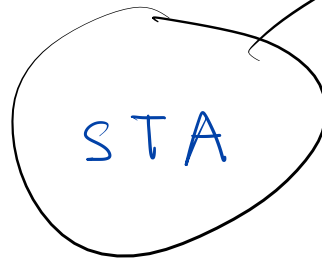
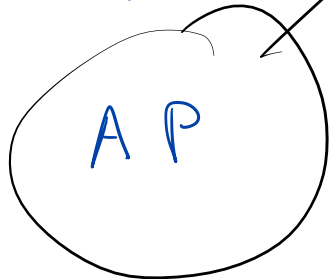


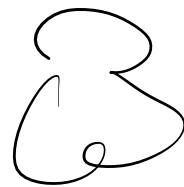
427

- 802.11 family

Access point

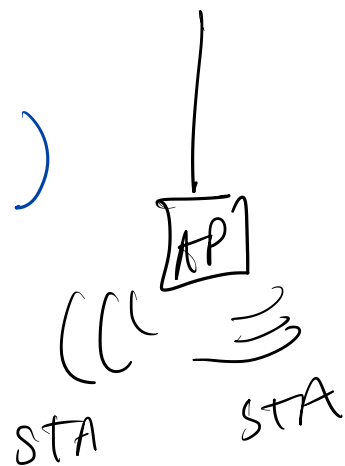


Stations



BSS (Basic Service Set)

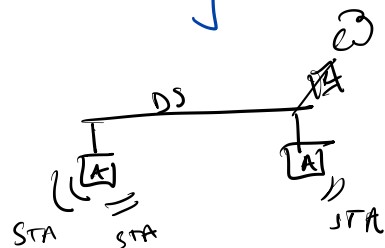
1 AP, 1+ STA



ESS (Extended Service Set)

1+ AP, 1+ STA

uses DS (Distribution System) to connect APs



APs periodically broadcast

'Beacon' frames:

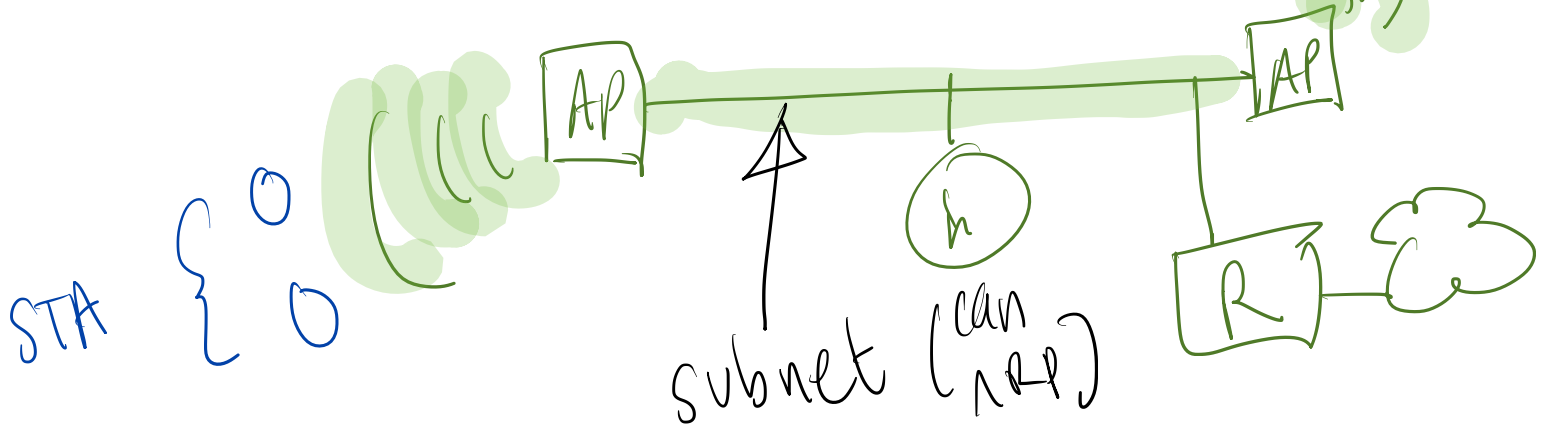
(ssid, mac)

STA 'scans' for Beacon

'Association Protocol' w/

Chosen AP

AP acts as a bridge



802.11

MAC

usually

infrastructure
mode



ad hoc :



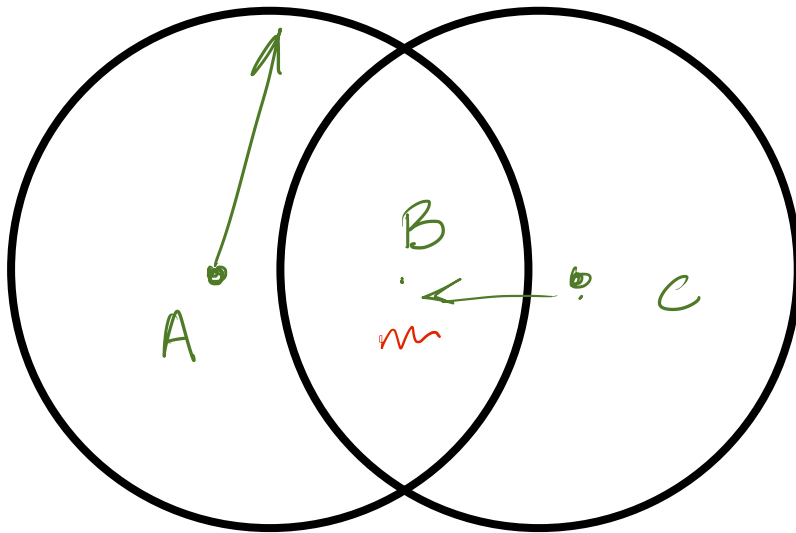
ad-hoc
mode

CSMA / CA

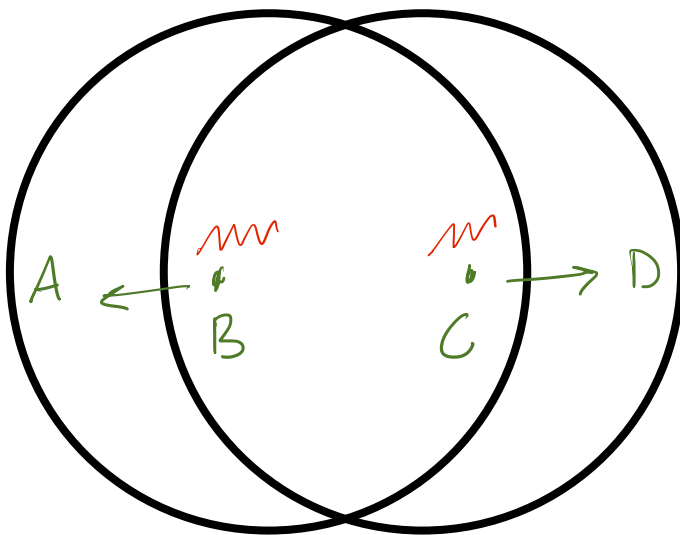
Collision

Avoidance

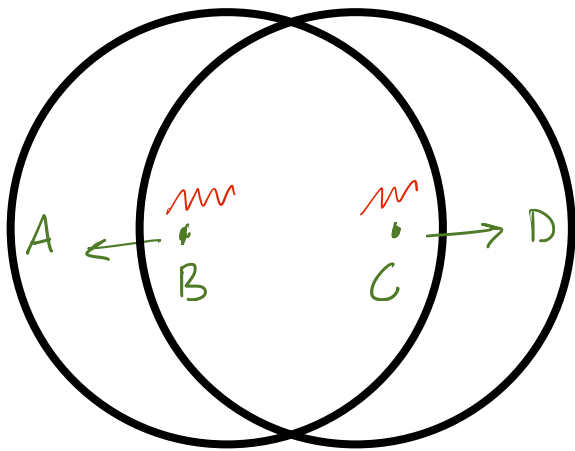
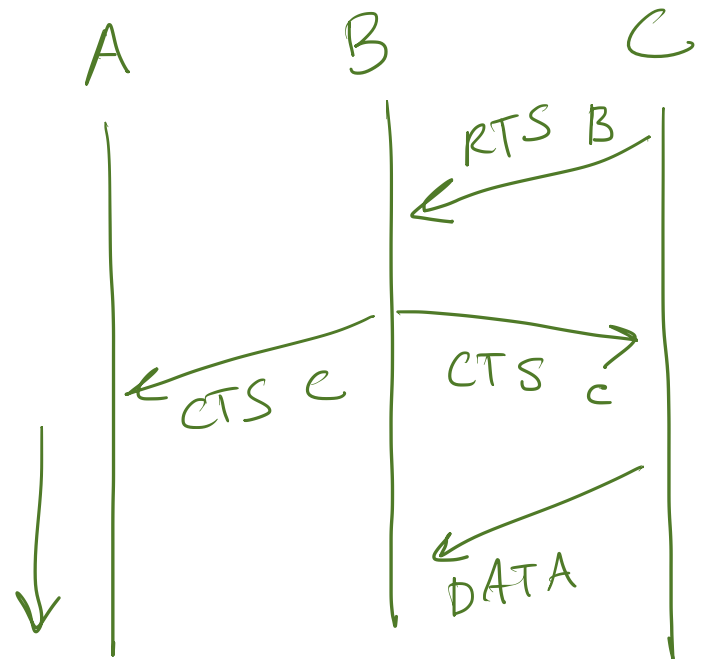
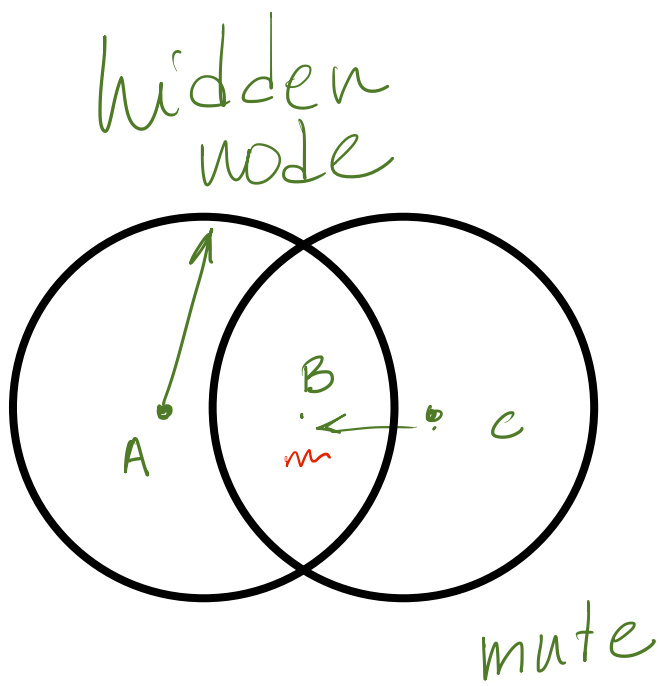
Why not CSMA/CD?



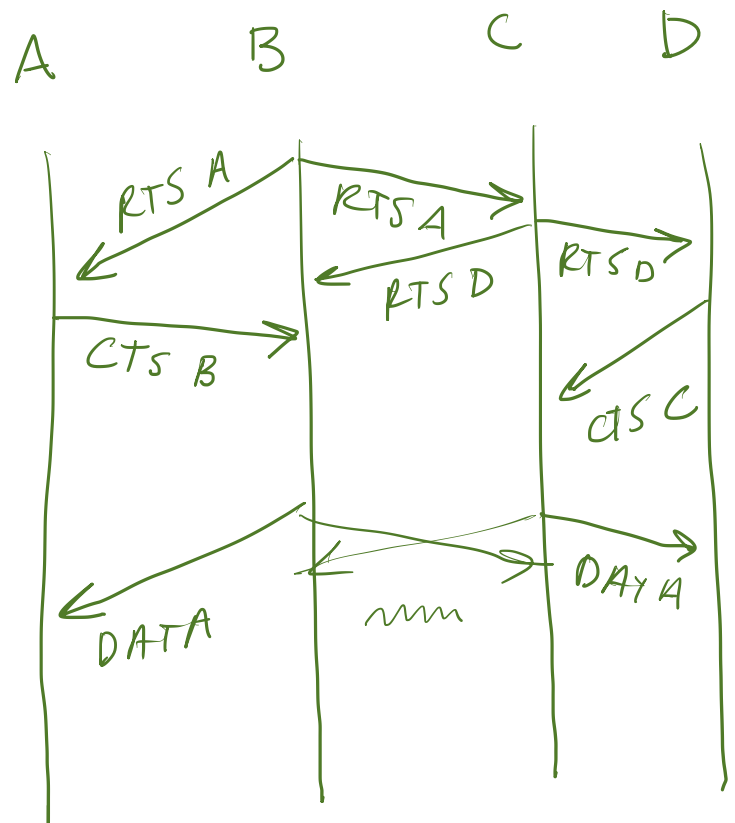
hidden
node



exposed
node



exposed node



if X
hears CTS X
& no other
CTS

Rule : X may transmit

802.11 MAC

PCF (Point Coordinatⁿ Fun)
Abandoned

DCF (Distributed Coordinatⁿ Fun)

IFS time slot
(Inter Frame Spacing)

DIFS
Dist.

SIFS
short

$2 \times \text{IFS} + \text{SIFS}$

1
2

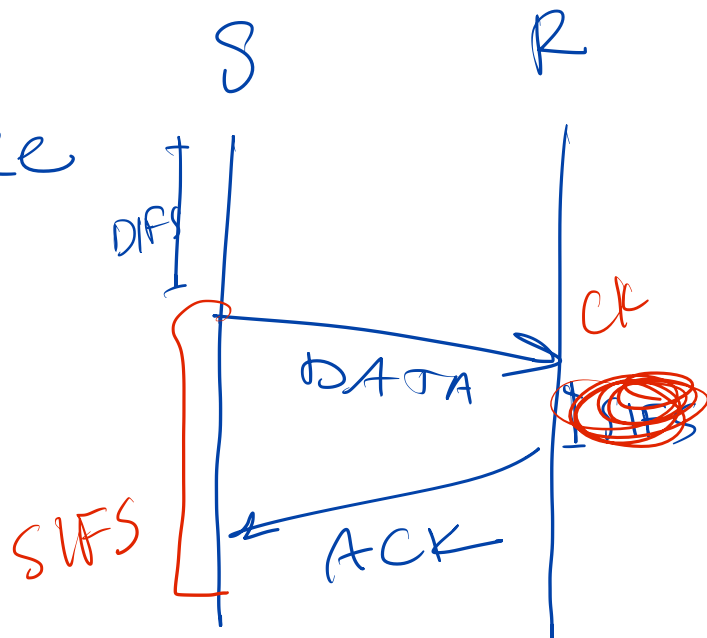
DCF Sender

if ch. is NOT busy

wait DIFS

if still free

send DATA
wait SIFS
recv ACK



if busy initially or

during DIFS:

BACKOFF

BACK OFF (high level)

- wait until current transmission is over

- wait DIFS

choose r (unif at random)

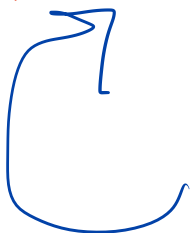
start timer at r
(countdown)

if medium free at end
of countdown $\rightarrow$ transmit

until timer expires

if medium goes busy

freeze timer, wait DIFS



specifically

choose $r \in (0, cw]$

↑
contention
window

while $r > 0$

if med is free
for one slot time

$r \leftarrow r - 1$

xmit when $r = 0$

IFS

SIFS

DIFS

802.11 Header

2	2	6	6	6	2	6	22c / SNAP	4
Frame Control	Duration / ID	A 1	A 2	A 3	seq ctrl	A 4	DATA	FCS

0-2304

2	2	4	1	1	1	1	1	1	1	1
ver	type	sub type	to DS	fr DS	More Frag	Re-Try	Pwr Mgt	More Data	WEP	Res

0 Mgt

1 Control

2 Data

0000 Assoc Req

0001 Assoc Resp

1100 CTS 1011 RTS

1101 ACK 1000 Beacon

To DS	From DS	A 1	A 2	A 3	A 4
----------	------------	--------	--------	--------	--------

0	0	DA	SA	BSSID	X
---	---	----	----	-------	---

0	1	DA	BSSID	SA	X
---	---	----	-------	----	---

1	0	BSSID	SA	DA	X
---	---	-------	----	----	---

1	1	RA	TA	DA	SA
---	---	----	----	----	----

DA : Dest Addr SA : src Address

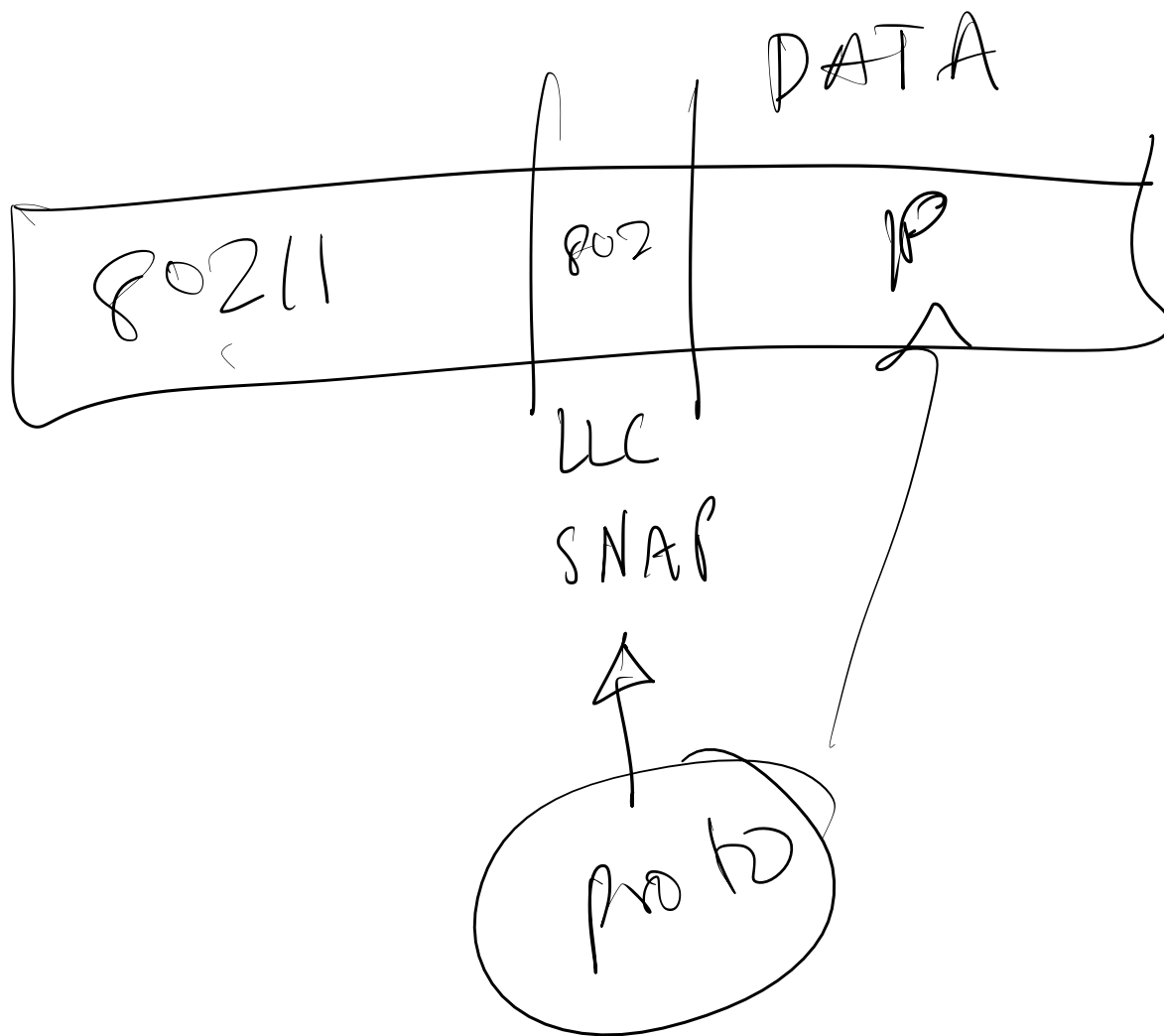
BSSID : AP MAC Addr (random in ad-hoc)

RA : next hop receiver

TA : this hop xmitter

LLC/SNAP encapsulation

802.2



SM

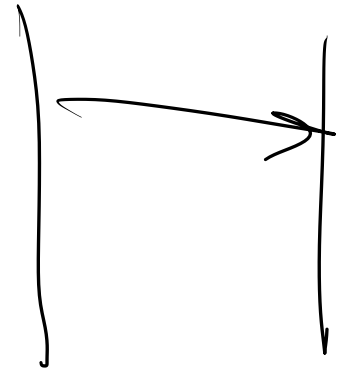
M



? if
FCS
fails

M

8

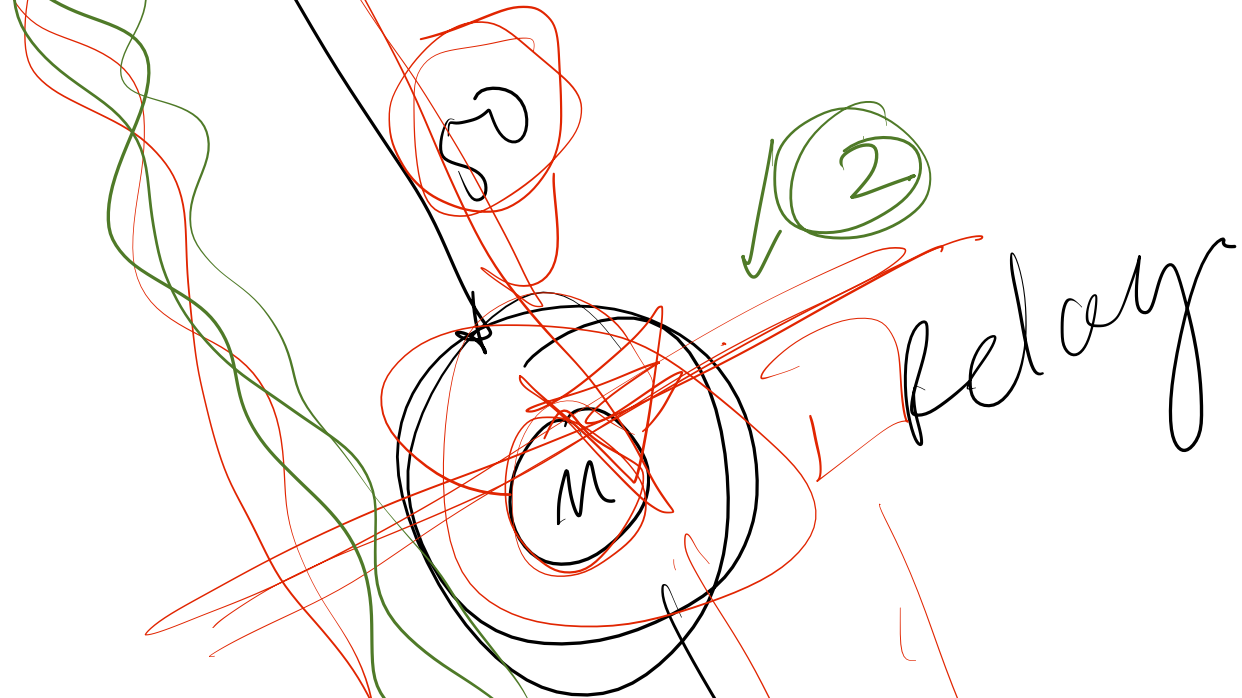


S

M



$$\text{time} = \frac{100}{s} \quad p$$



1000

