

实验3

计非211班 - 学号202131990522 - 姓名 嵇纹培

一、接受远程主机发送的信息

- 设置通讯模式为TCP Server，设置远程主机ip地址，选择本地端口为1005，另一台主机完成相关设置并发送相关信息即可在本地受到相关信息。

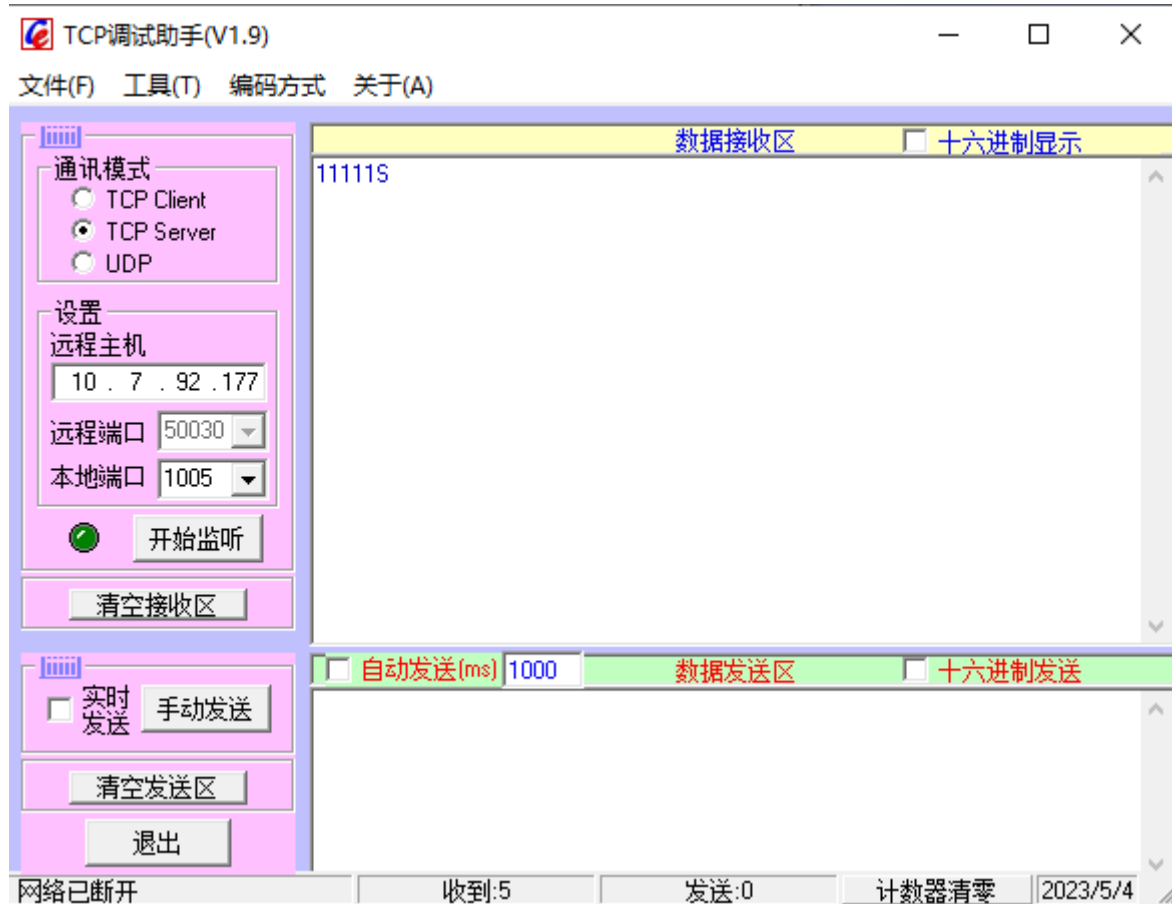


图1 接收信息

二、进行抓包实验

1、三次招手

Frame Summary - [Conversation Filter]

Find ↓ ↑ Autoscroll Color Rules Aliases Columns

Frame Number	Time Date Local Adjusted	Time Offset	Process Name	Source	Destination	Protocol Name	Description
160	19:52:34 2023/5/4	8.8803665	TCP	10.7.92.177	10.7.92.174	TCP	TCP-Flags=.....S., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442395, Ack=0, Win=64240
161	19:52:34 2023/5/4	8.8805765	TCP	10.7.92.174	10.7.92.177	TCP	TCP-Flags=...A..S., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289658, Ack=2672442396, Win=64240
162	19:52:34 2023/5/4	8.8807355	TCP	10.7.92.177	10.7.92.174	TCP	TCP-Flags=...A....., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442396, Ack=3747289659, Win=64240
232	19:52:38 2023/5/4	12.3072995	TCP	10.7.92.177	10.7.92.174	TCP	TCP-Flags=...A....., SrcPort=50030, DstPort=1005, PayloadLen=5, Seq=2672442396 - 2672442401, Ack=3747289659, Win=64240
234	19:52:38 2023/5/4	12.3559230	TCP	10.7.92.174	10.7.92.177	TCP	TCP-Flags=...A....., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289659, Ack=2672442401, Win=64240
750	19:53:03 2023/5/4	37.4359197	TCP	10.7.92.174	10.7.92.177	TCP	TCP-Flags=...A..F, SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289659, Ack=2672442401, Win=64240
751	19:53:03 2023/5/4	37.4361781	TCP	10.7.92.177	10.7.92.174	TCP	TCP-Flags=...A....., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442401, Ack=3747289660, Win=64240
752	19:53:03 2023/5/4	37.4428274	TCP	10.7.92.177	10.7.92.174	TCP	TCP-Flags=...A.....F, SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442401, Ack=3747289660, Win=64240
754	19:53:03 2023/5/4	37.4428541	TCP	10.7.92.174	10.7.92.177	TCP	TCP-Flags=...A....., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289660, Ack=2672442402, Win=64240

Frame Details

DetPort: 1005
 SequenceNumber: 2672442395 (0x9F4A3C1B)
 AcknowledgementNumber: 0 (0x0)
 DataOffset: 128 (0x80)
 Flags:S.
 CWR: (0.....) CWR not significant
 ECE: (.0.....) ECN-Echo not significant
 Urgent: (.0.....) Not Urgent Data
 Ack: (...0....) Acknowledgement field not significant
 Push: (....0...) No Push Function
 Reset: (....0..) No Reset
 Syn: (.....1.) Synchronize sequence numbers
 Fin: (.....0) Not End of data
 Window: 64240 (Negotiating scale factor 0x8) = 64240
 Checksum: 0x3F1 Good

Hex Details

Decode As Width Prot Off: 13 (0x0D) Frame Off: 47 (0x2F) Sel Byt

```

0000 2C F0 5D 47 37 DA 2C F0 5D 47 38 6E ,G70n,G70
000C 08 00 45 00 00 34 0F 2A 40 00 80 06 ..E..4A88.
0018 1E 2D 0A 07 5C B1 0A 07 5C AE C3 6E ...\.0..±.i
0024 03 ED 9F 4A 3C 1B 00 00 00 00 80 02 .i J<.....
0030 FA F0 03 F1 00 00 02 04 05 B4 01 03 ú.ß.....
003C 03 08 01 01 04 02 .....

```

图2 挥手1

Frame Summary - [Conversation Filter]

Find ↓ ↑ Autoscroll Color Rules Aliases Columns

Frame Number	Time Date Local Adjusted	Time Offset	Process Name	Source	Destination	Protocol Name	Description
160	19:52:34 2023/5/4	8.8803665	TCP	10.7.92.177	10.7.92.174	TCP	TCP-Flags=.....S., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442395, Ack=0, Win=64240
161	19:52:34 2023/5/4	8.8805765	TCP	10.7.92.174	10.7.92.177	TCP	TCP-Flags=...A..S., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289658, Ack=2672442396, Win=64240
162	19:52:34 2023/5/4	8.8807355	TCP	10.7.92.177	10.7.92.174	TCP	TCP-Flags=...A....., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442396, Ack=3747289659, Win=64240
232	19:52:38 2023/5/4	12.3072995	TCP	10.7.92.177	10.7.92.174	TCP	TCP-Flags=...A....., SrcPort=50030, DstPort=1005, PayloadLen=5, Seq=2672442396 - 2672442401, Ack=3747289659, Win=64240
234	19:52:38 2023/5/4	12.3559230	TCP	10.7.92.174	10.7.92.177	TCP	TCP-Flags=...A....., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289659, Ack=2672442401, Win=64240
750	19:53:03 2023/5/4	37.4359197	TCP	10.7.92.174	10.7.92.177	TCP	TCP-Flags=...A..F, SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289659, Ack=2672442401, Win=64240
751	19:53:03 2023/5/4	37.4361781	TCP	10.7.92.177	10.7.92.174	TCP	TCP-Flags=...A....., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442401, Ack=3747289660, Win=64240
752	19:53:03 2023/5/4	37.4428274	TCP	10.7.92.177	10.7.92.174	TCP	TCP-Flags=...A.....F, SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442401, Ack=3747289660, Win=64240
754	19:53:03 2023/5/4	37.4428541	TCP	10.7.92.174	10.7.92.177	TCP	TCP-Flags=...A....., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289660, Ack=2672442402, Win=64240

Frame Details

Tcp: Flags=...A..S., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289658, Ack=2672442396, Win=64240
 SrcPort: 1005
 DstPort: 50030
 SequenceNumber: 3747289658 (0xDF5B1A3A)
 AcknowledgementNumber: 2672442396 (0x9F4A3C1C)
 DataOffset: 128 (0x80)
 Flags: ...A..S.
 CWR: (0.....) CWR not significant
 ECE: (.0.....) ECN-Echo not significant
 Urgent: (.0.....) Not Urgent Data
 Ack: (...1....) Acknowledgement field significant
 Push: (....0...) No Push Function
 Reset: (....0..) No Reset
 Syn: (.....1.) Synchronize sequence numbers
 Fin: (.....0) Not End of data

Hex Details

Decode As Width Prot Off: 13 (0x0D) Frame Off: 47 (0x2F) Sel Byt

```

0000 2C F0 5D 47 38 6E 2C F0 5D 47 37 DA ,G70n,G70
000C 08 00 45 00 00 34 E0 D1 40 00 80 06 ..E..4A88.
0018 00 00 0A 07 5C AE 0A 07 5C B1 03 ED ...\.0..±.i
0024 C3 6E DF 5B 1A 3A 9F 4A 3C 1C 80 .3 ÂnB[.: J<.
0030 FF FF CD 93 00 00 02 04 05 B4 01 03 yyi .....
003C 03 08 01 01 04 02 .....

```

Displayed: 9 Dropped: 0 Captured: 843 Pending: 0 Focused: 161 Selected: 1

图3 挥手2

Frame Number	Time Date Local Adjusted	Time Offset	Process Name	Source	Destination	Protocol Name	Description
160	19:52:34 2023/5/4	8.8803665	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=.....S., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442395, Ack=0, Win=64240
161	19:52:34 2023/5/4	8.8805765	TCP	10.7.92.174	10.7.92.177	TCP	TCP:Flags=...A..S., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289658, Ack=2672442396
162	19:52:34 2023/5/4	8.8807355	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=...A...., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442396, Ack=3747289659
232	19:52:38 2023/5/4	12.3072995	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=...AP..., SrcPort=50030, DstPort=1005, PayloadLen=5, Seq=2672442396 - 2672442401, Ack
234	19:52:38 2023/5/4	12.3559230	TCP	10.7.92.174	10.7.92.177	TCP	TCP:Flags=...A...., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289659, Ack=2672442401
750	19:53:03 2023/5/4	37.4359197	TCP	10.7.92.174	10.7.92.177	TCP	TCP:Flags=...A...., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289659, Ack=2672442401
751	19:53:03 2023/5/4	37.4361781	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=...A...., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442401, Ack=3747289660
752	19:53:03 2023/5/4	37.4428274	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=...A...., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442401, Ack=3747289660
754	19:53:03 2023/5/4	37.4428541	TCP	10.7.92.174	10.7.92.177	TCP	TCP:Flags=...A...., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289660, Ack=2672442402

Frame Details		Hex Details	
Tcp: Flags=...A...., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442396 SrcPort: 50030 DstPort: 1005 SequenceNumber: 2672442396 (0x9F4A3C1C) AcknowledgementNumber: 3747289659 (0xDF5B1A3B) DataOffset: 80 (0x50) Flags: ...A.... CWR: (0.....) CWR not significant ECE: (.0.....) ECN-Echo not significant Urgent: (.0.....) Not Urgent Data Ack: (...1....) Acknowledgement field significant Push: (....0..) No Push Function Reset: (.....0.) No Reset Syn: (.....0.) Not Synchronize sequence numbers Fin: (.....0.) Not End of data		Decode As Width Prot Off: 13 (0x0D) Frame Off: 47 (0x2F) Sel Byte 0000 2C F0 5D 47 37 DA 2C F0 5D 47 38 6E ,8]G7U,8]G8n 000C 08 00 45 00 00 28 0F 2B 40 00 80 06 ..E...+.0. 0018 1E 38 0A 07 5C B1 0A 07 5C AE C3 6E .8..+..0An 0024 03 ED 9F 4A 3C 1C DF 5B 1A 3B 50 18 .i J<.B[.:F 0030 20 14 25 FA 00 00 00 00 00 00 00 00 .0u..... 003C	

图4 挥手3

2、两次握手

Frame Number	Time Date Local Adjusted	Time Offset	Process Name	Source	Destination	Protocol Name	Description
160	19:52:34 2023/5/4	8.8803665	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=.....S., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442395, Ack=0, Win=64240
161	19:52:34 2023/5/4	8.8805765	TCP	10.7.92.174	10.7.92.177	TCP	TCP:Flags=...A..S., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289658, Ack=2672442396
162	19:52:34 2023/5/4	8.8807355	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=...A...., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442396, Ack=3747289659
232	19:52:38 2023/5/4	12.3072995	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=...AP..., SrcPort=50030, DstPort=1005, PayloadLen=5, Seq=2672442396 - 2672442401, Ack
234	19:52:38 2023/5/4	12.3559230	TCP	10.7.92.174	10.7.92.177	TCP	TCP:Flags=...A...., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289659, Ack=2672442401
750	19:53:03 2023/5/4	37.4359197	TCP	10.7.92.174	10.7.92.177	TCP	TCP:Flags=...A...., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289659, Ack=2672442401
751	19:53:03 2023/5/4	37.4361781	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=...A...., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442401, Ack=3747289660
752	19:53:03 2023/5/4	37.4428274	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=...A...., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442401, Ack=3747289660
754	19:53:03 2023/5/4	37.4428541	TCP	10.7.92.174	10.7.92.177	TCP	TCP:Flags=...A...., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289660, Ack=2672442402

Frame Details		Hex Details	
Tcp: Flags=...AP..., SrcPort=50030, DstPort=1005, PayloadLen=5, Seq=2672442396 SrcPort: 50030 DstPort: 1005 SequenceNumber: 2672442396 (0x9F4A3C1C) AcknowledgementNumber: 3747289659 (0xDF5B1A3B) DataOffset: 80 (0x50) Flags: ...AP... CWR: (0.....) CWR not significant ECE: (.0.....) ECN-Echo not significant Urgent: (.0.....) Not Urgent Data Ack: (...1....) Acknowledgement field significant Push: (....1..) Push Function Reset: (.....0.) No Reset Syn: (.....0.) Not Synchronize sequence numbers Fin: (.....0.) Not End of data		Decode As Width Prot Off: 13 (0x0D) Frame Off: 47 (0x2F) Sel Byte 0000 2C F0 5D 47 37 DA 2C F0 5D 47 38 6E ,8]G7U,8]G8n 000C 08 00 45 00 00 2D 0F 2C 40 00 80 06 ..E...+.0. 0018 1E 32 0A 07 5C B1 0A 07 5C AE C3 6E .2..+..0An 0024 03 ED 9F 4A 3C 1C DF 5B 1A 3B 50 18 .i J<.B[.:F 0030 20 14 92 8A 00 00 31 31 31 31 31 00 . .11111. 003C	

图5 握手1

Frame Number	Time Date Local Adjusted	Time Offset	Process Name	Source	Destination	Protocol Name	Description
160	19:52:34 2023/5/4	8.8803665	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=.....S., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442395, Ack=0, Win=64240
161	19:52:34 2023/5/4	8.8805765	TCP	10.7.92.174	10.7.92.177	TCP	TCP:Flags=...A.S., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289658, Ack=2672442396, Win=64240
162	19:52:34 2023/5/4	8.8807355	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=...A....., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442396, Ack=3747289659, Win=64240
232	19:52:38 2023/5/4	12.3072995	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=...AP...., SrcPort=50030, DstPort=1005, PayloadLen=5, Seq=2672442396 - 2672442401, Ack=3747289660, Win=64240
234	19:52:38 2023/5/4	12.3559230	TCP	10.7.92.174	10.7.92.177	TCP	TCP:Flags=...A....., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289659, Ack=2672442401, Win=64240
750	19:53:03 2023/5/4	37.4359197	TCP	10.7.92.174	10.7.92.177	TCP	TCP:Flags=...A..F, SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289659, Ack=2672442401, Win=64240
751	19:53:03 2023/5/4	37.4361781	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=...A....., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442401, Ack=3747289660, Win=64240
752	19:53:03 2023/5/4	37.4428274	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=...A..F, SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442401, Ack=3747289660, Win=64240
754	19:53:03 2023/5/4	37.4428541	TCP	10.7.92.174	10.7.92.177	TCP	TCP:Flags=...A....., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289660, Ack=2672442402, Win=64240

Frame Details	Hex Details
Top: Flags=...A....., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289659, Ack=2672442401, Win=64240 SrcPort: 1005 DstPort: 50030 SequenceNumber: 3747289659 (0xDF5B1A3B) AcknowledgementNumber: 2672442401 (0x9F4A3C21) DataOffset: 80 (0x50) Flags: ...A..... CWR: (0.....) CWR not significant ECE: (0.....) ECN-Echo not significant Urgent: (..0.....) Not Urgent Data Ack: (...1....) Acknowledgement field significant Push: (....0....) No Push Function Reset: (.....0..) No Reset Syn: (.....0..) Not Synchronize sequence numbers Fin: (.....0..) Not End of data	Decode As Width Prot Off: 13 (0x0D) Frame Off: 47 (0x2F) Sel Byt 0000 2C F0 5D 47 38 6E 2C F0 5D 47 37 DA ,8]G8n,8]G7U 000C 08 00 45 00 00 28 E0 D2 40 00 80 06 ..E..(808. . 0018 00 00 0A 07 5C AE 0A 07 5C B1 03 ED ...\\8..\\±.i 0024 C3 6E DF 5B 1A 3B 9F 4A 3C 21 50 10 An8[.: J<1F 0030 20 14 CD 87 00 00 .i ..

Displayed: 9 Dropped: 0 Captured: 843 Pending: 0 Focused: 234 Selected: 1

图6 握手2

3、四次挥手

Frame Number	Time Date Local Adjusted	Time Offset	Process Name	Source	Destination	Protocol Name	Description
160	19:52:34 2023/5/4	8.8803665	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=.....S., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442395, Ack=0, Win=64240
161	19:52:34 2023/5/4	8.8805765	TCP	10.7.92.174	10.7.92.177	TCP	TCP:Flags=...A.S., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289658, Ack=2672442396, Win=64240
162	19:52:34 2023/5/4	8.8807355	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=...A....., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442396, Ack=3747289659, Win=64240
232	19:52:38 2023/5/4	12.3072995	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=...AP...., SrcPort=50030, DstPort=1005, PayloadLen=5, Seq=2672442396 - 2672442401, Ack=3747289660, Win=64240
234	19:52:38 2023/5/4	12.3559230	TCP	10.7.92.174	10.7.92.177	TCP	TCP:Flags=...A....., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289659, Ack=2672442401, Win=64240
750	19:53:03 2023/5/4	37.4359197	TCP	10.7.92.174	10.7.92.177	TCP	TCP:Flags=...A..F, SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289659, Ack=2672442401, Win=64240
751	19:53:03 2023/5/4	37.4361781	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=...A....., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442401, Ack=3747289660, Win=64240
752	19:53:03 2023/5/4	37.4428274	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=...A..F, SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442401, Ack=3747289660, Win=64240
754	19:53:03 2023/5/4	37.4428541	TCP	10.7.92.174	10.7.92.177	TCP	TCP:Flags=...A....., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289660, Ack=2672442402, Win=64240

Frame Details	Hex Details
Top: Flags=...A..F, SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289659, Ack=2672442401, Win=64240 SrcPort: 1005 DstPort: 50030 SequenceNumber: 3747289659 (0xDF5B1A3B) AcknowledgementNumber: 2672442401 (0x9F4A3C21) DataOffset: 80 (0x50) Flags: ...A..F CWR: (0.....) CWR not significant ECE: (0.....) ECN-Echo not significant Urgent: (..0.....) Not Urgent Data Ack: (...1....) Acknowledgement field significant Push: (....0....) No Push Function Reset: (.....0..) No Reset Syn: (.....0..) Not Synchronize sequence numbers Fin: (.....1..) End of data	Decode As Width Prot Off: 13 (0x0D) Frame Off: 47 (0x2F) Sel Byt 0000 2C F0 5D 47 38 6E 2C F0 5D 47 37 DA ,8]G8n,8]G7U 000C 08 00 45 00 00 28 E0 D3 40 00 80 06 ..E..(808. . 0018 00 00 0A 07 5C AE 0A 07 5C B1 03 ED ...\\8..\\±.i 0024 C3 6E DF 5B 1A 3B 9F 4A 3C 21 50 10 An8[.: J<1F 0030 20 14 CD 87 00 00 .i ..

图7 挥手1

Frame Number	Time Date Local Adjusted	Time Offset	Process Name	Source	Destination	Protocol Name	Description
160	19:52:34 2023/5/4	8.8803665	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=.....S., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442395, Ack=0, Win=6424
161	19:52:34 2023/5/4	8.8805765	TCP	10.7.92.174	10.7.92.177	TCP	TCP:Flags=...A..S., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289658, Ack=2672442396
162	19:52:34 2023/5/4	8.8807355	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=...A....., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442396, Ack=3747289659
232	19:52:38 2023/5/4	12.3072995	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=...AP....., SrcPort=50030, DstPort=1005, PayloadLen=5, Seq=2672442396 - 2672442401, Ack
234	19:52:38 2023/5/4	12.3559230	TCP	10.7.92.174	10.7.92.177	TCP	TCP:Flags=...A....., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289659, Ack=2672442401
750	19:53:03 2023/5/4	37.4359197	TCP	10.7.92.174	10.7.92.177	TCP	TCP:Flags=...A...F, SrcPort=50030, DstPort=1005, Seq=3747289659, Ack=2672442401
751	19:53:03 2023/5/4	37.4361781	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=...A....., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442401, Ack=3747289660
752	19:53:03 2023/5/4	37.4428274	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=...A...F, SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442401, Ack=3747289660
754	19:53:03 2023/5/4	37.4428541	TCP	10.7.92.174	10.7.92.177	TCP	TCP:Flags=...A....., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289660, Ack=2672442402

Frame Details	Hex Details
<p>Tcp: Flags=...A....., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442401 (0x9F4A3C21)</p> <p>AcknowledgementNumber: 3747289660 (0xDF5B1A3C)</p> <p>DataOffset: 80 (0x50)</p> <p>Flags: ...A.....</p> <ul style="list-style-type: none"> -CWR: (0.....) CWR not significant -ECE: (.0.....) ECN-Echo not significant -Urgent: (...0.....) Not Urgent Data -Ack: (...1.....) Acknowledgement field significant -Push: (....0....) No Push Function -Reset: (.....0..) No Reset -Syn: (.....0.) Not Synchronize sequence numbers -Fin: (.....0) Not End of data 	<p>Decode As Width Prot Off: 13 (0x0D) Frame Off: 47 (0x2F) Sel Byt</p> <pre> 0000 2C F0 5D 47 37 DA 2C F0 5D 47 38 6E 06 08 08 000C 08 00 45 00 00 28 0F 2D 40 00 80 06 06 06 0018 1E 36 0A 07 5C B1 0A 07 5C AE C3 6E 06 06 0024 03 ED 9F 4A 3C 21 DF 5B 1A 3C 50 10 10 10 0030 20 14 25 F4 00 00 00 00 00 00 00 00 00 00 003C </pre>

图8 挥手2

Frame Number	Time Date Local Adjusted	Time Offset	Process Name	Source	Destination	Protocol Name	Description
160	19:52:34 2023/5/4	8.8803665	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=.....S., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442395, Ack=0, Win=6424
161	19:52:34 2023/5/4	8.8805765	TCP	10.7.92.174	10.7.92.177	TCP	TCP:Flags=...A..S., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289658, Ack=2672442396
162	19:52:34 2023/5/4	8.8807355	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=...A....., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442396, Ack=3747289659
232	19:52:38 2023/5/4	12.3072995	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=...AP....., SrcPort=50030, DstPort=1005, PayloadLen=5, Seq=2672442396 - 2672442401, Ad
234	19:52:38 2023/5/4	12.3559230	TCP	10.7.92.174	10.7.92.177	TCP	TCP:Flags=...A....., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289659, Ack=2672442401
750	19:53:03 2023/5/4	37.4359197	TCP	10.7.92.174	10.7.92.177	TCP	TCP:Flags=...A...F, SrcPort=50030, DstPort=1005, Seq=3747289659, Ack=2672442401
751	19:53:03 2023/5/4	37.4361781	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=...A....., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442401, Ack=3747289660
752	19:53:03 2023/5/4	37.4428274	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=...A...F, SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442401, Ack=3747289660
754	19:53:03 2023/5/4	37.4428541	TCP	10.7.92.174	10.7.92.177	TCP	TCP:Flags=...A....., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289660, Ack=2672442402

Frame Details	Hex Details
<p>Tcp: Flags=...A...F, SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442401 (0x9F4A3C21)</p> <p>AcknowledgementNumber: 3747289660 (0xDF5B1A3C)</p> <p>DataOffset: 80 (0x50)</p> <p>Flags: ...A...F</p> <ul style="list-style-type: none"> -CWR: (0.....) CWR not significant -ECE: (.0.....) ECN-Echo not significant -Urgent: (...0.....) Not Urgent Data -Ack: (...1.....) Acknowledgement field significant -Push: (....0....) No Push Function -Reset: (.....0..) No Reset -Syn: (.....0.) Not Synchronize sequence numbers -Fin: (.....0) End of data 	<p>Decode As Width Prot Off: 13 (0x0D) Frame Off: 47 (0x2F) Sel Byt</p> <pre> 0000 2C F0 5D 47 37 DA 2C F0 5D 47 38 6E 06 08 08 000C 08 00 45 00 00 28 0F 2E 40 00 80 06 06 06 0018 1E 35 0A 07 5C B1 0A 07 5C AE C3 6E 06 06 0024 03 ED 9F 4A 3C 21 DF 5B 1A 3C 50 10 10 10 0030 20 14 25 F3 00 00 00 00 00 00 00 00 00 00 003C </pre>

图9 挥手3

Frame Number	Time Date Local Adjusted	Time Offset	Process Name	Source	Destination	Protocol Name	Description
160	19:52:34 2023/5/4	8.8803665	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=.....S., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442395, Ack=0, Win=6424
161	19:52:34 2023/5/4	8.8805765	TCP	10.7.92.174	10.7.92.177	TCP	TCP:Flags=...A..S., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289658, Ack=2672442396
162	19:52:34 2023/5/4	8.8807355	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=...A....., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442396, Ack=3747289659
232	19:52:38 2023/5/4	12.3072995	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=...AP...., SrcPort=50030, DstPort=1005, PayloadLen=5, Seq=2672442396 - 2672442401, Ad
234	19:52:38 2023/5/4	12.3359230	TCP	10.7.92.174	10.7.92.177	TCP	TCP:Flags=...A....., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289659, Ack=2672442401
750	19:53:03 2023/5/4	37.4359197	TCP	10.7.92.174	10.7.92.177	TCP	TCP:Flags=...A...F., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289659, Ack=2672442401
751	19:53:03 2023/5/4	37.4361781	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=...A....., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442401, Ack=3747289660
752	19:53:03 2023/5/4	37.4428274	TCP	10.7.92.177	10.7.92.174	TCP	TCP:Flags=...A...F., SrcPort=50030, DstPort=1005, PayloadLen=0, Seq=2672442401, Ack=3747289660
754	19:53:03 2023/5/4	37.4428541	TCP	10.7.92.174	10.7.92.177	TCP	TCP:Flags=...A....., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289660, Ack=2672442402

Frame Details		Hex Details	
Tcp: Flags=...A....., SrcPort=1005, DstPort=50030, PayloadLen=0, Seq=3747289660 (0xDF5B1A3C) SrcPort: 1005 DstPort: 50030 SequenceNumber: 3747289660 (0xDF5B1A3C) AcknowledgementNumber: 2672442402 (0x9F4A3C22) DataOffset: 80 (0x50) Flags: ...A..... CWR: (0.....) CWR not significant ECE: (.0.....) ECN-Echo not significant Urgent: (.0.....) Not Urgent Data Ack: (...1....) Acknowledgement field significant Push: (....0...) No Push Function Reset: (....0..) No Reset Syn: (.....0.) Not Synchronize sequence numbers Fin: (.....0) Not End of data		Decode As Width Prot Off: 13 (0x0D) Frame Off: 47 (0x2F) Sel Byt 0000 2C F0 5D 47 38 6E 2C F0 5D 47 37 DA ,8]G8n,8]G70 000C 08 00 45 00 00 28 E0 D4 40 00 80 06 ...(\&08. 0018 00 00 0A 07 5C AE 0A 07 5C B1 03 ED ...\\0..\\z.i 0024 C3 6E DF 5B 1A 3C 9F 4A 3C 22 50 10 8ns[.< J<"P 0030 20 14 CD 87 00 00 .i ..	

图10 挥手4

三、总结

- TCP 提供面向有连接的通信传输，面向有连接是指在传送数据之前必须先建立连接，数据传送完成后要释放连接。
- 无论哪一方向另一方发送数据之前，都必须先在双方之间建立一条连接。在TCP/IP协议中，TCP协议提供可靠的连接服务，连接是通过**三次握手**进行初始化的。
同时由于TCP协议是一种面向连接的、可靠的、基于字节流的运输层通信协议，TCP是**全双工模式**，所以需要**四次挥手**关闭连接。
- 所谓三次握手(Three-way Handshake)，是指建立一个 TCP 连接时，需要客户端和服务端总共发送3个包。
- 三次握手的目的是连接服务器指定端口，建立 TCP 连接，并同步连接双方的序列号和确认号，交换 TCP 窗口大小信息。在 socket 编程中，客户端执行 `connect()` 时。将触发三次握手。
- TCP 的连接的拆除需要发送四个包，因此称为四次挥手(Four-way handshake)，也叫做改进的三次握手。客户端或服务端均可主动发起挥手动作，在 socket 编程中，任何一方执行 `close()` 操作即可产生挥手操作。