

Chapter 5

Conclusions

Wireless sensor networks are more than just a specific form of ad hoc networks. The stringent miniaturization and cost requirements make economic usage of energy and computational power a significantly larger issue than in normal ad hoc networks.

On the distributed and adaptive source coding, we implemented the algorithm analyzed in Chapter 1, yielding an almost perfect tracking of the environmental magnitudes being sensed. A compression gain of around 50% was shown to be achievable for large WSNs and enough number of samples. Furthermore, the algorithm was shown to be robust to packet losses through a simulation of a Gilbert-Elliott channel.

In the chapters of this thesis, different joint source-channel coding schemes to reducing power consumption have been exposed and analyzed. Firstly, we have dealt with ME coding and showed how a reduction of the MAI can be achieved. ME coding allows to save energy when using a DS-CDMA scheme in which the usual BPSK modulation is substituted by an OOK one, which takes advantage of the large run of zeros. However, an enlarged codeword may exhibit two major drawbacks: on the one hand it increases the bit error probability, on the other it increases the power used on the receiver.

To address this problem MME coding has been analyzed and compared to ME coding in terms of relative gain. Novel expressions for the evaluation of the bit error probability and the power gain have been provided.

We have also proposed and solved a constrained minimization problem to adapt the optimal transmission powers for the nodes in the WSN, so that the consumed power in the network is the smallest possible while satisfying a given constraint.