

计算机网络之TCP实验(wireshark版)

原创

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10 篇文章 0 订阅

订阅专栏

写在前头的话

本次实验的内容是关于TCP的，这段时间一直都在积极的储备着关于计算机网络基础的知识，所以接触过一点wireshark，本次实验的对象是TCP，因为应用层的FTP是建立在TCP上的，又因为机房的电脑FTP服务好使，所以.....

先来看一看本次实验的要求吧

TCP 实验

1. 实验目的

掌握 TCP 协议的原理，深入理解 TCP 协议中的连接管理、可靠传输机制、流量控制机制和拥塞控制。

2. 实验内容

- a) TCP 协议基础
 - i. 传输层源地址结构
 - ii. 传输层目的地址结构
- b) 分析 TCP 连接管理的机制
 - i. 建立连接机制
 - ii. 释放连接机制
 - iii. 连接过程中的异常处理
- c) 分析 TCP 可靠传输原理
 - i. 确认机制
 - ii. 重传机制
 - iii. 分析其传输模型
- d) 分析 TCP 的流量控制原理
 - i. 流量控制机制
 - ii. 零窗口处理机制
 - iii. 小窗口、傻瓜窗口问题
- e) 分析 TCP 的拥塞控制原理

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为了更好的理解本次实验的FTP的操作，我建议先对此博客进行详细阅读：

[FTP文件传输协议——xwdpepsi的博客](#)引用了大神的博客，希望大神看到了不要介意哈哈哈哈哈

The screenshot displays a network capture of an FTP session. The main window shows a list of packets with the following columns: No., Time, Source, Destination, Protocol, Length, and Info. The selected packet (No. 604) shows an FTP response with user name 'anonymous' and a request for an email address as a password. The bottom pane shows the raw packet data in hexadecimal and ASCII.

No.	Time	Source	Destination	Protocol	Length	Info
599	2017-05-25 16:24:34.10.111.134.124	10.111.134.124	10.111.100.210	TCP	62	imsocialserver > ftp [SYN] Seq=0 win=65535 Len=0 MSS=1460 SACK_PERM=1
600	2017-05-25 16:24:34.10.111.100.210	10.111.100.210	10.111.134.124	TCP	62	ftp > imsocialserver [SYN, ACK] Seq=0 Ack=1 win=8192 Len=0 MSS=1460 SACK_PERM=1
601	2017-05-25 16:24:34.10.111.134.124	10.111.134.124	10.111.100.210	TCP	54	imsocialserver > ftp [ACK] Seq=1 Ack=1 win=65535 Len=0
602	2017-05-25 16:24:34.10.111.100.210	10.111.134.124	10.111.100.210	FTP	92	Response: 220 Serv-U FTP Server v12.1 ready...
603	2017-05-25 16:24:34.10.111.134.124	10.111.100.210	10.111.134.124	FTP	70	Request: USER anonymous
604	2017-05-25 16:24:34.10.111.100.210	10.111.134.124	10.111.100.210	FTP	124	Response: 331 User name okay, please send complete E-mail address as password.
605	2017-05-25 16:24:34.10.111.134.124	10.111.100.210	10.111.134.124	FTP	68	Request: PASS IEUser@
606	2017-05-25 16:24:34.10.111.100.210	10.111.134.124	10.111.100.210	FTP	84	Response: 230 User logged in, proceed.
607	2017-05-25 16:24:34.10.111.134.124	10.111.100.210	10.111.134.124	FTP	68	Request: opts utf8 on
608	2017-05-25 16:24:34.10.111.100.210	10.111.134.124	10.111.100.210	FTP	84	Response: 502 command not implemented.
609	2017-05-25 16:24:34.10.111.134.124	10.111.100.210	10.111.134.124	FTP	60	Request: syst
610	2017-05-25 16:24:34.10.111.100.210	10.111.134.124	10.111.100.210	FTP	73	Response: 215 UNIX Type: L8
611	2017-05-25 16:24:34.10.111.134.124	10.111.100.210	10.111.134.124	FTP	65	Request: site help
613	2017-05-25 16:24:34.10.111.100.210	10.111.134.124	10.111.100.210	FTP	690	Response: 214-The following commands are recognized (* => unimplemented).
614	2017-05-25 16:24:34.10.111.134.124	10.111.100.210	10.111.134.124	FTP	59	Request: PWD
615	2017-05-25 16:24:34.10.111.100.210	10.111.134.124	10.111.100.210	FTP	85	Response: 257 "/" is current directory.
618	2017-05-25 16:24:34.10.111.134.124	10.111.100.210	10.111.134.124	FTP	60	Request: noop
619	2017-05-25 16:24:34.10.111.100.210	10.111.134.124	10.111.100.210	FTP	73	Response: 200 Command okay.
621	2017-05-25 16:24:34.10.111.134.124	10.111.100.210	10.111.134.124	FTP	61	Request: CWD /
622	2017-05-25 16:24:34.10.111.100.210	10.111.134.124	10.111.100.210	FTP	82	Response: 250 Directory changed to /
624	2017-05-25 16:24:34.10.111.134.124	10.111.100.210	10.111.134.124	FTP	62	Request: TYPE A
625	2017-05-25 16:24:34.10.111.100.210	10.111.134.124	10.111.100.210	FTP	74	Response: 200 Type set to A.
626	2017-05-25 16:24:34.10.111.134.124	10.111.100.210	10.111.134.124	FTP	60	Request: PASV
627	2017-05-25 16:24:34.10.111.100.210	10.111.134.124	10.111.100.210	FTP	105	Response: 227 Entering Passive Mode (10,111,100,210,204,86)
628	2017-05-25 16:24:34.10.111.134.124	10.111.100.210	10.111.100.210	TCP	62	tcp > 52310 [SYN] Seq=0 win=65535 Len=0 MSS=1460 SACK_PERM=1
629	2017-05-25 16:24:34.10.111.100.210	10.111.134.124	10.111.100.210	TCP	62	52310 > tcp [SYN, ACK] Seq=0 Ack=1 win=8192 Len=0 MSS=1460 SACK_PERM=1
630	2017-05-25 16:24:34.10.111.134.124	10.111.100.210	10.111.100.210	TCP	54	tcp > 52310 [ACK] Seq=1 Ack=1 win=65535 Len=0
631	2017-05-25 16:24:34.10.111.134.124	10.111.100.210	10.111.134.124	FTP	60	Request: LIST
632	2017-05-25 16:24:34.10.111.100.210	10.111.134.124	10.111.100.210	FTP	107	Response: 150 Opening ASCII mode data connection for /bin/ls.
633	2017-05-25 16:24:34.10.111.100.210	10.111.134.124	10.111.134.124	FTP-DAT	376	FTP Data: 322 bytes
634	2017-05-25 16:24:34.10.111.100.210	10.111.134.124	10.111.134.124	TCP	60	52310 > tcp [FIN, ACK] Seq=323 Ack=1 win=64240 Len=0
635	2017-05-25 16:24:34.10.111.134.124	10.111.100.210	10.111.134.124	TCP	54	tcp > 52310 [ACK] Seq=1 Ack=324 win=65213 Len=0
636	2017-05-25 16:24:34.10.111.134.124	10.111.100.210	10.111.100.210	TCP	54	tcp > 52310 [FIN, ACK] Seq=1 Ack=324 win=65213 Len=0
637	2017-05-25 16:24:34.10.111.100.210	10.111.134.124	10.111.134.124	TCP	60	52310 > tcp [ACK] Seq=324 Ack=2 win=64240 Len=0
644	2017-05-25 16:24:34.10.111.134.124	10.111.100.210	10.111.100.210	TCP	54	imsocialserver > ftp [ACK] Seq=100 Ack=1026 win=64510 Len=0
645	2017-05-25 16:24:34.10.111.100.210	10.111.134.124	10.111.134.124	FTP	114	Response: 226 Transfer complete. 322 bytes transferred. 0.31 KB/sec

Frame 604: 124 bytes on wire (992 bits), 124 bytes captured (992 bits) on interface 0
Ethernet II, Src: FujianSt_1b:96:af (14:14:4b:1b:96:af), Dst: Micro-St_23:d8:3e (d4:3d:7e:23:d8:3e)
Internet Protocol Version 4, Src: 10.111.100.210 (10.111.100.210), Dst: 10.111.134.124 (10.111.134.124)
Transmission Control Protocol, Src Port: ftp (21), Dst Port: imsocialserver (1111), Seq: 39, Ack: 17, Len: 70

```

0000  d4 3d 7e 23 d8 3e 14 14 4b 1b 96 af 08 00 45 00  .-#>.. K....E.
0010  00 6e 69 1d 40 00 3f 06 d2 40 0a 6f 64 d2 0a 6f  .ni.?. .@.od..o
0020  86 7c 00 15 04 57 a3 d2 a7 ca fb a6 1c 2f 50 18  .l...W...../P.
0030  fa e0 73 60 00 33 33 31 20 55 73 65 72 20 6e    .s...33 1 User n
0040  61 6d 65 20 6f 61 79 2c 20 70 0c 65 61 73 65   ame okay please
0050  70 72 65 60 64 70 62 6f 6d 70 6c 65 74 65 70  .ond co mpora f

```

1、从上图来分析，我们可以很方便的看到此次试验所用的客户端ip地址为10.111.134.124，所用服务器的ip地址为10.111.100.210，因为使用的是FTP协议进行的试验，根据FTP的性质，我们可以得知FTP是建立在可靠地TCP上的，而且FTP所进行的传输是未加密的明文传输，所以我们可以从截图可以方便的得知FTP客户端所使用的账户是：anonymous，服务器想要使用完整的email地址作为传输密码，所以客户端发送密码：IEUser@（应该是默认的），当前有230位客户在线，根据syst返回的消息，服务器使用的是UNIX系统，TYPE A，说明使用的是ascii数据类型传输，PASV说明是采用的被动模式（即客户端主动发起连接）。

Capturing from Realtek 10/100/1000 Ethernet NIC (Microsoft's Packet Scheduler) : \Device\NPF_{0C8DD37C-F200-4495-BEEA-FFE8A1890EB3}

Filter: tcp.stream eq 0

No.	Time	Source	Destination	Protocol	Length	Info
44	2017-05-25 17:51:34.10.111.134.124	10.111.100.210	10.111.100.210	TCP	62	vrts-at-port > ftp [SYN] Seq=0 win=65535 Len=0 MSS=1460 SACK_PERM=1
45	2017-05-25 17:51:34.10.111.100.210	10.111.134.124	10.111.100.210	TCP	62	ftp > vrts-at-port [SYN, ACK] Seq=0 Ack=1 win=8192 Len=0 MSS=1460 SACK_PERM=1
46	2017-05-25 17:51:34.10.111.134.124	10.111.100.210	10.111.100.210	TCP	54	vrts-at-port > ftp [ACK] Seq=1 Ack=1 win=65535 Len=0
47	2017-05-25 17:51:34.10.111.100.210	10.111.134.124	10.111.100.210	FTP	92	Response: 220 Serv-U FTP Server v12.1 ready...
48	2017-05-25 17:51:34.10.111.134.124	10.111.100.210	10.111.100.210	TCP	54	vrts-at-port > ftp [ACK] Seq=1 Ack=39 win=65497 Len=0
64	2017-05-25 17:51:43.10.111.134.124	10.111.100.210	10.111.100.210	FTP	70	Request: USER anonymous
65	2017-05-25 17:51:43.10.111.100.210	10.111.134.124	10.111.100.210	FTP	124	Response: 331 User name okay, please send complete E-mail address as password.
66	2017-05-25 17:51:43.10.111.134.124	10.111.100.210	10.111.100.210	TCP	54	vrts-at-port > ftp [ACK] Seq=17 Ack=109 win=65427 Len=0
107	2017-05-25 17:51:51.10.111.134.124	10.111.100.210	10.111.100.210	FTP	68	Request: PASS IEuser@
108	2017-05-25 17:51:51.10.111.100.210	10.111.134.124	10.111.100.210	FTP	84	Response: 230 User logged in, proceed.
109	2017-05-25 17:51:51.10.111.134.124	10.111.100.210	10.111.100.210	TCP	54	vrts-at-port > ftp [ACK] Seq=31 Ack=139 win=65397 Len=0
131	2017-05-25 17:51:58.10.111.134.124	10.111.100.210	10.111.100.210	FTP	72	Request: CWD ^275\314\312\246\262\274\326\303\327\367\322\265
132	2017-05-25 17:51:58.10.111.100.210	10.111.134.124	10.111.100.210	FTP	94	Response: 250 Directory changed to ^275\314\312\246\262\274\326\303\327\367\322\265
133	2017-05-25 17:51:58.10.111.134.124	10.111.100.210	10.111.100.210	TCP	54	vrts-at-port > ftp [ACK] Seq=49 Ack=179 win=65357 Len=0
158	2017-05-25 17:52:06.10.111.134.124	10.111.100.210	10.111.100.210	FTP	63	Request: CWD bdr
159	2017-05-25 17:52:06.10.111.100.210	10.111.134.124	10.111.100.210	FTP	105	Response: 550 ^275\314\312\246\262\274\326\303\327\367\322\265\bdr: No such file or directory.
162	2017-05-25 17:52:06.10.111.134.124	10.111.100.210	10.111.100.210	TCP	54	vrts-at-port > ftp [ACK] Seq=58 Ack=230 win=65306 Len=0
215	2017-05-25 17:52:25.10.111.134.124	10.111.100.210	10.111.100.210	FTP	63	Request: CWD dbr
216	2017-05-25 17:52:25.10.111.100.210	10.111.134.124	10.111.100.210	FTP	98	Response: 250 Directory changed to ^275\314\312\246\262\274\326\303\327\367\322\265\dbr
217	2017-05-25 17:52:25.10.111.134.124	10.111.100.210	10.111.100.210	TCP	54	vrts-at-port > ftp [ACK] Seq=67 Ack=274 win=65262 Len=0
303	2017-05-25 17:52:57.10.111.134.124	10.111.100.210	10.111.100.210	FTP	84	Request: PORT 10,111,134,124,11,19
304	2017-05-25 17:52:57.10.111.100.210	10.111.134.124	10.111.100.210	FTP	84	Response: 200 PORT command successful.
305	2017-05-25 17:52:57.10.111.134.124	10.111.100.210	10.111.100.210	FTP	70	Request: RETR \315\274\306\2541.png
306	2017-05-25 17:52:57.10.111.100.210	10.111.134.124	10.111.100.210	FTP	125	Response: 150 Opening BINARY mode data connection for \315\274\306\2541.png (148801 bytes).
430	2017-05-25 17:52:57.10.111.134.124	10.111.100.210	10.111.100.210	TCP	54	vrts-at-port > ftp [ACK] Seq=110 Ack=375 win=65161 Len=0
431	2017-05-25 17:52:57.10.111.100.210	10.111.134.124	10.111.100.210	FTP	122	Response: 226 Transfer complete. 148,801 bytes transferred. 9,082.09 KB/sec.
432	2017-05-25 17:52:58.10.111.134.124	10.111.100.210	10.111.100.210	TCP	54	vrts-at-port > ftp [ACK] Seq=110 Ack=443 win=65093 Len=0
502	2017-05-25 17:53:25.10.111.134.124	10.111.100.210	10.111.100.210	FTP	60	Request: QUIT
503	2017-05-25 17:53:25.10.111.100.210	10.111.134.124	10.111.100.210	FTP	85	Response: 221 Goodbye, closing session.
504	2017-05-25 17:53:25.10.111.134.124	10.111.100.210	10.111.100.210	TCP	54	vrts-at-port > ftp [FIN, ACK] Seq=116 Ack=474 win=65062 Len=0
505	2017-05-25 17:53:25.10.111.100.210	10.111.134.124	10.111.100.210	TCP	60	ftp > vrts-at-port [ACK] Seq=474 Ack=117 win=64125 Len=0
506	2017-05-25 17:53:25.10.111.100.210	10.111.134.124	10.111.100.210	TCP	60	ftp > vrts-at-port [FIN, ACK] Seq=474 Ack=117 win=64125 Len=0
507	2017-05-25 17:53:25.10.111.134.124	10.111.100.210	10.111.100.210	TCP	54	vrts-at-port > ftp [ACK] Seq=117 Ack=475 win=65062 Len=0

Realtek 10/100/1000 Ethernet NIC ... Packets: 798 Displayed: 33 Marked: 0 Profile: Default

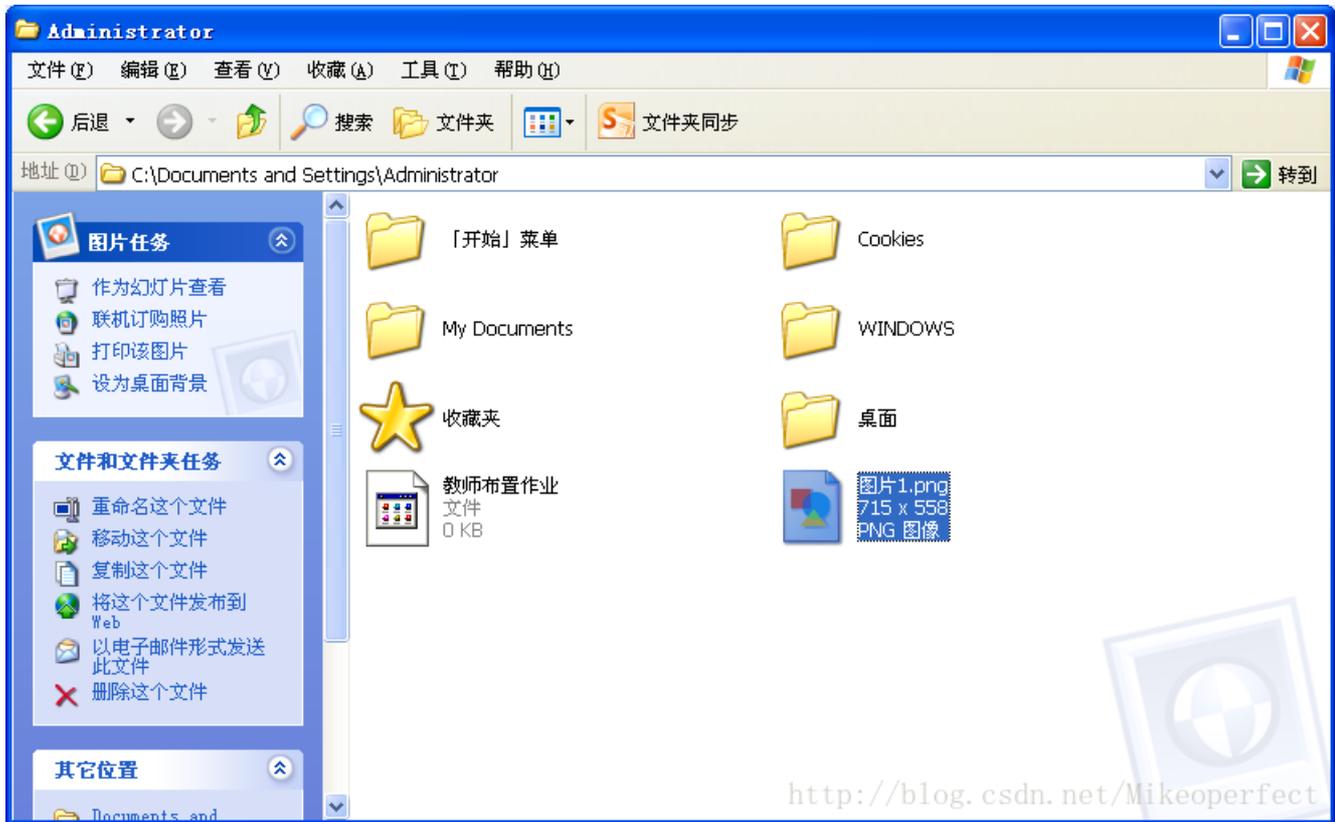
```

C:\WINDOWS\system32\cmd.exe

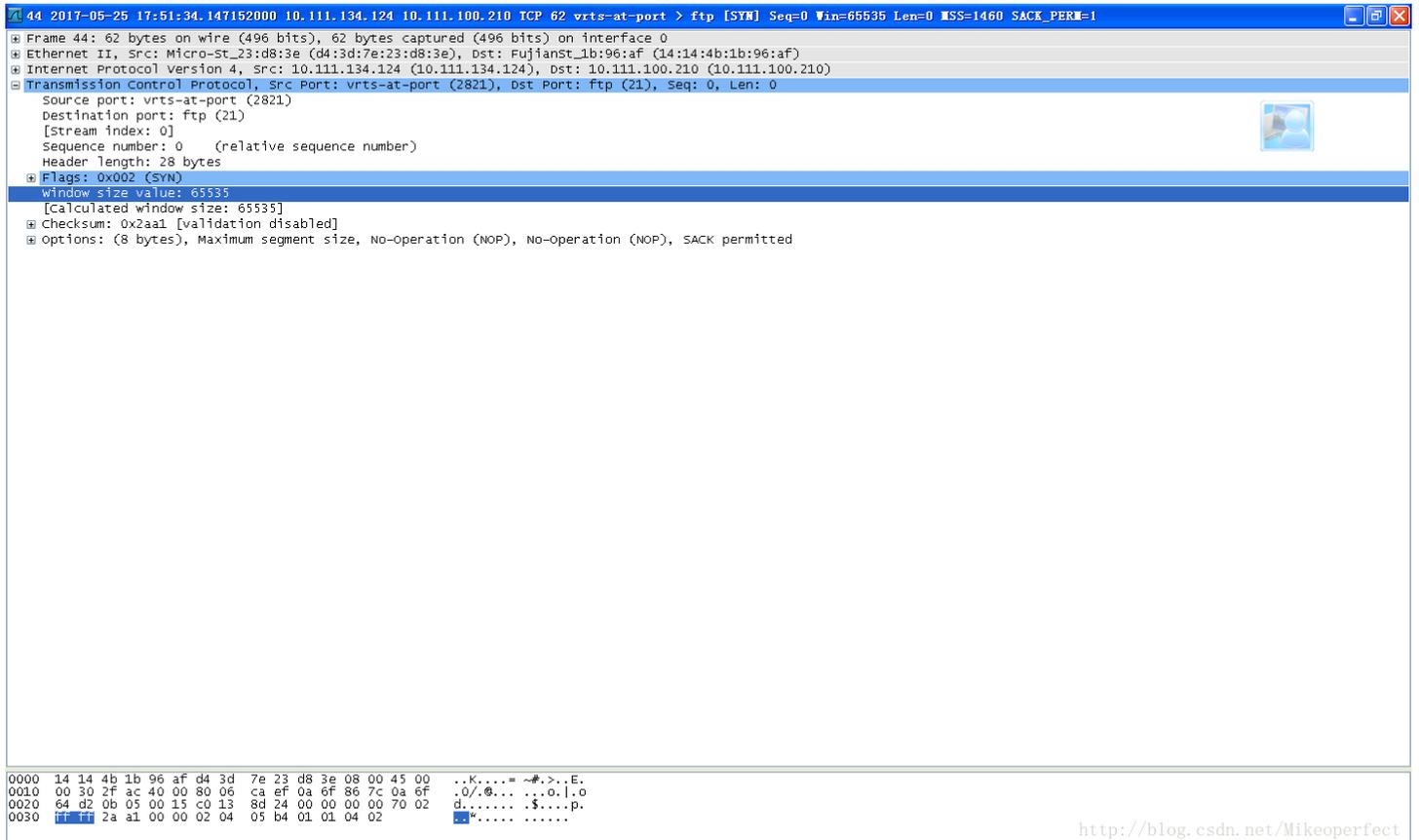
C:\Documents and Settings\Administrator>ftp 10.111.100.210
Connected to 10.111.100.210.
220 Serv-U FTP Server v12.1 ready...
User (10.111.100.210:(none)): anonymous
331 User name okay, please send complete E-mail address as pas
Password:
230 User logged in, proceed.
ftp> cd 教师布置作业
250 Directory changed to /教师布置作业
ftp> cd bdr
550 /教师布置作业/bdr: No such file or directory.
ftp> dbr
Invalid command.
ftp> cd dbr
250 Directory changed to /教师布置作业/dbr
ftp> get 图片1.png
200 PORT command successful.
150 Opening BINARY mode data connection for 图片1.png (148801
226 Transfer complete. 148,801 bytes transferred. 9,082.09 KB/
ftp: 收到 148801 字节, 用时 0.00Seconds 148801000.00Kbytes/sec
ftp> bye
221 Goodbye, closing session.

C:\Documents and Settings\Administrator>

```



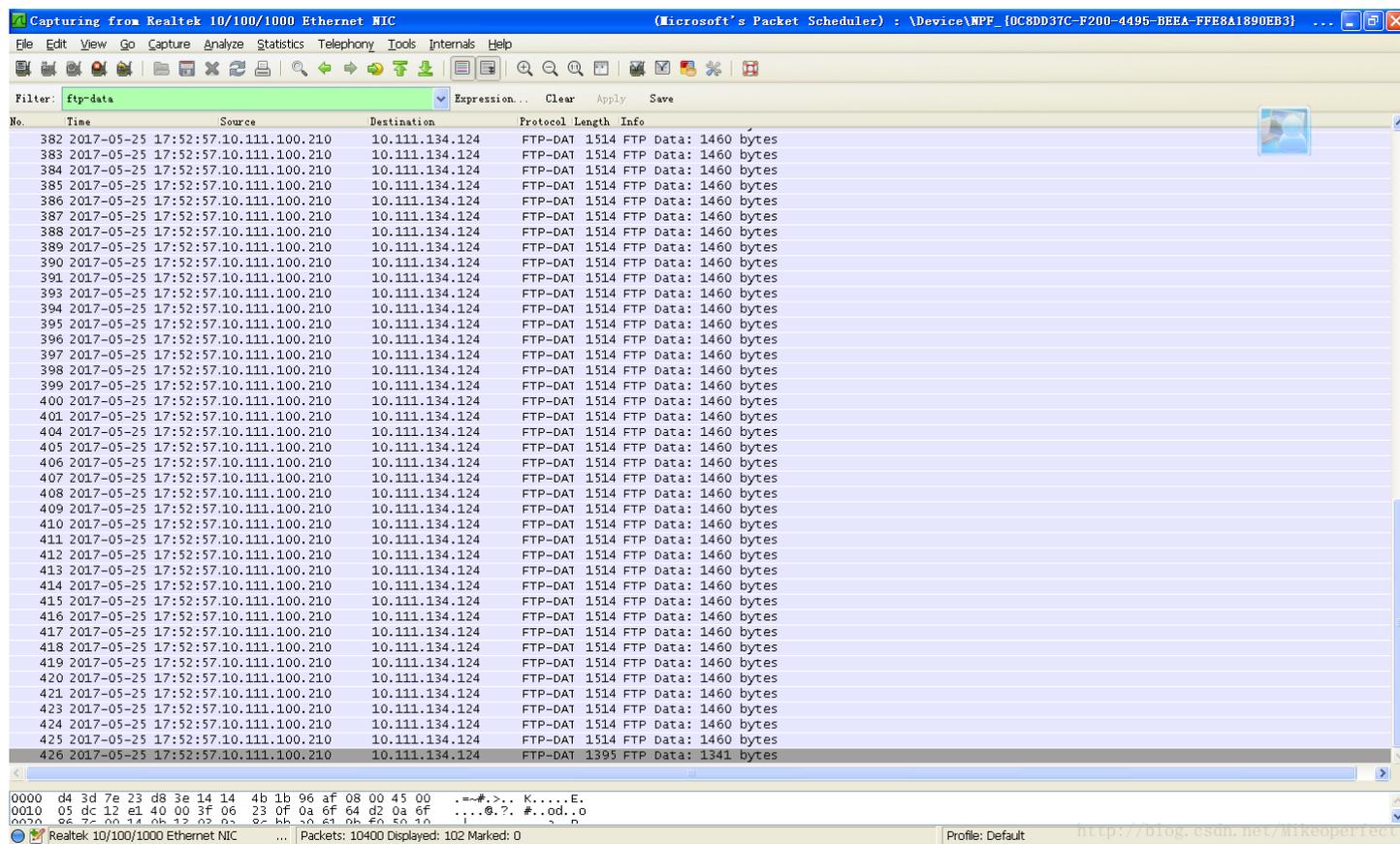
3、我们查看44号包，可以发现，客户端使用的是2821端口（临时端口），服务器使用的是21端口（熟知端口，同时验证是pasv模式，FTP传输分两步：1、控制信息在21号端口传输 2、数据信息在20号端口传输），并且可以得知44号包第一个握手报文段的首部是28个字节（加了SACK选项），同时客户端向服务器声明自己的接收窗口大小为65535字节，这也符合2的16次方报文段规定的大小。



4、查看303号包到430号包，发现缺少307号到429号包，分析303、304、305、306号包发现，客户端和服务器进行数据传输前的确认工作，303：服务器：我想连接客户端的4377（11,19）号端口（前面是状态端口，这个是数据端口）。304：客户端：客户端连接成功。305：客户端：请求图片1.png的信息。306：服务器：请求成功，给你文件信息。

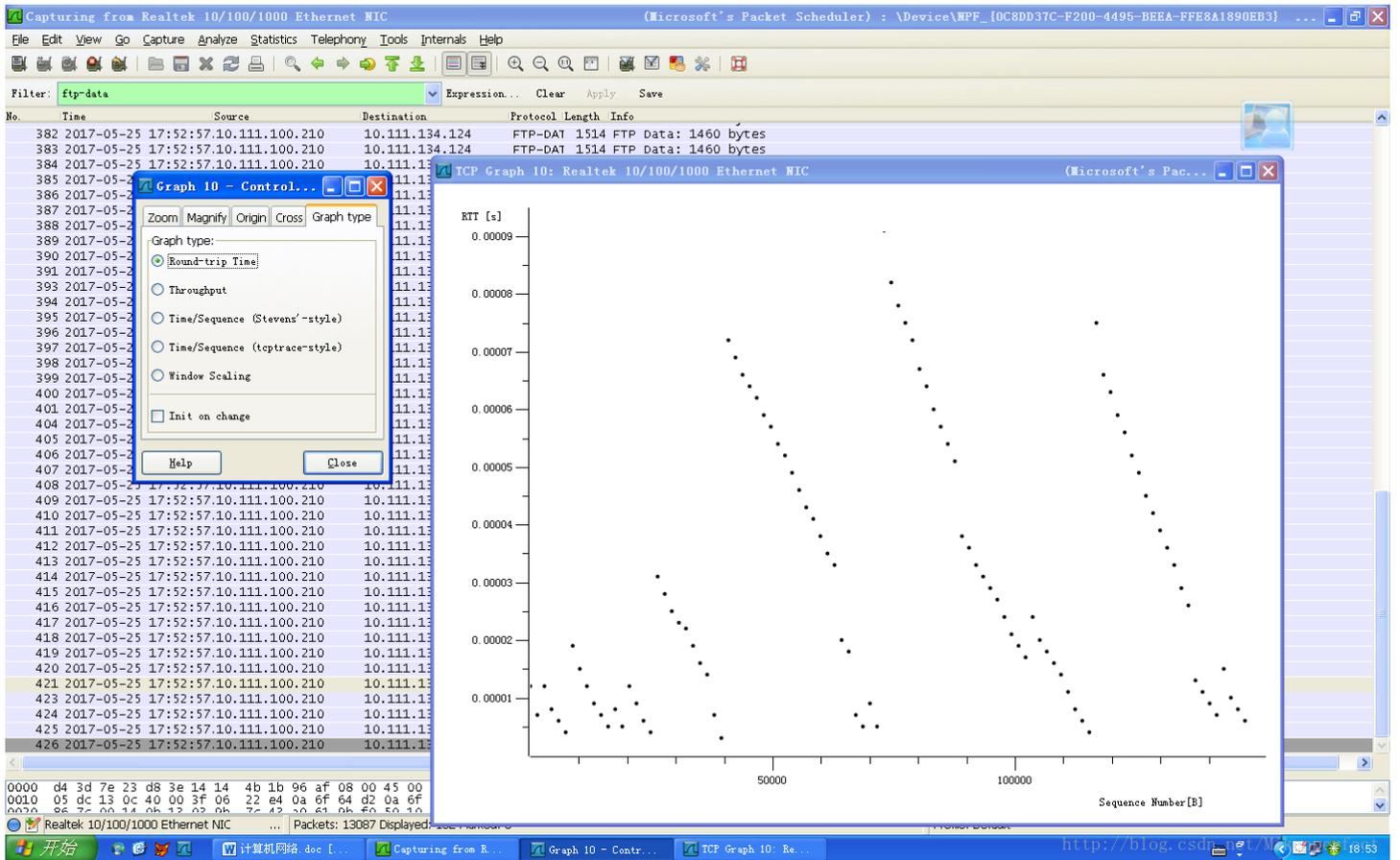
接下来就进入FTP的数据传输过程

在wireshark中的Filter中输入:ftp-data，进行数据包的过滤，



图片1.png的字节数是148801 Bytes，100多个包，每一次传输1460字节数据（目测该以太网最大传输单元为MTU=1500，1460+ip头部20+TCP头部20），结果也基本正确。

5、连续查看FTP数据传输时的TCP Graph RTT图，发现RTT大多都稳定在0.000085s之下，基本可以判断该链路TCP不存在拥塞状况



6、通过查看wireshark的专家信息，发现也没有出现数据包重传的情况，进一步判断该链路拥塞状况良好，基本排除拥塞的可能。



通过仔细排查TCP协议的报文段，没有发现重传的痕迹。

The screenshot shows a Wireshark capture of an FTP session. The main pane displays a list of packets with columns for No., Time, Source, Destination, Protocol, Length, and Info. The filter is set to 'tcp'. The packet list shows multiple FTP data transfers (1460 bytes) and control messages like 'Request: QUIT' and 'Response: 221 Goodbye, closing session.' The status bar at the bottom indicates 'Packets: 14694 Displayed: 252 Marked: 0'.

No.	Time	Source	Destination	Protocol	Length	Info
400	2017-05-25 17:52:57.10.111.100.210	10.111.134.124	10.111.134.124	FTP-DAI	1514	FTP Data: 1460 bytes
401	2017-05-25 17:52:57.10.111.100.210	10.111.134.124	10.111.100.210	FTP-DAI	1514	FTP Data: 1460 bytes
402	2017-05-25 17:52:57.10.111.134.124	10.111.100.210	10.111.100.210	TCP	54	evtp-data > ftp-data [ACK] Seq=1 Ack=116801 win=61155 Len=0
403	2017-05-25 17:52:57.10.111.134.124	10.111.100.210	10.111.100.210	TCP	54	[TCP window update] evtp-data > ftp-data [ACK] Seq=1 Ack=116801 win=64915 Len=0
404	2017-05-25 17:52:57.10.111.100.210	10.111.134.124	10.111.134.124	FTP-DAI	1514	FTP Data: 1460 bytes
405	2017-05-25 17:52:57.10.111.100.210	10.111.134.124	10.111.134.124	FTP-DAI	1514	FTP Data: 1460 bytes
406	2017-05-25 17:52:57.10.111.100.210	10.111.134.124	10.111.134.124	FTP-DAI	1514	FTP Data: 1460 bytes
407	2017-05-25 17:52:57.10.111.100.210	10.111.134.124	10.111.134.124	FTP-DAI	1514	FTP Data: 1460 bytes
408	2017-05-25 17:52:57.10.111.100.210	10.111.134.124	10.111.134.124	FTP-DAI	1514	FTP Data: 1460 bytes
409	2017-05-25 17:52:57.10.111.100.210	10.111.134.124	10.111.134.124	FTP-DAI	1514	FTP Data: 1460 bytes
410	2017-05-25 17:52:57.10.111.100.210	10.111.134.124	10.111.134.124	FTP-DAI	1514	FTP Data: 1460 bytes
411	2017-05-25 17:52:57.10.111.100.210	10.111.134.124	10.111.134.124	FTP-DAI	1514	FTP Data: 1460 bytes
412	2017-05-25 17:52:57.10.111.100.210	10.111.134.124	10.111.134.124	FTP-DAI	1514	FTP Data: 1460 bytes
413	2017-05-25 17:52:57.10.111.100.210	10.111.134.124	10.111.134.124	FTP-DAI	1514	FTP Data: 1460 bytes
414	2017-05-25 17:52:57.10.111.100.210	10.111.134.124	10.111.134.124	FTP-DAI	1514	FTP Data: 1460 bytes
415	2017-05-25 17:52:57.10.111.100.210	10.111.134.124	10.111.134.124	FTP-DAI	1514	FTP Data: 1460 bytes
416	2017-05-25 17:52:57.10.111.100.210	10.111.134.124	10.111.134.124	FTP-DAI	1514	FTP Data: 1460 bytes
417	2017-05-25 17:52:57.10.111.100.210	10.111.134.124	10.111.134.124	FTP-DAI	1514	FTP Data: 1460 bytes
418	2017-05-25 17:52:57.10.111.100.210	10.111.134.124	10.111.134.124	FTP-DAI	1514	FTP Data: 1460 bytes
419	2017-05-25 17:52:57.10.111.100.210	10.111.134.124	10.111.134.124	FTP-DAI	1514	FTP Data: 1460 bytes
420	2017-05-25 17:52:57.10.111.100.210	10.111.134.124	10.111.134.124	FTP-DAI	1514	FTP Data: 1460 bytes
421	2017-05-25 17:52:57.10.111.100.210	10.111.134.124	10.111.134.124	FTP-DAI	1514	FTP Data: 1460 bytes
422	2017-05-25 17:52:57.10.111.134.124	10.111.100.210	10.111.100.210	TCP	54	evtp-data > ftp-data [ACK] Seq=1 Ack=143081 win=65535 Len=0
423	2017-05-25 17:52:57.10.111.100.210	10.111.134.124	10.111.134.124	FTP-DAI	1514	FTP Data: 1460 bytes
424	2017-05-25 17:52:57.10.111.100.210	10.111.134.124	10.111.134.124	FTP-DAI	1514	FTP Data: 1460 bytes
425	2017-05-25 17:52:57.10.111.100.210	10.111.134.124	10.111.134.124	FTP-DAI	1514	FTP Data: 1460 bytes
426	2017-05-25 17:52:57.10.111.100.210	10.111.134.124	10.111.134.124	FTP-DAI	1395	FTP Data: 1341 bytes
427	2017-05-25 17:52:57.10.111.134.124	10.111.100.210	10.111.100.210	TCP	54	evtp-data > ftp-data [ACK] Seq=1 Ack=148803 win=65535 Len=0
428	2017-05-25 17:52:57.10.111.134.124	10.111.100.210	10.111.100.210	TCP	54	evtp-data > ftp-data [FIN, ACK] Seq=1 Ack=148803 win=65535 Len=0
429	2017-05-25 17:52:57.10.111.100.210	10.111.134.124	10.111.134.124	TCP	60	ftp-data > evtp-data [ACK] Seq=148803 Ack=2 win=10485760 Len=0
430	2017-05-25 17:52:57.10.111.134.124	10.111.100.210	10.111.100.210	TCP	54	vrts-at-port > ftp [ACK] Seq=110 Ack=375 win=65161 Len=0
431	2017-05-25 17:52:57.10.111.100.210	10.111.134.124	10.111.134.124	FTP	122	Response: 226 Transfer complete. 148,801 bytes transferred. 9,082.09 KB/sec.
432	2017-05-25 17:52:58.10.111.134.124	10.111.100.210	10.111.100.210	TCP	54	vrts-at-port > ftp [ACK] Seq=110 Ack=443 win=65093 Len=0
502	2017-05-25 17:53:25.10.111.134.124	10.111.100.210	10.111.100.210	FTP	60	Request: QUIT
503	2017-05-25 17:53:25.10.111.100.210	10.111.134.124	10.111.134.124	FTP	85	Response: 221 Goodbye, closing session.
504	2017-05-25 17:53:25.10.111.134.124	10.111.100.210	10.111.100.210	TCP	54	vrts-at-port > ftp [FIN, ACK] Seq=116 Ack=474 win=65062 Len=0
505	2017-05-25 17:53:25.10.111.100.210	10.111.134.124	10.111.134.124	TCP	60	ftp > vrts-at-port [ACK] Seq=474 Ack=117 win=64125 Len=0
506	2017-05-25 17:53:25.10.111.100.210	10.111.134.124	10.111.134.124	TCP	60	ftp > vrts-at-port [FIN, ACK] Seq=474 Ack=117 win=64125 Len=0
507	2017-05-25 17:53:25.10.111.134.124	10.111.100.210	10.111.100.210	TCP	54	vrts-at-port > ftp [ACK] Seq=117 Ack=475 win=65062 Len=0
4328	2017-05-25 18:13:08.10.111.134.224	10.111.134.224	10.111.134.224	TCP	66	49210 > netbios-ssn [SYN] Seq=0 Win=8192 Len=0 MSS=1460 WS=256 SACK_PERM=1
4329	2017-05-25 18:13:08.10.111.134.124	10.111.134.224	10.111.134.224	TCP	66	netbios-ssn > 49210 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=1 SACK_PERM=1

总结:

本次实验最大的收获就是通过wireshark进一步立即了计算机网络相关协议的联系，本次实验的对象是FTP，通过对FTP的研究，深刻的认识到各协议之间的紧密联系，同时也明白了计算机网络分层的强大之处。