Multichannel adaptation of IRSA in LTE

Highly varying traffic distribution demands a reactive resource allocation. One way to provide this dynamic is to use contention based access protocols. Irregular repetition slotted ALOHA (IRSA) has been proposed as a solution to the contention based access with high resource efficiency (throughput). However, when tight delay constraints are required, the long frames where IRSA shines are not usable anymore. Thus, the transmissions have to be distributed over multiple channels to reach the required delay constraints. In this work we start by analyzing how will the analysis of IRSA be modified through application of a multichannel algorithm. We then adapt our model to the Beta distribution so that the solution is relevant to the upcoming problems of 5G. And finally we adopt the proposed model to the LTE architecture such that the proposal can be deployed as a solution considering the practical limitations of a cellular network.

The work will start with analytical understanding of IRSA. Delay constraints will be used to modify the analysis into a multichannel capability. Following, the initial access to IRSA algorithm will be modified in order to support Beta arrivals. And finally, the algorithm will be adopted to LTE under the light of the analytical results. And the capabilities of the proposed algorithm will be compared with state of the art with simulations.

Requirements:

- Stochastic Analysis background,
- MATLAB,
- Wireless Communication background.

Note: This work will be jointly supervised from DLR by Federico Clazzer. For more information send an e-mail.

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