

a 發現無法送出

```
xx8897@b0829060:~$ date
公曆 2022年 十一月 十日 週四 十五時七分四秒
xx8897@b0829060:~$ traceroute www.google.com
traceroute to www.google.com (142.251.43.4), 30 hops max, 60 byte packets
 1 _gateway (192.168.139.2) 0.387 ms 0.353 ms 0.338 ms
 2 * * *
 3 * * *
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30 * * *
```

```
xx8897@b0829060:~$ date
公曆 2022年 十一月 十日 週四 十六時〇分十四秒
xx8897@b0829060:~$ traceroute www.google.com
traceroute to www.google.com (142.251.42.228), 30 hops max, 60 byte packets
 1 _gateway (192.168.139.2) 0.341 ms 0.317 ms 0.303 ms
 2 * * *
 3 * * *
 4 * * *
 5 * * *
 6 * * *
 7 * * *
 8 * * *
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10 * * *
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30 * * *
```

```
xx8897@b0829060:~$ date
公曆 2022年 十一月 十日 週四 十七時一分卅一秒
xx8897@b0829060:~$ traceroute www.google.com
traceroute to www.google.com (142.251.43.4), 30 hops max, 60 byte packets
 1 _gateway (192.168.139.2) 0.385 ms 0.347 ms 0.333 ms
 2 * * *
 3 * * *
 4 * * *
 5 * * *
 6 * * *
 7 * * *
 8 * * *
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```

把虛擬機網路改成橋接

```
xx8897@b0829060:~$ date
公曆 20廿二年 十一月 十日 週四 十四時廿五分33秒
xx8897@b0829060:~$ traceroute www.google.com
traceroute to www.google.com (142.251.43.4), 30 hops max, 60 byte packets
 1 _gateway (192.168.194.99) 3.638 ms 6.078 ms 7.577 ms
 2 * * *
 3 10.11.209.64 (10.11.209.64) 24.384 ms 30.251 ms 30.221 ms
 4 10.11.30.34 (10.11.30.34) 36.109 ms 41.495 ms 41.448 ms
 5 10.9.3.49 (10.9.3.49) 41.412 ms 41.539 ms 41.819 ms
 6 10.9.3.18 (10.9.3.18) 41.312 ms 42.776 ms 16.755 ms
 7 10.9.166.57 (10.9.166.57) 28.806 ms 28.773 ms 35.284 ms
 8 10.9.166.54 (10.9.166.54) 35.248 ms 35.213 ms 40.692 ms
 9 202.144.222.198 (202.144.222.198) 40.662 ms 202.144.222.50 (202.144.222.50) 40.632 ms 202.144.222.242 (202.144.222.242) 40.602 ms
10 72.14.195.146 (72.14.195.146) 40.756 ms 72.14.214.1 (72.14.214.1) 40.510 ms 72.14.195.146 (72.14.195.146) 40.685 ms
11 108.170.244.129 (108.170.244.129) 40.422 ms 40.355 ms 40.278 ms
12 142.251.77.85 (142.251.77.85) 29.795 ms 142.251.77.87 (142.251.77.87) 19.229 ms 142.251.77.85 (142.251.77.85) 30.727 ms
13 tsao3s08-lin-f4.1e100.net (142.251.43.4) 20.246 ms 20.048 ms 20.015 ms
```

```
xx8897@b0829060:~$ date
公曆 20廿二年 十一月 十日 週四 十五時廿五分40秒
xx8897@b0829060:~$ traceroute www.google.com
traceroute to www.google.com (142.251.43.4), 30 hops max, 60 byte packets
 1 _gateway (192.168.194.99) 2.627 ms 6.877 ms 6.832 ms
 2 * * *
 3 10.11.209.64 (10.11.209.64) 35.327 ms 35.367 ms 35.316 ms
 4 10.11.30.34 (10.11.30.34) 35.280 ms 35.246 ms 35.229 ms
 5 10.9.3.49 (10.9.3.49) 35.542 ms 35.508 ms 35.128 ms
 6 10.9.3.18 (10.9.3.18) 34.997 ms 26.909 ms 26.739 ms
 7 * * *
 8 10.9.166.54 (10.9.166.54) 41.992 ms 41.945 ms 41.080 ms
 9 202.144.222.250 (202.144.222.250) 41.831 ms 41.770 ms 202.144.222.110 (202.144.222.110) 60.766 ms
10 72.14.195.146 (72.14.195.146) 41.640 ms 41.583 ms 72.14.214.1 (72.14.214.1) 43.479 ms
11 108.170.244.97 (108.170.244.97) 41.410 ms 108.170.244.129 (108.170.244.129) 42.653 ms 108.170.244.97 (108.170.244.97) 31.012 ms
12 142.251.77.87 (142.251.77.87) 42.501 ms 42.501 ms 142.251.77.85 (142.251.77.85) 42.614 ms
13 tsao3s08-lin-f4.1e100.net (142.251.43.4) 43.496 ms 43.463 ms 43.665 ms
```

```
xx8897@b0829060:~$ date
公曆 20廿二年 十一月 十日 週四 十六時廿五分廿四秒
xx8897@b0829060:~$ traceroute www.google.com
traceroute to www.google.com (142.251.43.4), 30 hops max, 60 byte packets
 1 _gateway (192.168.194.99) 2.661 ms 6.436 ms 6.386 ms
 2 * * *
 3 10.11.209.64 (10.11.209.64) 83.106 ms 83.073 ms 83.042 ms
 4 10.11.30.34 (10.11.30.34) 83.007 ms 82.980 ms 83.003 ms
 5 10.9.3.49 (10.9.3.49) 82.976 ms 82.935 ms 82.901 ms
 6 10.9.3.18 (10.9.3.18) 82.804 ms 74.412 ms 74.260 ms
 7 10.9.166.57 (10.9.166.57) 74.278 ms 27.027 ms 34.335 ms
 8 10.9.166.54 (10.9.166.54) 39.992 ms 39.802 ms 39.914 ms
 9 202.144.222.234 (202.144.222.234) 39.609 ms 202.144.222.146 (202.144.222.146) 33.927 ms 202.144.222.226 (202.144.222.226) 39.494 ms
10 72.14.195.146 (72.14.195.146) 39.555 ms 39.393 ms 72.14.214.1 (72.14.214.1) 39.348 ms
11 108.170.244.129 (108.170.244.129) 39.820 ms 39.854 ms 24.653 ms
12 142.251.77.85 (142.251.77.85) 17.634 ms 142.251.77.87 (142.251.77.87) 30.622 ms 142.251.77.85 (142.251.77.85) 24.710 ms
13 tsao3s08-lin-f4.1e100.net (142.251.43.4) 25.553 ms 25.470 ms 25.579 ms
```

b

```
xx8897@b0829060:~$ date
公曆 20廿二年 十一月 十日 週四 十四時廿六分卅秒
xx8897@b0829060:~$ traceroute www.mit.edu
traceroute to www.mit.edu (104.124.236.61), 30 hops max, 60 byte packets
 1 _gateway (192.168.194.99) 2.945 ms 5.904 ms 5.876 ms
 2 * * *
 3 10.11.209.64 (10.11.209.64) 33.365 ms 33.322 ms 38.889 ms
 4 10.11.30.34 (10.11.30.34) 38.864 ms 38.835 ms 38.842 ms
 5 10.9.3.49 (10.9.3.49) 38.817 ms 39.090 ms 39.055 ms
 6 10.9.3.18 (10.9.3.18) 38.671 ms 32.167 ms 31.760 ms
 7 10.9.166.57 (10.9.166.57) 32.094 ms 37.185 ms 37.081 ms
 8 10.9.166.54 (10.9.166.54) 31.545 ms 31.456 ms 34.604 ms
 9 202.144.222.181 (202.144.222.181) 35.683 ms 44.053 ms 37.292 ms
10 202.144.222.210 (202.144.222.210) 66.709 ms 202.144.222.218 (202.144.222.218) 66.650 ms 202.144.222.198 (202.144.222.198) 37.268 ms
11 202.144.222.16 (202.144.222.16) 245.668 ms 248.818 ms 319.853 ms
12 a104-124-236-61.deploy.static.akamaitechnologies.com (104.124.236.61) 23.644 ms 34.179 ms 34.154 ms
```

```
xx8897@b0829060:~$ date
公曆 20廿二年 十一月 十日 週四 十五時廿六分九秒
xx8897@b0829060:~$ traceroute www.mit.edu
traceroute to www.mit.edu (104.124.236.61), 30 hops max, 60 byte packets
 1 _gateway (192.168.194.99) 3.011 ms 6.473 ms 6.441 ms
 2 * * *
 3 10.11.209.64 (10.11.209.64) 39.969 ms 39.943 ms 40.252 ms
 4 10.11.30.34 (10.11.30.34) 39.883 ms 45.496 ms 45.473 ms
 5 10.9.3.49 (10.9.3.49) 45.480 ms 45.645 ms 45.387 ms
 6 10.9.3.18 (10.9.3.18) 45.357 ms 44.045 ms 44.024 ms
 7 10.9.166.57 (10.9.166.57) 43.904 ms 17.593 ms 27.119 ms
 8 10.9.166.54 (10.9.166.54) 27.082 ms 27.097 ms 21.902 ms
 9 202.144.222.181 (202.144.222.181) 25.680 ms 25.761 ms 25.750 ms
10 202.144.222.214 (202.144.222.214) 25.574 ms 202.144.222.194 (202.144.222.194) 25.867 ms 202.144.222.218 (202.144.222.218) 20.170 ms
11 202.144.222.16 (202.144.222.16) 25.732 ms 25.695 ms 25.362 ms
12 a104-124-236-61.deploy.static.akamaitechnologies.com (104.124.236.61) 22.105 ms 30.159 ms 30.111 ms
```

```
xx8897@b0829060:~$ date
公曆 20廿二年 十一月 十日 週四 十六時廿六分三秒
xx8897@b0829060:~$ traceroute www.mit.edu
traceroute to www.mit.edu (104.124.236.61), 30 hops max, 60 byte packets
 1 _gateway (192.168.194.99) 3.169 ms 4.233 ms 4.190 ms
 2 * * *
 3 10.11.209.64 (10.11.209.64) 33.915 ms 33.875 ms 33.843 ms
 4 10.11.30.34 (10.11.30.34) 33.955 ms 38.870 ms 39.024 ms
 5 10.9.3.49 (10.9.3.49) 38.801 ms 38.765 ms 38.731 ms
 6 10.9.3.18 (10.9.3.18) 38.695 ms 31.821 ms 31.747 ms
 7 10.9.166.57 (10.9.166.57) 32.014 ms 17.396 ms 32.016 ms
 8 10.9.166.54 (10.9.166.54) 31.978 ms 31.934 ms 30.545 ms
 9 202.144.222.101 (202.144.222.101) 36.397 ms 36.470 ms 36.302 ms
10 202.144.222.198 (202.144.222.198) 36.165 ms 202.144.222.202 (202.144.222.202) 36.216 ms 202.144.222.206 (202.144.222.206) 36.076 ms
11 202.144.222.16 (202.144.222.16) 36.271 ms 37.961 ms 25.873 ms
12 a104-124-236-61.deploy.static.akamaitechnologies.com (104.124.236.61) 19.167 ms 19.068 ms 30.909 ms
```

c

虛擬機首先發出 `TTL=1` 的數據包，第一個路由器將 `TTL` 減 1 得 0 後就不再繼續轉發此數據包，而是返回一個 `ICMP` 逾時報文，虛擬機從逾時報文中即可提取出數據包所經過的第一個閘道器位址。然後又發出一個 `TTL=2` 的 `ICMP` 數據包，可獲得第二個閘道器位址，依次遞增 `TTL` 便獲取了沿途所有閘道器位址。

需要注意的是，並不是所有閘道器都會如實返回 `ICMP` 逾時報文。出於安全性

考慮，大多數防火牆以及啓用了防火牆功能的路由器預設組態為不返回各種 ICMP 報文，其餘路由器或交換機也可被管理員主動修改組態變為不返回 ICMP 報文。因此 Traceroute 程式不一定能拿全所有的沿途閘道器位址。所以，當某個 TTL 值的數據包得不到響應時，並不能停止這一追蹤過程，程式仍然會把 TTL 遞增而發出下一個數據包。一直達到預設或用參數指定的追蹤限制（maximum_hops）才結束追蹤。

一開始只出現***表示虛擬機被主機的防火牆擋住了，就是上述的原因

///參考維基百科與 <https://www.cnblogs.com/lhx9527/p/11954763.html>

d

每次跑的路徑不一樣，有可能是作為其中繼站的 router 關閉了