Abstract

Energy consumption is one of the important challenge in WSNs deployment and applications. This is because power of WSNs is limited by battery which is difficult if not impossible to replace or recharge in some manner in the sensor nodes. Power consumption can be controlled in WSNs in more than one layer. In this thesis, power efficiency problems and techniques of enlarging battery life using WSNs physical layer are investigated in the second layer MAC sublayer. The latter has been achieved using the multiple access techniques, TDMA and CDMA. Initially, the research attempt to divide the WSN nodes into clusters such that at any time only one specific cluster will operate and the remaining cluster switched off to reduce the power consumption. Each cluster consists of several nodes and one sub-station (SS), all the nodes in one cluster send its data to the (SS) that forwards the data to main station (MS). Furthermore, the link between nodes, SS, and MS is controlled and scheduled such that cluster and node switched to active or sleep modes. Four systems with multi-types of multiple access are proposed and tested. These systems are classified according to the way multiple access provided in the link: TDMA-TDMA-OFDM system, CDMA-CDMA system, CDMA-TDMA-OFDM system, and TDMA-OFDM-TDMA-OFDM system. These systems have been simulated and
investigated. By comparing the results of each system with different case of cluster, it has been
found that the less consumed power is achieved with 8 clusters of 16 nodes/cluster case. The
results also show that the best performance is achieved with CDMA-CDMA system with 8
clusters of 16 nodes/cluster case.

References

  Techniques for Wireless Sensor Networks", Journal of Global Research in Computer
  Science, VOL. 4, No 1, 2013.
- K. Sohraby, D. Minoli, and T. Znati, "Wireless Sensor Networks Technology,
- T. Shu and M. Krunz, "Energy-Efficient Power/Rate Control and Scheduling in
  Hybrid TDMA/CDMA Wireless Sensor Networks", IEEE GLOBECOM Conference, San
  Sons Ltd., 2010.
- A. Goldsmith, "Wireless Communications", by Cambridge University Press,
  2005.
- T. Sumathra, N. S. Nagaraja and B. Shreeganesh, "Chaotically Modulated
  RSA/SHIFT Secured IFFT/FFT Based OFDM Wireless System", IJERT, Vol. 2, Issue 4,
  2013.
- A. S. Cacciapuotig, "The Role of the Widely Linear Processing in the
- J. Shapira, and S. Y. Miller, "CDMA Radio with Repeaters", Springer US,
  2007.
- Z. Nikolova, and et al, "Narrowband Interference Suppression in Wireless OFDM
  Systems", African Journal of Information and Communication Technology, VOL. 5, No. 1,
  2009.

Index Terms

Computer Science

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Keywords

Browser WSNs Power Consumption Clustering Multiple Access