Evaluation and Design of Tree Algorithm with Stochastic Transmission Power

A transmission in a random access protocol have two possible outcomes. Either no other transmission occurred on the same resource thus, the transmission is a success. Or there was simultaneous transmission that results in a collision for the use of the resource. In case of a collision a way to obtain the collided packet back is successive interference cancellation. This requires hardware capabilities and post-processing. A lighter and more common solution is to use a contention resolution, a MAC scheme guides the transmissions to other resources until they are successful.

Tree resolution techniques are one method for contention resolution. Power constraints on tree resolution such that the degrees of freedom are further exploited for a resolution is not investigated. A recent work discussed the possibilities to use power ramping strategies [1] for Slotted ALOHA perspective. Another recent work SICTA [2] uses successive interference cancellation to make use of interference cancellation techniques to solve overlapping signals. However, this requires heavy post processing such that it increases delay and power consumption. We think a tree resolution with stochastic transmission power can be more efficient than binary trees while overcoming the delay burden of complex techniques.


- State of the art on power control with tree algorithms
- Analysis of adding stochastic Tx Power
- Simulations for approving the results
- (Possible) Implementation and tests in OpenWSN

Requirements: Matlab / C, Queueing Theory, Broadband Communications, Wireless Communication.

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