Random Users Submenu

Until now the user has already set the Manhattan Environment, the Topology Parameters, the User Parameters and the UEs coordinates. At this case all UEs are assumed to be static, and each UE is supposed to have its own coordinates. The "Random Users submenu" (Figure 1) gives the user the possibility to watch some graphics (results) with the topology and parameters that have been selected.

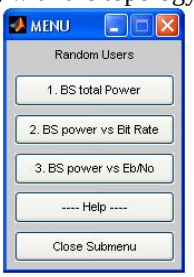

Figure 1: Random Users Submenu

BS total Power

By clicking the first button of the "Random Users submenu", the user can see the Examined BS total power. Two new figures appear. The first, called "Manhattan Grid Environment", presents the topology and the points where the UEs have been placed.

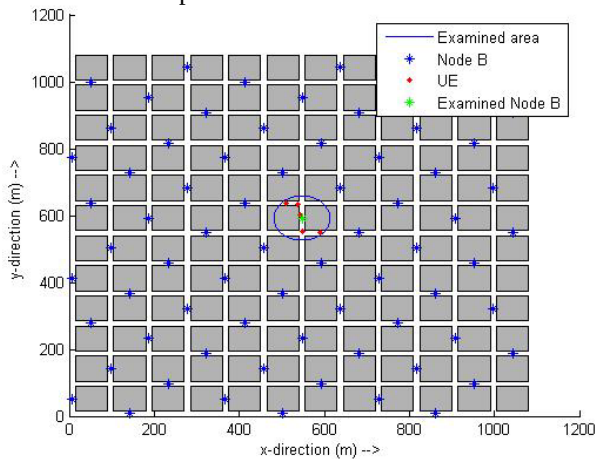

Figure 2: Manhattan Grid Environment (Node Bs, UEs and Active Node B)

The above figure appears every time a button from the "Random Users Submenu" is clicked, so we won't go over it again.

The second figure, called "Parameters And Results Display", is a message box that shows the values of all parameters that the user has selected and the results derived from the above selections.

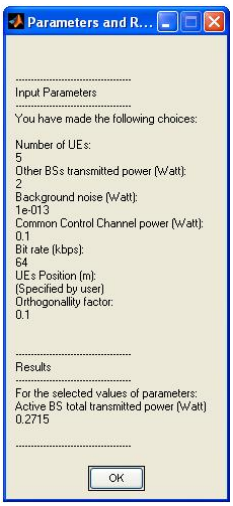

Figure 3: Parameters And Results Display

The above figure appears every time a button from the "Random Users Submenu" is clicked, having however different results, so we won't go over it again.

BS power vs Bit Rate

By clicking the second button of the "Random Users submenu" (Figure 1), the user can examine how the BS total power changes with different Bit Rates. Three new figures appear. The first, called "Manhattan Grid Environment", presents the topology and the points where the UEs have been placed (same as Figure 2).

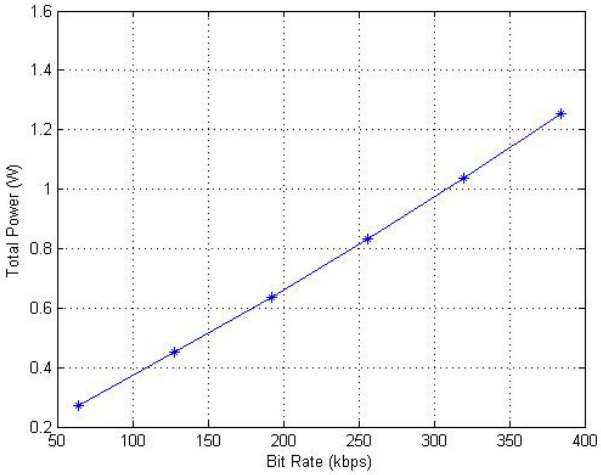

Figure 4: BS total transmission power vs Bit Rate

The second figure (Figure 4), called "BS total transmission power vs Bit Rate", examines how the total transmission power of the examined Node B changes with different Bit Rates. The program assumes that all the UEs have the same Bit Rate demand. This figure shows how the total transmission power of the Examined Node B changes, while the Bit Rate takes the value 64, 128, 192, 256, 320, 384 Kbps. The x-axis of the figure shows the Bit Rate in Kbps, while the y-axis shows the corresponding total transmission power of the Examined Node B in Watts.

The third figure, called "Parameters And Results Display", is a message box that shows the values of all parameters that the user has selected and the results derived from the above selections (same as Figure 3).

BS power vs Eb/No

By clicking the third button of the "Random Users submenu" (Figure 1), the user can examine how the BS total power changes with different Eb/No. Three new figures appear. The first, called "Manhattan Grid Environment", presents the topology and the points where the UEs have been placed (same as Figure 2).

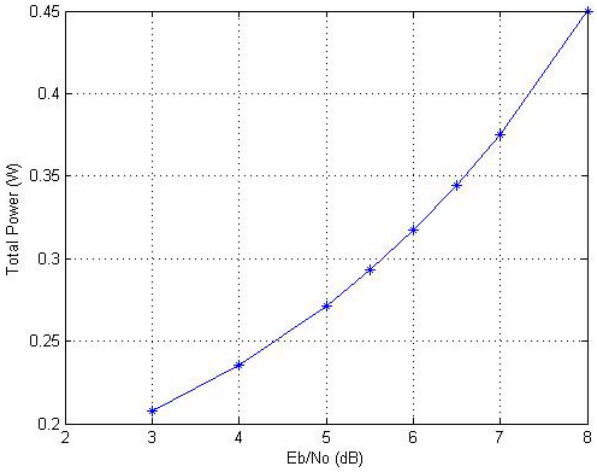

Figure 5: BS total transmission power vs Eb/No

The second figure (Figure 5), called "BS total transmission power vs Eb/No", examines how the total transmission power of the Examined Node B changes with different Eb/No. The program assumes that all the UEs experience the same Eb/No. This figure shows how the total transmission power of the Examined Node B changes, while Eb/No takes the value 3, 4, 5, 5.5, 6, 6.5, 7, 8 dB. The x-axis of the

figure shows the Eb/No in dB, while the y-axis shows the corresponding total transmission power of the Examined Node B in Watts.
The third figure, called "Parameters And Results Display", is a message box that shows the values of all parameters that the user has selected and the results derived from the above selections (same as Figure 3).

Help (Adobe Acrobat required)

Clicking this button opens this manual.

Close Submenu

Clicking this button closes the "Random Users submenu" and returns to "UE Topology submenu".

Figures and Results Explanation*

The program calculates the Node B's total transmission power, when a number of n MBMS users who are residing in the above mentioned Node B use DCH. In that case the Node B's total transmission power is calculated as follows:

$$P_T = \frac{P_P + \sum_{i=1}^{n} \frac{(P_N + x_i)}{W} L_{p,i}}{1 - \sum_{i=1}^{n} \frac{p}{\frac{W}{(E_b/N_o)_i R_{b,i}} + p}} \frac{}{} + p \qquad \textbf{Eq. 1}$$

where P_T is the total transmission power for all the DCH users in the cell, P_P is the power devoted to common control channels, $L_{p,i}$ refers to the path loss for user *i*, $R_{b,i}$ the bit rate for user *i*, *W* the bandwidth, P_N the background noise, *p* the orthogonality factor and $(E_b/N_o)_i$ is the signal energy per bit divided by noise spectral density. Parameter x_i is the intercell interference observed by user *i* given as a function of the transmitted power by the neighbouring cells P_{Tj}, *j*=1,…K and the path loss from this user to the *j*th cell L_{ij}. More specifically:

$$x_i = \sum_{j=1}^{K} \frac{P_{Tj}}{L_{ij}} \qquad \textbf{Eq. 2}$$

From the above equations it is observed that Node B's transmission power, for the PTP case, increases when the distance between the Node B and the UEs increases. The same occurs when the bit rate of the MBMS service increases. Objective of present program is to simulate a Microcell environment (Manhattan grid environment) taking into consideration moving and non moving users. Using Eq. 1 the program calculates the transmitted power from the Node Bs that serve a number of MBMS users. By changing one of the user Parameters in Eq. 1 we examine how the total transmission power of the examined Node B changes. In the Random Users case (all UEs static but in different positions) user can examine three different cases:

- Total transmission power of the examined Node B (all other parameters constant)
- Total transmission power of the examined Node B vs Bit Rate (all other parameters constant)
- Total transmission power of the examined Node B vs Eb/No (all other parameters constant)

* Footnote: The following results have been calculated assuming: *n*=5, *Pp*=0.1W, *p*=0.1, *Pn*=1e-13W, *Eb/No*=5dB, *Rb*=64Kbps, *W*=3.84Mcps, *UE x,y-coordinate* from the topology.

BS total Power

The first figure (Figure 2), called “Manhattan Grid Environment”, presents the topology and the points where the UEs have been placed. Substantially, it is a graphic representation of the topology the user has created, consequently, it is not essential to be further analyzed.
The second figure (Figure 3), called “Parameters And Results Display”, is a message box that shows the values of all parameters that the user has selected and the results derived from the above selections.

BS power vs Bit Rate

The first figure (same as Figure 2), called “Manhattan Grid Environment”, is a graphic representation of the topology the user has created.
The second figure (Figure 4), called “BS total transmission power vs Bit Rate”, examines how the total transmission power of the active Node B changes with the Bit Rate. This figure shows how the total transmission power of the active Node B changes, while the Bit Rate takes the value 64, 128, 192, 256, 320, 384 Kbps. Substantially, it is graphic representation of the total transmission power calculated by Eq. 1, where the Bit Rate takes these values. As expected, the total transmission power of the Examined Node B increases when the Bit rate demand increases. Referring to (Figure 4), the Examined Node B total transmission power was calculated:

- For 64 Kbps bit rate, BS total transmission power = 0.2715 Watt,
- For 128 Kbps bit rate, BS total transmission power = 0.4505 Watt,
- For 192 Kbps bit rate, BS total transmission power = 0.6376 Watt,
- For 256 Kbps bit rate, BS total transmission power = 0.8334 Watt,
- For 320 Kbps bit rate, BS total transmission power = 1.0383 Watt,
- For 384 Kbps bit rate, BS total transmission power = 1.2531 Watt.

It is worth mentioning that the above values may change if one of the parameters in Eq. 1 changes (see the Footnote at page 3). However, in order to change one of the parameters the user has to return to a previous submenu (“Manhattan Environment Simulation menu” or “UEs Topology submenu”).
The third figure (same as Figure 3), called “Parameters And Results Display”, is a message box that shows the values of all parameters that the user has selected and the results derived from the above selections.

BS power vs Eb/No

The first figure (same as Figure 2), called “Manhattan Grid Environment”, is a graphic representation of the topology the user has created.
The second figure (Figure 5), called “BS total transmission power vs Eb/No”, examines how the total transmission power of the active Node B changes with the Eb/No. This figure shows how the total transmission power of the active Node B changes, while Eb/No takes the value 3, 4, 5, 5.5, 6, 6.5, 7, 8 dB. Substantially, it is graphic representation of the total transmission power calculated by Eq. 1, where the Eb/No takes these values. As expected, the total transmission power of the Examined Node B increases when the Eb/No increases. Referring to (Figure 5), the Examined Node B total transmission power was calculated:

- For 3 dB Eb/No, BS total transmission power = 0.2074 Watt,
- For 4 dB Eb/No, BS total transmission power = 0.2356 Watt,
- For 5 dB Eb/No, BS total transmission power = 0.2715 Watt,
- For 5.5 dB Eb/No BS total transmission power = 0.2929 Watt,
- For 6 dB Eb/No, BS total transmission power = 0.3171 Watt,
- For 6.5 dB Eb/No BS total transmission power = 0.3444 Watt,
- For 7 dB Eb/No BS total transmission power = 0.3753 Watt,
- For 8 dB Eb/No BS total transmission power = 0.4497 Watt.

It is worth mentioning that the above values may change if one of the parameters in Eq. 1 changes (see the Footnote at page 3). However, in order to change one of the parameters the user has to return to a previous submenu (“Manhattan Environment Simulation menu” or “UEs Topology submenu”).
The third figure (same as Figure 3), called “Parameters And Results Display”, is a message box that shows the values of all parameters that the user has selected and the results derived from the above selections.