

## Errata

**Text:** *Fundamentals of Wireless Communication*, D. Tse and P. Viswanath, Cambridge University Press, 2005.

1. Page 76, 3rd line of the penultimate paragraph: replace “ $\lambda_\ell = |d_\ell|^2$ ” by “ $\lambda_\ell^2 = |d_\ell|^2$ ”.
2. Page 92: replace  $n + L$  by  $n + L - 1$ .
  - (a) in Equation (3.118);
  - (b) in two places in the fourth line after Equation (3.118);
  - (c) in the fifth line after Equation (3.118);
  - (d) in the sixth line after the Equation (3.118);
  - (e) in the fourth line after Equation (3.119).
3. Page 159, Equation (4.33): replace  $\beta_i$  by  $\frac{\beta_i}{G}$ .
4. Page 159, Equation (4.34): replace  $\beta_1$  and  $\beta_K$  by  $\frac{\beta_1}{G}$  and  $\frac{\beta_K}{G}$ , respectively.
5. Page 159, Equation (4.32): With the changes made above, this equation is correctly written in the first printing of the book
6. Undo the typo numbered 23 in the list of corrections implemented after the first printing of the book.
7. Page 159, Exercise 4.6, part 1: replace “The number of mobiles  $K$  is at least two” by “The number of mobiles  $K$  is greater than two”.
8. Page 194, Equation (5.75) should read:

$$\frac{2^{LR} - 1}{L(2^R - 1)}.$$

9. Page 348, 2nd line following Equation (8.41): replace “to  $n_{\min} \log \text{SNR}$  bits/s/Hz” by “ $n_{\min} \log \frac{\text{SNR}}{n_t}$  bits/s/Hz”.
10. Page 362, Equation (8.71): replace “ $\mathbf{I}_{n_r} + \mathbf{H}\mathbf{K}_x\mathbf{H}^*$ ” by “ $\mathbf{I}_{n_r} + \frac{1}{N_0}\mathbf{H}\mathbf{K}_x\mathbf{H}^*$ ”.
11. Page 370, Equation (8.88): replace “ $\mathbf{I}_{n_r} + \mathbf{H}\mathbf{K}_x\mathbf{H}^*$ ” by “ $\mathbf{I}_{n_r} + \frac{1}{N_0}\mathbf{H}\mathbf{K}_x\mathbf{H}^*$ ”.
12. Page 370, Equation (8.89): replace “ $\mathbf{I}_{n_r} + \mathbf{H}\mathbf{K}_x\mathbf{H}^*$ ” by “ $\mathbf{I}_{n_r} + \frac{1}{N_0}\mathbf{H}\mathbf{K}_x\mathbf{H}^*$ ”.
13. Page 376, Equation (8.106): replace  $(p_1, \dots, p_K)$  by  $(p_1, \dots, p_{n_t})$ .
14. Page 426, 5th line of Section 10.1.1: replace “Chapter 5” by “Chapter 7”.
15. Page 455, four lines prior to Equation (10.47): replace “closest to  $s$ ” by “closest to  $y$ ”.

The following typos correspond to the first printing of the book and have been corrected second print onwards.

1. Page 6: 7th line from the bottom: “AWGN channel, as a baseline” should be replaced by “AWGN channel is used as a baseline”.
2. Page 27: 5th line from the top replace “at the Nyquist sampling rate.” by “above the Nyquist sampling rate.”
3. Page 29: 3rd line from the top: missing close bracket at the very end of the line.
4. Page 44: in the 2nd line from the top replace “met” by “absorbed”.
5. Page 44, equation (2.70): the displayed equation should be “ $\frac{e^{-\eta\sqrt{\gamma}|r|}}{2}$ ”.
6. Page 80, 2nd line: “can be calculated from (3.86)” should be replaced by “can be calculated from (3.91)”.
7. Page 80, Equation (3.94): 1600 should be replaced by 10,000.
8. Page 80, 9th line from the bottom: replace “ .... in depth in Chapters 7 and 9....” by “....in depth in Chapter 8....”
9. Page 81: all  $(i, j)$  should be converted to  $(j, i)$  in each of the equations (3.97) through (3.100).
10. Page 86, Figure 3.14: the symbol sent on the 3rd antenna at the 3rd time slot should be  $x[1]$  instead of  $x[3]$ .
11. Page 93, Figure 3.19:  $\mathbf{X}_A$  and  $\mathbf{X}_B$  should be replaced by  $\mathbf{x}_A$  and  $\mathbf{x}_B$ , respectively.
12. Page 97:  $N$  should be replaced by  $N_c$  in each of the Figures 3.20, 3.21, and 3.22.
13. Page 97:  $N$  should be replaced by  $N_c$  in equation (3.135).
14. Page 113, Exercise 3.7, part 2: The second sentence should read: “Show that the product of  $\text{SNR}^2$  and the difference between the upper bound and the actual pairwise error probability goes to a constant with increasing SNR.”
15. Page 118, Exercise 3.26: In part 1, replace “Suppose  $N = L$ ” by “Suppose  $N = 1$  and replace  $x[0]$  by  $x[1]$ . In part 3, replace “general block length  $N \geq L$ ” by “general block length  $N$ ” and replace “for  $m \leq N - L$ ” by “for  $m \leq N$ ”.
16. Page 127, 15th line: “intra-sector” should be replaced by “inter-sector”.
17. Page 127, 2nd line after the displayed equation: “with  $P$  denoting the average received power” should be replaced by “with  $P$  denoting the average transmit power”.
18. Page 134, Equation (4.6): replace “for  $\ell \neq 0$ ” by “for  $\ell \neq 0$ ”.

19. Page 157, Exercise 4.2 part (3): in the second sentence, replace “list of of  $C$  numbers” by “list of  $C$  numbers”.
20. Page 158, Equation (4.29): replace “ $\text{sinc}(t - nT)$ ” by “ $\text{sinc}\left(\frac{t-nT}{T}\right)$ ”.
21. Page 158, Equation (4.30): replace “ $PP(d)$ ” by “ $PP(x)$ ”.
22. Page 159, 3rd line: “as the vector  $\mathbf{p} = (p_1, \dots, p_K)^t$ ” should be replaced by “as the vector  $\mathbf{p} = (P_1, \dots, P_k)^t$ ”.
23. Page 159, Equation (4.32): the displayed equation should read “ $(G\mathbf{I}_K - \mathbf{F}) \geq \mathbf{b}$ ”.
24. Page 161, Exercise 4.8, part 1(c): Replace “ $I(\alpha\mathbf{p}) \leq \alpha I(\mathbf{p})$ ” by “ $I(\alpha\mathbf{p}) < \alpha I(\mathbf{p})$ ”.
25. Page 174, label in the vertical axis of Figure 5.5: “ $\frac{P}{N_0} \log_2 e$ ” should be replaced by “ $\frac{\bar{P}}{N_0} \log_2 e$ ”.
26. Page 175, Equation (5.18): “bits/s” should be replaced by “bits/s.” (i.e., a period is missing at the end of that sentence).
27. Page 180, 7th line after Equation (5.30): replace “the received SNR  $P\|\mathbf{h}\|^2/N_0$  of the transmission” by “the received SNR,  $P\|\mathbf{h}\|^2/N_0$ , of the transmission”.
28. Page 198, last line: replace “separated in bot the sub-channels” by “separated in both the sub-channels”.
29. Page 208: the shaded area should be shifted over to the right in the top right figure.
30. Page 210, line 9: “uplink” should be replaced by “downlink”.
31. Page 219, Ex. 5.9(1): replace “in terms of the  $u_i$ ” by “in terms of “ $u_1, u_2, \dots, u_M$ ”.
32. Page 221, Exercise 5.15: In Equations (5.126) and (5.127), replace “ $\mathbf{h}^t \mathbf{K}_x \mathbf{h}$ ” by “ $\mathbf{h}^* \mathbf{K}_x \mathbf{h}$ ”.
33. Page 221, Exercise 5.16, part (2): in the second line, replace “is non-positive as long as” by “is non-negative as long as”.
34. Page 224, Ex. 5.26 part 2: in the second line, replace “is larger than 0.5” by “is larger than 0.05”.
35. Page 252, 5th line from top: replace “continue focusing on” by “continue to focus on”.
36. Page 256, 8th line from top: replace “Rician case compared to the” by “Rician case, as compared to the”.
37. Page 294, 4th line from bottom: replace “*hertz*” by “*Hertz*”.
38. Page 310, the legend of Figure 7.11: “Here there are 4 receive antennas ( $L_r=2$ ) and 6 transmit antennas ( $L_t=3$ )” should be replaced by “Here there are 6 receive antennas ( $L_r = 3$ ) and 4 transmit antennas ( $L_t=2$ )”.

39. Page 314, Equation (7.66): “ $k, l = 0, \dots, n_r - 1$ ” should be “ $k, l = 0, \dots, n_t - 1$ ”.
40. Page 319, Example 7.1: in the paragraph preceding (7.76), “ $\Theta_t = 2$ ” should be replaced by “ $\Omega_t = 2$ ”.
41. Page 328, second para: “On the other” should be replaced by “On the other hand”.
42. Page 330, Exercise 7.2: in the second line, replace “period  $\Delta_r$ ” by “period  $1/\Delta_r$ ”.
43. Page 333, 5th line from the top: replace “mean square estimation” by “mean square error estimation”.
44. Page 341, last sentence: “The  $\frac{\lambda_i}{\sqrt{n}}$  are” should be replaced by “ $\frac{\lambda_1}{\sqrt{n}}, \dots, \frac{\lambda_n}{\sqrt{n}}$  are”.
45. Page 350, line 21: “Optional” should be replaced by “Optimal”.
46. Page 350, displaced equation before (8.44): replace “ $\mathbf{x}_k[m]$ ” by “ $x_k[m]$ ”.
47. Page 351, sentence before (8.47): “ $k$ th column of pseudoinverse” should be replaced by “ $k$ th row of pseudoinverse”.
48. Page 379, penultimate line of Exercise 8.11: replace “learnt from Chapter 5 of [99]” by “learnt from Chapter 5 of [131]”.
49. Page 450, equation (10.36):  $\mathbf{y}$  should be replaced by  $y$ .
50. Page 460, Fig 10.22 upper: uncertainty sphere radius should be  $\sqrt{N\sigma^2}$  instead of  $\sqrt{NP}$ .
51. Page 466, equation (10.69):  $\mathbf{y}$  should be replaced by  $y$ .
52. Page 489:  $N_\phi$  should be replaced by  $N_0$  in each of the equations (10.111), (10.112) and (10.114).
53. Page 496, two lines above (A.5): “ $Q(3) = 0.00015$ ” should be replaced by “ $Q(3) = 0.00135$ ”.
54. Page 501, equation (A.20): The density should be

$$f(r) = \frac{2r}{\sigma^2} \exp\left\{\frac{-r^2}{\sigma^2}\right\}, \quad r \geq 0.$$

55. Page 503, equation (A.32): The random variable  $u$  should be conditioned on  $u_B$  instead of  $u_A$ .
56. Page 521, footnote: “Faro’s inequality” should be replaced by “Fano’s inequality”.
57. page 548, reference [47]: “Blcskei” should be replaced by “Bölcskei”.