SEMINAR

TEAM 1: SYSTEM PARAMETERS

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SYSTEM PARAMETERS

Received signal power: Pr = (Pt, Gr, Gt, Lp)
Received Sensivity: Sr = (Es/N0, kT0; Rs, F, Lr)
Signal to Noise: SNR = (*Pt, Gr,* Gt, *kT0,* BW, F, Lp,Lr)
Energy per bit to noise: Es/N0 = (SNR, BW, N0, Rs)
...

Pr: received power
Pt: Transmitted power;
Gr; Gt: Antenna Gains
Lp: Path loss
kT0: (1.38.10-23 ws/k)*(290K)
Rs: Symbol rate
F: Noise figure
BW: Bandwidth
Lr: Implementation loss (2-3 dB)

- *Received Signal Power:* Pr = (Pt ·Gr · Gt) / (Lp. Lr)
- *Signal-to-Noise Ratio:* SNR= (Pt . Gr ·Gt) / (kT0 ·BW ·F ·Lp ·Lr)
- *Ratio of signal energy to noise power spectral density:* Es/N0 =SNR.·(BW/Rs) = (Pt . Gr . Gt) / (kT0 .·Rs .·F . Lp . Lr)
- *Receiver Sensitivity:* SR = (Es/N0) .·kT0. Rs . F . Lr
- *Radiation pattern:* See "AntennaPattern.pdf"

TEAM 2: FADING

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FADING

Slow fading effects: Lb(d) = (L(d), σ (x,y))
Fast fading effectis: Lb (d) = (L(d), σ (x,y), R(x,y))
L(d) = L0 + 10n log d
...

L(d): Loss distance d
σ (x,y): Gaussian random variable
R(x,y): Rayleigh random variable

- See: http://www.mathworks.se/help/comm/ug/fading-channels.html

TEAM 3: PATH LOSS & CELL SIZE

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PATH LOSS & CELL SIZE

Path loss (Free s): Lp = (4π, d, λ) =(4π, d, fc, c)
Okumura-hata model: Lp = (f, hm, hb, d)

(Cell) Efficiency = (Nc, BW, Ac)

...

d: distance
λ: wavelength
Fc: Frequency
C: light speed
Nc: Number of channels per cell
BW: Bandwidth
Ac: Area of cell.
hb: Height of base station Antenna
hm: Height of mobile station Antenna
f: Frequency of Transmission

- *Free Space:* $Lp = (4\pi d/\lambda)^2 = (4\pi df/c)^2$
- *Hata Model for Urban Areas:* $Lpu = 69.55 + 26.16 \log f - 13.82 \log hb - Ch + (44.9 - 6.55 \log hb) \log d$
- *Hata Model for Suburban Areas:* $Lpsu = Lpu - 2 (\log (f/28))^2 - 5.4$
- *Hata Model for Open Areas:* $Lpo = Lpu - 4.78(\log f)^2 + 18.33 \log f - 40.94$
- See: http://www.mathworks.com/matlabcentral/fileexchange/2096-rf-wave-toolbox/content/RFWave/hata.m

- Cell range versus cell edge throughput, See: cells.pdf

TEAM 4: PATH CHANGES & MOBILITY

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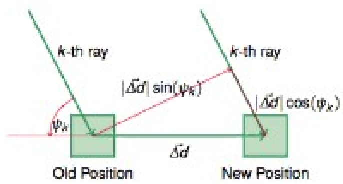
PATH CHANGES & MOBILITY

If a mobile constant velocity:
|Δd| = vt
$\Delta\phi k (t) = -2\pi v/\lambda c.\cos(\psi k)t = -2\pi v/c.fc.\cos(\psi k)t$
...

|Δd|: distance between old and new position
v: velocity of the mobile
Δϕk (t): phase



- *Path-Changes Induced by Mobility,* See: Mobility.pdf (page 41-47)