6.3 *Simulation Case 3: Cross Country Scenario with 100% Spectrum Overlap*

The third simulation case examines cross-country system scenario with the complete overlap between spectrum allocations for the two systems. The outline for the spectrum reuse is presented in Fig. 3. Except for the spectrum allocation all other system parameters remain as they are specified in Table 2. The cells are configured as omni-directional with antenna patterns as shown in Fig. 14.

The results of the simulations for different loading cases are presented in Figs 36 to 46.

Comparing simulation cases 1 and 3, one notices an increased level of interference for the case of 100% spectrum overlap. This increase is more readily observed in cases of high network loading. For example, comparing Figs 22 and 43, one notices that in the case of 75% loading, the probability of experiencing the SINR degradation of 1dB increases from 0.18 to 0.58%. However, both numbers are very small and despite the increase, the overall impact stays quite small.

The best indication of the overall impact can be obtained from Fig. 45. It can be observed that even in the worst-case scenario of 75% loading, the relative decrease of the forward link capacity stays below 2%. The 100% spectrum overlap scenario is never expected to operate under such high loading and therefore, the impact on the forward link capacity will always be smaller than 2%.

For the sake of comparison with other simulation scenarios, the important results for simulation case 3 are summarized in Tables 9 and 10.

Table 9. Probability of experiencing SINR degradation larger than 1dB

Loading [%]	System 1 [%]	System 2 [%]	Average [%]
25	0	0	0
50	0.02	0.02	0.02
75	0.7	0.45	0.58

Table 10. Average reverse link TX power

Loading [%]	System 1 - mean TX power [dBm]	System 2 - mean TX power [dBm]	Average TX power [dBm]
25	9.12	9.27	9.20
50	11.06	11.19	11.13
75	14.97	15.29	15.13

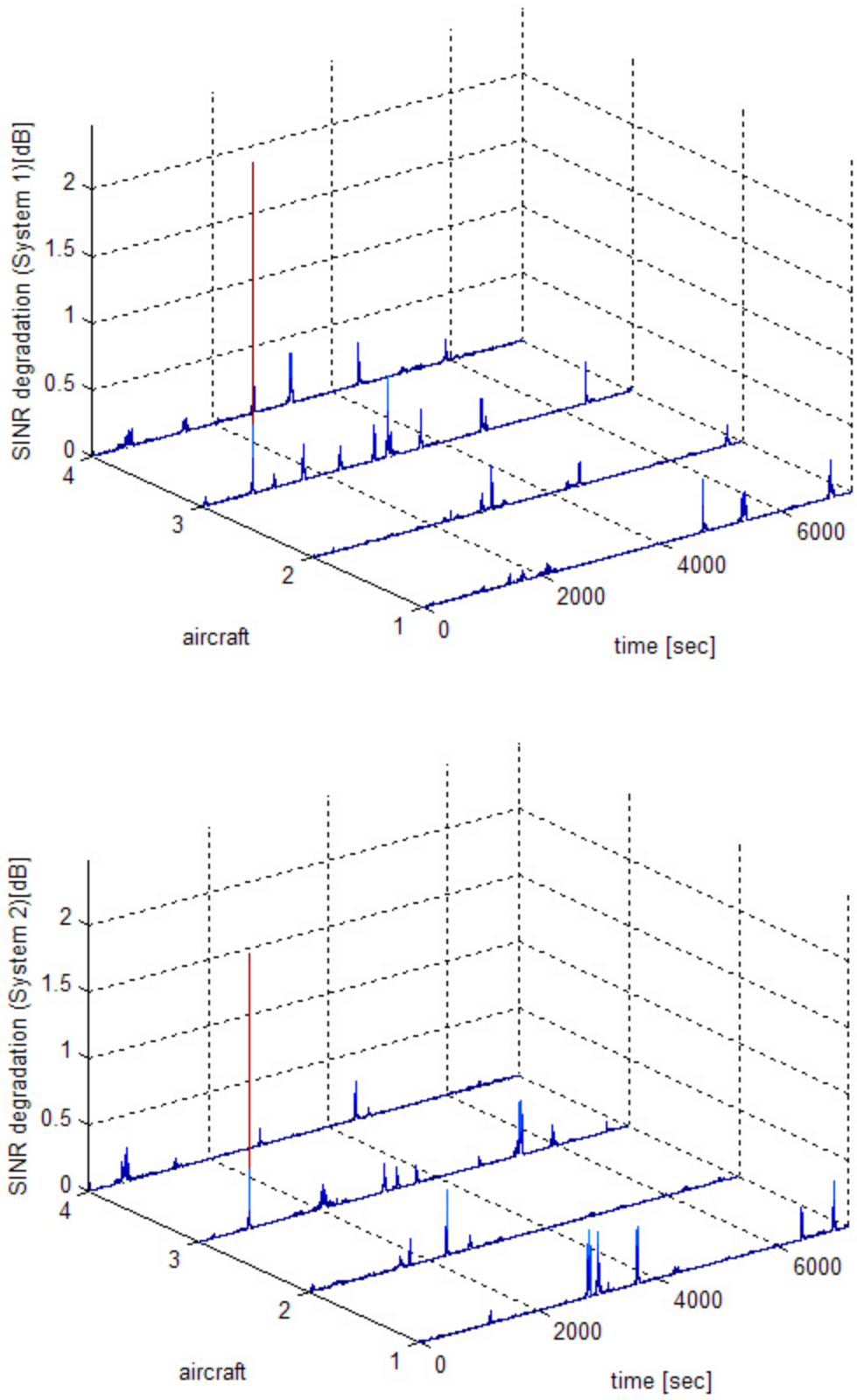

Figure 36. Time domain SINR degradation for the cross-country configuration, 25% pole point loading and 100% spectrum overlap

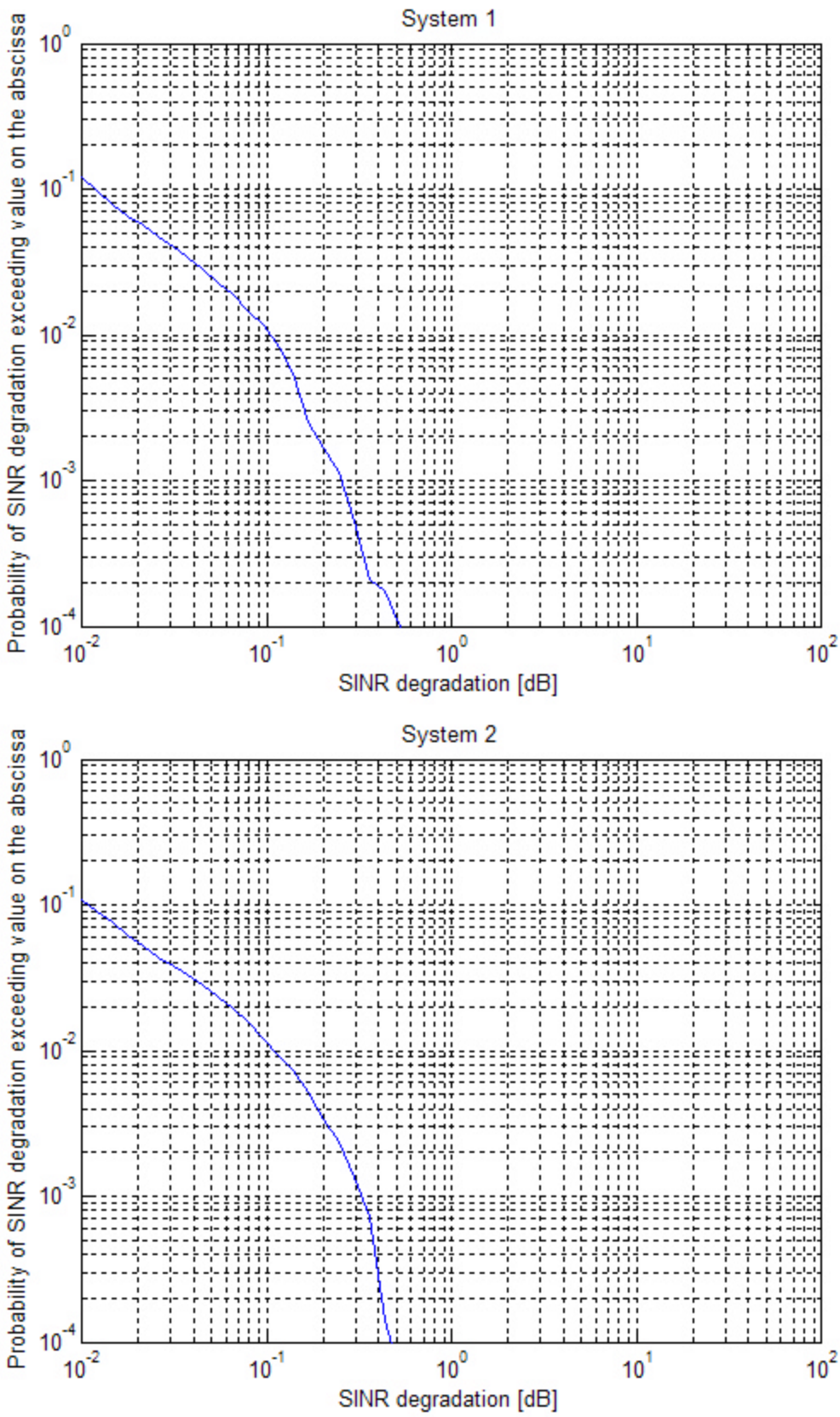

Figure 37. Probability of the SINR degradation for cross-country configuration, 25% pole point loading and 100% spectrum overlap

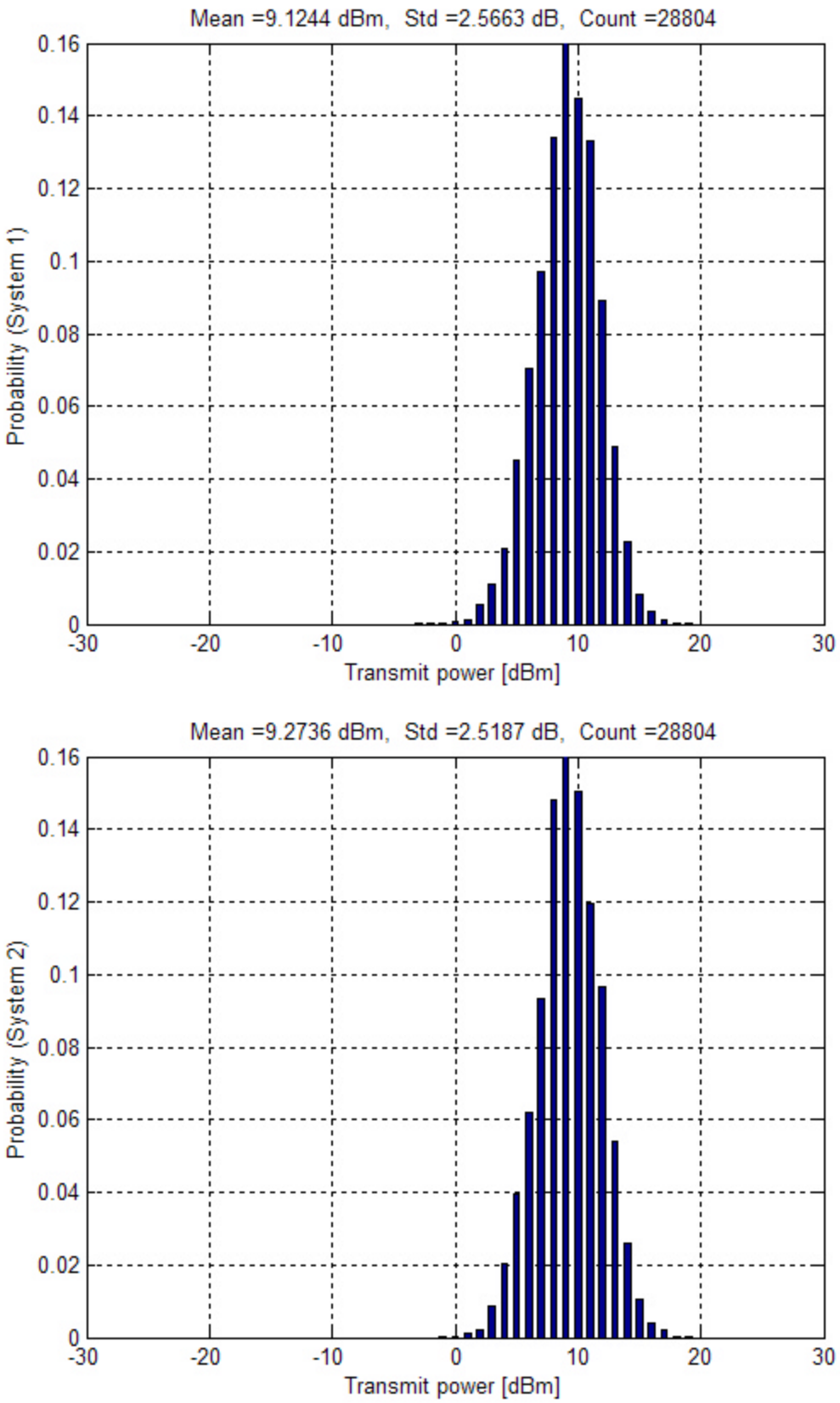

Figure 38. Distribution of the aircraft transmit power for cross-country configuration, 25% pole point loading and 100% spectrum overlap

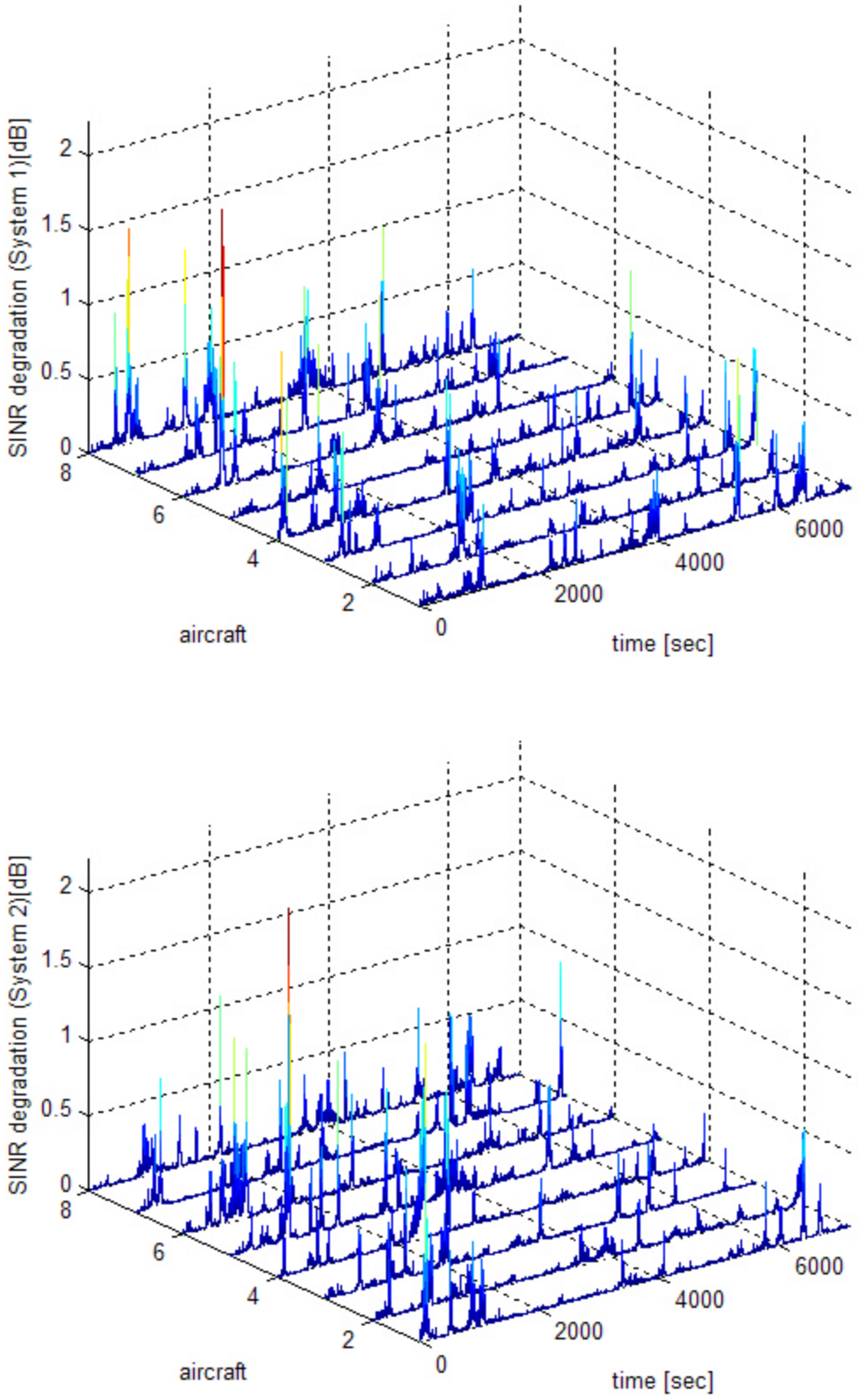

Figure 39. Time domain SINR degradation for cross-country configuration, 50% pole point loading and 100% spectrum overlap

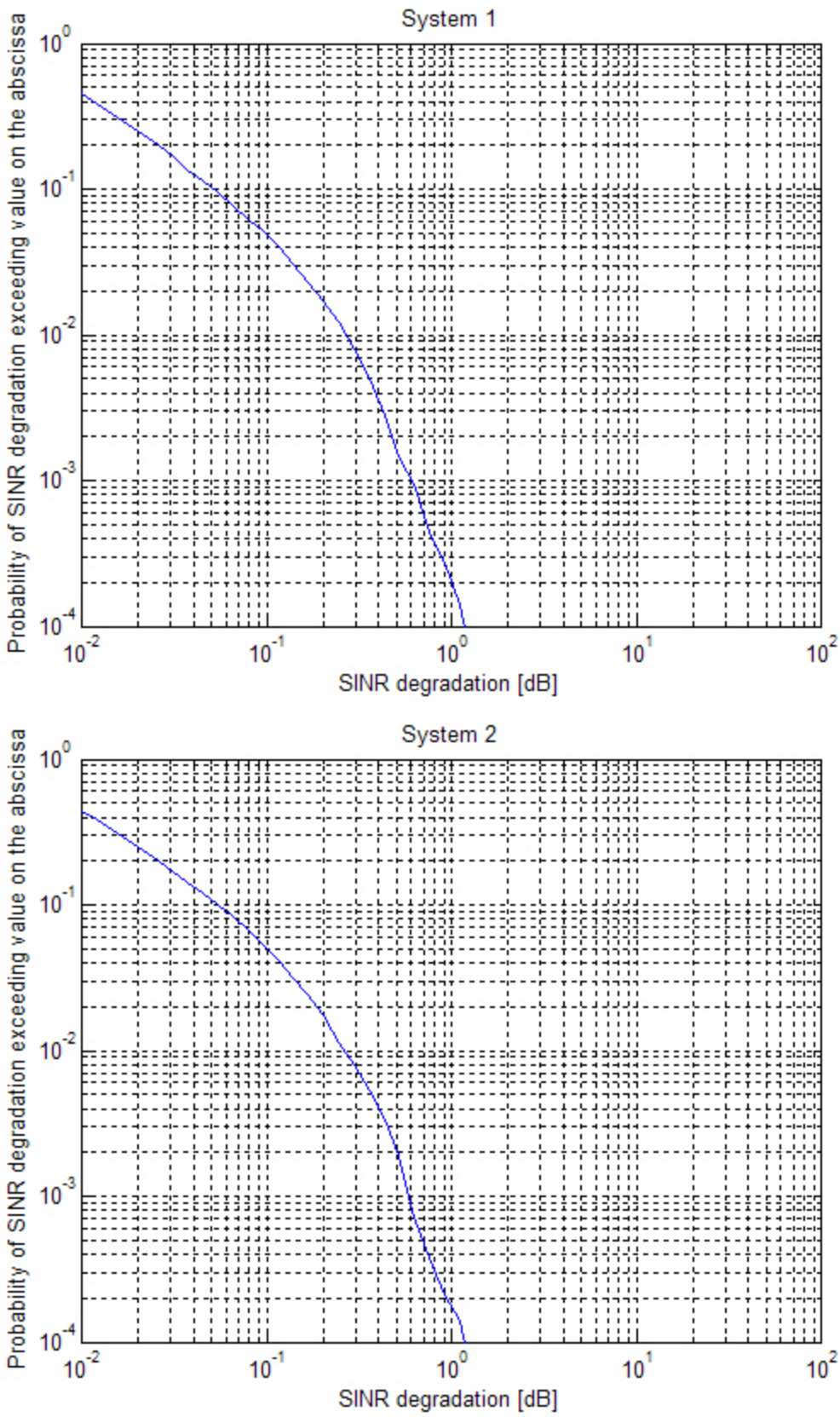

Figure 40. Probability of the SINR degradation for cross-country configuration, 50% pole point loading and 100% spectrum overlap

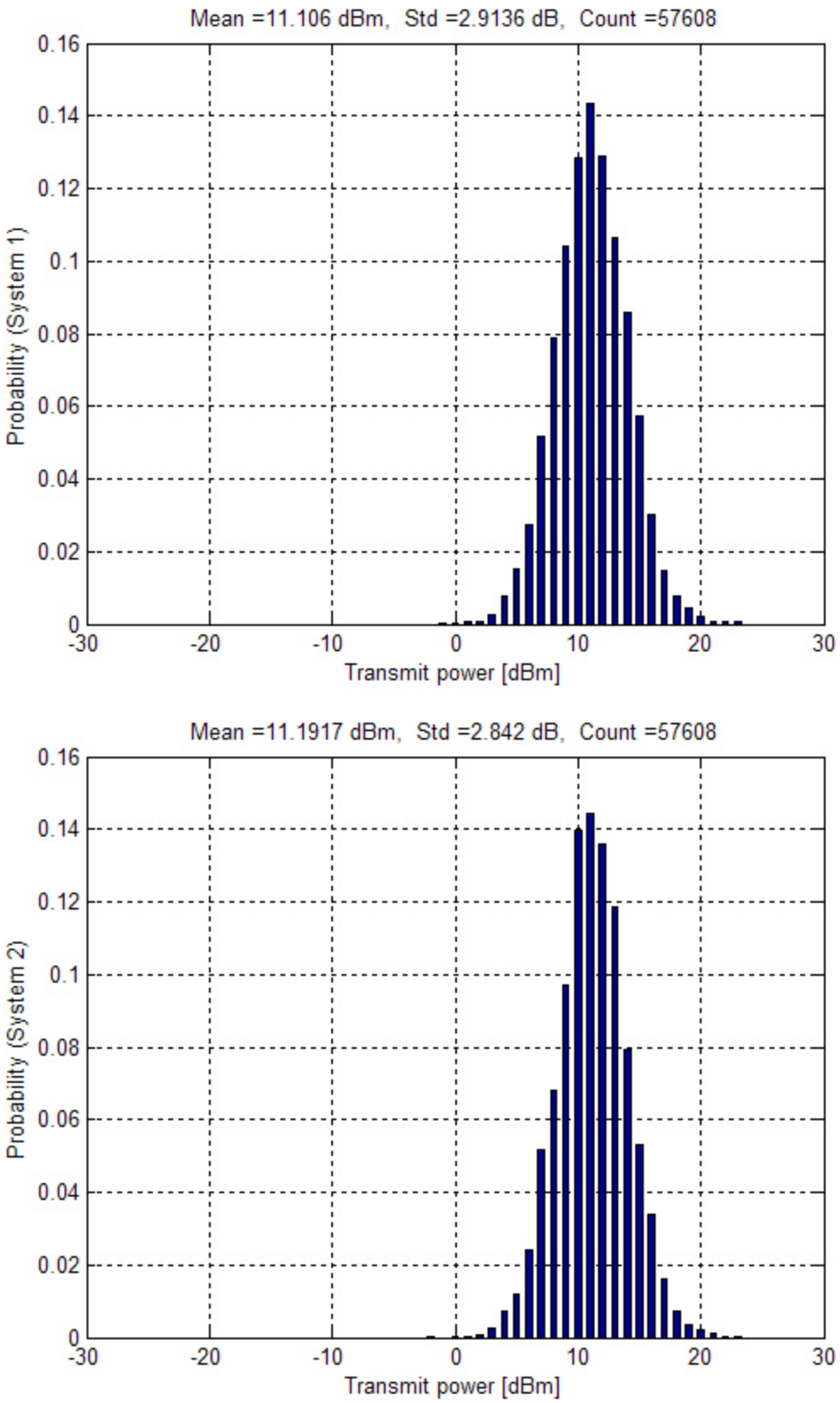

Figure 41. Distribution of the aircraft transmit power for cross-country configuration, 50% pole point loading and 100% spectrum overlap

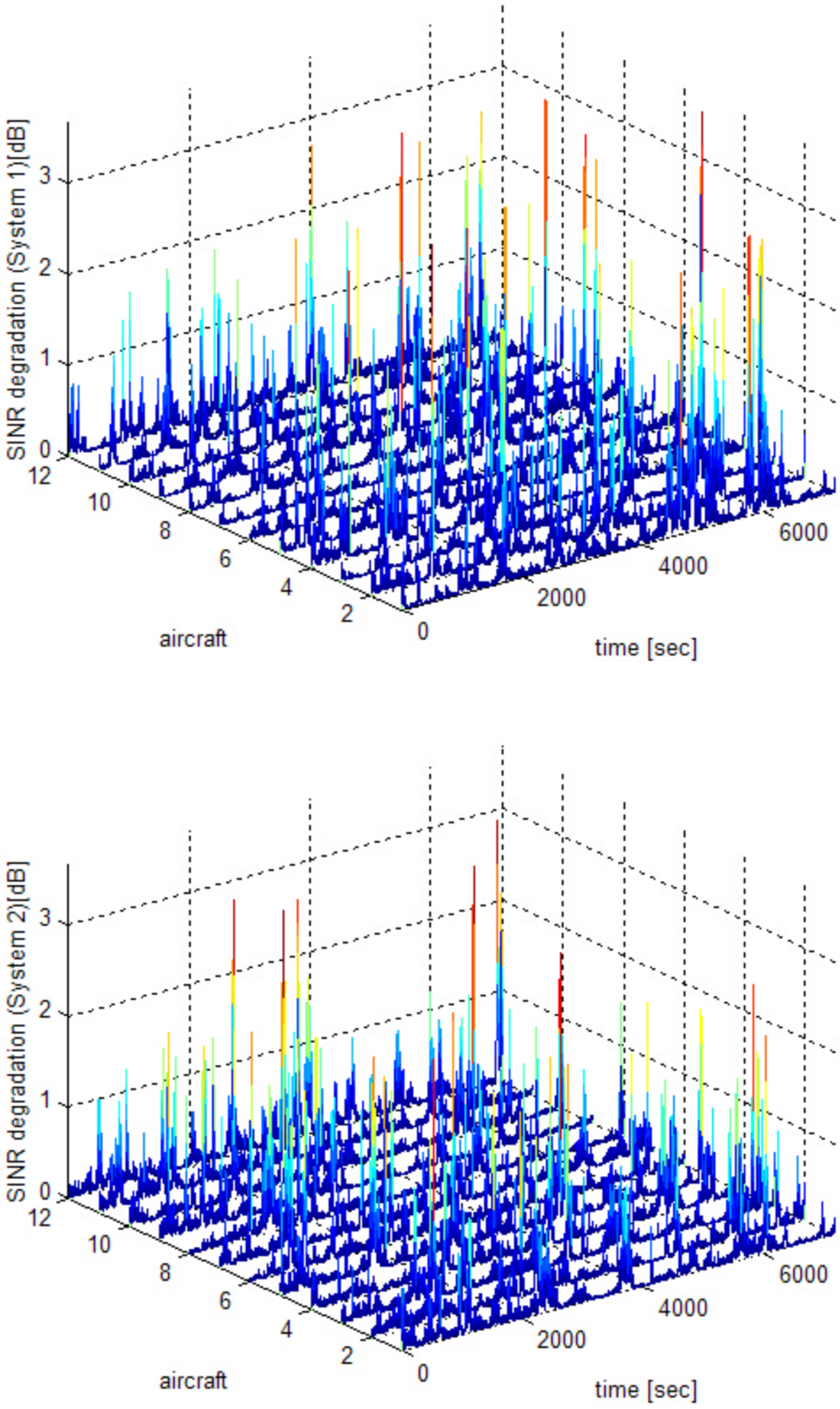

Figure 42. Time domain SINR degradation for cross-country configuration, 75% pole point loading and 100% spectrum overlap

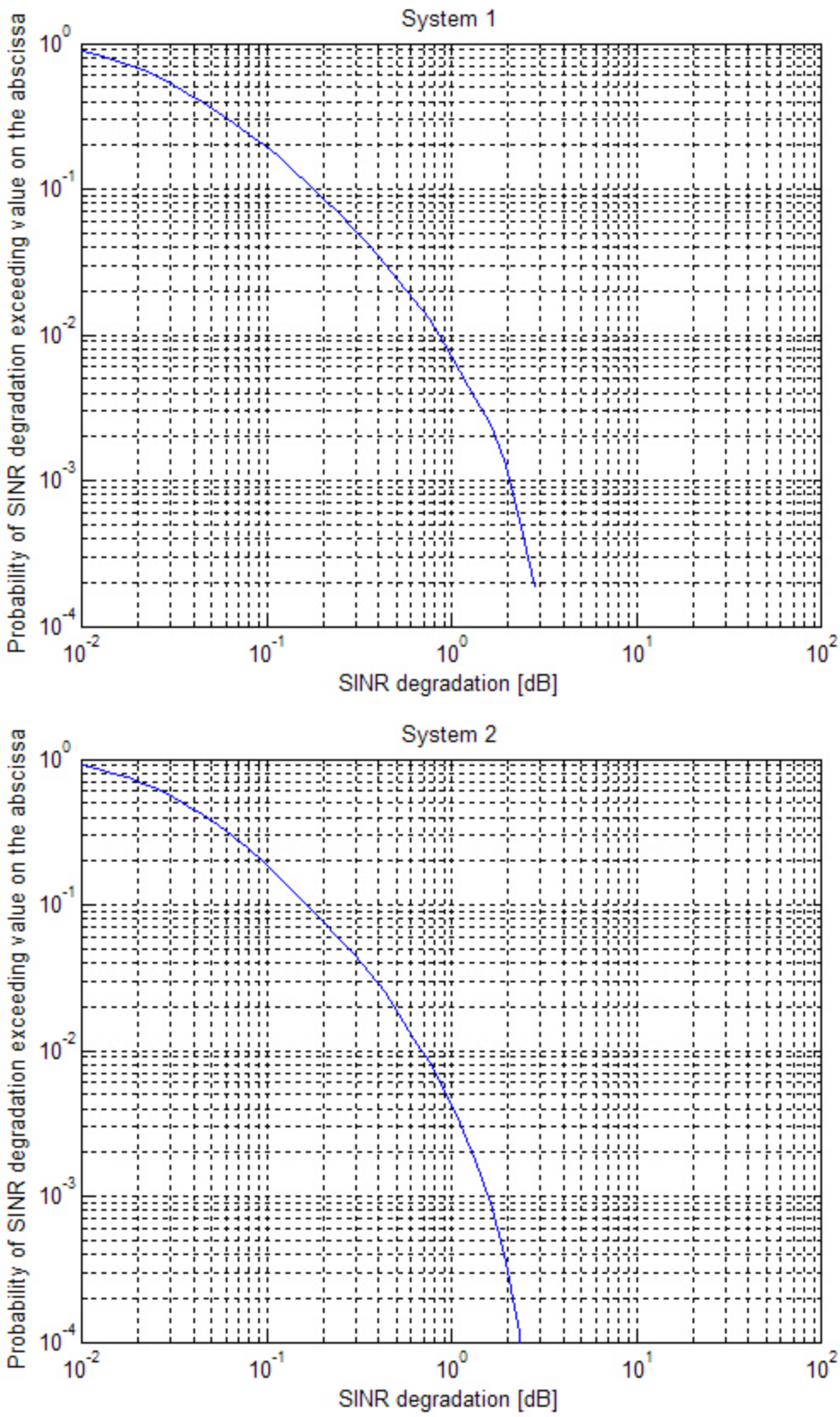

Figure 43. Probability of the SINR degradation for cross-country configuration, 75% pole point loading and 100% spectrum overlap

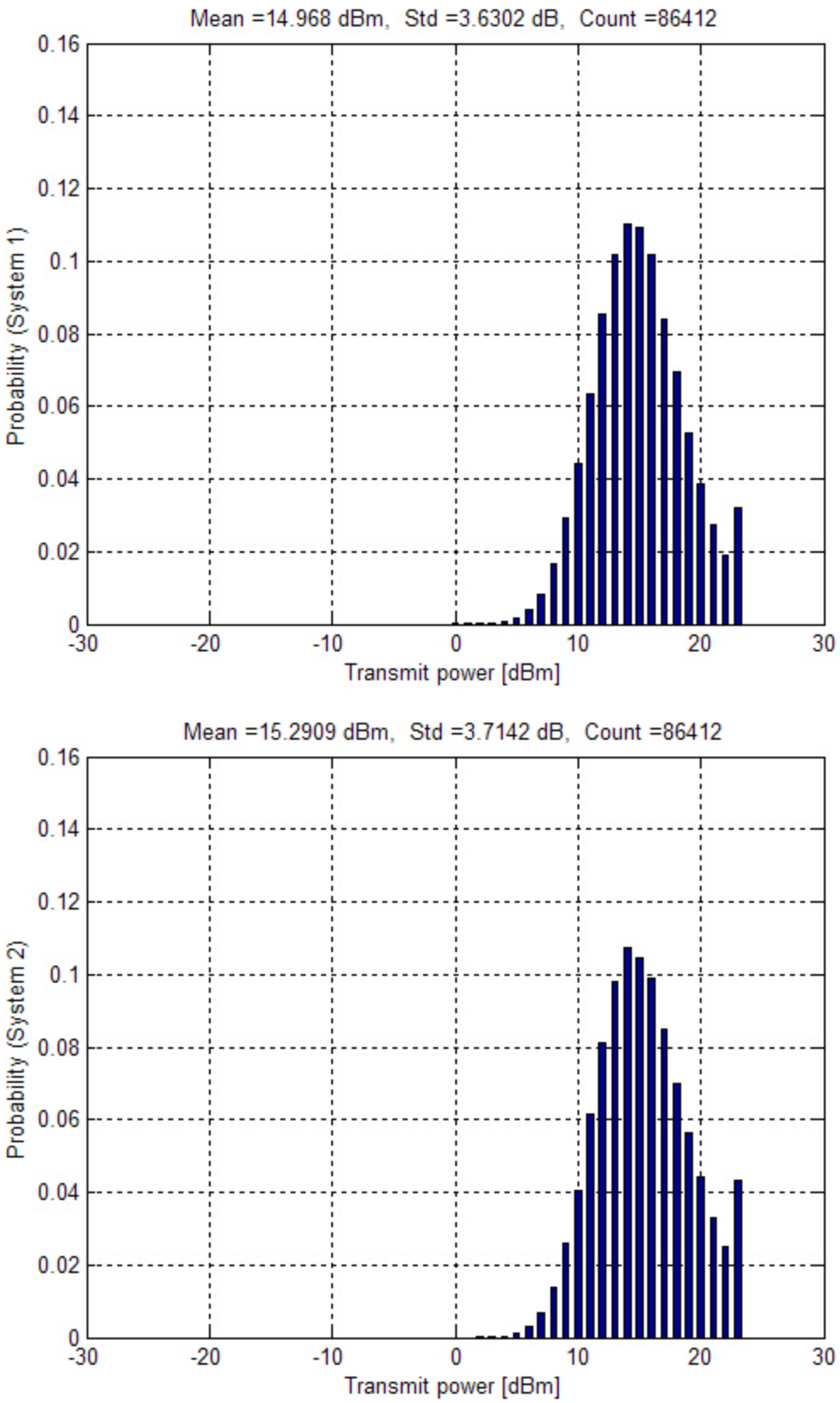

Figure 44. Distribution of the aircraft transmit power for cross-country configuration, 75% pole point loading and 100% spectrum overlap

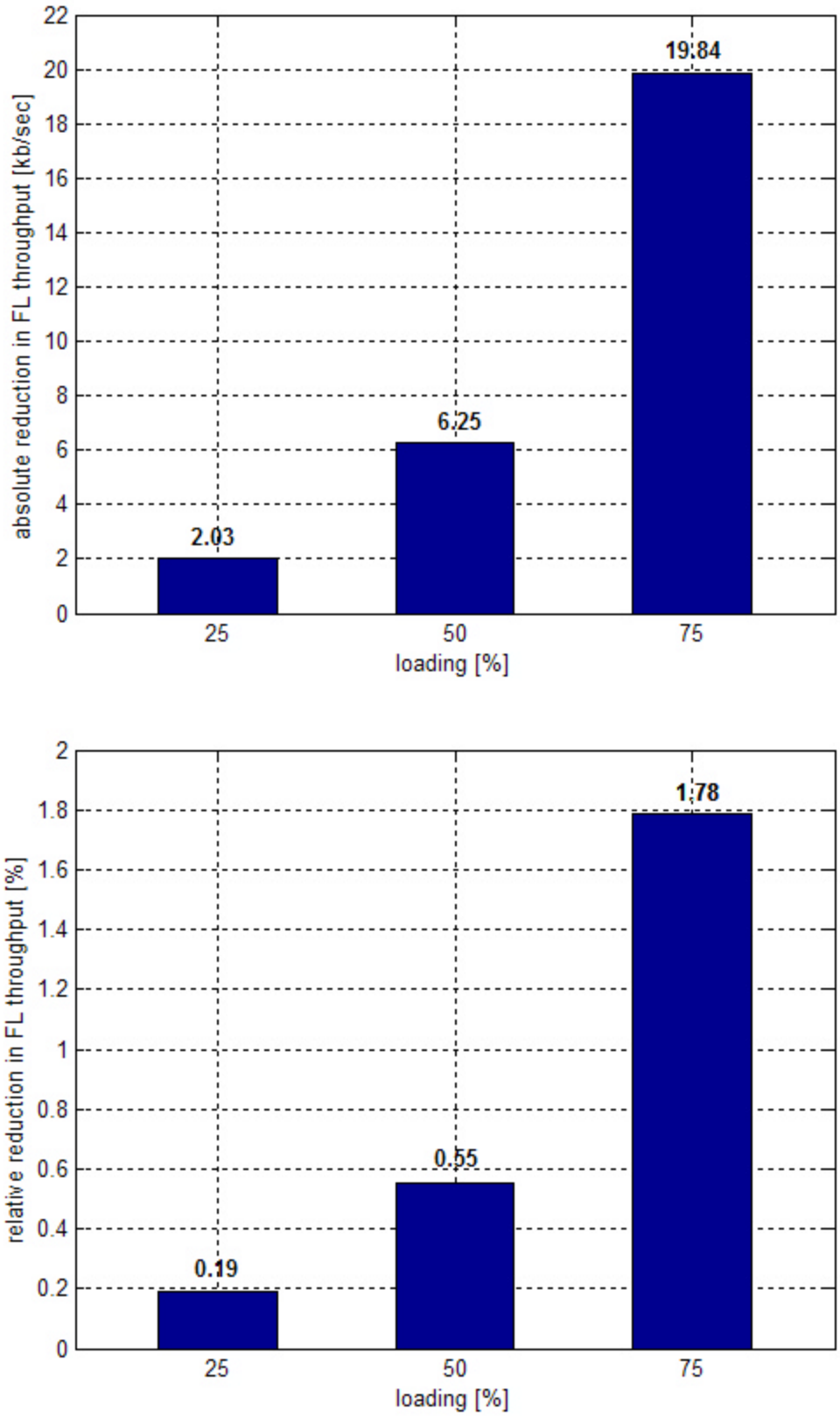

Figure 45. Absolute and relative reduction of FL throughput for the cross-country configuration and 100% spectrum overlap

6.4 *Simulation Case 4: Airport Scenario with 100% Spectrum Overlap*

The fourth simulation case examines the airport scenario with 100% overlap between spectrum allocations for the two systems. The outline for the spectrum reuse is presented in Fig. 3. Except for the spectrum allocation all other system parameters remain as they are specified in Table 2. The cells are configured as three sectored with antenna patterns as shown in Fig. 25.

The results of the simulations for different loading cases are presented in Figs 46 to 45.

From the cross system interference standpoint, this scenario represents the absolute worst-case. Due to 100% spectrum overlap, the cross-system interference potential is increased. Additionally, since geographical area of the airport is relatively small, the possibility of a close encounter between the two systems' aircraft is much higher than in the case of the cross-country scenario. The combination of the two effects (close proximity and 100% overlap) causes an interference increase, especially in cases of higher loading. For example, when the loading is 75%, the probability of experiencing the SINR degradation of 1dB becomes 6.15%. This is a five times increase over the case when the spectrum overlap is 40%. However, in the 100% spectrum overlap scenario, the two systems are never expected to operate at such high loading. In a more typical operation when the loading is below 50%, the probability of experiencing 1dB SINR degradation is still around 1%.

The overall effect is more easily determined from Fig. 55. It can be seen that for typical system loading of 50%, the decrease in forward link throughput remains below 1.1%. Given that in 1xEvDO systems the reverse link is the limiting one, forward link degradation of 1.1% may be rendered as insignificant.

For the sake of comparison with other simulation scenarios, the important results for simulation case 3 are summarized in Tables 11 and 12.

Table 11. Probability of experiencing SINR degradation larger than 1dB

Loading [%]	System 1 [%]	System 2 [%]	Average [%]
25	0	0	0
50	1.0	1.0	1.0
75	6.1	6.2	6.15

Table 12. Average reverse link TX power

Loading [%]	System 1 - mean TX power [dBm]	System 2 - mean TX power [dBm]	Average TX power [dBm]
25	-2.31	-2.00	-2.16
50	6.24	6.00	6.12
75	15.60	15.83	15.72

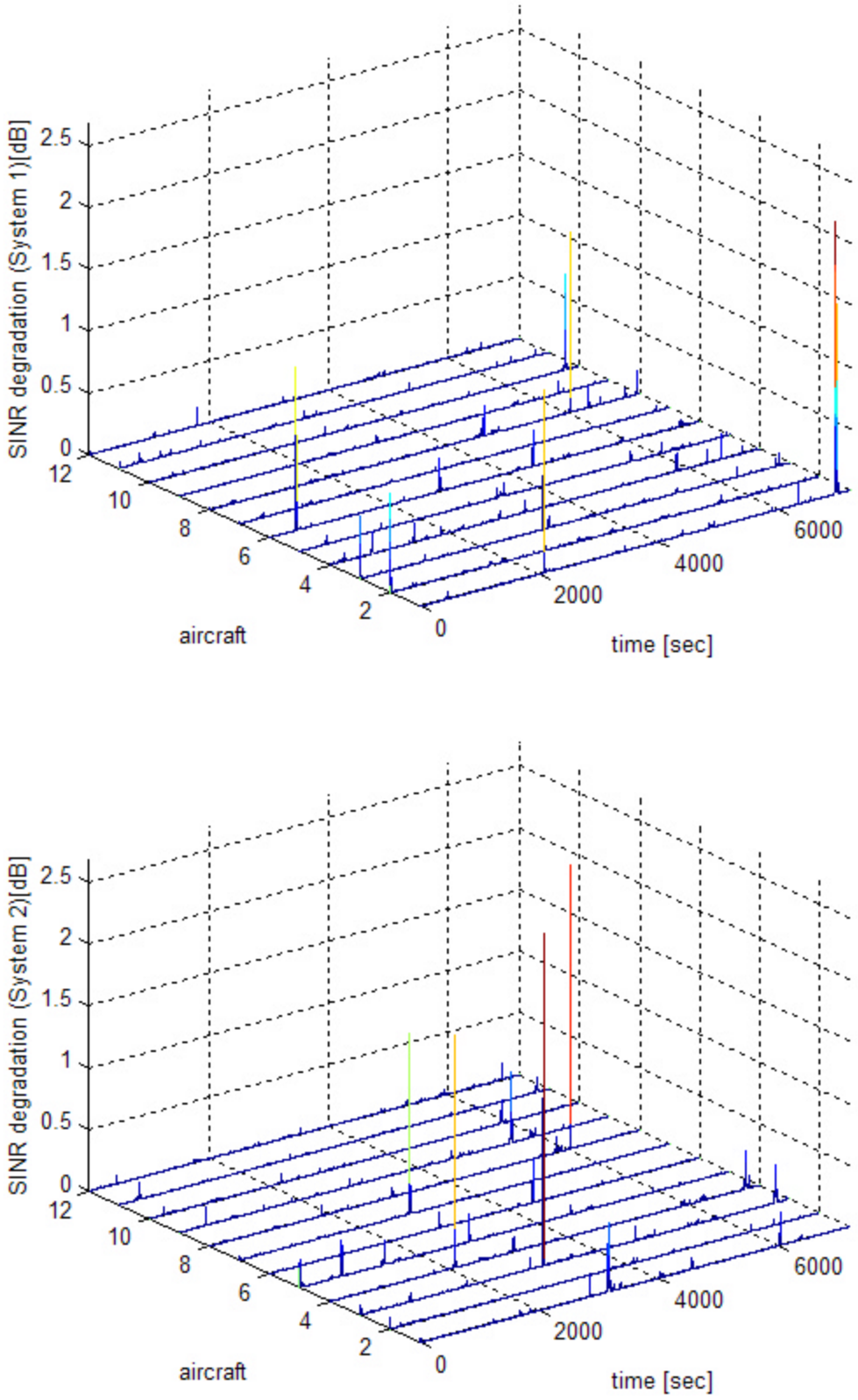

Figure 46. Time domain SINR degradation for the airport configuration, 25% pole point loading and 100% spectrum overlap

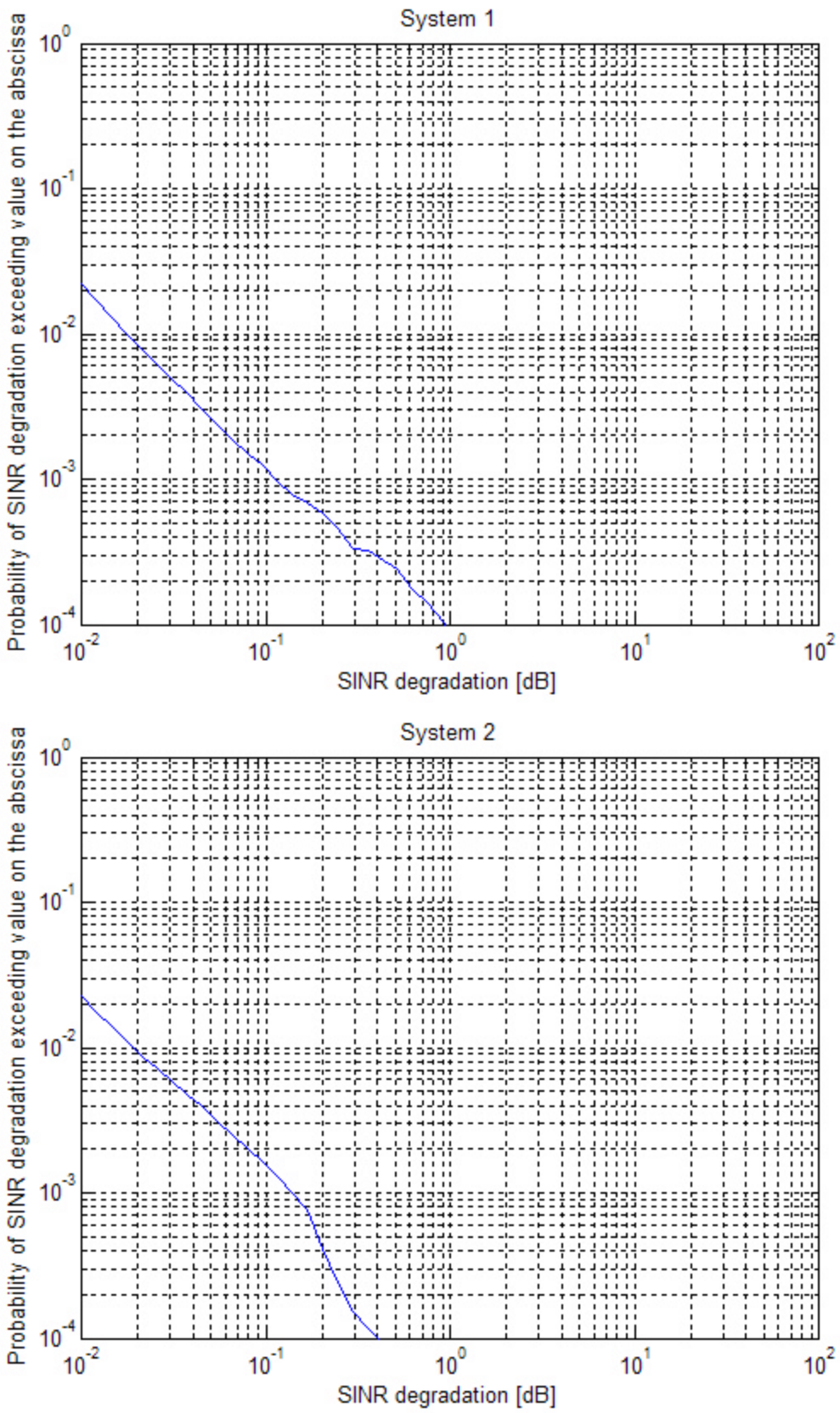

Figure 47. Probability of the SINR degradation for airport configuration, 25% pole point loading and 100% spectrum overlap