

# Enhanced MIMO Framework for Optimized Wireless Communications

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## An innovative $K$ -best detection method that improves efficiency and lowers complexity

This invention is a practical solution for implementing  $K$ -best detection in multiple-input and multiple-output (MIMO) data signal transmission techniques.  $K$ -best detection is a highly effective, tree-search-based strategy that is both high performing and flexible. Its level of complexity is unaffected by noise or type of channel. Georgia Tech researchers have improved the  $K$ -best method by modifying it with a scalar list detector that utilizes a slicing operation to reduce the complexity of large alphabets. With this novel algorithm, the processing delay does not increase at the same rate as the modulation order, thereby achieving a higher data rate and preserving performance. The resulting framework is a highly efficient, low-complexity MIMO solution with a competitive error rate.

### Summary Bullets

- **Innovative:** Overcomes the efficiency and complexity challenges of conventional detector frameworks
- **Independent:** Has a fixed complexity that remains unaffected by noise
- **Sophisticated:** Combines the high performance of  $K$ -best detection with the low-complexity scalar list detector

### Solution Advantages

- **Innovative:** Overcomes the efficiency and complexity challenges of conventional detector frameworks
- **Independent:** Has a fixed complexity that remains unaffected by noise
- **Sophisticated:** Combines the high performance of  $K$ -best detection with the low-complexity scalar list detector

### Potential Commercial Applications

- Wireless communications systems
- Radio
- Power line communications systems

### Background and More Information

The demand for higher spectral efficiency in MIMO communications systems and standards is leading to an increase in the number of antennas and alphabet size. With new 5G cellular networks using carrier frequencies above 6 gigahertz, increased spectral efficiency also increases the complexity of the MIMO detector at the receiver. This Georgia Tech innovation supports enhanced MIMO receivers to significantly improve wireless communications systems overall.

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## **IP Status**

Patent has issued: US10374772B2

## **Publications**

[Reduced-Complexity MIMO Detection via a Slicing Breadth-First Tree Search](#), IEEE Transactions on Wireless Communications - March 2017

## **Images**

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