



1. After circuit switching is established, let's assume the initial circuit is the optimal path. However, over time, there may be a better path for servers in circuit switching. The previous circuit is not the optimal anymore
2. DSL uses telephone lines and is the slowest option, whereas cable transmits data over copper TV lines, works faster, and carries more bandwidth. DSL is widely available because almost every part of the country has access to phone service, so it's a great option for people in rural areas who don't want to choose satellite internet. Cable is ideal if you stream on multiple devices. One way to improve DSL is to reduce the distance between the user house and local office.
3. The non-persistent connection takes a total time of  $2RTT$  + file transmission time. It takes the first RTT (round-trip time) to establish the connection between the server and the client. The second RTT is taken to request and return the object. This case stands for a single object transmission. Non Persistent connections are the default mode for HTTP/1.0 and persistent connections are the default mode for HTTP/1.1. Non-persistent HTTP is used in fetching those objects which are not needed that frequently. It does not lead to a wastage of resources since the connection is opened only when some data needs to be sent over it. It is more secure than persistent HTTP since after sending data over the connection, the connection gets terminated and nothing can be transmitted over it once it gets terminated.
4. DDoS attacks: distributed denial of service, The attacker controls an overwhelming amount of computers (hundreds or thousands) in order to spread malware and flood the victim's computer with unnecessary and overloading traffic. Not successful to date, because Traffic Filtering (configured to block ping messages) and Local DNS servers cache IPs of TLD servers, allowing root server bypass.
5. Traceroute to [www.eurecom.fr](http://www.eurecom.fr)

Perform an online traceroute with the `mtr` command line tool. **MTR** is an advanced `traceroute` tool that uses multiple **ICMP pings** to test the connectivity to each hop across the Internet.

www.eurecom.fr

☐ I'm not a robot  reCAPTCHA  
Privacy - Terms

 Remove limits & captcha with **membership**

**START TRACEROUTE**

```

Start: Tue Dec 13 01:02:52 2022
HOST: 0e3280ddb536

```

	Loss%	Snt	Last	Avg	Best	Wrst	StDev
1.  -- 172.17.0.1	0.0%	2	0.2	0.2	0.2	0.2	0.0
2.  -- 10.206.5.139	0.0%	2	1.8	2.2	1.8	2.6	0.0
3.  -- 10.206.35.7	0.0%	2	1.4	2.5	1.4	3.5	1.4
4.  -- 10.206.32.1	0.0%	2	1.1	5.5	1.1	10.0	6.2
5.  -- 10.0-0.gw2.cj11.us.linode.com	0.0%	2	1.1	1.0	1.0	1.1	0.0
6.  -- ???	100.0	2	0.0	0.0	0.0	0.0	0.0
7.  -- 154.24.84.77	0.0%	2	2.4	2.3	2.3	2.4	0.0
8.  -- be2262.ccr42.jfk02.atlas.cogentco.com	0.0%	2	2.6	2.8	2.6	3.0	0.0
9.  -- be3363.ccr31.jfk04.atlas.cogentco.com	0.0%	2	3.2	6.3	3.2	9.5	4.4
10.  -- gtt.jfk04.atlas.cogentco.com	0.0%	2	49.8	27.6	5.5	49.8	31.4
11.  -- et-3-3-0.cr2-par7.ip4.gtt.net	0.0%	2	113.1	99.6	86.1	113.1	19.1
12.  -- renater-gw-th2.gtt.net	0.0%	2	95.8	95.9	95.8	96.0	0.0
13.  -- te-0-1-0-14-ren-nr-lyon2-rtr-091.noc.renater.fr	0.0%	2	95.4	96.9	95.4	98.4	2.0
14.  -- te1-5-marseille2-rtr-021.noc.renater.fr	0.0%	2	96.0	96.3	96.0	96.6	0.0
15.  -- xe0-0-6-marseille1-rtr-131.noc.renater.fr	0.0%	2	93.5	97.1	93.5	100.8	5.2
16.  -- te0-2-0-0-ren-nr-sophia-rtr-091.noc.renater.fr	0.0%	2	95.7	96.8	95.7	97.9	1.4
17.  -- eurocom-valbonne-gi9-7-sophia-rtr-021.noc.renater.fr	0.0%	2	95.1	95.2	95.1	95.3	0.0
18.  -- ???	100.0	2	0.0	0.0	0.0	0.0	0.0

There are packet losses in host 5 and host 18. Host 11 has significant delay

6. tit-for-tat means that in order to receive files, you have to give them. With BitTorrent, the more files you share with others, the faster your downloads are. Finally, to make better use of available Internet bandwidth (the pipeline for data transmission), BitTorrent downloads different pieces of the file you want simultaneously from multiple computers. If you continue to run the BitTorrent client software after your download is complete, others can receive .torrent files from your computer; your future download rates improve because you are ranked higher in the "tit-for-tat" system.

7.

## Client Server

		<i>N</i>		
		<b>10</b>	<b>100</b>	<b>1000</b>
<i>u</i>	<b>300 Kbps</b>	5000s	50000s	50000s
	<b>700 Kbps</b>	5000s	50000s	50000s
	<b>2 Mbps</b>	5000s	50000s	50000s

## Peer to Peer

		<i>N</i>		
		<b>10</b>	<b>100</b>	<b>1000</b>
<i>u</i>	<b>300 Kbps</b>	4545s	25000s	45454s
	<b>700 Kbps</b>	4054s	15000s	40540s
	<b>2 Mbps</b>	3000s	6521s	7389s

8. a) propagation delay =  $12000000 / 2.5 \cdot 10^8 = 0.048s$

b) transmission delay =  $8 \cdot 6 \cdot 10^6 / 5 \cdot 10^6 = 9.6s$

9. c)  $4000000 / 4 \cdot 10^6 + 4000000 / 5 \cdot 10^6 + 4000000 / 6 \cdot 10^6 = 2.46s$

d)  $2 \cdot 2 \cdot 6 / 5 = 4.8s$

e) transmission delay + propagation delay =  $2 \cdot 20 / 5 + 2.46s = 10.46s$