

## TASK-2

**1. What protocol does Windows tracert use by default, and what protocol does Linux traceroute use by default?**

Windows tracert uses ICMP Echo Request (ICMP type 8) by default. The probes we send are ICMP Echo Requests, intermediate routers reply with ICMP Time Exceeded (type 11), and the destination replies with ICMP Echo Reply (type 0).

[illegible][illegible]

The screenshot shows the Wireshark network protocol analyzer interface. The top menu bar includes File, Edit, View, Go, Capture, Analyze, Statistics, Telephony, Wireless, Tools, and Help. Below the menu is a toolbar with icons for file operations, capture control, search, and zooming. The main pane displays the details of the selected packet, which is an ICMP Echo (ping) request. The packet list on the left shows three packets, all of type ICMP Echo (ping) request.

No.	Time	Source	Destination	Protocol	Length	Info
18455	185.560515	142.251.42.228	10.240.21.252	ICMP		Echo (ping) reply seq=0001, seq=18/4545, ttl=113 (request in 18448)
18457	185.591219	142.251.42.228	10.240.21.252	ICMP		Echo (ping) reply seq=0001, seq=12/4581, ttl=113 (request in 18456)
18459	185.614120	142.251.42.228	10.240.21.252	ICMP		Echo (ping) reply seq=0001, seq=432/4587, ttl=113 (request in 18458)

Linux traceroute uses UDP by default. It sends UDP packets to very high port numbers (starting from 33434). Routers on the way reply with ICMP Time Exceeded messages when the packet's TTL runs out. When the packet finally reaches the destination, that computer replies with ICMP Port Unreachable because no program listens to those high-numbered ports.

The screenshot displays the Wireshark network protocol analyzer interface. At the top, the filter bar shows 'udp.dstport == 31344 and udp.dstport <= 33534'. The packet list on the left shows 25 captured packets. The selected packet (No. 25) is a UDP packet from 10.0.2.15 to 10.0.2.1. The packet details pane on the right shows the structure of the selected packet, including Ethernet II, Internet Protocol Version 4, and User Datagram Protocol. The packet bytes pane at the bottom shows the raw data in hexadecimal and ASCII.

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	10.0.2.15	10.0.2.1	ICMP	8	8 - Echo (ping) request 0
2	0.000000	10.0.2.1	10.0.2.15	ICMP	8	8 - Echo (ping) reply 0
3	0.000000	10.0.2.15	10.0.2.1	ICMP	8	8 - Echo (ping) request 0
4	0.000000	10.0.2.1	10.0.2.15	ICMP	8	8 - Echo (ping) reply 0
5	0.000000	10.0.2.15	10.0.2.1	ICMP	8	8 - Echo (ping) request 0
6	0.000000	10.0.2.1	10.0.2.15	ICMP	8	8 - Echo (ping) reply 0
7	0.000000	10.0.2.15	10.0.2.1	ICMP	8	8 - Echo (ping) request 0
8	0.000000	10.0.2.1	10.0.2.15	ICMP	8	8 - Echo (ping) reply 0
9	0.000000	10.0.2.15	10.0.2.1	ICMP	8	8 - Echo (ping) request 0
10	0.000000	10.0.2.1	10.0.2.15	ICMP	8	8 - Echo (ping) reply 0
11	0.000000	10.0.2.15	10.0.2.1	ICMP	8	8 - Echo (ping) request 0
12	0.000000	10.0.2.1	10.0.2.15	ICMP	8	8 - Echo (ping) reply 0
13	0.000000	10.0.2.15	10.0.2.1	ICMP	8	8 - Echo (ping) request 0
14	0.000000	10.0.2.1	10.0.2.15	ICMP	8	8 - Echo (ping) reply 0
15	0.000000	10.0.2.15	10.0.2.1	ICMP	8	8 - Echo (ping) request 0
16	0.000000	10.0.2.1	10.0.2.15	ICMP	8	8 - Echo (ping) reply 0
17	0.000000	10.0.2.15	10.0.2.1	ICMP	8	8 - Echo (ping) request 0
18	0.000000	10.0.2.1	10.0.2.15	ICMP	8	8 - Echo (ping) reply 0
19	0.000000	10.0.2.15	10.0.2.1	ICMP	8	8 - Echo (ping) request 0
20	0.000000	10.0.2.1	10.0.2.15	ICMP	8	8 - Echo (ping) reply 0
21	0.000000	10.0.2.15	10.0.2.1	ICMP	8	8 - Echo (ping) request 0
22	0.000000	10.0.2.1	10.0.2.15	ICMP	8	8 - Echo (ping) reply 0
23	0.000000	10.0.2.15	10.0.2.1	ICMP	8	8 - Echo (ping) request 0
24	0.000000	10.0.2.1	10.0.2.15	ICMP	8	8 - Echo (ping) reply 0
25	0.000000	10.0.2.15	10.0.2.1	UDP	100	70 - 10.0.2.15:31344 → 10.0.2.1:33534 [RST] Seq=1000000000 Win=0 Len=0

[illegible]

2. Some hops in your traceroute output may show \*\*\*. Provide at least two reasons why a router might not reply.

When traceroute shows \*\*\* for a hop, no reply (no valuable ICMP Time Exceeded/ICMP Reply) arrived within the probe timeout for that TTL.

```
● heputhrisha@Thrisha:~$ traceroute go
ogle.com
traceroute to google.com (142.250.183.46), 30 hops max, 60 byte packets
 1 Thrisha.mshome.net (172.21.176.1)  1.177 ms  1.157 ms  1.145 ms
 2 10.240.0.2 (10.240.0.2)  17.287 ms  17.224 ms  16.997 ms
 3 10.3.0.29 (10.3.0.29)  18.056 ms  18.042 ms  18.026 ms
 4 10.3.0.5 (10.3.0.5)  18.008 ms  17.996 ms  17.987 ms
 5 172.16.4.7 (172.16.4.7)  16.900 ms  16.890 ms  16.880 ms
 6 14.139.98.1 (14.139.98.1)  16.881 ms  13.747 ms  13.675 ms
 7 10.117.81.253 (10.117.81.253)  8.947 ms  10.342 ms  10.263 ms
 8 10.154.8.137 (10.154.8.137)  20.678 ms  19.652 ms  20.611 ms
 9 10.255.239.170 (10.255.239.170)  22.953 ms  22.921 ms  20.533 ms
10 10.152.7.214 (10.152.7.214)  20.384 ms  20.473 ms  20.378 ms
11 * * *
12 * * *
13 209.85.250.138 (209.85.250.138)  24.658 ms  142.251.70.56 (142.251.70.56)  24.661 ms  142.250.227.72 (142.250.227.72)  18.971 ms
14 142.250.226.66 (142.250.226.66)  16.952 ms  142.250.239.171 (142.250.239.171)  31.878 ms  192.178.110.248 (192.178.110.248)  21.647 ms
15 192.178.110.207 (192.178.110.207)  21.321 ms  192.178.110.105 (192.178.110.105)  17.523 ms  192.178.110.199 (192.178.110.199)  21.228 ms
16 bom12s11-in-f14.1e100.net (142.250.183.46)  21.059 ms  142.250.239.171 (142.250.239.171)  31.771 ms  31.742 ms
```

The following are the reasons why a router might not reply:

- **ICMP Filtering:** Some routers are set up to block ICMP Time Exceeded messages. Since traceroute relies on these ICMP replies to identify each hop along the path, blocking them prevents traceroute from learning the router's IP address. As a result, the hop appears as \*\*\* instead of showing its actual address.
- **Rate Limiting:** Routers may use rate limiting, only responding to a few traceroute requests and dropping the rest. This is done to prevent overload. If our probes are dropped, traceroute will show \*\*\* even though the router is still working and forwarding traffic.
- **Security Reasons:** Some Internet Service Providers intentionally configure their routers not to respond to traceroute probes. This is done for security reasons, so outside users cannot map the internal network structure. When this happens, we will again see \*\*\* instead of the router's IP address.

### 3. In Linux traceroute, which field in the probe packets changes between successive probes sent to the destination?

The UDP destination port changes between successive probes. Classic traceroute starts at UDP destination port 33434 and increments the destination port for each probe.

No.	Time	Source	Destination	Protocol	Length	Info
242	2.752214	10.240.21.252	142.250.183.46	UDP		74 59677 → 33437 Len=32
243	2.752280	10.240.21.252	142.250.183.46	UDP		74 59671 → 33438 Len=32
244	2.752454	10.240.21.252	142.250.183.46	UDP		74 59622 → 33439 Len=32
245	2.752565	10.240.21.252	142.250.183.46	UDP		74 59673 → 33441 Len=32
246	2.752644	10.240.21.252	142.250.183.46	UDP		74 59616 → 33446 Len=32
247	2.752653	10.240.21.252	142.250.183.46	UDP		74 59585 → 33442 Len=32
248	2.752705	10.240.21.252	142.250.183.46	UDP		74 59688 → 33449 Len=32
249	2.752752	10.240.21.252	142.250.183.46	UDP		74 59656 → 33443 Len=32
250	2.752763	10.240.21.252	142.250.183.46	UDP		74 59602 → 33447 Len=32
251	2.752774	10.240.21.252	142.250.183.46	UDP		74 59636 → 33448 Len=32
252	2.752809	10.240.21.252	142.250.183.46	UDP		74 59618 → 33440 Len=32
253	2.752820	10.240.21.252	142.250.183.46	UDP		74 59588 → 33444 Len=32
254	2.752831	10.240.21.252	142.250.183.46	UDP		74 63815 → 33445 Len=32
260	2.766123	10.240.21.252	142.250.183.46	UDP		74 59587 → 33450 Len=32
261	2.766129	10.240.21.252	142.250.183.46	UDP		74 59647 → 33451 Len=32
262	2.766358	10.240.21.252	142.250.183.46	UDP		74 59624 → 33452 Len=32
281	2.789772	10.240.21.252	142.250.183.46	UDP		74 59593 → 33456 Len=32
282	2.789918	10.240.21.252	142.250.183.46	UDP		74 59678 → 33455 Len=32
283	2.790039	10.240.21.252	142.250.183.46	UDP		74 59683 → 33457 Len=32
284	2.790444	10.240.21.252	142.250.183.46	UDP		74 59615 → 33453 Len=32
285	2.790611	10.240.21.252	142.250.183.46	UDP		74 59666 → 33454 Len=32
286	2.790437	10.240.21.252	142.250.183.46	UDP		74 59625 → 33459 Len=32
287	2.790594	10.240.21.252	142.250.183.46	UDP		74 59612 → 33458 Len=32
289	2.790868	10.240.21.252	10.240.21.252	ICMP		70 Time-to-live exceeded (Time to live exceeded in transit)
290	2.790864	10.117.81.253	10.240.21.252	ICMP		70 Time-to-live exceeded (Time to live exceeded in transit)
292	2.808444	10.154.8.137	10.240.21.252	ICMP		186 Time-to-live exceeded (Time to live exceeded in transit)
293	2.809619	10.154.8.137	10.240.21.252	ICMP		186 Time-to-live exceeded (Time to live exceeded in transit)
294	2.809619	10.154.8.137	10.240.21.252	ICMP		186 Time-to-live exceeded (Time to live exceeded in transit)
296	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
297	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
314	2.884145	10.240.21.252	142.250.183.46	UDP		74 59595 → 33461 Len=32
315	2.884133	10.240.21.252	142.250.183.46	UDP		74 59606 → 33460 Len=32
316	2.884156	10.240.21.252	142.250.183.46	UDP		74 59668 → 33462 Len=32
317	2.884289	10.240.21.252	142.250.183.46	UDP		74 59649 → 33464 Len=32
318	2.884293	10.240.21.252	142.250.183.46	UDP		74 59597 → 33465 Len=32
319	2.884386	10.240.21.252	142.250.183.46	UDP		74 59599 → 33467 Len=32
320	2.884347	10.240.21.252	142.250.183.46	UDP		74 59659 → 33463 Len=32
321	2.884351	10.240.21.252	142.250.183.46	UDP		74 59646 → 33466 Len=32
322	2.884379	10.240.21.252	142.250.183.46	UDP		74 59651 → 33460 Len=32
312	2.904118	10.152.7.214	10.240.21.252	ICMP		110 Time-to-live exceeded (Time to live exceeded in transit)
317	2.904118	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
328	2.904118	10.152.7.214	10.240.21.252	ICMP		110 Time-to-live exceeded (Time to live exceeded in transit)
329	2.904118	10.152.7.214	10.240.21.252	ICMP		110 Time-to-live exceeded (Time to live exceeded in transit)
331	2.907875	10.240.21.252	142.250.183.46	UDP		74 59605 → 33470 Len=32
332	2.907875	10.240.21.252	142.250.183.46	UDP		74 59689 → 33474 Len=32
333	2.907889	10.240.21.252	142.250.183.46	UDP		74 59681 → 33469 Len=32
334	2.907909	10.240.21.252	142.250.183.46	UDP		74 59611 → 33473 Len=32
335	2.907919	10.240.21.252	142.250.183.46	UDP		74 59617 → 33472 Len=32
336	2.907921	10.240.21.252	142.250.183.46	UDP		74 59588 → 33473 Len=32
337	2.907933	10.240.21.252	142.250.183.46	UDP		74 59655 → 33475 Len=32
340	2.918776	10.240.21.252	142.250.183.46	UDP		74 59596 → 33478 Len=32
341	2.918786	10.240.21.252	142.250.183.46	UDP		74 59618 → 33476 Len=32
342	2.918865	10.240.21.252	142.250.183.46	UDP		74 59619 → 33477 Len=32
343	2.919020	10.240.21.252	142.250.183.46	UDP		74 59633 → 33479 Len=32
344	2.924430	142.250.226.66	10.240.21.252	ICMP		70 Time-to-live exceeded (Time to live exceeded in transit)
345	2.924894	10.240.21.252	142.250.183.46	UDP		74 59661 → 33480 Len=32
346	2.925431	142.250.227.72	10.240.21.252	ICMP		102 Time-to-live exceeded (Time to live exceeded in transit)
347	2.925115	10.240.21.252	142.250.183.46	UDP		74 59621 → 33482 Len=32
348	2.925993	192.178.130.240	10.240.21.252	ICMP		110 Time-to-live exceeded (Time to live exceeded in transit)
349	2.925963	10.240.21.252	142.250.183.46	UDP		74 59592 → 33482 Len=32

Here, from the above two pictures, in the Info column, there are entries like 59677 -> 33437, 59671 -> 33438, and so on, which show the UDP destination port (the -> 334xy value). These numbers are changing across the probe packets.

### 4. At the final hop, how is the response different compared to the intermediate hop?

**Intermediate hops:** Windows tracert and Linux traceroute at the intermediate hops see the same behavior, and the packet's TTL runs out. The router drops the packet and replies with ICMP Time Exceeded (type 11).

No.	Time	Source	Destination	Protocol	Length	Info
281	2.789772	10.240.21.252	142.250.183.46	UDP		74 59593 → 33456 Len=32
282	2.789918	10.240.21.252	142.250.183.46	UDP		74 59678 → 33455 Len=32
283	2.790039	10.240.21.252	142.250.183.46	UDP		74 59683 → 33457 Len=32
284	2.790444	10.240.21.252	142.250.183.46	UDP		74 59615 → 33453 Len=32
285	2.790611	10.240.21.252	142.250.183.46	UDP		74 59666 → 33454 Len=32
286	2.790437	10.240.21.252	142.250.183.46	UDP		74 59625 → 33459 Len=32
287	2.790594	10.240.21.252	142.250.183.46	UDP		74 59612 → 33458 Len=32
289	2.790868	10.240.21.252	10.240.21.252	ICMP		70 Time-to-live exceeded (Time to live exceeded in transit)
290	2.790864	10.117.81.253	10.240.21.252	ICMP		70 Time-to-live exceeded (Time to live exceeded in transit)
292	2.808444	10.154.8.137	10.240.21.252	ICMP		186 Time-to-live exceeded (Time to live exceeded in transit)
293	2.809619	10.154.8.137	10.240.21.252	ICMP		186 Time-to-live exceeded (Time to live exceeded in transit)
294	2.809619	10.154.8.137	10.240.21.252	ICMP		186 Time-to-live exceeded (Time to live exceeded in transit)
296	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
297	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
314	2.884145	10.240.21.252	142.250.183.46	UDP		74 59595 → 33461 Len=32
315	2.884133	10.240.21.252	142.250.183.46	UDP		74 59606 → 33460 Len=32
316	2.884156	10.240.21.252	142.250.183.46	UDP		74 59668 → 33462 Len=32
317	2.884289	10.240.21.252	142.250.183.46	UDP		74 59649 → 33464 Len=32
318	2.884293	10.240.21.252	142.250.183.46	UDP		74 59597 → 33465 Len=32
319	2.884386	10.240.21.252	142.250.183.46	UDP		74 59599 → 33467 Len=32
320	2.884347	10.240.21.252	142.250.183.46	UDP		74 59659 → 33463 Len=32
321	2.884351	10.240.21.252	142.250.183.46	UDP		74 59646 → 33466 Len=32
322	2.884379	10.240.21.252	142.250.183.46	UDP		74 59651 → 33460 Len=32
312	2.904118	10.152.7.214	10.240.21.252	ICMP		110 Time-to-live exceeded (Time to live exceeded in transit)
317	2.904118	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
328	2.904118	10.152.7.214	10.240.21.252	ICMP		110 Time-to-live exceeded (Time to live exceeded in transit)
329	2.904118	10.152.7.214	10.240.21.252	ICMP		110 Time-to-live exceeded (Time to live exceeded in transit)
331	2.907875	10.240.21.252	142.250.183.46	UDP		74 59605 → 33470 Len=32
332	2.907875	10.240.21.252	142.250.183.46	UDP		74 59689 → 33474 Len=32
333	2.907889	10.240.21.252	142.250.183.46	UDP		74 59681 → 33469 Len=32
334	2.907909	10.240.21.252	142.250.183.46	UDP		74 59611 → 33473 Len=32
335	2.907919	10.240.21.252	142.250.183.46	UDP		74 59617 → 33472 Len=32
336	2.907921	10.240.21.252	142.250.183.46	UDP		74 59588 → 33473 Len=32
337	2.907933	10.240.21.252	142.250.183.46	UDP		74 59655 → 33475 Len=32
340	2.918776	10.240.21.252	142.250.183.46	UDP		74 59596 → 33478 Len=32
341	2.918786	10.240.21.252	142.250.183.46	UDP		74 59618 → 33476 Len=32
342	2.918865	10.240.21.252	142.250.183.46	UDP		74 59619 → 33477 Len=32
343	2.919020	10.240.21.252	142.250.183.46	UDP		74 59633 → 33479 Len=32
344	2.924430	142.250.226.66	10.240.21.252	ICMP		70 Time-to-live exceeded (Time to live exceeded in transit)
345	2.924894	10.240.21.252	142.250.183.46	UDP		74 59661 → 33480 Len=32
346	2.925431	142.250.227.72	10.240.21.252	ICMP		102 Time-to-live exceeded (Time to live exceeded in transit)
347	2.925115	10.240.21.252	142.250.183.46	UDP		74 59621 → 33482 Len=32
348	2.925993	192.178.130.240	10.240.21.252	ICMP		110 Time-to-live exceeded (Time to live exceeded in transit)
349	2.925963	10.240.21.252	142.250.183.46	UDP		74 59592 → 33482 Len=32

Linux Intermediate hops.

No.	Time	Source	Destination	Protocol	Length	Info
279	2.789894	10.240.21.252	142.250.183.46	UDP		74 59593 → 33456 Len=32
280	2.789918	10.240.21.252	142.250.183.46	UDP		74 59678 → 33455 Len=32
281	2.790039	10.240.21.252	142.250.183.46	UDP		74 59683 → 33457 Len=32
282	2.790444	10.240.21.252	142.250.183.46	UDP		74 59615 → 33453 Len=32
283	2.790611	10.240.21.252	142.250.183.46	UDP		74 59666 → 33454 Len=32
284	2.790437	10.240.21.252	142.250.183.46	UDP		74 59625 → 33459 Len=32
285	2.790594	10.240.21.252	142.250.183.46	UDP		74 59612 → 33458 Len=32
286	2.790868	10.240.21.252	10.240.21.252	ICMP		70 Time-to-live exceeded (Time to live exceeded in transit)
287	2.790864	10.117.81.253	10.240.21.252	ICMP		70 Time-to-live exceeded (Time to live exceeded in transit)
288	2.790864	10.117.81.253	10.240.21.252	ICMP		70 Time-to-live exceeded (Time to live exceeded in transit)
289	2.808444	10.154.8.137	10.240.21.252	ICMP		186 Time-to-live exceeded (Time to live exceeded in transit)
290	2.809619	10.154.8.137	10.240.21.252	ICMP		186 Time-to-live exceeded (Time to live exceeded in transit)
291	2.809619	10.154.8.137	10.240.21.252	ICMP		186 Time-to-live exceeded (Time to live exceeded in transit)
292	2.809619	10.154.8.137	10.240.21.252	ICMP		186 Time-to-live exceeded (Time to live exceeded in transit)
293	2.809619	10.154.8.137	10.240.21.252	ICMP		186 Time-to-live exceeded (Time to live exceeded in transit)
294	2.809619	10.154.8.137	10.240.21.252	ICMP		186 Time-to-live exceeded (Time to live exceeded in transit)
295	2.809619	10.154.8.137	10.240.21.252	ICMP		186 Time-to-live exceeded (Time to live exceeded in transit)
296	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
297	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
298	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
299	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
300	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
301	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
302	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
303	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
304	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
305	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
306	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
307	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
308	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
309	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
310	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
311	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
312	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
313	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
314	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
315	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
316	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
317	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
318	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
319	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
320	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
321	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
322	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
323	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
324	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
325	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
326	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
327	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
328	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
329	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
330	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
331	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
332	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
333	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
334	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
335	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
336	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
337	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
338	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
339	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
340	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
341	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
342	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
343	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
344	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
345	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
346	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
347	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
348	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
349	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
350	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
351	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
352	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
353	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
354	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
355	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
356	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
357	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
358	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
359	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
360	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
361	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
362	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
363	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
364	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
365	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
366	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
367	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
368	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
369	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
370	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
371	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
372	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
373	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
374	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
375	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
376	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
377	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
378	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
379	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
380	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
381	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
382	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
383	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
384	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
385	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
386	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
387	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
388	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
389	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
390	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
391	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
392	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
393	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
394	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
395	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
396	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
397	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
398	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
399	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)
400	2.811818	10.255.239.170	10.240.21.252	ICMP		182 Time-to-live exceeded (Time to live exceeded in transit)

## Final hop:

- In Linux traceroute, the destination usually replies with ICMP Destination Unreachable (type 3), because no program listens on the high UDP port. Traceroute recognizes this as “destination reached” and stops.

359	2.939483	192.178.110.207	10.240.21.252	ICMP	102 Time-to-live exceeded (Time to live exceeded in transit)
360	2.940459	142.250.183.46	10.240.21.252	ICMP	70 Destination unreachable (Port unreachable)
361	2.952361	142.250.183.46	10.240.21.252	ICMP	70 Destination unreachable (Port unreachable)
362	2.952361	142.250.183.46	10.240.21.252	ICMP	70 Destination unreachable (Port unreachable)
363	2.956153	142.250.183.46	10.240.21.252	ICMP	70 Destination unreachable (Port unreachable)

- In Windows tracert, the destination replies with an ICMP Echo Reply (type 0), since Windows sends ICMP Echo Requests.

9832	94.467941	10.240.21.252	142.251.42.228	ICMP	106 Echo (ping) request id=0x0001, seq=427/43777, ttl=12 (no response found)
9833	94.483583	142.250.214.107	10.240.21.252	ICMP	134 Time-to-live exceeded (Time to live exceeded in transit)
9834	94.487484	10.240.21.252	142.251.42.228	ICMP	106 Echo (ping) request id=0x0001, seq=428/44033, ttl=12 (no response found)
10060	97.591825	10.240.21.252	142.251.42.228	ICMP	106 Echo (ping) request id=0x0001, seq=429/44289, ttl=12 (no response found)
10069	98.401638	142.250.214.107	10.240.21.252	ICMP	134 Time-to-live exceeded (Time to live exceeded in transit)
10448	103.520513	10.240.21.252	142.251.42.228	ICMP	106 Echo (ping) request id=0x0001, seq=430/44545, ttl=13 (reply in 10455)
10455	103.565515	142.251.42.228	10.240.21.252	ICMP	106 Echo (ping) reply id=0x0001, seq=430/44545, ttl=13 (request in 10448)
10456	103.566776	10.240.21.252	142.251.42.228	ICMP	106 Echo (ping) request id=0x0001, seq=431/44801, ttl=13 (reply in 10457)
10457	103.591359	142.251.42.228	10.240.21.252	ICMP	106 Echo (ping) reply id=0x0001, seq=431/44801, ttl=13 (request in 10456)
10458	103.592542	10.240.21.252	142.251.42.228	ICMP	106 Echo (ping) request id=0x0001, seq=432/45057, ttl=13 (reply in 10459)
10459	103.614120	142.251.42.228	10.240.21.252	ICMP	106 Echo (ping) reply id=0x0001, seq=432/45057, ttl=13 (request in 10458)

## 5. Suppose a firewall blocks UDP traffic but allows ICMP – how would this affect the results of Linux traceroute vs. Windows tracert?

- Linux traceroute:** will likely fail or be incomplete. If the firewall blocks UDP probes, those probes never reach the destination, and you will not receive the expected ICMP Destination Unreachable. We will therefore see \*\*\* for hops because the replies have not been generated or returned.
- Windows tracert:** will likely succeed, because the firewall allows ICMP. Windows tracert sends ICMP Echo Requests and expects Echo Replies. Since the firewall permits ICMP, we will receive replies, and the path will be discovered.