

# Отчёт по лабораторной работе «Механизмы протокола TCP»

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## Содержание

1. Установка и разрыв соединения	1
2. Окно получателя	2
3. Окно отправителя	7
4. Нейгл и Мишналь	9
5. Агрессивная буферизация	10
6. Отправка без задержки	11
7. Быстрый повтор	12
8. Обычный повтор	13
9. Неудачная попытка соединени с портом	14
10.Опыт с PMTU	14
11.Соединение с неверным портом	15

## 1. Установка и разрыв соединения

Запускаем tcpdump на машинах c2 и c6 командой:

```
|tcpdump -n -i eth0 tcp
```

На машине c2:

```
|15:22:26.906986 IP 10.10.0.2.46208 > 10.50.0.2.9: S 3270243622:3270243622(0) win 5840  
|<mss 1460,sackOK,timestamp 293235 0,nop,wscale 1>  
|15:22:26.907496 IP 10.50.0.2.9 > 10.10.0.2.46208: S 3267236843:3267236843(0) ack 3270243623  
|win 5792 <mss 536,sackOK,timestamp 293175 293235,nop,wscale 1>
```

```

15:22:26.907595 IP 10.10.0.2.46208 > 10.50.0.2.9: . ack 1 win 2920 <nop,nop,
timestamp 293235 293175>

15:22:38.108570 IP 10.10.0.2.46208 > 10.50.0.2.9: P 1:8(7) ack 1
win 2920 <nop,nop,timestamp 294361 293175>
15:22:38.109292 IP 10.50.0.2.9 > 10.10.0.2.46208: . ack 8
win 2896 <nop,nop,timestamp 294296 294361>

15:22:48.867462 IP 10.10.0.2.46208 > 10.50.0.2.9: P 8:12(4) ack 1 win 2920
<nop,nop,timestamp 295436 294296>
15:22:48.868855 IP 10.50.0.2.9 > 10.10.0.2.46208: . ack 12
win 2896 <nop,nop,timestamp 295372 295436>

15:23:00.307568 IP 10.10.0.2.46208 > 10.50.0.2.9: F 12:12(0) ack 1
win 2920 <nop,nop,timestamp 296580 295372>
15:23:00.313943 IP 10.50.0.2.9 > 10.10.0.2.46208: F 1:1(0) ack 13
win 2896 <nop,nop,timestamp 296516 296580>
15:23:00.314331 IP 10.10.0.2.46208 > 10.50.0.2.9: . ack 2
win 2920 <nop,nop,timestamp 296580 296516>

```

На машине сб:

```

15:22:26.601053 IP 10.10.0.2.46208 > 10.50.0.2.9: S 3270243622:3270243622(0)
win 5840 <mss 536,sackOK,timestamp 293235 0,nop,wscale 1>
15:22:26.601075 IP 10.50.0.2.9 > 10.10.0.2.46208: S 3267236843:3267236843(0) ack 3270243623
win 5792 <mss 1460,sackOK,timestamp 293175 293235,nop,wscale 1>
15:22:26.601521 IP 10.10.0.2.46208 > 10.50.0.2.9: . ack 1
win 2920 <nop,nop,timestamp 293235 293175>

15:22:37.802752 IP 10.10.0.2.46208 > 10.50.0.2.9: P 1:8(7) ack 1
win 2920 <nop,nop,timestamp 294361 293175>
15:22:37.802784 IP 10.50.0.2.9 > 10.10.0.2.46208: . ack 8
win 2896 <nop,nop,timestamp 294296 294361>

15:22:48.562024 IP 10.10.0.2.46208 > 10.50.0.2.9: P 8:12(4) ack 1
win 2920 <nop,nop,timestamp 295436 294296>
15:22:48.562148 IP 10.50.0.2.9 > 10.10.0.2.46208: . ack 12
win 2896 <nop,nop,timestamp 295372 295436>

15:23:00.002017 IP 10.10.0.2.46208 > 10.50.0.2.9: F 12:12(0) ack 1
win 2920 <nop,nop,timestamp 296580 295372>
15:23:00.007058 IP 10.50.0.2.9 > 10.10.0.2.46208: F 1:1(0) ack 13
win 2896 <nop,nop,timestamp 296516 296580>
15:23:00.008614 IP 10.10.0.2.46208 > 10.50.0.2.9: . ack 2
win 2920 <nop,nop,timestamp 296580 296516>

```

## 2. Окно получателя

Где что дамвим. Дампить без -t обязательно!

```

17:59:04.537085 IP 10.10.0.2.53408 > 10.30.0.2.3002: S 315225232:315225232(0) win 5840 <mss 146
17:59:04.537264 IP 10.30.0.2.3002 > 10.10.0.2.53408: S 319632071:319632071(0) ack 315225233 win
17:59:04.537490 IP 10.10.0.2.53408 > 10.30.0.2.3002: . ack 1 win 2920 <nop,nop,timestamp 123300
17:59:04.537676 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 1:525(524) ack 1 win 2920 <nop,nop,times
17:59:04.537692 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 525:1049(524) ack 1 win 2920 <nop,nop,ti
17:59:04.537781 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 525 win 1572 <nop,nop,timestamp 1232
17:59:04.537792 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 1049 win 2096 <nop,nop,timestamp 123
17:59:04.537941 IP 10.10.0.2.53408 > 10.30.0.2.3002: P 1049:1573(524) ack 1 win 2920 <nop,nop,t
17:59:04.537949 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 1573:2097(524) ack 1 win 2920 <nop,nop,t
17:59:04.537960 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 2097:2621(524) ack 1 win 2920 <nop,nop,t
17:59:04.537965 IP 10.10.0.2.53408 > 10.30.0.2.3002: P 2621:3145(524) ack 1 win 2920 <nop,nop,t
17:59:04.538042 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 1573 win 2620 <nop,nop,timestamp 123
17:59:04.538051 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 2097 win 3144 <nop,nop,timestamp 123
17:59:04.538055 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 2621 win 3668 <nop,nop,timestamp 123
17:59:04.538065 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 3145 win 4192 <nop,nop,timestamp 123
17:59:04.538279 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 3145:3669(524) ack 1 win 2920 <nop,nop,t
17:59:04.538292 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 3669:4193(524) ack 1 win 2920 <nop,nop,t
17:59:04.538306 IP 10.10.0.2.53408 > 10.30.0.2.3002: P 4193:4717(524) ack 1 win 2920 <nop,nop,t
17:59:04.538309 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 4717:5241(524) ack 1 win 2920 <nop,nop,t
17:59:04.538312 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 5241:5765(524) ack 1 win 2920 <nop,nop,t
17:59:04.538325 IP 10.10.0.2.53408 > 10.30.0.2.3002: P 5765:6289(524) ack 1 win 2920 <nop,nop,t
17:59:04.538328 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 6289:6813(524) ack 1 win 2920 <nop,nop,t
17:59:04.538331 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 6813:7337(524) ack 1 win 2920 <nop,nop,t
17:59:04.538387 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 3669 win 4716 <nop,nop,timestamp 123
17:59:04.538393 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 4193 win 5240 <nop,nop,timestamp 123
17:59:04.538406 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 4717 win 5764 <nop,nop,timestamp 123
17:59:04.538409 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 5241 win 6288 <nop,nop,timestamp 123
17:59:04.538412 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 5765 win 6812 <nop,nop,timestamp 123
17:59:04.538424 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 6289 win 7336 <nop,nop,timestamp 123
17:59:04.538427 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 6813 win 7860 <nop,nop,timestamp 123
17:59:04.538430 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 7337 win 8384 <nop,nop,timestamp 123
17:59:04.538534 IP 10.10.0.2.53408 > 10.30.0.2.3002: P 7337:7861(524) ack 1 win 2920 <nop,nop,t
17:59:04.538551 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 7861:8385(524) ack 1 win 2920 <nop,nop,t
17:59:04.538560 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 8385:8909(524) ack 1 win 2920 <nop,nop,t
17:59:04.538593 IP 10.10.0.2.53408 > 10.30.0.2.3002: P 8909:9433(524) ack 1 win 2920 <nop,nop,t
17:59:04.538620 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 9433:9957(524) ack 1 win 2920 <nop,nop,t
17:59:04.538627 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 9957:10481(524) ack 1 win 2920 <nop,nop,
17:59:04.538646 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 10481:11005(524) ack 1 win 2920 <nop,nop,
17:59:04.538654 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 7861 win 8384 <nop,nop,timestamp 123
17:59:04.538660 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 8385 win 8384 <nop,nop,timestamp 123
17:59:04.538681 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 11005:11529(524) ack 1 win 2920 <nop,nop,
17:59:04.538689 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 11529:12053(524) ack 1 win 2920 <nop,nop,
17:59:04.538695 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 12053:12577(524) ack 1 win 2920 <nop,nop,
17:59:04.538700 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 12577:13101(524) ack 1 win 2920 <nop,nop,
17:59:04.538707 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 9433 win 8384 <nop,nop,timestamp 123
17:59:04.538754 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 13101:13625(524) ack 1 win 2920 <nop,nop,
17:59:04.538762 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 13625:14149(524) ack 1 win 2920 <nop,nop,
17:59:04.538768 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 14149:14673(524) ack 1 win 2920 <nop,nop,
17:59:04.538788 IP 10.10.0.2.53408 > 10.30.0.2.3002: P 14673:15197(524) ack 1 win 2920 <nop,nop,
17:59:04.538796 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 10481 win 8384 <nop,nop,timestamp 12

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17:59:04.538805 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 11529 win 8384 <nop,nop,timestamp 12
17:59:04.538810 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 12577 win 8384 <nop,nop,timestamp 12
17:59:04.538846 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 13625 win 8384 <nop,nop,timestamp 12
17:59:04.538853 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 14673 win 8384 <nop,nop,timestamp 12
17:59:04.538863 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 15197:15721(524) ack 1 win 2920 <nop,nop
17:59:04.538884 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 15721:16245(524) ack 1 win 2920 <nop,nop
17:59:04.538939 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 15721 win 8384 <nop,nop,timestamp 12
17:59:04.539000 IP 10.10.0.2.53408 > 10.30.0.2.3002: P 16245:16385(140) ack 1 win 2920 <nop,nop
17:59:04.539073 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 16385 win 8384 <nop,nop,timestamp 12
17:59:04.539141 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 16385:16909(524) ack 1 win 2920 <nop,nop
17:59:04.539155 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 16909:17433(524) ack 1 win 2920 <nop,nop
17:59:04.539204 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 17433:17957(524) ack 1 win 2920 <nop,nop
17:59:04.539212 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 17957:18481(524) ack 1 win 2920 <nop,nop
17:59:04.539231 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 18481:19005(524) ack 1 win 2920 <nop,nop
17:59:04.539238 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 19005:19529(524) ack 1 win 2920 <nop,nop
17:59:04.539245 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 17433 win 8384 <nop,nop,timestamp 12
17:59:04.539269 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 19529:20053(524) ack 1 win 2920 <nop,nop
17:59:04.539276 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 20053:20577(524) ack 1 win 2920 <nop,nop
17:59:04.539281 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 20577:21101(524) ack 1 win 2920 <nop,nop
17:59:04.539286 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 21101:21625(524) ack 1 win 2920 <nop,nop
17:59:04.539290 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 21625:22149(524) ack 1 win 2920 <nop,nop
17:59:04.539296 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 22149:22673(524) ack 1 win 2920 <nop,nop
17:59:04.539316 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 22673:23197(524) ack 1 win 2920 <nop,nop
17:59:04.539322 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 23197:23721(524) ack 1 win 2920 <nop,nop
17:59:04.539327 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 23721:24245(524) ack 1 win 2920 <nop,nop
17:59:04.539334 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 18481 win 8384 <nop,nop,timestamp 12
17:59:04.539347 IP 10.10.0.2.53408 > 10.30.0.2.3002: P 24245:24577(332) ack 1 win 2920 <nop,nop
17:59:04.539410 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 24577:25101(524) ack 1 win 2920 <nop,nop
17:59:04.539418 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 25101:25625(524) ack 1 win 2920 <nop,nop
17:59:04.539422 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 25625:26149(524) ack 1 win 2920 <nop,nop
17:59:04.539431 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 26149:26673(524) ack 1 win 2920 <nop,nop
17:59:04.539441 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 26673:27197(524) ack 1 win 2920 <nop,nop
17:59:04.539463 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 27197:27721(524) ack 1 win 2920 <nop,nop
17:59:04.539472 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 27721:28245(524) ack 1 win 2920 <nop,nop
17:59:04.539487 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 28245:28769(524) ack 1 win 2920 <nop,nop
17:59:04.539494 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 28769:29293(524) ack 1 win 2920 <nop,nop
17:59:04.539553 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 27197 win 4026 <nop,nop,timestamp 12
17:59:04.539582 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 27721 win 3764 <nop,nop,timestamp 12
17:59:04.539591 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 28245 win 3502 <nop,nop,timestamp 12
17:59:04.539606 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 28769 win 3240 <nop,nop,timestamp 12
17:59:04.539613 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 29293 win 3144 <nop,nop,timestamp 12
17:59:04.539698 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 29293:29817(524) ack 1 win 2920 <nop,nop
17:59:04.539707 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 29817:30341(524) ack 1 win 2920 <nop,nop
17:59:04.539718 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 30341:30865(524) ack 1 win 2920 <nop,nop
17:59:04.539721 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 30865:31389(524) ack 1 win 2920 <nop,nop
17:59:04.539735 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 31389:31913(524) ack 1 win 2920 <nop,nop
17:59:04.539741 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 31913:32437(524) ack 1 win 2920 <nop,nop
17:59:04.539754 IP 10.10.0.2.53408 > 10.30.0.2.3002: P 32437:32769(332) ack 1 win 2920 <nop,nop
17:59:04.539778 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 32769:33293(524) ack 1 win 2920 <nop,nop
17:59:04.539785 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 29817 win 3668 <nop,nop,timestamp 12

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17:59:04.539810 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 33293:33817(524) ack 1 win 2920 <nop,nop
17:59:04.539816 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 33817:34341(524) ack 1 win 2920 <nop,nop
17:59:04.539821 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 34341:34865(524) ack 1 win 2920 <nop,nop
17:59:04.539828 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 30341 win 4192 <nop,nop,timestamp 12
17:59:04.539836 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 30865 win 4716 <nop,nop,timestamp 12
17:59:04.539841 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 31389 win 5240 <nop,nop,timestamp 12
17:59:04.539859 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 34865:35389(524) ack 1 win 2920 <nop,nop
17:59:04.539866 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 31913 win 5764 <nop,nop,timestamp 12
17:59:04.539875 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 32437 win 6288 <nop,nop,timestamp 12
17:59:04.539880 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 32769 win 6812 <nop,nop,timestamp 12
17:59:04.539885 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 33293 win 7336 <nop,nop,timestamp 12
17:59:04.539899 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 33817 win 7860 <nop,nop,timestamp 12
17:59:04.539903 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 34341 win 8384 <nop,nop,timestamp 12
17:59:04.539947 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 35389:35913(524) ack 1 win 2920 <nop,nop
17:59:04.539956 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 35389 win 8384 <nop,nop,timestamp 12
17:59:04.539965 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 35913:36437(524) ack 1 win 2920 <nop,nop
17:59:04.539973 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 36437:36961(524) ack 1 win 2920 <nop,nop
17:59:04.540091 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 36437 win 8384 <nop,nop,timestamp 12
17:59:04.540194 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 36961:37485(524) ack 1 win 2920 <nop,nop
17:59:04.540203 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 37485:38009(524) ack 1 win 2920 <nop,nop
17:59:04.540217 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 38009:38533(524) ack 1 win 2920 <nop,nop
17:59:04.540221 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 38533:39057(524) ack 1 win 2920 <nop,nop
17:59:04.540225 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 39057:39581(524) ack 1 win 2920 <nop,nop
17:59:04.540230 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 39581:40105(524) ack 1 win 2920 <nop,nop
17:59:04.540252 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 40105:40629(524) ack 1 win 2920 <nop,nop
17:59:04.540258 IP 10.10.0.2.53408 > 10.30.0.2.3002: P 40629:40961(332) ack 1 win 2920 <nop,nop
17:59:04.540262 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 40961:41485(524) ack 1 win 2920 <nop,nop
17:59:04.540267 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 41485:42009(524) ack 1 win 2920 <nop,nop
17:59:04.540272 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 42009:42533(524) ack 1 win 2920 <nop,nop
17:59:04.540297 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 42533:43057(524) ack 1 win 2920 <nop,nop
17:59:04.540304 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 43057:43581(524) ack 1 win 2920 <nop,nop
17:59:04.540309 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 43581:44105(524) ack 1 win 2920 <nop,nop
17:59:04.540314 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 44105:44629(524) ack 1 win 2920 <nop,nop
17:59:04.540319 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 44629:45153(524) ack 1 win 2920 <nop,nop
17:59:04.540325 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 37485 win 8384 <nop,nop,timestamp 12
17:59:04.540346 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 45153:45677(524) ack 1 win 2920 <nop,nop
17:59:04.540355 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 45677:46201(524) ack 1 win 2920 <nop,nop
17:59:04.540360 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 46201:46725(524) ack 1 win 2920 <nop,nop
17:59:04.540364 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 46725:47249(524) ack 1 win 2920 <nop,nop
17:59:04.540369 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 47249:47773(524) ack 1 win 2920 <nop,nop
17:59:04.540373 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 47773:48297(524) ack 1 win 2920 <nop,nop
17:59:04.540532 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 48297:48821(524) ack 1 win 2920 <nop,nop
17:59:04.540575 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 48821:49345(524) ack 1 win 2920 <nop,nop
17:59:04.540585 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 49345:49869(524) ack 1 win 2920 <nop,nop
17:59:04.572632 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 49869 win 5764 <nop,nop,timestamp 12
17:59:04.573163 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 49869:50393(524) ack 1 win 2920 <nop,nop
17:59:04.573179 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 50393:50917(524) ack 1 win 2920 <nop,nop
17:59:04.573183 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 50917:51441(524) ack 1 win 2920 <nop,nop
17:59:04.573186 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 51441:51965(524) ack 1 win 2920 <nop,nop
17:59:04.573190 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 51965:52489(524) ack 1 win 2920 <nop,nop

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17:59:04.573209 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 52489:53013(524) ack 1 win 2920 <nop,nop
17:59:04.573212 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 53013:53537(524) ack 1 win 2920 <nop,nop
17:59:04.573216 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 53537:54061(524) ack 1 win 2920 <nop,nop
17:59:04.573219 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 54061:54585(524) ack 1 win 2920 <nop,nop
17:59:04.573222 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 54585:55109(524) ack 1 win 2920 <nop,nop
17:59:04.573225 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 55109:55633(524) ack 1 win 2920 <nop,nop
17:59:04.573239 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 55633:56157(524) ack 1 win 2920 <nop,nop
17:59:04.573243 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 56157:56681(524) ack 1 win 2920 <nop,nop
17:59:04.573246 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 56681:57205(524) ack 1 win 2920 <nop,nop
17:59:04.573249 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 57205:57729(524) ack 1 win 2920 <nop,nop
17:59:04.573261 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 57729:58253(524) ack 1 win 2920 <nop,nop
17:59:04.573264 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 58253:58777(524) ack 1 win 2920 <nop,nop
17:59:04.573273 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 58777:59301(524) ack 1 win 2920 <nop,nop
17:59:04.573282 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 59301:59825(524) ack 1 win 2920 <nop,nop
17:59:04.573292 IP 10.10.0.2.53408 > 10.30.0.2.3002: P 59825:60349(524) ack 1 win 2920 <nop,nop
17:59:04.573300 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 60349:60873(524) ack 1 win 2920 <nop,nop
17:59:04.573309 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 60873:61397(524) ack 1 win 2920 <nop,nop
17:59:04.573519 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 50393 win 6288 <nop,nop,timestamp 12
17:59:04.573528 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 50917 win 6812 <nop,nop,timestamp 12
17:59:04.573797 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 61397:61921(524) ack 1 win 2920 <nop,nop
17:59:04.573807 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 61921:62445(524) ack 1 win 2920 <nop,nop
17:59:04.573811 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 62445:62969(524) ack 1 win 2920 <nop,nop
17:59:04.573814 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 62969:63493(524) ack 1 win 2920 <nop,nop
17:59:04.573825 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 63493:64017(524) ack 1 win 2920 <nop,nop
17:59:04.573829 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 64017:64541(524) ack 1 win 2920 <nop,nop
17:59:04.612573 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 64541 win 740 <nop,nop,timestamp 123
17:59:04.613017 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 64541:65065(524) ack 1 win 2920 <nop,nop
17:59:04.613038 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 65065:65589(524) ack 1 win 2920 <nop,nop
17:59:04.652572 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 65589 win 216 <nop,nop,timestamp 123
17:59:04.864700 IP 10.10.0.2.53408 > 10.30.0.2.3002: P 65589:66021(432) ack 1 win 2920 <nop,nop
17:59:04.865064 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 66021 win 1048 <nop,nop,timestamp 12
17:59:04.865592 IP 10.10.0.2.53408 > 10.30.0.2.3002: P 66021:66113(92) ack 1 win 2920 <nop,nop
17:59:04.865621 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 66113:66637(524) ack 1 win 2920 <nop,nop
17:59:04.865631 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 66637:67161(524) ack 1 win 2920 <nop,nop
17:59:04.865646 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 67161:67685(524) ack 1 win 2920 <nop,nop
17:59:04.865864 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 66637 win 1572 <nop,nop,timestamp 12
17:59:04.865880 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 67161 win 2096 <nop,nop,timestamp 12
17:59:04.865895 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 67685 win 2620 <nop,nop,timestamp 12
17:59:04.866622 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 67685:68209(524) ack 1 win 2920 <nop,nop
17:59:04.866642 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 68209:68733(524) ack 1 win 2920 <nop,nop
17:59:04.866648 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 68733:69257(524) ack 1 win 2920 <nop,nop
17:59:04.866654 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 69257:69781(524) ack 1 win 2920 <nop,nop
17:59:04.866659 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 69781:70305(524) ack 1 win 2920 <nop,nop
17:59:04.866664 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 70305:70829(524) ack 1 win 2920 <nop,nop
17:59:04.866669 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 70829:71353(524) ack 1 win 2920 <nop,nop
17:59:04.866674 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 71353:71877(524) ack 1 win 2920 <nop,nop
17:59:04.866679 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 71877:72401(524) ack 1 win 2920 <nop,nop
17:59:04.866684 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 72401:72925(524) ack 1 win 2920 <nop,nop
17:59:04.902879 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 72925 win 1664 <nop,nop,timestamp 12
17:59:04.903859 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 72925:73449(524) ack 1 win 2920 <nop,nop

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17:59:04.903907 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 73449:73973(524) ack 1 win 2920 <nop,nop
17:59:04.903921 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 73973:74497(524) ack 1 win 2920 <nop,nop
17:59:04.903960 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 74497:75021(524) ack 1 win 2920 <nop,nop
17:59:04.903969 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 75021:75545(524) ack 1 win 2920 <nop,nop
17:59:04.903978 IP 10.10.0.2.53408 > 10.30.0.2.3002: P 75545:76069(524) ack 1 win 2920 <nop,nop
17:59:04.942815 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 76069 win 1136 <nop,nop,timestamp 12
17:59:04.943905 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 76069:76593(524) ack 1 win 2920 <nop,nop
17:59:04.943966 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 76593:77117(524) ack 1 win 2920 <nop,nop
17:59:04.943984 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 77117:77641(524) ack 1 win 2920 <nop,nop
17:59:04.943998 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 77641:78165(524) ack 1 win 2920 <nop,nop
17:59:04.982879 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 78165 win 818 <nop,nop,timestamp 123
17:59:04.983826 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 78165:78689(524) ack 1 win 2920 <nop,nop
17:59:04.983890 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 78689:79213(524) ack 1 win 2920 <nop,nop
17:59:04.983912 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 79213:79737(524) ack 1 win 2920 <nop,nop
17:59:05.022749 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 79737 win 32 <nop,nop,timestamp 1232
17:59:05.234829 IP 10.10.0.2.53408 > 10.30.0.2.3002: P 79737:79801(64) ack 1 win 2920 <nop,nop,
17:59:05.235229 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 79801 win 0 <nop,nop,timestamp 12329
17:59:05.454903 IP 10.10.0.2.53408 > 10.30.0.2.3002: . ack 1 win 2920 <nop,nop,timestamp 123309
17:59:05.455343 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 79801 win 0 <nop,nop,timestamp 12329
17:59:05.894855 IP 10.10.0.2.53408 > 10.30.0.2.3002: . ack 1 win 2920 <nop,nop,timestamp 123313
17:59:05.895312 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 79801 win 0 <nop,nop,timestamp 12330
17:59:06.543282 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 79801 win 524 <nop,nop,timestamp 123
17:59:06.544119 IP 10.10.0.2.53408 > 10.30.0.2.3002: P 79801:80261(460) ack 1 win 2920 <nop,nop
17:59:06.544161 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 80261:80785(524) ack 1 win 2920 <nop,nop
17:59:06.544492 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 80261 win 1048 <nop,nop,timestamp 12
17:59:06.544513 IP 10.30.0.2.3002 > 10.10.0.2.53408: . ack 80785 win 1214 <nop,nop,timestamp 12
17:59:06.545314 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 80785:81309(524) ack 1 win 2920 <nop,nop
17:59:06.545359 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 81309:81833(524) ack 1 win 2920 <nop,nop
17:59:06.545380 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 81833:82357(524) ack 1 win 2920 <nop,nop
17:59:06.545394 IP 10.10.0.2.53408 > 10.30.0.2.3002: . 82357:82881(524) ack 1 win 2920 <nop,nop
17:59:06.545416 IP 10.30.0.2.3002 > 10.10.0.2.53408: R 1:1(0) ack 80785 win 1572 <nop,nop,times
17:59:06.545624 IP 10.30.0.2.3002 > 10.10.0.2.53408: R 319632072:319632072(0) win 0
17:59:06.545650 IP 10.30.0.2.3002 > 10.10.0.2.53408: R 319632072:319632072(0) win 0
17:59:06.545684 IP 10.30.0.2.3002 > 10.10.0.2.53408: R 319632072:319632072(0) win 0
17:59:06.545699 IP 10.30.0.2.3002 > 10.10.0.2.53408: R 319632072:319632072(0) win 0

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### 3. Окно отправителя

Дамшим на С2, установив задержку на С5 в 100мсек. Отправляем с С1 50 пакетов.

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окно отправителя растёт и растёт
16:30:14.897809 IP 10.10.0.2.44868 > 10.40.0.2.9: S 812249770:812249770(0) win 5840 <mss 1460,s
16:30:15.000569 IP 10.40.0.2.9 > 10.10.0.2.44868: S 806129081:806129081(0) ack 812249771 win 57
16:30:15.001156 IP 10.10.0.2.44868 > 10.40.0.2.9: . ack 1 win 2920 <nop,nop,timestamp 741443 74
16:30:15.001405 IP 10.10.0.2.44868 > 10.40.0.2.9: P 1:101(100) ack 1 win 2920 <nop,nop,timestamp
16:30:15.011823 IP 10.10.0.2.44868 > 10.40.0.2.9: P 101:201(100) ack 1 win 2920 <nop,nop,timestamp
16:30:15.021396 IP 10.10.0.2.44868 > 10.40.0.2.9: P 201:301(100) ack 1 win 2920 <nop,nop,timestamp
16:30:15.110533 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 101 win 2896 <nop,nop,timestamp 741447
16:30:15.111145 IP 10.10.0.2.44868 > 10.40.0.2.9: P 301:1101(800) ack 1 win 2920 <nop,nop,times
16:30:15.120421 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 201 win 2896 <nop,nop,timestamp 741447

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16:30:15.121202 IP 10.10.0.2.44868 > 10.40.0.2.9: P 1101:1201(100) ack 1 win 2920 <nop,nop,time
16:30:15.130451 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 301 win 2896 <nop,nop,timestamp 741449
16:30:15.135195 IP 10.10.0.2.44868 > 10.40.0.2.9: P 1201:1301(100) ack 1 win 2920 <nop,nop,time
16:30:15.141354 IP 10.10.0.2.44868 > 10.40.0.2.9: P 1301:1401(100) ack 1 win 2920 <nop,nop,time
16:30:15.151298 IP 10.10.0.2.44868 > 10.40.0.2.9: P 1401:1501(100) ack 1 win 2920 <nop,nop,time
16:30:15.161281 IP 10.10.0.2.44868 > 10.40.0.2.9: P 1501:1601(100) ack 1 win 2920 <nop,nop,time
16:30:15.220536 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 1101 win 3696 <nop,nop,timestamp 741458
16:30:15.221153 IP 10.10.0.2.44868 > 10.40.0.2.9: P 1601:2101(500) ack 1 win 2920 <nop,nop,time
16:30:15.231013 IP 10.10.0.2.44868 > 10.40.0.2.9: P 2101:2201(100) ack 1 win 2920 <nop,nop,time
16:30:15.236006 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 1201 win 3696 <nop,nop,timestamp 741459
16:30:15.236041 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 1301 win 3696 <nop,nop,timestamp 741460
16:30:15.244283 IP 10.10.0.2.44868 > 10.40.0.2.9: P 2201:2301(100) ack 1 win 2920 <nop,nop,time
16:30:15.251596 IP 10.10.0.2.44868 > 10.40.0.2.9: P 2301:2401(100) ack 1 win 2920 <nop,nop,time
16:30:15.256515 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 1401 win 3696 <nop,nop,timestamp 741461
16:30:15.256549 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 1501 win 3696 <nop,nop,timestamp 741461
16:30:15.264587 IP 10.10.0.2.44868 > 10.40.0.2.9: P 2401:2501(100) ack 1 win 2920 <nop,nop,time
16:30:15.271477 IP 10.10.0.2.44868 > 10.40.0.2.9: P 2501:2601(100) ack 1 win 2920 <nop,nop,time
16:30:15.272061 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 1601 win 3696 <nop,nop,timestamp 741463
16:30:15.282454 IP 10.10.0.2.44868 > 10.40.0.2.9: P 2601:2701(100) ack 1 win 2920 <nop,nop,time
16:30:15.291595 IP 10.10.0.2.44868 > 10.40.0.2.9: P 2701:2801(100) ack 1 win 2920 <nop,nop,time
16:30:15.301640 IP 10.10.0.2.44868 > 10.40.0.2.9: P 2801:2901(100) ack 1 win 2920 <nop,nop,time
16:30:15.330448 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 2101 win 4496 <nop,nop,timestamp 741469
16:30:15.331047 IP 10.10.0.2.44868 > 10.40.0.2.9: P 2901:3001(100) ack 1 win 2920 <nop,nop,time
16:30:15.340454 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 2201 win 4496 <nop,nop,timestamp 741469
16:30:15.350446 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 2301 win 4496 <nop,nop,timestamp 741471
16:30:15.351036 IP 10.10.0.2.44868 > 10.40.0.2.9: P 3001:3101(100) ack 1 win 2920 <nop,nop,time
16:30:15.361594 IP 10.10.0.2.44868 > 10.40.0.2.9: P 3101:3201(100) ack 1 win 2920 <nop,nop,time
16:30:15.361632 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 2401 win 4496 <nop,nop,timestamp 741471
16:30:15.371040 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 2501 win 4496 <nop,nop,timestamp 741473
16:30:15.371595 IP 10.10.0.2.44868 > 10.40.0.2.9: P 3201:3301(100) ack 1 win 2920 <nop,nop,time
16:30:15.381232 IP 10.10.0.2.44868 > 10.40.0.2.9: P 3301:3401(100) ack 1 win 2920 <nop,nop,time
16:30:15.381741 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 2601 win 4496 <nop,nop,timestamp 741475
16:30:15.390586 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 2701 win 4496 <nop,nop,timestamp 741475
16:30:15.395574 IP 10.10.0.2.44868 > 10.40.0.2.9: P 3401:3501(100) ack 1 win 2920 <nop,nop,time
16:30:15.401158 IP 10.10.0.2.44868 > 10.40.0.2.9: P 3501:3601(100) ack 1 win 2920 <nop,nop,time
16:30:15.407902 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 2801 win 4496 <nop,nop,timestamp 741476
16:30:15.407924 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 2901 win 4496 <nop,nop,timestamp 741477
16:30:15.414621 IP 10.10.0.2.44868 > 10.40.0.2.9: P 3601:3701(100) ack 1 win 2920 <nop,nop,time
16:30:15.421255 IP 10.10.0.2.44868 > 10.40.0.2.9: P 3701:3801(100) ack 1 win 2920 <nop,nop,time
16:30:15.431464 IP 10.10.0.2.44868 > 10.40.0.2.9: P 3801:3901(100) ack 1 win 2920 <nop,nop,time
16:30:15.440485 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 3001 win 4496 <nop,nop,timestamp 741480
16:30:15.451015 IP 10.10.0.2.44868 > 10.40.0.2.9: P 3901:4001(100) ack 1 win 2920 <nop,nop,time
16:30:15.461304 IP 10.10.0.2.44868 > 10.40.0.2.9: P 4001:4101(100) ack 1 win 2920 <nop,nop,time
16:30:15.461897 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 3101 win 4496 <nop,nop,timestamp 741482
16:30:15.470719 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 3201 win 4496 <nop,nop,timestamp 741484
16:30:15.476563 IP 10.10.0.2.44868 > 10.40.0.2.9: P 4101:4201(100) ack 1 win 2920 <nop,nop,time
16:30:15.481375 IP 10.10.0.2.44868 > 10.40.0.2.9: P 4201:4301(100) ack 1 win 2920 <nop,nop,time
16:30:15.487845 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 3301 win 4496 <nop,nop,timestamp 741484
16:30:15.487874 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 3401 win 4496 <nop,nop,timestamp 741486
16:30:15.494194 IP 10.10.0.2.44868 > 10.40.0.2.9: P 4301:4401(100) ack 1 win 2920 <nop,nop,time

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16:30:15.500711 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 3501 win 4496 <nop,nop,timestamp 741486
16:30:15.501129 IP 10.10.0.2.44868 > 10.40.0.2.9: P 4401:4501(100) ack 1 win 2920 <nop,nop,time
16:30:15.511062 IP 10.10.0.2.44868 > 10.40.0.2.9: P 4501:4601(100) ack 1 win 2920 <nop,nop,time
16:30:15.511330 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 3601 win 4496 <nop,nop,timestamp 741486
16:30:15.520551 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 3701 win 4496 <nop,nop,timestamp 741488
16:30:15.524971 IP 10.10.0.2.44868 > 10.40.0.2.9: P 4601:4701(100) ack 1 win 2920 <nop,nop,time
16:30:15.531257 IP 10.10.0.2.44868 > 10.40.0.2.9: P 4701:4801(100) ack 1 win 2920 <nop,nop,time
16:30:15.537656 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 3801 win 4496 <nop,nop,timestamp 741489
16:30:15.537680 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 3901 win 4496 <nop,nop,timestamp 741490
16:30:15.544513 IP 10.10.0.2.44868 > 10.40.0.2.9: P 4801:4901(100) ack 1 win 2920 <nop,nop,time
16:30:15.551151 IP 10.10.0.2.44868 > 10.40.0.2.9: P 4901:5001(100) ack 1 win 2920 <nop,nop,time
16:30:15.561437 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 4001 win 4496 <nop,nop,timestamp 741492
16:30:15.561869 IP 10.10.0.2.44868 > 10.40.0.2.9: F 5001:5001(0) ack 1 win 2920 <nop,nop,timest
16:30:15.574529 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 4101 win 4496 <nop,nop,timestamp 741494
16:30:15.580314 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 4201 win 4496 <nop,nop,timestamp 741494
16:30:15.590310 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 4301 win 4496 <nop,nop,timestamp 741494
16:30:15.600598 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 4401 win 4496 <nop,nop,timestamp 741496
16:30:15.610313 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 4501 win 4496 <nop,nop,timestamp 741497
16:30:15.620365 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 4601 win 4496 <nop,nop,timestamp 741499
16:30:15.630307 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 4701 win 4496 <nop,nop,timestamp 741499
16:30:15.640313 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 4801 win 4496 <nop,nop,timestamp 741499
16:30:15.650377 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 4901 win 4496 <nop,nop,timestamp 741501
16:30:15.660347 IP 10.40.0.2.9 > 10.10.0.2.44868: . ack 5001 win 4496 <nop,nop,timestamp 741502
16:30:15.670372 IP 10.40.0.2.9 > 10.10.0.2.44868: F 1:1(0) ack 5002 win 4496 <nop,nop,timestamp
16:30:15.670716 IP 10.10.0.2.44868 > 10.40.0.2.9: . ack 2 win 2920 <nop,nop,timestamp 741510 74

```

## 4. Нейгл и Мишналь

Дампим на машине C2

```

15:27:35.953472 IP 10.10.0.2.59206 > 10.40.0.2.9: S 2000699599:2000699599(0) win 5840 <mss 1460
15:27:35.953616 IP 10.40.0.2.9 > 10.10.0.2.59206: S 2015086639:2015086639(0) ack 2000699600 win
15:27:35.953694 IP 10.10.0.2.59206 > 10.40.0.2.9: . ack 1 win 2920 <nop,nop,timestamp 365538 36
15:27:35.953747 IP 10.10.0.2.59206 > 10.40.0.2.9: P 1:101(100) ack 1 win 2920 <nop,nop,timestam
15:27:35.953833 IP 10.40.0.2.9 > 10.10.0.2.59206: . ack 101 win 2896 <nop,nop,timestamp 365542
15:27:35.956241 IP 10.10.0.2.59206 > 10.40.0.2.9: P 101:201(100) ack 1 win 2920 <nop,nop,timest
15:27:35.956336 IP 10.40.0.2.9 > 10.10.0.2.59206: . ack 201 win 2896 <nop,nop,timestamp 365542
15:27:35.961324 IP 10.10.0.2.59206 > 10.40.0.2.9: P 201:301(100) ack 1 win 2920 <nop,nop,timest
15:27:35.961694 IP 10.40.0.2.9 > 10.10.0.2.59206: . ack 301 win 2896 <nop,nop,timestamp 365542
15:27:35.972147 IP 10.10.0.2.59206 > 10.40.0.2.9: P 301:401(100) ack 1 win 2920 <nop,nop,timest
15:27:35.972759 IP 10.40.0.2.9 > 10.10.0.2.59206: . ack 401 win 2896 <nop,nop,timestamp 365544
15:27:35.973200 IP 10.10.0.2.59206 > 10.40.0.2.9: P 401:701(300) ack 1 win 2920 <nop,nop,timest
15:27:35.973643 IP 10.40.0.2.9 > 10.10.0.2.59206: . ack 701 win 3432 <nop,nop,timestamp 365544
15:27:35.973965 IP 10.10.0.2.59206 > 10.40.0.2.9: P 701:901(200) ack 1 win 2920 <nop,nop,timest
15:27:35.974383 IP 10.40.0.2.9 > 10.10.0.2.59206: . ack 901 win 3968 <nop,nop,timestamp 365544
15:27:35.974739 IP 10.10.0.2.59206 > 10.40.0.2.9: P 901:1201(300) ack 1 win 2920 <nop,nop,times
15:27:35.975084 IP 10.40.0.2.9 > 10.10.0.2.59206: . ack 1201 win 4504 <nop,nop,timestamp 365544
15:27:35.975386 IP 10.10.0.2.59206 > 10.40.0.2.9: P 1201:1501(300) ack 1 win 2920 <nop,nop,time

```

```

15:27:35.975764 IP 10.40.0.2.9 > 10.10.0.2.59206: . ack 1501 win 4504 <nop,nop,timestamp 365544
15:27:35.985564 IP 10.10.0.2.59206 > 10.40.0.2.9: P 1501:1601(100) ack 1 win 2920 <nop,nop,time
15:27:35.986026 IP 10.40.0.2.9 > 10.10.0.2.59206: . ack 1601 win 4504 <nop,nop,timestamp 365546
15:27:35.986701 IP 10.10.0.2.59206 > 10.40.0.2.9: P 1601:1901(300) ack 1 win 2920 <nop,nop,time
15:27:35.987019 IP 10.40.0.2.9 > 10.10.0.2.59206: . ack 1901 win 4504 <nop,nop,timestamp 365546
15:27:35.991881 IP 10.10.0.2.59206 > 10.40.0.2.9: P 1901:2001(100) ack 1 win 2920 <nop,nop,time
15:27:35.992550 IP 10.40.0.2.9 > 10.10.0.2.59206: . ack 2001 win 4504 <nop,nop,timestamp 365547
15:27:35.992974 IP 10.10.0.2.59206 > 10.40.0.2.9: P 2001:2501(500) ack 1 win 2920 <nop,nop,time
15:27:35.993263 IP 10.40.0.2.9 > 10.10.0.2.59206: . ack 2501 win 5040 <nop,nop,timestamp 365547
15:27:35.993567 IP 10.10.0.2.59206 > 10.40.0.2.9: P 2501:2701(200) ack 1 win 2920 <nop,nop,time
15:27:35.993876 IP 10.40.0.2.9 > 10.10.0.2.59206: . ack 2701 win 5040 <nop,nop,timestamp 365547
15:27:36.003733 IP 10.10.0.2.59206 > 10.40.0.2.9: P 2701:2801(100) ack 1 win 2920 <nop,nop,time
15:27:36.004158 IP 10.40.0.2.9 > 10.10.0.2.59206: . ack 2801 win 5040 <nop,nop,timestamp 365547
15:27:36.004533 IP 10.10.0.2.59206 > 10.40.0.2.9: P 2801:2901(100) ack 1 win 2920 <nop,nop,time
15:27:36.004934 IP 10.40.0.2.9 > 10.10.0.2.59206: . ack 2901 win 5040 <nop,nop,timestamp 365547
15:27:36.011075 IP 10.10.0.2.59206 > 10.40.0.2.9: P 2901:3001(100) ack 1 win 2920 <nop,nop,time
15:27:36.011679 IP 10.40.0.2.9 > 10.10.0.2.59206: . ack 3001 win 5040 <nop,nop,timestamp 365547
15:27:36.022021 IP 10.10.0.2.59206 > 10.40.0.2.9: F 3001:3001(0) ack 1 win 2920 <nop,nop,timest
15:27:36.025551 IP 10.40.0.2.9 > 10.10.0.2.59206: F 1:1(0) ack 3002 win 5040 <nop,nop,timestamp
15:27:36.025762 IP 10.10.0.2.59206 > 10.40.0.2.9: . ack 2 win 2920 <nop,nop,timestamp 365546 36

```

## 5. Агрессивная буферизация

Дампим на C2, исчезает при задержке > 200.

```

16:00:10.075515 IP 10.10.0.2.55203 > 10.40.0.2.9: S 2578934968:2578934968(0) win 5840 <mss 1460
16:00:10.075943 IP 10.40.0.2.9 > 10.10.0.2.55203: S 2578066573:2578066573(0) ack 2578934969 win
16:00:10.076254 IP 10.10.0.2.55203 > 10.40.0.2.9: . ack 1 win 2920 <nop,nop,timestamp 560950 56
16:00:10.301110 IP 10.10.0.2.55203 > 10.40.0.2.9: P 1:301(300) ack 1 win 2920 <nop,nop,timestam
16:00:10.301773 IP 10.40.0.2.9 > 10.10.0.2.55203: . ack 301 win 3432 <nop,nop,timestamp 560977
16:00:10.620968 IP 10.10.0.2.55203 > 10.40.0.2.9: P 301:501(200) ack 1 win 2920 <nop,nop,timest
16:00:10.621509 IP 10.40.0.2.9 > 10.10.0.2.55203: . ack 501 win 3968 <nop,nop,timestamp 561009
16:00:10.840971 IP 10.10.0.2.55203 > 10.40.0.2.9: P 501:701(200) ack 1 win 2920 <nop,nop,timest
16:00:10.841444 IP 10.40.0.2.9 > 10.10.0.2.55203: . ack 701 win 4504 <nop,nop,timestamp 561031
16:00:11.060693 IP 10.10.0.2.55203 > 10.40.0.2.9: P 701:901(200) ack 1 win 2920 <nop,nop,timest
16:00:11.060835 IP 10.40.0.2.9 > 10.10.0.2.55203: . ack 901 win 4504 <nop,nop,timestamp 561053
16:00:11.281379 IP 10.10.0.2.55203 > 10.40.0.2.9: P 901:1201(300) ack 1 win 2920 <nop,nop,times
16:00:11.281971 IP 10.40.0.2.9 > 10.10.0.2.55203: . ack 1201 win 4504 <nop,nop,timestamp 561075
16:00:11.600960 IP 10.10.0.2.55203 > 10.40.0.2.9: P 1201:1401(200) ack 1 win 2920 <nop,nop,time
16:00:11.601605 IP 10.40.0.2.9 > 10.10.0.2.55203: . ack 1401 win 4504 <nop,nop,timestamp 561107
16:00:11.821015 IP 10.10.0.2.55203 > 10.40.0.2.9: P 1401:1601(200) ack 1 win 2920 <nop,nop,time
16:00:11.821612 IP 10.40.0.2.9 > 10.10.0.2.55203: . ack 1601 win 4504 <nop,nop,timestamp 561129
16:00:12.040929 IP 10.10.0.2.55203 > 10.40.0.2.9: P 1601:1801(200) ack 1 win 2920 <nop,nop,time
16:00:12.041567 IP 10.40.0.2.9 > 10.10.0.2.55203: . ack 1801 win 4504 <nop,nop,timestamp 561151
16:00:12.260740 IP 10.10.0.2.55203 > 10.40.0.2.9: P 1801:2001(200) ack 1 win 2920 <nop,nop,time
16:00:12.260955 IP 10.40.0.2.9 > 10.10.0.2.55203: . ack 2001 win 4504 <nop,nop,timestamp 561173
16:00:12.470984 IP 10.10.0.2.55203 > 10.40.0.2.9: P 2001:2201(200) ack 1 win 2920 <nop,nop,time
16:00:12.471501 IP 10.40.0.2.9 > 10.10.0.2.55203: . ack 2201 win 4504 <nop,nop,timestamp 561194

```

```

16:00:12.701000 IP 10.10.0.2.55203 > 10.40.0.2.9: P 2201:2401(200) ack 1 win 2920 <nop,nop,time
16:00:12.701563 IP 10.40.0.2.9 > 10.10.0.2.55203: . ack 2401 win 4504 <nop,nop,timestamp 561217
16:00:12.910791 IP 10.10.0.2.55203 > 10.40.0.2.9: P 2401:2601(200) ack 1 win 2920 <nop,nop,time
16:00:12.911091 IP 10.40.0.2.9 > 10.10.0.2.55203: . ack 2601 win 4504 <nop,nop,timestamp 561238
16:00:13.140991 IP 10.10.0.2.55203 > 10.40.0.2.9: P 2601:2801(200) ack 1 win 2920 <nop,nop,time
16:00:13.141481 IP 10.40.0.2.9 > 10.10.0.2.55203: . ack 2801 win 4504 <nop,nop,timestamp 561261
16:00:13.350948 IP 10.10.0.2.55203 > 10.40.0.2.9: P 2801:3001(200) ack 1 win 2920 <nop,nop,time
16:00:13.351457 IP 10.40.0.2.9 > 10.10.0.2.55203: . ack 3001 win 4504 <nop,nop,timestamp 561282
16:00:13.363474 IP 10.10.0.2.55203 > 10.40.0.2.9: F 3001:3001(0) ack 1 win 2920 <nop,nop,timest
16:00:13.369053 IP 10.40.0.2.9 > 10.10.0.2.55203: F 1:1(0) ack 3002 win 4504 <nop,nop,timestamp
16:00:13.369407 IP 10.10.0.2.55203 > 10.40.0.2.9: . ack 2 win 2920 <nop,nop,timestamp 561280 56

```

## 6. Отправка без задержки

Дампим на С2.

```

16:22:00.245090 IP 10.10.0.2.35849 > 10.40.0.2.9: S 1654025736:1654025736(0) win 5840 <mss 1460
16:22:00.245652 IP 10.40.0.2.9 > 10.10.0.2.35849: S 1659701060:1659701060(0) ack 1654025737 win
16:22:00.246061 IP 10.10.0.2.35849 > 10.40.0.2.9: . ack 1 win 2920 <nop,nop,timestamp 691965 69
16:22:00.246331 IP 10.10.0.2.35849 > 10.40.0.2.9: P 1:101(100) ack 1 win 2920 <nop,nop,timestam
16:22:00.246721 IP 10.40.0.2.9 > 10.10.0.2.35849: . ack 101 win 2896 <nop,nop,timestamp 691971
16:22:00.257062 IP 10.10.0.2.35849 > 10.40.0.2.9: P 101:201(100) ack 1 win 2920 <nop,nop,timest
16:22:00.257161 IP 10.10.0.2.35849 > 10.40.0.2.9: P 201:301(100) ack 1 win 2920 <nop,nop,timest
16:22:00.257450 IP 10.10.0.2.35849 > 10.40.0.2.9: P 301:401(100) ack 1 win 2920 <nop,nop,timest
16:22:00.257482 IP 10.10.0.2.35849 > 10.40.0.2.9: P 401:501(100) ack 1 win 2920 <nop,nop,timest
16:22:00.257712 IP 10.40.0.2.9 > 10.10.0.2.35849: . ack 201 win 2896 <nop,nop,timestamp 691971
16:22:00.257744 IP 10.40.0.2.9 > 10.10.0.2.35849: . ack 301 win 2896 <nop,nop,timestamp 691971
16:22:00.257760 IP 10.40.0.2.9 > 10.10.0.2.35849: . ack 401 win 2896 <nop,nop,timestamp 691971
16:22:00.257771 IP 10.40.0.2.9 > 10.10.0.2.35849: . ack 501 win 2896 <nop,nop,timestamp 691971
16:22:00.257997 IP 10.10.0.2.35849 > 10.40.0.2.9: P 501:901(400) ack 1 win 2920 <nop,nop,timest
16:22:00.258182 IP 10.10.0.2.35849 > 10.40.0.2.9: P 901:1001(100) ack 1 win 2920 <nop,nop,times
16:22:00.258289 IP 10.40.0.2.9 > 10.10.0.2.35849: . ack 901 win 3432 <nop,nop,timestamp 691971
16:22:00.258407 IP 10.10.0.2.35849 > 10.40.0.2.9: P 1001:1101(100) ack 1 win 2920 <nop,nop,time
16:22:00.258602 IP 10.10.0.2.35849 > 10.40.0.2.9: P 1101:1201(100) ack 1 win 2920 <nop,nop,time
16:22:00.258731 IP 10.10.0.2.35849 > 10.40.0.2.9: P 1201:1301(100) ack 1 win 2920 <nop,nop,time
16:22:00.258889 IP 10.10.0.2.35849 > 10.40.0.2.9: P 1301:1401(100) ack 1 win 2920 <nop,nop,time
16:22:00.259024 IP 10.10.0.2.35849 > 10.40.0.2.9: P 1401:1501(100) ack 1 win 2920 <nop,nop,time
16:22:00.259213 IP 10.10.0.2.35849 > 10.40.0.2.9: P 1501:1601(100) ack 1 win 2920 <nop,nop,time
16:22:00.259251 IP 10.40.0.2.9 > 10.10.0.2.35849: . ack 1501 win 3432 <nop,nop,timestamp 691971
16:22:00.259506 IP 10.10.0.2.35849 > 10.40.0.2.9: P 1601:1801(200) ack 1 win 2920 <nop,nop,time
16:22:00.259597 IP 10.10.0.2.35849 > 10.40.0.2.9: P 1801:1901(100) ack 1 win 2920 <nop,nop,time
16:22:00.259805 IP 10.10.0.2.35849 > 10.40.0.2.9: P 1901:2001(100) ack 1 win 2920 <nop,nop,time
16:22:00.259889 IP 10.40.0.2.9 > 10.10.0.2.35849: . ack 1801 win 3968 <nop,nop,timestamp 691971
16:22:00.259951 IP 10.10.0.2.35849 > 10.40.0.2.9: P 2001:2101(100) ack 1 win 2920 <nop,nop,time
16:22:00.260171 IP 10.10.0.2.35849 > 10.40.0.2.9: P 2101:2201(100) ack 1 win 2920 <nop,nop,time
16:22:00.260266 IP 10.10.0.2.35849 > 10.40.0.2.9: P 2201:2301(100) ack 1 win 2920 <nop,nop,time
16:22:00.260440 IP 10.10.0.2.35849 > 10.40.0.2.9: P 2301:2401(100) ack 1 win 2920 <nop,nop,time
16:22:00.260639 IP 10.10.0.2.35849 > 10.40.0.2.9: P 2401:2501(100) ack 1 win 2920 <nop,nop,time

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16:22:00.260673 IP 10.40.0.2.9 > 10.10.0.2.35849: . ack 2401 win 3968 <nop,nop,timestamp 691971
16:22:00.261957 IP 10.40.0.2.9 > 10.10.0.2.35849: . ack 2501 win 3968 <nop,nop,timestamp 691971
16:22:00.266178 IP 10.10.0.2.35849 > 10.40.0.2.9: P 2501:2601(100) ack 1 win 2920 <nop,nop,time
16:22:00.266219 IP 10.10.0.2.35849 > 10.40.0.2.9: P 2601:2701(100) ack 1 win 2920 <nop,nop,time
16:22:00.266323 IP 10.10.0.2.35849 > 10.40.0.2.9: P 2701:2801(100) ack 1 win 2920 <nop,nop,time
16:22:00.266364 IP 10.10.0.2.35849 > 10.40.0.2.9: P 2801:2901(100) ack 1 win 2920 <nop,nop,time
16:22:00.266829 IP 10.40.0.2.9 > 10.10.0.2.35849: . ack 2901 win 3968 <nop,nop,timestamp 691971
16:22:00.271640 IP 10.10.0.2.35849 > 10.40.0.2.9: P 2901:3001(100) ack 1 win 2920 <nop,nop,time
16:22:00.271930 IP 10.10.0.2.35849 > 10.40.0.2.9: F 3001:3001(0) ack 1 win 2920 <nop,nop,timest
16:22:00.271961 IP 10.40.0.2.9 > 10.10.0.2.35849: . ack 3001 win 3968 <nop,nop,timestamp 691971
16:22:00.274022 IP 10.40.0.2.9 > 10.10.0.2.35849: F 1:1(0) ack 3002 win 3968 <nop,nop,timestamp
16:22:00.274172 IP 10.10.0.2.35849 > 10.40.0.2.9: . ack 2 win 2920 <nop,nop,timestamp 691971 69

```

## 7. Быстрый повтор

Дампим на машине С3, шлем запрос пакеты с С1 на С4

```

16:39:36.175963 IP 10.10.0.2.59176 > 10.30.0.2.9: S 27278130:27278130(0) win 5840 <mss 1460,sac
16:39:39.127042 IP 10.10.0.2.59176 > 10.30.0.2.9: S 27278130:27278130(0) win 5840 <mss 1460,sac
16:39:39.137735 IP 10.30.0.2.9 > 10.10.0.2.59176: S 72796733:72796733(0) ack 27278131 win 2096
16:39:39.138726 IP 10.10.0.2.59176 > 10.30.0.2.9: . ack 1 win 2920 <nop,nop,timestamp 919010 91
16:39:39.138995 IP 10.10.0.2.59176 > 10.30.0.2.9: P 1:101(100) ack 1 win 2920 <nop,nop,timestam
16:39:39.139334 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 101 win 1048 <nop,nop,timestamp 918854
16:39:39.150002 IP 10.10.0.2.59176 > 10.30.0.2.9: P 101:201(100) ack 1 win 2920 <nop,nop,timest
16:39:39.150381 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 201 win 1048 <nop,nop,timestamp 918854
16:39:39.156965 IP 10.10.0.2.59176 > 10.30.0.2.9: P 201:301(100) ack 1 win 2920 <nop,nop,timest
16:39:39.157323 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 301 win 1048 <nop,nop,timestamp 918854
16:39:39.168776 IP 10.10.0.2.59176 > 10.30.0.2.9: P 301:401(100) ack 1 win 2920 <nop,nop,timest
16:39:39.178016 IP 10.10.0.2.59176 > 10.30.0.2.9: P 401:501(100) ack 1 win 2920 <nop,nop,timest
16:39:39.178434 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 501 win 1048 <nop,nop,timestamp 918859
16:39:39.189308 IP 10.10.0.2.59176 > 10.30.0.2.9: P 501:601(100) ack 1 win 2920 <nop,nop,timest
16:39:39.189761 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 601 win 1048 <nop,nop,timestamp 918860
16:39:39.197698 IP 10.10.0.2.59176 > 10.30.0.2.9: P 601:701(100) ack 1 win 2920 <nop,nop,timest
16:39:39.198507 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 701 win 1048 <nop,nop,timestamp 918861
16:39:39.209415 IP 10.10.0.2.59176 > 10.30.0.2.9: P 701:801(100) ack 1 win 2920 <nop,nop,timest
16:39:39.209710 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 801 win 1048 <nop,nop,timestamp 918862
16:39:39.216786 IP 10.10.0.2.59176 > 10.30.0.2.9: P 801:901(100) ack 1 win 2920 <nop,nop,timest
16:39:39.217016 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 901 win 1048 <nop,nop,timestamp 918863
16:39:39.228117 IP 10.10.0.2.59176 > 10.30.0.2.9: P 901:1001(100) ack 1 win 2920 <nop,nop,times
16:39:39.237647 IP 10.10.0.2.59176 > 10.30.0.2.9: P 1001:1101(100) ack 1 win 2920 <nop,nop,time
16:39:39.238113 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 901 win 1048 <nop,nop,timestamp 918864
16:39:39.248983 IP 10.10.0.2.59176 > 10.30.0.2.9: P 1101:1201(100) ack 1 win 2920 <nop,nop,time
16:39:39.249394 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 901 win 1048 <nop,nop,timestamp 918866
16:39:39.257910 IP 10.10.0.2.59176 > 10.30.0.2.9: P 1201:1301(100) ack 1 win 2920 <nop,nop,time
16:39:39.258388 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 901 win 1048 <nop,nop,timestamp 918867
16:39:39.259038 IP 10.10.0.2.59176 > 10.30.0.2.9: P 901:1001(100) ack 1 win 2920 <nop,nop,times
16:39:39.259377 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 1301 win 1048 <nop,nop,timestamp 918867
16:39:39.269581 IP 10.10.0.2.59176 > 10.30.0.2.9: P 1301:1401(100) ack 1 win 2920 <nop,nop,time
16:39:39.270032 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 1401 win 1048 <nop,nop,timestamp 918867

```

```

16:39:39.277352 IP 10.10.0.2.59176 > 10.30.0.2.9: P 1401:1501(100) ack 1 win 2920 <nop,nop,time
16:39:39.286985 IP 10.10.0.2.59176 > 10.30.0.2.9: P 1501:1601(100) ack 1 win 2920 <nop,nop,time
16:39:39.287471 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 1401 win 1048 <nop,nop,timestamp 918869
16:39:39.299075 IP 10.10.0.2.59176 > 10.30.0.2.9: P 1601:1701(100) ack 1 win 2920 <nop,nop,time
16:39:39.299489 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 1401 win 1048 <nop,nop,timestamp 918871
16:39:39.308513 IP 10.10.0.2.59176 > 10.30.0.2.9: P 1701:1801(100) ack 1 win 2920 <nop,nop,time
16:39:39.308948 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 1401 win 1048 <nop,nop,timestamp 918872
16:39:39.309686 IP 10.10.0.2.59176 > 10.30.0.2.9: P 1401:1501(100) ack 1 win 2920 <nop,nop,time
16:39:39.310115 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 1801 win 1048 <nop,nop,timestamp 918872
16:39:39.320001 IP 10.10.0.2.59176 > 10.30.0.2.9: P 1801:1901(100) ack 1 win 2920 <nop,nop,time
16:39:39.320451 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 1901 win 1048 <nop,nop,timestamp 918873
16:39:39.327093 IP 10.10.0.2.59176 > 10.30.0.2.9: P 1901:2001(100) ack 1 win 2920 <nop,nop,time
16:39:39.337016 IP 10.10.0.2.59176 > 10.30.0.2.9: P 2001:2101(100) ack 1 win 2920 <nop,nop,time
16:39:39.337530 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 1901 win 1048 <nop,nop,timestamp 918875
16:39:39.350022 IP 10.10.0.2.59176 > 10.30.0.2.9: P 2101:2201(100) ack 1 win 2920 <nop,nop,time
16:39:39.350547 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 1901 win 1048 <nop,nop,timestamp 918876
16:39:39.357138 IP 10.10.0.2.59176 > 10.30.0.2.9: P 2201:2301(100) ack 1 win 2920 <nop,nop,time
16:39:39.357702 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 1901 win 1048 <nop,nop,timestamp 918876
16:39:39.358668 IP 10.10.0.2.59176 > 10.30.0.2.9: P 1901:2001(100) ack 1 win 2920 <nop,nop,time
16:39:39.359191 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 2301 win 1048 <nop,nop,timestamp 918876
16:39:39.370756 IP 10.10.0.2.59176 > 10.30.0.2.9: P 2301:2401(100) ack 1 win 2920 <nop,nop,time
16:39:39.371451 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 2401 win 1048 <nop,nop,timestamp 918878
16:39:39.377111 IP 10.10.0.2.59176 > 10.30.0.2.9: P 2401:2501(100) ack 1 win 2920 <nop,nop,time
16:39:39.387419 IP 10.10.0.2.59176 > 10.30.0.2.9: P 2501:2601(100) ack 1 win 2920 <nop,nop,time
16:39:39.388160 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 2401 win 1048 <nop,nop,timestamp 918879
16:39:39.400280 IP 10.10.0.2.59176 > 10.30.0.2.9: P 2601:2701(100) ack 1 win 2920 <nop,nop,time
16:39:39.400753 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 2401 win 1048 <nop,nop,timestamp 918881
16:39:39.407027 IP 10.10.0.2.59176 > 10.30.0.2.9: P 2701:2801(100) ack 1 win 2920 <nop,nop,time
16:39:39.407662 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 2401 win 1048 <nop,nop,timestamp 918881
16:39:39.408549 IP 10.10.0.2.59176 > 10.30.0.2.9: P 2401:2501(100) ack 1 win 2920 <nop,nop,time
16:39:39.408957 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 2801 win 1048 <nop,nop,timestamp 918881
16:39:39.420566 IP 10.10.0.2.59176 > 10.30.0.2.9: P 2801:2901(100) ack 1 win 2920 <nop,nop,time
16:39:39.421212 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 2901 win 1048 <nop,nop,timestamp 918883
16:39:39.427073 IP 10.10.0.2.59176 > 10.30.0.2.9: P 2901:3001(100) ack 1 win 2920 <nop,nop,time
16:39:39.437741 IP 10.10.0.2.59176 > 10.30.0.2.9: F 3001:3001(0) ack 1 win 2920 <nop,nop,timest
16:39:39.438199 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 2901 win 1048 <nop,nop,timestamp 918884
16:39:39.637038 IP 10.10.0.2.59176 > 10.30.0.2.9: P 2901:3001(100) ack 1 win 2920 <nop,nop,time
16:39:39.637568 IP 10.30.0.2.9 > 10.10.0.2.59176: . ack 3002 win 1048 <nop,nop,timestamp 918904
16:39:39.641392 IP 10.30.0.2.9 > 10.10.0.2.59176: F 1:1(0) ack 3002 win 1048 <nop,nop,timestamp
16:39:39.642134 IP 10.10.0.2.59176 > 10.30.0.2.9: . ack 2 win 2920 <nop,nop,timestamp 919060 91

```

## 8. Обычный повтор

Дампим на C1 задержка таймера 200мсек, теряем последний пакет.

```

17:09:28.953360 IP 10.10.0.2.43565 > 10.30.0.2.9: S 3363568270:3363568270(0) win 5840 <mss 1460
17:09:31.922918 IP 10.10.0.2.43565 > 10.30.0.2.9: S 3363568270:3363568270(0) win 5840 <mss 1460
17:09:31.924566 IP 10.30.0.2.9 > 10.10.0.2.43565: S 3417476110:3417476110(0) ack 3363568271 win
17:09:31.924623 IP 10.10.0.2.43565 > 10.30.0.2.9: . ack 1 win 2920 <nop,nop,timestamp 977135 97
17:09:31.925977 IP 10.10.0.2.43565 > 10.30.0.2.9: P 1:101(100) ack 1 win 2920 <nop,nop,timestamp

```

```

17:09:31.926975 IP 10.30.0.2.9 > 10.10.0.2.43565: . ack 101 win 1048 <nop,nop,timestamp 977096
17:09:31.937695 IP 10.10.0.2.43565 > 10.30.0.2.9: P 101:201(100) ack 1 win 2920 <nop,nop,timestamp
17:09:31.938776 IP 10.30.0.2.9 > 10.10.0.2.43565: . ack 201 win 1048 <nop,nop,timestamp 977096
17:09:31.944465 IP 10.10.0.2.43565 > 10.30.0.2.9: P 201:301(100) ack 1 win 2920 <nop,nop,timestamp
17:09:31.945717 IP 10.30.0.2.9 > 10.10.0.2.43565: . ack 301 win 1048 <nop,nop,timestamp 977096
17:09:31.955181 IP 10.10.0.2.43565 > 10.30.0.2.9: P 301:401(100) ack 1 win 2920 <nop,nop,timestamp
17:09:31.964262 IP 10.10.0.2.43565 > 10.30.0.2.9: P 401:501(100) ack 1 win 2920 <nop,nop,timestamp
17:09:31.965994 IP 10.30.0.2.9 > 10.10.0.2.43565: . ack 501 win 1048 <nop,nop,timestamp 977101
17:09:31.975868 IP 10.10.0.2.43565 > 10.30.0.2.9: P 501:601(100) ack 1 win 2920 <nop,nop,timestamp
17:09:31.977308 IP 10.30.0.2.9 > 10.10.0.2.43565: . ack 601 win 1048 <nop,nop,timestamp 977102
17:09:31.982943 IP 10.10.0.2.43565 > 10.30.0.2.9: P 601:701(100) ack 1 win 2920 <nop,nop,timestamp
17:09:31.984412 IP 10.30.0.2.9 > 10.10.0.2.43565: . ack 701 win 1048 <nop,nop,timestamp 977102
17:09:31.993003 IP 10.10.0.2.43565 > 10.30.0.2.9: P 701:801(100) ack 1 win 2920 <nop,nop,timestamp
17:09:31.994298 IP 10.30.0.2.9 > 10.10.0.2.43565: . ack 801 win 1048 <nop,nop,timestamp 977104
17:09:32.005365 IP 10.10.0.2.43565 > 10.30.0.2.9: P 801:901(100) ack 1 win 2920 <nop,nop,timestamp
17:09:32.007024 IP 10.30.0.2.9 > 10.10.0.2.43565: . ack 901 win 1048 <nop,nop,timestamp 977105
17:09:32.014153 IP 10.10.0.2.43565 > 10.30.0.2.9: P 901:1001(100) ack 1 win 2920 <nop,nop,timestamp
17:09:32.025412 IP 10.10.0.2.43565 > 10.30.0.2.9: F 1001:1001(0) ack 1 win 2920 <nop,nop,timestamp
17:09:32.026667 IP 10.30.0.2.9 > 10.10.0.2.43565: . ack 901 win 1048 <nop,nop,timestamp 977106
17:09:32.232850 IP 10.10.0.2.43565 > 10.30.0.2.9: P 901:1001(100) ack 1 win 2920 <nop,nop,timestamp
17:09:32.234311 IP 10.30.0.2.9 > 10.10.0.2.43565: . ack 1002 win 1048 <nop,nop,timestamp 977127
17:09:32.238406 IP 10.30.0.2.9 > 10.10.0.2.43565: F 1:1(0) ack 1002 win 1048 <nop,nop,timestamp
17:09:32.238444 IP 10.10.0.2.43565 > 10.30.0.2.9: . ack 2 win 2920 <nop,nop,timestamp 977166 97

```

## 9. Неудачная попытка соединени с портом

Результат telnet 10.80.0.2 10 на C1

```

Trying 10.80.0.2...
telnet: Unable to connect to remote host: No route to host

```

дамп на C2

```

17:51:01.210835 IP 10.10.0.2.44070 > 10.80.0.2.10: S 3159528890:3159528890(0) win 5840 <mss 1460
17:51:01.217638 IP 10.20.0.2 > 10.10.0.2: ICMP time exceeded in-transit, length 68

```

## 10. Опыт с PMTU

```

17:35:06.158896 IP 10.10.0.2.33607 > 10.50.0.2.9: S 1071868364:1071868364(0) win 5840 <mss 1460
17:35:06.196397 IP 10.50.0.2.9 > 10.10.0.2.33607: S 1061363759:1061363759(0) ack 1071868365 win
17:35:06.196898 IP 10.10.0.2.33607 > 10.50.0.2.9: . ack 1 win 2920 <nop,nop,timestamp 429494823
17:35:08.658612 IP 10.10.0.2.33607 > 10.50.0.2.9: F 1:1(0) ack 1 win 2920 <nop,nop,timestamp 42
17:35:08.666000 IP 10.50.0.2.9 > 10.10.0.2.33607: F 1:1(0) ack 2 win 2896 <nop,nop,timestamp 42
17:35:08.666368 IP 10.10.0.2.33607 > 10.50.0.2.9: . ack 2 win 2920 <nop,nop,timestamp 429494847

17:35:30.184581 IP 10.10.0.2.33608 > 10.50.0.2.9: S 1437321903:1437321903(0) win 5840 <mss 1460
17:35:30.185964 IP 10.50.0.2.9 > 10.10.0.2.33608: S 1441201210:1441201210(0) ack 1437321904 win

```

```

17:35:30.186304 IP 10.10.0.2.33608 > 10.50.0.2.9: . ack 1 win 2920 <nop,nop,timestamp 429495062
17:35:30.208492 IP 10.10.0.2.33608 > 10.50.0.2.9: . 1:1449(1448) ack 1 win 2920 <nop,nop,timest
17:35:30.208569 IP 10.10.0.1 > 10.10.0.2: ICMP 10.50.0.2 unreachable - need to frag (mtu 1492),
17:35:30.209058 IP 10.10.0.2.33608 > 10.50.0.2.9: . 1:1441(1440) ack 1 win 2920 <nop,nop,timest
17:35:30.209113 IP 10.10.0.2.33608 > 10.50.0.2.9: . 1441:1449(8) ack 1 win 2920 <nop,nop,timest
17:35:30.209597 IP 10.20.0.2 > 10.10.0.2: ICMP 10.50.0.2 unreachable - need to frag (mtu 576),
17:35:30.210478 IP 10.10.0.2.33608 > 10.50.0.2.9: . 1449:1973(524) ack 1 win 2920 <nop,nop,time
17:35:30.210980 IP 10.50.0.2.9 > 10.10.0.2.33608: . ack 1 win 2896 <nop,nop,timestamp 429495062
17:35:30.211348 IP 10.10.0.2.33608 > 10.50.0.2.9: . 1:525(524) ack 1 win 2920 <nop,nop,timestam
17:35:30.212035 IP 10.50.0.2.9 > 10.10.0.2.33608: . ack 1 win 2896 <nop,nop,timestamp 429495062
17:35:30.212382 IP 10.10.0.2.33608 > 10.50.0.2.9: . 525:1049(524) ack 1 win 2920 <nop,nop,times
17:35:30.212907 IP 10.50.0.2.9 > 10.10.0.2.33608: . ack 525 win 3432 <nop,nop,timestamp 4294950
17:35:30.213263 IP 10.10.0.2.33608 > 10.50.0.2.9: . 1049:1441(392) ack 1 win 2920 <nop,nop,time
17:35:30.213307 IP 10.10.0.2.33608 > 10.50.0.2.9: P 1973:2201(228) ack 1 win 2920 <nop,nop,time
17:35:30.213679 IP 10.50.0.2.9 > 10.10.0.2.33608: . ack 1049 win 3956 <nop,nop,timestamp 429495
17:35:30.213973 IP 10.10.0.2.33608 > 10.50.0.2.9: . 2201:2725(524) ack 1 win 2920 <nop,nop,time
17:35:30.214011 IP 10.10.0.2.33608 > 10.50.0.2.9: FP 2725:3001(276) ack 1 win 2920 <nop,nop,tin
17:35:30.214777 IP 10.50.0.2.9 > 10.10.0.2.33608: . ack 1973 win 4480 <nop,nop,timestamp 429495
17:35:30.214960 IP 10.50.0.2.9 > 10.10.0.2.33608: . ack 2201 win 4480 <nop,nop,timestamp 429495
17:35:30.214988 IP 10.50.0.2.9 > 10.10.0.2.33608: . ack 2725 win 5004 <nop,nop,timestamp 429495
17:35:30.220196 IP 10.50.0.2.9 > 10.10.0.2.33608: F 1:1(0) ack 3002 win 5004 <nop,nop,timestamp
17:35:30.220626 IP 10.10.0.2.33608 > 10.50.0.2.9: . ack 2 win 2920 <nop,nop,timestamp 429495063

```

## 11. Соединение с неверным портом

```

Результат telnet 10.50.0.2 10 на C1

```

```

Trying 10.50.0.2...

```

```

telnet: Unable to connect to remote host: Connection refused

```

```

дамп на C2

```

```

17:43:48.584557 IP 10.10.0.2.37582 > 10.50.0.2.10: S 664537353:664537353(0) win 5840 <mss 1460,
17:43:48.585858 IP 10.50.0.2.10 > 10.10.0.2.37582: R 0:0(0) ack 664537354 win 0

```