Theme: Big Data & Network

Subject: Massive QAM Scheme for 100Gbps Wireless Communication

Introduction

Modulation and Coding Schemes (MCS) are key enablers for increasing spectral efficiency. Current max spectral efficiency in wireless standards is only 6-bit/s/Hz per channel using 64-QAM. Higher MCS is only used in wired (fiber) communication (i.e. 4096-QAM). Increasing MCS to support higher modulation scheme could potentially double the spectral efficiency. The goal of this research is to explore novel modulations and coding algorithms and architectures to increase spectral efficiency of wireless communication to support 100Gbps.

Required to research and propose techniques to overcome channel limitations and enable successful decoding at low SNR and low EVM.

Scope

The scope of the project is:

- Research and exploration of different modulation and coding algorithms and architectures to increase and potentially double the spectral efficiency in wireless channels.
- Verification of the proposed techniques in different channel models and SNRs. Comparison to current wireless methods.
- Propose novel massive modulation and coding hardware architectures to support 100 Gbps wireless systems.

Research questions

We are interested in the following research questions. These questions are not exhaustive but different research questions are open to discuss with research partners.

- What would be strong Massive QAM candidate for increasing and potentially double spectral efficiency in wireless communication?
- What would be the most effective combination between Massive QAM and coding in terms of capacity, power, performance, and flexibility?
- How the above techniques compare to other spectral efficiency enhancement techniques such as Spatial Multiplexing (i.e. Massive MIMO) in terms of performance, capacity, complexity, flexibility, and power?
- Can both (Massive MIMO and Massive QAM) techniques efficiently used together?
- What are other alternatives to the above techniques and how they are compared to the proposed techniques?

Expected Deliverables

The following is open to discussion:

- Proposal of new Massive modulation and coding techniques
- Detailed progress reports every 3 months summarizing accomplishments.
- Proposal of Massive MCS codes architectures
- Patents with Samsung (if agreed)