

## Phase Offset Correction

In this step it's the transition from time to frequency domain, which is done by the FFT block. Following the FFT, the OFDM Equalize Symbols block is the first one in frequency domain and is responsible for phase offset correction and channel estimation. As the sampling times of sender and receiver are not synchronized and as the symbol alignment is not perfect, a phase offset is introduced. This phase offset is linear with frequency and can be corrected with the help of pilot subcarriers. IEEE802.11 mandates four pilot subcarriers that encode a predefined BPSK constellation which is the same for each frame, but changes from symbol to symbol. Thus, the symbol index within the frame has to be known; it is signaled by a tag in the sample stream that is added by the OFDM Sync Long block. Based on the four pilots the phase offset is estimated by a linear regression and compensated

In my wifi receiver code, the **phase offset estimation** is handled in the **frame equalizer block**. This block in the ieee802.11 module is responsible for estimating both the **channel** and the **phase offset**, internally, this uses the **Long Training Field (LTF)** to calculate the **phase rotation** per subcarrier. This phase offset is applied to correct the symbols before decoding the MAC frame:

```
self.ieee802_11_frame_equalizer_0.set_algorithm(ieee802_11.Equalizer(self.chan_est))  
self.ieee802_11_frame_equalizer_0.set_frequency(self.freq)  
self.ieee802_11_frame_equalizer_0.set_bandwidth(self.samp_rate)
```