Interference detection and mitigation (ESR6)

The work of ESR6 aims to design and implement advanced signal processing techniques for detection, classification and mitigation of radio frequency interference (RFI) on GNSS signals, to be integrated in PPP and RTK techniques.

It is well known that the presence of spurious signals in the GNSS bandwidth, or close to it, can be the source of errors for the signal processing stages of the GNSS receivers, eventually causing biases and additional noise on the measurements. Sources of interference may be unintentional or intentional (jamming) and they might cause disruptive effects that may range from a worsening of the GNSS-based positioning performance to complete blinding of the receiver. While the blinding of the receiver is clearly identifiable, detection of interference affecting the receiver and threatening the accuracy and reliability of the position solution may be a challenging task. In this case the effect of interference on positioning becomes even more important in the context of high-accuracy applications, where the user requires centimeter level accuracy performance, as well as continuity and reliability of the solution. In addition, the operation of mitigation techniques itself may also cause distortion on the signals and lead to non-negligible biases. The impact of chirp jamming signals and notch filtering operation on the signal processing stages of a GNSS receiver has been investigated. The error envelope due to the presence of chirp signals with different power levels is depicted in the figure as an example. Within WP3, the implementation of the investigated algorithms is based on the SDR receiver developed by ESR5. In collaboration with ESR7, the research work also considers the specific scenarios where both interference and ionospheric scintillation are present. The latter is important because, due to the very similar effect that might be seen from the GNSS receiver perspective, i.e., fast variations of amplitude and phase, RFI and scintillation may be mis-detected, thus leading to misunderstanding of the realistic events.

![Error envelope for the linear chirp with different power levels.](image-url)