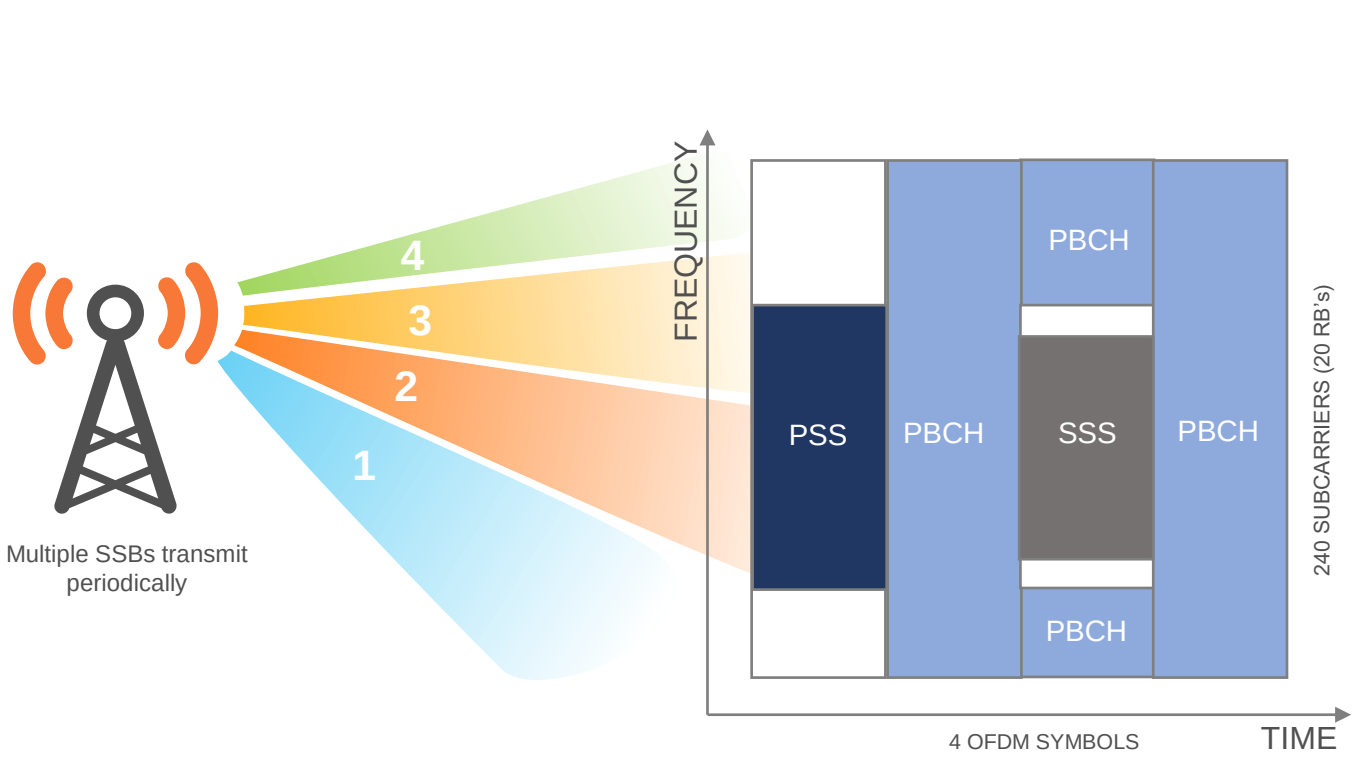
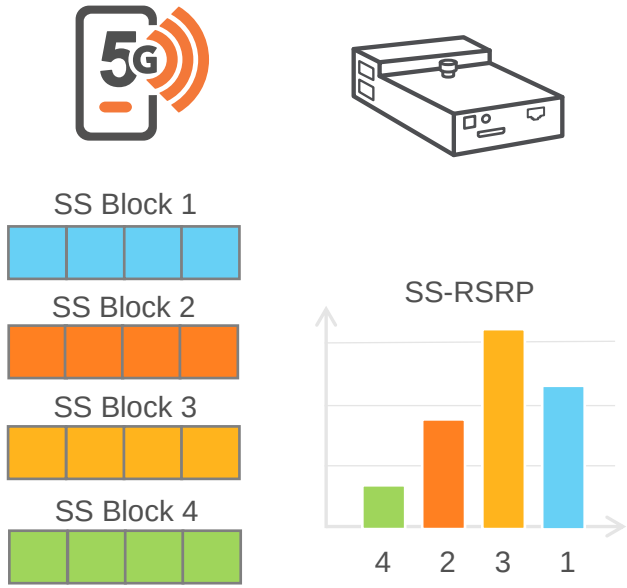
TEMS 5G Measurements

Comprehensive network testing solutions for greenfield and mature 5G networks

infovista

What do TEMS™ tools measure?

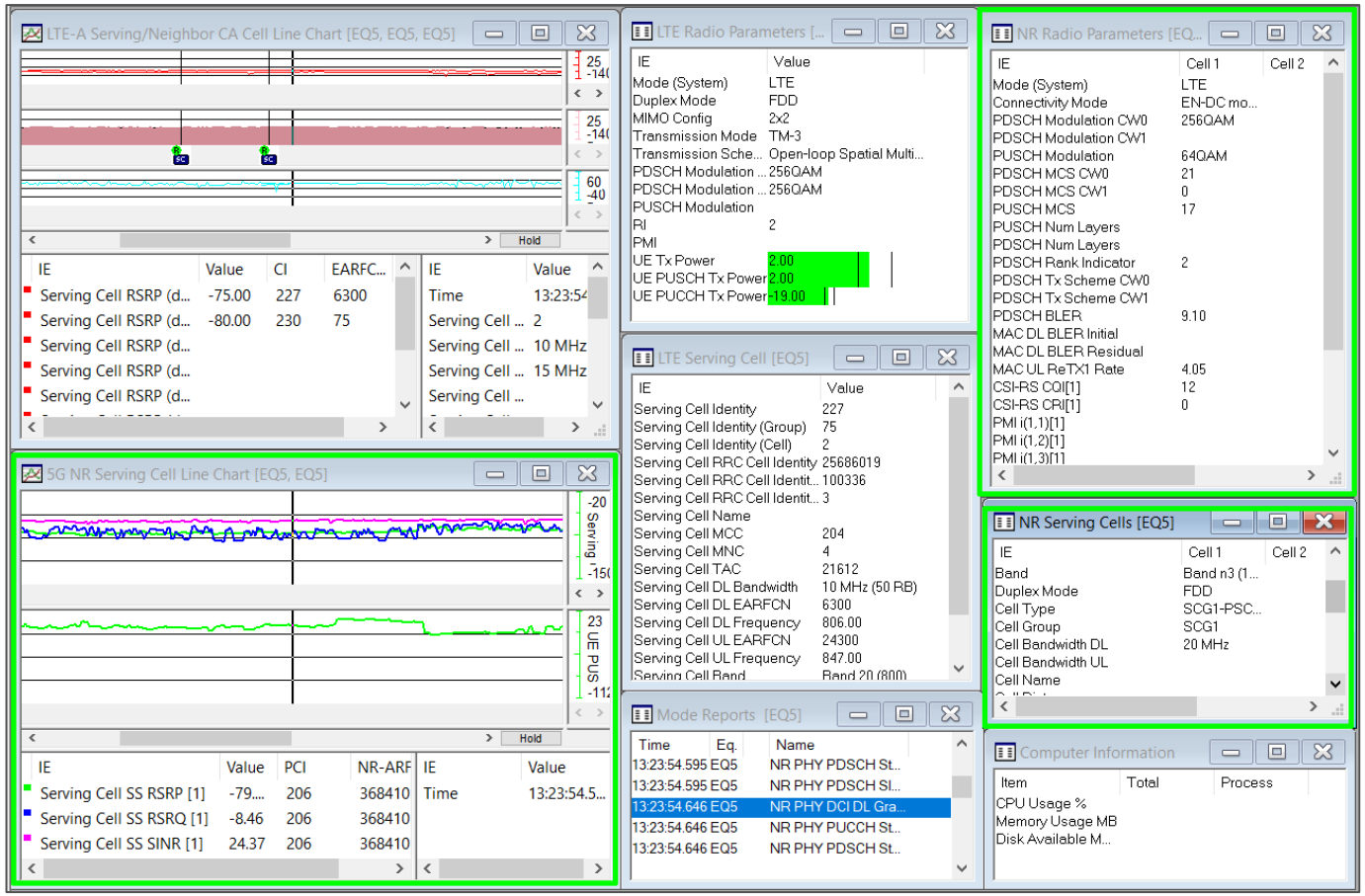




Example of information from SSB

- PCI (Physical Layer Cell ID)
- Each Received SS/PBCH blocks and their indices
- PSS and SSS meas. (RSSI, RSRP, RSRQ, CINR)
- (PBCH) DM-RS meas. (RSSI, RSRP, RSRQ, CINR)
- CIR based on sync signal SSS (Power Delay Profile)

5G NR analysis – Presentation views



Analyze serving cell and beam KPIs with line charts, status windows, and map windows

5G NR serving cell line chart

- SS RSRP, RSRQ and SINR
- UE PUSCH TX Power

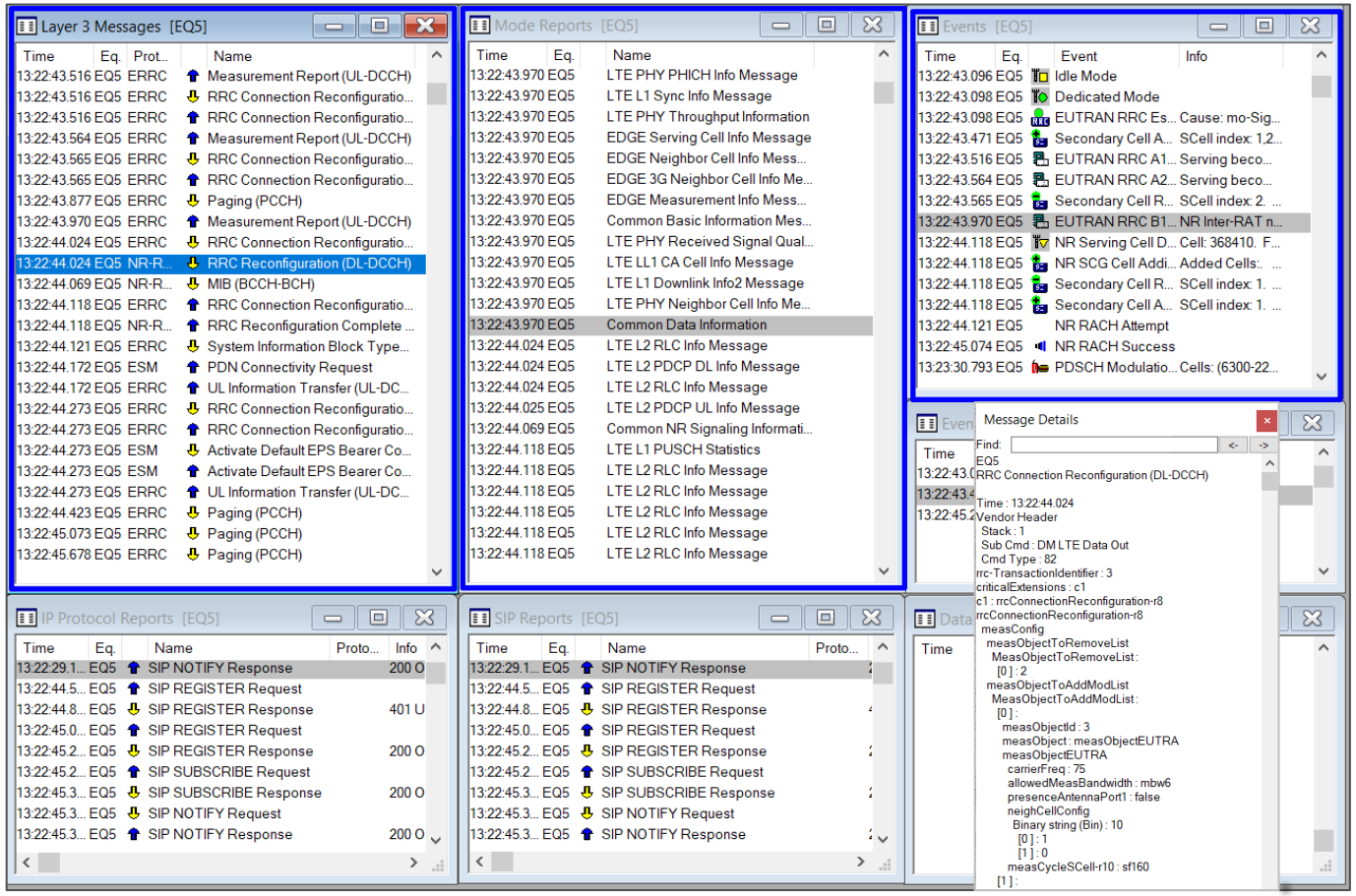
5G NR serving cell information

- Physical cell ID
- DL/UL NR-ARFCN
- Band, DL/UL bandwidth
- Cell type / cell group

5G NR radio parameters

- Mode (system) / connectivity mode
- PDSCH modulation CW0/CW1
- PDSCH MCS CW0/CW1
- PUSCH MCS
- PDSCH rank indicator
- PDSCH transmission scheme CW0/CW1

5G NR analysis – Presentation views



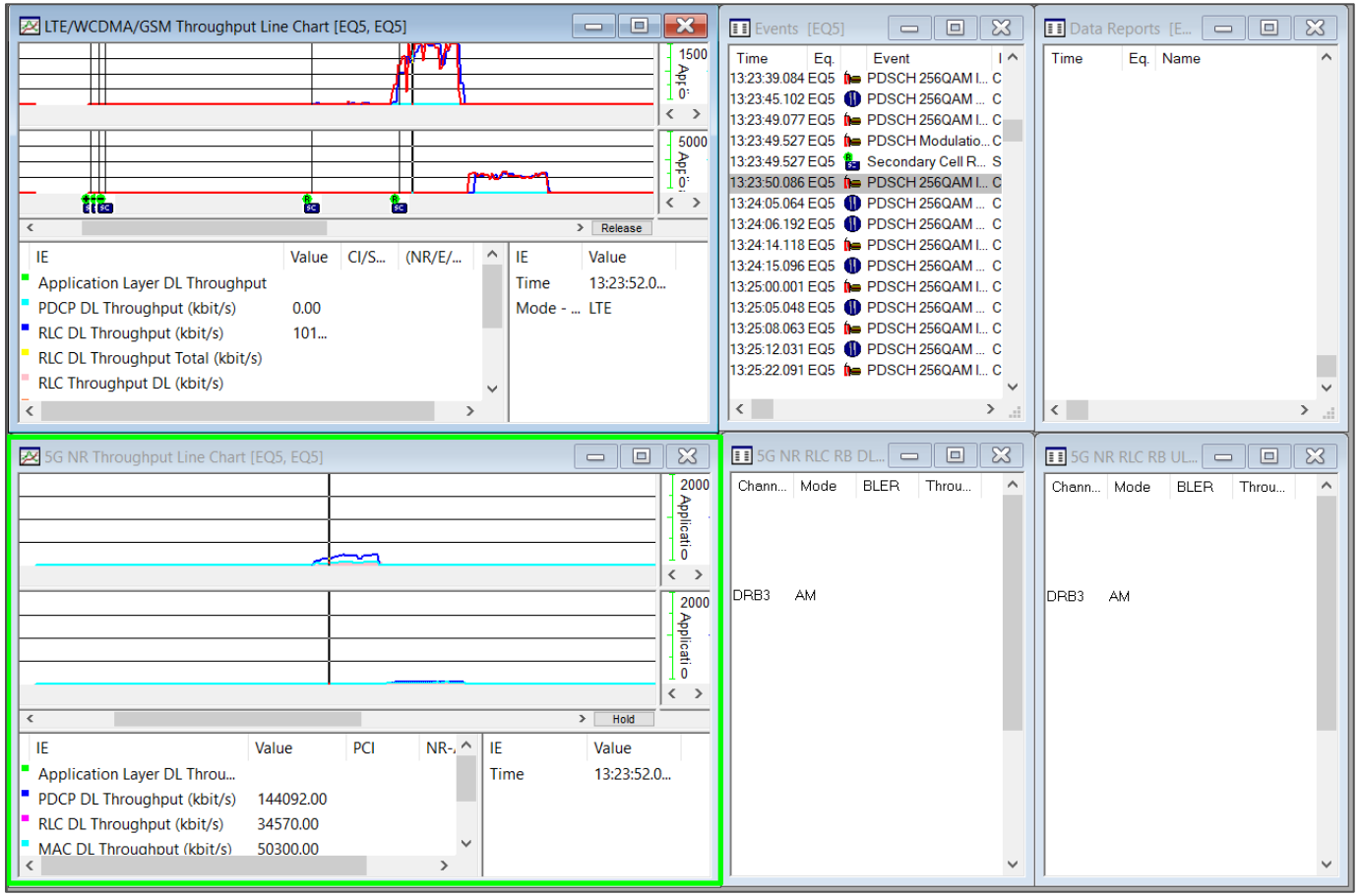
Message windows for verification and troubleshooting

- View signaling (message flow)
- Filtering and search functionality
- Information available in mode reports
- Custom or use predefined message windows
- Detailed message decoding

Message windows include

- Layer 3
- Events
- Mode reports
- IP protocol reports
- SIP reports
- Data reports
- Events of KPI type

5G NR analysis – Presentation views

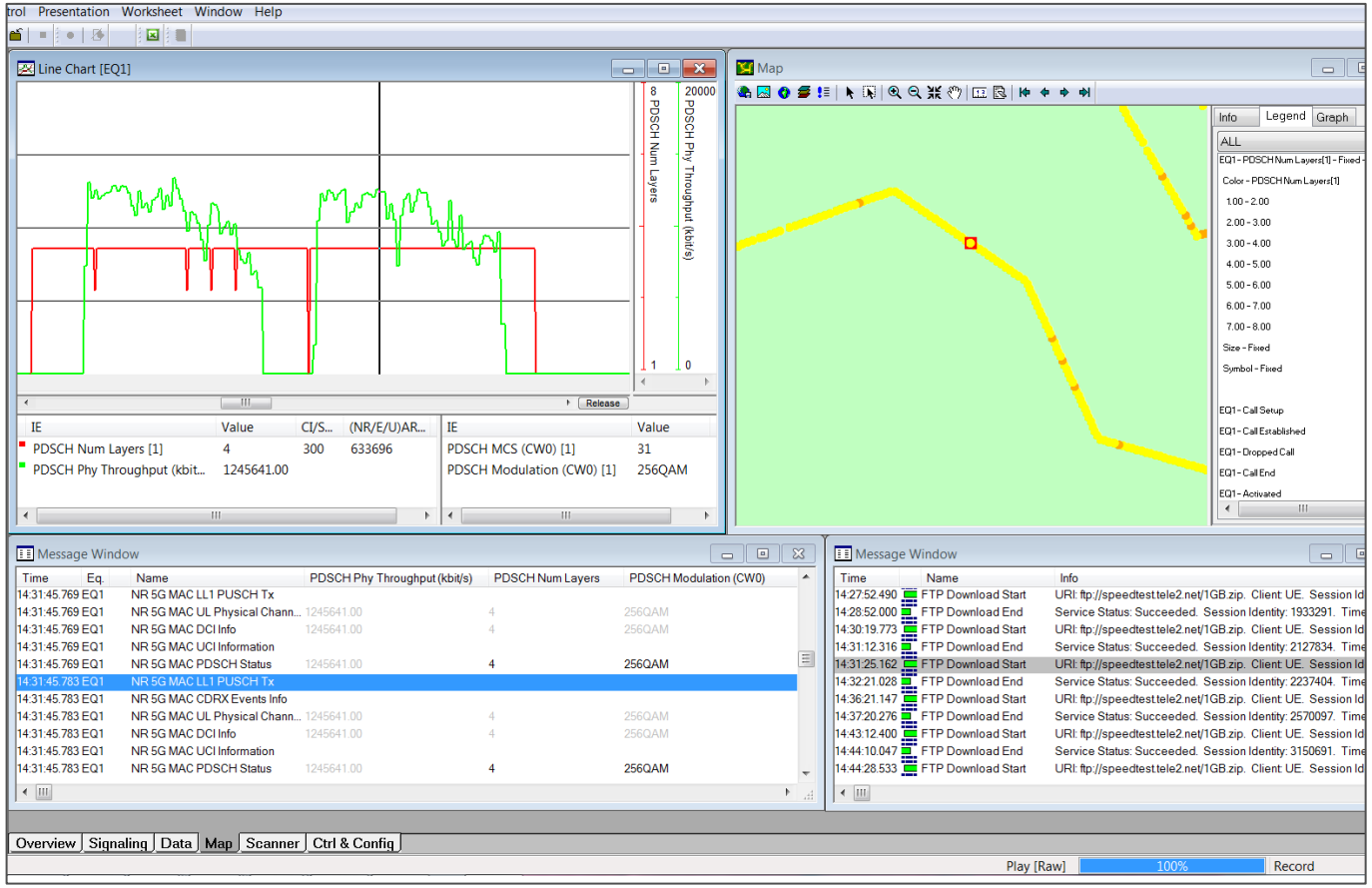


Verify throughput in line charts, status windows, and map windows

5G NR throughput line chart includes

- View signaling (message flow)
- Application layer throughput DL/UL
- Application layer throughput DL/UL
- PDCP DL/UL throughput
- RLC DL/UL throughput
- MAC DL/UL throughput
- PDSCH/PUSCH physical throughput

5G NR throughput – PDSCH layers and modulation

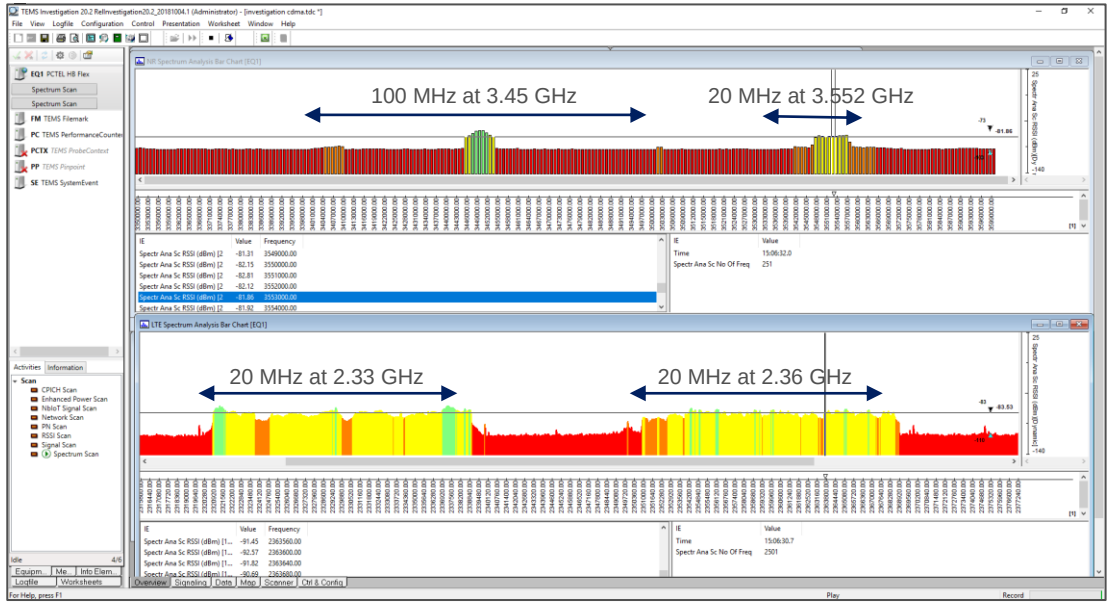


Verify throughput in relation to the number of PDSCH layers and PDSCH modulation

- Visualize the number of PDSCH layers and PDSCH modulation in line charts and message windows
- Map window to present where a higher rank is achieved
- Useful for throughput testing and link adaptation verification

Spectrum clearance and coverage validation

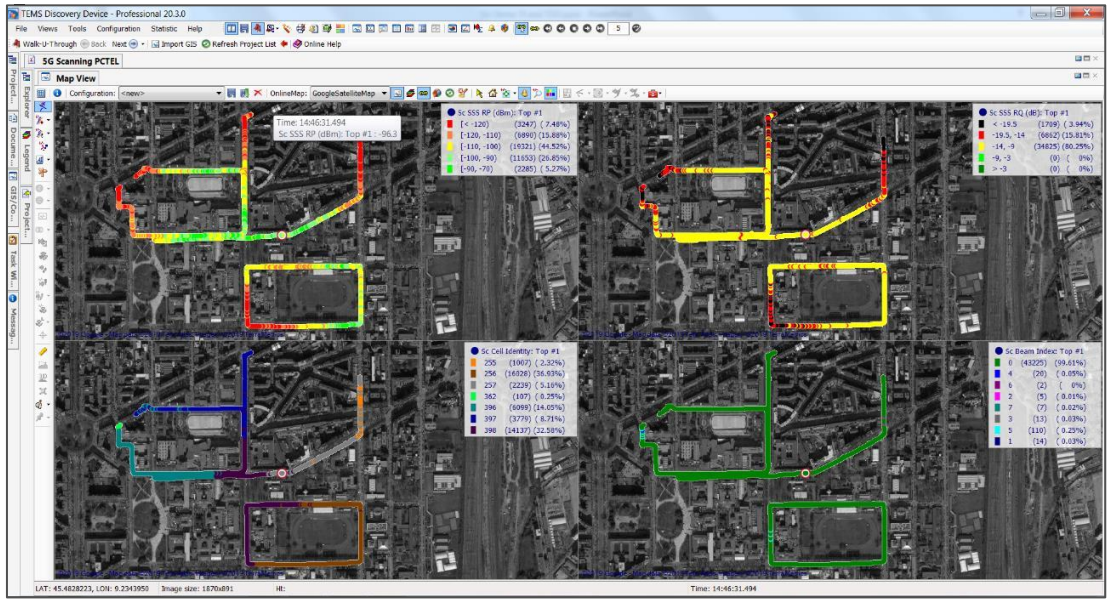
TEMS Investigation



Spectrum scan - 5G NR n78 and LTE B40

- Spectrum scan analysis bar chart for 5G NR and LTE
- Received power in defined bandwidth at an instance in time

TEMS Discovery



Identify strongest beams

- SSS RP, SSS RQ, CI and Beam Index for strongest scanned cell identity
- Verify overall and cell coverage as well as coverage gaps

5G NR Non-Standalone testing

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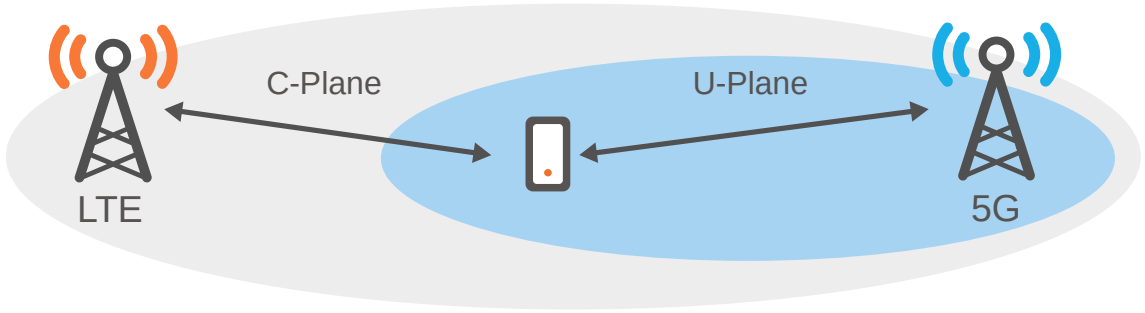
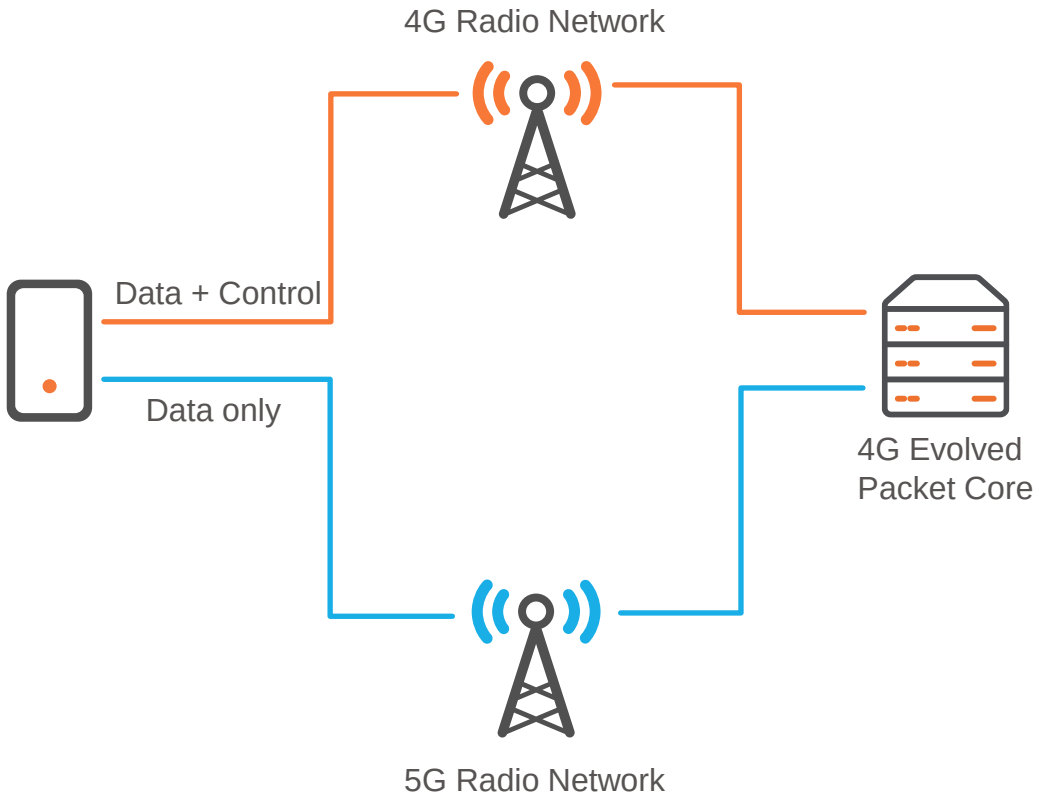
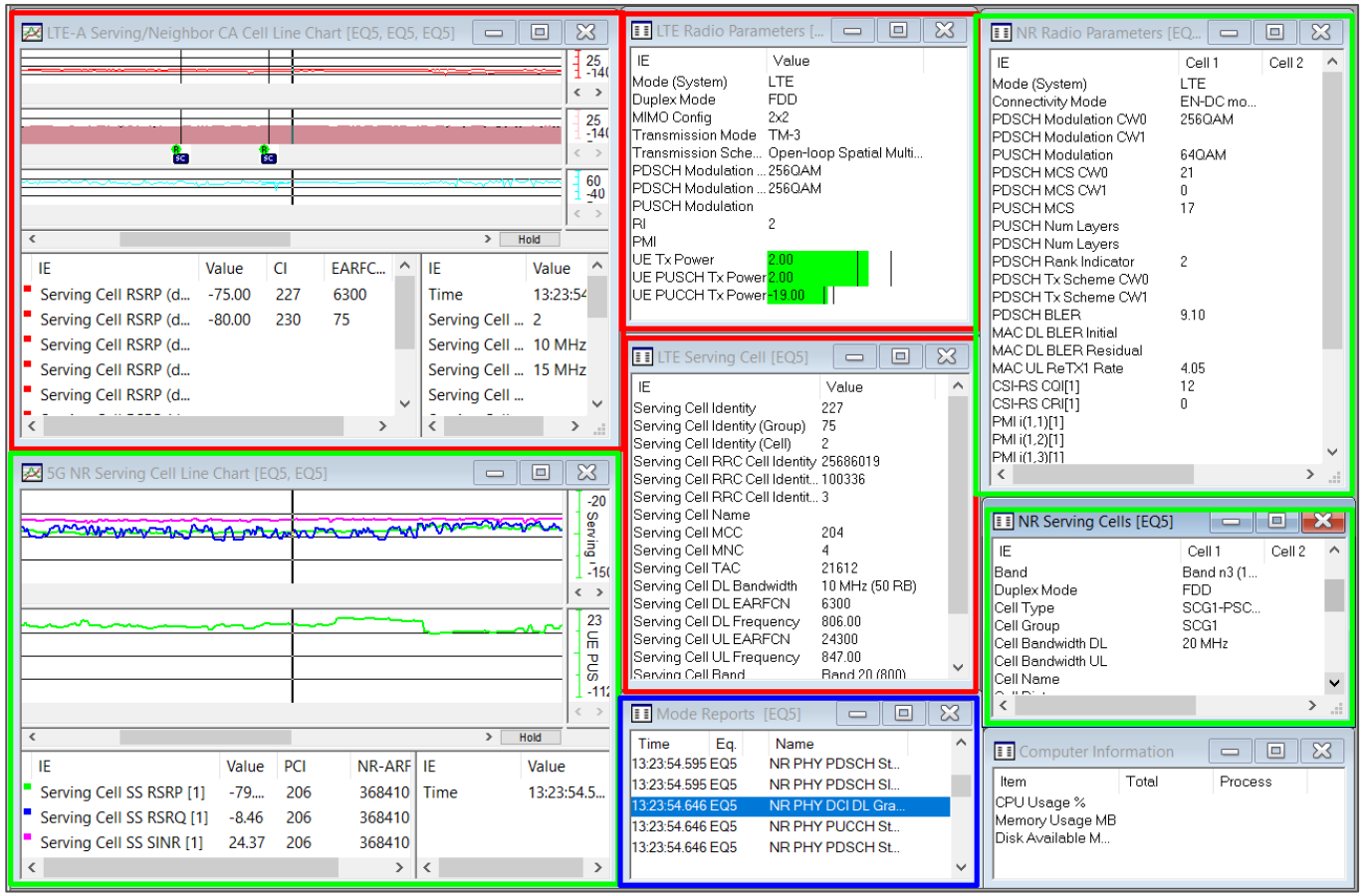
Multi-RAT testing – EN-DC connectivity



Non-Standalone (LTE Anchor)



5G NR analysis – Multi-technology view

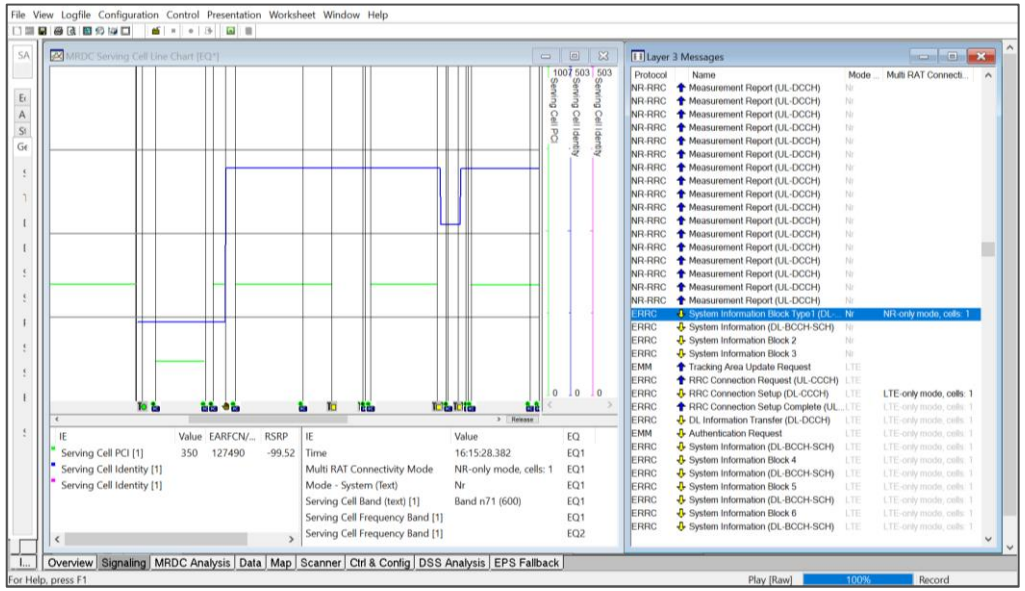


Multi technology workspace for easy and quick analysis

- LTE views
- 5G NR views
- Common messaging windows

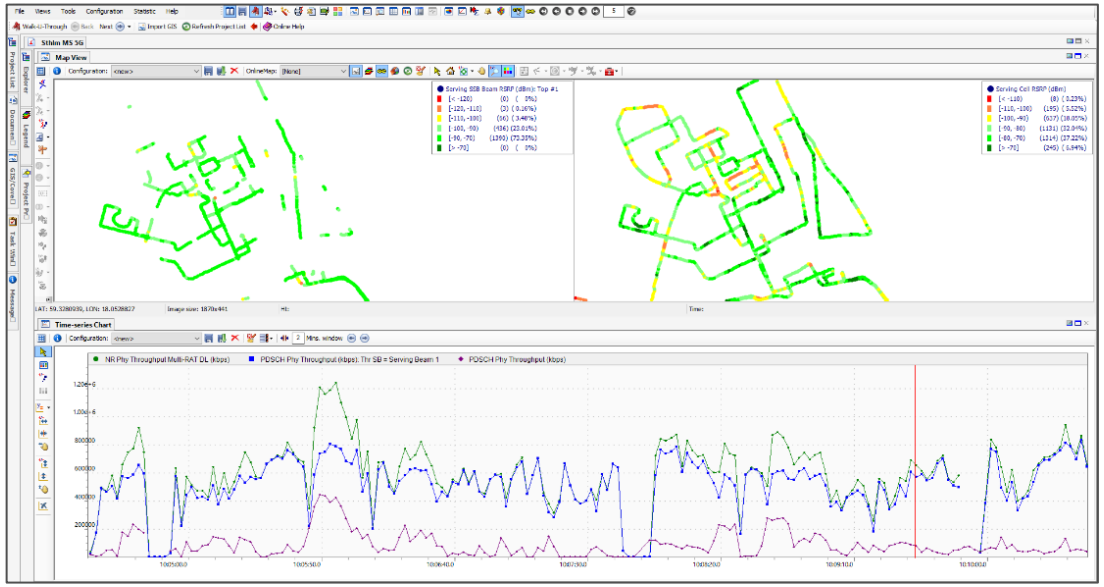
Multi-RAT analysis

TEMS Investigation



5G SA and LTE transition analysis

TEMS Discovery



‘Multi RAT Connectivity Mode’ for identifying areas with EN-DC and LTE-only coverage

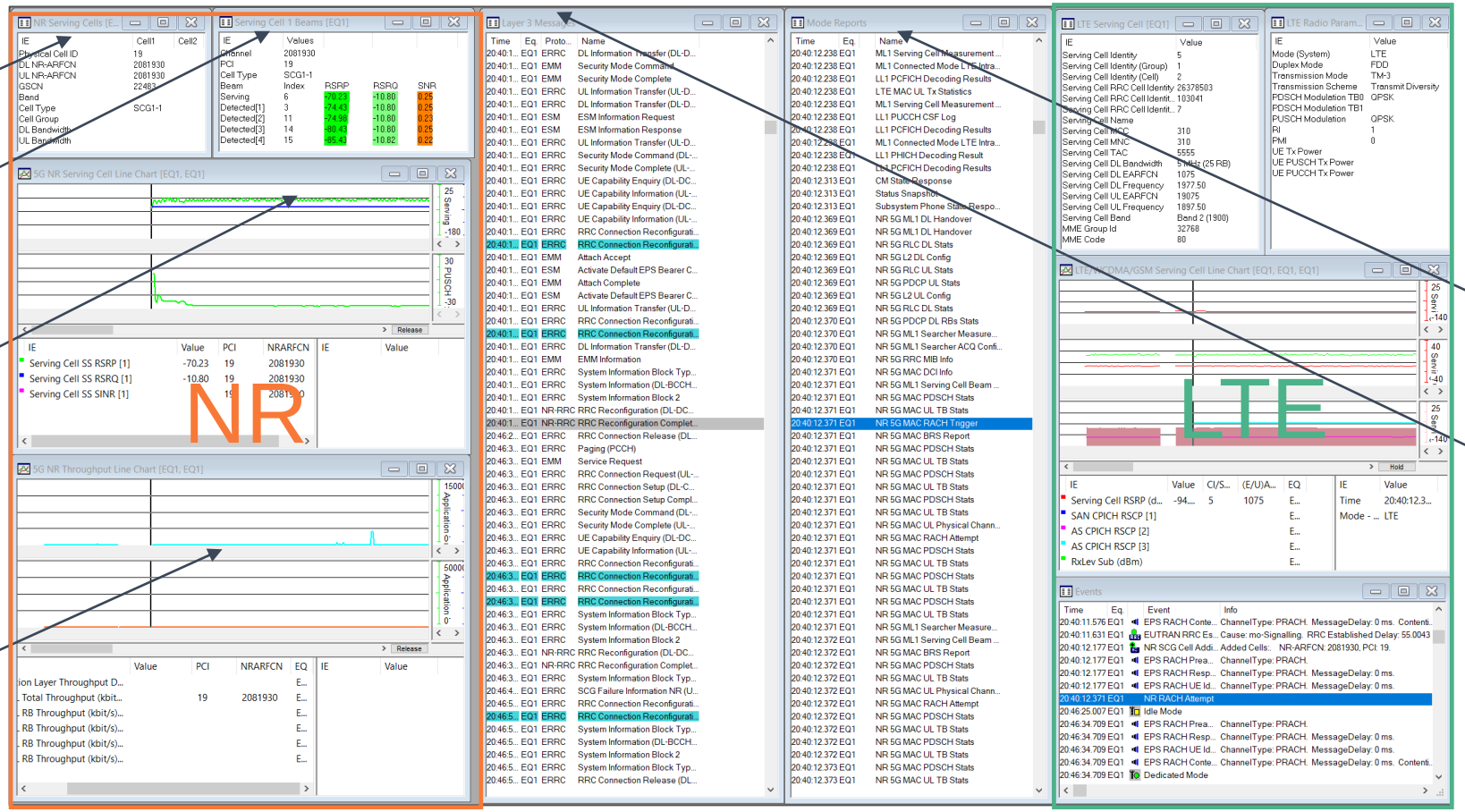
ENDC analysis - TEMS Investigation

Serving Cell Info

Beam / Cell Info

NR Serv Cell Chart
- SS RSRP
- SS RSRQ
- SS SINR

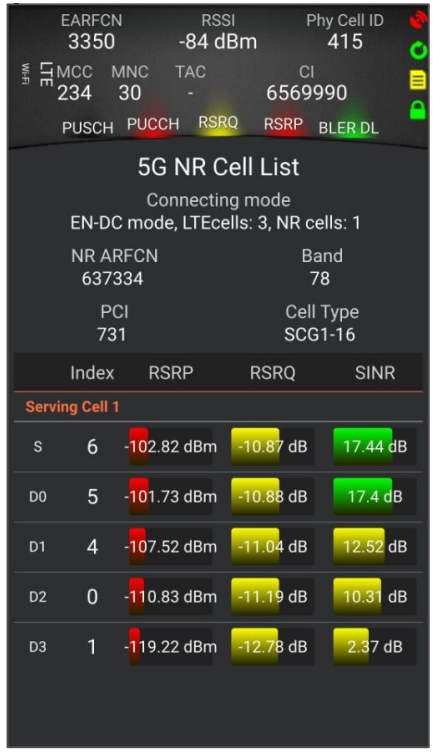
NR Throughput Chart
- Application Layer
- PDCP RB Throughput (UL/DL)

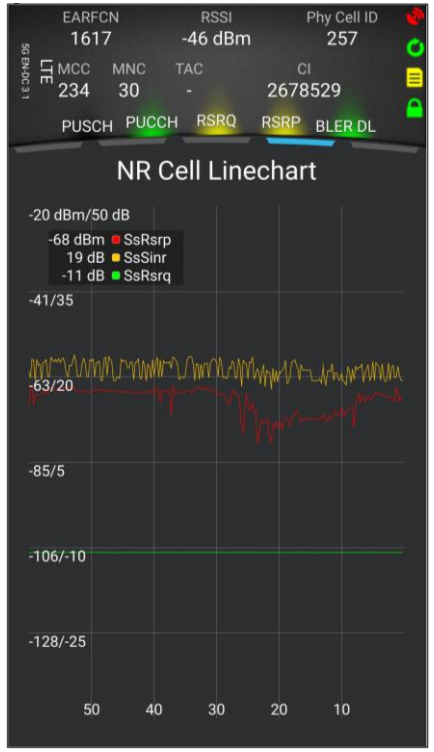


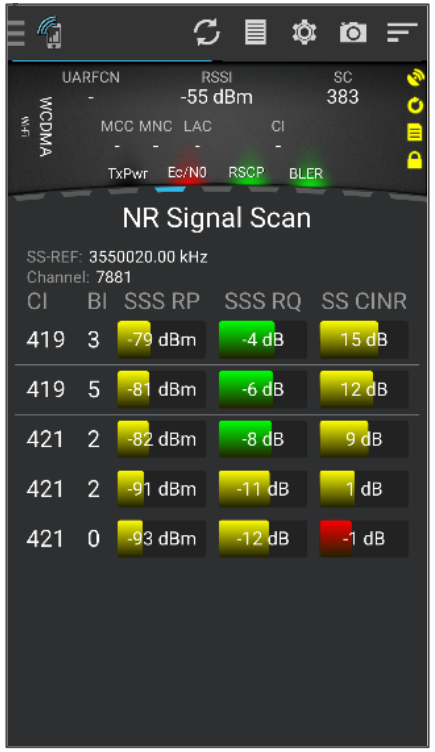
Measurement reports (including Decoding)

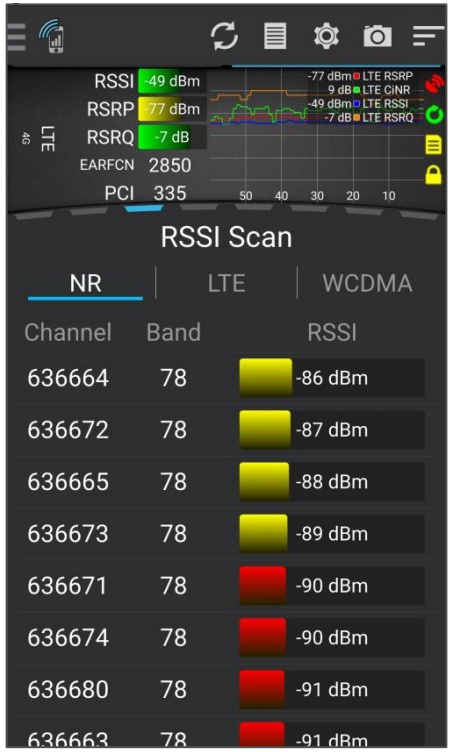
Layer 3 Messages (including decoding)

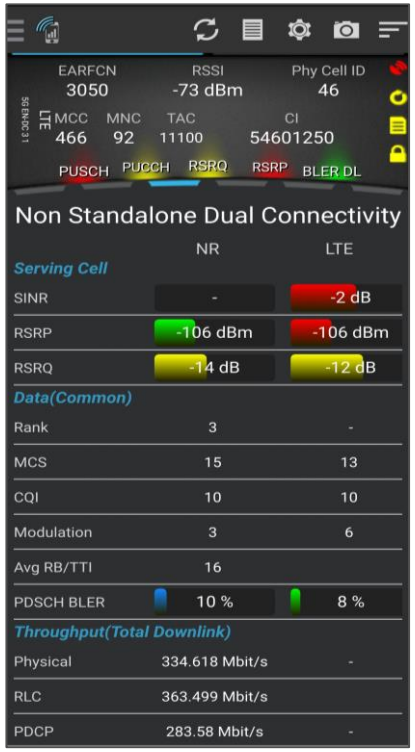
5G NR NSA views - TEMS Pocket







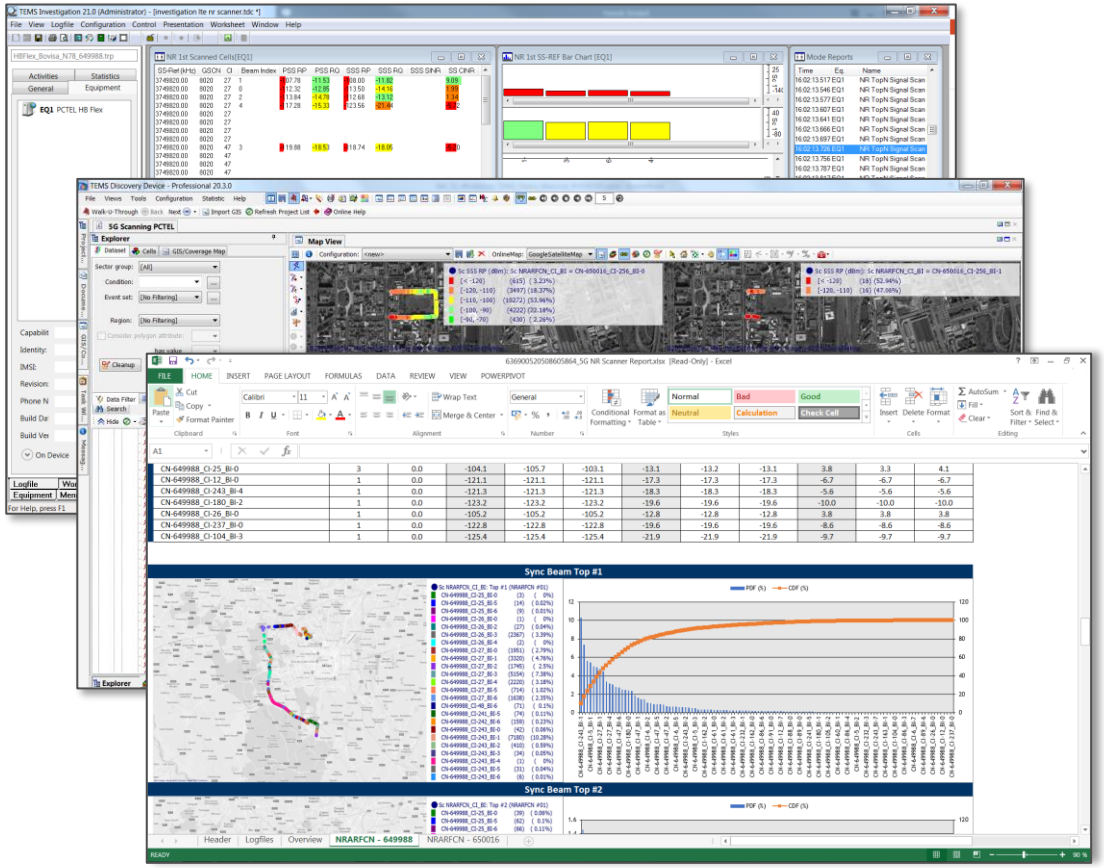




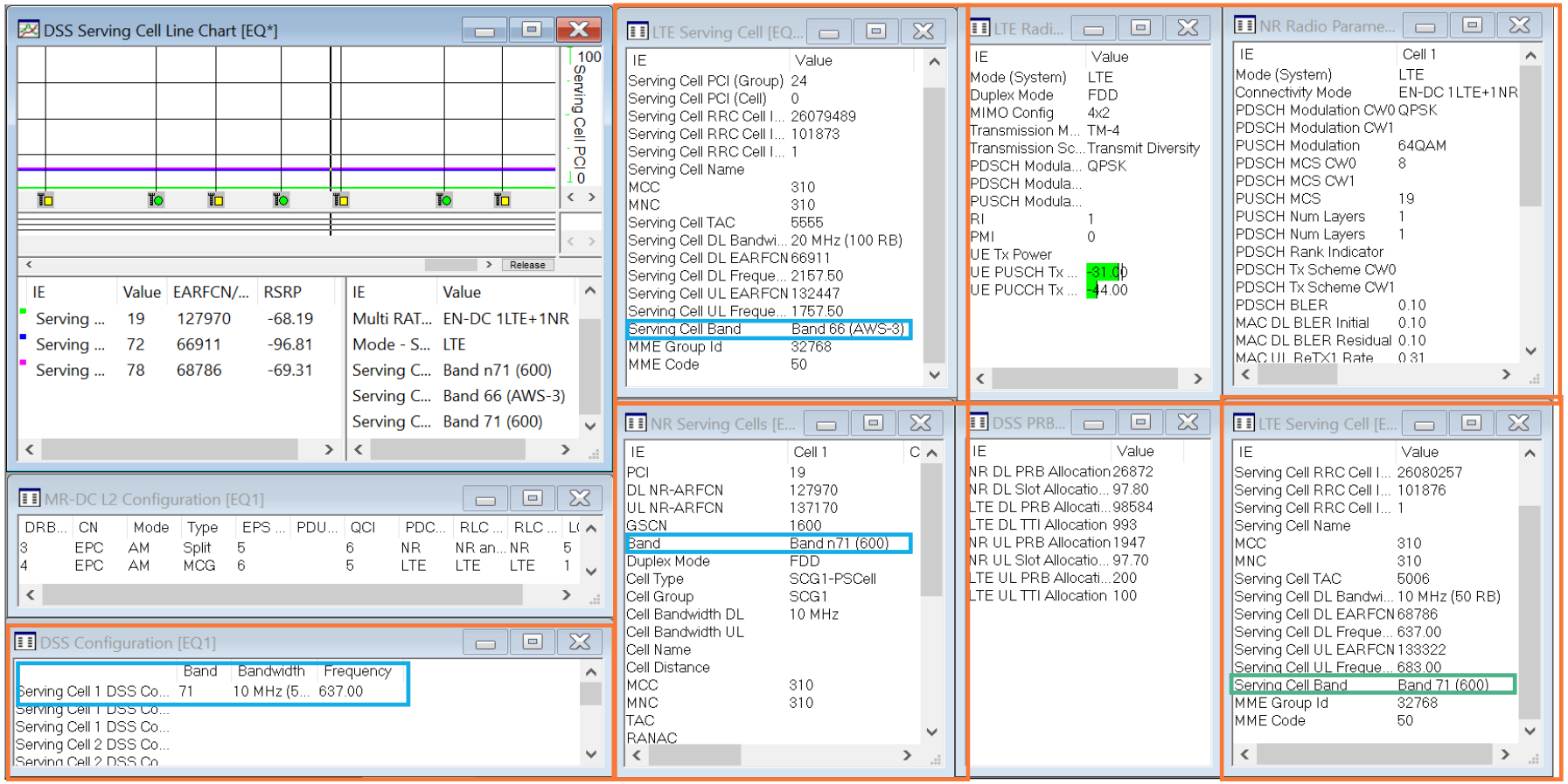
5G NR analysis - TEMS Discovery

5G NR measurements are best analyzed in TEMS Discovery

- Designed for analysis and reporting
- Manages multiple logfiles from various projects
- Seamlessly handles large volumes of data
- More advanced visualization capabilities than TEMS Investigation
- Drag and drop functionality into presentation windows
- Advanced scripting and reporting
- Reporting automation capabilities



Dynamic Spectrum Sharing – TEMS Investigation



EQ1: NSA (EN-DC) NR configuration:

- LTE anchor: Band 66
- NR: Band 71

EQ2: LTE only mode (Band 71)

5G NR Standalone testing

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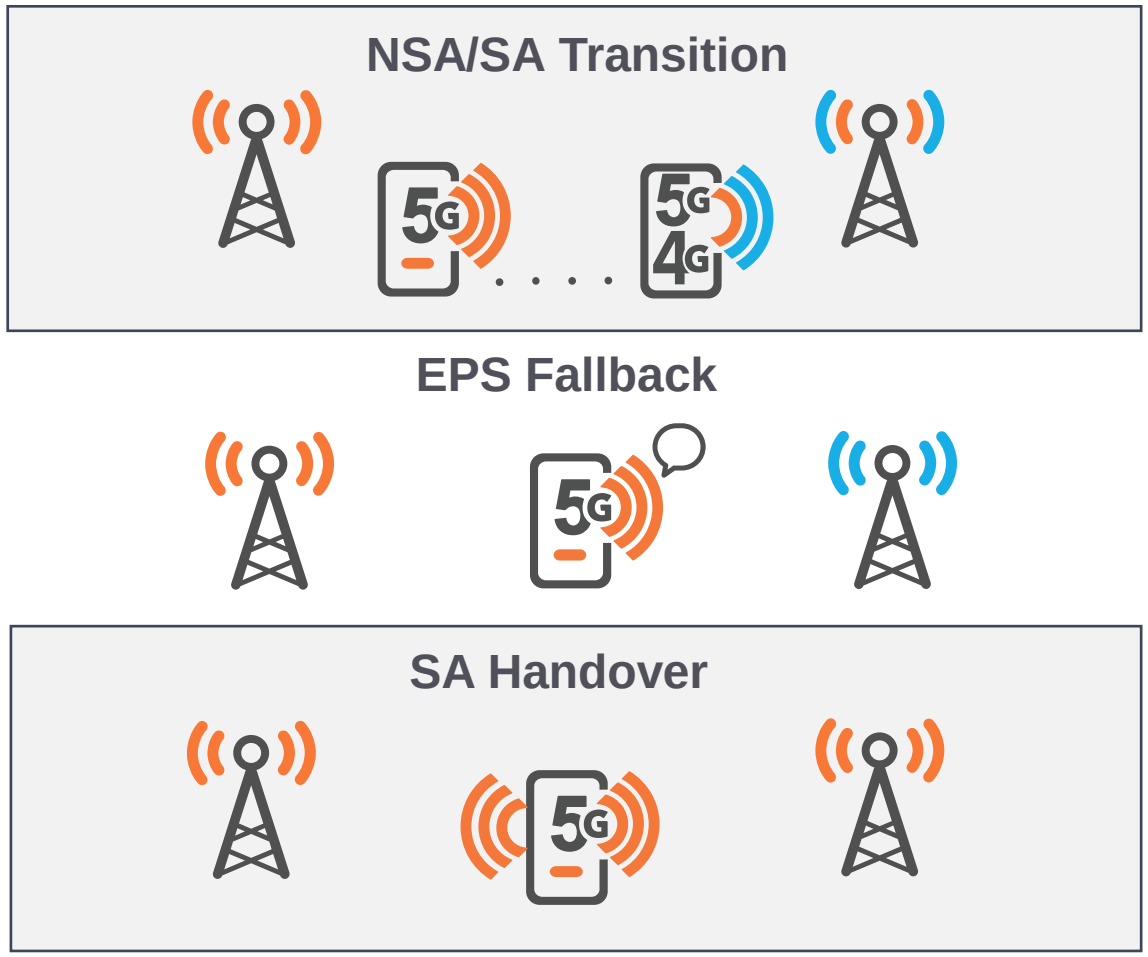
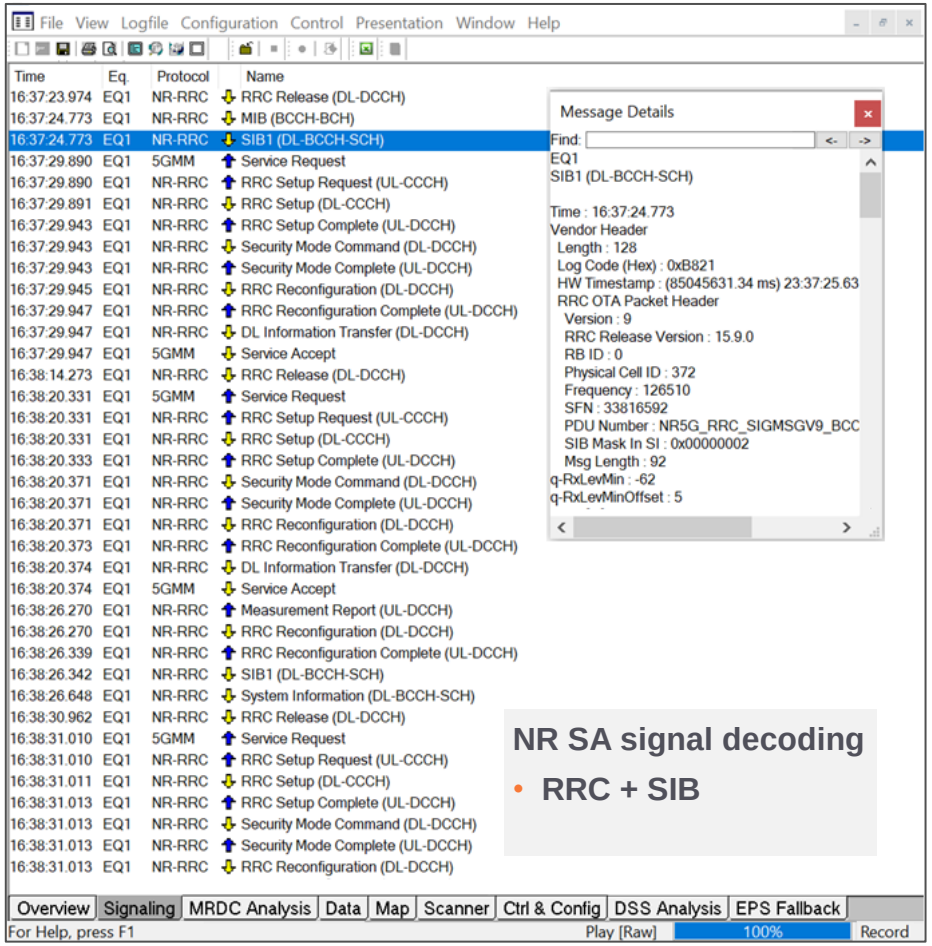
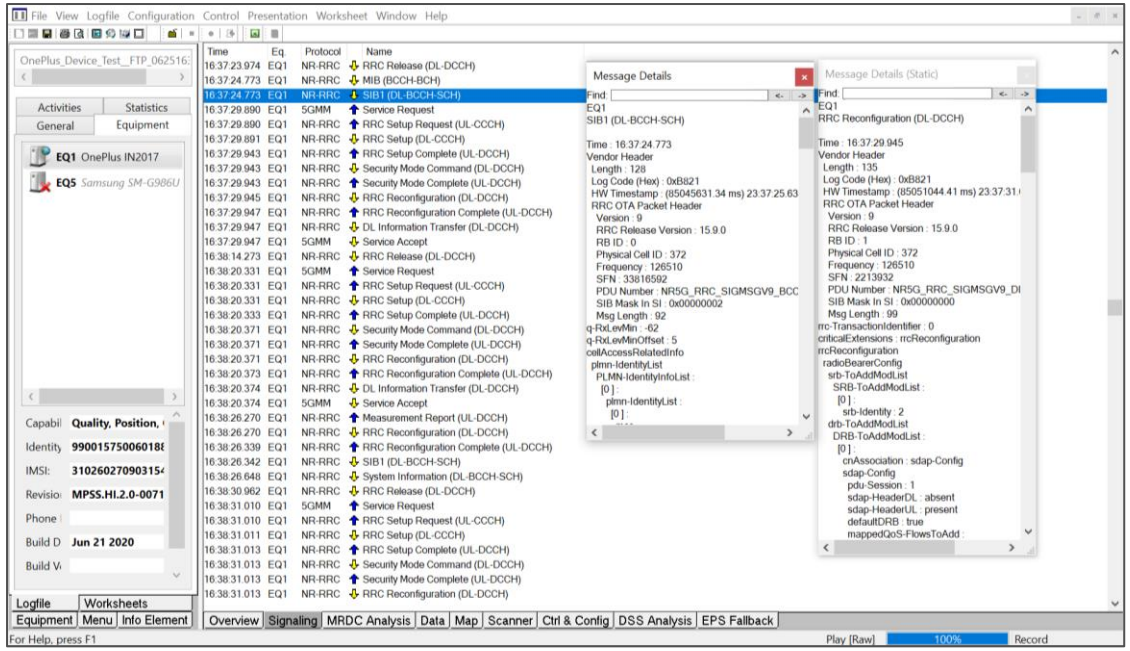
5G NR Standalone testing - TEMS Investigation





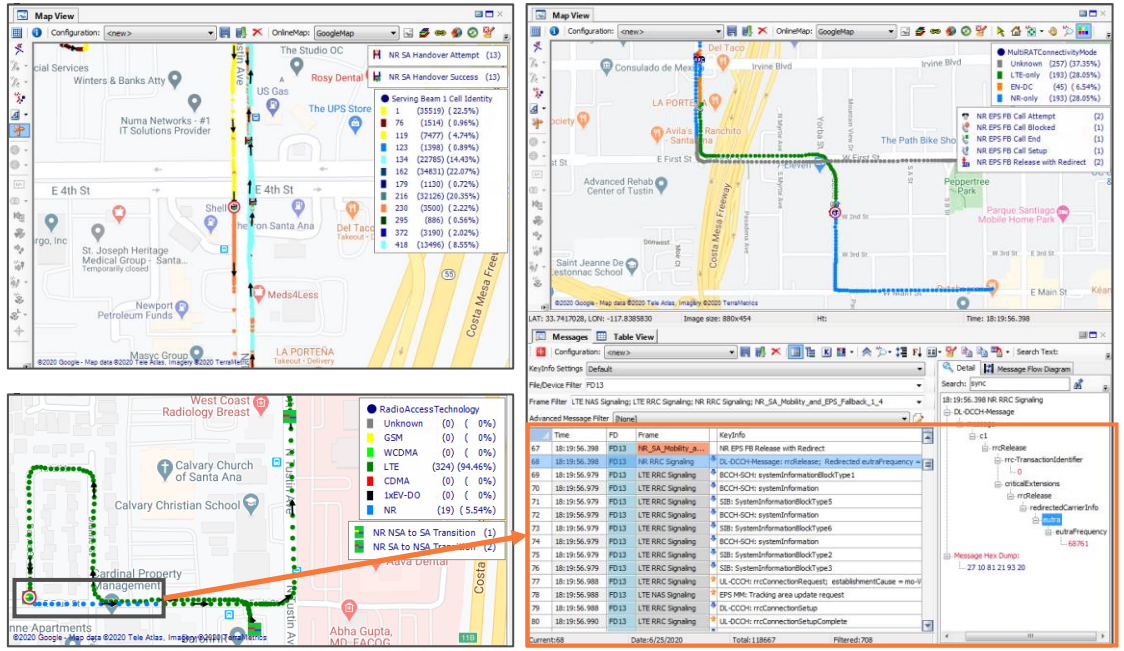
5G NR Standalone data collection and analysis

TEMS Investigation



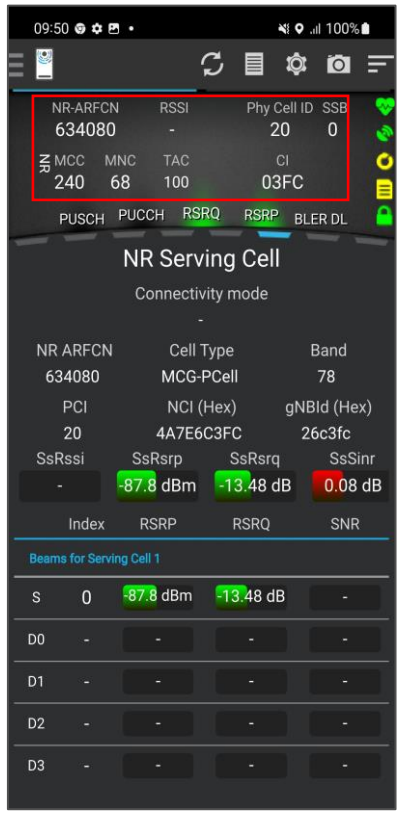
5G Standalone Layer 3 messages decoding

TEMS Discovery

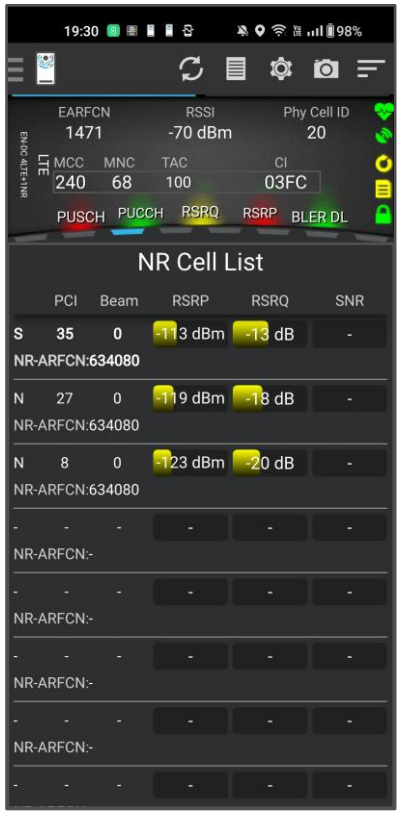


Detailed bin-level analysis of collected 5G data

5G NR Standalone views – TEMS Pocket

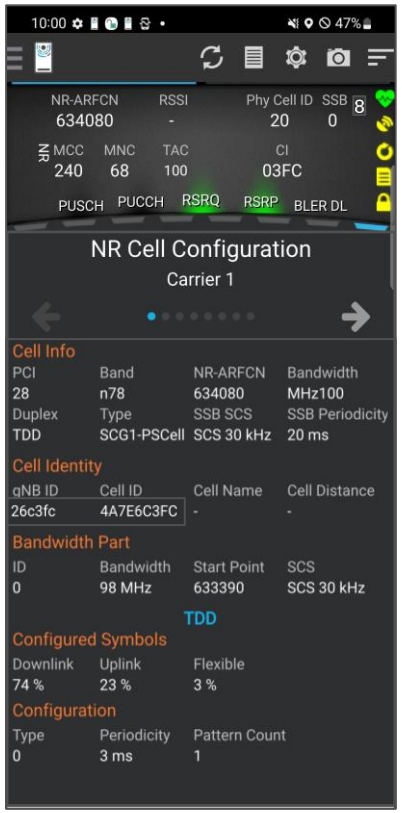


SSB information



NR cell list

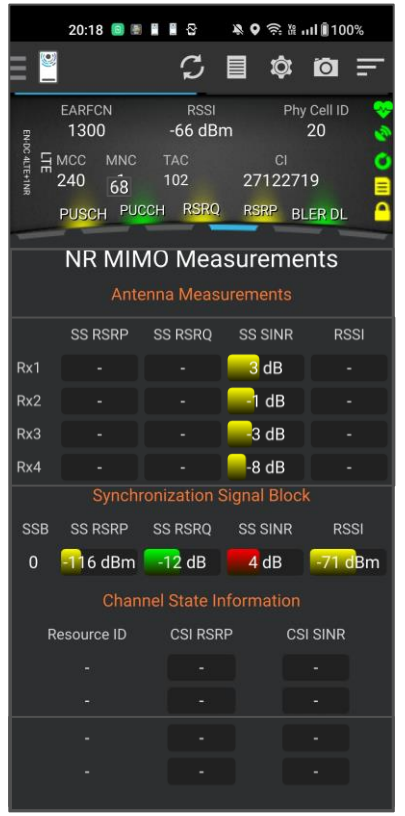
- Up to 20 beams



NR cell config

- Up to 8 carriers

New NR RACH analysis view

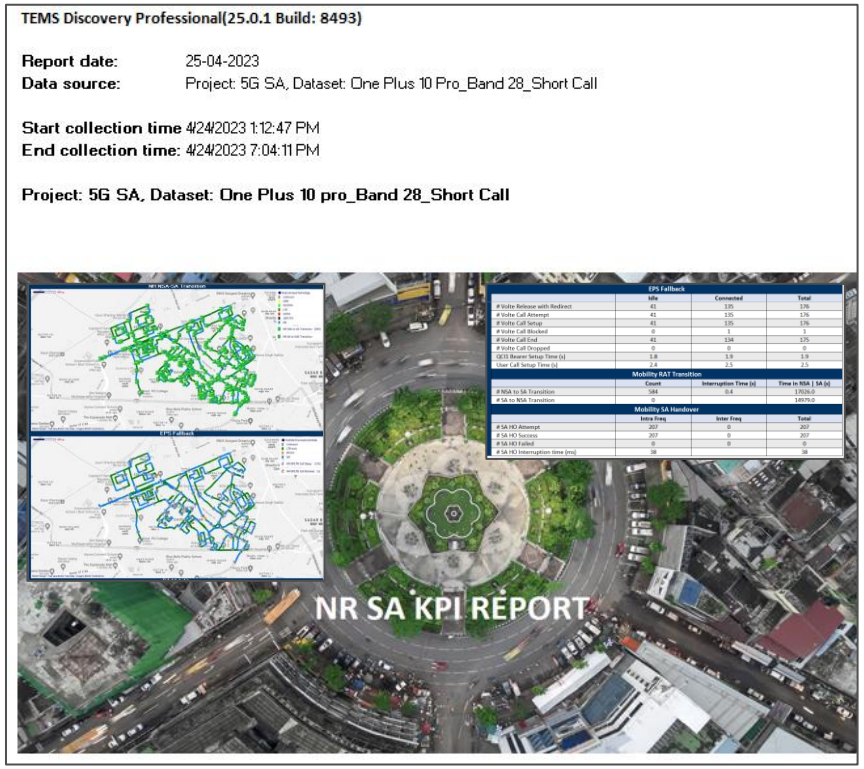


NR MIMO view

Per antenna (Rx1-4) measurement

5G NR Standalone analytics – TEMS Discovery

Correlated views (histogram, maps and L3) for in-depth 5G analysis



Pre-configured reports with relevant 5G Standalone KPIs

Devices and chipsets

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Support for all the major 5G device models

Agreements with leading handset manufacturers enables Infovista to support full logging capability across a vast array of devices

Apple iPhone 14 Series

Samsung S23 Series

OnePlus 11 Series

Xiaomi 13 Series

Sony Xperia Mark IV Series

Refer to the TEMS Support Portal for a complete list of supported devices:
https://support-tems.infovista.com/document/DeviceList/index.php

Comprehensive 5G chipset support

- Agreements with major chipset vendors - Qualcomm, Samsung and Huawei
  - Faster time to market for new 5G devices
  - Access to Layer 3 messages without the need for reverse engineering ensures highly accurate decoding
- Support for 5G devices based on the latest 8th generation chipsets

Support for PCTEL and Rohde & Schwarz scanners

Device independent RF measurements across multiple channels/bands/technologies – efficiently identify potential interference sources

- Some of the latest supported 5G scanner features in TEMS Investigation and TEMS Paragon include:
  - 5G mmWave (PCTEL Gflex, PCTEL HBflex and R&S TSME6)
  - 5G NR Mobile Blind Scan
  - 5G NR Fast Automatic Channel Detection
  - Multi-unit 5G signal scan with R&S TSME 6 scanner

PCTEL Gflex

PCTEL HB*flex*

PCTEL iB*flex*

PCTEL MX*flex*

R&S TSME6


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Thank you!
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