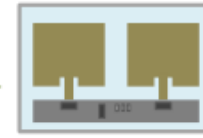


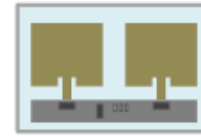
Design



Uplink communication - from tag to reader

- However **not every sub-channel** can observe such obvious amplitude deviation, the best sub-channel **seems distance-dependent**.
- Step 2: find out good sub-channels & combining them into one
 - Before the Tag msgs the reader, it will also send a shared preamble.
 - Reader listens all of the sub-channel and find out the top 10 sub-channels that has the best quality of the preamble
 - for the msg body, using average(**weighted by noise variance**) of the measurement from these 10 good sub-channels.

Design



Uplink communication - from tag to reader

- Step 3: decode the bits
 - Pretty simple, $\text{bit} = (\text{CSI_normed_weighted} \geq 0) ? 1:0$
- Some added schemes:
 - Use multiple WiFi channel for redundancy and using majority vote to figure out the bits
 - Use timestamp to cluster packets that stands for the same bit
 - Hysteresis thresholds design for CSI variance