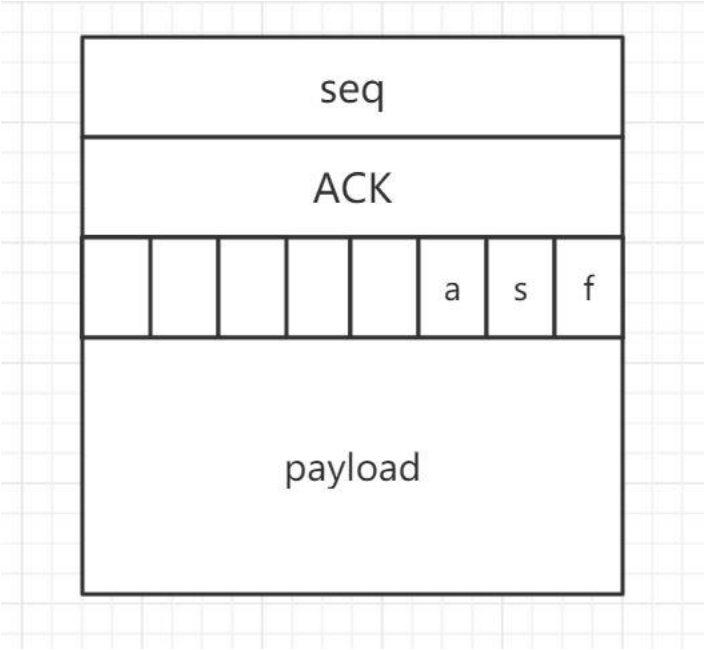
1. My PTP protocol is similar to TCP protocol. First, it starts a socket for packet transmission. It does 3-way handshake before start sending messages and 4-way termination after sending all messages. It also maintains a timer. If a packet is sent without ACK received in a limited time, PTP would retransmit starting from that packet. PTP cannot do fast retransmission. It can only retransmit after timeout.
2. PTP header contains three main field. First field is seq, which carry sequence number. Second field is ACK, which carry ack number. Third field contains three flags, ack, syn and fin. ack is used to indicate whether the message is an ack message. syn is used for connection setup, while fin is used for teardown.
3. a). I first set 100 ms, a relevantly large timeout to guarantee complete transmission and checked log file to see how long it takes to transmit max window size of bytes. In screen shot 3.1, we can see a whole transmission and reception start from 409.11 ms and stop at 414.24 ms. Thus, a whole procedure takes about 5.13 ms. For such a transmission, setting timeout to 10 ms is sufficient. Picture 3.2 shows receiver's log file. Picture 3.3 and 3.4 shows sender and receiver's log file where dropping happened when pdrop = 0.3.

   b).

timeout	Transmitted packets	Overall time
Tcurrent	15699	8309.49
4 * Tcurrent	15699	25325.36
Tcurrent / 4	22243	4800.21

   From the table we can find that number of transmitted packets for timeout Tcurrent and 4 * Tcurrent is same, but smaller than transmission with timeout Tcurrent / 4. This is Because in some moment acks is sending back when time is out. Then a retransmission starts, which take times. This is why time of transmission with timeout Tcurrent / 4 is half of transmission with timeout Tcurrent, while overall time of transmission with timeout Tcurrent is 4 times of transmission with timeout 4 * Tcurrent. Data can be found in picture 3.5, 3.6 and 3.7.

   Below is appendix.



2.1 Header field

77	rcv	308.80	A	1	0	501
78	rcv	308.84	A	1	0	501
79	rcv	308.88	A	1	0	501
80	snd	409.11	D	501	50	1
81	snd	409.15	D	551	50	1
82	snd	409.17	D	601	50	1
83	snd	409.18	D	651	50	1
84	snd	409.19	D	701	50	1
85	snd	409.20	D	751	50	1
86	snd	409.22	D	801	50	1
87	snd	409.23	D	851	50	1
88	snd	409.24	D	901	50	1
89	snd	409.25	D	951	50	1
90	rcv	409.83	A	1	0	551
91	rcv	410.37	A	1	0	601
92	rcv	410.89	A	1	0	651
93	rcv	411.38	A	1	0	701
94	rcv	411.84	A	1	0	751
95	rcv	412.31	A	1	0	801
96	rcv	412.85	A	1	0	851
97	rcv	413.26	A	1	0	901
98	rcv	413.79	A	1	0	951
99	rcv	414.24	A	1	0	1001
100	snd	414.31	D	1001	50	1
101	snd	414.33	D	1051	50	1
102	snd	414.35	D	1101	50	1
103	snd	414.37	D	1151	50	1
104	snd	414.39	D	1201	50	1

3.1 timeout estimation with pdrop = 0.1

49	snd	26.31	A	1	0	401
50	rcv	26.33	D	501	50	1
51	snd	26.34	A	1	0	401
52	rcv	26.36	D	551	50	1
53	snd	26.38	A	1	0	401
54	rcv	26.39	D	601	50	1
55	snd	26.41	A	1	0	401
56	rcv	26.42	D	651	50	1
57	snd	26.44	A	1	0	401
58	rcv	36.59	D	401	50	1
59	snd	37.23	A	1	0	451
60	rcv	37.25	D	451	50	1
61	snd	37.81	A	1	0	501
62	rcv	37.83	D	551	50	1
63	snd	37.84	A	1	0	501
64	rcv	37.85	D	601	50	1
65	snd	37.85	A	1	0	501
66	rcv	37.86	D	651	50	1
67	snd	37.87	A	1	0	501
68	rcv	37.88	D	701	50	1
69	snd	37.88	A	1	0	501
70	rcv	37.89	D	751	50	1
71	snd	37.90	A	1	0	501
72	rcv	37.90	D	801	50	1
73	snd	37.91	A	1	0	501
74	rcv	37.92	D	851	50	1
75	snd	37.93	A	1	0	501
76	rcv	48.10	D	501	50	1
77	snd	48.72	A	1	0	551

3.2 sequence of PTP packets that are observed at the receiver with timeout = 10, pdrop = 0.1

34	rcv	12.87	A	1	0	101
35	rcv	12.88	A	1	0	101
36	rcv	12.90	A	1	0	101
37	rcv	12.91	A	1	0	101
38	snd	23.03	D	101	50	1
39	snd	23.06	D	151	50	1
40	drop	23.07	D	201	50	1
41	snd	23.09	D	251	50	1
42	drop	23.10	D	301	50	1
43	snd	23.11	D	351	50	1
44	snd	23.12	D	401	50	1
45	snd	23.14	D	451	50	1
46	snd	23.15	D	501	50	1
47	snd	23.17	D	551	50	1
48	rcv	23.61	A	1	0	151
49	rcv	24.30	A	1	0	201
50	rcv	24.32	A	1	0	201
51	rcv	24.34	A	1	0	201
52	rcv	24.35	A	1	0	201
53	rcv	24.37	A	1	0	201
54	rcv	24.38	A	1	0	201
55	rcv	24.40	A	1	0	201
56	snd	34.54	D	201	50	1
57	snd	34.57	D	251	50	1
58	drop	34.58	D	301	50	1
59	snd	34.60	D	351	50	1
60	snd	34.61	D	401	50	1
61	snd	34.63	D	451	50	1

3.3 Sender log file where dropping occurred (timeout = 10, pdrop = 0.3)

22	rcv	12.52	D	301	50	1
23	snd	12.53	A	1	0	101
24	rcv	12.54	D	351	50	1
25	snd	12.55	A	1	0	101
26	rcv	12.56	D	401	50	1
27	snd	12.57	A	1	0	101
28	rcv	12.58	D	451	50	1
29	snd	12.58	A	1	0	101
30	rcv	12.60	D	551	50	1
31	snd	12.61	A	1	0	101
32	rcv	22.78	D	101	50	1
33	snd	23.32	A	1	0	151
34	rcv	23.34	D	151	50	1
35	snd	23.78	A	1	0	201
36	rcv	23.81	D	251	50	1
37	snd	23.83	A	1	0	201
38	rcv	23.85	D	351	50	1
39	snd	23.86	A	1	0	201
40	rcv	23.88	D	401	50	1
41	snd	23.89	A	1	0	201
42	rcv	23.91	D	451	50	1
43	snd	23.92	A	1	0	201
44	rcv	23.93	D	501	50	1
45	snd	23.95	A	1	0	201
46	rcv	23.96	D	551	50	1
47	snd	23.99	A	1	0	201
48	rcv	34.28	D	201	50	1

3.4 Sender log file where dropping occurred (timeout = 10, pdrop = 0.3)

15687	snd	8297.27	A	1	0	262001
15688	rcv	8297.29	D	262001	50	1
15689	snd	8297.75	A	1	0	262051
15690	rcv	8297.77	D	262101	43	1
15691	snd	8297.79	A	1	0	262051
15692	rcv	8308.20	D	262051	50	1
15693	snd	8308.92	A	1	0	262101
15694	rcv	8308.94	D	262101	43	1
15695	snd	8309.36	A	1	0	262144
15696	rcv	8309.41	F	262144	0	1
15697	snd	8309.43	A	1	0	262145
15698	snd	8309.45	F	1	0	262145
15699	rcv	8309.49	A	262144	0	2
15700						

3.5 receiver log file of transmitting test2 with timeout Tcurrent

15685	snd	25282.02	A	1	0	261951
15686	rcv	25282.05	D	261951	50	1
15687	snd	25282.63	A	1	0	262001
15688	rcv	25282.66	D	262001	50	1
15689	snd	25283.17	A	1	0	262051
15690	rcv	25283.20	D	262101	43	1
15691	snd	25283.22	A	1	0	262051
15692	rcv	25323.47	D	262051	50	1
15693	snd	25324.39	A	1	0	262101
15694	rcv	25324.44	D	262101	43	1
15695	snd	25325.10	A	1	0	262144
15696	rcv	25325.21	F	262144	0	1
15697	snd	25325.25	A	1	0	262145
15698	snd	25325.29	F	1	0	262145
15699	rcv	25325.36	A	262144	0	2
15700						

3.6 receiver log file of transmitting test2 with timeout 4 * Tcurrent

22233	snd	4798.46	A	1	0	262001
22234	rcv	4798.48	D	262001	50	1
22235	snd	4799.01	A	1	0	262051
22236	rcv	4799.03	D	262051	50	1
22237	snd	4799.55	A	1	0	262101
22238	rcv	4799.56	D	262101	43	1
22239	snd	4800.05	A	1	0	262144
22240	rcv	4800.14	F	262144	0	1
22241	snd	4800.16	A	1	0	262145
22242	snd	4800.16	F	1	0	262145
22243	rcv	4800.21	A	262144	0	2
22244						

3.7 receiver log file of transmitting test2 with timeout Tcurrent / 4