Aalto/RAD
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S-26.2350 Parts of Radiocommunications Systems

Examination 21.5.2013, at 1–4 p.m., hall S1 (A102)

Part B, at 2:45–4:00 p.m., "open books"

Use of literature and own prior notes is allowed in part B.

Maximum points in part B: 2x8 = 16 points

1. Given for a 38-GHz radio link equipment is the following: transmit power is 16 dBm, receiver sensitivity (for a $BER = 10^{-3}$) is –82 dBm and the antenna gain is 41 dB for both antennas. We assume no attenuation between transmitter and antenna, and between receiver and antenna.
   a) What is the maximum link span when the required fading margin for clear weather is 40 dB?
   b) With how strong rain (in mm/h) can such a radio link (with the span calculated in a) still operate? Let's assume that the fading is caused only by the rain.

2. You have two amplifiers at hand. For amplifier 1, the third-order intercept point OIP_3 = 15 dBm and the gain G = 12 dB. For amplifier 2, we have OIP_3 = 22 dBm and G = 8 dB. Calculate the third-order intercept point at the input, for both amplifier arrangements 1–2 and 2–1. Which arrangement is better, and why?