

# CSE461 Section #3

Anran Wang, 4/19/2018

# Today

Checksum practice

Hidden/Exposed Terminals, RTS/CTS

Switch

Q&A

# Checksum 3254 55f0 663a 4010

## Encoding: (16 bit)

input: data[0..L-1]

s=sum(data)

return ~((s & 0xffff) + ((s >> 16) & 0xffff))

## Decoding:

input: data[0..L-1], checksum

s=sum(data)+checksum

return ~((s & 0xffff) + ((s >> 16) & 0xffff))

# Checksum Practice

3254 55f0 663a 4010

# Checksum Practice

3254 55f0 663a 4010

Encoding:  $3254+55f0+663a+4010=12e8e$ ;  $\sim(2e8e+1)=d170$

Decoding:  $3254+55f0+663a+4010+d170=1fffe$ ;  $\sim(1+fffe)=0000$

# CRC

Encoding:

Input: data[0..L-1], C (generator), k (check bits #)

data=[data, 0,0,...,0 (k zeros)]

return data % C

Decoding:

redo encoding, check result

# CRC Practice

data: AC35 (1010 1100 0011 0101)

C: 10011

k: 4

# CRC Practice

data: AC35 (1010 1100 0011 0101)

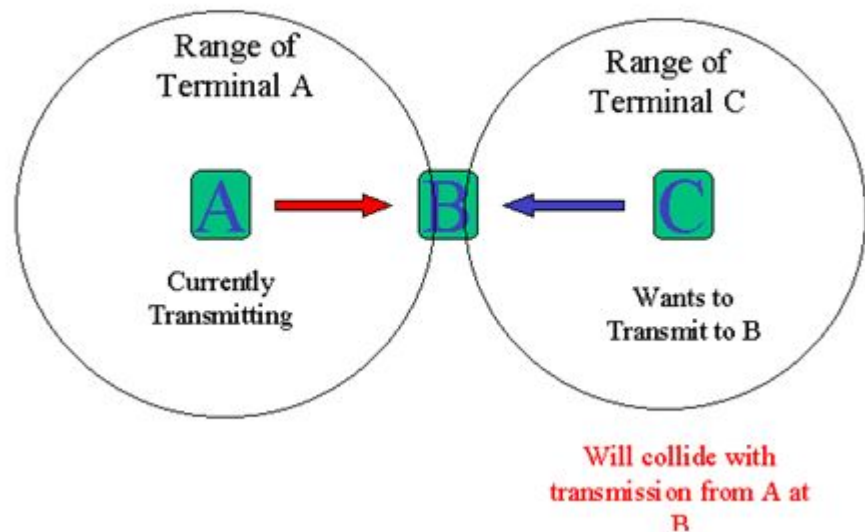
C: 10011

k: 4

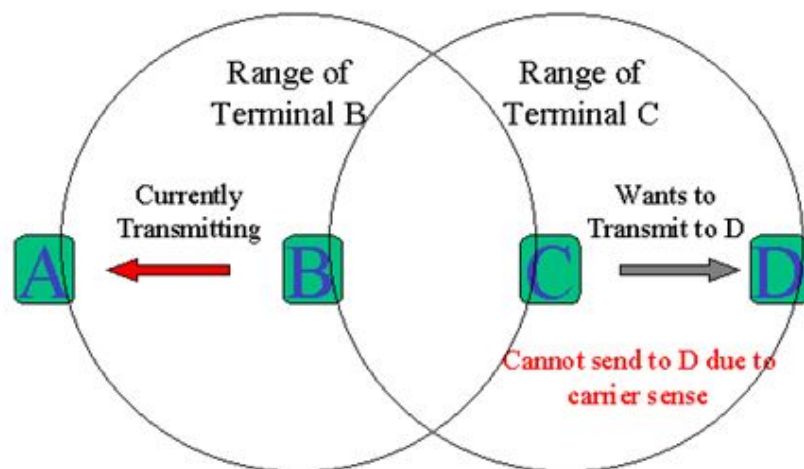
CRC: 1111



## Hidden Terminal Problem



## Exposed Terminal Problem



# MACA

Transmitter sends RTS (Request To Send) with destination id

Receiver responds CTS (Clear To Send) with transmitter id

Failed contenders use a random back-off

Acknowledgement to notify failed contenders

# 802.11 (eg, WiFi) vs 802.3 (eg, Ethernet) link layer protocols

CSMA/CA - CSMA/CD

MACA - None

# Switch

Packet switching vs. circuit switching

Switch

Input:  $N$  ports

Output:  $M$  ports

# MAC Address

Identify devices in link layer

48 bits

XX-XX-XX-XX-XX-XX

# Port $\Leftrightarrow$ MAC mapping

Backward learning