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Power Controlled Multiple Access (PCMA) in Wireless Communication Networks

Stanford researchers have developed novel systems and methods for power-controlled shared channel access in wireless networks supporting packetized data traffic. They have designed a new family of distributed and asynchronous Power Controlled Multiple Access (PCMA) algorithms which, among other aspects, evaluates the channel state and processing the transmissions using various types of transmission modes including, for example, setting the power level, modulation scheme, access point, coding scheme, and combinations of these adjustable parameters. This invention allows interfering links sharing the same radio channel to achieve required quality of service (QoS) levels, minimizing the power spent in the process and extending the battery life of mobile users. Moreover, by judiciously using power to achieve their QoS goals, interference is mitigated and the network capacity increases.

Experimental simulation showed substantially better performance than standard benchmark algorithm for power control. This is a first step towards the design of full PCMA protocols for autonomous channel access in high-performance wireless networks.

Applications

- Applicable to a variety of systems and methods that communicate data blocks/packets in a communication environment that is susceptible to interference from neighboring packet transmissions
- Controlling the transmitter power in wireless communication networks
- The development of full PCMA protocols for autonomous channel access in high-performance wireless networks

Advantages

- Power efficiency - achieves required quality of service (QoS) levels using minimal power and extending the battery life of mobile users
- Mitigates interference and increases network capacity
- More adaptive than the standard Constant-SIR algorithm and achieve higher performance
- Performs better than standard benchmark algorithm for power control
- Supports next generation wireless networks using intermittent packetized data traffic beyond the standard voice-oriented continuous one

Publications

- N. Bambos and S. Kandukuri, "Power Controlled Multiple Access (PCMA) in Wireless Communication Networks," Proc. IEEE INFOCOM 2000, vol. 2, 2000, pp. 386–95.
- N. Bambos and S. Kandukuri, "Power-controlled mutiple access schemes for next-generation wireless packet networks," IEEE Wireless Communications, vol. 9, June 2002, pp. 58-64.

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