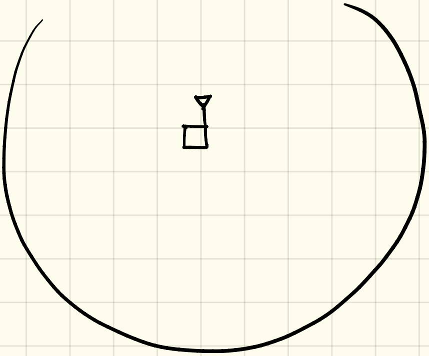
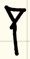


How to measure range, r?

1. Time
   ↳ Hard w/o time sync. and WiFi AP location

2. From power of

- Power of transmitted and received signal



Received power at any distance 'r' decays as

Why?

Because around the antenna is ... and every on the sphere should have equal received power (since).

Thus, P_r =

- But with multipath/echo, P_r becomes more complicated

Delayed copies adding up.

P_R =

→ $\alpha = 2$ in deep space
$\alpha \approx 2.75$ in soccer stadium }
$\alpha \approx 3.1$ in apartment room }
α will vary

→ Also, LoS path not easy to pull out since its a continuous mixture

⇓

This motivates WiFi RADAR

→ But received signal can be modeled as

$$y = x_{LoS} +$$

$$y =$$

Often called channel or impulse response (RIR)

↓

CIR is a fn of

This opens 2 opportunities

1. Estimate CIR 'h' and use it as a

2. Estimate the of CIR and that should be the

→ Note in reality : $y =$

Freq. domain: $Y = HX + N$

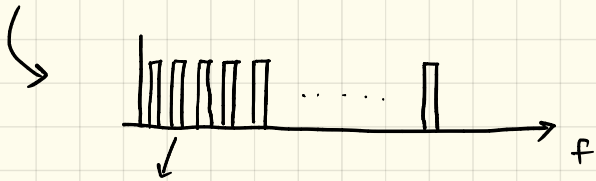
$\therefore \quad \hat{H} =$

$\hat{h} =$

→ $\hat{h}$ fingerprinting still needs

↳ Also, environment changes modify h.

But WiFi system use wide bandwidth (20MHz) using methods



This means $(\hat{h}_{sub_i})$ and fingerprint = [ ]

With 3 WiFi APs,

↳ dimensional space

↳ More opportunity for or

→ Los power technique needs to know and ... and also erroneous,

↳ However, not needed