LS telcom

LS of South Africa Radio Communication Services (Pty) Ltd

RF spectrum and site audit

LS telcom

LS of South Africa Radio Communication Services (Pty) Ltd

Content

01 Our fleet

02 Drone system characterization – Anechoic Chamber

03 Multi-spectral direction finding

04 Broadcast site audit

05 Mobile site audit

06 Broadcast and mobile tower modelling

07 3D tower model and RF information integration

08 Channel specific inspections

09 Satellite dish analysis and micro-wave measurements

01

Our fleet

LS telcom
LS of South Africa Radio Communication Services (Pty) Ltd

DJI Phantom

- Photogrammetry
- Surveying
- Footage
  - Video
  - Images

© 2021 LS of SA | **LS Spectrum Audit 2021**

Our fleet continued

LS telcom
LS of South Africa Radio Communication Services (Pty) Ltd

DJI Matrice 210 series

- Photogrammetry
- Surveying
- Footage
  - Video
  - Images
- Mobile site audits

© 2021 LS of SA | **LS Spectrum Audit 2021**

Our fleet continued

LS telcom
LS of South Africa Radio Communication Services (Pty) Ltd

DJI Matrice 300 RTK series

- 3D modelling
- Tower Inspections
- Broadcast site audits
- Mobile site audits
- D-RTK compatible
- Satellite + Microwave measurements

© 2021 LS of SA | **LS Spectrum Audit 2021**

Our fleet continued

LS telcom
LS of South Africa Radio Communication Services (Pty) Ltd

DJI Matrice 600 Pro

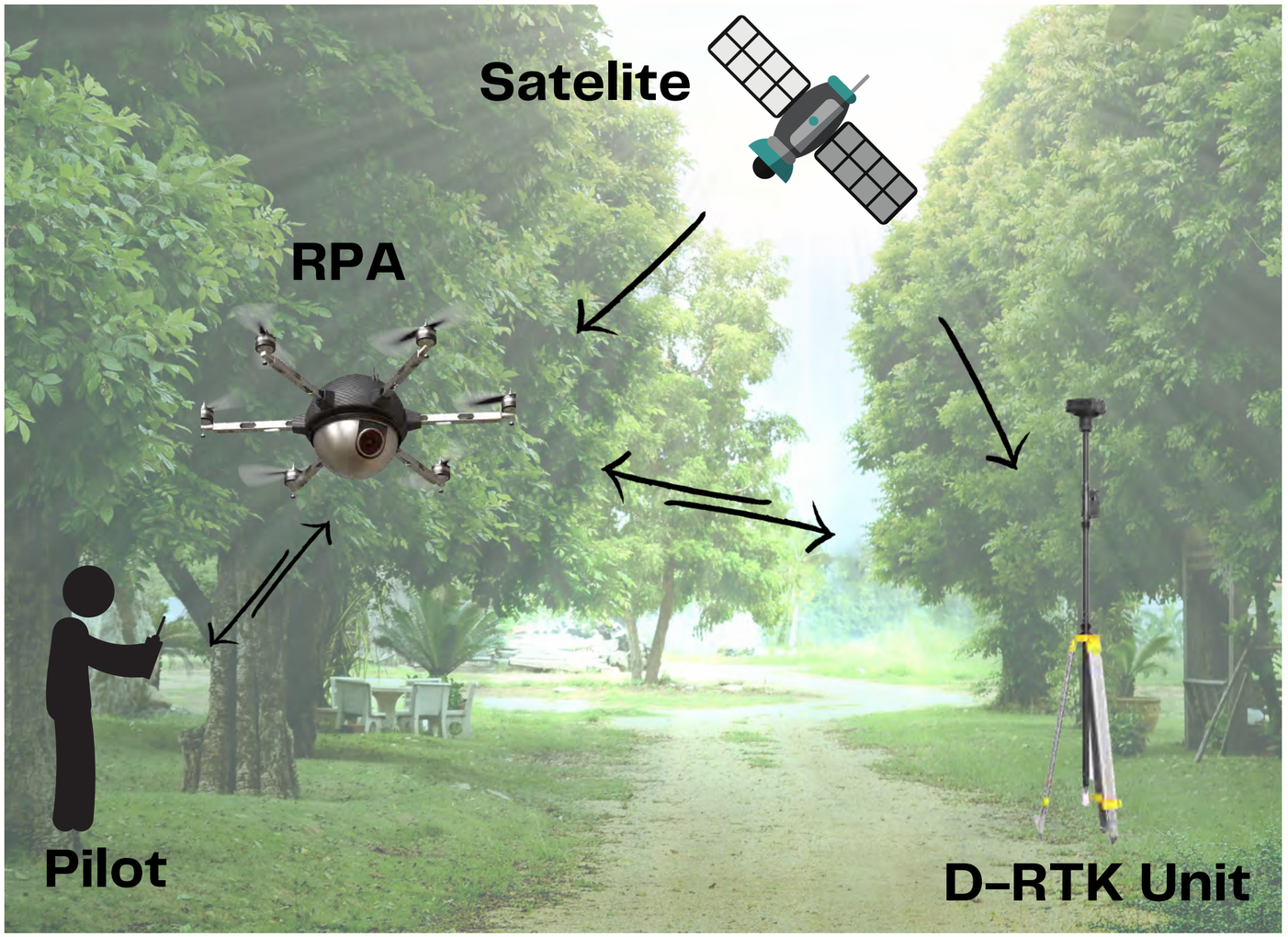
- Broadcast site audits
- Mobile site audits
- D–RTK compatible
- Satellite + Microwave measurements

© 2021 LS of SA | **LS Spectrum Audit 2021**

LS telcom
LS of South Africa Radio Communication Services (Pty) Ltd

D-RTK GNSS

- Centimeter-Level Positioning Accuracy
- IP65 level ingress protection
- Built-in IMUs for optamization



© 2021 LS of SA | **LS Spectrum Audit 2021**

02

Drone characterization: Anechoic chamber

- Full anechoic chamber for drone characterization
  - Receive pattern (Roll, Pitch and Azimuth offsets)
  - Receiver gain
  - Front-to-back ratio

- Special jacket has been designed to cover the RPA to ensure that it is shielded against Radio Frequency interference!

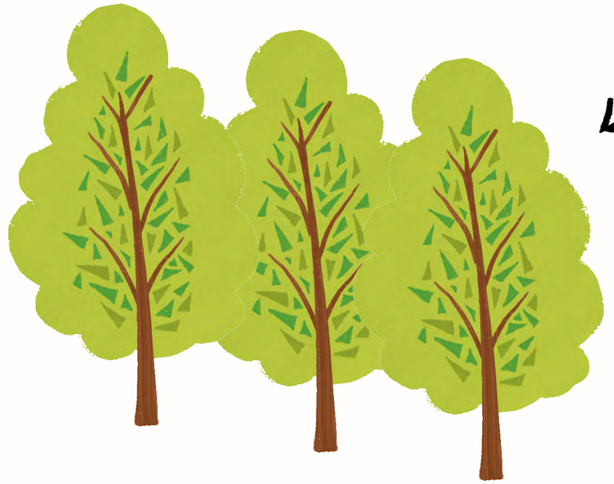
© 2021 LS of SA | **LS Spectrum Audit 2021**

LS telcom
LS of South Africa Radio Communication Services (Pty) Ltd

03

Multi-Spectral direction finding

- Point rotation out of clutter measurements
- Multi spectrum analysis
- Not limited to environment
- Database compiling
- Fast results and feedback



© 2021 LS of SA | **LS Spectrum Audit 2021**

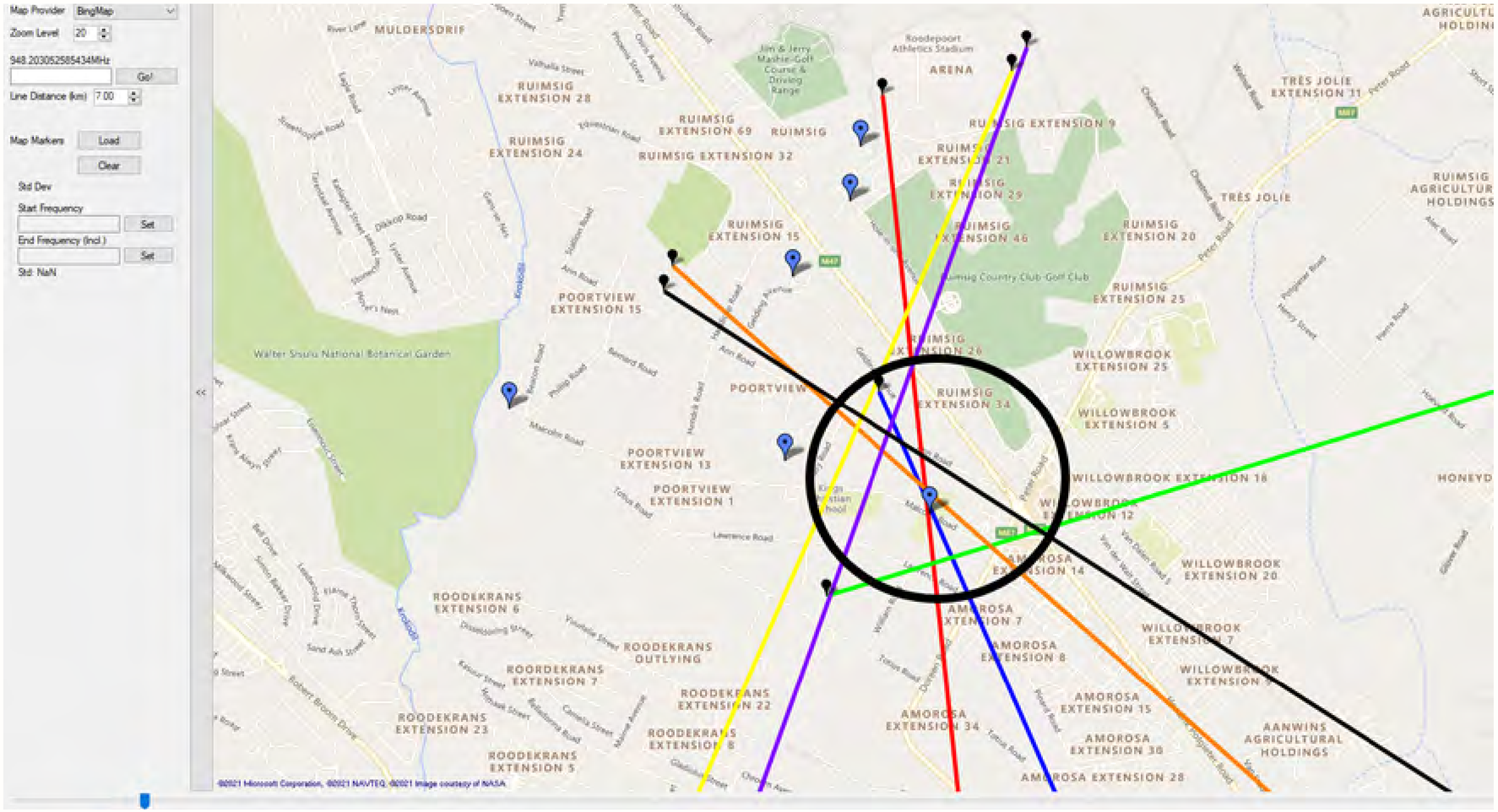
© 2021 LS of SA | **LS Spectrum Audit 2021**

Live spectrum analysis

- See wideband information per selected RPA azimuth in DF measurement
- View drone movement and relative spectrum

Vector based RF source identification

- Plot vector for every measurement point in color of choice
- Automatic source detection per channel or selected frequency



04

Broadcast site audit

LS telcom
LS of South Africa Radio Communication Services (Pty) Ltd

- Antenna pattern determination per channel
  - Elevation pattern
  - Azimuth pattern
  - 3D pattern
- Antenna tilt determination
- Antenna center of radiation height allocation
- Channel EIRP
- Antenna null-fill
- Broadcast Coverage predictions
- VHF and UHF broadcasting technologies

© 2021 LS of SA | **LS Spectrum Audit 2021**

05

Mobile site audit

- Site channel occupancy detection
- Antenna pattern determination per channel
  – Elevation pattern
  – Azimuth pattern
- Antenna tilt determination
- Antenna center of radiation height allocation
- Channel EIRP
- Antenna null-fill
- GSM, UMTS, LTE, LTE-A, 5G technologies

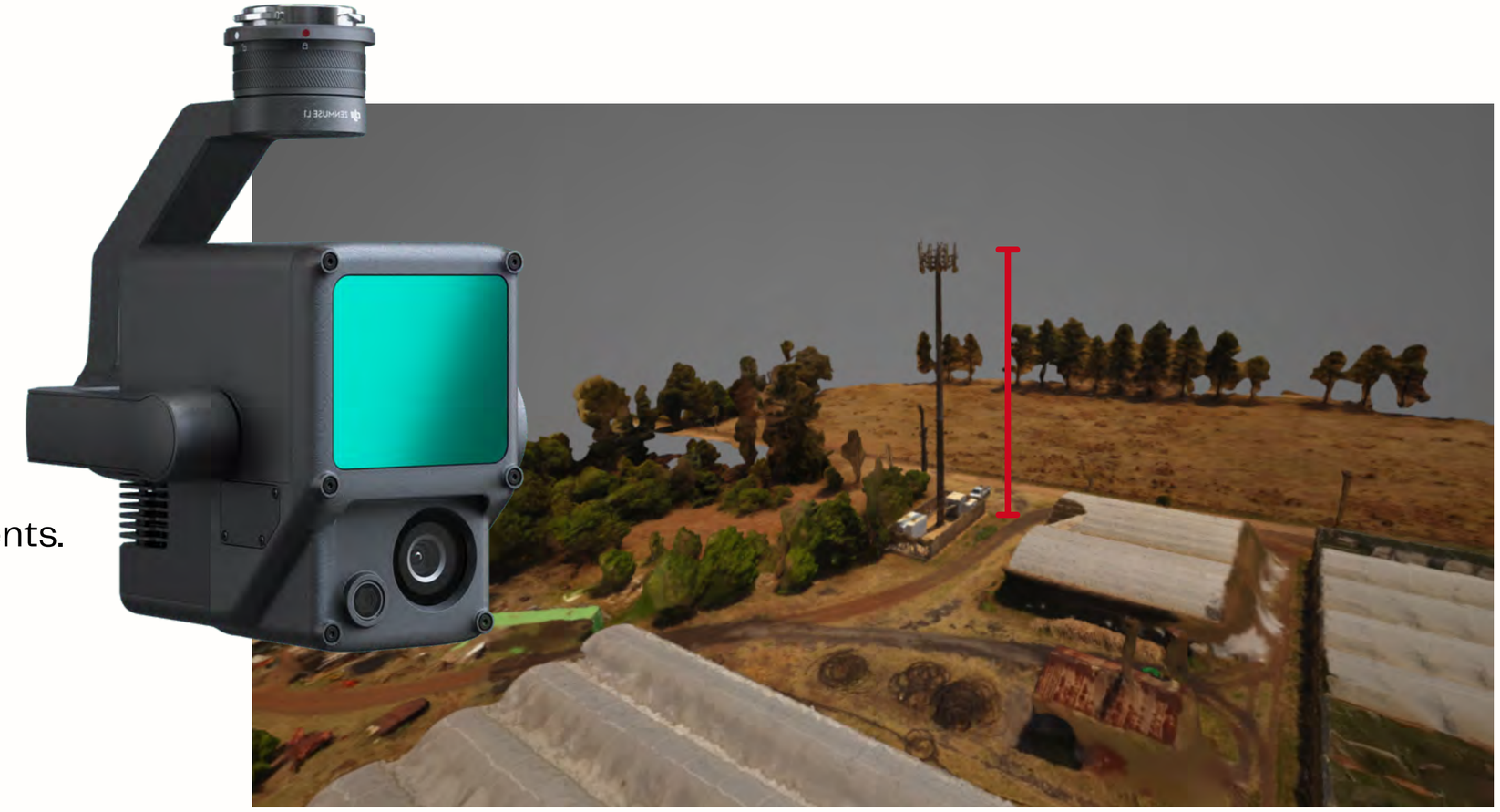
© 2021 LS of SA | **LS Spectrum Audit 2021**

06

Broadcast and mobile tower modelling

LS telcom
LS of South Africa Radio Communication Services (Pty) Ltd

- Tower modelling enabled through photogrammetry
- New Lidar technology used on DJI M300 RTK, creates highly accurate models for analysis and measurements.



© 2021 LS of SA | **LS Spectrum Audit 2021**

07

3D tower model and RF information integration

LS telcom
LS of South Africa Radio Communication Services (Pty) Ltd

- Antenna specifications can be determined
  - Antenna mounting height
  - Antenna dimensions
  - Mast dimensions
  - Tower inspections

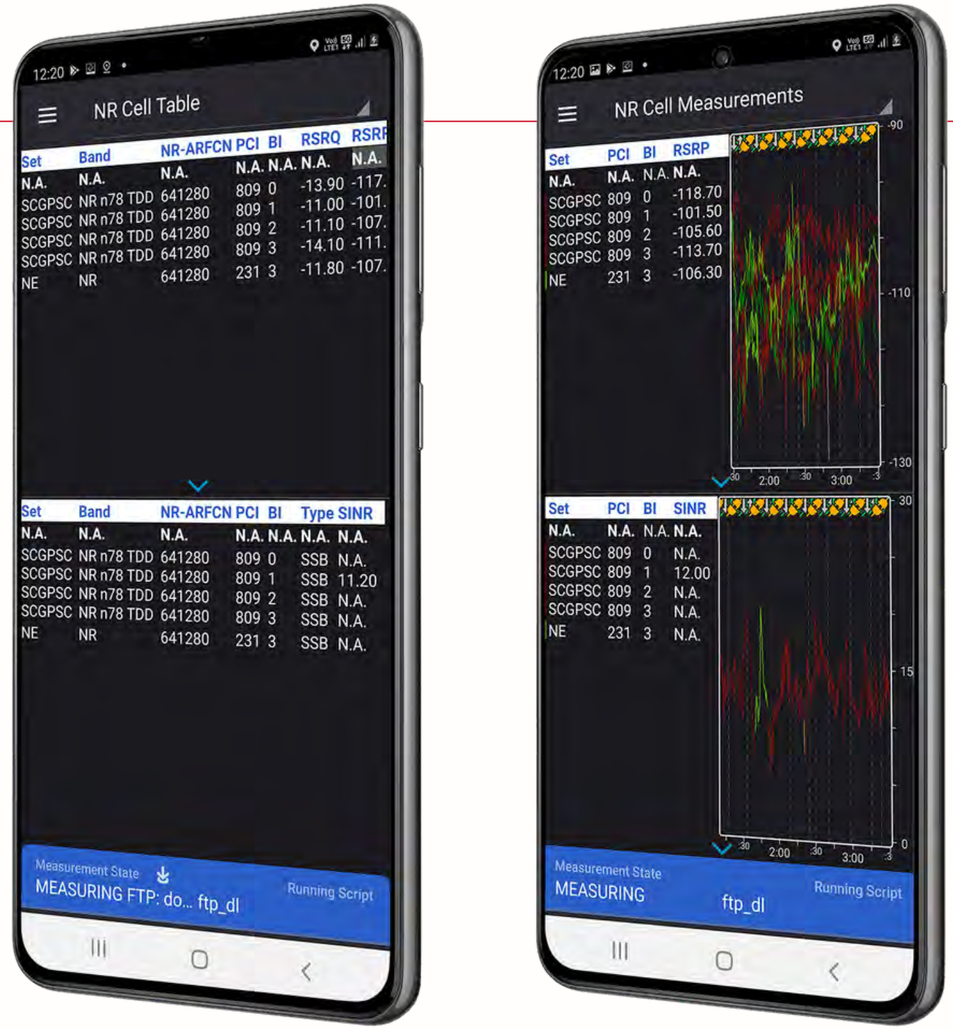
© 2021 LS of SA | **LS Spectrum Audit 2021**

08

Channel specific inspections

LS telcom
LS of South Africa Radio Communication Services (Pty) Ltd

- Using Keysight Nemo Handy mobile tool we are enable to integrate spectrum data as well as inter-modulated data to make more accurate conclusions about specific channels
- GSM, UMTS, LTE, LTE-A, 5G technologies



© 2021 LS of SA | **LS Spectrum Audit 2021**

09

Satellite beam measurements + Microwave

- Measurements for microwave links and satelite dish antennas
  - Antenna 3 dB beamwidth
  - Main beam direction indication
  - Maximum transmitting power

© 2021 LS of SA | **LS Spectrum Audit 2021**

Disclaimer

LS of South Africa Radio Communication Services (Pty) Ltd

Copyright (c) 2021 by LS of SA

This document must neither be copied wholly or partly, nor published or re-sold without prior written permission of LS of SA. The information contained in this document is proprietary to LS of SA. The information shall only serve for documentation purposes or as support for education and training purposes and for the operation and maintenance of LS of SA products. It must be treated strictly confidential and must neither be disclosed to any third party nor be used for other purposes, e.g. software development, without the written consent of LS of SA.

This document may contain product names, e. g. MS Windows, MS Word, MS Excel and MS Access, which are protected by copyright or registered trademarks / brand names in favour of their respective owners.

LS of SA makes no warranty or representation relating to this document and the information contained herein. LS of SA is not responsible for any costs incurred as a result of the use of this document and the information contained herein, including but not limited to, lost profits or revenue, loss of data, costs of recreating data, the cost of any substitute equipment or program, or claims by any third party.