

# 1 Introduction.

通信标准, Lte, 5G, Wi-Fi, Bluetooth, NFC.  
(4G)

长距离: 电离层反射 (早期) = 电报

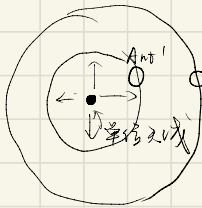
发射至高轨卫星转发 (> 5万公里, 过高). (星链).

地面基站 ...

## 2

• Path Loss.

includes  
average  
shadowing



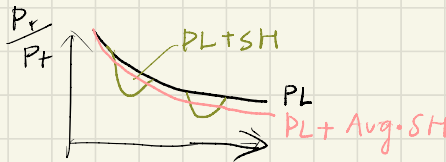
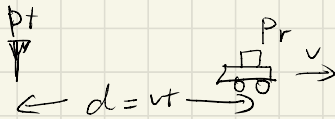
$Rx \text{ Power of Ant}^2 < Rx \text{ Power of Ant}^1$

各向均匀传播

EM wave encounters an obstacle

Reflection 反射  
 Diffraction 衍射  
 Scattering 散射  
 Absorption 吸收

• Shadowing (due to obstructions)



• Multipath Fading