Multiuser Detection-enabled Wireless Communication Utilizing Adaptive Interference
Technology #17478

Applications

- Wireless communications such as 4G/5G cellular systems
- WiFi (802.11) and WiMax (802.16)
- Multiple input, multiple output (MIMO) receivers and signal propagation on cables

Problem Addressed

The proliferation of wireless technology has resulted in increased network interference. Cognitive networks (intelligent wireless communication systems which perform on-the-fly optimization) are used to control interference by careful selection of the transmission frequencies of secondary users. However, these technologies are designed to avoid interference, rather than use interference to facilitate network transmissions. In addition, existing channel models are insufficient for describing methods for overlaying or underlaying communications in the presence of an already established network of rate adaptive nodes, especially when explicit coordination is prohibited.

Technology

The invention is a cognitive coexistence radio which seeks out opportunities to utilize interference to take advantage of the situation as well as the device protocols and available capabilities. By using advanced processing and sensing technology, high throughputs are enabled for its own link and the link with which it simultaneously shares the frequency band. The invention provides a method for overlaying or underlaying communications in an established network of rate adaptive nodes. The technology is viable for any number of primary and secondary users on a channel and supports next generation multiuser detection (MUD)-enabled receivers, which can lead to full interference leveraging. In addition, the method can be applied to MIMO receiver systems and for signals propagating on a cable.

Advantages

- Cognitive coexistence radio leverages interference to facilitate communication
- Viable for any number of primary and secondary users on a channel
- Backward compatible with existing networks
- Supports next generation MUDs leading to full interference leveraging

Categories For This Invention:

- Electronics & Circuits
- Electronic Components
- Lincoln Laboratory
- Networks & Systems
Photonics
Data Communications
Telecommunications
Sources

Intellectual Property:
Method and apparatus for message fractionation and physical layer channel assignment for multiuser detection-enabled wireless communication among adaptive interference
PCT
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Message fractionation and physical layer channel assignment for multiuser detection-enabled wireless communication among adaptive interference
US Patent Pending

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Publications:
A Study of Network Throughput Gain in Optical-Wireless (FiWi) Networks Subject to Peer-to-Peer Communications
IEEE International Conference on Communications
June 14, 2009
MIMO Wireless Communication
Lincoln Laboratory Journal
Vol. 15, No. 1, 2005
Adaptive Interference Canceler for Narrowband and Wideband Interferences Using Higher Order Statistics
IEEE Transactions on Signal Processing
August 6, 2002

External Links:
Lincoln Laboratory
http://www.ll.mit.edu/index.html
Robust MIMO Wireless Communication in the Presence of Interference Using Ad Hoc Antenna Arrays
https://www.ll.mit.edu/asap/asap_03/presentations/bliss.prn.pdf

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