Design and Prototype of Next Generation Internet of Things

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**Multi-user MIMO-OFDM Platform**

**SEFDM Signal Waveform**

- OFDM (12 sub-carriers, data rate is 480 Mb/s)
- SEFDM Type-I (12 sub-carriers, bandwidth compression ratio is at=0.67, data rate is 360 Mb/s)
- SEFDM Type-II (12 sub-carriers, bandwidth compression ratio is at=0.67, data rate is 1.5 Mb/s)

**Indoor Experiment**

**Precoding Schemes**

- Zero Force Precoding (ZFP)
- Sparse Code Precoding (SCP)
- Gaussian Mixture Precoding (GMP)

**Experimental CI Precoding Performance**

- Simulated Correlation
- CI Precoding Correlation

**Downlink Scheme**

**ZF Precoding**

**Cl Precoding**

- QPSK
- 8PSK

**Uplink Scheme**

**Fast-OFDM Signal Waveform**

- BPSK constellation comparison

- Enhanced Connections

- Enhanced Power Efficiency

- Half-Sinc Signal Waveform

- Double data rate via packing two Half-Sinc signals
- Robust to frequency offset due to the protection gap

**Enhancement of Data Rate**

- Performance of QPSK modulated eNB-LoT signals (a) and 8PSK and QPSK, 8PSK modulated NB-LoT signals.
- Non-orthogonal signal waveform is better than dense modulation formats to improve IoT data rate!