



# WIreless Networks with Interference Exploitation

### **Results in Brief**

## Novel protocols and algorithms to optimise wireless networks

With the exploding popularity of all things wireless, the radio frequency (RF) spectrum has become a scarce commodity. In response, an EU initiative has provided solutions to boost the performance and efficiency of wireless networks.





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Without enough RF, the frequencies and airwaves that wireless signals get transmitted over, mobile providers are not able to offer the most optimal and cost-effective services to consumers.

To address this issue, the EU-funded WINIE (Wireless networks with interference exploitation) project set out to develop algorithms and protocols to enhance the capacity of wireless networks. The focus was

on examining the potential of physical-layer network coding to considerably improve the capacity of distributed and dynamic wireless networks with multiple communicating stations.

The WINIE team designed, applied and validated various protocols and signal processing algorithms for wireless networks. The complete set of developed protocols and algorithms enable several wireless network users to transmit

simultaneously over the same RF spectrum.

To achieve such network efficiency as network users continuously grow, two novel approaches were carried out. First, project partners introduced a protocol that selects which two users should transmit simultaneously. This consistently performs better than contemporary multi-source or standard cooperative protocols. Second, they proposed 'Distributed space-time codes' (DSTCs) to address the simultaneous transmission of multiple users and the signals that interfere with the relays. The DSTCs were found to significantly boost the RF spectrum efficiency of wireless communication.

WINIE delivered efficient algorithms and protocols to tackle several issues, from RF spectrum scarcity and its physical constraints to wireless network interference. The wireless sector that develops and standardises communications protocols stands to benefit from these innovations, and ultimately so will the users of these networked systems.

### Keywords

Wireless networks, signal processing algorithms, RF spectrum, distributed spacetime codes

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