DISTRIBUTED INTERFERENCE CANCELATION BASED ON OUTDATED CHANNEL GAIN INFORMATION

TECHNOLOGY SUMMARY

New method aimed to enhance the overall throughput of communication systems by utilizing delayed channel gain information for distributed interference compression and removal. The technology targets a dynamic environment in which the transmitters, the receivers or even the scattering environment are not static and is useful for a communication scenario with several distributed transmitters and receivers sharing a common medium, in which interference removal is crucial to enhance system throughput and to enable simultaneous transmission of information from several transmitters to several receivers, using the same resources.

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DISTRIBUTED INTERFERENCE CANCELATION using only outdated channel gain information.

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

CONTEXT

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 network state may be already different and then the adaptation is detrimental, instead of beneficial.

Channel gain information is a crucial component for enhancing the throughput of current and future wireless systems by enabling the adaptation of the transmission and reception entities to the network state. Channel gain information, when available, may be utilized to improve the system multiplexing gain and simultaneously send data to multiple receivers. The channel is usually estimated at the receivers and the fed back to the transmitter(s). This procedure leads to a delay in the availability of the channel gain information at the transmitter(s). If the delay is larger than the channel coherence time, due to e.g. high mobility, the current channel realization cannot be predicted by the received channel gain information. Therefore, the use of predicted channel gain information based on outdated information leads to no multiplexing gain.

This technology makes use of the outdated channel gain information, which allows the interference generated by a group of terminals into another terminal to be efficiently compressed and removed. Using this technology, the system throughput scales with half the square root of the number of terminals (e.g., 500% throughput improvement in a scenario with 100 terminals).

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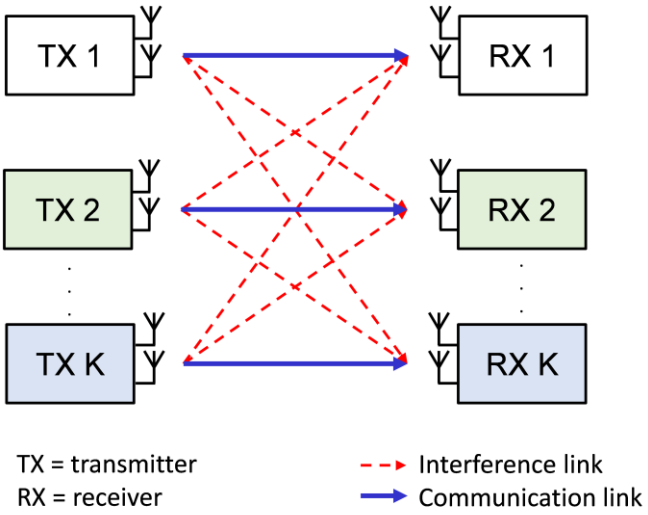
IP RIGHTS

International patent application filed (PCT/IB2017/054124).

DEVELOPMENT STAGE

TRL 3-4: Laboratorial tests 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

DEVELOPED BY

Researchers from Instituto de Telecomunicações (IT) from Universidade de Aveiro.

BUSINESS OPPORTUNITY

Licensing agreement.

Further joint technology development.

PARTNERSHIP

Universidade de Aveiro seeks companies within wireless communications area, interested in improving the capacity of their communication systems.

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