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MAC protocol for cooperative MIMO transmissions in asynchronous wireless sensor networks (2008) *2008 International Symposium on Communications and Information Technologies, ISCIT 2008*, art. no. 4700258, pp. 580-585. Cited 1 time.

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Abstract

Cooperative MIMO schemes can reduce both transmission energy and latency in distributed wireless sensor networks (WSNs). In this paper we develop a new Cooperative low power listening (LPL) Medium Access Control (MAC) protocol for two cooperative MIMO schemes: Optimal Beamforming (BF) and Spatial Multiplexing (SM). We develop analytical models for the total energy consumption and packet latency for both schemes and analyse the proposed MAC protocol in term of the total energy consumption and packet latency with imperfect synchronisation due to clock jitter. The impact of the clock jitter, the check interval and the number of cooperative nodes on the total energy consumption and latency are investigated. We observe that the Cooperative LPL MAC with Optimal BF is the most promising configuration and it is optimal when then number of co-operating nodes $M=2$ and jitter difference is below 0.6Tb. © 2008 IEEE.

Author Keywords

Beamforming; Cooperative transmissions; Imperfect synchronisation; Mac protocols; Spatial multiplexing

Index Keywords

Analytical model, Clock-jitter, Cooperative MIMO, Cooperative transmissions, Distributed wireless sensor networks, Imperfect synchronisation, Low power listening, MAC protocol, Mac protocols, Medium access control protocols, Operating nodes, Optimal beamforming, Packet latencies, Spatial multiplexing, Synchronisation, Total energy consumption, Transmission energy; Beamforming, Medium access control, Multiplexing, Optimization, Sensor networks, Synchronization, Timing jitter, Transmissions, Wireless telecommunication systems; Wireless sensor networks

References

- Yang, H., Shen, H.-Y., Sikdar, B.
A MAC Protocol for Cooperative MIMO Transmissions in Sensor Networks
(2007) *IEEE Global Communications Conference, Exhibition and Industry Forum 2007 (GLOBECOM)*, presented at , Washington DC, USA
- Ahmad, M.R., Dutkiewicz, E., Huang, X.
Performance Analysis of MAC Protocol for Cooperative MIMO Transmissions in WSN
(2008) *to be presented at IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PTMRC2008)*, Cannes, France
- Polastre, J., Hill, J., Culler, D.
Versatile Low Power Media Access for Wireless Sensor Networks
(2004) *ACM Conference on Embedded Networked Sensor Systems*, presented at The, Sensys, Baltimore, Maryland, USA
- Buettner, M., Yee, G., Anderson, E., Han, R.
X-MAC: A Short Preamble MAC Protocol for Duty-Cycled Wireless Sensor Networks
(2006) *4th ACM International Conference on Embedded Sensor Systems*, presented at, Sensys

- **SpeckMAC: Low Power Decentralized MAC Protocols for Low Data Rate Transmissions in Specknets**
(2006) *2nd International Workshop on Multi-hop Ad-hoc Networks: From Theory to Reality*,
presented at, Florence, Italy
- Jagannathan, S., Aghajan, H., Goldsmith, A.
The Effect of Time Synchronization Errors on The Performance of Cooperative MISO Systems
(2004) *IEEE Globecom Workshops*,
presented at, Dallas, Texas, USA
- Cui, S., Goldsmith, A.J., Bahai, A.
Energy-efficient of MIMO and Cooperative MIMO Techniques in Sensor Networks
(2004) *IEEE Journal on Selected Areas in Communications*,
- Kohvakka, M., Kuorilehto, M., Hannikainen, M., Hamalainen, T.D.
Performance Analysis of IEEE 802.15.4 and Zigbee for Large-Scale Wireless Sensor Network Applications
(2006) *ACM International Workshop on Performance Evaluation of Wireless Ad hoc, Sensor, and Ubiquitous Networks*,
presented at Malaga, Spain

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