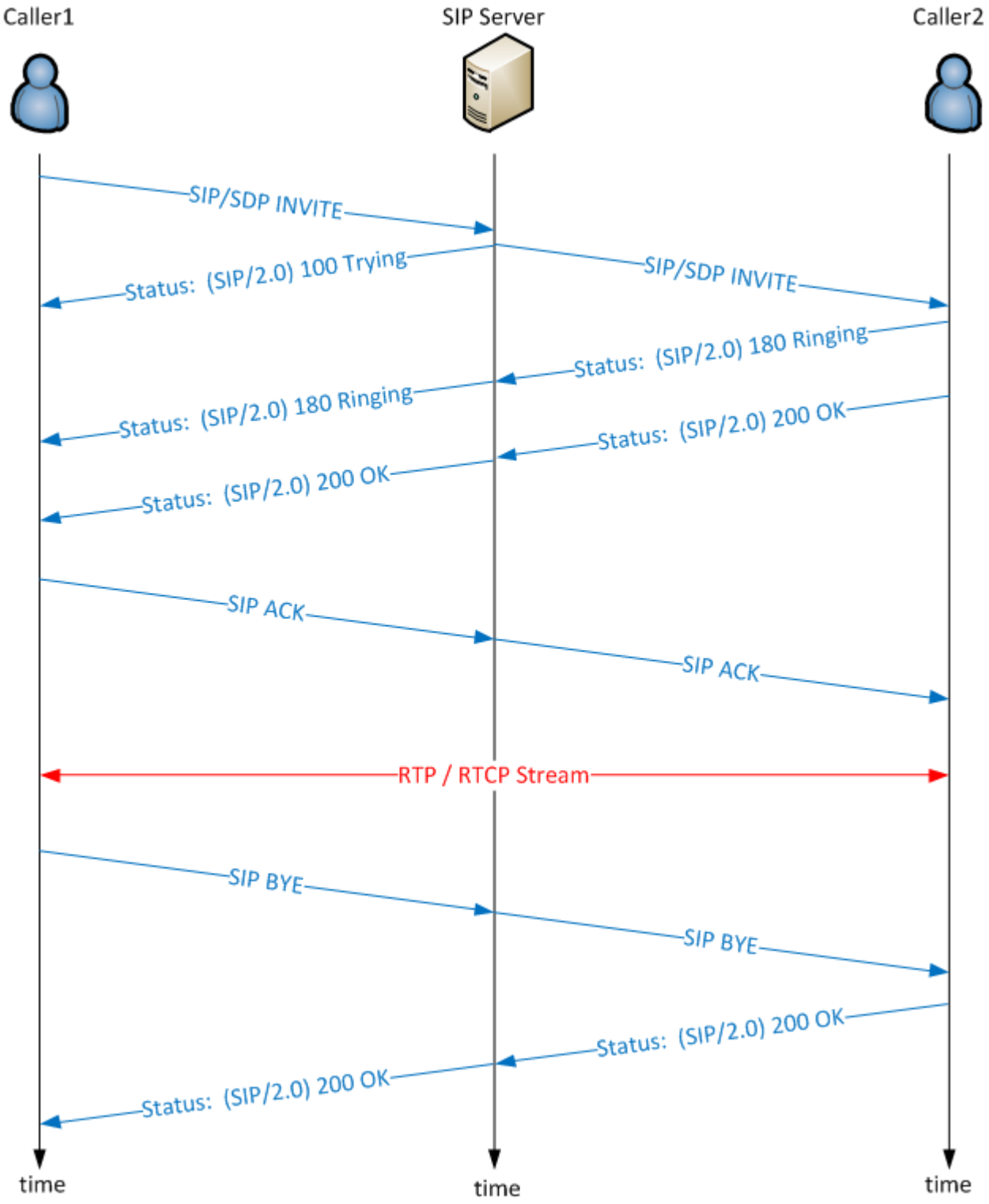
SIP (Session Initiation Protocol)

- Responsible for Session Setup/Modifying/Teardown of a RTP Stream.



SIP Packet Capture

NOTE: The following is packet capture from an Active VoIP Test Traffic Generator. These probes do not require a SIP server, hence some of the transmissions to the SIP server will be transmitted directly to between the end devices.

SIP Call Setup

	From	Time	Length	Source	Destination	Protocol	Summary
◉	User	10:39:15.820	719	192.169.223.70	192.169.230.1	SIP	INVITE sip:tcmyua1@192.169.230.1 SIP/2.0
○	Net	10:39:15.821	352	192.169.230.1	192.169.223.70	SIP	SIP/2.0 100 Trying
○	Net	10:39:15.821	425	192.169.230.1	192.169.223.70	SIP	SIP/2.0 180 Ringing
○	Net	10:39:15.821	679	192.169.230.1	192.169.223.70	SIP	SIP/2.0 200 OK
○	User	10:39:15.822	335	192.169.223.70	192.169.230.1	SIP	ACK sip:tcmyua1@192.169.230.1:5060 SIP/2.0
○	Net	10:39:15.857	218	192.169.230.1	192.169.223.70	RTP Audio	SSRC=1357833597 Seq=15691
○	User	10:39:15.860	218	192.169.223.70	192.169.230.1	RTP Audio	SSRC=4008740144 Seq=47168
○	Net	10:39:15.876	218	192.169.230.1	192.169.223.70	RTP Audio	SSRC=1357833597 Seq=15692

```
Frame source: (User)
Length: 719
Time: 07/28/11 10:39:15.820 Pacific Daylight Time
⊞ Ethernet
⊞ Internet Protocol (IP)
⊟ User Datagram Protocol (UDP)
      Source Port : 5060 SIP
      Destination Port: 5060 SIP
      Data Length: 681
      Checksum: 0x8f3c
⊟ Session Initiation Protocol (SIP)
      INVITE sip:tcmyua1@192.169.230.1 SIP/2.0
      Via: SIP/2.0/UDP 192.169.223.70:5060;branch=z9hG4bKc6e2773c833a364c;rport
      From: <sip:@192.169.223.70>;tag=4195464938
      To: <sip:tcmyua1@192.169.230.1>
      CSeq: 1 INVITE
      Call-ID: 691955178@app50
      Contact: <sip:@192.169.223.70:5060;transport=udp>
      Allow: INVITE, ACK, CANCEL, BYE, MESSAGE
      Max-Forwards: 70
      Content-Type: application/sdp
      Content-Length: 272
      \r\n
      v=0
      o=- 2950746058 1 IN IP4 192.169.223.70
      s=SIP Call
      i=YXBwNTAgMDA5MEZCMUEzMjE1IC0gYzBhOWRmNDYgYzBhOWU2MDEgMCA0NDAwMCAw
      c=IN IP4 192.169.223.70
      t=0 0
      a=cat:Vm9JUF9HNzExIDU4MTQzNzk1MDEyNjQzOSAt
      m=audio 30000 RTP/AVP 0
      a=sendrecv
      a=rtpmap:0 PCMU/8000
      a=ptime:20
```

Hex Decode

```
00:  00 17 df ba d4 00 00 03  ........
08:  e4 b8 e4 19 08 00 45 00  ......E.
10:  02 bd 00 00 40 00 3f 11  ....@.?.
18:  f2 94 c0 a9 df 46 c0 a9  .....F..
20:  e6 01 13 c4 13 c4 02 a9  ........
28:  8f 3c 49 4e 56 49 54 45  .<INVITE
30:  20 73 69 70 3a 74 63 6d  .sip:tcm
38:  79 75 61 31 40 31 39 32  yual@192
40:  2e 31 36 39 2e 32 33 30  .169.230
48:  2e 31 20 53 49 50 2f 32  .1.SIP/2
50:  2e 30 0d 0a 56 69 61 3a  .0..Via:
58:  20 53 49 50 2f 32 2e 30  .SIP/2.0
60:  2f 55 44 50 20 31 39 32  /UDP.192
68:  2e 31 36 39 2e 32 32 33  .169.223
70:  2e 37 30 3a 35 30 36 30  .70:5060
78:  3b 62 72 61 6e 63 68 3d  ;branch=
80:  7a 39 68 47 34 62 4b 63  z9hG4bKc
88:  36 65 32 37 37 33 63 38  6e2773c8
90:  33 33 61 33 36 34 63 3b  33a364c;
98:  72 70 6f 72 74 0d 0a 46  rport..F
A0:  72 6f 6d 3a 20 3c 73 69  rom:.<si
A8:  70 3a 40 31 39 32 2e 31  p:@192.1
B0:  36 39 2e 32 32 33 2e 37  69.223.7
B8:  30 3e 3b 74 61 67 3d 34  0>;tag=4
C0:  31 39 35 34 36 34 39 33  19546493
C8:  38 0d 0a 54 6f 3a 20 3c  8..To:.<
D0:  73 69 70 3a 74 63 6d 79  sip:tcmy
D8:  75 61 31 40 31 39 32 2e  ual@192.
E0:  31 36 39 2e 32 33 30 2e  169.230.
E8:  31 3e 0d 0a 43 53 65 71  1>..CSeq
```

	From	Time	Length	Source	Destination	Protocol	Summary
○	User	10:39:15.820	719	192.169.223.70	192.169.230.1	SIP	INVITE sip:tcmyua1@192.169.230.1 SIP/2.0
◉	Net	10:39:15.821	352	192.169.230.1	192.169.223.70	SIP	SIP/2.0 100 Trying
○	Net	10:39:15.821	425	192.169.230.1	192.169.223.70	SIP	SIP/2.0 180 Ringing
○	Net	10:39:15.821	679	192.169.230.1	192.169.223.70	SIP	SIP/2.0 200 OK
○	User	10:39:15.822	335	192.169.223.70	192.169.230.1	SIP	ACK sip:tcmyua1@192.169.230.1:5060 SIP/2.0
○	Net	10:39:15.857	218	192.169.230.1	192.169.223.70	RTP Audio	SSRC=1357833597 Seq=15691
○	User	10:39:15.860	218	192.169.223.70	192.169.230.1	RTP Audio	SSRC=4008740144 Seq=47168
○	Net	10:39:15.876	218	192.169.230.1	192.169.223.70	RTP Audio	SSRC=1357833597 Seq=15692

Detail Decode

```
Packet Number: 2
Frame source: (Network)
Length: 352
Time: 07/28/11 10:39:15.821 Pacific Daylight Time
⊞ Ethernet
⊞ Internet Protocol (IP)
⊟ User Datagram Protocol (UDP)
      Source Port : 5060 SIP
      Destination Port: 5060 SIP
      Data Length: 314
      Checksum: 0x3dc4
⊟ Session Initiation Protocol (SIP)
      SIP/2.0 100 Trying
      Via: SIP/2.0/UDP 192.169.223.70:5060;branch=z9hG4bKc6e2773c833a364c;rport=5060;received=192.169.223
      .70
      From: <sip:@192.169.223.70>;tag=4195464938
      To: <sip:tcmyua1@192.169.230.1>
      CSeq: 1 INVITE
      Call-ID: 691955178@app50
      Allow: INVITE, ACK, CANCEL, BYE, MESSAGE
      Content-Length: 0
      \r\n
```

Hex Decode

```
00:  00 03 e4 b8 e4 19 00 17  ........
08:  df ba d4 00 08 00 45 00  ......E.
10:  01 4e 00 00 40 00 3d 11  .N..@.=.
18:  f6 03 c0 a9 e6 01 c0 a9  ........
20:  df 46 13 c4 13 c4 01 3a  .F.....:
28:  3d c4 53 49 50 2f 32 2e  =.SIP/2.
30:  30 20 31 30 30 20 54 72  0.100.Tr
38:  79 69 6e 67 0d 0a 56 69  ying..Vi
40:  61 3a 20 53 49 50 2f 32  a:.SIP/2
48:  2e 30 2f 55 44 50 20 31  .0/UDP.1
50:  39 32 2e 31 36 39 2e 32  92.169.2
58:  32 33 2e 37 30 3a 35 30  23.70:50
60:  36 30 3b 62 72 61 6e 63  60;branc
68:  68 3d 7a 39 68 47 34 62  h=z9hG4b
70:  4b 63 36 65 32 37 37 33  Kc6e2773
78:  63 38 33 33 61 33 36 34  c833a364
80:  63 3b 72 70 6f 72 74 3d  c;rport=
88:  35 30 36 30 3b 72 65 63  5060;rec
90:  65 69 76 65 64 3d 31 39  eived=19
98:  32 2e 31 36 39 2e 32 32  2.169.22
A0:  33 2e 37 30 0d 0a 46 72  3.70..Fr
A8:  6f 6d 3a 20 3c 73 69 70  om:.<sip
B0:  3a 40 31 39 32 2e 31 36  :@192.16
B8:  39 2e 32 32 33 2e 37 30  9.223.70
C0:  3e 3b 74 61 67 3d 34 31  >;tag=41
C8:  39 35 34 36 34 39 33 38  95464938
D0:  0d 0a 54 6f 3a 20 3c 73  ..To:.<s
D8:  69 70 3a 74 63 6d 79 75  ip:tcmyu
E0:  61 31 40 31 39 32 2e 31  a1@192.1
E8:  36 39 2e 32 33 30 2e 31  69.230.1
```

SIP Call Setup (continued)

	From	Time	Length	Source	Destination	Protocol	Summary
○	User	10:39:15.820	719	192.169.223.70	192.169.230.1	SIP	INVITE sip:tcmyua1@192.169.230.1 SIP/2.0
○	Net	10:39:15.821	352	192.169.230.1	192.169.223.70	SIP	SIP/2.0 100 Trying
◉	Net	10:39:15.821	425	192.169.230.1	192.169.223.70	SIP	SIP/2.0 180 Ringing
○	Net	10:39:15.821	679	192.169.230.1	192.169.223.70	SIP	SIP/2.0 200 OK
○	User	10:39:15.822	335	192.169.223.70	192.169.230.1	SIP	ACK sip:tcmyua1@192.169.230.1:5060 SIP/2.0
○	Net	10:39:15.857	218	192.169.230.1	192.169.223.70	RTP Audio	SSRC=1357833597 Seq=15691
○	User	10:39:15.860	218	192.169.223.70	192.169.230.1	RTP Audio	SSRC=4008740144 Seq=47168
○	Net	10:39:15.876	218	192.169.230.1	192.169.223.70	RTP Audio	SSRC=1357833597 Seq=15692

Detail Decode

```
Packet Number: 3
Frame source: (Network)
Length: 425
Time: 07/28/11 10:39:15.821 Pacific Daylight Time
⊞ Ethernet
⊞ Internet Protocol (IP)
⊟ User Datagram Protocol (UDP)
        Source Port : 5060 SIP
        Destination Port: 5060 SIP
        Data Length: 387
        Checksum: 0x8d35
⊟ Session Initiation Protocol (SIP)
        SIP/2.0 180 Ringing
        Via: SIP/2.0/UDP 192.169.223.70:5060;branch=z9hG4bKc6e2773c833a364c;rport=5060;received=192.169.223
        .70
        From: <sip:@192.169.223.70>;tag=4195464938
        To: <sip:tcmyual@192.169.230.1>;tag=2226374547
        CSeq: 1 INVITE
        Call-ID: 691955178@app50
        Contact: <sip:tcmyual@192.169.230.1:5060;transport=udp>
        Allow: INVITE, ACK, CANCEL, BYE, MESSAGE
        Content-Length: 0
        \r\n
```

Hex Decode

```
00:  00 03 e4 b8 e4 19 00 17  ........
08:  df ba d4 00 08 00 45 00  ......E.
10:  01 97 00 00 40 00 3d 11  ....@.=.
18:  f5 ba c0 a9 e6 01 c0 a9  ........
20:  df 46 13 c4 13 c4 01 83  .F......
28:  8d 35 53 49 50 2f 32 2e  .5SIP/2.
30:  30 20 31 38 30 20 52 69  0.180.Ri
38:  6e 67 69 6e 67 0d 0a 56  nging..V
40:  69 61 3a 20 53 49 50 2f  ia:.SIP/
48:  32 2e 30 2f 55 44 50 20  2.0/UDP.
50:  31 39 32 2e 31 36 39 2e  192.169.
58:  32 32 33 2e 37 30 3a 35  223.70:5
60:  30 36 30 3b 62 72 61 6e  060;bran
68:  63 68 3d 7a 39 68 47 34  ch=z9hG4
70:  62 4b 63 36 65 32 37 37  bKc6e277
78:  33 63 38 33 33 61 33 36  3c833a36
80:  34 63 3b 72 70 6f 72 74  4c;rport
88:  3d 35 30 36 30 3b 72 65  =5060;re
90:  63 65 69 76 65 64 3d 31  ceived=1
98:  39 32 2e 31 36 39 2e 32  92.169.2
A0:  32 33 2e 37 30 0d 0a 46  23.70..F
A8:  72 6f 6d 3a 20 3c 73 69  rom:.<si
B0:  70 3a 40 31 39 32 2e 31  p:@192.1
B8:  36 39 2e 32 32 33 2e 37  69.223.7
C0:  30 3e 3b 74 61 67 3d 34  0>;tag=4
C8:  31 39 35 34 36 34 39 33  19546493
D0:  38 0d 0a 54 6f 3a 20 3c  8..To:.<
D8:  73 69 70 3a 74 63 6d 79  sip:tcmy
E0:  75 61 31 40 31 39 32 2e  ual@192.
E8:  31 36 39 2e 32 33 30 2e  169.230.
```

	From	Time	Length	Source	Destination	Protocol	Summary
○	User	10:39:15.820	719	192.169.223.70	192.169.230.1	SIP	INVITE sip:tcmyua1@192.169.230.1 SIP/2.0
○	Net	10:39:15.821	352	192.169.230.1	192.169.223.70	SIP	SIP/2.0 100 Trying
○	Net	10:39:15.821	425	192.169.230.1	192.169.223.70	SIP	SIP/2.0 180 Ringing
◉	Net	10:39:15.821	679	192.169.230.1	192.169.223.70	SIP	SIP/2.0 200 OK
○	User	10:39:15.822	335	192.169.223.70	192.169.230.1	SIP	ACK sip:tcmyua1@192.169.230.1:5060 SIP/2.0
○	Net	10:39:15.857	218	192.169.230.1	192.169.223.70	RTP Audio	SSRC=1357833597 Seq=15691
○	User	10:39:15.860	218	192.169.223.70	192.169.230.1	RTP Audio	SSRC=4008740144 Seq=47168
○	Net	10:39:15.876	218	192.169.230.1	192.169.223.70	RTP Audio	SSRC=1357833597 Seq=15692

```
Packet Number: 4
Frame source: (Network)
Length: 679
Time: 07/28/11 10:39:15.821 Pacific Daylight Time
⊞ Ethernet
⊞ Internet Protocol (IP)
⊟ User Datagram Protocol (UDP)
        Source Port : 5060 SIP
        Destination Port: 5060 SIP
        Data Length: 641
        Checksum: 0x665a
⊟ Session Initiation Protocol (SIP)
        SIP/2.0 200 OK
        Via: SIP/2.0/UDP 192.169.223.70:5060;branch=z9hG4bKc6e2773c833a364c;rport=5060;received=192.169.223
        .70
        From: <sip:@192.169.223.70>;tag=4195464938
        To: <sip:tcmyual@192.169.230.1>;tag=2226374547
        CSeq: 1 INVITE
        Call-ID: 691955178@app50
        Contact: <sip:tcmyual@192.169.230.1:5060;transport=udp>
        Allow: INVITE, ACK, CANCEL, BYE, MESSAGE
        Content-Type: application/sdp
        Content-Length: 226
        \r\n
        v=0
        o=- 2950746059 2 IN IP4 192.169.230.1
        s=SIP Call
        i=YXBwMjAwIDAw0TBGQjIlRkU5RSAtIGMwYT1lNjAxIGMwYT1kZjQ2IDAgMCAw
        c=IN IP4 192.169.230.1
        t=0 0
        a=cat:LSAtICOg
        m=audio 30000 RTP/AVP 0
        a=rtpmap:0 PCMU/8000
        a=ptime:20
```

Hex Decode

```
00:  00 03 e4 b8 e4 19 00 17  ........
08:  df ba d4 00 08 00 45 00  ......E.
10:  02 95 00 00 40 00 3d 11  ....@.=.
18:  f4 bc c0 a9 e6 01 c0 a9  ........
20:  df 46 13 c4 13 c4 02 81  .F......
28:  66 5a 53 49 50 2f 32 2e  fZSIP/2.
30:  30 20 32 30 30 20 4f 4b  0.200.OK
38:  0d 0a 56 69 61 3a 20 53  ..Via:.S
40:  49 50 2f 32 2e 30 2f 55  IP/2.0/U
48:  44 50 20 31 39 32 2e 31  DP.192.1
50:  36 39 2e 32 32 33 2e 37  69.223.7
58:  30 3a 35 30 36 30 3b 62  0:5060;b
60:  72 61 6e 63 68 3d 7a 39  ranch=z9
68:  68 47 34 62 4b 63 36 65  hG4bKc6e
70:  32 37 37 33 63 38 33 33  2773c833
78:  61 33 36 34 63 3b 72 70  a364c;rp
80:  6f 72 74 3d 35 30 36 30  ort=5060
88:  3b 72 65 63 65 69 76 65  ;receive
90:  64 3d 31 39 32 2e 31 36  d=192.16
98:  39 2e 32 32 33 2e 37 30  9.223.70
A0:  0d 0a 46 72 6f 6d 3a 20  ..From:.
A8:  3c 73 69 70 3a 40 31 39  <sip:@19
B0:  32 2e 31 36 39 2e 32 32  2.169.22
B8:  33 2e 37 30 3e 3b 74 61  3.70>;ta
C0:  67 3d 34 31 39 35 34 36  g=419546
C8:  34 39 33 38 0d 0a 54 6f  4938..To
D0:  3a 20 3c 73 69 70 3a 74  :.<sip:t
D8:  63 6d 79 75 61 31 40 31  cmyual@1
E0:  39 32 2e 31 36 39 2e 32  92.169.2
E8:  33 30 2e 31 3e 3b 74 61  30.1>;ta
```

	From	Time	Length	Source	Destination	Protocol	Summary
○	User	10:39:15.820	719	192.169.223.70	192.169.230.1	SIP	INVITE sip:tcmyua1@192.169.230.1 SIP/2.0
○	Net	10:39:15.821	352	192.169.230.1	192.169.223.70	SIP	SIP/2.0 100 Trying
○	Net	10:39:15.821	425	192.169.230.1	192.169.223.70	SIP	SIP/2.0 180 Ringing
○	Net	10:39:15.821	679	192.169.230.1	192.169.223.70	SIP	SIP/2.0 200 OK
◉	User	10:39:15.822	335	192.169.223.70	192.169.230.1	SIP	ACK sip:tcmyua1@192.169.230.1:5060 SIP/2.0
○	Net	10:39:15.857	218	192.169.230.1	192.169.223.70	RTP Audio	SSRC=1357833597 Seq=15691
○	User	10:39:15.860	218	192.169.223.70	192.169.230.1	RTP Audio	SSRC=4008740144 Seq=47168
○	Net	10:39:15.876	218	192.169.230.1	192.169.223.70	RTP Audio	SSRC=1357833597 Seq=15692

Detail Decode

```
Packet Number: 5
Frame source: (User)
Length: 335
Time: 07/28/11 10:39:15.822 Pacific Daylight Time
⊞ Ethernet
⊞ Internet Protocol (IP)
⊟ User Datagram Protocol (UDP)
        Source Port : 5060 SIP
        Destination Port: 5060 SIP
        Data Length: 297
        Checksum: 0x7c92
⊟ Session Initiation Protocol (SIP)
        ACK sip:tcmyual@192.169.230.1:5060 SIP/2.0
        Via: SIP/2.0/UDP 192.169.223.70:5060;branch=z9hG4bK2bf587a3ac96d62b;rport
        From: <sip:@192.169.223.70>;tag=4195464938
        To: <sip:tcmyual@192.169.230.1>;tag=2226374547
        CSeq: 1 ACK
        Call-ID: 691955178@app50
        Max-Forwards: 70
        Content-Length: 0
        \r\n
```

Hex Decode

```
00:  00 17 df ba d4 00 00 03  ........
08:  e4 b8 e4 19 08 00 45 00  ......E.
10:  01 3d 00 00 40 00 3f 11  .=..@.?.
18:  f4 14 c0 a9 df 46 c0 a9  .....F..
20:  e6 01 13 c4 13 c4 01 29  .......)
28:  7c 92 41 43 4b 20 73 69  |.ACK.si
30:  70 3a 74 63 6d 79 75 61  p:tcmyua
38:  31 40 31 39 32 2e 31 36  1@192.16
40:  39 2e 32 33 30 2e 31 3a  9.230.1:
48:  35 30 36 30 20 53 49 50  5060.SIP
50:  2f 32 2e 30 0d 0a 56 69  /2.0..Vi
58:  61 3a 20 53 49 50 2f 32  a:.SIP/2
60:  2e 30 2f 55 44 50 20 31  .0/UDP.1
68:  39 32 2e 31 36 39 2e 32  92.169.2
70:  32 33 2e 37 30 3a 35 30  23.70:50
78:  36 30 3b 62 72 61 6e 63  60;branc
80:  68 3d 7a 39 68 47 34 62  h=z9hG4b
88:  4b 32 62 66 35 38 37 61  K2bf587a
90:  33 61 63 39 36 64 36 32  3ac96d62
98:  62 3b 72 70 6f 72 74 0d  b;rport.
A0:  0a 46 72 6f 6d 3a 20 3c  .From:.<
A8:  73 69 70 3a 40 31 39 32  sip:@192
B0:  2e 31 36 39 2e 32 32 33  .169.223
B8:  2e 37 30 3e 3b 74 61 67  .70>;tag
C0:  3d 34 31 39 35 34 36 34  =4195464
C8:  39 33 38 0d 0a 54 6f 3a  938..To:
D0:  20 3c 73 69 70 3a 74 63  .<sip:tc
D8:  6d 79 75 61 31 40 31 39  myual@19
E0:  32 2e 31 36 39 2e 32 33  2.169.23
E8:  30 2e 31 3e 3b 74 61 67  0.1>;tag
```

SIP Session Teardown

	From	Time	Length	Source	Destination	Protocol	Summary
○	Net	12:10:31.046	218	192.169.230.1	192.169.223.70	RTP Audio	SSRC=998022158 Seq=4653
○	User	12:10:31.060	218	192.169.223.70	192.169.230.1	RTP Audio	SSRC=720345257 Seq=17507
○	Net	12:10:31.067	218	192.169.230.1	192.169.223.70	RTP Audio	SSRC=998022158 Seq=4654
○	User	12:10:31.070	138	192.169.223.70	192.169.230.1	RTCP	SR: SSRC=720345257
◉	User	12:10:31.071	518	192.169.223.70	192.169.230.1	SIP	BYE sip:tcmyua1@192.169.230.1:5060 SIP/2.0
○	Net	12:10:31.071	500	192.169.230.1	192.169.223.70	SIP	SIP/2.0 200 OK
○	Net	12:10:31.071	138	192.169.230.1	192.169.223.70	RTCP	SR: SSRC=998022158
○	User	12:10:31.072	118	192.169.223.70	192.169.230.1	RTCP	RR: SSRC=720345257

Detail Decode

```
Packet Number: 4404
Frame source: (User)
Length: 518
Time: 07/28/11 12:10:31.071 Pacific Daylight Time
⊞ Ethernet
⊞ Internet Protocol (IP)
⊟ User Datagram Protocol (UDP)
      Source Port : 5060 SIP
      Destination Port: 5060 SIP
      Data Length: 480
      Checksum: 0x173b
⊟ Session Initiation Protocol (SIP)
      BYE sip:tcmyual@192.169.230.1:5060 SIP/2.0
      Via: SIP/2.0/UDP 192.169.223.70:5060;branch=z9hG4bKcda4c3a968b88e5c;rport
      From: <sip:@192.169.223.70>;tag=1511811784
      To: <sip:tcmyual@192.169.230.1>;tag=3449893253
      CSeq: 2 BYE
      Call-ID: 345811152@app50
      Reason: Q.850 ;cause=16
      Max-Forwards: 70
      Content-Type: text/plain
      Content-Length: 130
      \r\n
      MCwwLDY2LDAsNTQsMzMsMzMsMCwwLDAsIjE5Mi4xNjkuMjIzLjEiLDMsIjE5Mi4xNjkuMjIxLjIiLDQsIjE3Mi4xNi4yMjEuMSI
      sNTMsIjE5Mi4xNjkuMjMwLjEiLDQg
```

Hex Decode

```
00:  00 17 df ba d4 00 00 03  ........
08:  e4 b8 e4 19 08 00 45 00  ......E.
10:  01 f4 00 00 40 00 3f 11  ....@.?.
18:  f3 5d c0 a9 df 46 c0 a9  .]...F..
20:  e6 01 13 c4 13 c4 01 e0  ........
28:  17 3b 42 59 45 20 73 69  .;BYE.si
30:  70 3a 74 63 6d 79 75 61  p:tcmyua
38:  31 40 31 39 32 2e 31 36  1@192.16
40:  39 2e 32 33 30 2e 31 3a  9.230.1:
48:  35 30 36 30 20 53 49 50  5060.SIP
50:  2f 32 2e 30 0d 0a 56 69  /2.0..Vi
58:  61 3a 20 53 49 50 2f 32  a:.SIP/2
60:  2e 30 2f 55 44 50 20 31  .0/UDP.1
68:  39 32 2e 31 36 39 2e 32  92.169.2
70:  32 33 2e 37 30 3a 35 30  23.70:50
78:  36 30 3b 62 72 61 6e 63  60;branc
80:  68 3d 7a 39 68 47 34 62  h=z9hG4b
88:  4b 63 64 61 34 63 33 61  Kcda4c3a
90:  39 36 38 62 38 38 65 35  968b88e5
98:  63 3b 72 70 6f 72 74 0d  c;rport.
A0:  0a 46 72 6f 6d 3a 20 3c  .From:.<
A8:  73 69 70 3a 40 31 39 32  sip:@192
B0:  2e 31 36 39 2e 32 32 33  .169.223
B8:  2e 37 30 3e 3b 74 61 67  .70>;tag
C0:  3d 31 35 31 31 38 31 31  =1511811
C8:  37 38 34 0d 0a 54 6f 3a  784..To:
D0:  20 3c 73 69 70 3a 74 63  .<sip:tc
D8:  6d 79 75 61 31 40 31 39  myual@19
E0:  32 2e 31 36 39 2e 32 33  2.169.23
E8:  30 2e 31 3e 3b 74 61 67  0.1>;tag
```

	From	Time	Length	Source	Destination	Protocol	Summary
○	Net	12:10:31.046	218	192.169.230.1	192.169.223.70	RTP Audio	SSRC=998022158 Seq=4653
○	User	12:10:31.060	218	192.169.223.70	192.169.230.1	RTP Audio	SSRC=720345257 Seq=17507
○	Net	12:10:31.067	218	192.169.230.1	192.169.223.70	RTP Audio	SSRC=998022158 Seq=4654
○	User	12:10:31.070	138	192.169.223.70	192.169.230.1	RTCP	SR: SSRC=720345257
○	User	12:10:31.071	518	192.169.223.70	192.169.230.1	SIP	BYE sip:tcmyua1@192.169.230.1:5060 SIP/2.0
◉	Net	12:10:31.071	500	192.169.230.1	192.169.223.70	SIP	SIP/2.0 200 OK
○	Net	12:10:31.071	138	192.169.230.1	192.169.223.70	RTCP	SR: SSRC=998022158
○	User	12:10:31.072	118	192.169.223.70	192.169.230.1	RTCP	RR: SSRC=720345257

Detail Decode

```
Packet Number: 4405
Frame source: (Network)
Length: 500
Time: 07/28/11 12:10:31.071 Pacific Daylight Time
⊞ Ethernet
⊞ Internet Protocol (IP)
⊟ User Datagram Protocol (UDP)
      Source Port : 5060 SIP
      Destination Port: 5060 SIP
      Data Length: 462
      Checksum: 0xdb47
⊟ Session Initiation Protocol (SIP)
      SIP/2.0 200 OK
      Via: SIP/2.0/UDP 192.169.223.70:5060;branch=z9hG4bKcda4c3a968b88e5c;rport=5060;received=192.169.223
      .70
      From: <sip:@192.169.223.70>;tag=1511811784
      To: <sip:tcmyual@192.169.230.1>;tag=3449893253
      CSeq: 2 BYE
      Call-ID: 345811152@app50
      Content-Type: text/plain
      Content-Length: 154
      \r\n
      MCwwLDY1LDAsMSwzNCwzNCwwLDAsMCwiMTkyLjE2OS4yMzAuMiIsMiwiMTcyLjE2LjIyMi4xIiw4LCIxOTIuMTY5LjIyMS4yIiw
      xNywiMTkyLjE2OS4yMjEuMSIsMTYsIjE5Mi4xNjkuMjIzLjcwIiw3
```

Hex Decode

```
00:  00 03 e4 b8 e4 19 00 17  ........
08:  df ba d4 00 08 00 45 00  ......E.
10:  01 e2 00 00 40 00 3d 11  ....@.=.
18:  f5 6f c0 a9 e6 01 c0 a9  .o......
20:  df 46 13 c4 13 c4 01 ce  .F......
28:  db 47 53 49 50 2f 32 2e  .GSIP/2.
30:  30 20 32 30 30 20 4f 4b  0.200.OK
38:  0d 0a 56 69 61 3a 20 53  ..Via:.S
40:  49 50 2f 32 2e 30 2f 55  IP/2.0/U
48:  44 50 20 31 39 32 2e 31  DP.192.1
50:  36 39 2e 32 32 33 2e 37  69.223.7
58:  30 3a 35 30 36 30 3b 62  0:5060;b
60:  72 61 6e 63 68 3d 7a 39  ranch=z9
68:  68 47 34 62 4b 63 64 61  hG4bKcda
70:  34 63 33 61 39 36 38 62  4c3a968b
78:  38 38 65 35 63 3b 72 70  88e5c;rp
80:  6f 72 74 3d 35 30 36 30  ort=5060
88:  3b 72 65 63 65 69 76 65  ;receive
90:  64 3d 31 39 32 2e 31 36  d=192.16
98:  39 2e 32 32 33 2e 37 30  9.223.70
A0:  0d 0a 46 72 6f 6d 3a 20  ..From:.
A8:  3c 73 69 70 3a 40 31 39  <sip:@19
B0:  32 2e 31 36 39 2e 32 32  2.169.22
B8:  33 2e 37 30 3e 3b 74 61  3.70>;ta
C0:  67 3d 31 35 31 31 38 31  g=151181
C8:  31 37 38 34 0d 0a 54 6f  1784..To
D0:  3a 20 3c 73 69 70 3a 74  :.<sip:t
D8:  63 6d 79 75 61 31 40 31  cmyual@1
E0:  39 32 2e 31 36 39 2e 32  92.169.2
E8:  33 30 2e 31 3e 3b 74 61  30.1>;ta
```

RTP (Real Time Protocol)

- Application Layer protocol. Typically transported via UDP.
- Carries the actual payload such as VoIP call content or the Video content.
- RTP Packets have time stamp and sequence number so the corresponding end device can measure call metrics such as jitter, and number of packets dropped, throughput of the call, (delay?- one way/round trip).

RTP Packet Capture

	From	Time	Length	Source	Destination	Protocol	Summary
○	User	10:39:15.820	719	192.169.223.70	192.169.230.1	SIP	INVITE sip:tcmyua1@192.169.230.1 SIP/2.0
○	Net	10:39:15.821	352	192.169.230.1	192.169.223.70	SIP	SIP/2.0 100 Trying
○	Net	10:39:15.821	425	192.169.230.1	192.169.223.70	SIP	SIP/2.0 180 Ringing
○	Net	10:39:15.821	679	192.169.230.1	192.169.223.70	SIP	SIP/2.0 200 OK
○	User	10:39:15.822	335	192.169.223.70	192.169.230.1	SIP	ACK sip:tcmyua1@192.169.230.1:5060 SIP/2.0
◉	Net	10:39:15.857	218	192.169.230.1	192.169.223.70	RTP Audio	SSRC=1357833597 Seq=15691
○	User	10:39:15.860	218	192.169.223.70	192.169.230.1	RTP Audio	SSRC=4008740144 Seq=47168
○	Net	10:39:15.876	218	192.169.230.1	192.169.223.70	RTP Audio	SSRC=1357833597 Seq=15692

Detail Decode

```
Packet Number: 6
Frame source: (Network)
Length: 218
Time: 07/28/11 10:39:15.857 Pacific Daylight Time
⊞ Ethernet
⊞ Internet Protocol (IP)
⊟ User Datagram Protocol (UDP)
        Source Port : 30000
        Destination Port: 30000
        Data Length: 180
        Checksum: 0x9fc8
⊟ Real-Time Protocol (RTP Audio)
        Flags: 0x80
                10.. ....: Version 2 (RFC 1889)
                ..0. ....: No padding
                ...0 ....: No extension
                .... 0000: CSRC count
        Type: 0x00
                0... ....: No marker
                .000 0000: PCMU
        Sequence: 15691
        Timestamp: 80037442
        SSRC: 1357833597
        Data: 160 octets
```

Hex Decode

```
00:  00 03 e4 b8 e4 19 00 17  ........
08:  df ba d4 00 08 00 45 00  ......E.
10:  00 c8 00 00 40 00 3d 11  ....@.=.
18:  f6 89 c0 a9 e6 01 c0 a9  ........
20:  df 46 75 30 75 30 00 b4  .Fu0u0..
28:  9f c8 80 00 3d 4b 04 c5  ....=K..
30:  46 42 50 ee e5 7d ff 89  FBP..}..
38:  80 89 ff 09 00 09 ff 89  ........
40:  80 89 ff 09 00 09 ff 89  ........
48:  80 89 ff 09 00 09 ff 89  ........
50:  80 89 ff 09 00 09 ff 89  ........
58:  80 89 ff 09 00 09 ff 89  ........
60:  80 89 ff 09 00 09 ff 89  ........
68:  80 89 ff 09 00 09 ff 89  ........
70:  80 89 ff 09 00 09 ff 89  ........
78:  80 89 ff 09 00 09 ff 89  ........
80:  80 89 ff 09 00 09 ff 89  ........
88:  80 89 ff 09 00 09 ff 89  ........
90:  80 89 ff 09 00 09 ff 89  ........
98:  80 89 ff 09 00 09 ff 89  ........
A0:  80 89 ff 09 00 09 ff 89  ........
A8:  80 89 ff 09 00 09 ff 89  ........
B0:  80 89 ff 09 00 09 ff 89  ........
B8:  80 89 ff 09 00 09 ff 89  ........
C0:  80 89 ff 09 00 09 ff 89  ........
C8:  80 89 ff 09 00 09 ff 89  ........
D0:  80 89 ff 09 00 09 c1 2c  .......,
D8:  0d c1                    ..
```

	From	Time	Length	Source	Destination	Protocol	Summary
○	User	10:39:15.820	719	192.169.223.70	192.169.230.1	SIP	INVITE sip:tcmyua1@192.169.230.1 SIP/2.0
○	Net	10:39:15.821	352	192.169.230.1	192.169.223.70	SIP	SIP/2.0 100 Trying
○	Net	10:39:15.821	425	192.169.230.1	192.169.223.70	SIP	SIP/2.0 180 Ringing
○	Net	10:39:15.821	679	192.169.230.1	192.169.223.70	SIP	SIP/2.0 200 OK
○	User	10:39:15.822	335	192.169.223.70	192.169.230.1	SIP	ACK sip:tcmyua1@192.169.230.1:5060 SIP/2.0
○	Net	10:39:15.857	218	192.169.230.1	192.169.223.70	RTP Audio	SSRC=1357833597 Seq=15691
◉	User	10:39:15.860	218	192.169.223.70	192.169.230.1	RTP Audio	SSRC=4008740144 Seq=47168
○	Net	10:39:15.876	218	192.169.230.1	192.169.223.70	RTP Audio	SSRC=1357833597 Seq=15692

Detail Decode

```
Packet Number: 7
Frame source: (User)
Length: 218
Time: 07/28/11 10:39:15.860 Pacific Daylight Time
⊞ Ethernet
⊞ Internet Protocol (IP)
⊟ User Datagram Protocol (UDP)
        Source Port : 30000
        Destination Port: 30000
        Data Length: 180
        Checksum: 0x119d
⊟ Real-Time Protocol (RTP Audio)
        Flags: 0x80
                10.. ....: Version 2 (RFC 1889)
                ..0. ....: No padding
                ...0 ....: No extension
                .... 0000: CSRC count
        Type: 0x00
                0... ....: No marker
                .000 0000: PCMU
        Sequence: 47168
        Timestamp: 1784985123
        SSRC: 4008740144
        Data: 160 octets
```

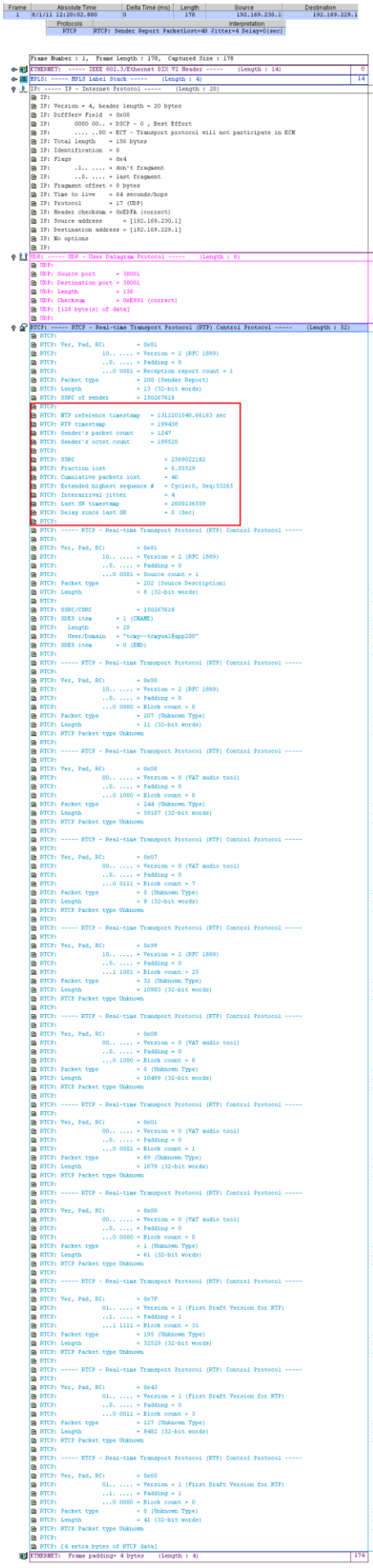
Hex Decode

```
00:  00 17 df ba d4 00 00 03  ........
08:  e4 b8 e4 19 08 00 45 00  ......E.
10:  00 c8 00 00 40 00 3f 11  ....@.?.
18:  f4 89 c0 a9 df 46 c0 a9  .....F..
20:  e6 01 75 30 75 30 00 b4  ..u0u0..
28:  11 9d 80 00 b8 40 6a 64  .....@jd
30:  b6 23 ee f0 85 30 ff 89  .#...0..
38:  80 89 ff 09 00 09 ff 89  ........
40:  80 89 ff 09 00 09 ff 89  ........
48:  80 89 ff 09 00 09 ff 89  ........
50:  80 89 ff 09 00 09 ff 89  ........
58:  80 89 ff 09 00 09 ff 89  ........
60:  80 89 ff 09 00 09 ff 89  ........
68:  80 89 ff 09 00 09 ff 89  ........
70:  80 89 ff 09 00 09 ff 89  ........
78:  80 89 ff 09 00 09 ff 89  ........
80:  80 89 ff 09 00 09 ff 89  ........
88:  80 89 ff 09 00 09 ff 89  ........
90:  80 89 ff 09 00 09 ff 89  ........
98:  80 89 ff 09 00 09 ff 89  ........
A0:  80 89 ff 09 00 09 ff 89  ........
A8:  80 89 ff 09 00 09 ff 89  ........
B0:  80 89 ff 09 00 09 ff 89  ........
B8:  80 89 ff 09 00 09 ff 89  ........
C0:  80 89 ff 09 00 09 ff 89  ........
C8:  80 89 ff 09 00 09 ff 89  ........
D0:  80 89 ff 09 00 09 65 09  ......e.
D8:  42 a2                    B.
```

RTCP (Real-Time Transport Control Protocol)

- RTCP packet will show QoS of the call between two end points.
- RTCP stream is out of band stream. Another words, it is a separate stream from the RTP Stream and will not interfere with RTP stream.
- Note, these values are contained in the payload(Data) and which are not decrypted by VNS Probe
- RTCP UDP Destination Port number = RTP stream port number + 1

RTCP Packet Capture

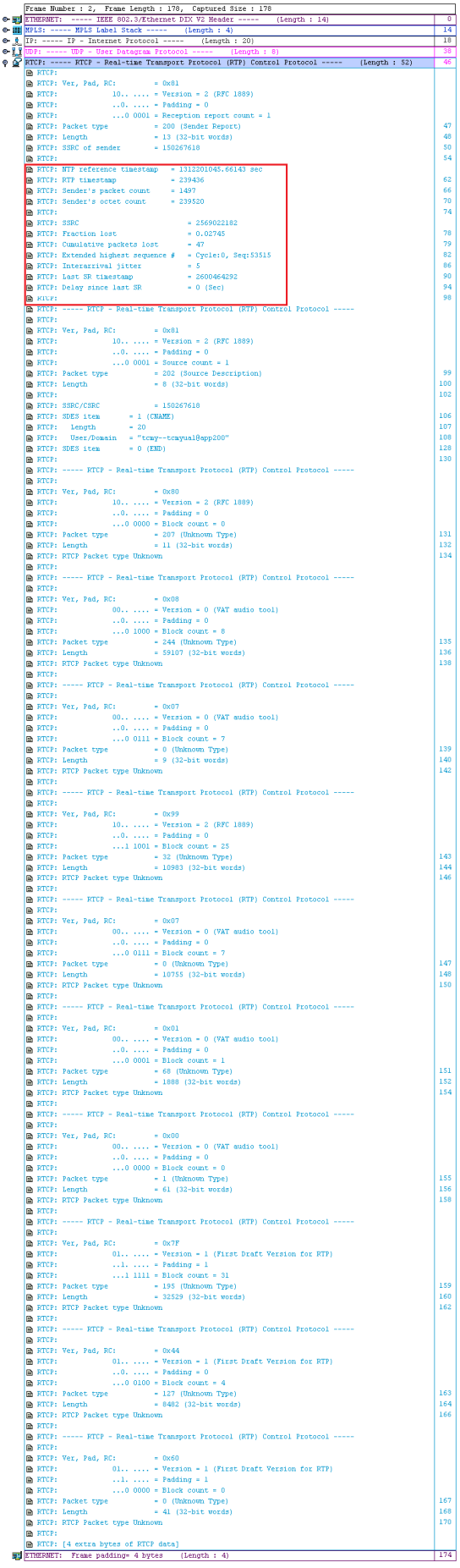


Frame	Absolute Time	Delta Time (ms)	Length	Source	Destination
1	8/1/11 12:20:02.880	0	178	192.169.230.1	192.169.229.1

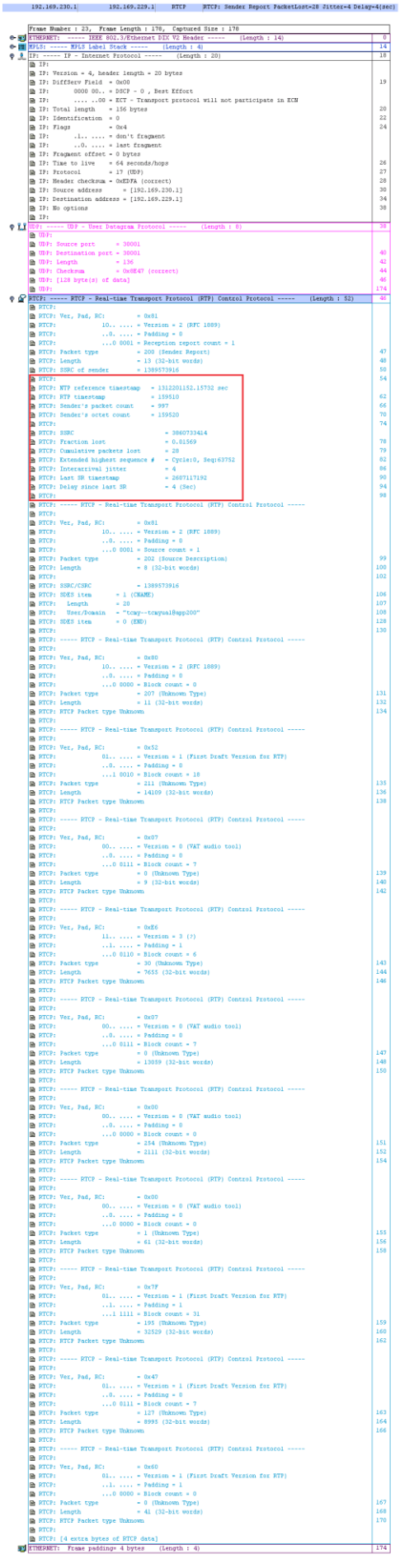
Protocols	Interpretation
RTCP	RTCP: Sender Report PacketLost=40 Jitter=4 Delay=0[sec]

```
Frame Number : 1,  Frame Length : 178,  Captured Size : 178
ETHERNET:  ----- IEEE 802.3/Ethernet DIX V2 Header -----    (Length : 14)                0
MPLS: ----- MPLS Label Stack -----    (Length : 4)                                       14
IP: ----- IP - Internet Protocol -----    (Length : 20)                                 18
IP:
IP: Version = 4, header length = 20 bytes
IP: DiffServ Field  = 0x00                                                             19
IP:       0000 00.. = DSCP - 0 , Best Effort
IP:       .... ..00 = ECT - Transport protocol will not participate in ECN
IP: Total length    = 156 bytes                                                        20
IP: Identification  = 0                                                                22
IP: Flags           = 0x4                                                              24
IP:       .1.. .... = don't fragment
IP:       ..0. .... = last fragment
IP: Fragment offset = 0 bytes
IP: Time to live    = 64 seconds/hops                                                  26
IP: Protocol        = 17 (UDP)                                                         27
IP: Header checksum = 0xED7A (correct)                                                 28
IP: Source address  = [192.169.230.1]                                                  30
IP: Destination address = [192.169.229.1]                                              34
IP: No options                                                                         38
IP:
UDP: ----- UDP - User Datagram Protocol -----    (Length : 8)                          38
UDP:
UDP: Source port      = 30001
UDP: Destination port = 30001                                                          40
UDP: Length           = 136                                                            42
UDP: Checksum         = 0xE991 (correct)                                               44
UDP: [128 byte(s) of data]                                                             46
UDP:                                                                                   174
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----    (Length : 52)   46
RTCP:
RTCP: Ver, Pad, RC:         = 0x81
RTCP:              10.. .... = Version = 2 (RFC 1889)
RTCP:              ..0. .... = Padding = 0
RTCP:              ...0 0001 = Reception report count = 1
RTCP: Packet type           = 200 (Sender Report)                                      47
RTCP: Length                = 13 (32-bit words)                                        48
RTCP: SSRC of sender        = 150267618                                                50
RTCP:                                                                                  54
RTCP: NTP reference timestamp   = 1312201040.66163 sec
RTCP: RTP timestamp             = 199436                                               62
RTCP: Sender's packet count     = 1247                                                 66
RTCP: Sender's octet count      = 199520                                               70
RTCP:                                                                                  74
RTCP: SSRC                        = 2569022182
RTCP: Fraction lost               = 0.03529                                            78
RTCP: Cumulative packets lost     = 40                                                 79
RTCP: Extended highest sequence #   = Cycle:0, Seq:53265                               82
RTCP: Interarrival jitter         = 4                                                  86
RTCP: Last SR timestamp           = 2600136559                                         90
RTCP: Delay since last SR         = 0 (Sec)                                            94
RTCP:                                                                                  98
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC:         = 0x81
RTCP:              10.. .... = Version = 2 (RFC 1889)
RTCP:              ..0. .... = Padding = 0
RTCP:              ...0 0001 = Source count = 1
RTCP: Packet type           = 202 (Source Description)                                 99
RTCP: Length                = 8 (32-bit words)                                         100
RTCP:                                                                                  102
RTCP: SSRC/CSRC             = 150267618
RTCP: SDES item       = 1 (CNAME)                                                      106
RTCP:   Length        = 20                                                             107
RTCP:   User/Domain   = "tcmy--tcmyual@app200"                                         108
RTCP: SDES item       = 0 (END)                                                        128
RTCP:                                                                                  130
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC:         = 0x80
RTCP:              10.. .... = Version = 2 (RFC 1889)
RTCP:              ..0. .... = Padding = 0
RTCP:              ...0 0000 = Block count = 0
RTCP: Packet type           = 207 (Unknown Type)                                       131
RTCP: Length                = 11 (32-bit words)                                        132
RTCP: RTCP Packet type Unknown                                                         134
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC:         = 0x08
RTCP:              00.. .... = Version = 0 (VAT audio tool)
RTCP:              ..0. .... = Padding = 0
RTCP:              ...0 1000 = Block count = 8
RTCP: Packet type           = 244 (Unknown Type)                                       135
RTCP: Length                = 59107 (32-bit words)                                     136
RTCP: RTCP Packet type Unknown                                                         138
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC:         = 0x07
RTCP:              00.. .... = Version = 0 (VAT audio tool)
RTCP:              ..0. .... = Padding = 0
RTCP:              ...0 0111 = Block count = 7
RTCP: Packet type           = 0 (Unknown Type)                                         139
RTCP: Length                = 9 (32-bit words)                                         140
RTCP: RTCP Packet type Unknown                                                         142
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC:         = 0x99
RTCP:              10.. .... = Version = 2 (RFC 1889)
RTCP:              ..0. .... = Padding = 0
RTCP:              ...1 1001 = Block count = 25
RTCP: Packet type           = 32 (Unknown Type)                                        143
RTCP: Length                = 10983 (32-bit words)                                     144
RTCP: RTCP Packet type Unknown                                                         146
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC:         = 0x08
RTCP:              00.. .... = Version = 0 (VAT audio tool)
RTCP:              ..0. .... = Padding = 0
RTCP:              ...0 1000 = Block count = 8
RTCP: Packet type           = 0 (Unknown Type)                                         147
RTCP: Length                = 10489 (32-bit words)                                     148
RTCP: RTCP Packet type Unknown                                                         150
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC:         = 0x01
RTCP:              00.. .... = Version = 0 (VAT audio tool)
RTCP:              ..0. .... = Padding = 0
RTCP:              ...0 0001 = Block count = 1
RTCP: Packet type           = 89 (Unknown Type)                                        151
RTCP: Length                = 1679 (32-bit words)                                      152
RTCP: RTCP Packet type Unknown                                                         154
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC:         = 0x00
RTCP:              00.. .... = Version = 0 (VAT audio tool)
RTCP:              ..0. .... = Padding = 0
RTCP:              ...0 0000 = Block count = 0
RTCP: Packet type           = 1 (Unknown Type)                                         155
RTCP: Length                = 61 (32-bit words)                                        156
RTCP: RTCP Packet type Unknown                                                         158
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC:         = 0x7F
RTCP:              01.. .... = Version = 1 (First Draft Version for RTP)
RTCP:              ..1. .... = Padding = 1
RTCP:              ...1 1111 = Block count = 31
RTCP: Packet type           = 195 (Unknown Type)                                       159
RTCP: Length                = 32529 (32-bit words)                                     160
RTCP: RTCP Packet type Unknown                                                         162
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC:         = 0x43
RTCP:              01.. .... = Version = 1 (First Draft Version for RTP)
RTCP:              ..0. .... = Padding = 0
RTCP:              ...0 0011 = Block count = 3
RTCP: Packet type           = 127 (Unknown Type)                                       163
RTCP: Length                = 8482 (32-bit words)                                      164
RTCP: RTCP Packet type Unknown                                                         166
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC:         = 0x60
RTCP:              01.. .... = Version = 1 (First Draft Version for RTP)
RTCP:              ..1. .... = Padding = 1
RTCP:              ...0 0000 = Block count = 0
RTCP: Packet type           = 0 (Unknown Type)                                         167
RTCP: Length                = 41 (32-bit words)                                        168
RTCP: RTCP Packet type Unknown                                                         170
RTCP:
RTCP: [4 extra bytes of RTCP data]
ETHERNET:  Frame padding= 4 bytes    (Length : 4)                                      174
```

Packet#1

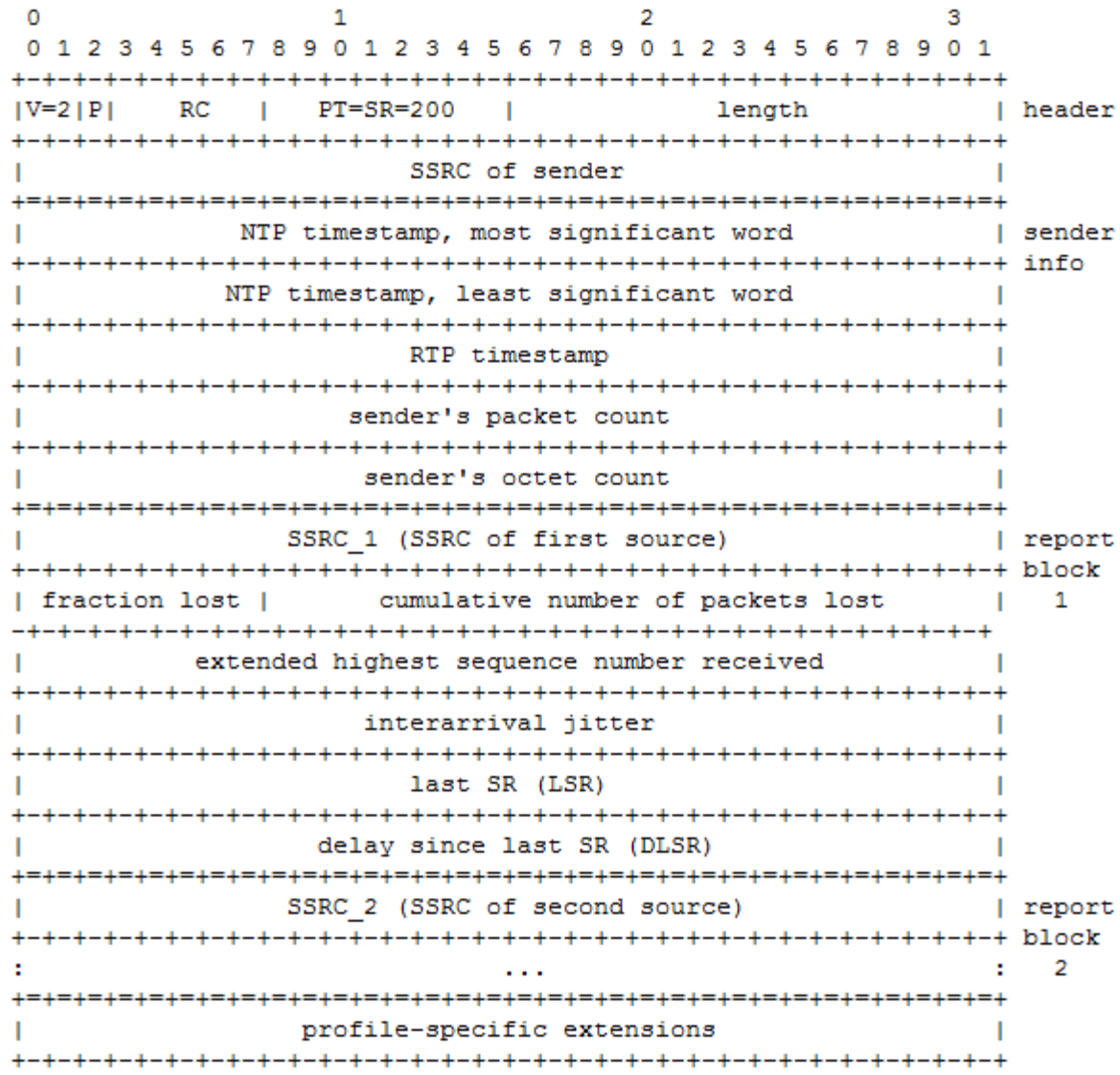

Frame Number : 2, Frame Length : 178, Captured Size : 178
ETHERNET: ----- IEEE 802.3/Ethernet DIX V2 Header ----- (Length : 14)
MPLS: ----- MPLS Label Stack ----- (Length : 4)
IP: ----- IP - Internet Protocol ----- (Length : 20)
UDP: ----- UDP - User Datagram Protocol ----- (Length : 8)
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol ----- (Length : 52)
RTCP:
RTCP: Ver, Pad, RC: = 0x81
RTCP: 10.. .... = Version = 2 (RFC 1889)
RTCP: ..0. .... = Padding = 0
RTCP: ...0 0001 = Reception report count = 1
RTCP: Packet type = 200 (Sender Report)
RTCP: Length = 13 (32-bit words)
RTCP: SSRC of sender = 150267618
RTCP:
RTCP: NTP reference timestamp = 1312201045.66143 sec
RTCP: RTP timestamp = 239436
RTCP: Sender's packet count = 1497
RTCP: Sender's octet count = 239520
RTCP:
RTCP: SSRC = 2569022182
RTCP: Fraction lost = 0.02745
RTCP: Cumulative packets lost = 47
RTCP: Extended highest sequence # = Cycle:0, Seq:53515
RTCP: Interarrival jitter = 5
RTCP: Last SR timestamp = 2600464292
RTCP: Delay since last SR = 0 (Sec)
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC: = 0x81
RTCP: 10.. .... = Version = 2 (RFC 1889)
RTCP: ..0. .... = Padding = 0
RTCP: ...0 0001 = Source count = 1
RTCP: Packet type = 202 (Source Description)
RTCP: Length = 8 (32-bit words)
RTCP:
RTCP: SSRC/CSRC = 150267618
RTCP: SDES item = 1 (CNAME)
RTCP: Length = 20
RTCP: User/Domain = "tcmy--tcmyual@app200"
RTCP: SDES item = 0 (END)
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC: = 0x80
RTCP: 10.. .... = Version = 2 (RFC 1889)
RTCP: ..0. .... = Padding = 0
RTCP: ...0 0000 = Block count = 0
RTCP: Packet type = 207 (Unknown Type)
RTCP: Length = 11 (32-bit words)
RTCP: RTCP Packet type Unknown
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC: = 0x08
RTCP: 00.. .... = Version = 0 (VAT audio tool)
RTCP: ..0. .... = Padding = 0
RTCP: ...0 1000 = Block count = 8
RTCP: Packet type = 244 (Unknown Type)
RTCP: Length = 59107 (32-bit words)
RTCP: RTCP Packet type Unknown
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC: = 0x07
RTCP: 00.. .... = Version = 0 (VAT audio tool)
RTCP: ..0. .... = Padding = 0
RTCP: ...0 0111 = Block count = 7
RTCP: Packet type = 0 (Unknown Type)
RTCP: Length = 9 (32-bit words)
RTCP: RTCP Packet type Unknown
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC: = 0x99
RTCP: 10.. .... = Version = 2 (RFC 1889)
RTCP: ..0. .... = Padding = 0
RTCP: ...1 1001 = Block count = 25
RTCP: Packet type = 32 (Unknown Type)
RTCP: Length = 10983 (32-bit words)
RTCP: RTCP Packet type Unknown
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC: = 0x07
RTCP: 00.. .... = Version = 0 (VAT audio tool)
RTCP: ..0. .... = Padding = 0
RTCP: ...0 0111 = Block count = 7
RTCP: Packet type = 0 (Unknown Type)
RTCP: Length = 10755 (32-bit words)
RTCP: RTCP Packet type Unknown
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC: = 0x01
RTCP: 00.. .... = Version = 0 (VAT audio tool)
RTCP: ..0. .... = Padding = 0
RTCP: ...0 0001 = Block count = 1
RTCP: Packet type = 68 (Unknown Type)
RTCP: Length = 1888 (32-bit words)
RTCP: RTCP Packet type Unknown
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC: = 0x00
RTCP: 00.. .... = Version = 0 (VAT audio tool)
RTCP: ..0. .... = Padding = 0
RTCP: ...0 0000 = Block count = 0
RTCP: Packet type = 1 (Unknown Type)
RTCP: Length = 61 (32-bit words)
RTCP: RTCP Packet type Unknown
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC: = 0x7F
RTCP: 01.. .... = Version = 1 (First Draft Version for RTP)
RTCP: ..1. .... = Padding = 1
RTCP: ...1 1111 = Block count = 31
RTCP: Packet type = 195 (Unknown Type)
RTCP: Length = 32529 (32-bit words)
RTCP: RTCP Packet type Unknown
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC: = 0x44
RTCP: 01.. .... = Version = 1 (First Draft Version for RTP)
RTCP: ..0. .... = Padding = 0
RTCP: ...0 0100 = Block count = 4
RTCP: Packet type = 127 (Unknown Type)
RTCP: Length = 8482 (32-bit words)
RTCP: RTCP Packet type Unknown
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC: = 0x60
RTCP: 01.. .... = Version = 1 (First Draft Version for RTP)
RTCP: ..1. .... = Padding = 1
RTCP: ...0 0000 = Block count = 0
RTCP: Packet type = 0 (Unknown Type)
RTCP: Length = 41 (32-bit words)
RTCP: RTCP Packet type Unknown
RTCP:
RTCP: [4 extra bytes of RTCP data]
ETHERNET: Frame padding= 4 bytes (Length : 4)

Packet#2


192.169.230.1 192.169.229.1 RTCP RTCP: Sender Report PacketLost=28 Jitter=4 Delay=4(sec)
Frame Number : 23, Frame Length : 178, Captured Size : 178
ETHERNET: ----- IEEE 802.3/Ethernet DIX V2 Header ----- (Length : 14)
MPLS: ----- MPLS Label Stack ----- (Length : 4)
IP: ----- IP - Internet Protocol ----- (Length : 20)
IP: Version = 4, header length = 20 bytes
IP: DiffServ Field = 0x00
IP: 0000 00.. = DSCP - 0 , Best Effort
IP: .... ..00 = ECT - Transport protocol will not participate in ECN
IP: Total length = 156 bytes
IP: Identification = 0
IP: Flags = 0x4
IP: .1.. .... = don't fragment
IP: ..0. .... = last fragment
IP: Fragment offset = 0 bytes
IP: Time to live = 64 seconds/hops
IP: Protocol = 17 (UDP)
IP: Header checksum = 0xED7A (correct)
IP: Source address = [192.169.230.1]
IP: Destination address = [192.169.229.1]
IP: No options
IP:
UDP: ----- UDP - User Datagram Protocol ----- (Length : 8)
UDP: Source port = 30001
UDP: Destination port = 30001
UDP: Length = 136
UDP: Checksum = 0x8E47 (correct)
UDP: [128 byte(s) of data]
UDP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol ----- (Length : 52)
RTCP: Ver, Pad, RC: = 0x81
RTCP: 10.. .... = Version = 2 (RFC 1889)
RTCP: ..0. .... = Padding = 0
RTCP: ...0 0001 = Reception report count = 1
RTCP: Packet type = 200 (Sender Report)
RTCP: Length = 13 (32-bit words)
RTCP: SSRC of sender = 1389573916
RTCP:
RTCP: NTP reference timestamp = 1312201152.15732 sec
RTCP: RTP timestamp = 159510
RTCP: Sender's packet count = 997
RTCP: Sender's octet count = 159520
RTCP:
RTCP: SSRC = 3860733414
RTCP: Fraction lost = 0.01569
RTCP: Cumulative packets lost = 28
RTCP: Extended highest sequence # = Cycle:0, Seq:63752
RTCP: Interarrival jitter = 4
RTCP: Last SR timestamp = 2607117192
RTCP: Delay since last SR = 4 (Sec)
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC: = 0x81
RTCP: 10.. .... = Version = 2 (RFC 1889)
RTCP: ..0. .... = Padding = 0
RTCP: ...0 0001 = Source count = 1
RTCP: Packet type = 202 (Source Description)
RTCP: Length = 8 (32-bit words)
RTCP:
RTCP: SSRC/CSRC = 1389573916
RTCP: SDES item = 1 (CNAME)
RTCP: Length = 20
RTCP: User/Domain = "tcmyu-tcmyual@app200"
RTCP: SDES item = 0 (END)
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC: = 0x80
RTCP: 10.. .... = Version = 2 (RFC 1889)
RTCP: ..0. .... = Padding = 0
RTCP: ...0 0000 = Block count = 0
RTCP: Packet type = 207 (Unknown Type)
RTCP: Length = 11 (32-bit words)
RTCP: RTCP Packet type Unknown
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC: = 0x52
RTCP: 01.. .... = Version = 1 (First Draft Version for RTP)
RTCP: ..0. .... = Padding = 0
RTCP: ...1 0010 = Block count = 18
RTCP: Packet type = 211 (Unknown Type)
RTCP: Length = 14109 (32-bit words)
RTCP: RTCP Packet type Unknown
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC: = 0x07
RTCP: 00.. .... = Version = 0 (VAT audio tool)
RTCP: ..0. .... = Padding = 0
RTCP: ...0 0111 = Block count = 7
RTCP: Packet type = 0 (Unknown Type)
RTCP: Length = 9 (32-bit words)
RTCP: RTCP Packet type Unknown
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC: = 0xE6
RTCP: 11.. .... = Version = 3 (?)
RTCP: ..1. .... = Padding = 1
RTCP: ...0 0110 = Block count = 6
RTCP: Packet type = 30 (Unknown Type)
RTCP: Length = 7655 (32-bit words)
RTCP: RTCP Packet type Unknown
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC: = 0x07
RTCP: 00.. .... = Version = 0 (VAT audio tool)
RTCP: ..0. .... = Padding = 0
RTCP: ...0 0111 = Block count = 7
RTCP: Packet type = 0 (Unknown Type)
RTCP: Length = 13059 (32-bit words)
RTCP: RTCP Packet type Unknown
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC: = 0x00
RTCP: 00.. .... = Version = 0 (VAT audio tool)
RTCP: ..0. .... = Padding = 0
RTCP: ...0 0000 = Block count = 0
RTCP: Packet type = 254 (Unknown Type)
RTCP: Length = 2111 (32-bit words)
RTCP: RTCP Packet type Unknown
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC: = 0x00
RTCP: 00.. .... = Version = 0 (VAT audio tool)
RTCP: ..0. .... = Padding = 0
RTCP: ...0 0000 = Block count = 0
RTCP: Packet type = 1 (Unknown Type)
RTCP: Length = 41 (32-bit words)
RTCP: RTCP Packet type Unknown
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC: = 0x7F
RTCP: 01.. .... = Version = 1 (First Draft Version for RTP)
RTCP: ..1. .... = Padding = 1
RTCP: ...1 1111 = Block count = 31
RTCP: Packet type = 195 (Unknown Type)
RTCP: Length = 32529 (32-bit words)
RTCP: RTCP Packet type Unknown
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC: = 0x47
RTCP: 01.. .... = Version = 1 (First Draft Version for RTP)
RTCP: ..0. .... = Padding = 0
RTCP: ...0 0111 = Block count = 7
RTCP: Packet type = 127 (Unknown Type)
RTCP: Length = 8995 (32-bit words)
RTCP: RTCP Packet type Unknown
RTCP:
RTCP: ----- RTCP - Real-time Transport Protocol (RTP) Control Protocol -----
RTCP:
RTCP: Ver, Pad, RC: = 0x60
RTCP: 01.. .... = Version = 1 (First Draft Version for RTP)
RTCP: ..1. .... = Padding = 1
RTCP: ...0 0000 = Block count = 0
RTCP: Packet type = 0 (Unknown Type)
RTCP: Length = 41 (32-bit words)
RTCP: RTCP Packet type Unknown
RTCP:
RTCP: [4 extra bytes of RTCP data]
ETHERNET: Frame padding= 4 bytes (Length : 4)

Packet#23

6.3.1 SR: Sender report RTCP packet



The sender report packet consists of three sections, possibly followed by a fourth profile-specific extension section if defined. The first section, the header, is 8 octets long. The fields have the following meaning:

version (V): 2 bits

Identifies the version of RTP, which is the same in RTCP packets as in RTP data packets. The version defined by this specification is two (2).

padding (P): 1 bit

If the padding bit is set, this RTCP packet contains some additional padding octets at the end which are not part of the control information. The last octet of the padding is a count of how many padding octets should be ignored. Padding may be needed by some encryption algorithms with fixed block sizes. In a compound RTCP packet, padding should only be required on the last individual packet because the compound packet is encrypted as a whole.

reception report count (RC): 5 bits

The number of reception report blocks contained in this packet. A value of zero is valid.

packet type (PT): 8 bits

Contains the constant 200 to identify this as an RTCP SR packet.

length: 16 bits

The length of this RTCP packet in 32-bit words minus one, including the header and any padding. (The offset of one makes zero a valid length and avoids a possible infinite loop in scanning a compound RTCP packet, while counting 32-bit words avoids a validity check for a multiple of 4.)

SSRC: 32 bits

The synchronization source identifier for the originator of this SR packet.

The second section, the sender information, is 20 octets long and is present in every sender report packet. It summarizes the data transmissions from this sender. The fields have the following meaning:

NTP timestamp: 64 bits

Indicates the wallclock time when this report was sent so that it may be used in combination with timestamps returned in reception reports from other receivers to measure round-trip propagation to those receivers. Receivers should expect that the measurement accuracy of the timestamp may be limited to far less than the resolution of the NTP timestamp. The measurement uncertainty of the timestamp is not indicated as it may not be known. A sender that can keep track of elapsed time but has no notion of wallclock time may use the elapsed time since joining the session instead. This is assumed to be less than 68 years, so the high bit will be zero. It is permissible to use the sampling clock to estimate elapsed wallclock time. A sender that has no notion of wallclock or elapsed time may set the NTP timestamp to zero.

RTP timestamp: 32 bits

Corresponds to the same time as the NTP timestamp (above), but in the same units and with the same random offset as the RTP timestamps in data packets. This correspondence may be used for intra- and inter-media synchronization for sources whose NTP timestamps are synchronized, and may be used by media-independent receivers to estimate the nominal RTP clock frequency. Note that in most cases this timestamp will not be equal to the RTP timestamp in any adjacent data packet. Rather, it is calculated from the corresponding NTP timestamp using the relationship between the RTP timestamp counter and real time as maintained by periodically checking the wallclock time at a sampling instant.

sender's packet count: 32 bits

The total number of RTP data packets transmitted by the sender since starting transmission up until the time this SR packet was generated. The count is reset if the sender changes its SSRC identifier.

sender's octet count: 32 bits

The total number of payload octets (i.e., not including header or padding) transmitted in RTP data packets by the sender since starting transmission up until the time this SR packet was generated. The count is reset if the sender changes its SSRC identifier. This field can be used to estimate the average payload data rate.

The third section contains zero or more reception report blocks depending on the number of other sources heard by this sender since the last report. Each reception report block conveys statistics on the reception of RTP packets from a single synchronization source. Receivers do not carry over statistics when a source changes its SSRC identifier due to a collision. These statistics are:

SSRC_n (source identifier): 32 bits

The SSRC identifier of the source to which the information in this reception report block pertains.

fraction lost: 8 bits

The fraction of RTP data packets from source SSRC_n lost since the previous SR or RR packet was sent, expressed as a fixed point number with the binary point at the left edge of the field. (That is equivalent to taking the integer part after multiplying the loss fraction by 256.) This fraction is defined to be the number of packets lost divided by the number of packets expected, as defined in the next paragraph. An implementation is shown in Appendix A.3. If the loss is negative due to duplicates, the fraction lost is set to zero. Note that a receiver cannot tell whether any packets were lost after the last one received, and that there will be no reception report block issued for a source if all packets from that source sent during the last reporting interval have been lost.

cumulative number of packets lost: 24 bits

The total number of RTP data packets from source SSRC_n that have been lost since the beginning of reception. This number is defined to be the number of packets expected less the number of packets actually received, where the number of packets received includes any which are late or duplicates. Thus packets that arrive late are not counted as lost, and the loss may be negative if there are duplicates. The number of packets

expected is defined to be the extended last sequence number received, as defined next, less the initial sequence number received. This may be calculated as shown in Appendix A.3.

extended highest sequence number received: 32 bits

The low 16 bits contain the highest sequence number received in an RTP data packet from source SSRC_n, and the most significant 16 bits extend that sequence number with the corresponding count of sequence number cycles, which may be maintained according to the algorithm in Appendix A.1. Note that different receivers within the same session will generate different extensions to the sequence number if their start times differ significantly.

interarrival jitter: 32 bits

An estimate of the statistical variance of the RTP data packet interarrival time, measured in timestamp units and expressed as an unsigned integer. The interarrival jitter J is defined to be the mean deviation (smoothed absolute value) of the difference D in packet spacing at the receiver compared to the sender for a pair of packets. As shown in the equation below, this is equivalent to the difference in the "relative transit time" for the two packets; the relative transit time is the difference between a packet's RTP timestamp and the receiver's clock at the time of arrival, measured in the same units.

If Si is the RTP timestamp from packet i, and Ri is the time of arrival in RTP timestamp units for packet i, then for two packets i and j, D may be expressed as

$$D(i,j)=(Rj-Ri)-(Sj-Si)=(Rj-Sj)-(Ri-Si)$$

The interarrival jitter is calculated continuously as each data packet i is received from source SSRC_n, using this difference D for that packet and the previous packet i-1 in order of arrival (not necessarily in sequence), according to the formula

$$J=J+(|D(i-1,i)|-J)/16$$

Whenever a reception report is issued, the current value of J is sampled.

The jitter calculation is prescribed here to allow profile- independent monitors to make valid interpretations of reports coming from different implementations. This algorithm is the optimal first- order estimator and the gain parameter 1/16 gives a good noise reduction ratio while maintaining a reasonable rate of convergence [11]. A sample implementation is shown in Appendix A.8.

last SR timestamp (LSR): 32 bits

The middle 32 bits out of 64 in the NTP timestamp (as explained in Section 4) received as part of the most recent RTCP sender report (SR) packet from source SSRC_n. If no SR has been received yet, the field is set to zero.

delay since last SR (DLSR): 32 bits

The delay, expressed in units of 1/65536 seconds, between receiving the last SR packet from source SSRC_n and sending this reception report block. If no SR packet has been received yet from SSRC_n, the DLSR field is set to zero.

Let SSRC_r denote the receiver issuing this receiver report. Source SSRC_n can compute the round propagation delay to SSRC_r by recording the time A when this reception report block is received. It calculates the total round-trip time A-LSR using the last SR timestamp (LSR) field, and then subtracting this field to leave the round-trip propagation delay as (A- LSR - DLSR). This is illustrated in Fig. 2.

This may be used as an approximate measure of distance to cluster receivers, although some links have very asymmetric delays.

6.3.2 RR: Receiver report RTCP packet

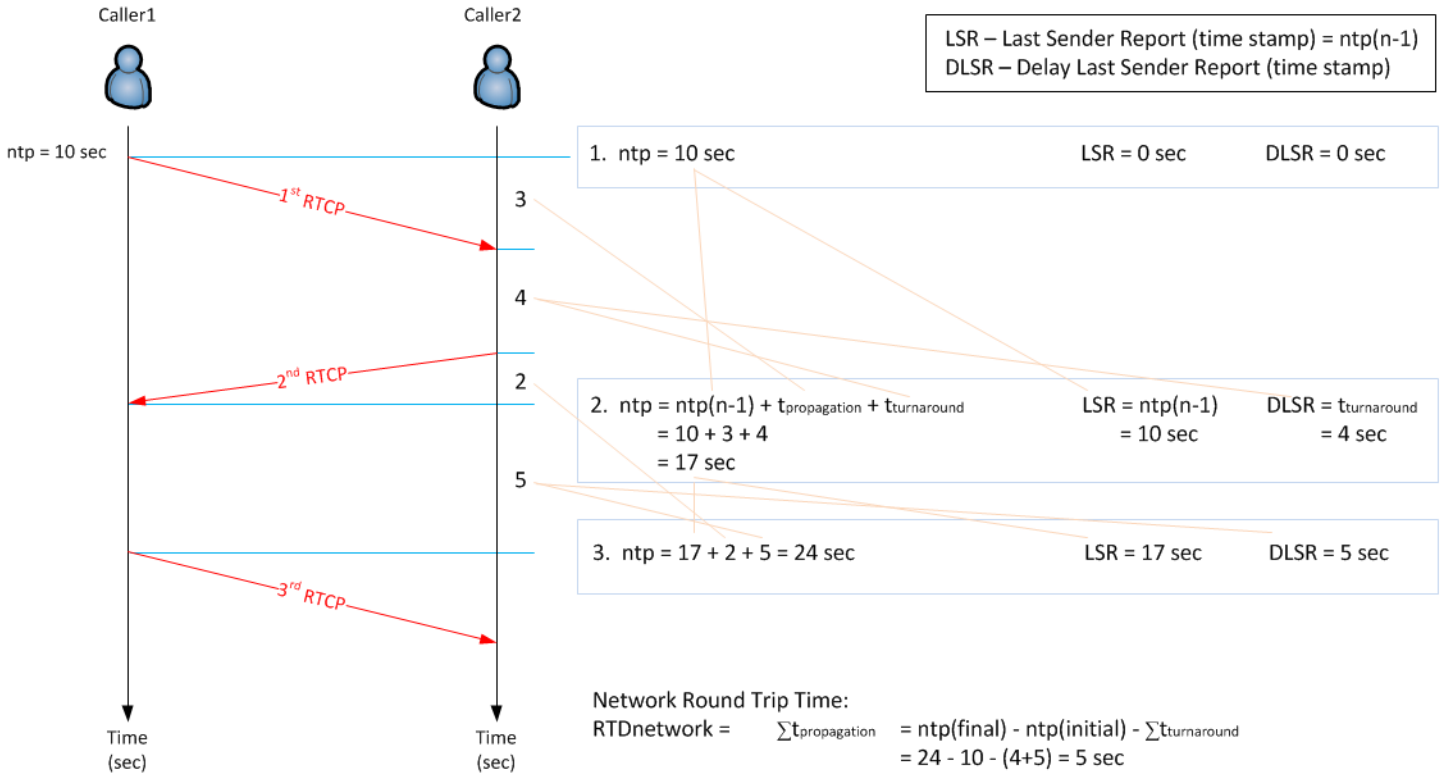
```
   [10 Nov 1995 11:33:25.125]           [10 Nov 1995 11:33:36.5]
   n                 SR(n)              A=b710:8000 (46864.500 s)
   ------------------------------------------------------------->
                      v                 ^
   ntp_sec =0xb44db705 v               ^ dlsr=0x0005.4000 (    5.250s)
   ntp_frac=0x20000000  v             ^  lsr =0xb705:2000 (46853.125s)
     (3024992016.125 s)  v           ^
   r                      v         ^ RR(n)
   ------------------------------------------------------------->
                         |<-DLSR->|
                          (5.250 s)

   A     0xb710:8000 (46864.500 s)
   DLSR -0x0005:4000 (    5.250 s)
   LSR  -0xb705:2000 (46853.125 s)
   -------------------------------
   delay 0x   6:2000 (    6.125 s)
```

Figure 2: Example for round-trip time computation

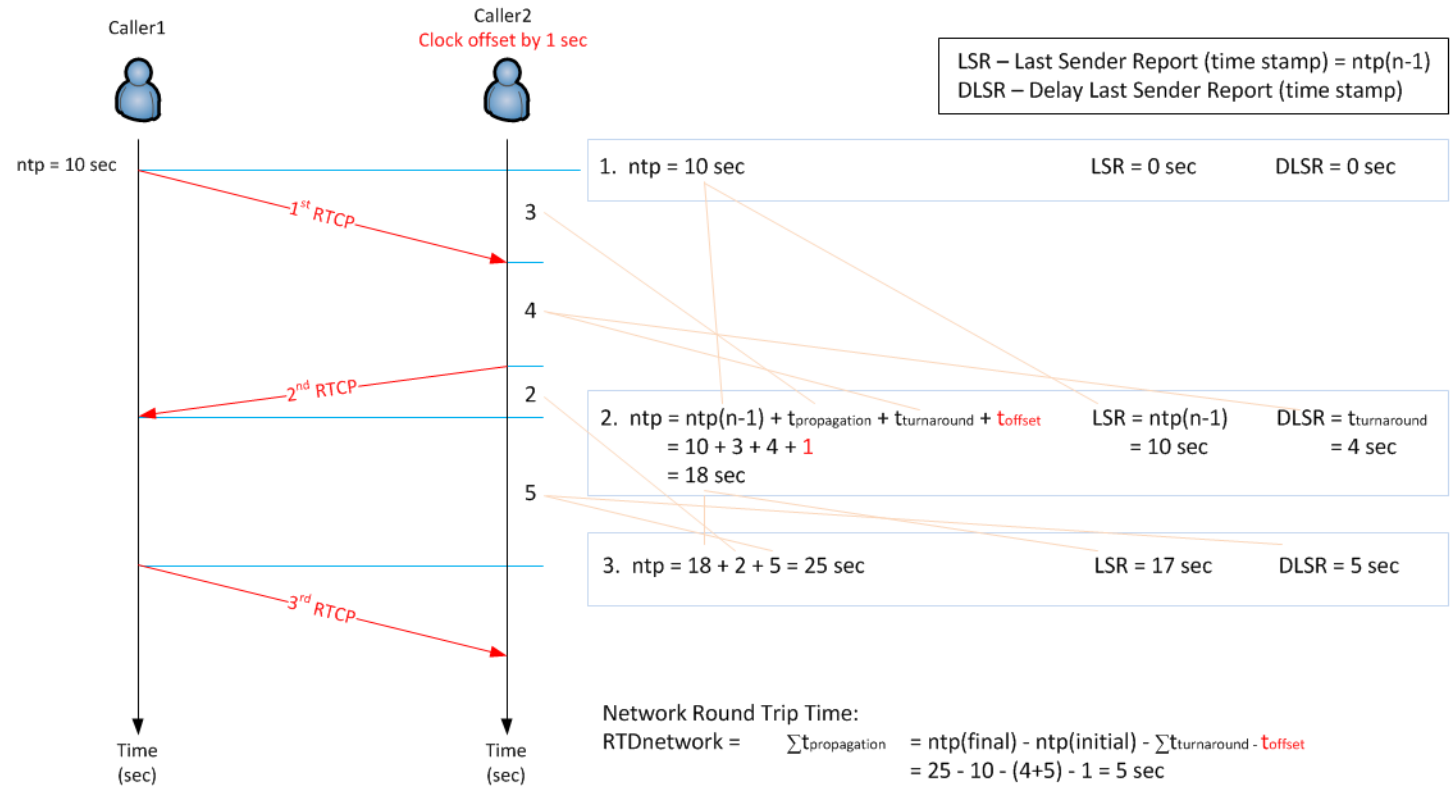
```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|V=2|P|    RC   |   PT=RR=201   |             length            | header
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                     SSRC of packet sender                     |
+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+
|                 SSRC_1 (SSRC of first source)                 | report
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+ block
| fraction lost |       cumulative number of packets lost       |   1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|           extended highest sequence number received           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                      interarrival jitter                      |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                         last SR (LSR)                         |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                   delay since last SR (DLSR)                  |
+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+
|                 SSRC_2 (SSRC of second source)                | report
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+ block
:                               ...                             :   2
+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+
|                  profile-specific extensions                  |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

The format of the receiver report (RR) packet is the same as that of the SR packet except that the packet type field contains the constant 201 and the five words of sender information are omitted (these are the NTP and RTP timestamps and sender's packet and octet counts). The remaining fields have the same meaning as for the SR packet.
An empty RR packet (RC = 0) is put at the head of a compound RTCP packet when there is no data transmission or reception to report.

Example of RTCP Network Round Trip Time Calculation



When the two callers ntp clock is not synced, it does not affect the resulting round trip time



Source:
http://www.packetizer.com/ipmc/sip/papers/understanding_sip_voip/

http://freesoft.org/CIE/RFC/1889/19.htm

Thanks Noman @Telchemy!