

Received Signals under multi-cell and multi-path fading environments

$$r(t) = \sum_{l=0}^{L-1} \sum_{n=1}^{NC} A \alpha_{ln} y_n d_n(t - \tau_n - lT_c) c_n(t - \tau_n - lT_c) \exp\{j(\psi_{ln} + \phi_n)\} + n(t)$$

Correlating the desired signals to the corresponding sequences with the joint use of beamforming and Rake receivers

$$r_T = \sum_{r=0}^{R-1} \alpha_{r1} \sum_{l=0}^{L-1} \sum_{n=1}^{NC} A G_r(\theta_n, \theta_1) \alpha_{ln} y_n \cos(\psi_{ln} - \psi_{r1} + \phi_n - \phi_1) I_{n,l,r} + N_w$$

Computing the in-cell interference and modeling the total other-cell interference as Gaussian, the error probability is obtained through SIGA:

$$\sigma_\psi^2 = N(N-1)\rho G_r^2 + N \text{Var}(Z_n G_r^2) + \rho N^2 F(\mu, \sigma)(G_r + F(\mu, \sigma)) + F^2(\mu, \sigma) \text{Var}(Z_n) N + E[Z_n^2] N (U(\mu, \sigma) - V(\mu, \sigma))$$

$$P_e = \frac{2}{3} Q\left(\frac{G}{\sqrt{\text{Var}[r_T^2]}}\right) + \frac{1}{6} \left[ Q\left(\frac{G}{\sqrt{\text{Var}[r_T^2]} + \sqrt{3}\sigma_\psi E[1/X]}\right) + Q\left(\frac{G}{\sqrt{\text{Var}[r_T^2]} - \sqrt{3}\sigma_\psi E[1/X]}\right) \right]$$

Error Prob. of CDMA systems with beamforming and Rake receivers under different power control schemes, which impact BER by changing the received signal-to-noise ratio.

