



New method aimed to enhance the overall throughput of communication systems by utilizing outdated channel gain information for distributed interference compression and removal. The technology targets a dynamic environment with several distributed transmitters and receivers sharing a common medium.



## Tech offer | Distributed interference cancellation based on outdated channel gain information

Interference is the main limitation faced by today wireless technologies, mainly due to the network densification, user density and the exponential increase in wireless data traffic verified in the last years. The dynamic nature of wireless communications further exacerbates the interference problem as the transmission and reception entities are unable to adapt as fast as the radio environment dynamics; namely, when they adapt the channel/network state may be already different and then the adaptation is detrimental, instead of beneficial.

This technology proposes a method to efficiently compress and remove the interference generated by multiple receivers using only outdated channel information. Using this technology, the system throughput scales with the square root of the number of terminals (e.g., 500% throughput improvement in a scenario with 100 terminals).

### APPLICATIONS

The technology is applicable in scenarios with several pairs of transmitters and receivers communicating simultaneously and using the same resources:

VEHICULAR AND MACHINE-TO-MACHINE COMMUNICATIONS

SCENARIOS WITH HIGH DENSITY OF USERS

DISTRIBUTED DATA STORAGE

PHYSICAL LAYER SECURITY FOR WIRELESS COMMUNICATIONS

### BENEFITS

**ENHANCED THROUGHPUT** and proportional to the square root of the number of transmitter/receiver pairs.

**DISTRIBUTED INTERFERENCE CANCELLATION** using only outdated channel gain information.

**MULTIPLE TRANSMITTER/RECEIVER PAIRS** communicating using the same time and frequency resources.



## INTELLECTUAL PROPERTY

- USA patent granted ([US10476620](#))
- European patent granted ([EP17751468](#))

## SCIENTIFIC PUBLICATIONS

D. Castanheira, A. Silva and A. Gameiro, "Retrospective Interference Alignment for the  $K$ -User  $M \times N$  MIMO Interference Channel," in *IEEE Transactions on Wireless Communications*, vol. 15, no. 12, pp. 8368-8379, Dec. 2016, doi: [10.1109/TWC.2016.2614276](#).

D. Castanheira, A. Silva and A. Gameiro, "Retrospective Interference Alignment: Degrees of Freedom Scaling With Distributed Transmitters," in *IEEE Transactions on Information Theory*, vol. 63, no. 3, pp. 1721-1730, March 2017, doi: [10.1109/TIT.2017.2655343](#).

## DEVELOPMENT STAGE

TRL 3-4  
Laboratorial tests have been performed, with very promising numerical results.

## KEYWORDS

DELAYED CHANNEL INFORMATION  
DISTRIBUTED COMPRESSION  
REPETITION CODING  
INTERFERENCE CHANNEL  
TRANSMISSION OVER A SHARED MEDIUM  
MULTI TRANSMITTER/RECEIVER PAIRS  
INTERFERENCE ALIGNMENT

## CONTACT

Instituto de Telecomunicações  
Campus Universitário de Santiago  
3810-193 Aveiro | Portugal  
Tel: +351 234 377 900  
Email: [ipr@av.it.pt](mailto:ipr@av.it.pt)  
Web: [www.it.pt](http://www.it.pt)

## TECHNOLOGY ID

PI-0102

## INVENTORS

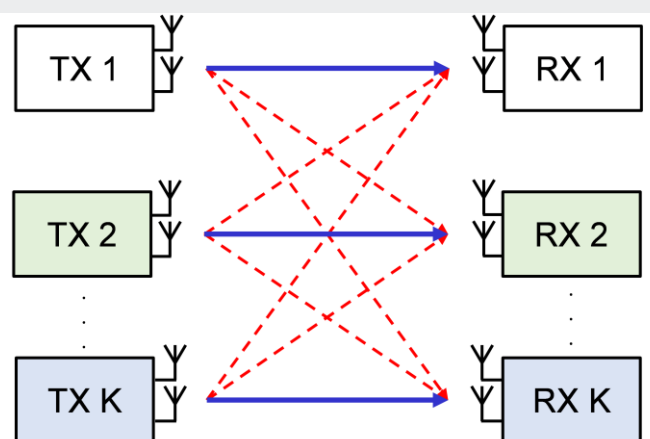
- Researchers from:
- Instituto de Telecomunicações (IT)
  - Universidade de Aveiro

## COMMERCIAL OFFERING

- Licensing agreement
- Testing new applications
- Joint further developments

## TARGET MARKET

IT seeks partners within information and communication technologies area (ICTs) to further develop, license or assign the technology, as well as possible end-users for testing new applications.



TX = transmitter  
RX = receiver

--- Interference link  
— Communication link