

NSCAP HW3

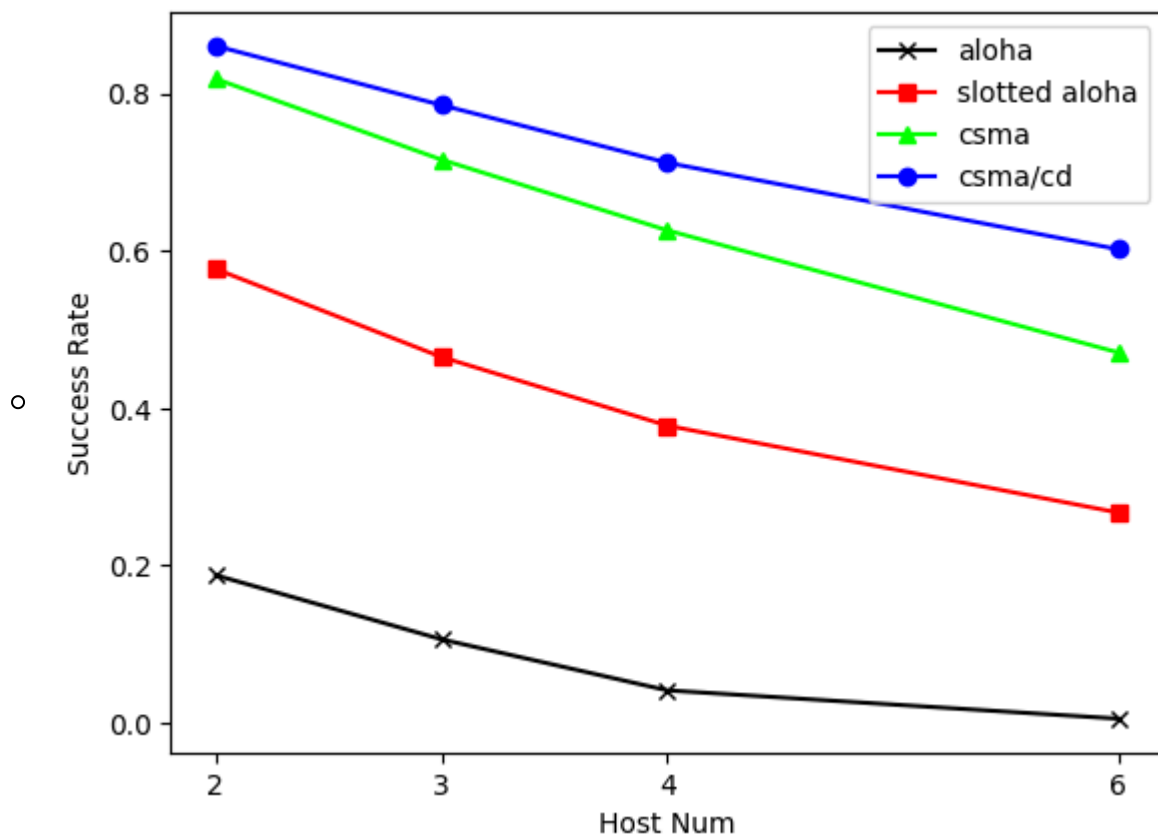
Code Section

```
aloha
      V              V              V              V
h0: .....<---|.....<---|...<---|.....<---|.....<---><---|.....<---|
      V      V              V      V
h1: .....<---|.....<---|.....<---><---|. <---|.....<---|.....<---
      V              V      V      V
h2: .....<---|<--->.....<---><---><---><--->.....<---|.....<---
success_rate: 0.15
idle_rate: 0.39
collision_rate: 0.46
slotted_aloha
      V              V              V              V
h0: .....<---|.....<---|.....<---|.....<---|<---><---><--->.....<---|.....
      V      V              V      V
h1: .....<---|.....<---><---|.....<--->.....<---|.....<---|<---|.....
      V              V      V      V
h2: .....<---|.....<---|.....<---|.....<---|<---|.....<---|<---|.....
success_rate: 0.25
idle_rate: 0.39
collision_rate: 0.36
csma
      V              V              V              V
h0: .....<---|.....<---|.....<---><---><--->.....<---><--->.....
      V      V              V      V
h1: .....<--->.....<---|...<--->.....<---><--->.....<---><--->.....
      V              V      V      V
h2: .....<---|<--->.....<---><---><---><---><---><---><---><--->.....
success_rate: 0.4
idle_rate: 0.48
collision_rate: 0.12
csma_cd
      V              V              V              V
h0: .....<--|<--->.....<-|.....<---><--->.....<---><--->.....<-|.....
      V      V              V      V
h1: .....<--|...<---><--|.....<---><--->.....<--|...<--|.....
      V              V      V      V
h2: .....<-|.....<-|.....<-|.....<--->.....<-|.....<--->.....
success_rate: 0.25
idle_rate: 0.52
collision_rate: 0.23
```

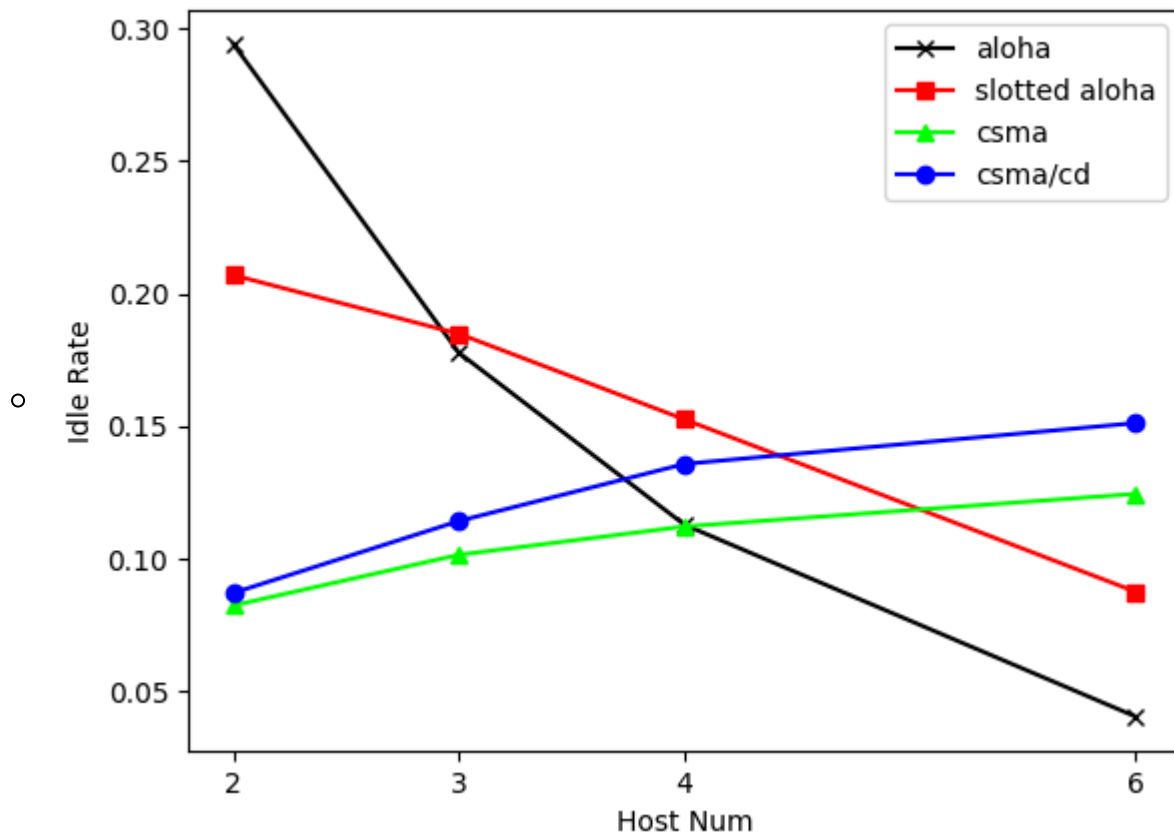
Questions

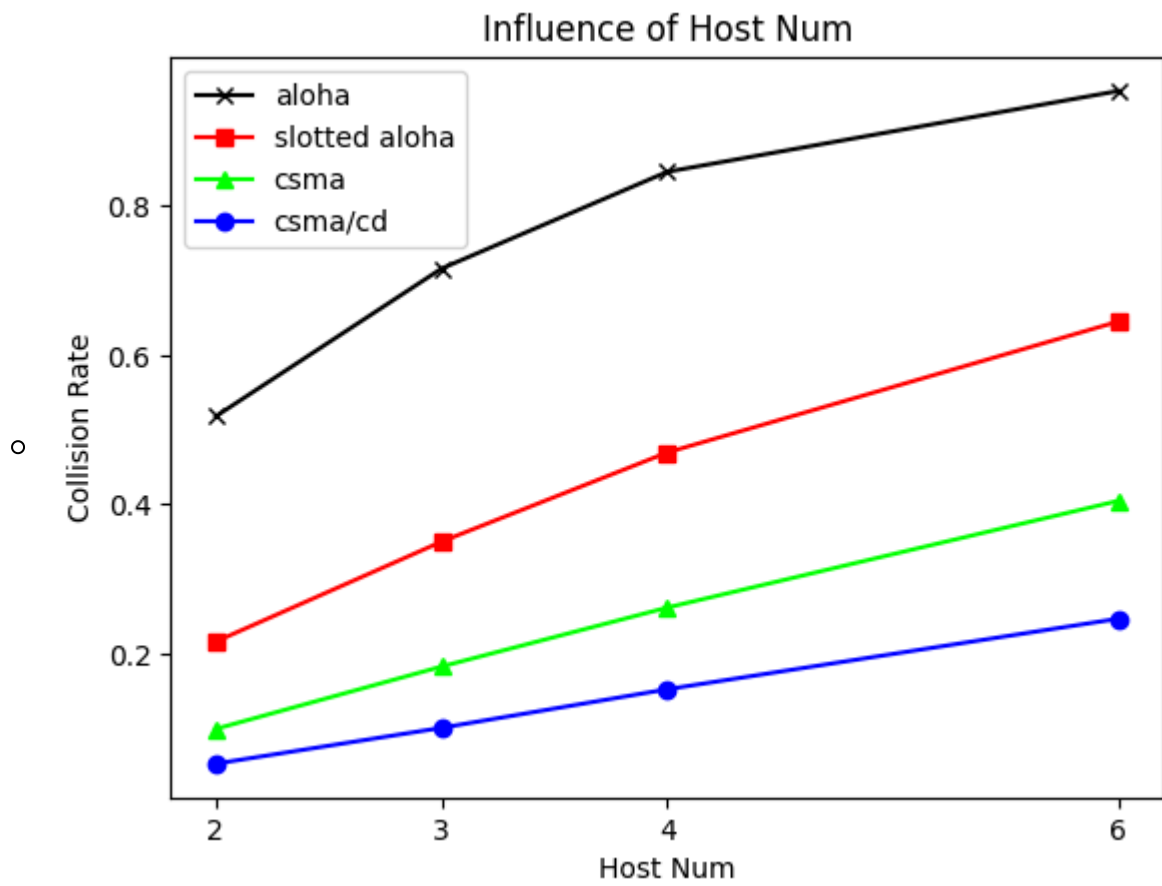
- max_collision_wait_time = c × **host_num** × self.**packet_time**
 - $p_{\text{resend}} = \frac{1}{c \cdot \text{host_num}}$
- Setting(host_num=h, packet_num=p, max_collision_wait_time=20, p_resend=0.3)

Influence of Host Num

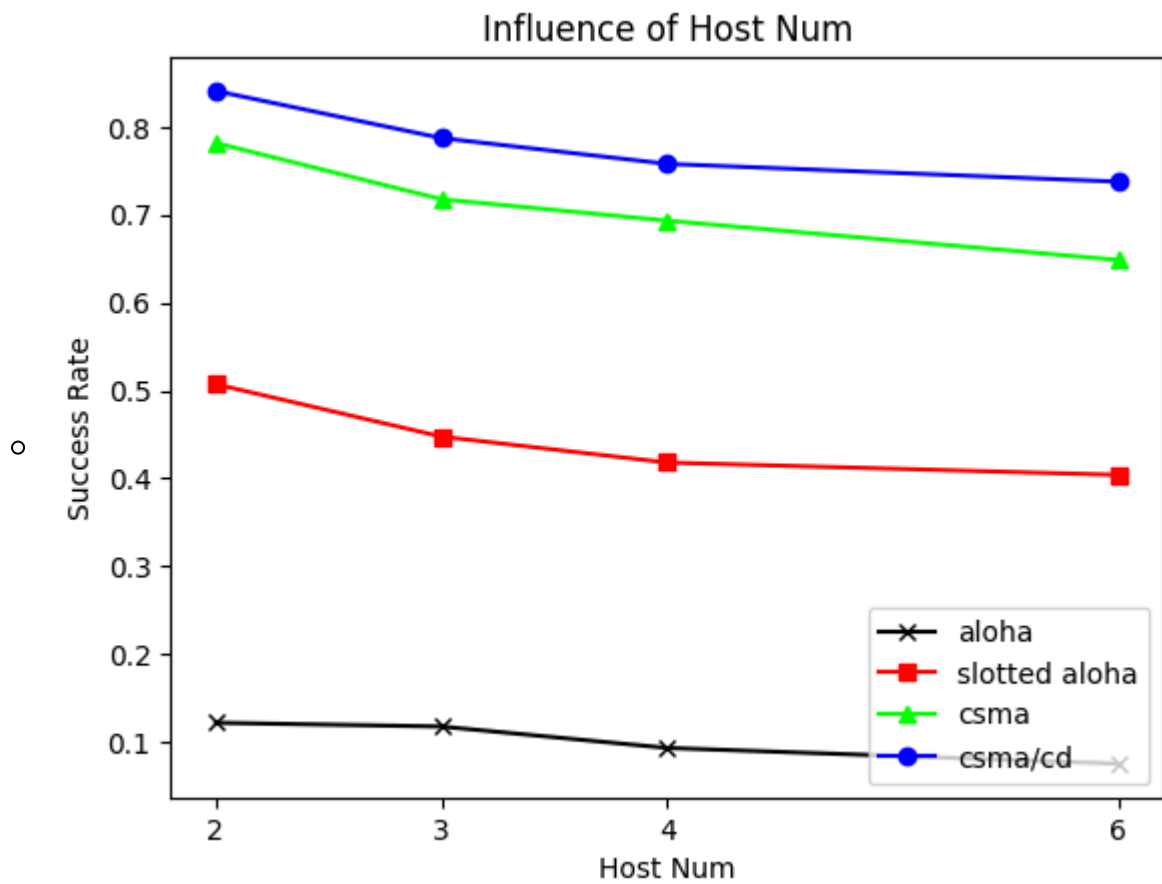


Influence of Host Num

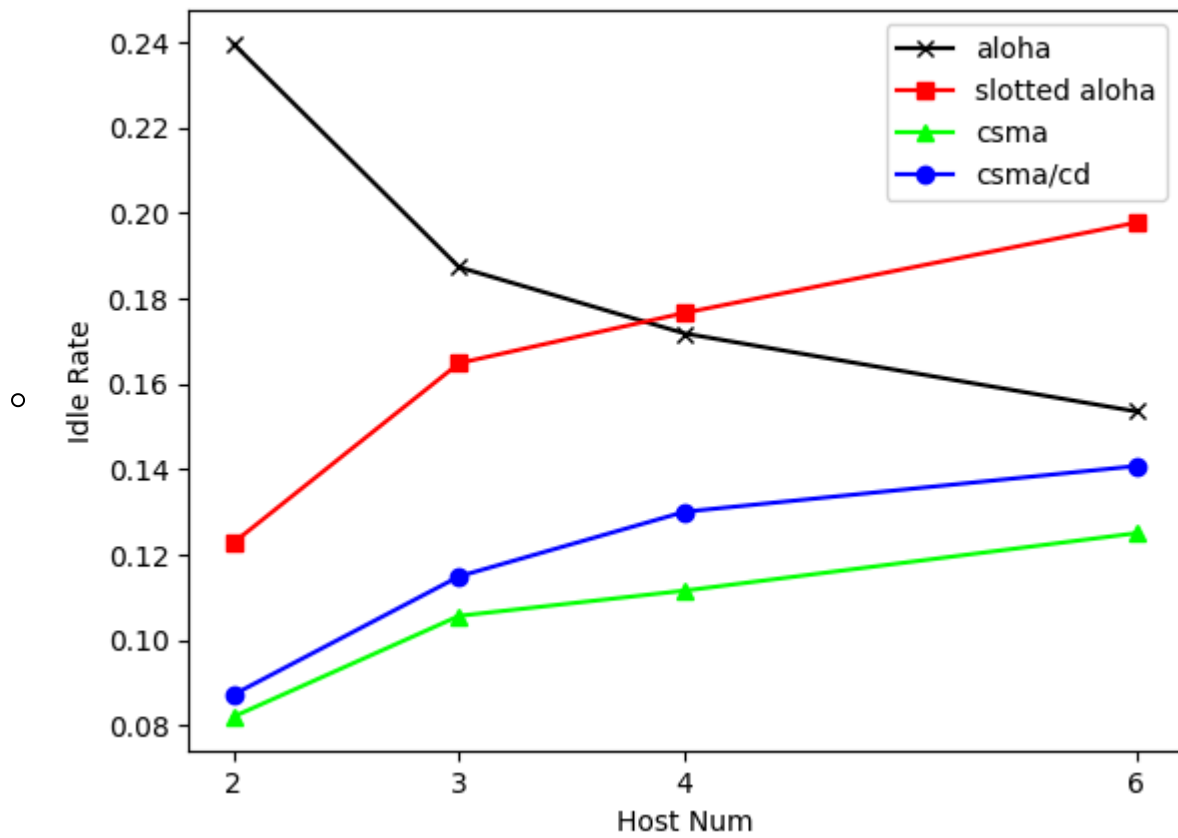




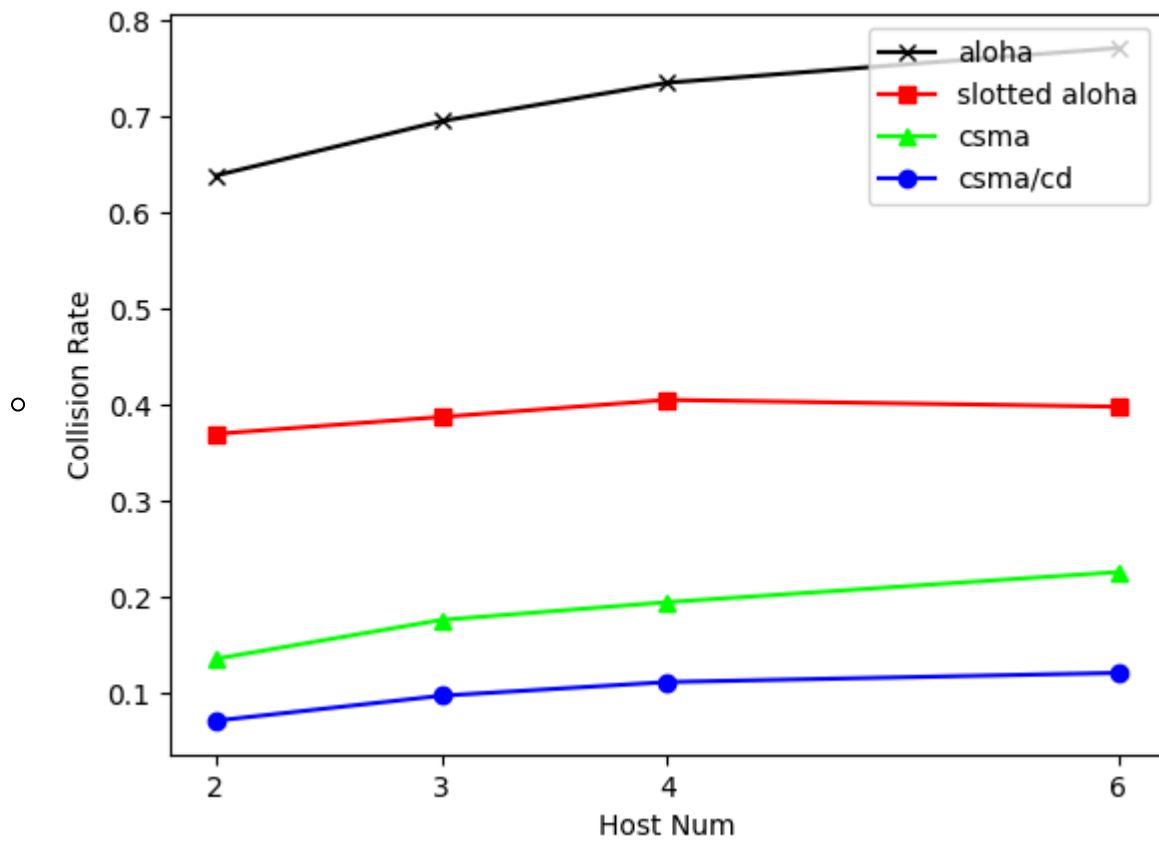
3. ○ Setting(host_num=h, packet_num=p, coefficient=1



Influence of Host Num



Influence of Host Num



○ Influence:

In Q2, we give a **static** value for max_collision_wait_time and p_resend. However, we set these two parameters varying with **host_num**.

The result attached our expectation:

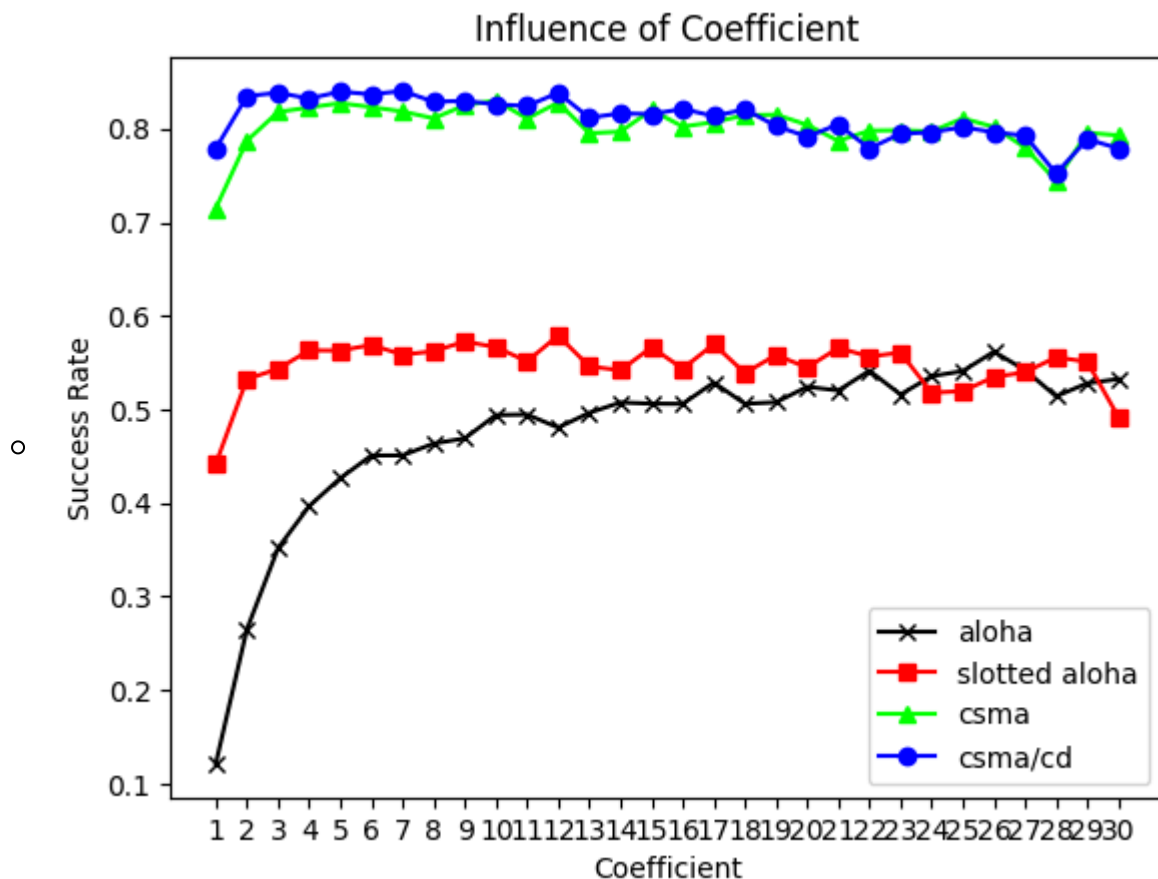
As the rising of host num

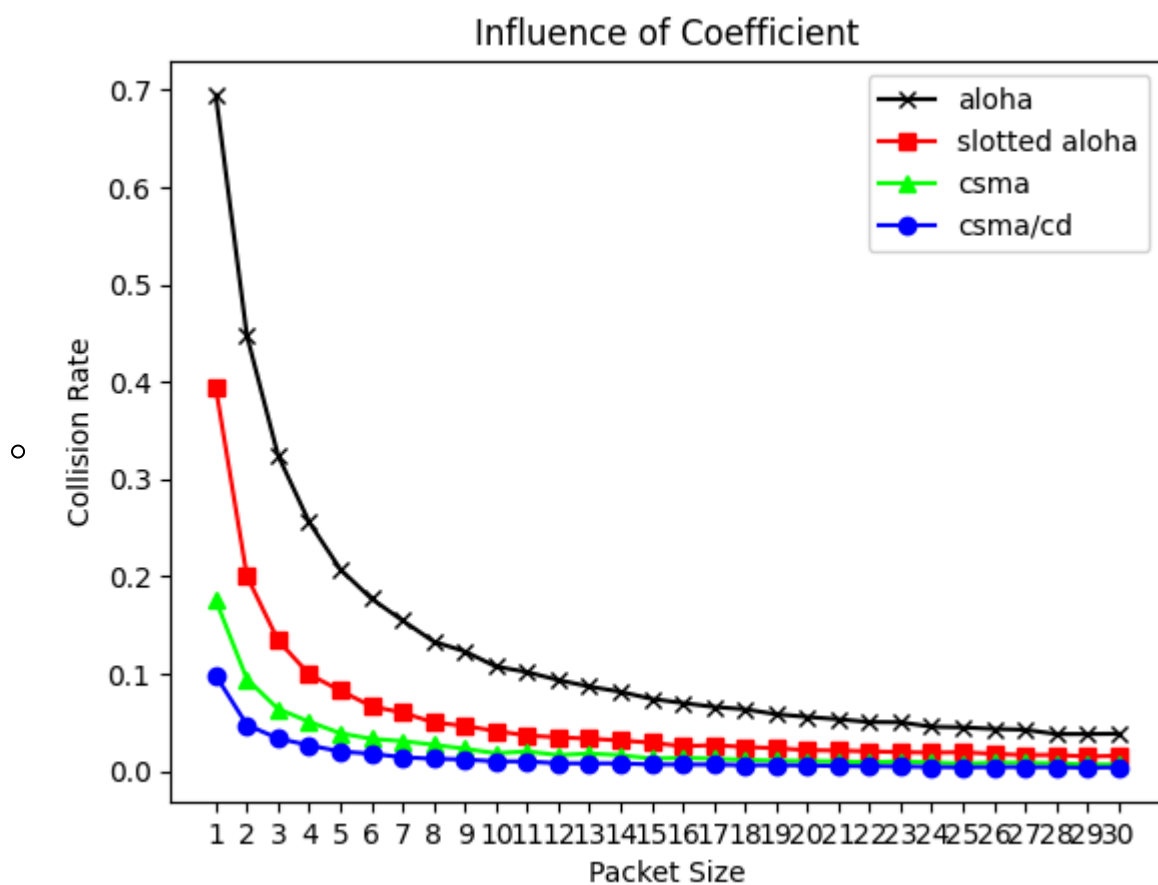
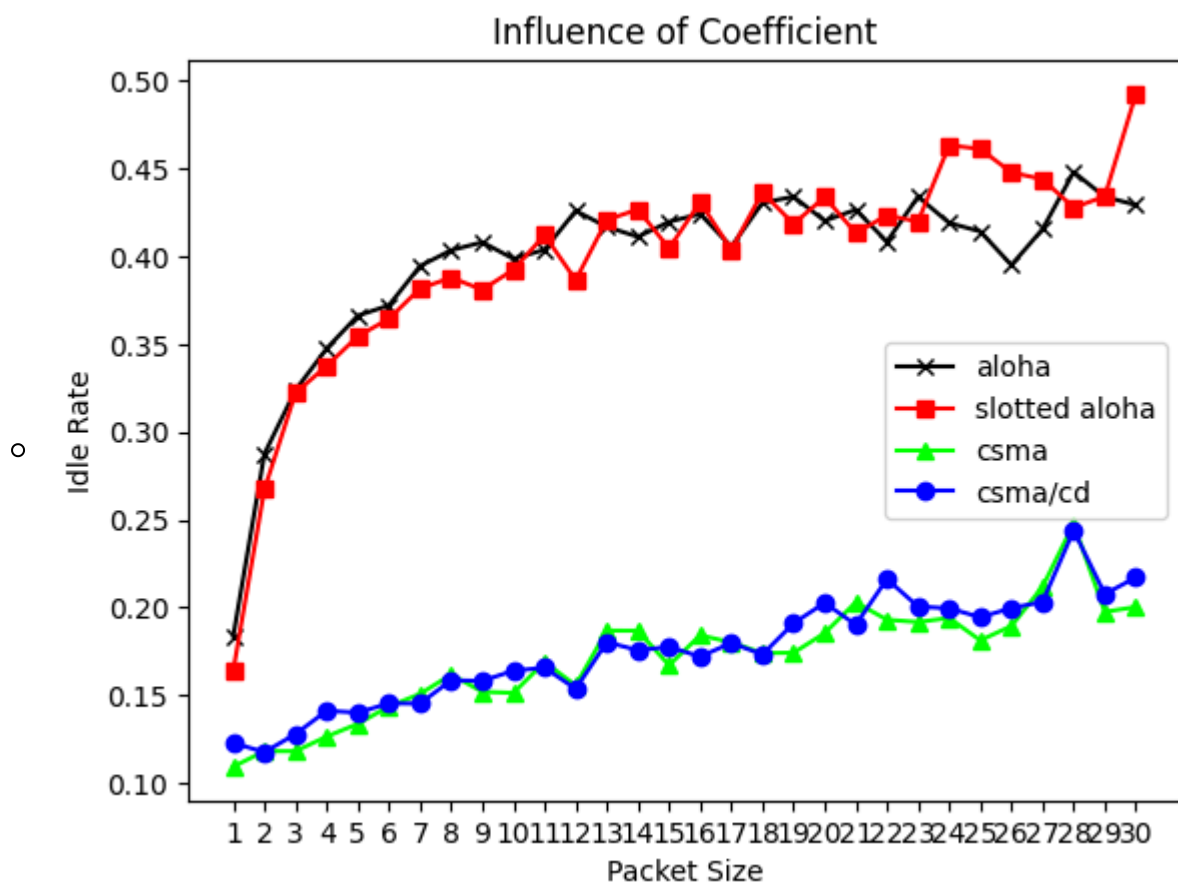
1. The **success** rate will not decrease fast

2. The **collision** rate will not increase fast

But I observed a result unexpected: the Idle rate of **slotted aloha** increase as host_num rising.

4. Coefficient = 1~30

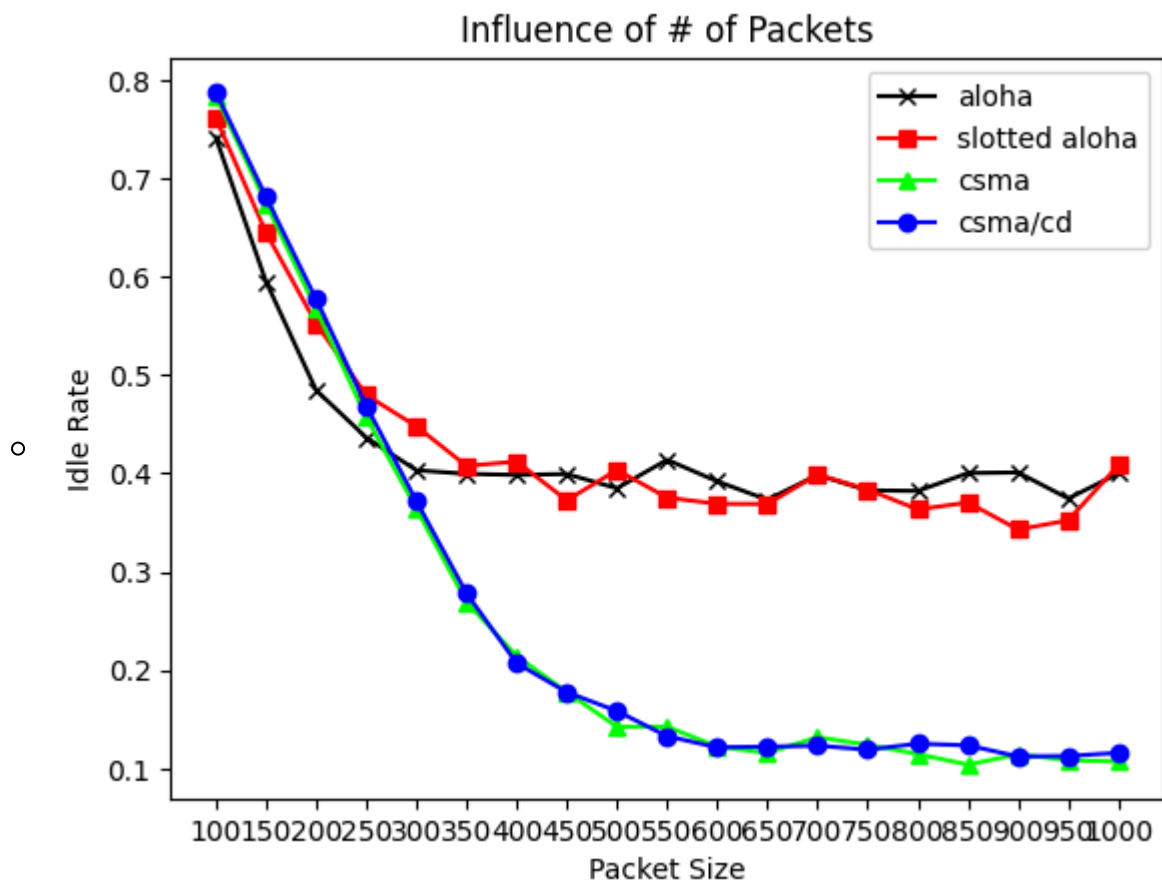
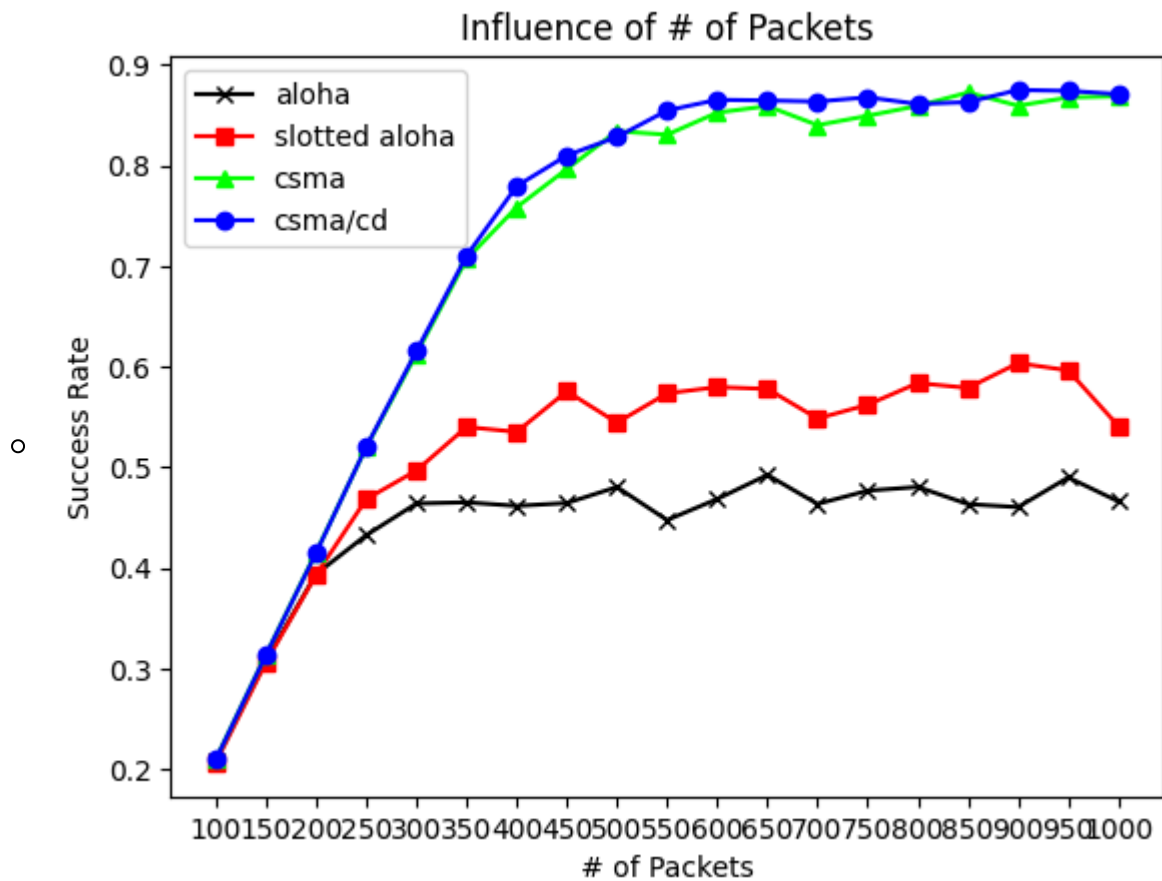


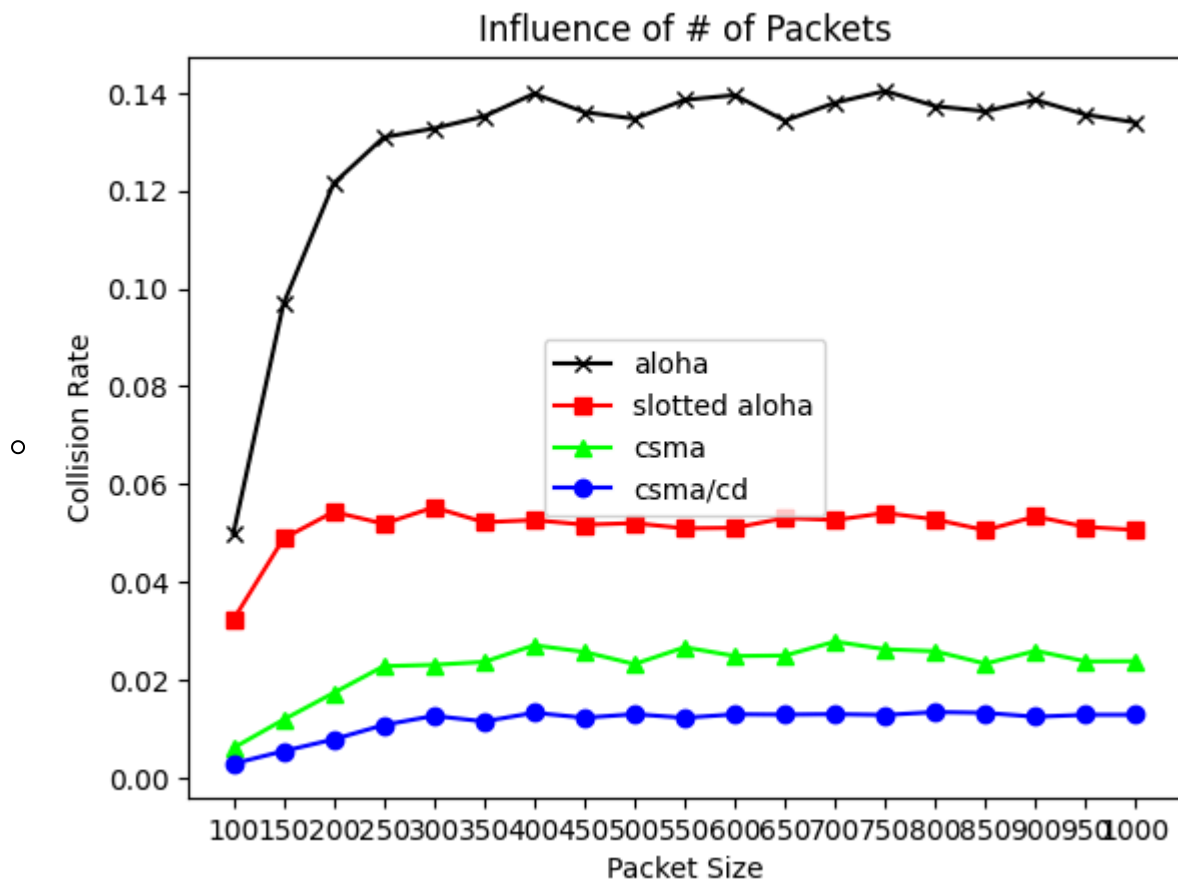


○ Influence:

Since coefficient influence **max_wait_time** such that the **range of wait time** get larger. Though the collision rate went down ↓, the idle rate went up ↑ consequently

5. Packet_num = 100~1050 (step=50)

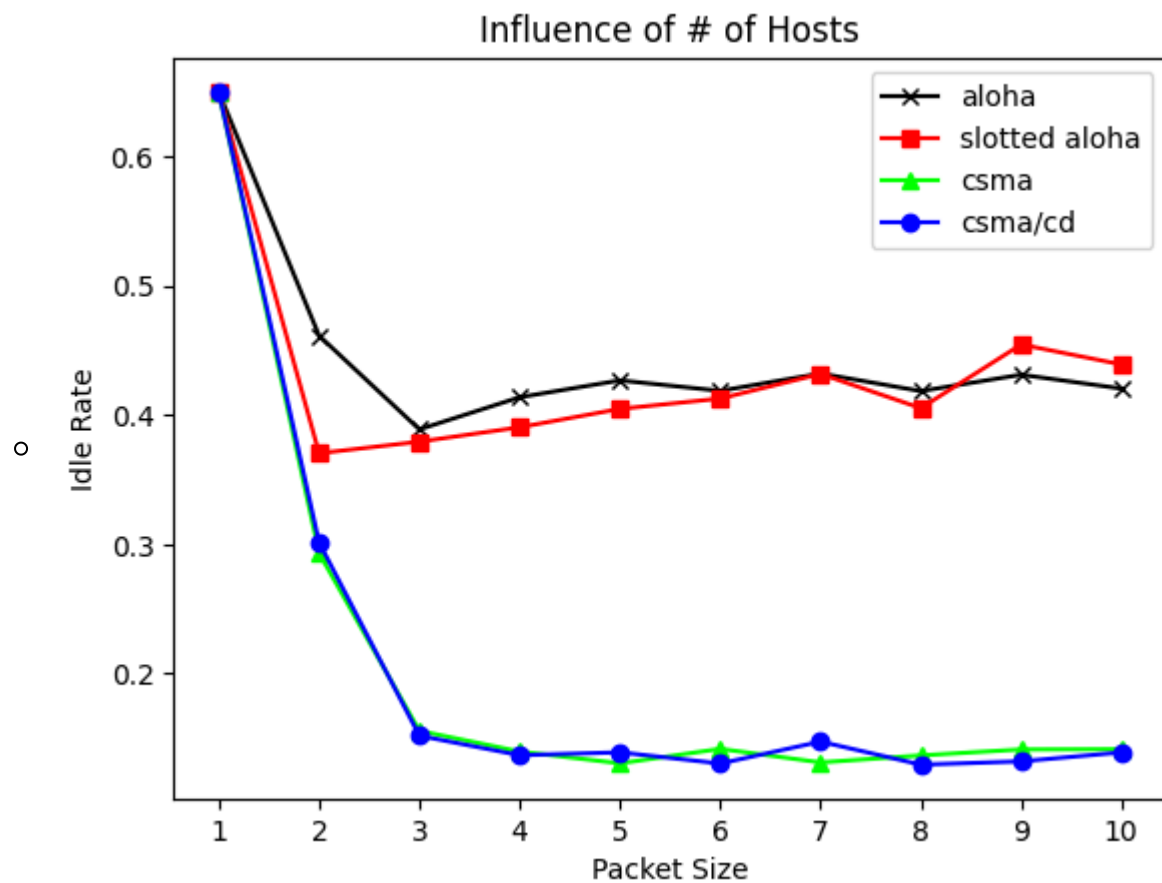
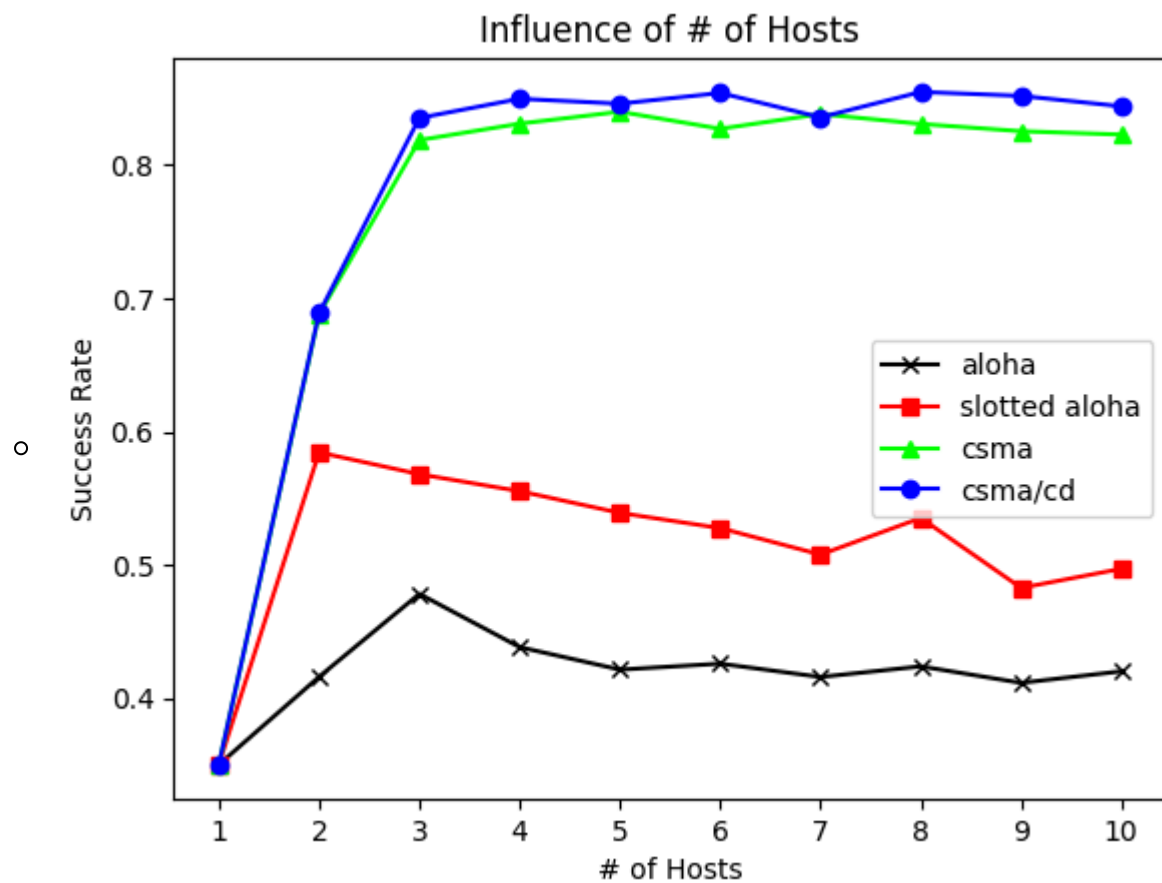


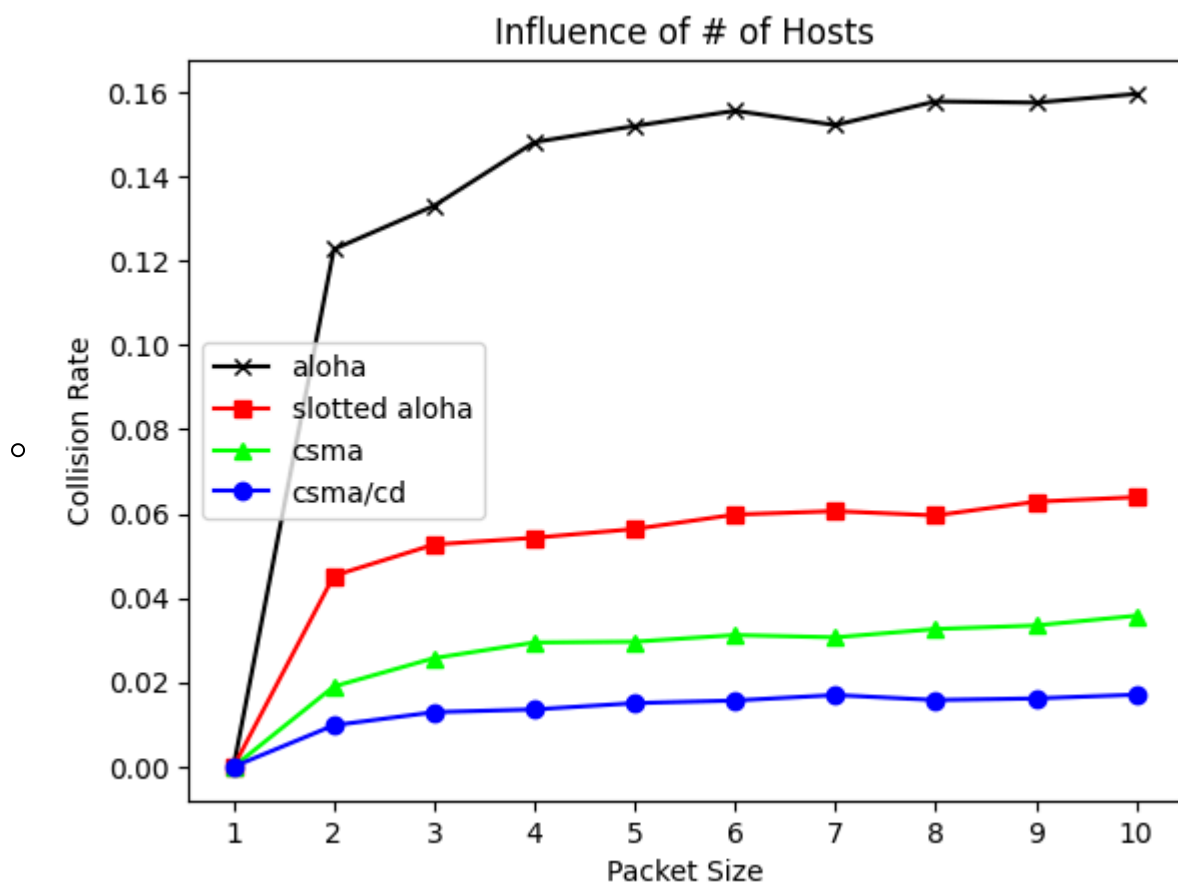


○ Influence:

- The rising of packet num means that hosts must **get busy**, they will not waste the time but send their packet best (idle time decrease ↓)
- Similarly, the success rate get better is beacase hosts **continuously** send their packet occupying their total time.
- However, it seems like the collision will not be influenced collision rate. It make sense that if we have **more task** to do but we keep the attitude as **normal**, the collision will not get rised. (packet num will not change the wait time)
- In conclusion, the packet num just **extend the time** hosts work, **not the attitude** on sending packets.

6. host_num = 1~10

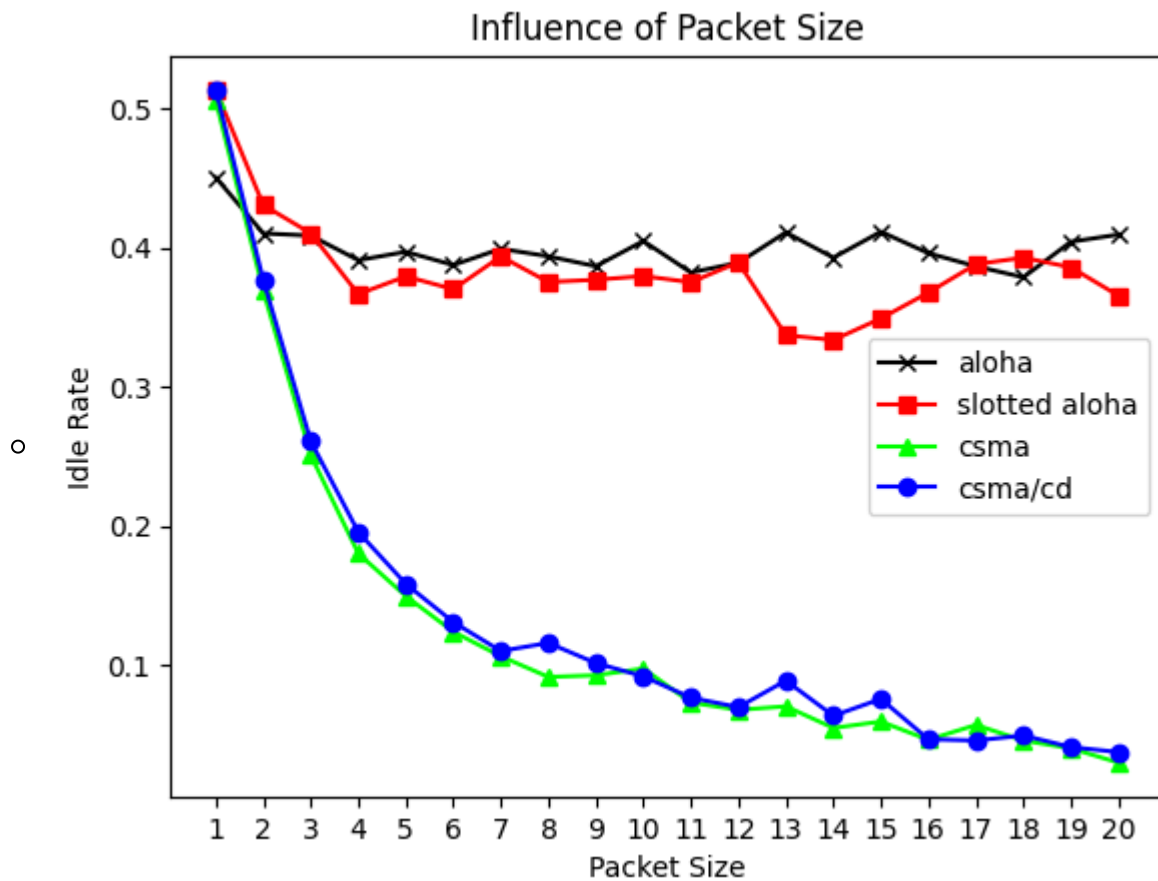
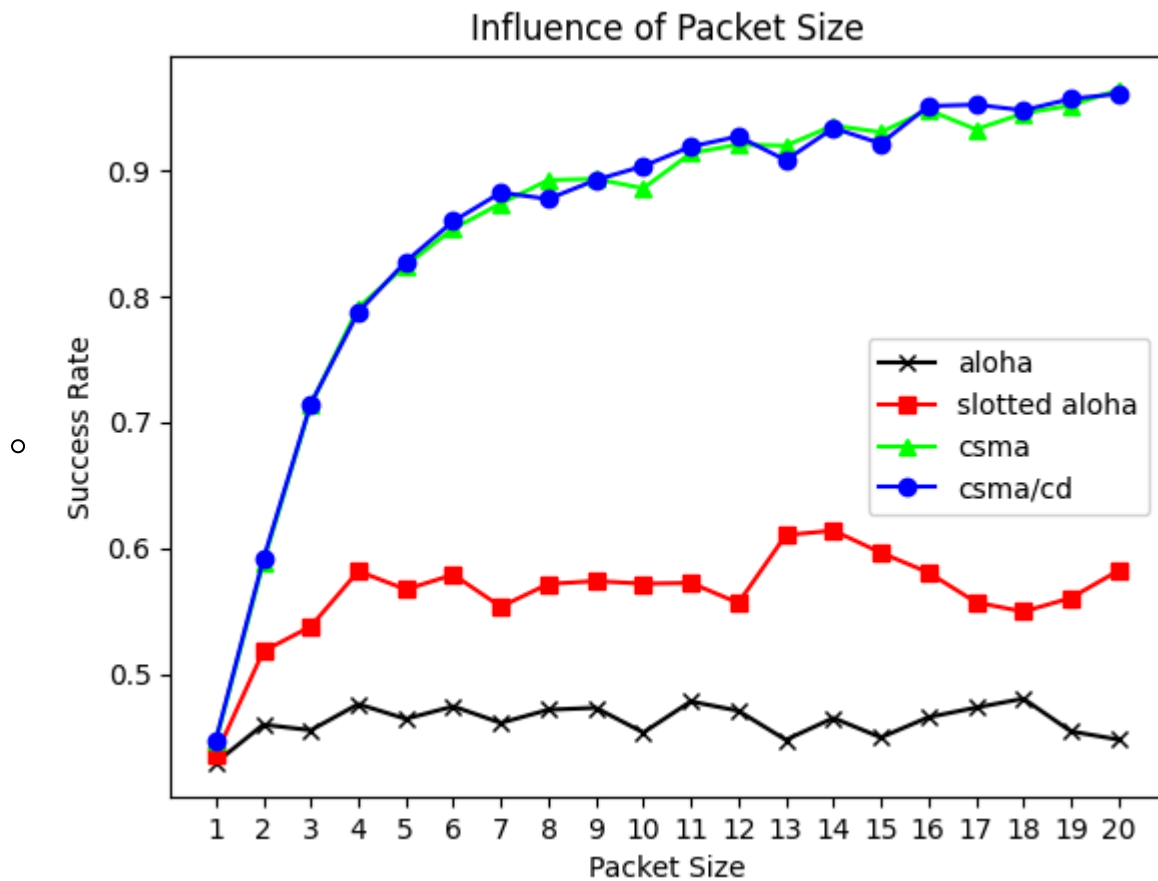


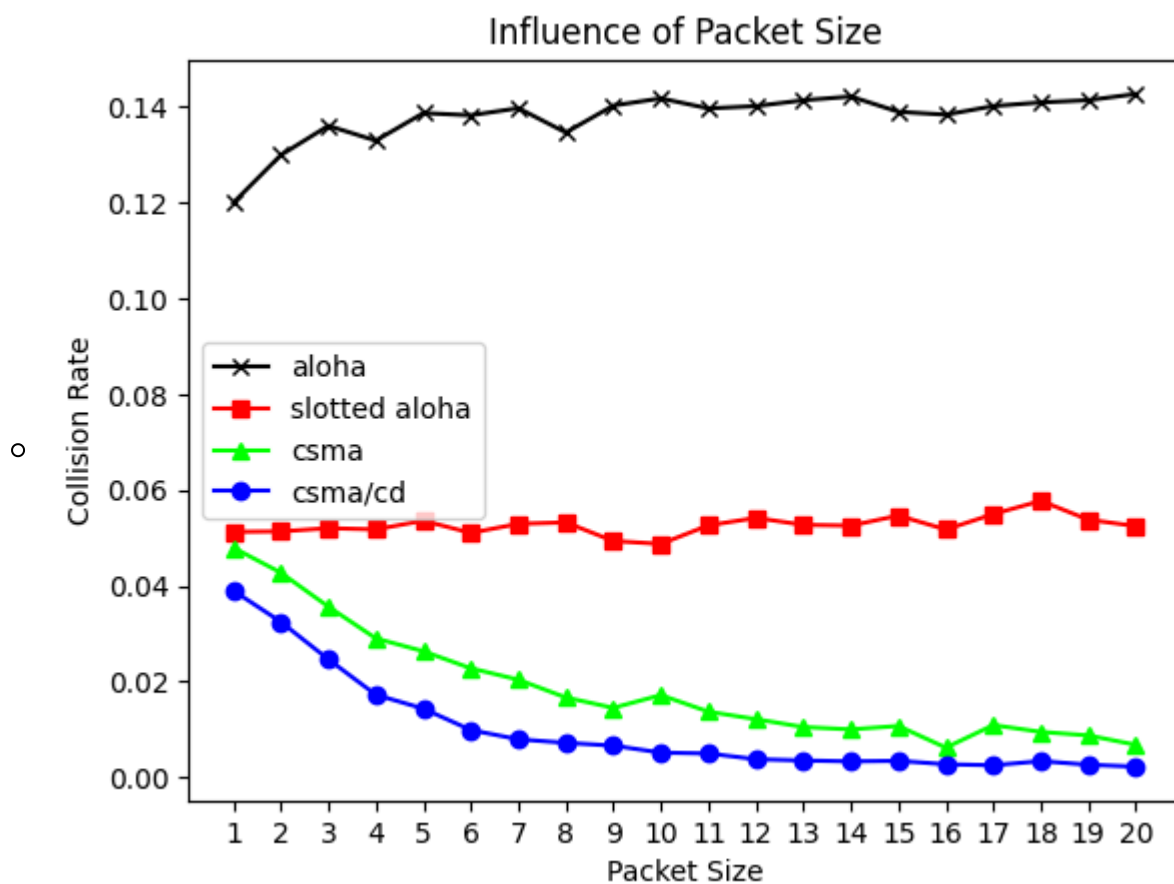


○ Influence:

- In the begining, the **unused bandwidth** will be utilized by increasing host num; however, the success rate will decrease **by collision rate increase**.
- Similarly, idle time will decrease because of new adding hosts and then increase by collision.
- My guess is that the collision and the number of host will **meet a balance** in some way causing the faltted pattern.

7. packet_size = 1~20





○ Influence

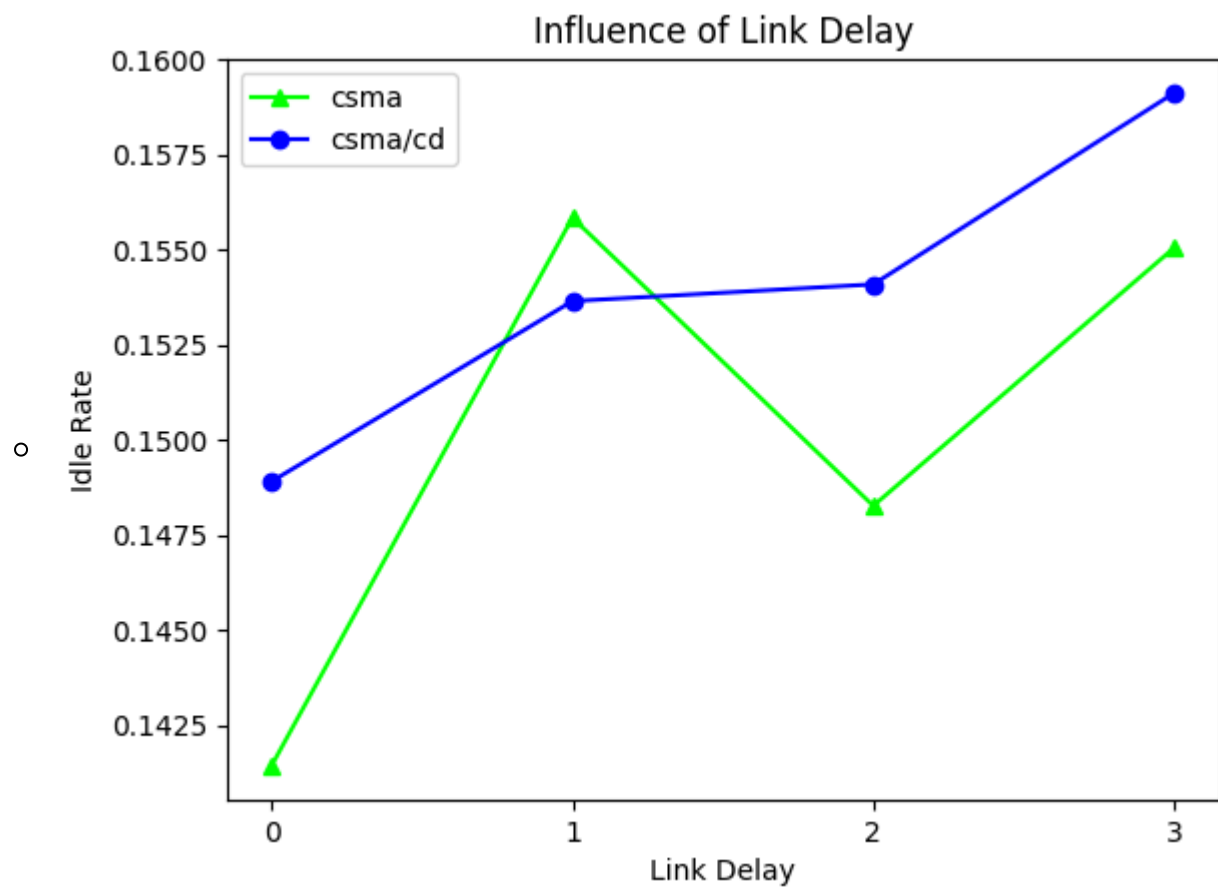
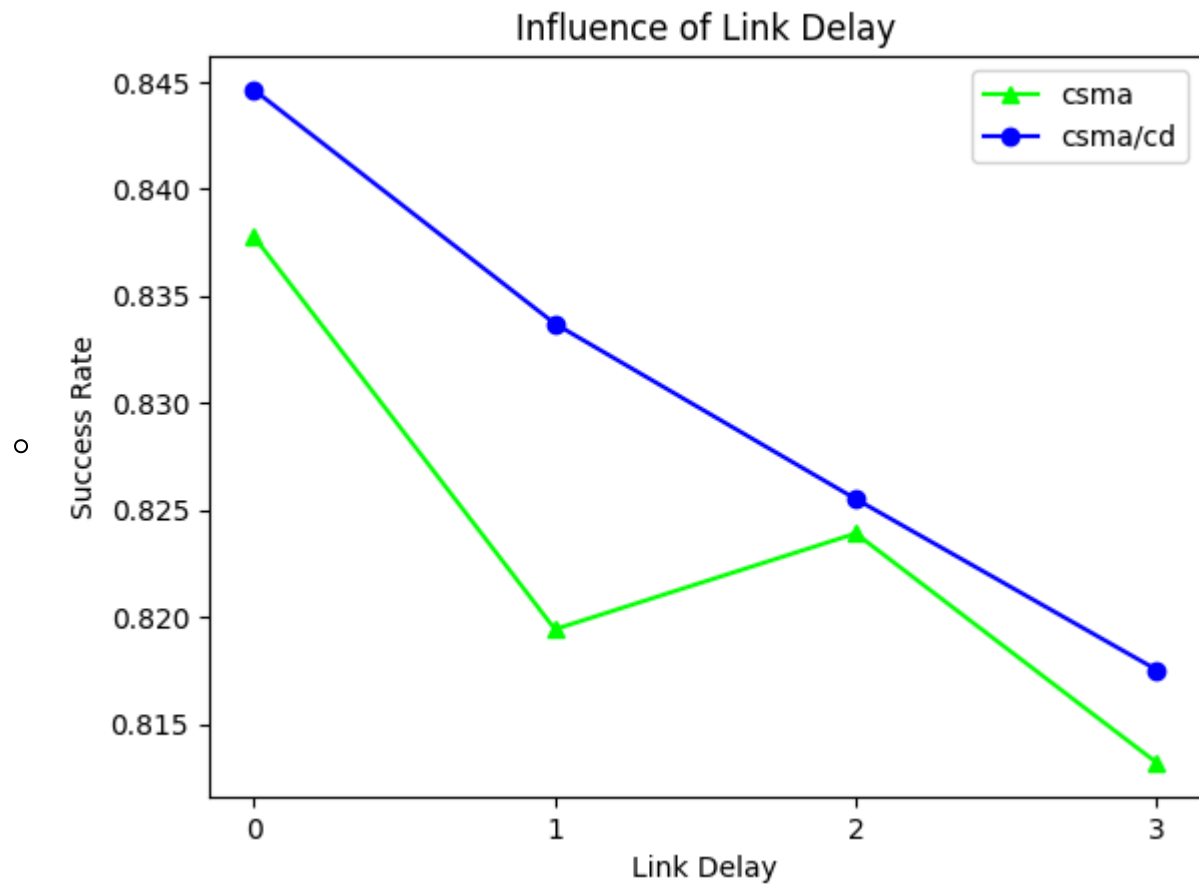
- By this formula,

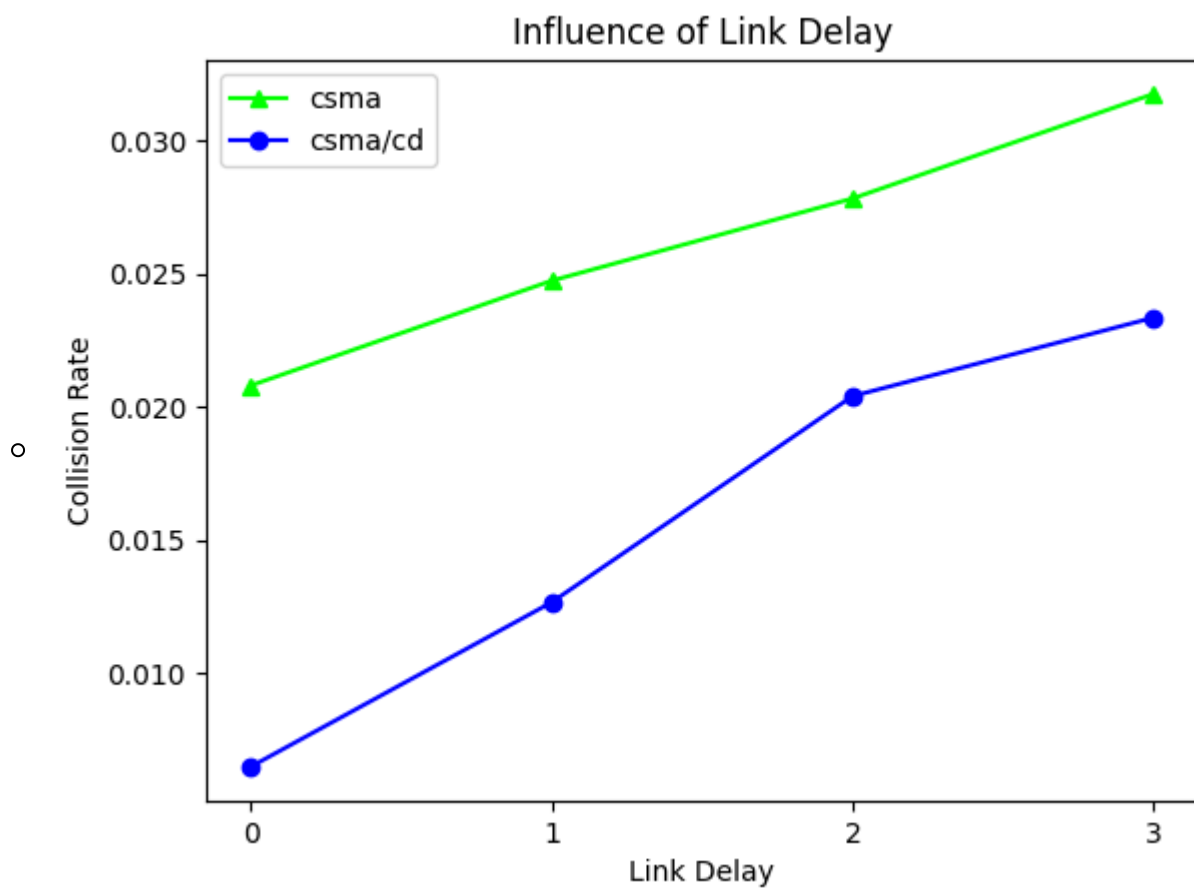
$$\text{total_success_time} = \text{total_success_num} * \text{packet_time}$$

- Since CSMA and CSMA\CD will not be interrupt when a host is sending a packet. Therefore, the longer packet size make a host **success more** if send successfully.
- The idle rate of CSMA and CSMA\CD decrease as a host can occupy a **longer period** after sending.

8. link_delay = 0, 1, 2, 3 | packet_size = 7, 5, 3, 1 | packet_time

= 4 (constant)





o Influence

- Larger link delay must cause more collision such that success rate get worse and idling occpying total time more consequently