NSCAP Homework #3

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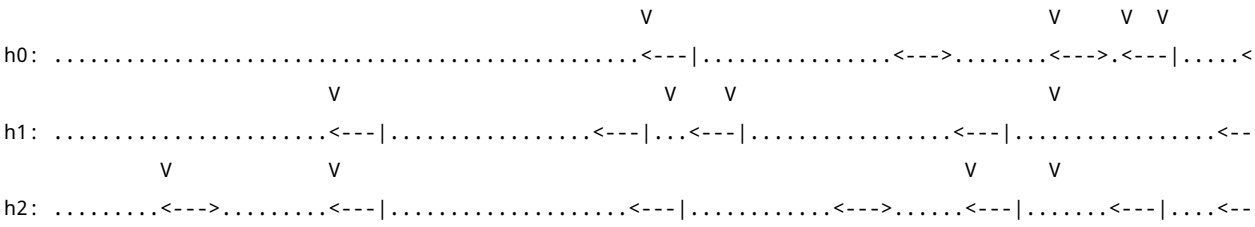
Part A. Code Test

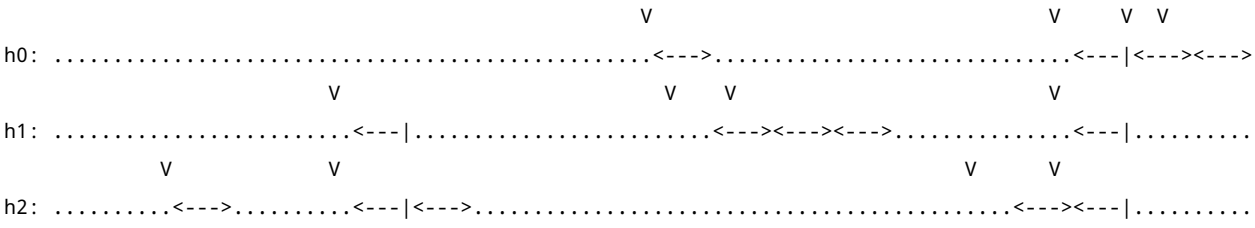
Using seed='0816146'

aloha



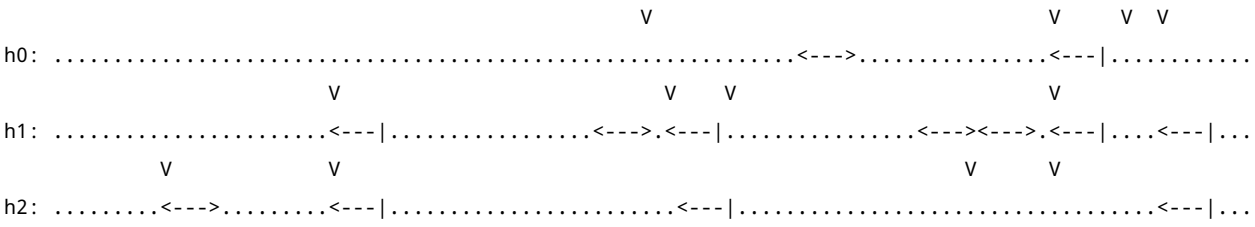
```
success_rate: 0.20
idle_rate: 0.47
collision_rate: 0.33
```

slotted_aloha



```
success_rate: 0.45
idle_rate: 0.45
collision_rate: 0.10
```

csma



```
success_rate: 0.25
idle_rate: 0.54
collision_rate: 0.21
```

csma_cd

```
                                                     V                                 V     V  V
h0: .................................................<--|.................<|............................
                           V                           V    V                          V
h1: .......................<-|.................<--->................<---><--|....<--->.<--->............
             V             V                                                    V      V
h2: .........<--->.........<-|........................<|............................................<---
```

success_rate: 0.25

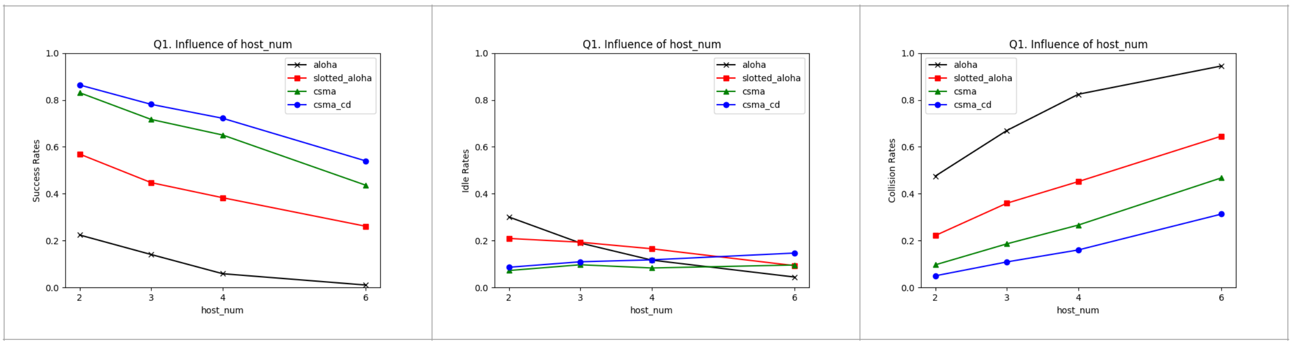
idle_rate: 0.60

collision_rate: 0.15

B. Questions

Q1: Changing host_num

The success rate will be lower when we increase number of host.



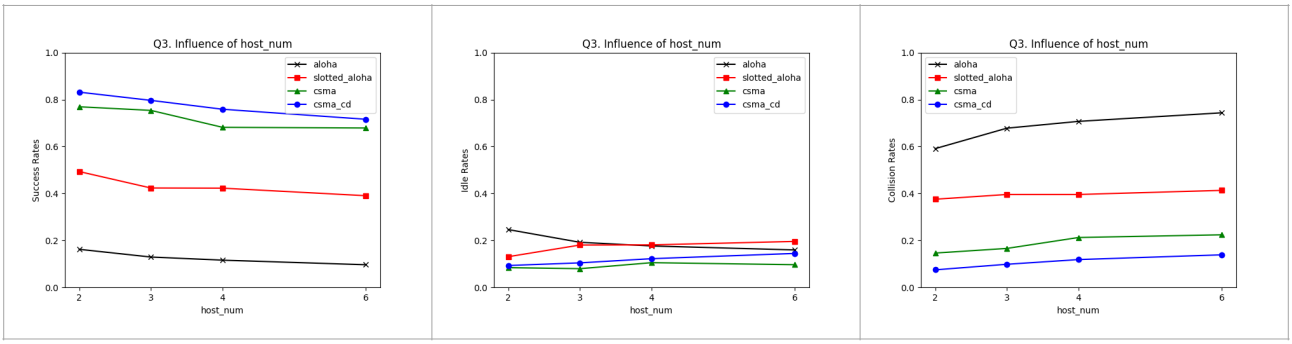
Q2: Find the expression

The parameter should be related to the number of host.

```
max_colision_wait_time = (host_num * packet_size) * c
p_resend = (1 / host_num) / c
```

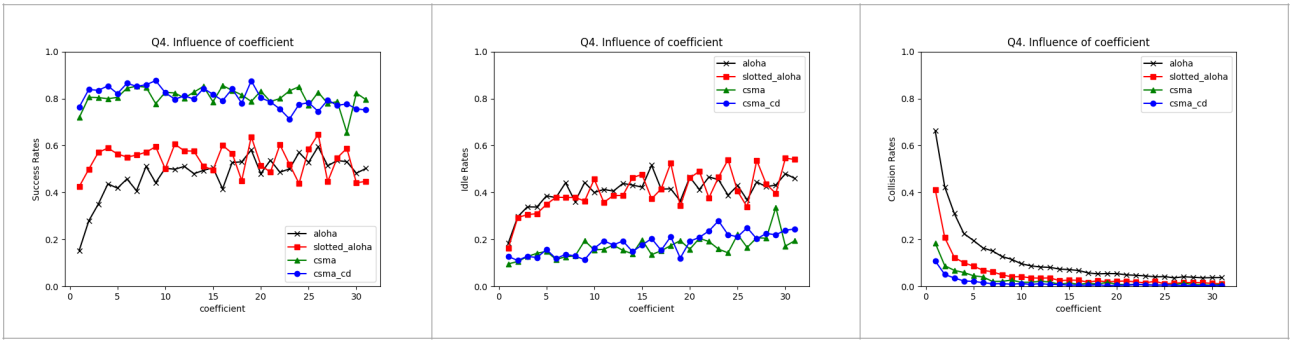
Q3: Redo the simulations

We can see the line is more flat than Q1. For `host_num` = 2 and 3, the success rate is lower. But it have better performance when `host_num` = 6.



Q4: Coefficient

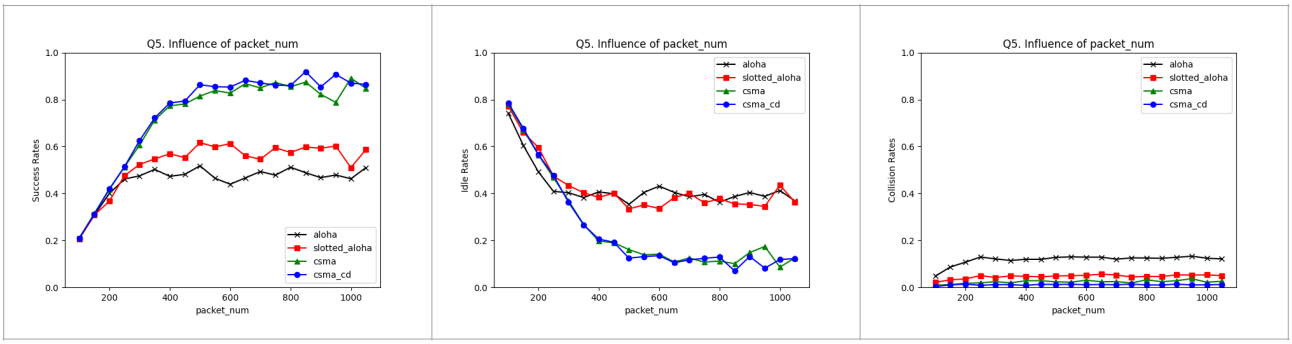
We can see the success rate is low when coefficient=1. And since it's a random result with not much trials, there are some unexplainable peaks. The higher coefficient is, the lower collision rate we get.



Q5: Number of packet

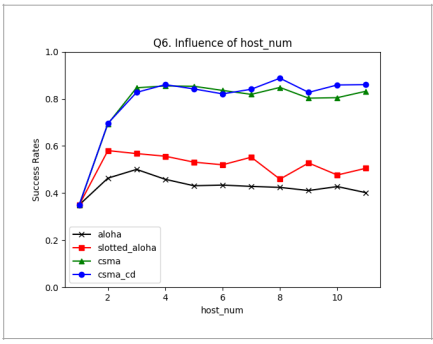
We can see when there are more packets, we will have lower idle rate. But as the packet_num increase, the collision rate will increase as well.

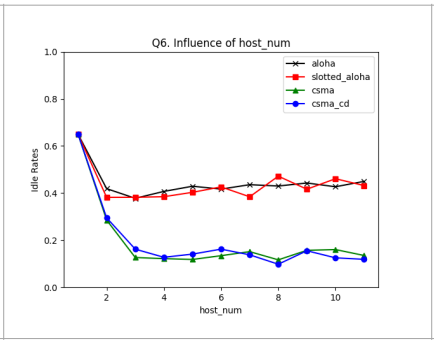
In this homework, success rate is calcualted by the ratio of transmiting unbroken packets, not the success ratio of total packets. So we will see higher "success rate" as the number of packet increase.

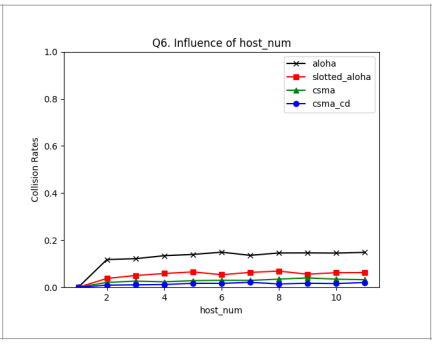


Q6: Number of host

When there is only one host, there will be no collision at all. When the number of host increased, since we use `host_num` as part of formula in Q2, the collision rate is basically the same.

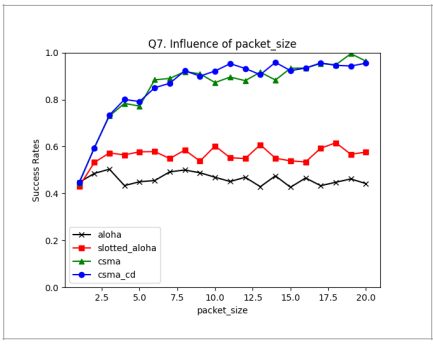


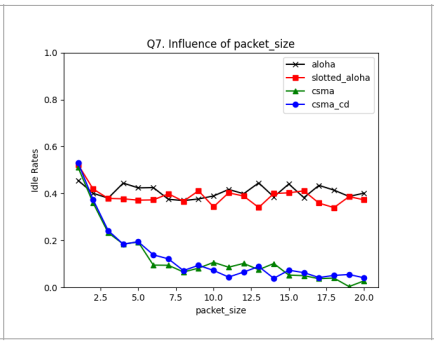


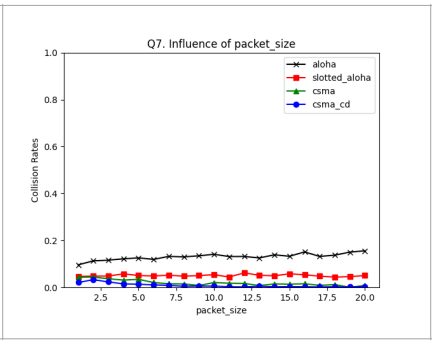


Q7: Packet size

Since we use `packet_size` as part of formula in Q2, the collision rate is basically the same. If we use `(packet_size + 2)` instead of `(packet_size)` in that formula, the line will be more flat.







Q8: Link delay

As the link delay increase, the success rate will be decrease.