**OKUMURA HATA MODEL (ORIGINAL)**



***a(hMS):***parameter related to the height of MS (negligible)

***Applicability range:***R>1km, hBS>30m, 150MHz<f<1500MHz(then extended to 2GHz)

**2G (GSM) Simulator**

**Simulator Parameters**

**Number of Snapshots**

snapshots = xxx;

**Number of Snapshots between two new MS deployments**

MS\_update = 10;

**Antennas Parameters**

Ptmax\_BS = 10; % BS Max TX Power (Watts)

Ptmin\_BS = 0.01; % BS Min TX Power (Watts)

Ptmax\_BS\_dBm = (10\*log10(Ptmax\_BS))+30; % BS Max TX Power (dBm)

Ptmin\_BS\_dBm = (10\*log10(Ptmin\_BS))+30; % BS Min TX Power (dBm)

Ptmax\_MS = 2; % MS Max TX Power (Watts)

Ptmin\_MS = 0.00002; % MS Min TX Power (Watts)

Ptmax\_MS\_dBm = (10\*log10(Ptmax\_MS))+30; % MS Max TX Power (dBm)

Ptmin\_MS\_dBm = (10\*log10(Ptmin\_MS))+30; % MS Min TX Power (dBm)

Prmin\_BS\_dBm = -104; % BS Sensitivity (dBm)

Prmin\_MS\_dBm = -102; % MS Sensitivity (dBm)

hBS = 30; % BS height (meters)

fc = 1800; % Carrier Frequency (MHz)

**Noise Figures**

F\_BS\_dB = 5; % BS noise figure (dB)

F\_MS\_dB = 10; % MS noise figure (dB)

F\_BS = 10^(F\_BS\_dB/10); % BS noise figure

F\_MS = 10^(F\_MS\_dB/10); % MS noise figure

**Propagation Parameters**

sigmadB = 8; % Shadowing St. Dev

Pcov = 0.95; % Coverage Probability

**Shadowing (Slow fading) Margin (dB)**

Mf\_dB = sigmadB\*sqrt(2)\*erfinv(2\*Pcov-1);

**Maximum Path Loss (dB)**

Lmax = min(Ptmax\_MS\_dBm - (Prmin\_BS\_dBm + Mf\_dB),Ptmax\_BS\_dBm - (Prmin\_MS\_dBm + Mf\_dB));

**Original Okumura Model -> Cell Radius (meters)**

R = round((10^((Lmax-69.55-26.16\*log10(fc)+13.82\*log10(hBS))/(44.9-6.55\*log10(hBS))))\*1000);

**Network Parameters**

K = 7; % Cluster Size (3 or 7)

N\_MSe = 12750; % Estimated Number of MS in the service area

Pcall\_average = 1.0; % Average call probability

Pcall\_StDev = 0.00; % Call probability standard deviation

p\_DL = 0.5; % Probability of Downlink State

p\_UL = 0.5; % Probability of Uplink State

Rb = 271e3; % Bitrate (bit/s)

**Power Control Parameters**

PCmargin\_dB = xx; % Power Control Margin(dB)

delta = xx; % Delta [0,1]

**Total number of Radio Resource Units available to the operator**

N\_RU = 700;

**Outage Thresholds**

SNR\_Out\_Thr\_DL = computeSNR(Prmin\_MS\_dBm,F\_MS,Rb) + 3; % Outage SNR Downlink(dB)

SNR\_Out\_Thr\_UL = computeSNR(Prmin\_BS\_dBm,F\_BS,Rb) + 3; % Outage SNR Uplink(dB)

SIR\_Out\_Thr = 10; % Outage SIR (dB)

**Forced Termination Thresholds**

SNR\_FT\_Thr\_DL = computeSNR(Prmin\_MS\_dBm,F\_MS,Rb) - 3; % FT SNR Downlink (dB)

SNR\_FT\_Thr\_UL = computeSNR(Prmin\_BS\_dBm,F\_BS,Rb) - 3; % FT SNR Uplink (dB)

SIR\_FT\_Thr = 5; % FT SIR (dB)