Deliverable 2.7  
Executive Summary  

PTFE-Based Single Layer V-band Antenna – Evaluation

A thin wavelength long arrangement wire-grid array approach has been followed, where microstrip lines connect half-wavelength long radiating patches. As the radiating patches placed one wavelength apart they are fed in phase at the resonance. A three-element configuration has been chosen as sufficient to provide 10 dBi gain and keep the feed planar. In order to match the input impedance of the structure parasitic patches were added. The antenna features three radiating elements and two parasitic patches in between them, see Fig. 1.

![Fig. 1: Schematic of the wire-grid antenna on low-permittivity substrate.](image)

The final antenna dimensions were chosen as S=1.7mm, W=1.45mm, L=3.98mm, W_{s}=W_{w}=0.1mm, W_{f}=0.5mm, L_{f}=0.65mm, W_{ms}=0.06mm, L_{t}=2.5mm. The simulated and de-embedded measured return losses are given in Fig. 2. From these, one can observe that the antenna is well-matched from 54 to 68 GHz and the measurement in a good agreement with the simulated results.

![Fig. 2. Comparison of the measured (squares) and simulated (solid) return loss.](image)
The radiation pattern of the antenna has been measured across the frequency band and is found to be in good agreement with those simulated in CST Microwave Studio. Based on the measured far-field pattern the directivity has been calculated. Since the antenna is well matched the difference between the directivity and the actual gain should be insignificant. The comparison of the directivity and the simulated gain is given in Fig. 3. The directivity of the antenna is higher than 10 dBi in the specified frequency range. More details on the antenna prototype can be found in reference [1].

![Fig. 3. Comparison of the simulated realized gain and measured directivity of the wire-grid antenna.](image)