**Outdoor Measurements at 28 GHz**

For each environment we have 2 folders:

‘Header files’ – information about Tx and Rx

‘MPC files’ – RF data

Our system simultaneously records positioning information from the navigation system while receiver is in motion and RF data from digitizer. The 16 channel impulse responses (CIRs) for each Tx-Rx configuration were synthesized through the space-alternating generalized expectation-maximization (SAGE) algorithm to extract multipath component (MPC) files with delay, angle-of-arrival (AoA) in azimuth and elevation, and path loss for each arrival.

Therefore, for each receiver position we report one RF data file with multipath components\* (e.g., MPC1581.mat) and one header file (e.g., F0001581hdr.mat) with all info about Tx and Rx (position, height, Tx power, Rx velocity, polarization…).

Important details from header files:

Tx POSITION: Transmitter was fixed all the time during measurements. Tx position info can be found in the header file: ‘TxData.lat\_Deg’, ‘TxData.long\_Deg’ and ‘TxData.alt’ (m)

Rx POSITION: The receiver equipment was placed on top of the robotic positioning system enabling data acquisition in untethered, mobile mode, while reporting position, velocity and heading of the receiver. Rx position info can be found in the header file: ‘GPSData.latitude\_Deg’, ‘GPSData.longitude\_Deg’, and ‘GPSData.altitude\_M’, as well as speed ‘GPSData.Speed\_MeterPerSecond’ (m/s) and heading ‘GPSData.AziHeading\_Deg’ (degree).

Tx HEIGHT: ‘TxData.Txh\_m’ (m)

Rx HEIGHT: ‘RxData.Rxh\_m’ (m)

More info about Tx and Rx can be found in the header file: ‘TxData’, ‘RxData’, and ‘GPSData’.

Important details from MPC files:

Column 1: Delay (ns)

Column 2: Angle-of-Arrival (AoA) Azimuth (degree)

Column 3: AoA Elevation (degree)

Column 4: Path loss (dB)

\*We collected 8 sectors of data (channel rotations), therefore some of the MPC files contain 8 sectors, while other contain 1 sector of data (processing time for all sectors is very long).