DESCRIPTION OF THE KIOSK SCENARIO

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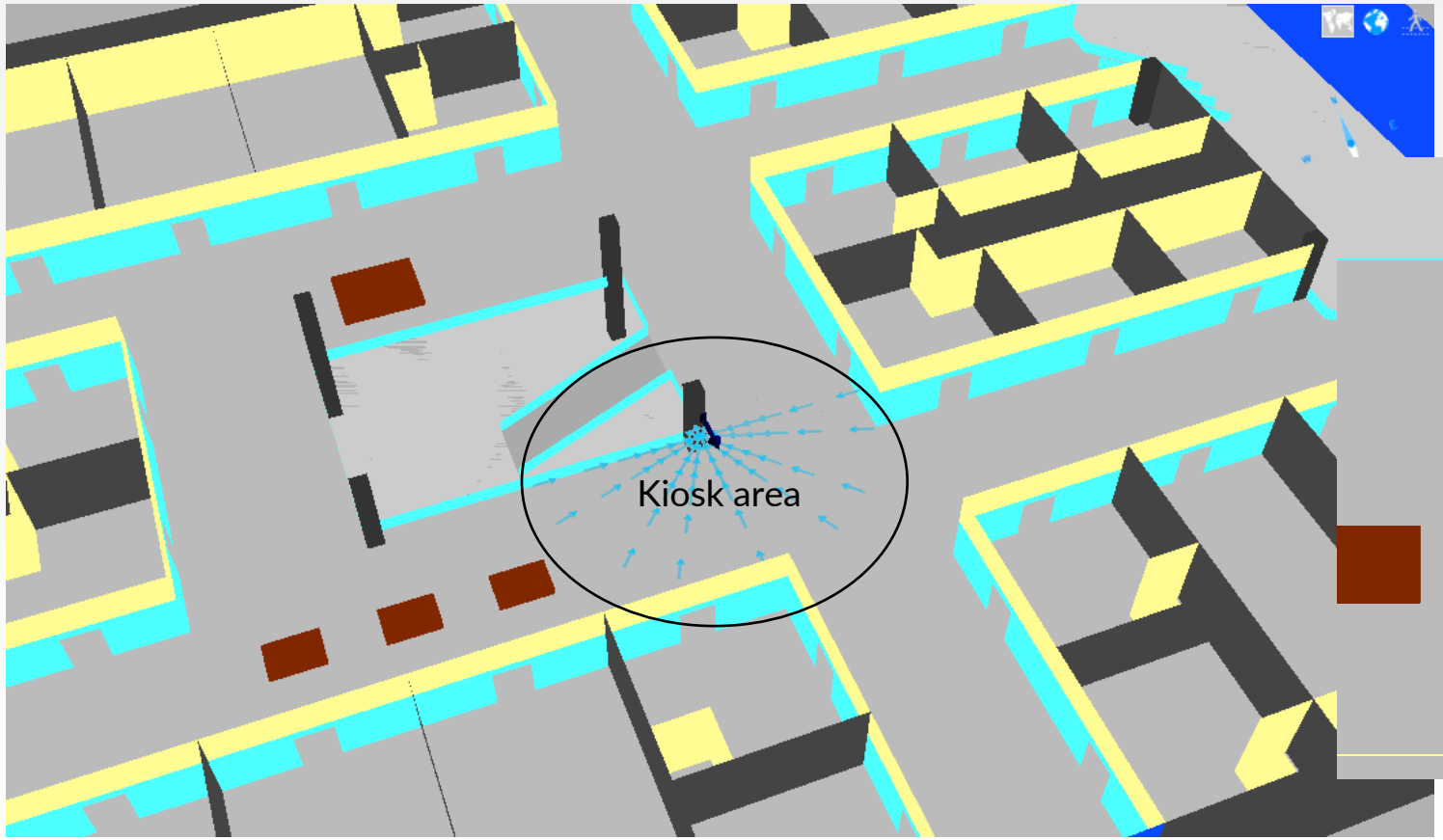
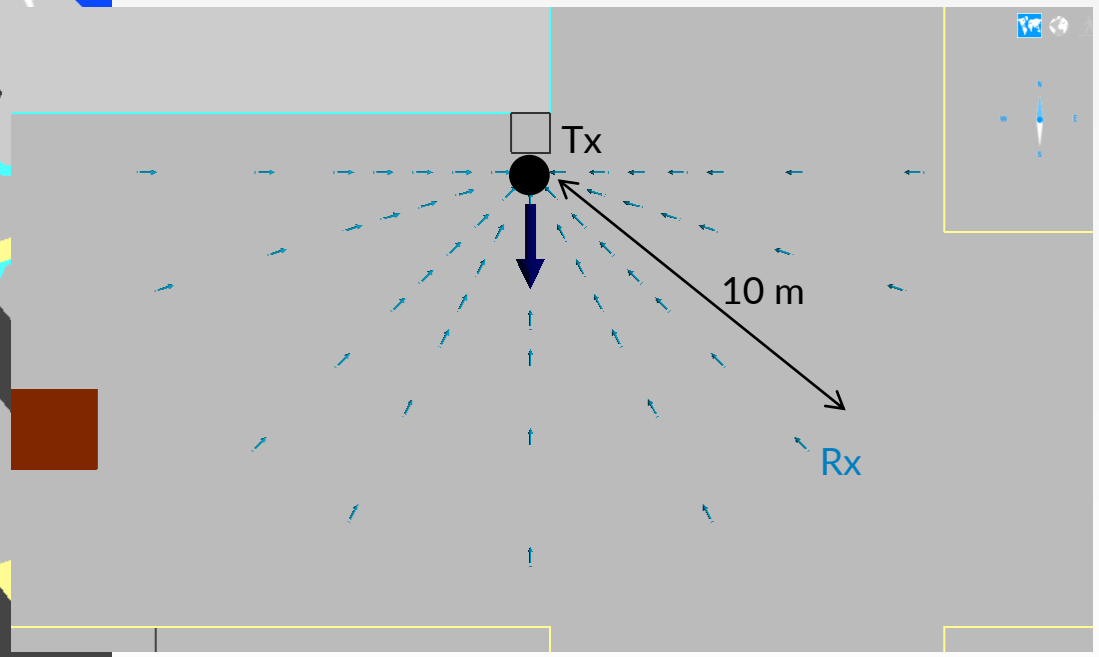
V1.3

INTRODUCTION

- **Set of MIMO channel samples at 150 GHz**
- **Simulated by Volcano ray-tracing**
- **Scenario**
  - Kiosk scenario in a corridor of a shopping mall, at the corner of a large open area
  - Kiosk transmitter
    - One fixed position
    - Rectangular antenna array: (16 x 8) x 2 polarizations
  - User equipment
    - 64 positions in front of the kiosk transmitter
    - Distance from the kiosk transmitter (in horizontal plane): 0.5 to 10 meters
    - Rectangular antenna array: (8 x 8) x 2 polarizations
  - Visibility condition: LoS or obstructed by human bodies
- **Channel samples: available in Matlab files**

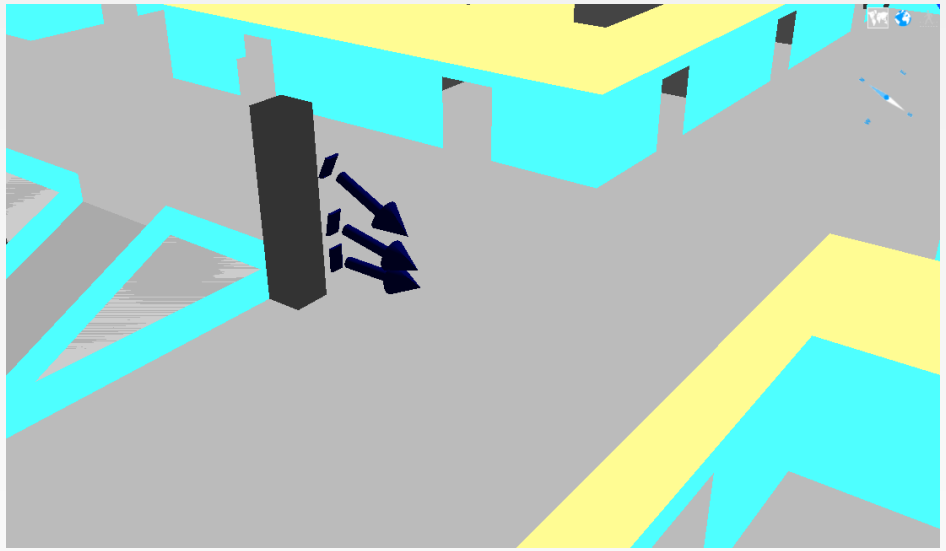
Setup (Sub-THz kiosk in a shopping mall)

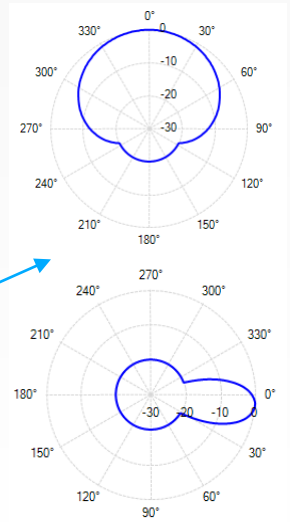




KIOSK TRANSMITTER

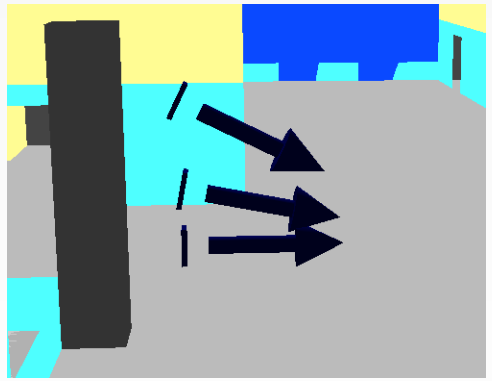
Property	Details
Location	Location 1 • Facing a large open area (intersection between corridors) • A pillar (made of concrete) is located 50 cm behind the antenna • The pillar width is 1 m • No other object in the vicinity of the Tx antenna *Location 2 maybe*
Height	Three simulated heights: 1.5 m, 2.5 m and 4 m above ground The ceiling height is 5 m
Tx frequency	150 GHz
Signal bandwidth	2 GHz
Tx power	0 dBm
Antenna array	Dual-polar elements distributed over a 16×8 rectangular array 16 columns × 8 rows × 2 polars ➔ 128 radiating elements Separation: λ/2 (= 0.1 cm) Polarization: either V/H or ±45°
Antenna orientation	Pointing towards the center of the considered reception area Downtilt = 0°, 11.3° and 26.5° at resp. height 1.5 m, 2.5 m and 4 m
Antenna radiation pattern	Pattern of each radiating element - Either isotropic (0 dBi gain) - Or directive (90° beamwidth, 0 dBi max gain)





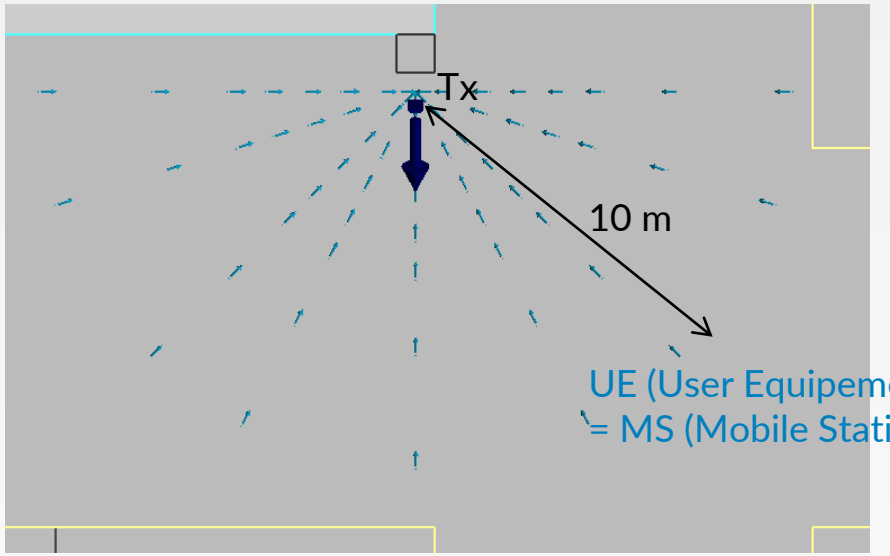
H-plane

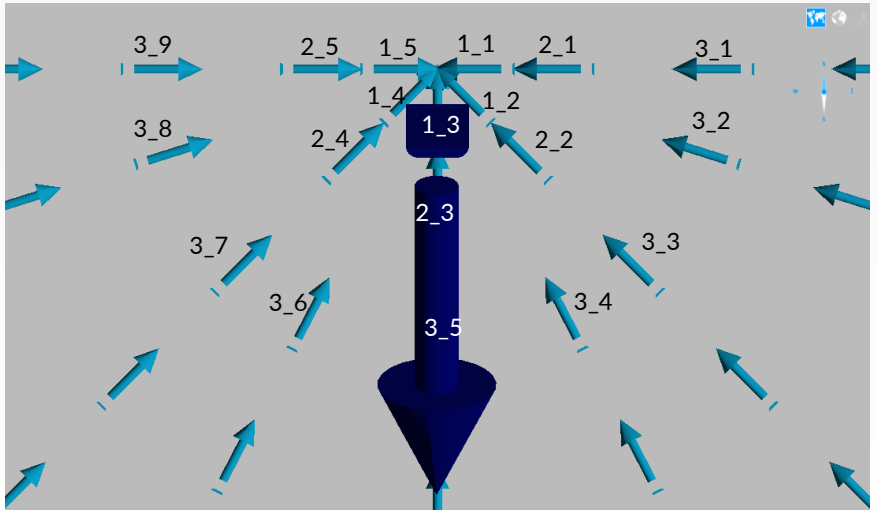
V-plane



User equipment

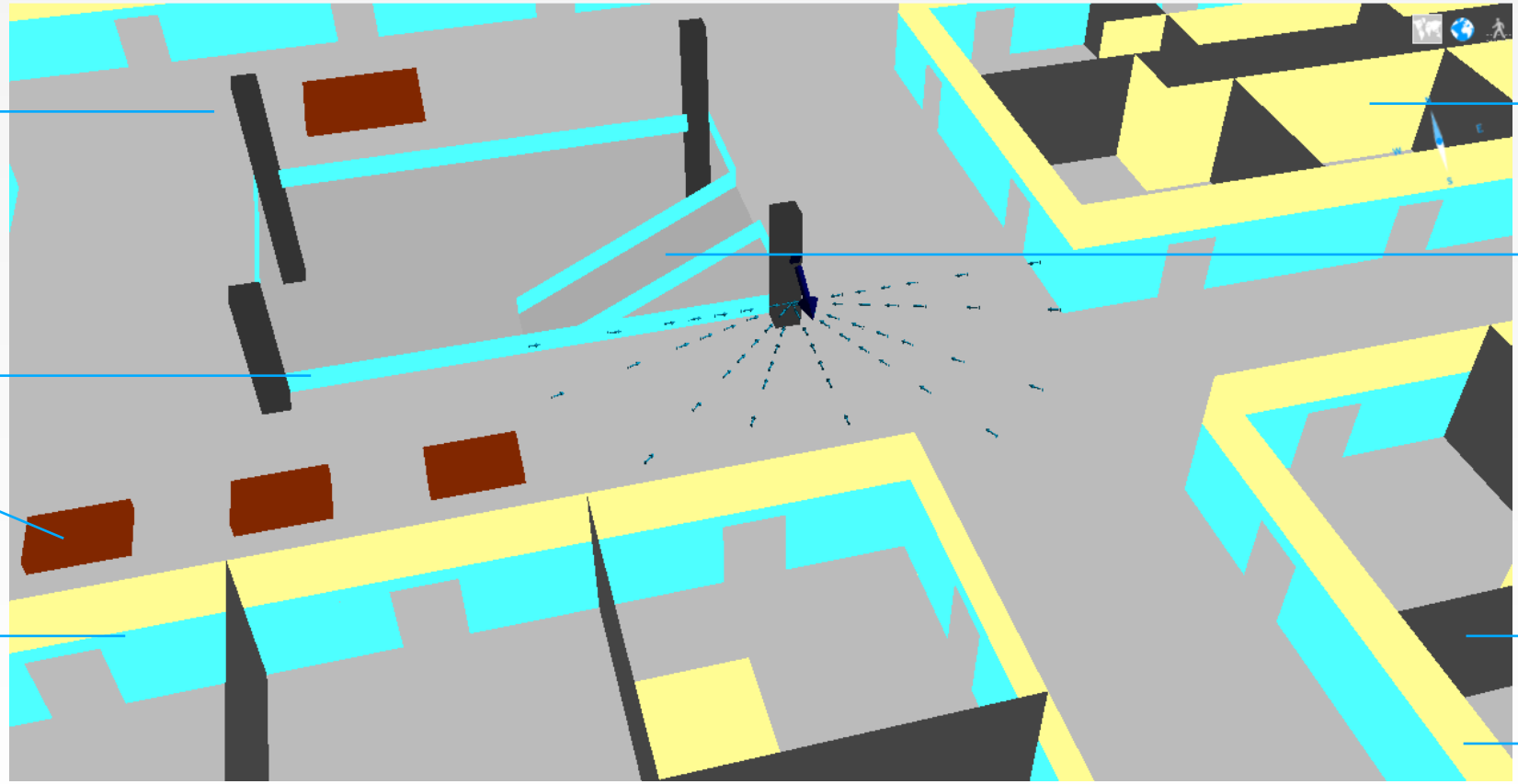
Property	Details
Location	64 positions distributed within the LoS area facing the kiosk transmitters Distance to the kiosk transmitter (horizontal plane): - 0.5 m: MS_1_1 to MS_1_5, every 45° - 1 m: MS_2_1 to MS_2_5, every 45° - 2 m: MS_3_1 to MS_3_9, every 30° - 3 m: MS_4_1 to MS_4_9, every 30° - 4 m: MS_5_1 to MS_5_9, every 30° - 5 m: MS_6_1 to MS_6_9, every 30° - 7 m: MS_7_1 to MS_7_9, every 30° - 10 m: MS_8_1 to MS_8_9, every 30°
Height	1.5 m above ground
Rx losses	0 dB
Antenna array	Dual-polar elements distributed over a 8×8 rectangular array 8 columns × 8 rows × 2 polars ➔ 64 radiating elements Separation: λ/2 (= 0.1 cm) Polarization: either V/H
Antenna orientation	Horizontal pointing towards the kiosk antenna Downtilt = 0°
Antenna radiation pattern	Pattern of each radiating element: isotropic (0 dBi gain)





ENVIRONMENT

- **In the corner of a large open square area of width 40 m**

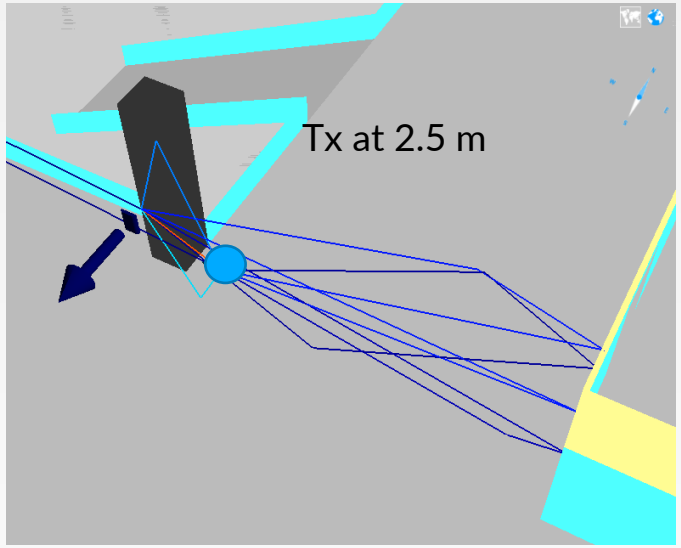


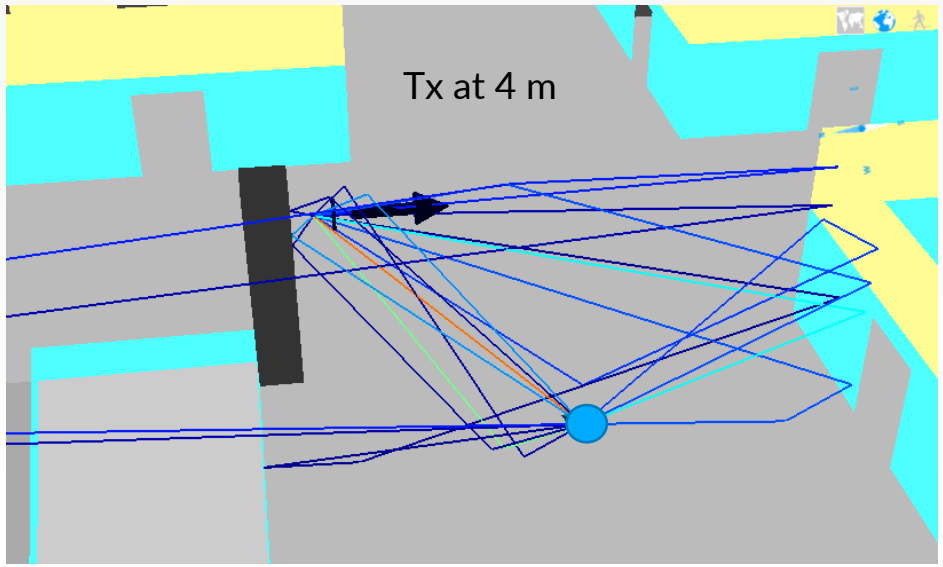
FREQUENCY-SELECTIVE CHANNEL PREDICTIONS

- **VolcanoFlex**
  - 3D ray-launching technique
  - Max. allowed interactions along a path
    - 3 reflections
    - 1 diffraction
- **MIMO prediction**
  - Plane-wave assumption
  - Channel stationarity along the antenna array
- **Frequency selective channel**
  - Bandwidth 2 GHz
  - Divided into 20 sub-carriers
- **163 840 channel complex coefficients per Tx-Rx link**
  - 128 Tx radiating elements × 64 Rx radiating elements × 20 sub-carriers

[1] G. Gougeon, Y. Corre and M. Z. Aslam, "Ray-based Deterministic Channel Modelling for sub-THz Band," *2019 IEEE 30th International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC Workshops)*, 2019

PROPAGATION PATHS





OUTPUT FILE FORMAT

- Channel matrices are written in Matlab file
- One Matlab file per Tx configuration & UE location
- About 600 Mo per file

Name	Value
channel_matrix	20x256x128 complex double
frequencies	1x20 double
input	1x1 struct

reshape(channel_matrix(1,:,:)

256x128 complex double

	1	2	3
1	-2.3183e-04 - 2.8660e-04i	-5.1914e-06 - 2.6113e-06i	-1.1367e-04 - 2.4889e-04i
2	8.6653e-06 + 4.3671e-06i	1.3418e-04 + 2.5678e-04i	6.6501e-06 - 2.6238e-06i
3	1.8314e-04 + 1.9518e-04i	-3.9867e-06 - 5.0243e-06i	1.6746e-04 + 3.1769e-04i
4	6.8334e-06 + 8.3294e-06i	-1.5240e-04 - 3.2345e-04i	8.4435e-06 + 6.5764e-07i
5	-9.4431e-05 - 2.8188e-04i	-1.6975e-06 - 6.7146e-06i	-2.1604e-04 - 2.7666e-04i
6	3.2105e-06 + 1.1223e-05i	2.4278e-04 + 2.7239e-04i	8.4591e-06 + 4.7147e-06i
7	2.1343e-04 + 3.3110e-04i	1.2293e-06 - 7.2292e-06i	1.8952e-04 + 2.1317e-04i
8	-1.5361e-06 + 1.2286e-05i	-1.3475e-04 - 2.0567e-04i	6.4691e-06 + 8.5946e-06i

Field	Value
n_frequencies	20
bs_n_columns	16
bs_antenna	'isotropic'
bs_polarization	'dual_polar_VH'
bs_n_rows	8
bs_n_elements	256
ms_n_columns	8
ms_polarization	'dual_polar_VH'
ms_n_rows	8
ms_n_elements	128

1x20 double

	1	2	3	4	5	6
1	149050	149150	149250	149350	149450	1495
2						

OUTPUT FILES ORGANIZATION

- **All results Matlab files related to one Tx configuration are stored into a single ZIP file**

File name	Tx height	Tx radiating element	Tx polarization
BS 1-5m - Iso pm45 16x8 - Iso VH 8x8.zip	1.5 m	Isotropic	V/H
BS 2-5m - Iso pm45 16x8 - Iso VH 8x8.zip	2.5 m	Isotropic	V/H
BS 4m - Iso pm45 16x8 - Iso VH 8x8.zip	4.0 m	Isotropic	V/H
BS 1-5m - Iso pm45 16x8 - Iso VH 8x8.zip	1.5 m	Isotropic	±45°
BS 2-5m - Iso pm45 16x8 - Iso VH 8x8.zip	2.5 m	Isotropic	±45°
BS 4m - Iso pm45 16x8 - Iso VH 8x8.zip	4.0 m	Isotropic	±45°
BS 1-5m - Dir pm45 16x8 - Iso VH 8x8.zip	1.5 m	Directive	V/H
BS 2-5m - Dir pm45 16x8 - Iso VH 8x8.zip	2.5 m	Directive	V/H
BS 4m - Dir pm45 16x8 - Iso VH 8x8.zip	4.0 m	Directive	V/H
BS 1-5m - Dir pm45 16x8 - Iso VH 8x8.zip	1.5 m	Directive	±45°
BS 2-5m - Dir pm45 16x8 - Iso VH 8x8.zip	2.5 m	Directive	±45°
BS 4m - Dir pm45 16x8 - Iso VH 8x8.zip	4.0 m	Directive	±45°

beyond 5G BRAVE

For any question,
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