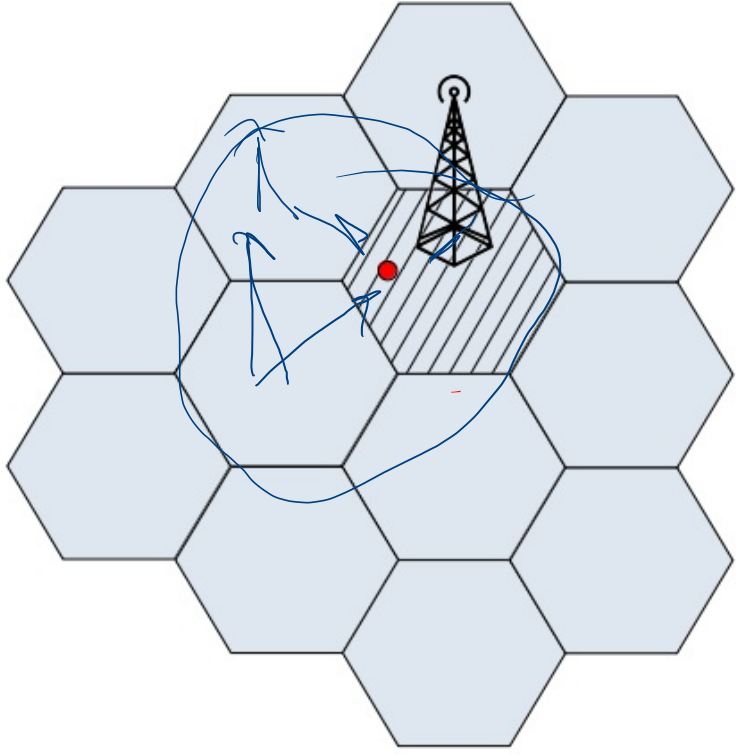
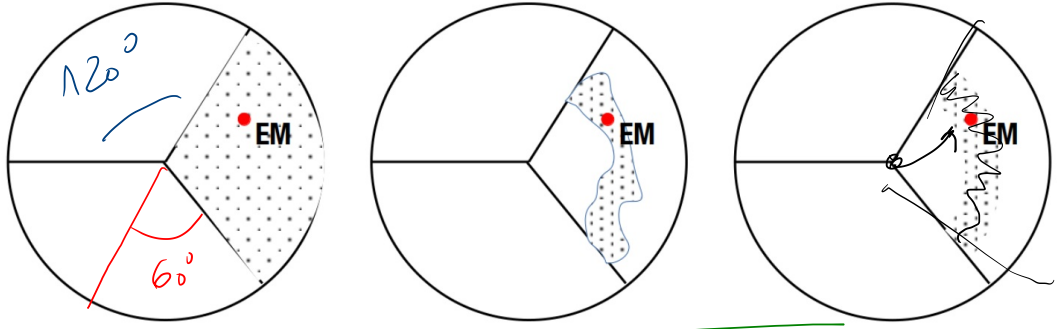
De oportunidad

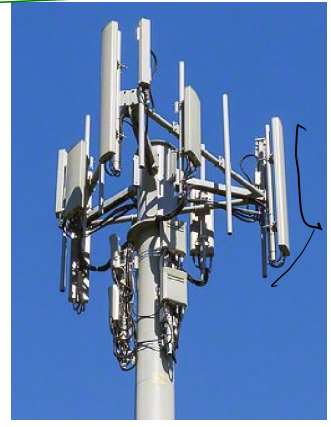
En interiores

Redes Celulares: Cell ID



Redes Celulares: Cell ID





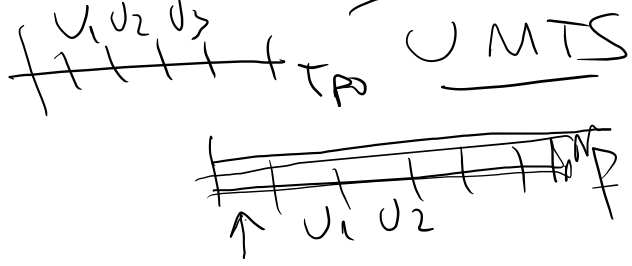
to prop. AJUSTE TOA

Tiempo de AVANCE

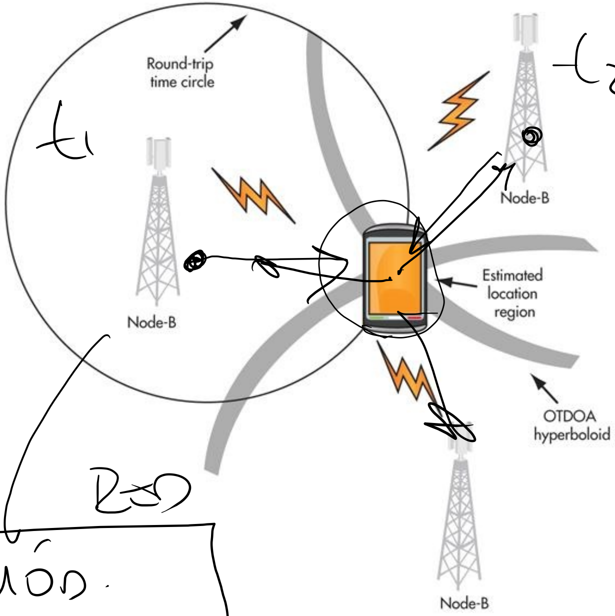
GSM

ROOM TDMA

UMTS



Redes Celulares: TDOA



OBSERVED TD

GSM

911

SINCRONIZ.

$t_1 - t_2$

34 EB

Pseudo aleat.

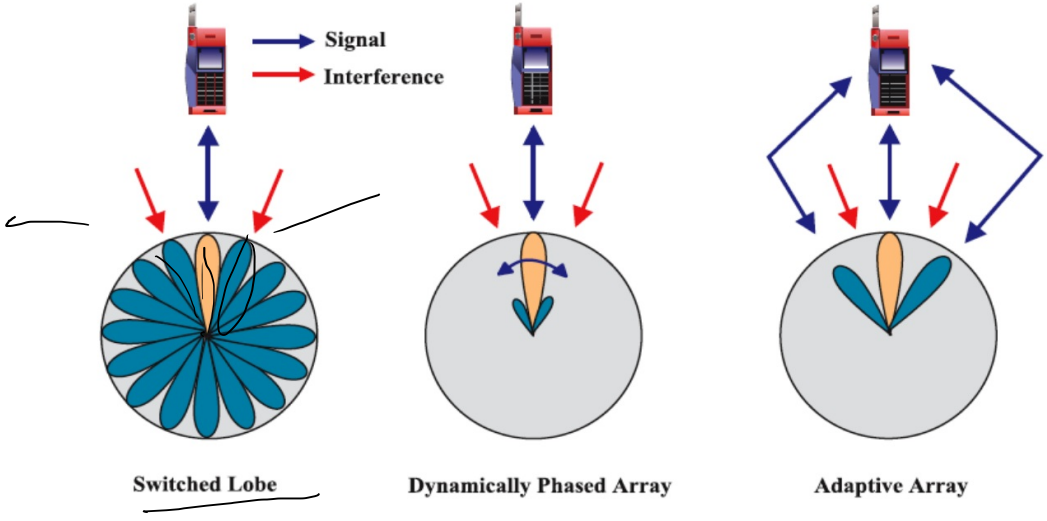
MÓD. UBICAC.

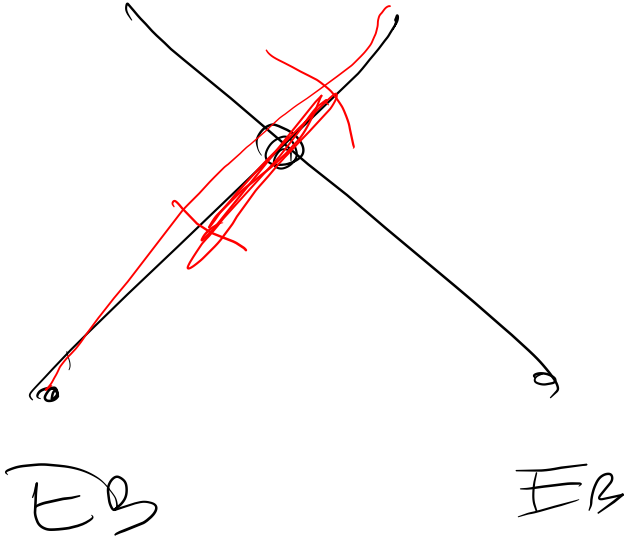
RED

LBS

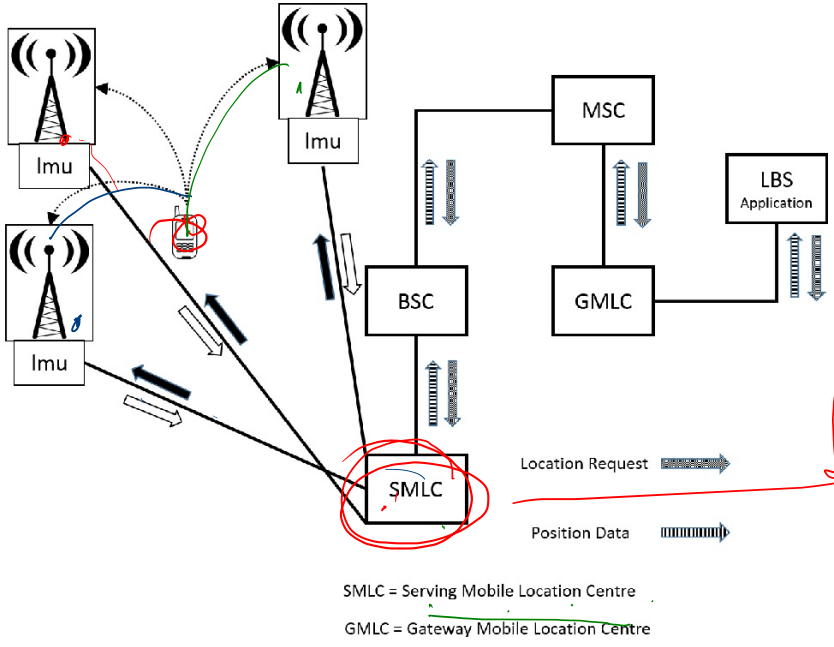
LOCATION BASED SERVICES

Redes Celulares: Ángulo de arribo

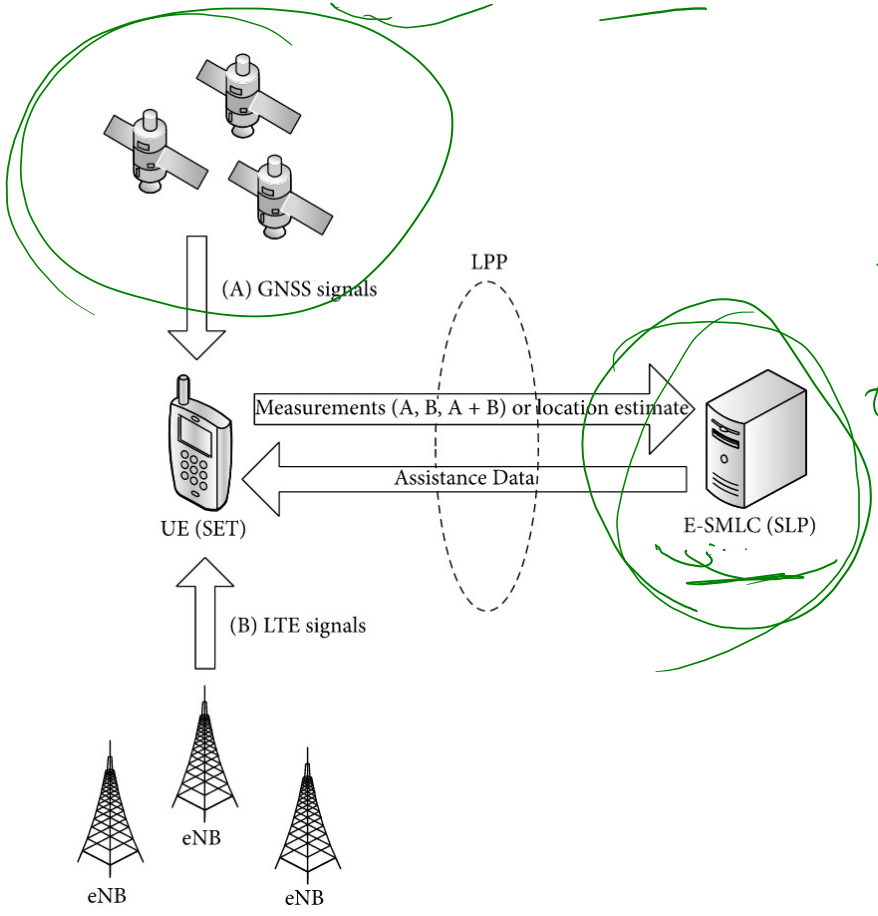




Redes Celulares: Potencia recibida



Redes Celulares: LTE 46 56



4 localiz.

E-CELLID —

oTDOA —

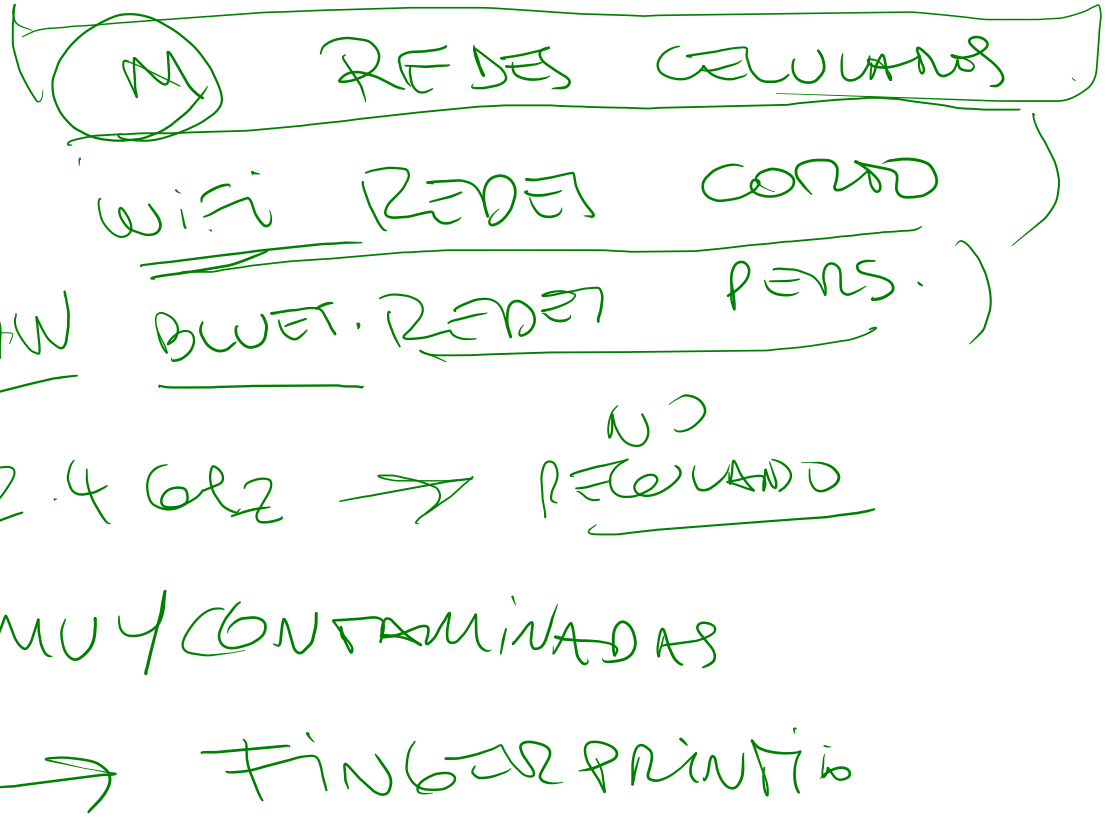
-TDOA —

Pos. —

A. GPS —

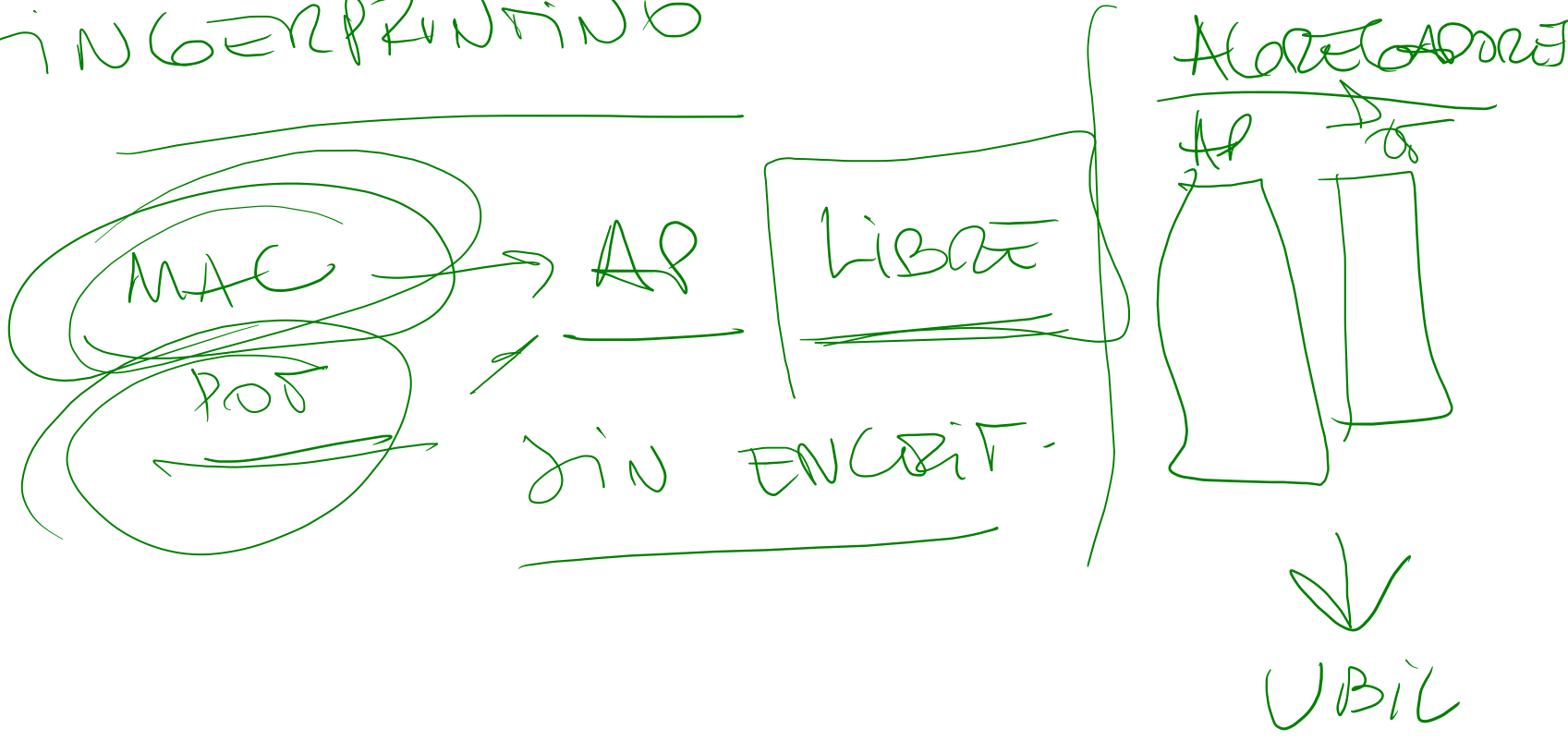
Redes de corto alcance

- Baja potencia
- Interiores
- Sin Licencia

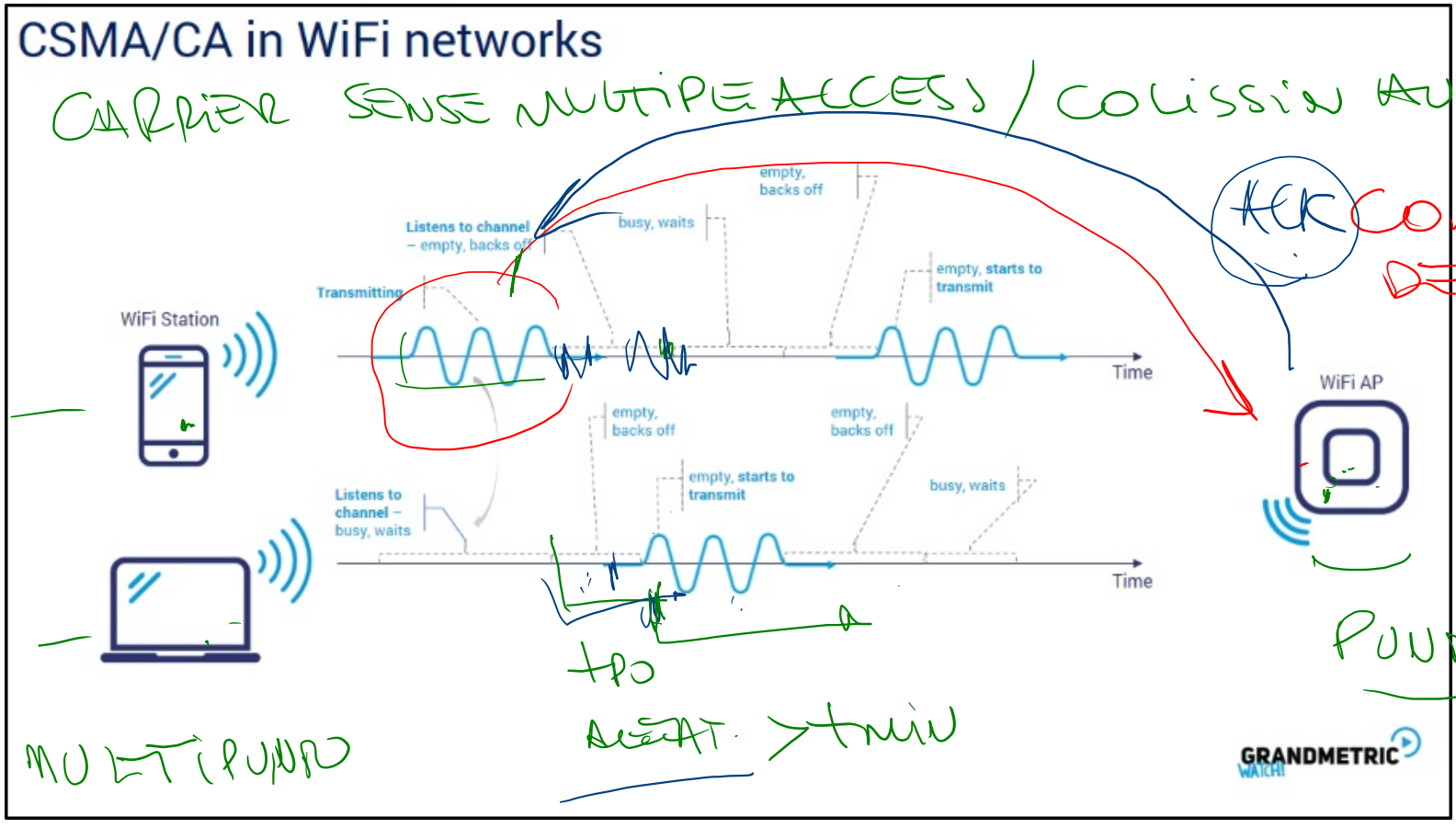


wifi

FINGERPRINTING



WLAN: TOA

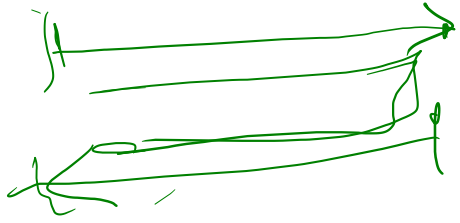

CSMA/CA in WiFi networks
CARRIER SENSE MULTIPLE ACCESS / COLLISION AVOIDANCE
RTS CTS CONTROL DE FLUJO
WiFi Station
Transmitting
Listens to channel – empty, backs off
busy, waits
empty, backs off
empty, starts to transmit
Time
empty, backs off
empty, backs off
empty, starts to transmit
busy, waits
Listens to channel – busy, waits
Time
WiFi AP
PUNTO
tpo
MULTIPUNTO
GRANDMETRIC

UNIDIRECCIONAL → TOA → AJUSTE A1-M

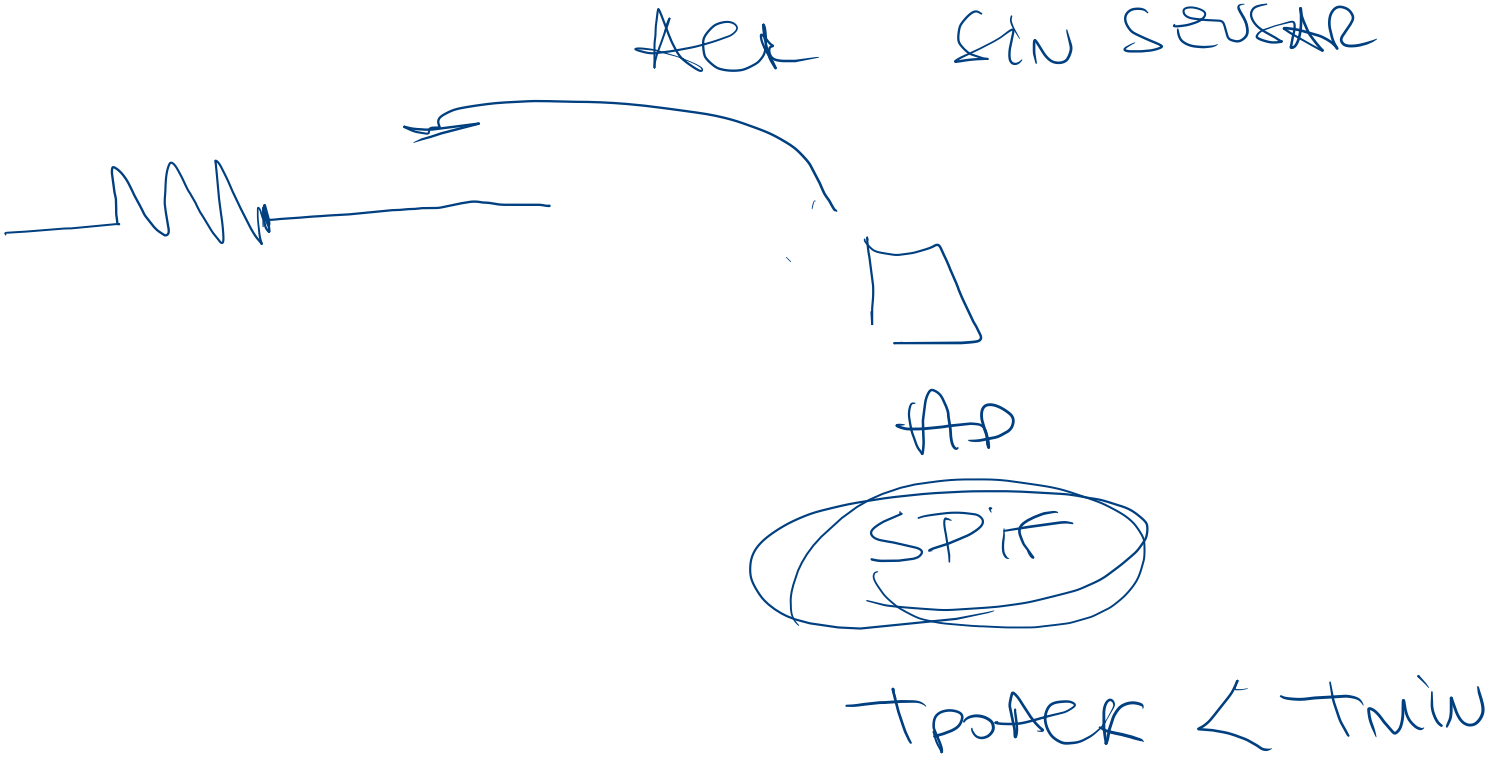
~ INS

BIDIRECCIONAL

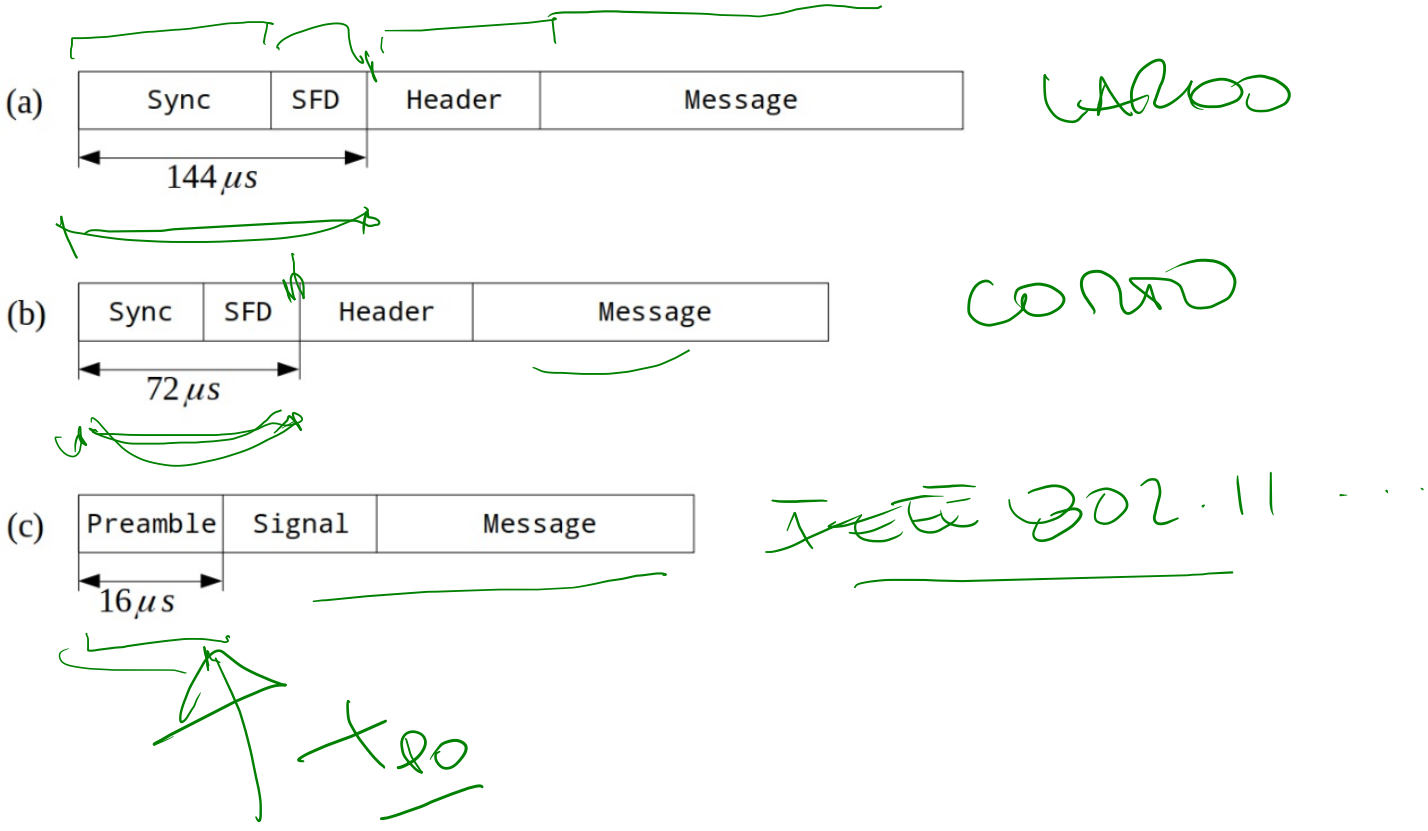
500 m



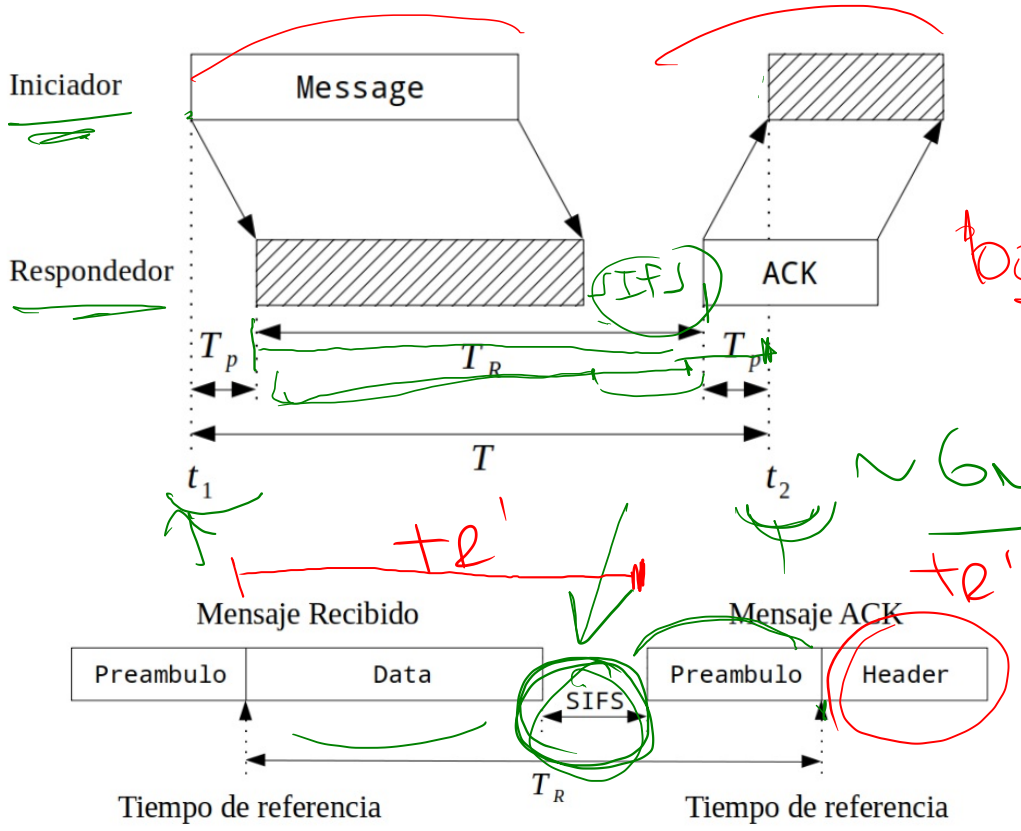
+ o (-) ERRORES comunes


AP
SPIF

WLAN: WiFi


(a)
Sync
SFD
Header
Message
144 μs
(b)
Sync
SFD
Header
Message
72 μs
(c)
Preamble
Signal
Message
16 μs

WiFi TOA



~ ns → ~ 1m

$t_1 - t_2 = t_p + T_R + t_p$

boucle

$t_p = \frac{1}{2}\left[(t_1 - t_2) - T_R\right]$

~ 6m

t_R'

t_R'

$c\,t_p = d$

$t_R = T_M + SIFS + T_p$

40 ns

MEJORA 1: EL RECEPTOR MANDE TR

USUARIO AMIGO

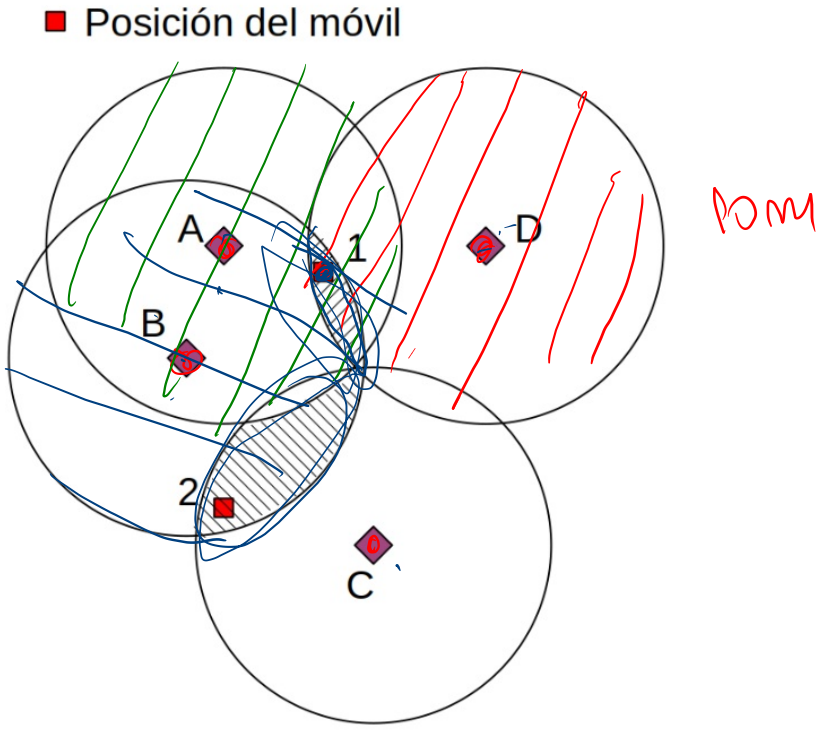
MEJORA 2: PROMEDIAR VARIAS MEDIDAS

QUIEN

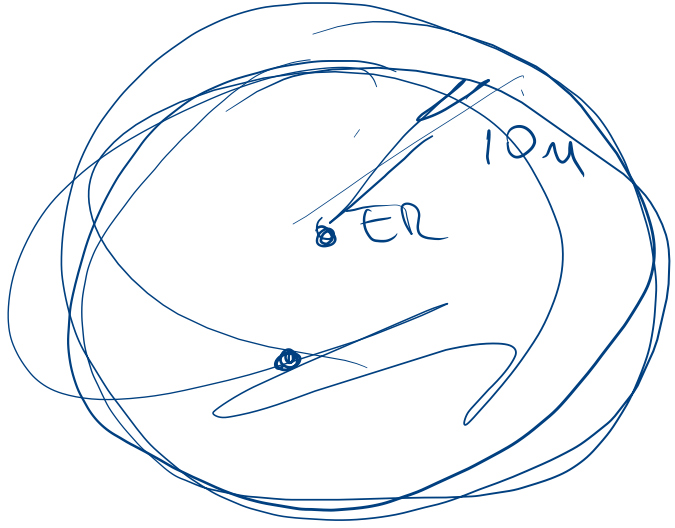
WPAN: Bluetooth

10 m

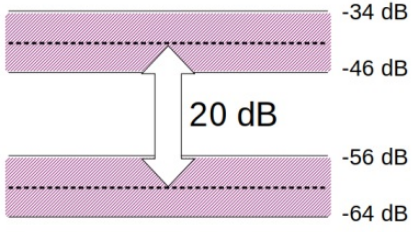
A, B, C, D → ER BT.

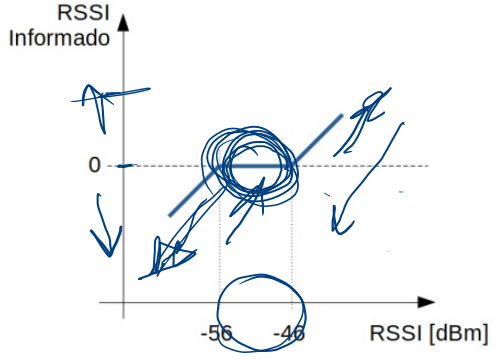


10m



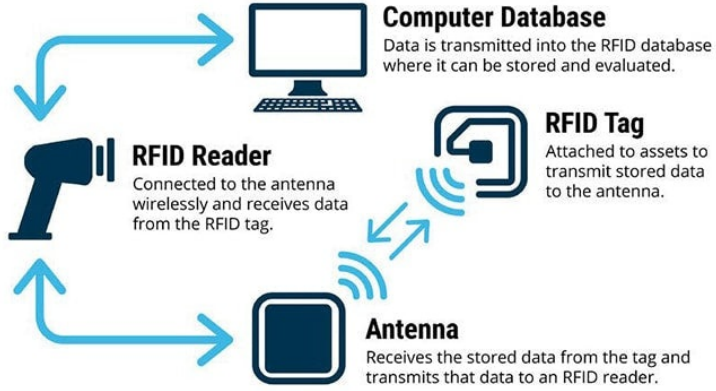
WPAN: Bluetooth RSSI





RFID RADIO FREQUENCY IDENTIFICATION

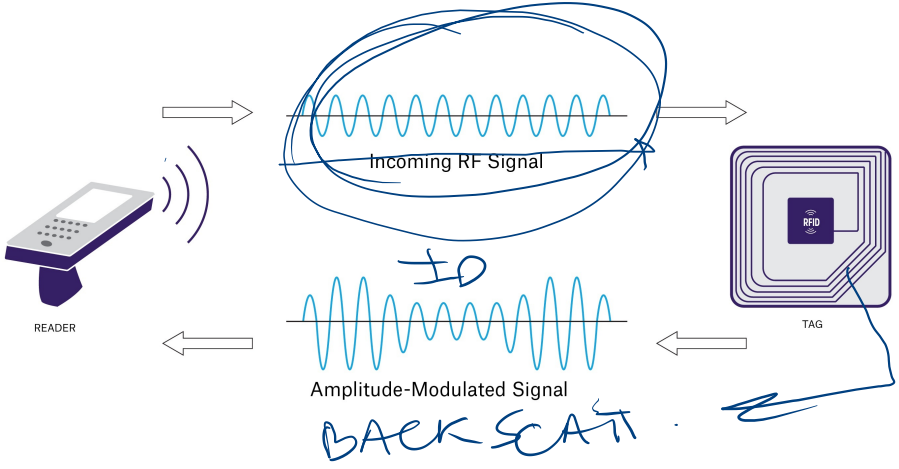
NFC



ACTIVOS (BAT)

PASIVOS

ALIMENTACIÓN



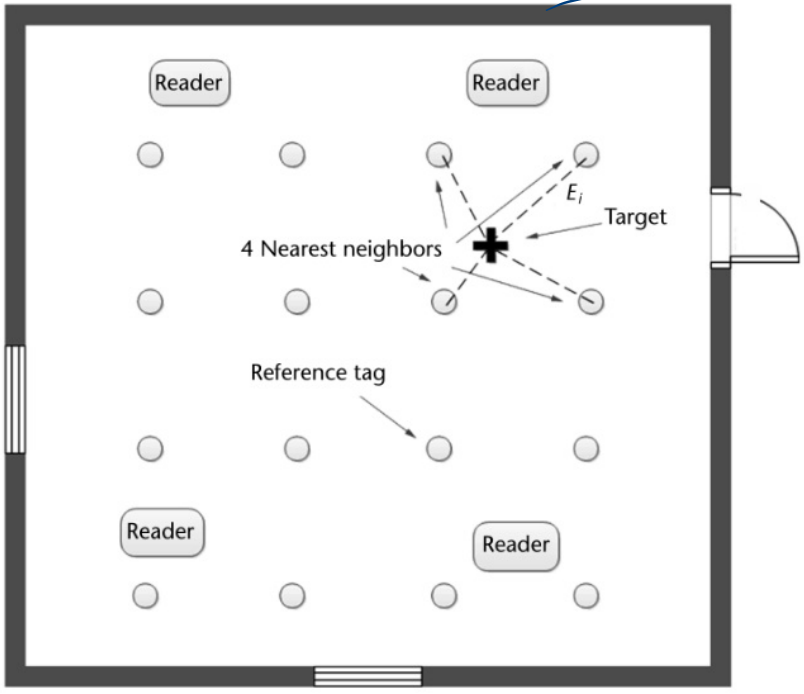
ID

2.

BACKSCATT.

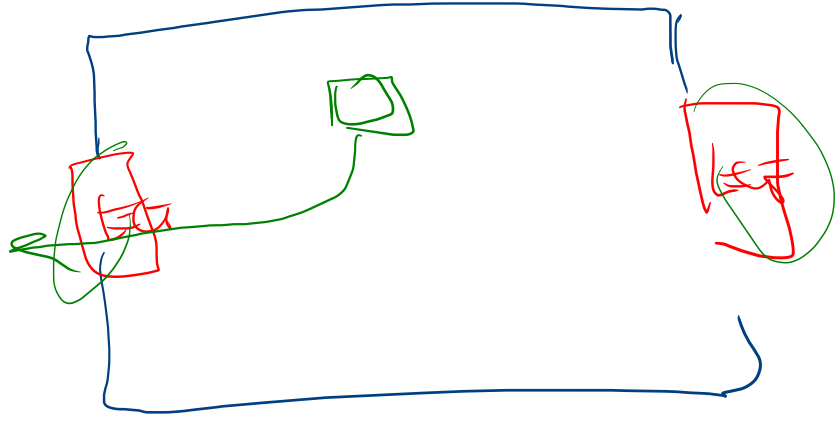
RFID

LANDMARC



13MHz → ~1 m

2.4 GHz → ~5 m



SEGUIMIENTO ACTIVO