

WizFi360

Application – Throughput

Version 1.2

WIZnet Co.,Ltd

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History

Ver	Date	Description
1.0	Aug.2019	Initial version
1.1	Sep.2019	Add command mode throughput test result
1.2	Oct.2019	Modify contents about command mode

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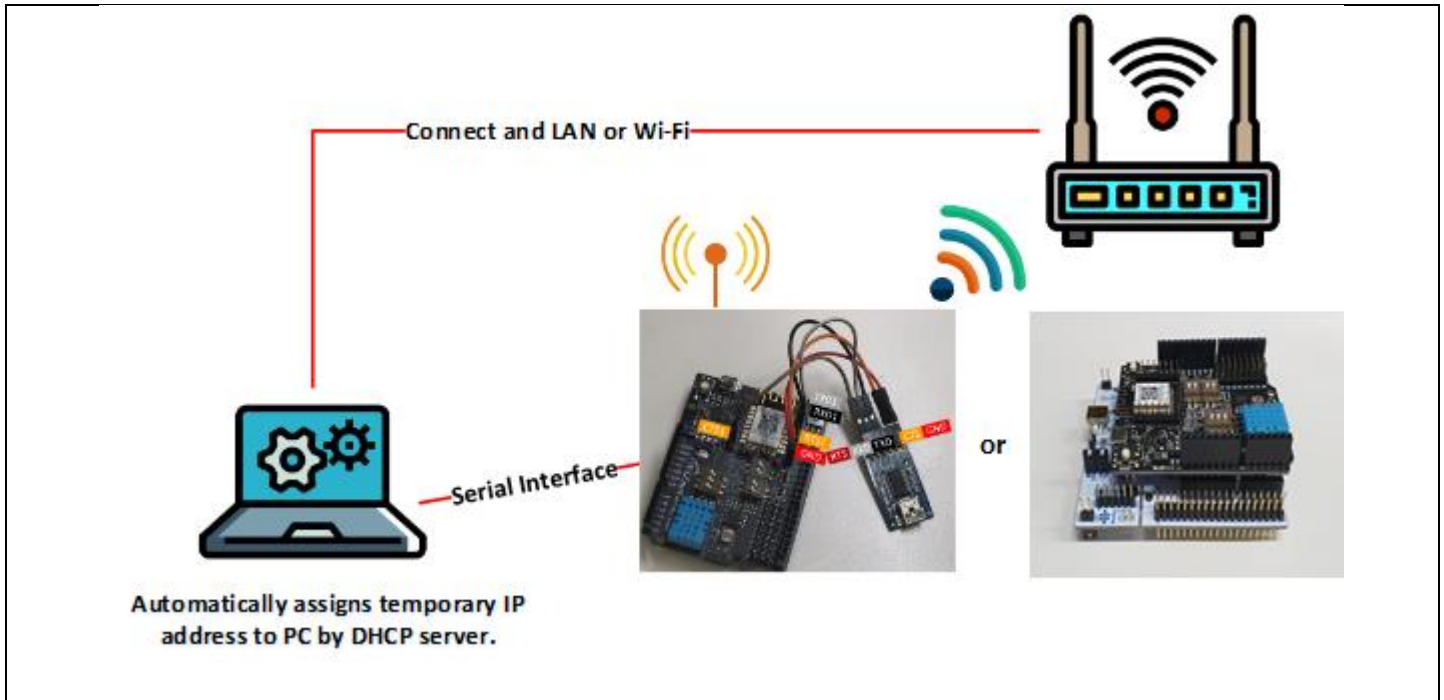
1. Test environment

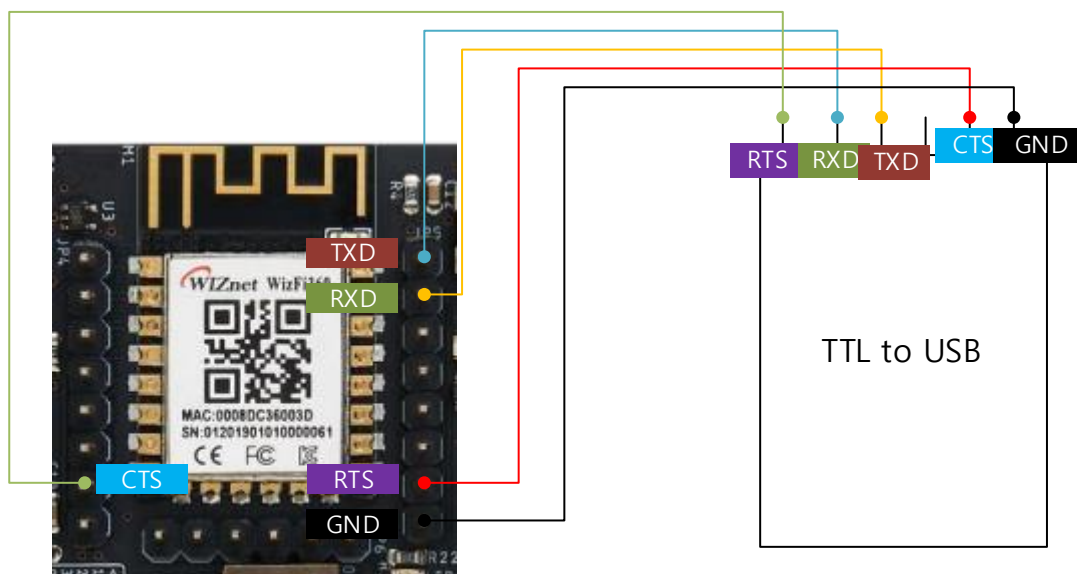
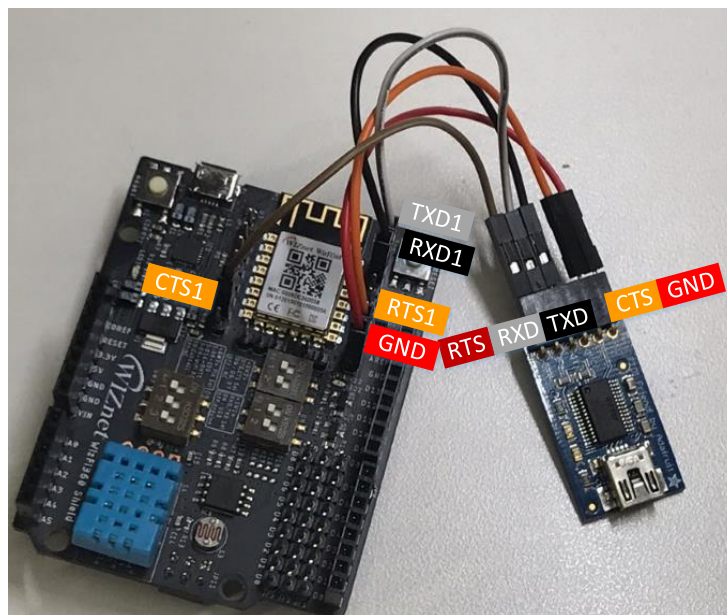
To UART throughput test, it controls using CTS / RTS and WizFi360 control software are required.

- WizFi360 EVB or WizFi360io
- STM32Fxxx EVB(NUCLEO-F401RE)
- PC
- Serial Tool
 - o YAT Serial Tool(Data Mode)
- WizFi360 Control Software(Command Mode)
- 1Mbyte data file
- WiFi Router(exclude when it use in softAP mode)

When data mode uses, it sets RTS/CTS in flow control the using the YAT Serial Tool and it sets DTR as Data Read signal.

When command mode uses, it sets the AT+CIPSEND BUF=2048 as maximum length of the data to be transmitted and it sends data of 2048 length. Repeat the previous operation.





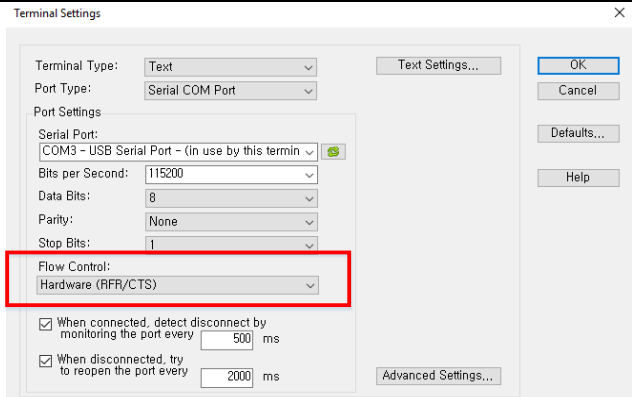
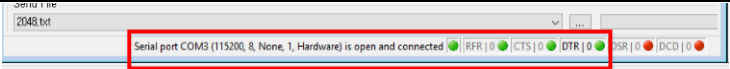
2. Using Serial command

- Station Mode

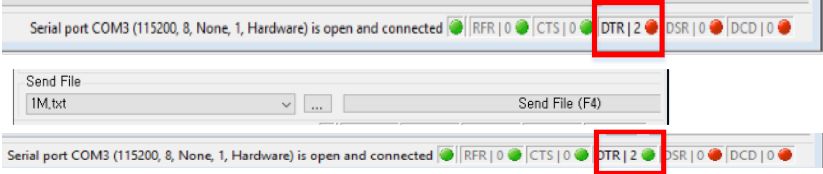
AT command	Terminal
AT AT+CWMODE_CUR=1 AT+CWDHCP_CUR=1,1 AT+CWLAP AT+CWJAP_CUR="wizms1","maker0701" AT+CIPSTA_CUR?	<pre> AT<CR><LF> <CR><LF> OK<CR><LF> AT+CWMODE_CUR=1<CR><LF> <CR><LF> OK<CR><LF> AT+CWDHCP_CUR=1,1<CR><LF> <CR><LF> OK<CR><LF> AT+CWLAP<CR><LF> +CWLAP:(4,"DIR-815_Wiznet",-59,"",1)<CR><LF> +CWLAP:(0,"ESP_574935",-71,"",1)<CR><LF> +CWLAP:(3,"#WIZnet_irina",-46,"",1)<CR><LF> +CWLAP:(3,"Matthew2.4",-63,"",2)<CR><LF> +CWLAP:(3,"rena",-46,"",3)<CR><LF> +CWLAP:(0,"iptime",-67,"",4)<CR><LF> +CWLAP:(3,"Dap",-63,"",5)<CR><LF> +CWLAP:(0,"ESP_577CC7",-67,"",6)<CR><LF> +CWLAP:(3,"wizms1",-63,"",6)<CR><LF> +CWLAP:(0,"Wizfi360",-69,"",6)<CR><LF> +CWLAP:(4,"DLINK-IPv6",-55,"",10)<CR><LF> +CWLAP:(0,"iptime",-59,"",11)<CR><LF> +CWLAP:(3,"WIZnet_Scott",-51,"",11)<CR><LF> +CWLAP:(0,"WizFi360_A1B2D1",-69,"",11)<CR><LF> +CWLAP:(3,"Teddy_AP",-57,"",13)<CR><LF> <CR><LF> OK<CR><LF> AT+CWJAP_CUR="wizms1","maker0701"<CR><LF> WIFI_DISCONNECT<CR><LF> WIFI_CONNECTED<CR><LF> WIFI_GOT_IP<CR><LF> <CR><LF> OK<CR><LF> AT+CIPSTA_CUR?<CR><LF> +CIPSTA_CUR:ip:"192.168.1.120"<CR><LF> +CIPSTA_CUR:gateway:"192.168.1.1"<CR><LF> +CIPSTA_CUR:netmask:"255.255.255.0"<CR><LF> <CR><LF> OK<CR><LF> </pre>

- UART CTS/RTS Setting

AT command	Terminal
AT+CWUART_CUR = 115200,8,1,0,1	<pre> AT+UART_CUR=115200,8,1,0,1<CR><LF> <CR><LF> OK<CR><LF> </pre>
Terminal Setting	

<ol style="list-style-type: none"> 1. Pressing Ctrl+Shift+S and Open the Terminal Settings window 2. You have to change the Hardware(RFR/CTS) in Flow Control 	
<ol style="list-style-type: none"> 3. If you can see under the terminal window that the CTS/DTR is green 	

- TCP Client /Data mode

AT command	Terminal
AT+CIPSTART="TCP","192.168.100.27",5001 AT+CIPMODE=1 AT+CIPSEND	<pre> AT+CIPSTART="TCP", "192.168.100.27",5001<CR><LF> CONNECT<CR><LF> <CR><LF> OK<CR><LF> AT+CIPMODE=1<CR><LF> <CR><LF> OK<CR><LF> AT+CIPSEND<CR><LF> <CR><LF> > </pre>
Terminal Setting	
<ol style="list-style-type: none"> 1. When DTR is red, it sends the 1M.txt 2. If you click the DTR, it changes the DTR is green and it is sending the data through Serial 	

- TCP Client / Command mode

AT command	Example Code
AT+CIPSTART="TCP","192.168.100.27",5001 AT+CIPMODE=0 AT+CIPSENDERBUF=2048 Send the 2048byte data * 512times = 1Mbyte	<pre> int8_t deviceTestThroughput_WizFi360(char *data, int len) { int8_t ret = RET_NOK; int cnt; int segid = 0; for(cnt = 0; cnt < (len / 4); cnt++) // 2k * 512 = 1M { if(ATCParser_send("AT+CIPSENDERBUF=%d", len)&& ATCParser_rcv("OK") && ATCParser_rcv(">")) { if(ATCParser_send("%s", data) && ATCParser_rcv("%d,SEND OK", &segid)) { ret = RET_OK; } else { printf("Write data : failed\r\n"); } } else { printf("Set buffer : failed\r\n"); } } return ret; } </pre>

3. The result of UART Throughput

PC sends the 1Mbyte through serial of WizFi360(UART1) and WizFi360 send the data to TCP Server.

Baud rate	Data mode		Command mode	
	Time	Speed(bit/s)	Time	Speed(bit/s)
115200	123s	66K	93.9s	87.2K
921600	16.3s	502K	14.0s	585.1K
1000000	14.9s	550K	13.0s	630.2K
1250000	12.7s	645K	11.0s	744.7K
1500000	10.5s	780K	10.0s	819.2K
2000000	9.7s	845K	8.0s	1.0M

We measured the time from the start of data transfer to the end of data transfer using the wireshark tool, see Appendix 1.

Appendix 1

Baud rate	Data mode	Command mode
115200	123s : 66Kbit/s <small>3823 122.869987 192.168.100.27 192.168.100.28 TCP 54 5801 - 52161 [ACK] Seq=1 Ack=1023025 Win=65535 Len=0 3824 122.865190 192.168.100.28 192.168.100.27 TCP 490 52161 - 5801 [PSH, ACK] Seq=1023025 Ack=1 Win=6144 Len=436 [TCP segment of wlen 436 len 436 3825 122.906828 192.168.100.27 192.168.100.28 TCP 54 5801 - 52161 [ACK] Seq=1 Ack=1023461 Win=65899 Len=0 3826 122.912979 192.168.100.28 192.168.100.27 TCP 594 52161 - 5801 [PSH, ACK] Seq=1023461 Ack=1 Win=6144 Len=540 [TCP segment of wlen 540 len 540 3827 122.958838 192.168.100.27 192.168.100.28 TCP 54 5801 - 52161 [ACK] Seq=1 Ack=1024001 Win=64559 Len=0</small>	11.0s : 744.7Kbit/s <small>3 3.351673 192.168.0.2 192.168.0.4 TCP 1078 57187 - 8000 [ACK] Seq=1 Ack=2 Win=6144 Len=1024 4 3.351673 192.168.0.2 192.168.0.4 TCP 1078 57187 - 8000 [PSH, ACK] Seq=1025 Ack=2 Win=6144 Len=1024 5 3.351752 192.168.0.4 192.168.0.2 TCP 54 8000 - 57187 [ACK] Seq=2 Ack=2049 Win=64512 Len=0 6 3.372523 192.168.0.2 192.168.0.4 TCP 1078 57187 - 8000 [ACK] Seq=2049 Ack=2 Win=6144 Len=1024 7 3.372524 192.168.0.2 192.168.0.4 TCP 1078 57187 - 8000 [PSH, ACK] Seq=3073 Ack=2 Win=6144 Len=1024 1534 14.330917 192.168.0.2 192.168.0.4 TCP 1078 57187 - 8000 [PSH, ACK] Seq=1045529 Ack=2 Win=6144 Len=1024 1535 14.330971 192.168.0.4 192.168.0.2 TCP 54 8000 - 57187 [ACK] Seq=2 Ack=1045529 Win=64512 Len=0 1536 14.351216 192.168.0.2 192.168.0.4 TCP 1078 57187 - 8000 [ACK] Seq=1045529 Ack=2 Win=6144 Len=1024 1537 14.351217 192.168.0.2 192.168.0.4 TCP 1078 57187 - 8000 [PSH, ACK] Seq=1045555 Ack=2 Win=6144 Len=1024 1538 14.351273 192.168.0.4 192.168.0.2 TCP 54 8000 - 57187 [ACK] Seq=2 Ack=1045577 Win=64512 Len=0</small>
921600	16.3s : 502Kbit/s <small>4299 16.227822 192.168.100.28 192.168.100.27 TCP 490 52161 - 5801 [ACK] Seq=1023185 Ack=1 Win=6144 Len=1024 [TCP segment of wlen 1024 len 1024 2547 16.227860 192.168.100.27 192.168.100.28 TCP 54 5801 - 52161 [ACK] Seq=1 Ack=1023185 Win=65535 Len=0 2548 16.217860 192.168.100.28 192.168.100.27 TCP 870 52161 - 5801 [PSH, ACK] Seq=1023185 Ack=1 Win=6144 Len=816 [TCP segment of wlen 816 len 816 2549 16.317138 192.168.100.27 192.168.100.28 TCP 54 5801 - 52161 [ACK] Seq=1 Ack=1024001 Win=64719 Len=0 2550 16.357729 192.168.100.28 192.168.100.27 TCP 490 58128 - 5801 [PSH, ACK] Seq=1023185 Ack=1 Win=6144 Len=436 [TCP segment of wlen 436 len 436 2551 16.357729 192.168.100.27 192.168.100.28 TCP 494 58128 - 5801 [PSH, ACK] Seq=1023185 Ack=1 Win=6144 Len=440 [TCP segment of wlen 440 len 440 2552 16.357729 192.168.100.28 192.168.100.27 TCP 54 5801 - 58128 [ACK] Seq=1 Ack=1024001 Win=64659 Len=0</small>	10.0s : 819.2Kbit/s <small>3 1.958011 192.168.0.2 192.168.0.4 TCP 1078 60368 - 8000 [ACK] Seq=1 Ack=2 Win=6144 Len=1024 4 1.958012 192.168.0.2 192.168.0.4 TCP 1078 60368 - 8000 [PSH, ACK] Seq=1025 Ack=2 Win=6144 Len=1024 5 1.958189 192.168.0.4 192.168.0.2 TCP 54 8000 - 60368 [ACK] Seq=2 Ack=2049 Win=64512 Len=0 6 1.979981 192.168.0.2 192.168.0.4 TCP 1078 60368 - 8000 [ACK] Seq=2049 Ack=2 Win=6144 Len=1024 7 1.979981 192.168.0.2 192.168.0.4 TCP 1078 60368 - 8000 [PSH, ACK] Seq=3073 Ack=2 Win=6144 Len=1024 1537 11.937349 192.168.0.2 192.168.0.4 TCP 1078 60368 - 8000 [PSH, ACK] Seq=1045529 Ack=2 Win=6144 Len=1024 1538 11.937412 192.168.0.4 192.168.0.2 TCP 54 8000 - 60368 [ACK] Seq=2 Ack=1045529 Win=64512 Len=0 1539 11.955972 192.168.0.2 192.168.0.4 TCP 1078 60368 - 8000 [ACK] Seq=1045529 Ack=2 Win=6144 Len=1024 1540 11.955972 192.168.0.2 192.168.0.4 TCP 1078 60368 - 8000 [PSH, ACK] Seq=1045555 Ack=2 Win=6144 Len=1024 1541 11.956032 192.168.0.4 192.168.0.2 TCP 54 8000 - 60368 [ACK] Seq=2 Ack=1045577 Win=64512 Len=0</small>
1000000	14.9s : 550Kbit/s <small>3868 14.774321 192.168.100.28 192.168.100.27 TCP 490 58128 - 5801 [PSH, ACK] Seq=1023125 Ack=1 Win=6144 Len=436 [TCP segment of wlen 436 len 436 3869 14.815213 192.168.100.27 192.168.100.28 TCP 54 5801 - 58128 [ACK] Seq=1 Ack=1023125 Win=65899 Len=0 3870 14.835495 192.168.100.28 192.168.100.27 TCP 494 58128 - 5801 [PSH, ACK] Seq=1023125 Ack=1 Win=6144 Len=440 [TCP segment of wlen 440 len 440 3871 14.859281 192.168.100.27 192.168.100.28 TCP 54 5801 - 58128 [ACK] Seq=1 Ack=1024001 Win=64659 Len=0</small>	8.0s : 1.0Mbit/s <small>3 2.492951 192.168.0.2 192.168.0.4 TCP 1078 63635 - 8000 [ACK] Seq=1 Ack=2 Win=6144 Len=1024 4 2.496860 192.168.0.2 192.168.0.4 TCP 1078 63635 - 8000 [PSH, ACK] Seq=1025 Ack=2 Win=6144 Len=1024 5 2.496929 192.168.0.4 192.168.0.2 TCP 54 8000 - 63635 [ACK] Seq=2 Ack=2049 Win=64512 Len=0 6 2.506899 192.168.0.2 192.168.0.4 TCP 1078 63635 - 8000 [ACK] Seq=2049 Ack=2 Win=6144 Len=1024 7 2.507544 192.168.0.2 192.168.0.4 TCP 1078 63635 - 8000 [PSH, ACK] Seq=3073 Ack=2 Win=6144 Len=1024 1533 10.470341 192.168.0.2 192.168.0.4 TCP 1078 63635 - 8000 [PSH, ACK] Seq=1045505 Ack=2 Win=6144 Len=1024 1534 10.470400 192.168.0.4 192.168.0.2 TCP 54 8000 - 63635 [ACK] Seq=2 Ack=1045529 Win=64512 Len=0 1535 10.485628 192.168.0.2 192.168.0.4 TCP 1078 63635 - 8000 [ACK] Seq=1045529 Ack=2 Win=6144 Len=1024 1536 10.485628 192.168.0.2 192.168.0.4 TCP 1078 63635 - 8000 [PSH, ACK] Seq=1045555 Ack=2 Win=6144 Len=1024 1537 10.485604 192.168.0.4 192.168.0.2 TCP 54 8000 - 63635 [ACK] Seq=2 Ack=1045577 Win=64512 Len=0</small>
1250000	12.7s : 645Kbit/s <small>2863 12.590480 192.168.100.28 192.168.100.27 TCP 490 58136 - 5801 [PSH, ACK] Seq=1023185 Ack=1 Win=6144 Len=436 [TCP segment of wlen 436 len 436 2864 12.631883 192.168.100.27 192.168.100.28 TCP 54 5801 - 58136 [ACK] Seq=1 Ack=102321 Win=65899 Len=0 2865 12.633959 192.168.100.28 192.168.100.27 TCP 434 58136 - 5801 [PSH, ACK] Seq=102321 Ack=1 Win=6144 Len=380 [TCP segment of wlen 380 len 380 2866 12.674856 192.168.100.27 192.168.100.28 TCP 54 5801 - 58136 [ACK] Seq=1 Ack=1024001 Win=64719 Len=0</small>	11.0s : 744.7Kbit/s <small>3 3.351673 192.168.0.2 192.168.0.4 TCP 1078 57187 - 8000 [ACK] Seq=1 Ack=2 Win=6144 Len=1024 4 3.351673 192.168.0.2 192.168.0.4 TCP 1078 57187 - 8000 [PSH, ACK] Seq=1025 Ack=2 Win=6144 Len=1024 5 3.351752 192.168.0.4 192.168.0.2 TCP 54 8000 - 57187 [ACK] Seq=2 Ack=2049 Win=64512 Len=0 6 3.372523 192.168.0.2 192.168.0.4 TCP 1078 57187 - 8000 [ACK] Seq=2049 Ack=2 Win=6144 Len=1024 7 3.372524 192.168.0.2 192.168.0.4 TCP 1078 57187 - 8000 [PSH, ACK] Seq=3073 Ack=2 Win=6144 Len=1024 1534 14.330917 192.168.0.2 192.168.0.4 TCP 1078 57187 - 8000 [PSH, ACK] Seq=1045529 Ack=2 Win=6144 Len=1024 1535 14.330971 192.168.0.4 192.168.0.2 TCP 54 8000 - 57187 [ACK] Seq=2 Ack=1045529 Win=64512 Len=0 1536 14.351216 192.168.0.2 192.168.0.4 TCP 1078 57187 - 8000 [ACK] Seq=1045529 Ack=2 Win=6144 Len=1024 1537 14.351217 192.168.0.2 192.168.0.4 TCP 1078 57187 - 8000 [PSH, ACK] Seq=1045555 Ack=2 Win=6144 Len=1024 1538 14.351273 192.168.0.4 192.168.0.2 TCP 54 8000 - 57187 [ACK] Seq=2 Ack=1045577 Win=64512 Len=0</small>
1500000	10.5s : 780Kbit/s <small>2242 10.389973 192.168.100.28 192.168.100.27 TCP 490 65821 - 5801 [PSH, ACK] Seq=1023874 Ack=1 Win=6144 Len=436 [TCP segment of wlen 436 len 436 2244 10.439942 192.168.100.27 192.168.100.28 TCP 54 5801 - 65821 [ACK] Seq=1 Ack=1023510 Win=65899 Len=0 2245 10.445897 192.168.100.28 192.168.100.27 TCP 545 65821 - 5801 [PSH, ACK] Seq=1023510 Ack=1 Win=6144 Len=380 [TCP segment of wlen 380 len 380 2247 10.486915 192.168.100.27 192.168.100.28 TCP 54 5801 - 65821 [ACK] Seq=1 Ack=1024001 Win=64608 Len=0</small>	10.0s : 819.2Kbit/s <small>3 1.958011 192.168.0.2 192.168.0.4 TCP 1078 60368 - 8000 [ACK] Seq=1 Ack=2 Win=6144 Len=1024 4 1.958012 192.168.0.2 192.168.0.4 TCP 1078 60368 - 8000 [PSH, ACK] Seq=1025 Ack=2 Win=6144 Len=1024 5 1.958189 192.168.0.4 192.168.0.2 TCP 54 8000 - 60368 [ACK] Seq=2 Ack=2049 Win=64512 Len=0 6 1.979981 192.168.0.2 192.168.0.4 TCP 1078 60368 - 8000 [ACK] Seq=2049 Ack=2 Win=6144 Len=1024 7 1.979981 192.168.0.2 192.168.0.4 TCP 1078 60368 - 8000 [PSH, ACK] Seq=3073 Ack=2 Win=6144 Len=1024 1533 11.937349 192.168.0.2 192.168.0.4 TCP 1078 60368 - 8000 [PSH, ACK] Seq=1045529 Ack=2 Win=6144 Len=1024 1534 11.937412 192.168.0.4 192.168.0.2 TCP 54 8000 - 60368 [ACK] Seq=2 Ack=1045529 Win=64512 Len=0 1535 11.955972 192.168.0.2 192.168.0.4 TCP 1078 60368 - 8000 [ACK] Seq=1045529 Ack=2 Win=6144 Len=1024 1536 11.955972 192.168.0.2 192.168.0.4 TCP 1078 60368 - 8000 [PSH, ACK] Seq=1045555 Ack=2 Win=6144 Len=1024 1537 11.956032 192.168.0.4 192.168.0.2 TCP 54 8000 - 60368 [ACK] Seq=2 Ack=1045577 Win=64512 Len=0</small>

2000000	9.7s : 845Kbit/s <div> <div>6316 9.646387192.168.100.28192.168.100.27TCP490 65031 → 5001 [PSH, ACK] Seq=1023245 Ack=1 Win=0 Len=0</div> <div>6317 9.686546192.168.100.27192.168.100.28TCP54 5001 → 65031 [ACK] Seq=1 Ack=1023681 Win=65099 Len=0</div> <div>6318 9.690489192.168.100.28192.168.100.27TCP374 65031 → 5001 [PSH, ACK] Seq=1023681 Ack=1 Win=0 Len=0</div> <div>6319 9.731538192.168.100.27192.168.100.28TCP54 5001 → 65031 [ACK] Seq=1 Ack=1024001 Win=64779 Len=0</div> </div>	8.0s : 1.0Mbit/s <div> <div>1078 63635 → 8000 [ACK] Seq=1 Ack=2 Win=6144 Len=1024</div> <div>1078 63635 → 8000 [PSH, ACK] Seq=1025 Ack=2 Win=6144 Len=1024</div> <div>54 8000 → 63635 [ACK] Seq=2 Ack=2049 Win=64512 Len=0</div> <div>1078 63635 → 8000 [ACK] Seq=2049 Ack=2 Win=6144 Len=1024</div> <div>1078 63635 → 8000 [PSH, ACK] Seq=3073 Ack=2 Win=6144 Len=1024</div> <div>1078 63635 → 8000 [PSH, ACK] Seq=1045505 Ack=2 Win=6144 Len=1024</div> <div>54 8000 → 63635 [ACK] Seq=2 Ack=1046529 Win=64512 Len=0</div> <div>1078 63635 → 8000 [ACK] Seq=1046529 Ack=2 Win=6144 Len=1024</div> <div>1078 63635 → 8000 [PSH, ACK] Seq=1047553 Ack=2 Win=6144 Len=1024</div> <div>54 8000 → 63635 [ACK] Seq=2 Ack=1048577 Win=64512 Len=0</div> </div>
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