

Mobile Communications

Problem Set 8

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1. Assume an IEEE 802.11n system with a capacity of 600 MBit/s. If you transmit packets of 1400 Byte length and no frame bursting takes place (i.e. each frame has its own PHY and MAC header), which long-term average throughput could you achieve using the distributed coordination function (DCF) without the RTS/CTS scheme? What does this mean with respect to efficiency? Assume a slot time of $9 \mu\text{s}$ and a backoff value drawn from a uniform distribution between 0 and 31.
2. An IEEE 802.11a network that covers a large hall has to be planned. The goal is to provide a minimum data rate of 24 Mb/s all over the place. What are the constraints that have to be satisfied? How can we assure these? The access points have a transmit power of 63 mW. Transmit antennas with a gain of 2 dB are used. The required received signal power to ensure a data rate of 24 Mb/s is -74 dBm. Assume a path loss coefficient of $\gamma = 2.5$. What is the maximum cell size? How many different channels N are required for $S/I \geq 13$ dB?