Reduced Overhead Feedback Scheme For Interference Mitigation In Cellular Networks (BIRAD)

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The Problem

The continuing increase in data transportation presents a major technological challenge to the wireless communications industry due to the shortage in the electromagnetic spectrum; a precious natural resource which is very limited. The scarcity of available spectrum has pushed cellular networks to a universal frequency reuse (every cell utilizes all of the frequencies), that in turn leads to high mutual interference between adjacent cells. This is the major factor in limiting network throughput, especially to cell edge users. Coordinated Multi-Point (CoMP) transmission is a key in breaking the spectrum gridlock by keeping interference at an adequate level and protecting cell-edge users. The current LTE standard includes low-rate communication links between adjacent Base Stations (BS) to support simple types of coordinated transmission and reception, mainly interference mitigation schemes. Such interference mitigation is expected to play an important role in LET advanced and to a larger extent in future 5G. Furthermore, the emergence of cloud radio access networks creates excellent condition for realizing coordinated transmission.
However, while CoMP is very promising in theory the performance gain as implied by field trials and system-level simulations is far from being a game changer. The main reason is the large overhead in acquiring channel state information between all cooperating base stations. These actions consume a large amount of channel estimation and feedback via wireless control channels, which outweigh the throughput gain. With all the research that has been done in this area and the great progress, CoMP is still far from realizing its full potential.

The Solution

This novel invention proposes a practical channel feedback scheme which enables interference mitigation and coordination in cellular networks, with less channel quantization bits.

The Commercial Benefit

This disruptive scheme:

Reduces the channel dimension by restricting the interfering base station to a well-chosen signal subspace.

Creates an effective channel towards the unintended receiver, which has lower dimensions than the full channel.

Provides more accurately interfering BS with lower number of bits.

Reduces the interference to the unintended UE in comparison to the standard scheme.

Market Potential

The cellular networks market is expected to grow at approximately at 40 % of CAGR between 2018 and 2023.
The global cellular IoT market is expected to reach USD 9.65 billion by 2025.

Target Markets/Industries

Cellular Networks industry

wireless communications industry

Intellectual Property

Patent pending

Team: Primary Inventor

Dr. Yair Noam
Dr. Noam is a Senior Lecturer at the Faculty of Engineering, Bar-Ilan University. In the years 2011-2013 he was Postdoctoral fellow in Wireless Systems Laboratory in the Electrical Engineering at Stanford University. He received his Ph.D. from Tel Aviv University and M.Sc. (summa cum laude) from Ben-Gurion University, both in Electrical Engineering.

Future Research
The proposed scheme is currently extended to account for antenna correlation. We also make appropriate adaptation to C-RAN.

The Opportunity
Companies are invited to license our patent through a licensing agreement with sponsored research.

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