Wireless Ad Hoc Networks
## Lab 3

Network Simulator

NS3 Experiment (II) – RTS & CTS

Introduction

- ## Goal
  - To investigate the impact of hidden terminal problem in ad hoc network and familiar with RTS/CTS mechanism
- ## Modify **the .cc code** to meet the scenario we specified in the next slide
- ## Run simulation and write the analysis to compute
  - System throughput
  - Packet loss ratio

Simulation environment

- ■ Set node distance
  - ❑ d_{01}=170m ; d_{23}=170m ;
  - ❑ Change d_{12} from **50 to 100, 150, 190, 220, 280, 320** (totally 7 scenario)

Simulation environment

a.

b.

c.

d.

e.

f.

g.
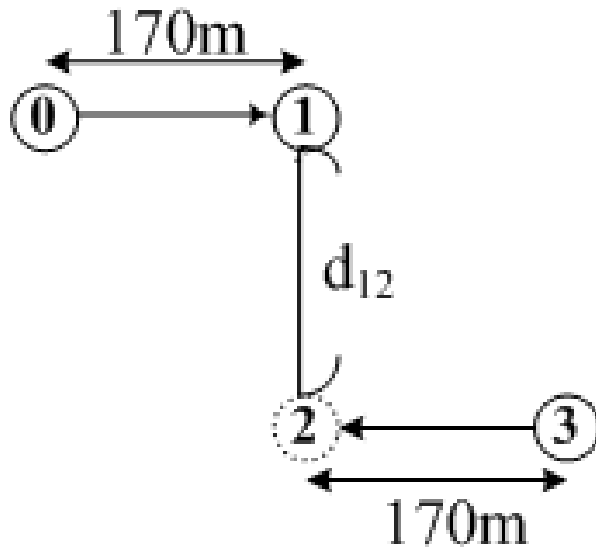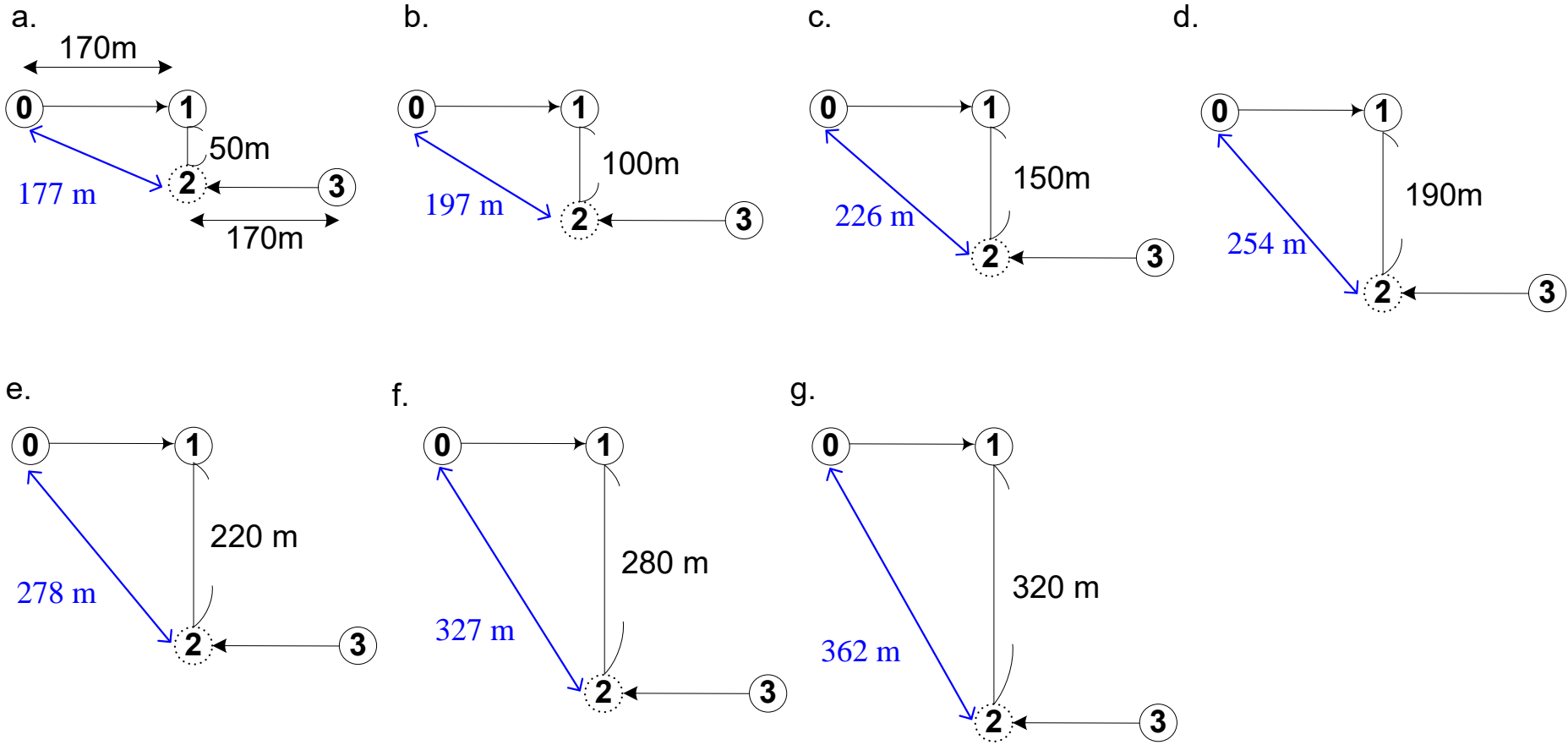
Simulation environment – Wifi Channel

- CS_Threshold_dBm = *value1*
- RX_Threshold_dBm = *value2*
  - Set proper value for value1 and value2

- Carrier sensing range: 300m
- Transmission range: 200m

Simulation environment – Wifi Channel

- Two-Ray Ground Propagation:

$$P_r(d) = \frac{P_t G_t G_r {h_t}^2 {h_r}^2}{d^4 L}$$

- C function (TwoRayGround CS/RX Calculator) is provided
  - compute the receiving threshold

Simulation environment – Wifi Channel

- set RTS/CTS Threshold = *value* ??

- Q. How to set proper value to turn on RTS/CTS mechanism?

➔ RtsCtsThreshold = ??

Simulation environment

- Network scenario – part 1

    - Set the position of four nodes
        - Example:
            - <ListPositionAllocator>->Add(Vector(x,y,z));

Simulation environment

- ## Network scenario – part 2

  - ❑ Implement the following four functions

    - ▪ LinearScale2dB

    - ▪ dB2LinearScale

    - ▪ dBm2Watt

    - ▪ Watt2dBm

Simulation environment

- ## Network scenario – part 3

  - Simulation time = 4
  - simulation area = 800(x)*800(y) (m2)
  - CSThresh= *value*
  - RXThresh= *value*
    - According to carrier sensing range 300m and transmission range 200m, set proper value

  - CWMin=20
  - CWMax=20
  - RTS/CTS Threshold= *value*
    - turn on RTS/CTS mechanism

Simulation environment

- ## Network scenario – part 4

  - ❑ CBR packet size = 1024 (bytes)
  - ❑ CBR rate = 800kbps
  - ❑ CBR traffic
    - ▪ start at 1.0
    - ▪ stop at 3.0
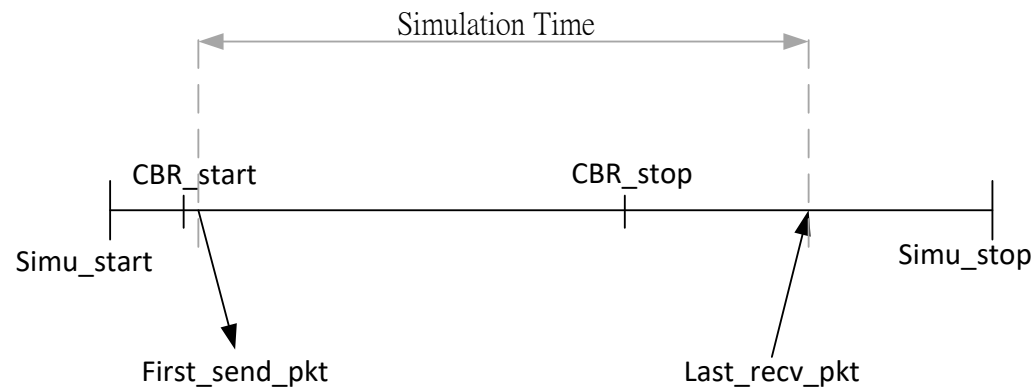
  - ❑ Please Make sure flow configuration is correct!!
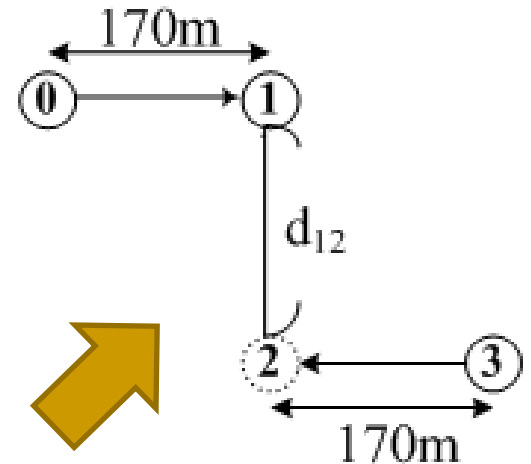
After Simulation

- Analysis
  - a. Average system throughput
  - b. Average packet loss ratio

Analysis

total received data size (bytes) x 8 (bits)

- a. throughput = --

simulation time

total lost packets

- b. packet loss ratio = --

total packets sent

Report

- Deadline is 2019/12/03

- Put the result and explain in your own words.

- Email the report to adhocta@bun.cm.nctu.edu.tw