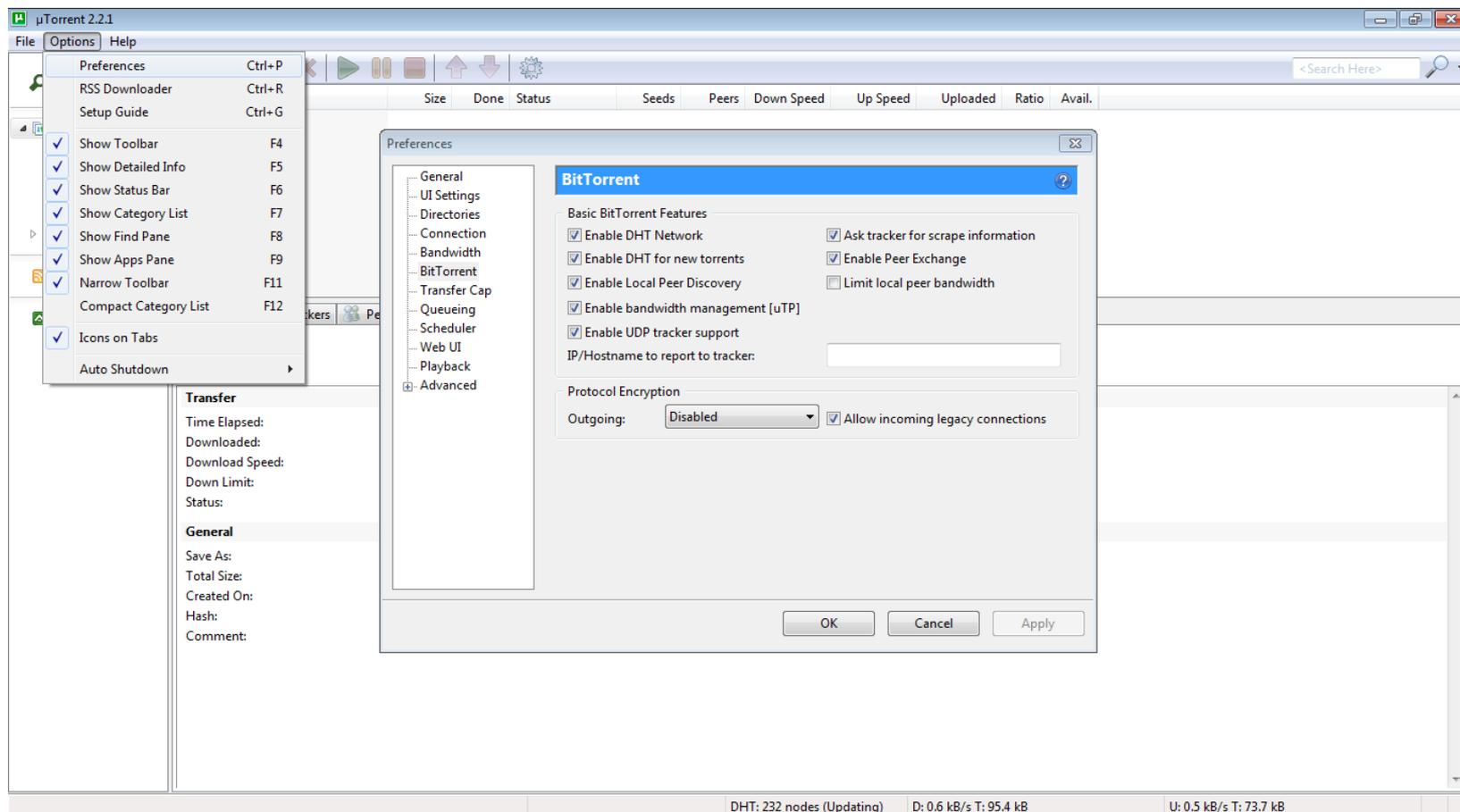


# Анализ влияния TSP и uTP в BitTorrent на скорость передачи

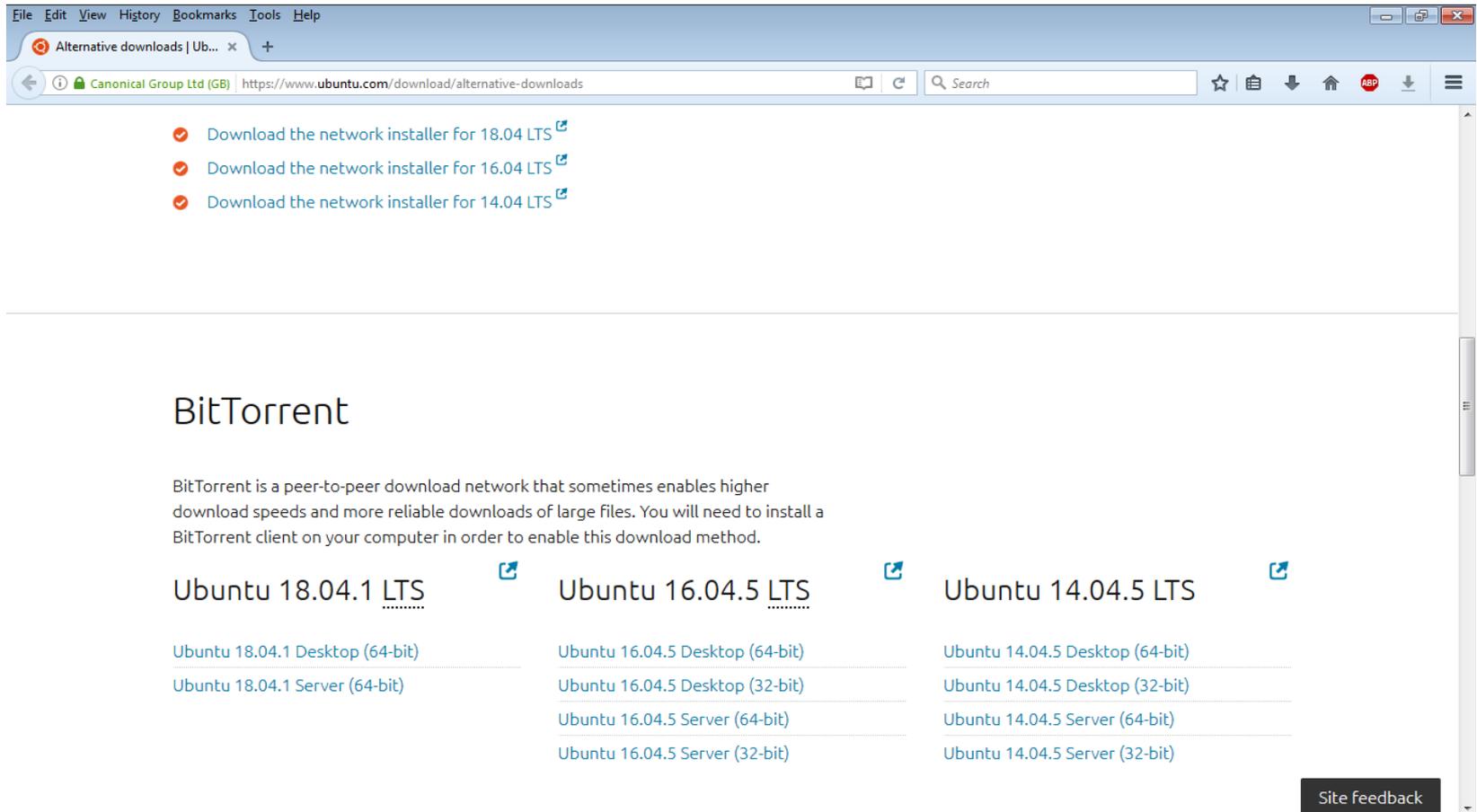
Дунайцев Р.А.

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# TCP и uTP в BitTorrent-клиентах



# Alternative downloads | Ubuntu



The screenshot shows a web browser window displaying the Ubuntu website's 'Alternative downloads' page. The browser's address bar shows the URL 'https://www.ubuntu.com/download/alternative-downloads'. The page content includes a list of network installers for Ubuntu 18.04 LTS, 16.04 LTS, and 14.04 LTS. Below this, there is a section titled 'BitTorrent' with a descriptive paragraph. Underneath, there are three columns of download links for Ubuntu 18.04.1 LTS, Ubuntu 16.04.5 LTS, and Ubuntu 14.04.5 LTS, each listing desktop and server versions for both 64-bit and 32-bit architectures. A 'Site feedback' button is visible in the bottom right corner.

File Edit View History Bookmarks Tools Help

Alternative downloads | Ub... x +

Canonical Group Ltd (GB) https://www.ubuntu.com/download/alternative-downloads

- Download the network installer for 18.04 LTS
- Download the network installer for 16.04 LTS
- Download the network installer for 14.04 LTS

## BitTorrent

BitTorrent is a peer-to-peer download network that sometimes enables higher download speeds and more reliable downloads of large files. You will need to install a BitTorrent client on your computer in order to enable this download method.

<b>Ubuntu 18.04.1 LTS</b>	<b>Ubuntu 16.04.5 LTS</b>	<b>Ubuntu 14.04.5 LTS</b>
<a href="#">Ubuntu 18.04.1 Desktop (64-bit)</a>	<a href="#">Ubuntu 16.04.5 Desktop (64-bit)</a>	<a href="#">Ubuntu 14.04.5 Desktop (64-bit)</a>
<a href="#">Ubuntu 18.04.1 Server (64-bit)</a>	<a href="#">Ubuntu 16.04.5 Desktop (32-bit)</a>	<a href="#">Ubuntu 14.04.5 Desktop (32-bit)</a>
	<a href="#">Ubuntu 16.04.5 Server (64-bit)</a>	<a href="#">Ubuntu 14.04.5 Server (64-bit)</a>
	<a href="#">Ubuntu 16.04.5 Server (32-bit)</a>	<a href="#">Ubuntu 14.04.5 Server (32-bit)</a>

Site feedback

# BitTorrent: 10 замеров TCP/uTP

The screenshot displays the uTorrent 2.2.1 interface. At the top, the main window title is "µTorrent 2.2.1". Below the title bar is a menu bar with "File", "Options", and "Help". A toolbar contains various icons for file operations. On the left side, there is a sidebar with "Find Content", "Torrents (1)", and "Feeds (0)". The "Torrents (1)" section shows a single active torrent: "ubuntu-18.04.1-desktop-amd64...". The main area displays a table with columns: Name, Size, Done, Status, Seeds, Peers, Down Speed, Up Speed, Uploaded, Ratio, and Avail. The torrent is currently downloading at 11.0 MB/s.

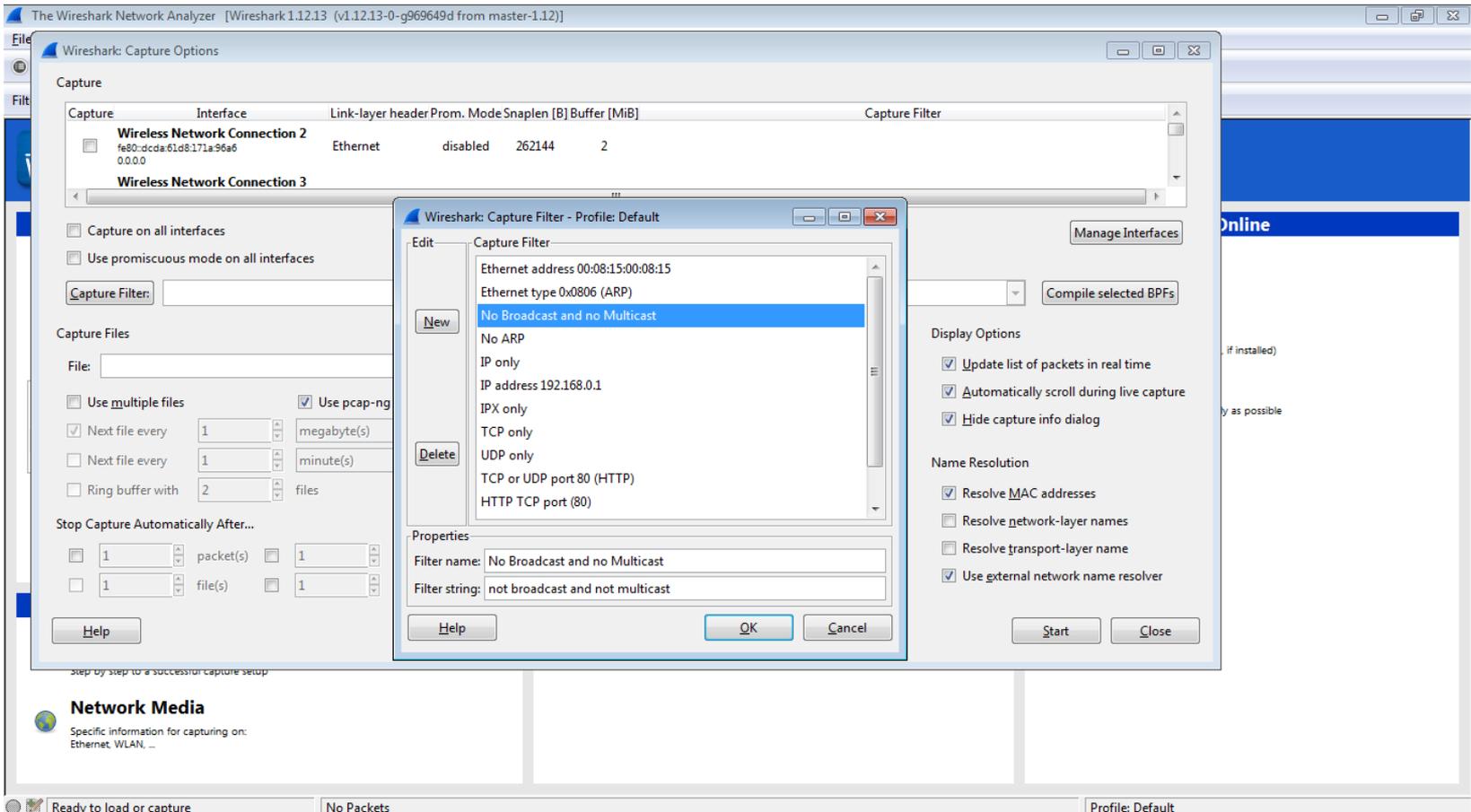
Name	Size	Done	Status	Seeds	Peers	Down Speed	Up Speed	Uploaded	Ratio	Avail.
ubuntu-18.04.1-desktop-amd64...	1.81 GB	15.1%	Downloading	49 (3295)	1 (127)	11.0 MB/s	20.5 kB/s	0 B	0.000	49.146

Below the torrent list, the "Peers" tab is selected, showing a detailed list of peers. The columns are: IP, Client, Flags, %, Down Speed, Up Speed, Reqs, Uploaded, Downloaded, and Peer dl. The list includes various clients like Transmission, Deluge, and libTorrent, with their respective connection statistics.

IP	Client	Flags	%	Down Speed	Up Speed	Reqs	Uploaded	Downloaded	Peer dl.
2-226-65-36.ip179...	Transmission 2.94	D IXE	100.0	41.5 kB/s	0.2 kB/s	11   0		672 kB	
5.196.75.153	Transmission 2.92	D IXE	100.0	83.2 kB/s	0.2 kB/s	19   0		1.37 MB	
gaireg.de	Transmission 2.94	D	100.0	1.0 MB/s	1.4 kB/s	194   0		13.6 MB	
p2E5A05F2.dip0.t...	Transmission 2.94	D	100.0	82.8 kB/s	0.3 kB/s	23   0		2.09 MB	
47-34-59-213.dhc...	Deluge 1.3.15	D X	100.0	4.8 kB/s	0.2 kB/s	3   0		48.0 kB	
65-183-140-144-d...	Transmission 2.94	D	100.0	48.2 kB/s	0.2 kB/s	14   0		1.37 MB	
dsl-67-55-2-160.a...	libTorrent 0.13.6	D	100.0	48.9 kB/s	0.3 kB/s	12   0		2.17 MB	
c-69-181-231-198...	Transmission 2.84	D	100.0	20.5 kB/s	0.2 kB/s	7   0		384 kB	
71-38-57-171.jsv2...	Transmission 2.94	D IXE	100.0	28.6 kB/s	0.2 kB/s	8   0		544 kB	
c-73-246-129-114...	Transmission 2.93	D	100.0	39.7 kB/s	0.2 kB/s	12   0		832 kB	
c-76-106-115-4.hs...	Transmission 2.93	D X	100.0	56.2 kB/s	0.2 kB/s	15   0		1.60 MB	
broadband-77-37-...	Transmission 2.92	D	100.0	161.8 kB/s	0.4 kB/s	56   0		4.15 MB	
ip4da66f53.direct...	Transmission 2.94	D X	100.0	80.9 kB/s	0.3 kB/s	23   0		1.31 MB	
eth-225.183-home...	Transmission 2.82	D X	100.0	60.7 kB/s	0.2 kB/s	13   0		1.17 MB	
p4FC1DF7F.dip0.t...	Deluge 1.3.12	D	100.0	16.9 kB/s	0.2 kB/s	5   0		352 kB	
96-101-243-80.cus...	Transmission 2.94	D IE	100.0	77.9 kB/s	0.2 kB/s	21   0		1.26 MB	
h2493059.stratoser...	Transmission 2.52	D	100.0	97.9 kB/s	0.3 kB/s	22   0		2.95 MB	
82-69-3-134.dsl.in...	Transmission 2.92	D X	100.0	61.9 kB/s	0.3 kB/s	18   0		1.20 MB	
101.red-83-55-204...	qBittorrent v3.3.7	D	100.0	97.1 kB/s		156   0		13.5 MB	
089-100-125045.nt...	Transmission 2.94	D	100.0	55.7 kB/s	0.2 kB/s	15   0		1.17 MB	
catv-89-135-67-16...	Transmission 2.92	d	100.0						
90.114.131.66	Transmission 2.93	D IX	100.0	7.9 kB/s	0.2 kB/s	4   0		96.0 kB	

At the bottom of the window, the status bar shows: "DHT: 179 nodes (Updating)", "D: 10.7 MB/s T: 282.6 MB", and "U: 20.5 kB/s T: 569.6 kB".

# Wireshark: только unicast трафик



# Wireshark: пропустить начало

The screenshot shows the Wireshark interface with the following components:

- Filter:** Expression... Clear Apply Save
- Packets List:**

No.	Time	Source	Destination	Protocol	Length	Info
1	0.00000000	94.19.117.161	8.8.8.8	DNS	79	Standard query 0x0f1c A releases.ubuntu.com
2	0.04833400	8.8.8.8	94.19.117.161	DNS	95	Standard query response 0x0f1c A 91.189.88.166
3	0.04901900	94.19.117.161	8.8.8.8	DNS	79	Standard query 0x34cd AAAA releases.ubuntu.com
4	0.09746600	8.8.8.8	94.19.117.161	DNS	107	Standard query response 0x34cd AAAA 2001:67c:1360:8001::26
5	0.09863600	94.19.117.161	91.189.88.166	TCP	66	50246->80 [SYN] Seq=0 win=8192 Len=0 MSS=1460 WS=256 SACK_PERM=1
6	0.09876400	94.19.117.161	8.8.8.8	DNS	79	Standard query 0xdba3 A releases.ubuntu.com
7	0.13802900	91.189.88.166	94.19.117.161	TCP	66	80->50246 [SYN, ACK] Seq=0 Ack=1 Win=29200 Len=0 MSS=1460 SACK_PERM=1 WS=128
8	0.13834200	94.19.117.161	91.189.88.166	TCP	54	50246->80 [ACK] Seq=1 Ack=1 Win=65536 Len=0
9	0.14197200	94.19.117.161	91.189.88.166	HTTP	431	GET /18.04/ubuntu-18.04.1-desktop-amd64.iso.torrent HTTP/1.1
10	0.14713300	8.8.8.8	94.19.117.161	DNS	95	Standard query response 0xdba3 A 91.189.88.166
- Packet Details:**
  - Frame 102: 169 bytes on wire (1352 bits), 169 bytes captured (1352 bits) on interface 0
  - Ethernet II, Src: CiscoInc\_c4:4d:7f (c4:7d:4f:c4:4d:7f), Dst: WistronI\_76:b1:d9 (3c:97:0e:76:b1:d9)
  - Internet Protocol Version 4, Src: 8.8.8.8 (8.8.8.8), Dst: 94.19.117.161 (94.19.117.161)
  - User Datagram Protocol, Src Port: 53 (53), Dst Port: 60124 (60124)
  - Domain Name System (response)
    - Request ID: 101
    - [Time: 0.005711000 seconds]
    - Transaction ID: 0x0495
    - Flags: 0x8180 Standard query response, No error
    - Questions: 1
    - Answer RRs: 1
    - Authority RRs: 1
    - Additional RRs: 0
    - Queries
    - Answers
    - Authoritative nameservers
- Packet Bytes:**

0000	3c 97 0e 76 b1 d9 c4 7d 4f c4 4d 7f 08 00 45 00	<.v...} O.M...E.
0010	00 9b 5a 76 00 00 6f 11 0d 18 08 08 08 08 5e 13	..Zv..o. ....^.
0020	75 a1 00 35 ea dc 00 87 a3 6c 04 95 81 80 00 01	u..5....l.....
0030	00 01 00 01 00 00 04 61 70 70 73 0a 62 69 74 74	.....a pps.bitt
0040	6f 72 72 65 6e 74 03 63 6f 6d 00 00 1c 00 01 c0	orrent.c om.....
0050	0c 00 05 00 01 00 00 01 7c 00 19 0a 62 69 74 74	.....  ...bitt
0060	6f 72 72 65 6e 74 02 76 6f 05 6c 6c 6e 77 64 03	orrent.v o.llnwd.
0070	6e 65 74 00 c0 3f 00 06 00 01 00 00 01 14 00 29	net..?..(.....)
0080	05 64 6e 73 31 c0 3f 0a 68 6f 73 74 6d 61 73	des11 7 hostma

Frame (frame), 169 bytes      Packets: 1206181 · Displayed: 1206181 (100.0%) · Dropped: 0 (0.0%)      Profile: Default

# Wireshark: только входящий

The screenshot displays the Wireshark interface with a network capture on the left and an IO graph in the center. The capture shows a series of TCP segments from source 63.0145130.185.21.216.197 to destination 94.19.117.161. The IO graph shows a sharp increase in traffic starting around 20 seconds and remaining high until approximately 100 seconds. The bottom of the interface shows the packet list and packet bytes view.

No.	Time	Source	Destination	Protocol	Length	Info
545012	63.0145130	185.21.216.197	94.19.117.161	TCP	1514	[TCP segment of a reassembled PDU]
545013	63.0145480					
545014	63.0147830					
545015	63.0148150					
545016	63.0148390					
545017	63.0148720					
545018	63.0148840					
545019	63.0148920					
545020	63.0151190					
545021	63.0151530					

Frame 545016: 15...  
Ethernet II, Src...  
Internet Proto...  
Transmission Con...

0994 [ACK] Seq=157066 Ack=140200377 win=1589760 Len=0 SLE=140499677  
0994 [ACK] Seq=157066 Ack=140200377 win=1589760 Len=0 SLE=140499677

1)  
k: 155906, Len: 1460

0000 3c 97 0e 76 b1 d9 c4 7d 4f c4 4d 7f 08 00 45 08 <..v...} O.M...E.  
0010 05 dc 2d be 40 00 3a 06 a7 c6 b9 15 d8 c5 5e 13 ..-.@.:. ....^.  
0020 75 a1 c7 32 c4 79 01 a4 5a 01 16 c8 e1 a1 50 10 u..2.y. Z.....P.  
0030 00 80 f3 67 00 00 e4 13 e0 5c f9 e4 93 e0 5c f9 ..g.... \.....\  
0040 e4 53 e0 3c f9 e4 d3 e0 2c f9 e4 33 e0 0c f9 c4 .S.<.....3.....  
0050 f5 ed 4c 71 f5 7b e2 fa fe 1c 59 f2 89 eb fb 38 ..Lq.{..Y...8  
0060 72 e3 93 e3 c1 39 f0 89 66 5f 72 02 19 f0 c9 89 r.....9.. f\_r.....  
0070 e0 dc f7 44 73 2f f9 12 79 ef 89 eb fe 24 32 dd ...Ds/. y...\$.  
0080 13 cd ba e4 14 72 dc 13 cd ce e4 34 72 d6 13 cd

Ready to load or capture Packets: 1206181 · Displayed: 1206181 (100.0%) · Dropped: 0 (0.0%) Profile: Default

# Excel: доверительный интервал

- <https://www.youtube.com/watch?v=LmESYyaLGRA>
- Microsoft Excel 2013 > New > File > Options >  
> Add-Ins > Manage: Excel Add-Ins > Go >  
+ Analysis ToolPack  
+ Solver Add-In
- DATA > Data Analysis > Descriptive Statistics  
+ Input Range  
+ Summary statistics  
+ Confidence Level for Mean: 95%