ESR1

Title: New Scheduling Algorithms For Interference Management in Small Cells at millimetre-wave frequencies

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GOAL OF THE PROJECT

Design **scheduling algorithms** for **interference management** and **cancellation**.

Scenario: small-cell heterogeneous environments at **mmWave frequencies**.

Aim: ensure **continuous coverage** at challenging mmWave channel by **resource allocation** at the different tiers

EXPECTED RESULTS

New **scheduling algorithms** will be developed contributing to increase the capacity of future densely deployed **small-cell** networks at **mmWave frequencies.**

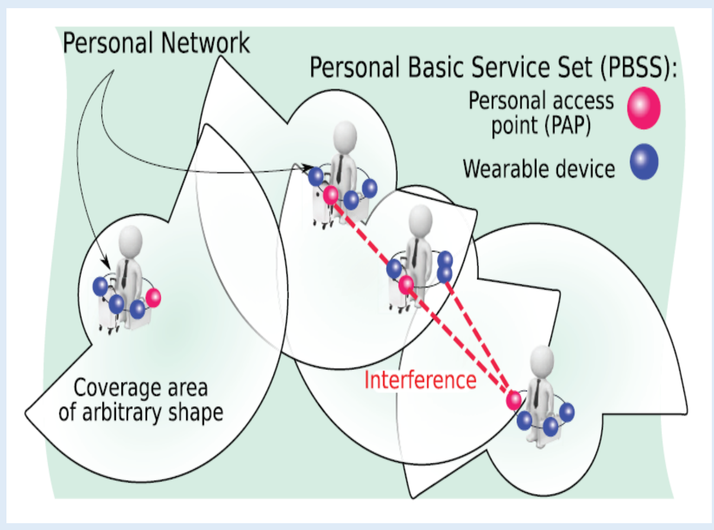
The achieved performance will be analyzed by system-level simulations and a selected set of techniques will be prototyped for a proof of concept.

Enabling technologies are emerged for broadband communications regarding to 5G and beyond 5G cellular networks:

- Multitier communication
- Massive MIMO
- Extreme densifications of nodes
- Hybrid beamforming techniques
- mmWave backhauling
- Full-duplex communications
- Energy harvesting

In this scenario, heterogeneous cellular networks with small cells densely deployed using mmWave communications exhibits critical challenges to mitigate interference.

INTERFERENCE MITIGATION ALGORITHMS



Beamforming optimization

Interference alignment

Interference cancellation

Fig1. Dense wearable network [1].

Full-duplex communication is a promising energy and spectral efficiency technology for high speed data services.
Main challenge: Self-Interference [2].

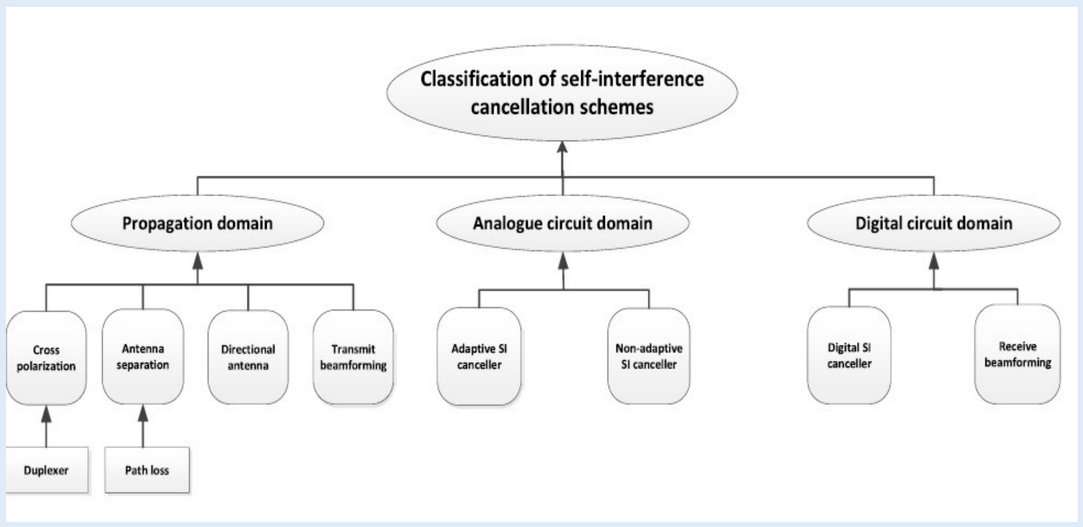


Fig2. Classification of self-interference cancellation schemes [3].

ENERGY-EFFICIENT ALGORITHMS

The major research challenge involves to satisfy several 5G operational requirements with high **energy efficiency** and at low cost. **Main solutions** to guarantee energy efficiency are summarized as:

- **Energy harvesting:** interference signals could be exploited to harvest energy and to power electronic devices based on Simultaneous Wireless Information and Power Transfer (SWIP) algorithms [4].
- **Power allocation policies:** to minimize energy consumption while throughput and interference constraints are satisfied [5].

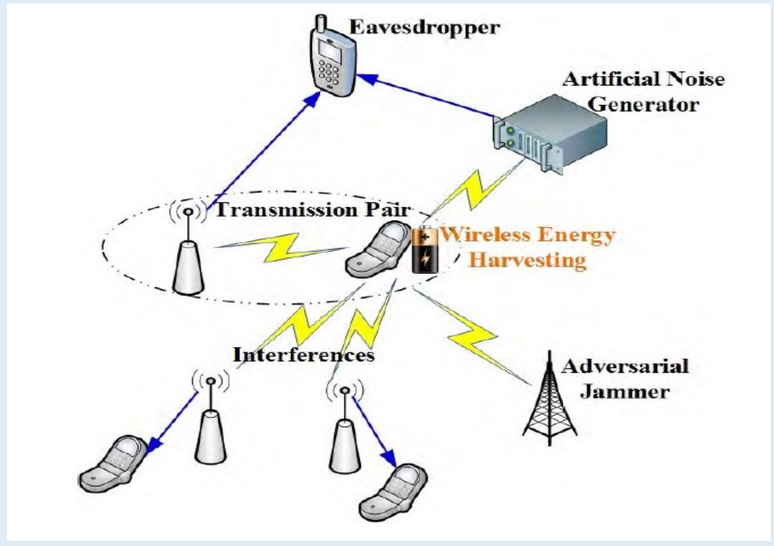


Fig 2. Pictorial illustration of exploiting ambient interferences for wireless energy harvesting [4].

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