

## Ng Ping Yi Gabriel] **Digital filtering approach to reduce pulse extension loss in Scan-on-Receive Digital Beamforming**

The operating concept of Scan-On-Receive in Elevation (SCORE) is a digital beamforming (DBF) concept that has been used with Phased Array Fed Reflector (PAFR) antenna architecture to achieve SAR imaging of higher resolution and larger scene sizes. The weights in SCORE are typically applied in the time domain to maximise SNR from radar returns by progressively scanning from the nearest edge of the scene, to the furthest edge. Considering the non-zero pulse widths of radar signals, SCORE can only optimise for one portion of the return pulse. This results in an amplitude modulation across the received pulse, and manifests as a loss in the expected SNR, termed as Pulse Extension Loss (PEL).

Our submission presents an improved implementation of SCORE through the use of digital filters. The filter design exploits the time-frequency relationship of stretch processed (dechirp) Linear Frequency Modulated (LFM) waveforms to apply DBF weights in the frequency domain. This implementation is shown to mitigate the effects of PEL, while preserving the SNR improvements from DBF. Experiments were conducted in an antenna compact range to validate the approach.