

Novel wireless communication scheme for ultra-reliable low-latency communication

PHYSICAL SCIENCES: IT

The Challenge	The most critical requirement of the future 5G wireless networks is to reduce the latency to at most 1ms whilst achieving ultra-high reliability with block error rates in order of 10^{-9}
The Solution	Our solution is a novel communication scheme that enables thousands of antennas to be placed at the transceiver system, which in turn results in ultra-reliable low-latency communication
Key benefits	<ul style="list-style-type: none"> • Ultra-reliable communication without requiring an error-correction encoding • Very low latency • The proposed communication scheme enables the multi-antenna transceiver system to be equipped with thousands of antennas, a task impossible with other communication schemes • Low power consumption • Low Cost
Development Stage	Technology Concept - Simulations have proven viability. Research team currently working towards implementing in real world systems.
Brief Description & Differentiation	<p>The only way to increase reliability in wireless communication without increasing latency is to equip the transceiver with as many antennas as possible. In this spirit, we propose a communication scheme for the simplest multi-antenna transceiver system where the transmit, receive and the channel-state information symbols use our novel method. As a result, this multi-antenna transceiver system can be equipped with thousands of antennas, which in turn results in an ultra-reliable communication without requiring error-correction encoding. The lack of error-correction encoding results in the lowest latency possible. Simple error-correction can be added on top of the proposed scheme to increase the reliability even further, at the expense of increased latency.</p> <p><u>An Example:</u></p> <ul style="list-style-type: none"> ➤ MIMO with 1000 antennas ➤ Unit size 1m² ➤ Range - 1 km and 60 km (depending on the environment) ➤ 4 Mbits/s data rate ➤ Max. Latency of 1ms ➤ Max. Reliability 10^{-9} errors
Research Team	Dr Nikola Zlatanov and Armin Bazrafkan
Intellectual Property	Australian Provisional Patent application filed.
Key Publications	Not published.

Potential Applications:

- Industrial Automation (Smart Factory): Wireless control of factory robots
- Unmanned Ground or Aerial Vehicles: Two-way Wireless Communication
- Tele-surgery: reliable low-latency wireless communication
- Military/Civil applications with very fast response requirement
- Augmented Reality (AR) and Virtual Reality (VR) Wireless Glasses
- Intelligent Transportation: Communication of Critical Information

Proposed Next Development steps:

Build prototype to verify the technology