

Motivation

- **Spectrum Scarcity → Frequency Agile Standards**
 - Non-contiguous Transmission
 - Carrier Aggregation (CA) in LTE-Advanced
 - Cognitive Radio
 - 5G Cellular
- **Non-contiguous carriers intermodulate**
 - Caused by nonlinearities in power amplifiers (PAs)
 - Undesired spurious emissions (spurs)
 - Could interfere with nearby channels
 - Self-interference to own receiver when using FDD
- **Current 4G chipsets support up to 4 carriers**
 - Snapdragon 835
 - 4x20 MHz carrier aggregation downlink, 2x20 MHz uplink
- **Need efficient way to linearize for this scenario**
- **DPD requires extra hardware**
 - Extra RX chains
 - Larger area
 - More Power

Main Idea

- **Use a lower precision ADC to reduce the area and cost for applying DPD on a UE device**
 - Iteratively learn coefficients as necessary using adaptive, LMS algorithm.
 - Apply them as in Equation 5 to reduce spurious emissions.

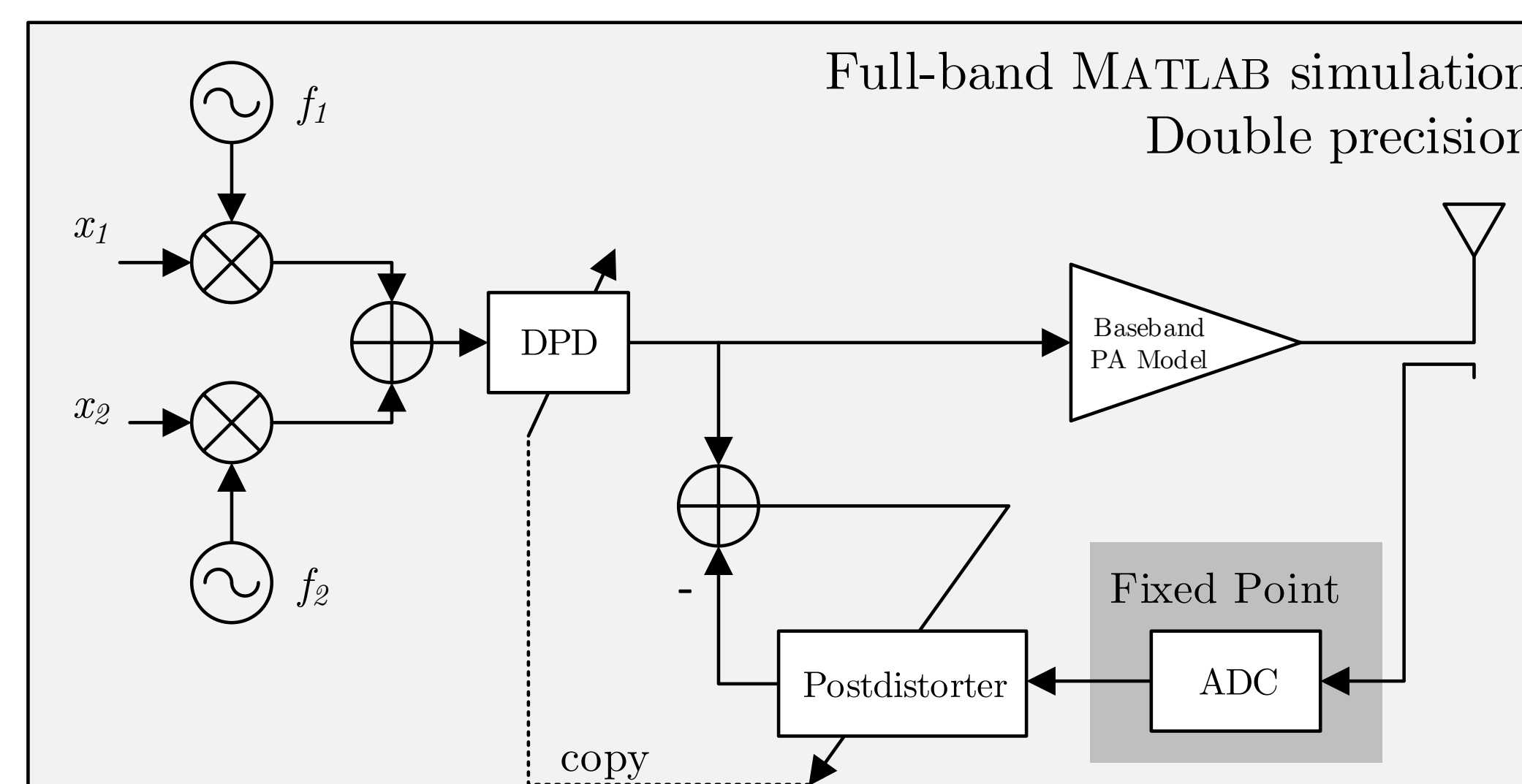
MATLAB Simulation

• LTE-Advanced CA Scenario

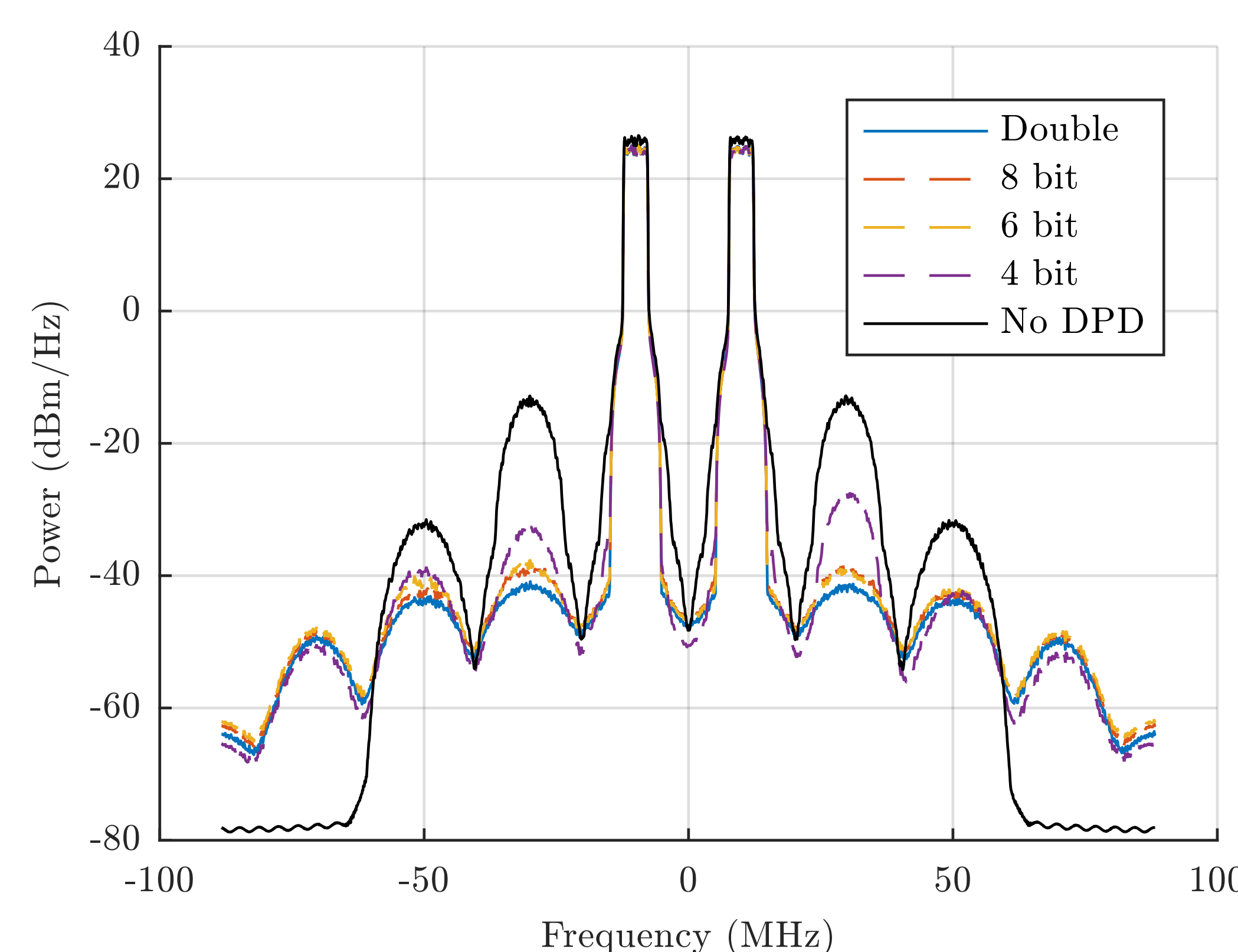
- Two, 5 MHz CCs

Full-band DPD Simulations

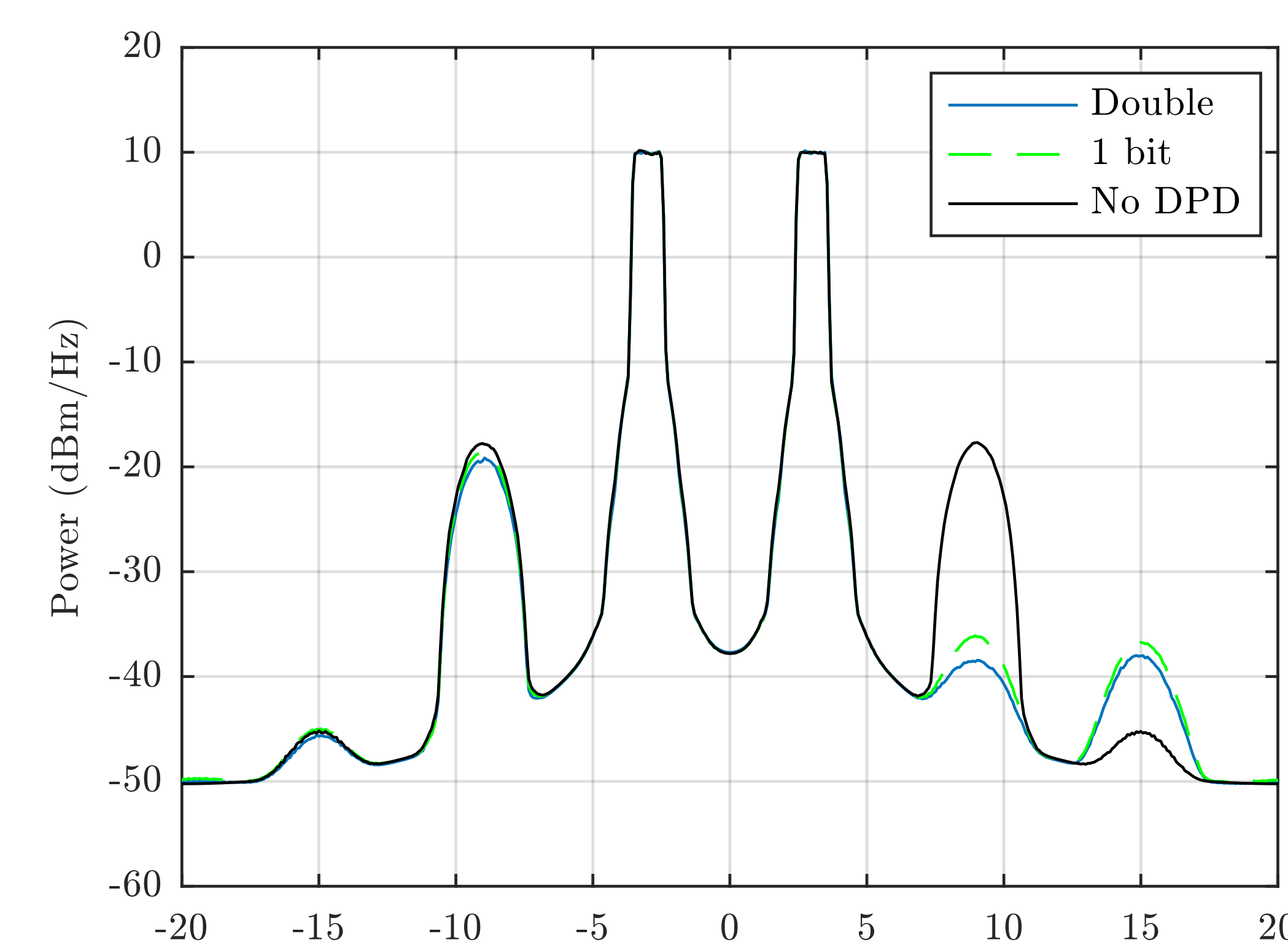
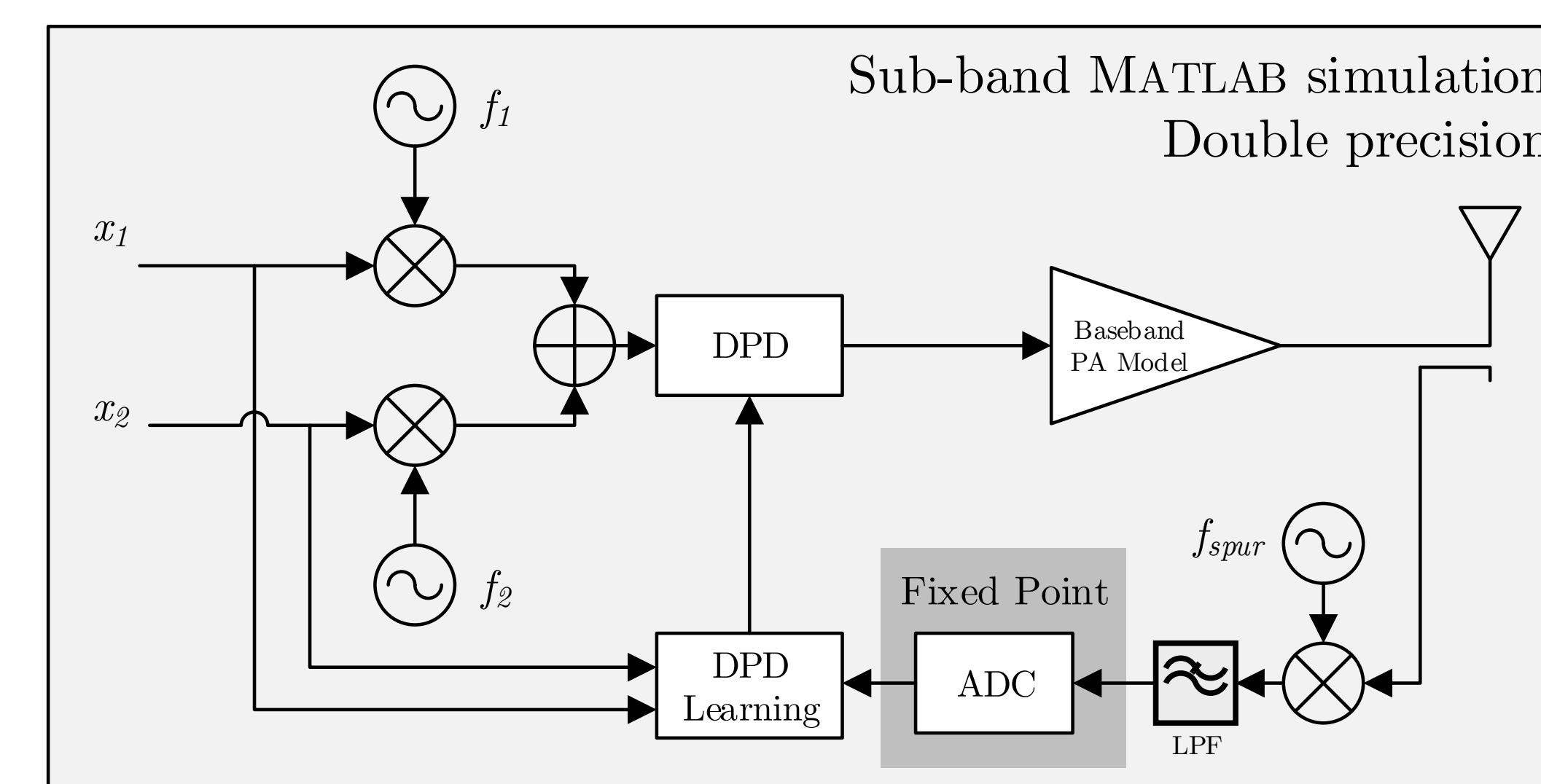
• Simulation Architecture



- MATLAB simulation
- 9th order Parallel Hammerstein PA model



Sub-band DPD Simulations



GNURadio Simulator

Future Work

- **Main carrier linearization**
- **Hardware testing with a real PA using the WARP SDR platform**