

Let $S_k = \Omega_{dk} / \Omega_{ck} =$ be the average SIR's at the k -th input branch of the multi-branch selection combiner. Then, the following integrals from previous expression can be presented in the form:

$$I_1 = \int_0^{\infty} r_1^{2k_1+2m_d+2m_c+2l_1-1} e^{\frac{-r_1^2(\lambda_1 m_d(1-\sqrt{\rho_c})+S_1 m_c(1-\sqrt{\rho_d}))}{\Omega_{d1}(1-\sqrt{\rho_d})(1-\sqrt{\rho_c})}} dr_1;$$

$$\vdots$$

$$I_n = \int_0^{\infty} r_n^{2k_n+2m_d+2m_c+2l_n-1} e^{\frac{-r_n^2(\lambda_n m_d(1-\sqrt{\rho_c})+S_n m_c(1-\sqrt{\rho_d}))}{\Omega_{dn}(1-\sqrt{\rho_d})(1-\sqrt{\rho_c})}} dr_n$$
(A.4)

Now by using variable substitutions:

$$t_i = r_i^2 \frac{(\lambda_i(1-\sqrt{\rho_c})m_d + S_i(1-\sqrt{\rho_d})m_c)}{\Omega_{di}(1-\sqrt{\rho_d})(1-\sqrt{\rho_c})}, \quad i=1\dots n$$
(A.5)

and well-known definition of Gamma function:

$$\Gamma(a) = \int_0^{\infty} t^{a-1} \exp(-t) dt$$
(A.6)

Finally, (A.2) can be written as

$$p_{\lambda_1, \lambda_2, \dots, \lambda_n}(t_1, t_2, \dots, t_n) = \sum_{\substack{k_1, \dots, k_n=0 \\ 2n}}^{\infty} \sum_{\substack{l_1, \dots, l_n=0}}^{\infty} G_1 \left(\frac{m_c(1-\sqrt{\rho_d})}{m_d(1-\sqrt{\rho_c})} S_1 \right)^{m_c+l_1} \dots$$

$$\dots \left(\frac{m_c(1-\sqrt{\rho_d})}{m_d(1-\sqrt{\rho_c})} S_n \right)^{m_c+l_n} \cdot \frac{t_1^{m_d+k_1-1}}{\left(t_1 + \frac{m_c(1-\sqrt{\rho_d})}{m_d(1-\sqrt{\rho_c})} S_1 \right)^{m_d+m_c+k_1+l_1}} \dots$$

$$\dots \frac{t_n^{m_d+k_n-1}}{\left(t_n + \frac{m_c(1-\sqrt{\rho_d})}{m_d(1-\sqrt{\rho_c})} S_n \right)^{m_d+m_c+k_n+l_n}}$$
(A.7)

with:

$$G_1 = \frac{(1-\sqrt{\rho_d})^{m_d} (1-\sqrt{\rho_c})^{m_c}}{\Gamma(m_d)\Gamma(m_c)}$$

$$\cdot \frac{\Gamma(m_d+k_1+\dots+k_n)\Gamma(m_c+l_1+\dots+l_n)}{\Gamma(m_d+k_1)\cdot\Gamma(m_d+k_n)}$$

$$\cdot \frac{\Gamma(m_d+m_c+k_1+l_1)\dots\Gamma(m_d+m_c+k_n+l_n)}{\Gamma(m_c+l_1)\cdot\Gamma(m_c+l_n)k_1!\cdot k_n!l_1!\cdot l_n!}$$

$$\cdot \rho_d^{\frac{k_1+\dots+k_n}{2}} \rho_c^{\frac{l_1+\dots+l_n}{2}} \left(\frac{1}{1+(n-1)\sqrt{\rho_d}} \right)^{m_d+k_1+\dots+k_n}$$

$$\cdot \left(\frac{1}{1+(n-1)\sqrt{\rho_c}} \right)^{m_c+l_1+\dots+l_n}$$
(A.8)

Now, CDF of output SIR could be derived from [30]:

$$F_{\lambda_1, \lambda_2, \dots, \lambda_n}(t_1, t_2, \dots, t_n) = \int_0^{t_1} \int_0^{t_2} \dots \int_0^{t_n} p_{\lambda_1, \lambda_2, \dots, \lambda_n}(x_1, x_2, \dots, x_n) dx_1 dx_2 \dots dx_n$$
(A.9)

Cumulative distribution function of output SIR, could be derived from (A.9) by equating the arguments $t_1=t_2=\dots=t_n=t$ as in [30]. By substituting, we obtain the following expression:

$$F_{\lambda}(t) = \sum_{\substack{k_1, \dots, k_n=0 \\ 2n}}^{\infty} \sum_{\substack{l_1, \dots, l_n=0}}^{\infty} C_2 \times J_1 \times \dots \times J_n;$$
(A.10)

whereas:

$$J_i = \int_0^t \frac{x_i^{k_i}}{\left(x_i + S_i \frac{(1-\sqrt{\rho_d})m_c}{(1-\sqrt{\rho_c})m_d} \right)^{k_i+l_i+m_d+m_c}} dx_i; \quad i=1, \dots, n$$
(A.11)

The integrals J_i $i=1, \dots, n$ can easily be solved using the well-known definition of incomplete beta function [25]:

$$\int_0^{\lambda} \frac{x^m}{(a+bx^n)^p} = \frac{a^{-p}}{n} \left(\frac{a}{b} \right)^{\frac{m+1}{n}} B_z \left(\frac{m+1}{n}, p - \frac{m+1}{n} \right);$$

$$z = \frac{b\lambda^n}{a+b\lambda^n}, \quad a > 0, \quad b > 0, \quad n > 0, \quad 0 < \frac{m+1}{n} < p$$
(A.12)

Now using the famous relationship between incomplete beta and ${}_2F_1$ hypergeometric function:

$$B_z(a, b) = \frac{z^a}{a} F_1(a, 1-b, 1+a, z)$$
(A.13)

and after some straightforward manipulations we obtain CDF in the form of (32).

7 Conclusion

In this paper, the performance analysis of system with switch-and-stay and selection diversity

combining, based on SIR over constant correlated Nakagami- m fading channels in the presence of co-channel interference, was obtained. Correlation model was observed for evaluating performances of proposed diversity system. The complete statistics for the SSC and SC output SIR is given in the infinite series expressions form, i.e., PDF, CDF, OP. Using these new formulae, ABER was efficiently evaluated for some modulation schemes BPSK and NCFSK. As an illustration of the mathematical formalism, numerical results of these performance criteria are presented, describing their dependence on correlation coefficient and fading severity.

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Authors' Biographies



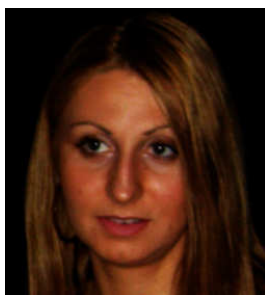
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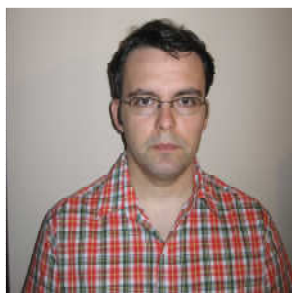
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