RF Self-Interference Channel Characterization
For Full-Duplex MIMO Transceivers
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Methodology
VNA channel sounding technique was used for characterization of the SI channel.

Advantages:
1. Co-located setup simplicity & minimum data post-processing required
2. Can sweep over wide frequency range of 500 MHz for increased time resolution without the need for high sampling rate needed in other sliding correlator channel sounding techniques
3. Practical only for co-located Tx/Rx channels with low external interference

Disadvantages:
1. Requires static environment when sweeping over wide frequency range to prevent variations of channel during the acquisition time. A time-varying channel may give erroneous data
2. Relatively slow measurement time compared to other Chip & PN Channel sounding techniques

Results
The graphs generated from the channel data show that the power delay profiles (PDP) are mainly composed of two parts:
1. The antenna reflection part which is due to internal reflection in the antenna caused by coupling between the V & H polarization. This < 10ns delay part is independent of the environment, and Tap Delay Stage 1 Passive RF/ Analog SI C canceller can be used for this very slowly changing SI part.
2. The second part > 10ns delay is due to the external reflections. Presence of reflecting objects cause multipath propagation of the same Tx signal, creating small-scale fading effects of the signal at the receiver. This space multipath highly depends on the environment. More dynamic Stage 2 & 3 SIC is used for this part.

Conclusion
16 different locations with at total of 62 measurements were performed to obtain various statistical results for a typical SI channel in office space indoor environment. Direct & Cross SI due to antenna internal structure and near objects, is static, and may need only 1-2 tap delays Stage 1 canceller with low rate tuning, but with passive high input power linearity. SI due to external objects reflections has Ricean distribution and requires digital S2 & S3 cancelation techniques.

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