S72-238 WCDMA systems

Tutorial 3   1.02.2002.

Exercises

1.

DS-CDMA system has spreading code rate 3.84 $\frac{Mchip}{s}$. User data rate is 15 $\frac{kbit}{s}$. How many users can one cell serve when the required level of performance requires SIR 9 dB.

2.

The spread symbol rate is 3.84 $\frac{Mchip}{s}$. The user data rate 15 $\frac{kbit}{s}$ is spread by error correction code to 30 $\frac{kbit}{s}$. For final spreading is used Walsh code. Each user should have a unique Walsh code. How many users can be admitted into the system when:
a) The target SIR is 10 dB and other-cell relative interference factor is 0.6.
b) The target SIR is 5 dB and other-cell relative interference factor is 0.6.
c) The target SIR is 5 dB and other-cell relative interference factor is 0.2.

3.

Investigate the SIR of WCDMA uplink with two users in the system. The users are at distances $d = [20 \ 55]$ m Attenuation in the channel is approximated as d^{-atten} where $atten = 4$.
a) Calculate the SIR for both users when no power control is applied and transmitted powers are $P_{tr} = [0.1 \ 0.1] \ W$

b) What are the transmitted powers when to assume an optimal power control and the SIR target for both users are 10 dB. (The transmitted powers should be in the intervals $-50 < P < 20$ dBm)
Assume that the other user interference is scaled by the spreading gain. The chip rate is 3.84 $\frac{Mchip}{s}$ and bitrate for both users is the same 15 $\frac{kbit}{s}$.

4.

In CDMA system are two users connected to different Base Stations. The distance matrix between the users and BS is:
$$\begin{bmatrix} d_{11} & d_{12} \\ d_{21} & d_{22} \end{bmatrix} = \begin{bmatrix} 20 & 40 \\ 60 & 55 \end{bmatrix}$$
Attenuation in the channel is approximated as d^{-4}.
a) Calculate SIR for both users when no power control is applied and transmission powers for users are $P = [0.1 \ 0.1] \ mW$.

b) What is the transmission power for both of users when to assume an optimal power control and the SIR target for both users is 10 dB.
Investigate the signals in uplink by assuming that the other users interference is scaled by the spreading gain, the chip rate is 3.84 $\frac{Mchip}{s}$, and bitrate for both users is same 15.

5.

How many orthogonal codes are available for the voice users with coded data rate 30 $\frac{kbit}{s}$ in CDMA uplink, if there are allocated codes for 6 data users with user data rates [130 130 130 260 260 260]. The spread chip rate is 3.84 $\frac{Mchip}{s}$.