**Advanced Wireless Communication Networks**

Our research group focuses our attention on exploring key technologies of next-generation wireless communication networks, such as 5G/6G and IoT. More specifically, our research interests include, but are not limited to: transmission technology, digital signal processing, network protocols, information theoretic security, cooperative communications, and wireless sensor networks.

### Faster-than-Nyquist Signaling

**Rate boost by non-orthogonal symbols**

\[ T/\alpha \]

**High Capacity**

This scheme packs more symbols than those limited by the Nyquist criterion, hence increasing a transmission rate without imposing the bandwidth and power expansion.

### Physical Layer Security

**Relay’s signal processing controls propagation environments.**

**High Security**

Physical layer security has the potential of attaining information-theoretically secure communications, without relying on encryption. This may be suitable for IoT networks.

### Massive MIMO Transmissions

**Symbol duration ≤ Symbol interval**

**Isolated pulse**

**100〜1000 antennas [Massive MIMO]**

**High Rate & High Energy Efficiency**

Source bits are allocated onto large-scale antenna elements. This scheme operates in a single-RF transmitter structure, hence attaining high capacity and energy efficiency.

### Delay Tolerant Networks

**Selected links**

\[ C(h_{SR_1}) > R \]

**Shared packet**

**Packets are deleted after ACK reception**

**Broadcast phase**

**Relaying phase**

**High Reliability**

Exploiting data buffers at relay nodes in cooperative communications allow us to attain an improved reliability, owing to the explicit benefits of flexible link selection.