

Antenna decoupling

Antenna decoupling is a set of techniques, based on physical and technical mechanisms, used to **minimize interference between multiple antennas in an RF system**. This ensures **optimum performance** in terms of radiation and reception, while preserving signal integrity. In modern environments, effective decoupling is essential to maximize the performance of communication systems.

How it works

Antennas can be characterized by several criterias indicating the impact of their coupling:

- **Impedance matching**, which determines their radiation frequencies.
- **Radiation pattern** shows how energy is transmitted/received in different directions, enabling analysis of how the antenna radiates or picks up RF signals.

The coupling between antennas can have a significant impact on their resonant frequency. This can lead to a **shift outside the frequency band originally intended**, and cause **distortion of the radiation pattern**.

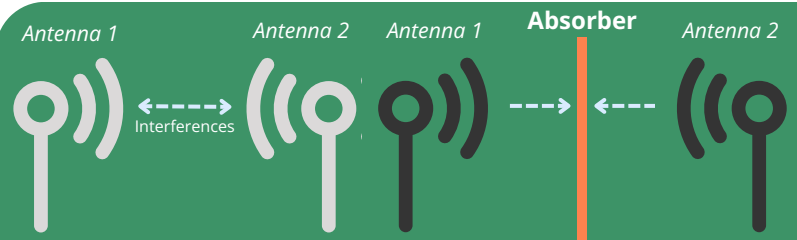


Fig. 1: Antenna coupling diagram

Fig. 2: Antenna decoupling diagram

Use cases

Multi-antenna communication systems

Reduction of interference between MIMO antennas to improve throughput and signal quality in wireless communication systems requiring multiple antennas

Radar and navigation systems

Decoupling between transmitting and receiving antennas to avoid signal distortion in radar, GNSS and other navigation systems.

Antenna arrays

Reduction of coupling between antennas to maintain acceptable performance while reducing the overall footprint in antenna arrays.

Densely populated RF environments

Applications in RF-saturated environments, such as industrial networks and smart cities to ensure efficient coexistence of multiple antennas.

Antenna coupling can be found on a drone. If two antennas are placed in close proximity, then coupling can occur, disrupt the antennas and impair overall communications. **FILAMAG-F** can then reduce the coupling between the antennas so that they operate optimally.

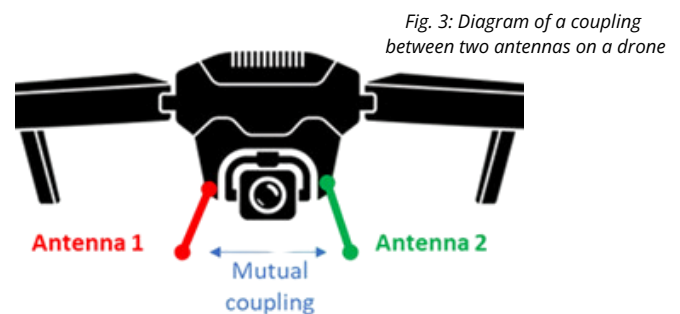


Fig. 3: Diagram of a coupling between two antennas on a drone

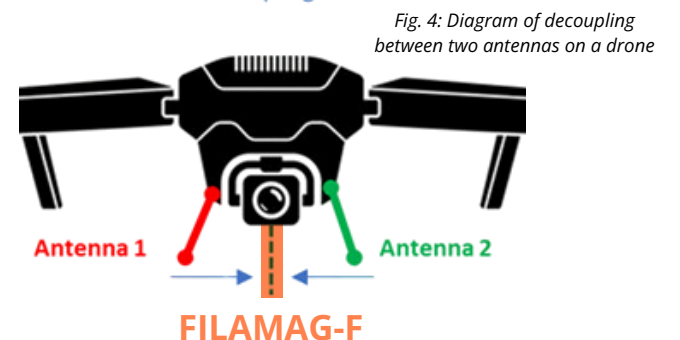


Fig. 4: Diagram of decoupling between two antennas on a drone

What's the HYMAG'IN's point?

With FILAMAG-F, decoupling methods can be **tailored to fit the available space** and effectively **isolate two closely spaced antennas**. In simulation, at the Wi-Fi frequency, the transmission coefficient improves **from -16.4 dB to -27.8 dB**, corresponding to a **69.5% reduction in coupling**.