VIAVI Solutions

Application Note

4G & 5G Air Interface Validation

OneAdvisor 800 Wireless

The VIAVI OneAdvisor 800 is the ideal portable test solution to verify and troubleshoot 4G and 5G radio access networks for proper deployment and effective operation.

OneAdvisor 800 design is based on a multi-functional architecture, covering different test applications, scaling and adapting to different user's groups, including radio operation, covering radio's transmission verification according to 3GPP standards, maintenance practices assessing radio's power level and coverage, as well as the ability to identify and locate interference impairments.

Real-Time Persistence Spectrum

OneAdvisor 800 real-time spectrum analysis (RTSA) performs a persistence power measurement through a defined frequency range in high-speed.

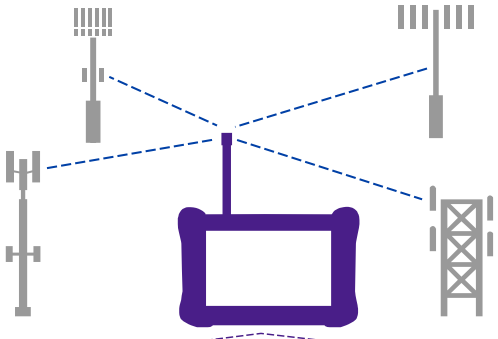
It provides a comprehensive view of intermittent signals for a fast characterization of wireless signals and the identification of intermittent interference signals through its 2D and 3D spectrogram measurements that characterize signals in power, frequency and time.

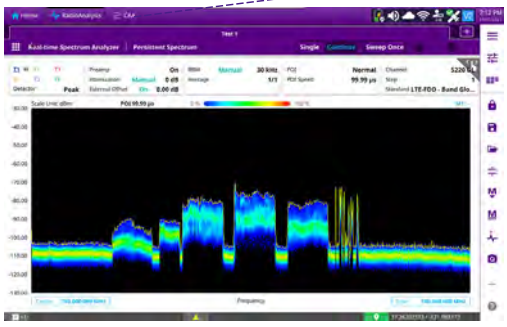
Key test functions include:

- Real-time persistence spectrum for 5G FR1 (9KHz to 6GHz) and FR2 (9KHz to 44GHz)
- Spectrum analysis with gated sweep for interference analysis of TDD signals.
- Over-the-Air spectrogram testing and logging capability to effectively characterize intermittent interference signals.
- Automatic Interference finding when the OneAdivsor 800 is paired with VIAVI InterferenceAdvisor.
- Interference finding with triangulation with VIAVI AntennaAdvsior.
- Spectrum route map, validating radio's coverage and signal propagation.

OneAdvisor 800
Realtime Persistence Spectrum

InterferenceAdvisor
Inteference Finding





OneAdvisor 800 Real-time Spectrum Analysis

OneAdvisor 800 Real-Time Spectrogram

1181.900.0722

OneAdvisor 800 real-time spectrum analysis is ideal to properly characterize signals that have different communication profile in time-domain, such as time division duplex (TDD) transmissions which in the same frequency channel allocates different time-slots for uplink and downlink signals which is the case of 5G carriers above 3GHz, and it also provides the ability to identify the presence and location of 5G beam signals, also referred as synchronization signal block (SSB), thanks to its 100MHz of instantaneous analysis bandwidth.

Wireless Interference Analysis

OneAdvisor 800 Interference Analyzer functions provides the most comprehensive measurement techniques to effectively identify, characterize and locate interfering signals.

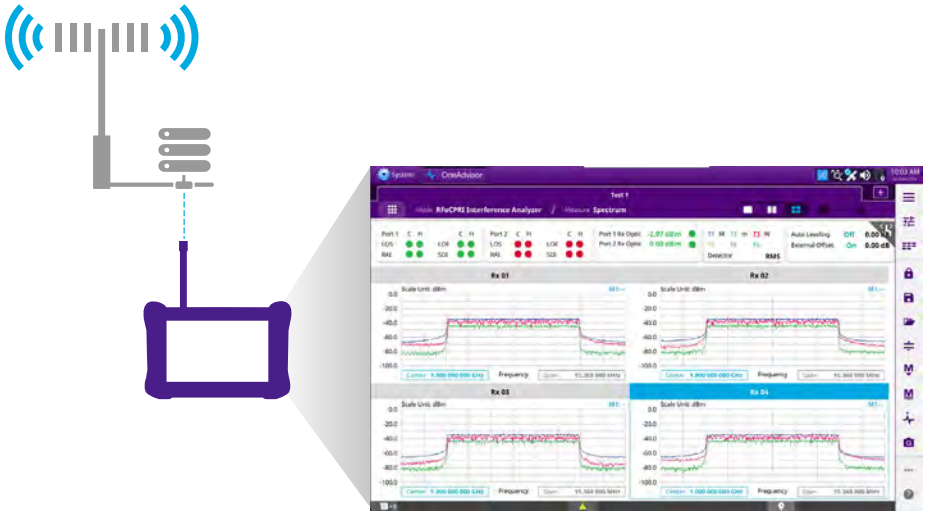
Key interference analysis measurement functions:

- RFoCPRI interference analysis
- Received Signal Strength Indicator (RSSI)
- Interference Finder
- Spectrum logging and re-player

RFoCPRI Interference Analysis

RFoCPRI technology performs RF measurements through the fiber fronthaul which is the link between base band units (BBU) and remote radio units (RRU).

RFoCPRI verifies the control signals and extracts the RF (IQ) data transmitted between the BBU and RRU at the ground without the need to climb the tower. Key benefit of RFoCPRI is that it enables monitoring and analysis of uplink signals (mobile devices), and PIM detection, precisely as they are received by the cell site.



1180.900.0722

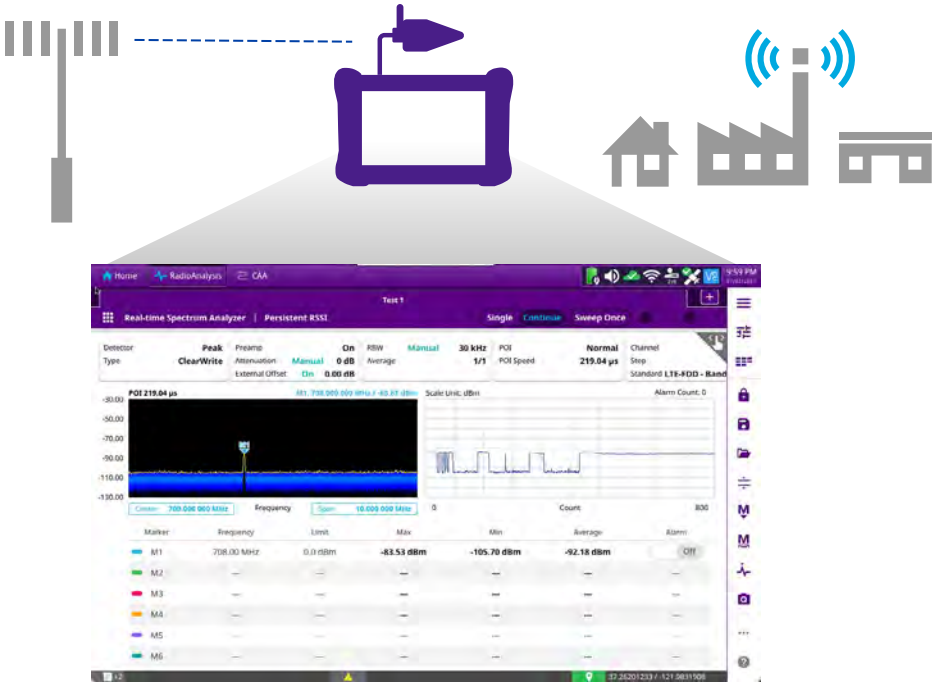
OneAdvisor 800 RFoCPRI (MIMO 4x4)

Received Signal Strength Indicator (RSSI)

RSSI performs a multi-signal measurement (up to 6 simultaneously signals) in time, assessing the power-level variations of interference signals over time.

In RSSI measurements power limits can be set for audible alarms and increase alarm counters every time a signal exceeds the defined limit line.

For long-term analysis, the spectrogram and RSSI measurements can be saved into an external USB memory for post-analysis.



1179.900.0722

OneAdvisor 800 Interference Analysis (RSSI)

TDD Interference Analysis (Gated Spectrum)

Interference analysis in TDD signals (LTE or 5G) requires a different measurement technique than conventional spectrum analysis, since the uplink and downlink signals are transmitted on the same frequency, but different timeslots.

OneAdvisor 800 performs single or dual gated sweep spectrum, effectively conducting spectrum measurements triggered only on the timeslots assigned for uplink transmission.

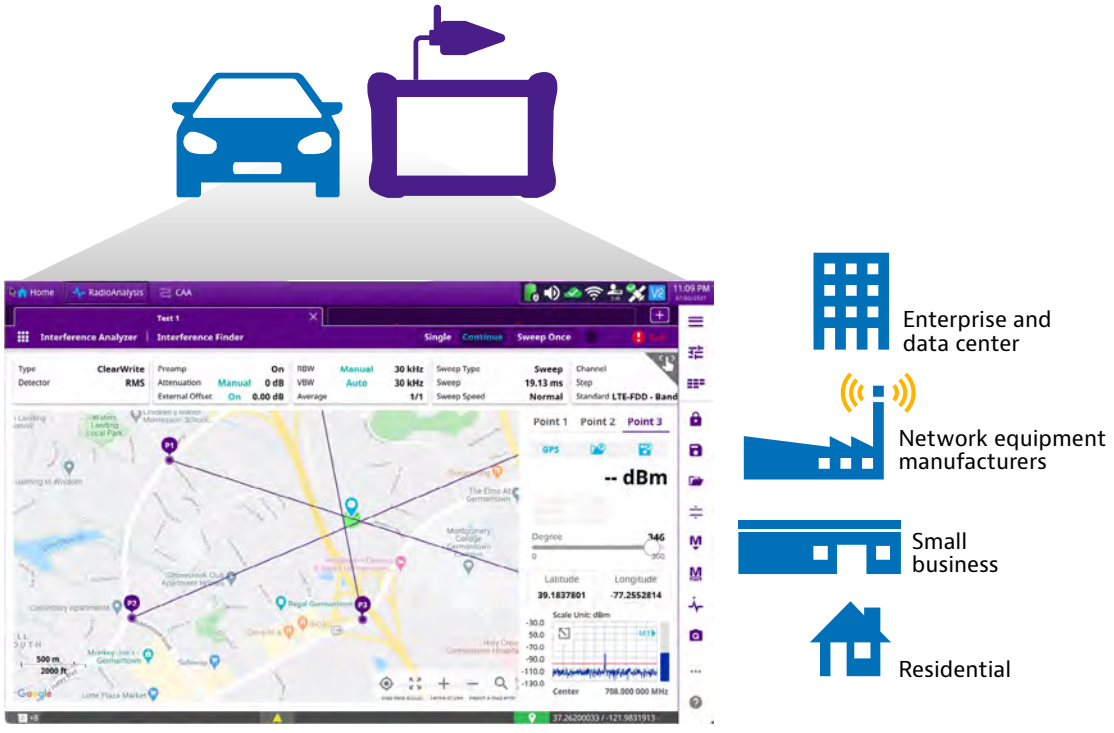
1178.900.0722

OneAdvisor 800 Dual Gate Spectrum Analysis (TDD Interference)

Interference Finder

Interference Finder is an automatic triangulation algorithm performed by the OneAdvisor 800 that uses GPS to extract geo-coordinates in multiple test points to locate the source of interference.

The interference finder automatically calculates the interference locations using an inscribed or circumscribed area based on the measured intersection points.



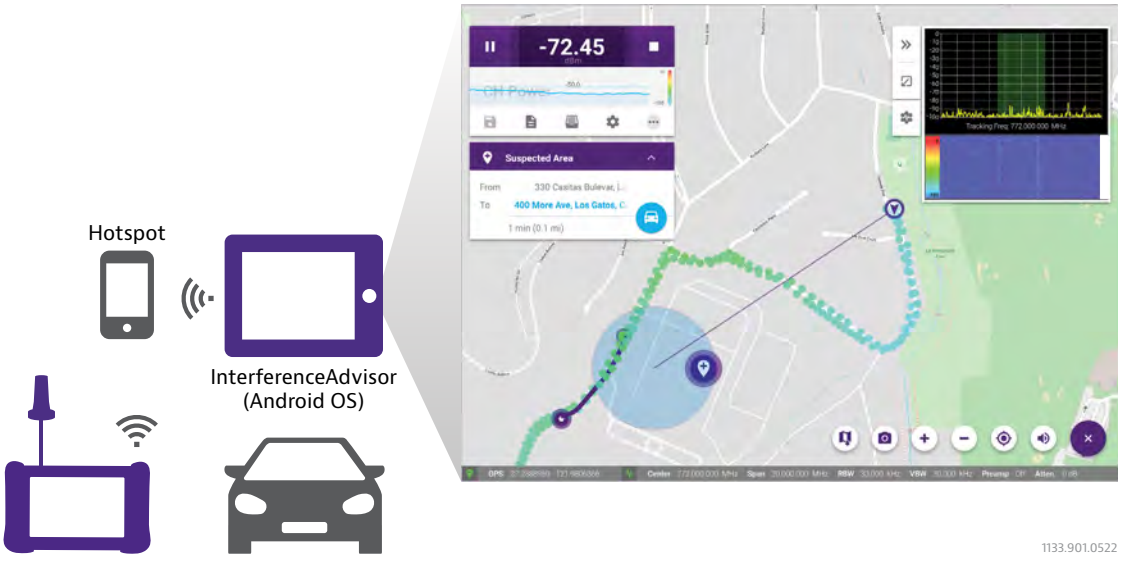
1177.900.0722

OneAdvisor 800 Interference Finder

Interference Hunting

InterferenceAdvisor™ is a fully automated RF interference hunting solution. Easy to set up and simple to use, it allows one RF engineer to automatically identify and locate an interference source, simply by following voice prompts on a familiar map-style application on an Android tablet.

The InterferenceAdvisor software communicates with OneAdvisor 800 to retrieve RF power measurements (Peak, RSSI, Channel) and creates a power heat-map during a drive test, and automatically detects the area of incidence with the highest presence of interference, giving optional navigation instructions to the detected location of interference.



InterferenceAdvisor – Interference Hunting

Wireless Signal Analysis

OneAdvisor 800 Signal Analysis functions provides the most comprehensive measurement techniques to effectively identify and characterize wireless signal quality. Including service cell site's identifier and key power indicators, as well as signal quality assessment of wireless control signals.

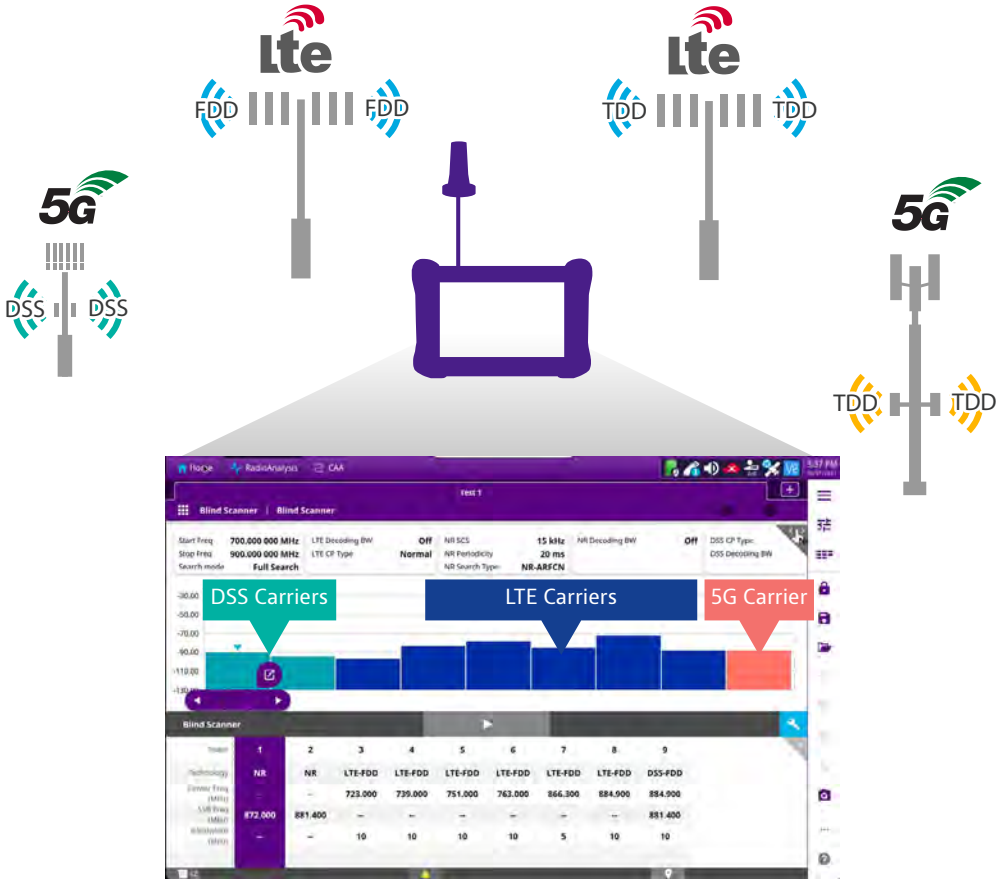
Key signal analysis measurement functions:

- 4G Signal Analysis
- 5GNR Signal Analysis
- DSS Signal Analysis
- NSA Signal Analysis
- Blind Scanner
- EMF Analysis
- 4G and 5G Coverage

Blind Scanner

OneAdvisor 800 is capable of performing a blind scanner, searching and identifying any of the following signal types:

- LTE Frequency Division Duplex (FDD)
- LTE Time Division Duplex (TDD)
- 5G New Radio (NR)
- Dynamic Spectrum Sharing (DSS)



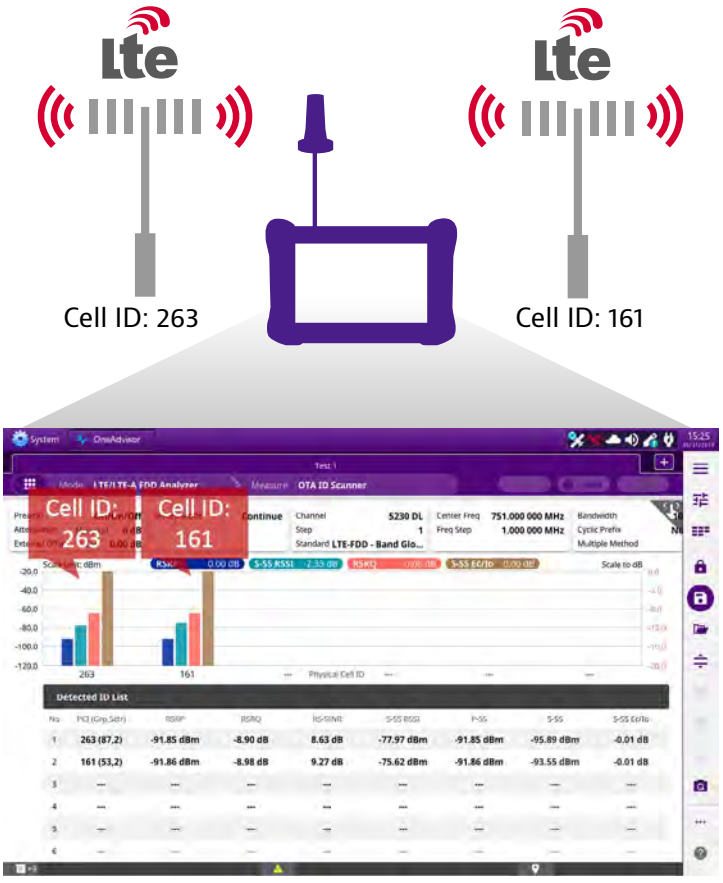
1177.900.0722

OneAdvisor 800 RF Blind Scanner

LTE Signal Analysis

OneAdvisor 800 is capable of performing signal analysis in LTE-FDD and LTE-TDD signal formats, covering the following key measurements:

- RF Characterization: 3GPP conformance tests including, channel power, occupied bandwidth, adjacent channel leakage ratio, and spectrum emission mask.
- LTE Over-the-Air: LTE carrier scanner for carrier aggregation validation; LTE ID scanner for multi-serving cell sites; LTE control channel for signal quality assessment; and LTE Route Map for service coverage verification.

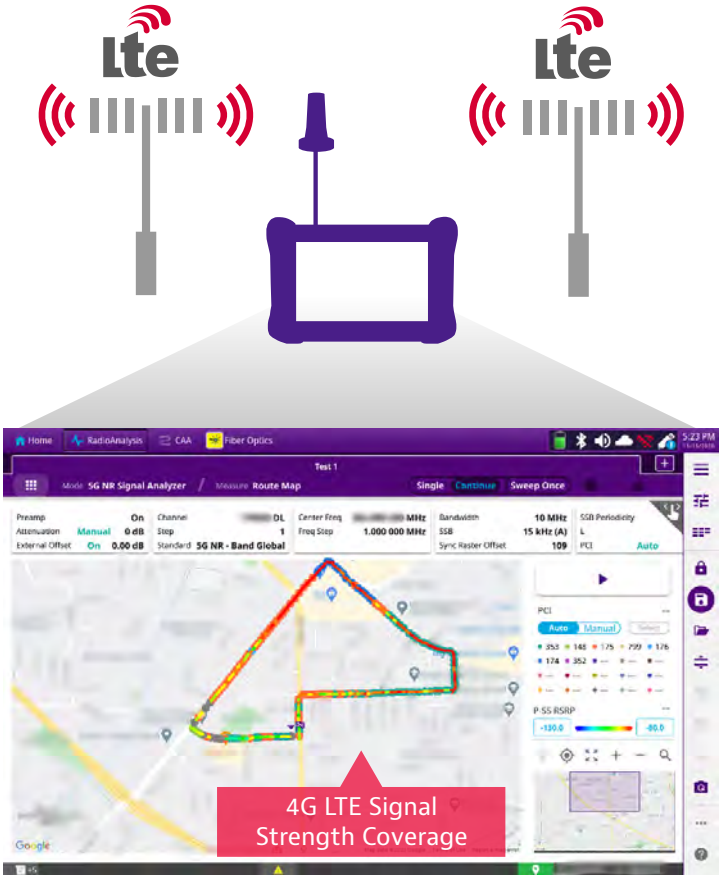


1175.900.0722

OneAdviso 800 LTE Signal Analysis

LTE Signal Coverage

Service availability is derived by signal coverage or power level of LTE pilot signals (synchronization and reference signals), not only to identify network dead-zones that will cause call drops, but also to identify areas where power levels are close to the UE sensitivity level that might degrade throughput and even cause retransmissions, negatively impacting customer experience.



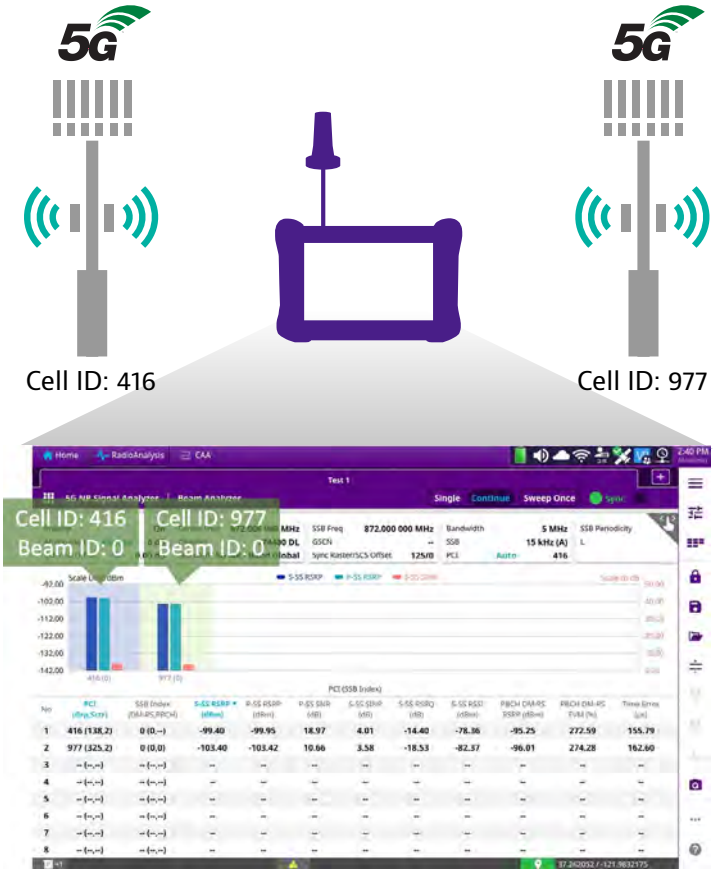
1182.900.0722

LTE Signal Coverage

5G Signal Analysis

OneAdvisor 800 is capable of performing 5G signal analysis, covering the following key measurements:

- RF Characterization: 3GPP conformance tests including, channel power, occupied bandwidth, adjacent channel leakage ratio, and spectrum emission mask.
- 5G Over-the-Air: 5G carrier scanner for carrier aggregation validation and signal quality assessment; 5G Beam Analyzer, for beamforming assessment and multi-serving cell sites; and 5G Route Map for service coverage verification.



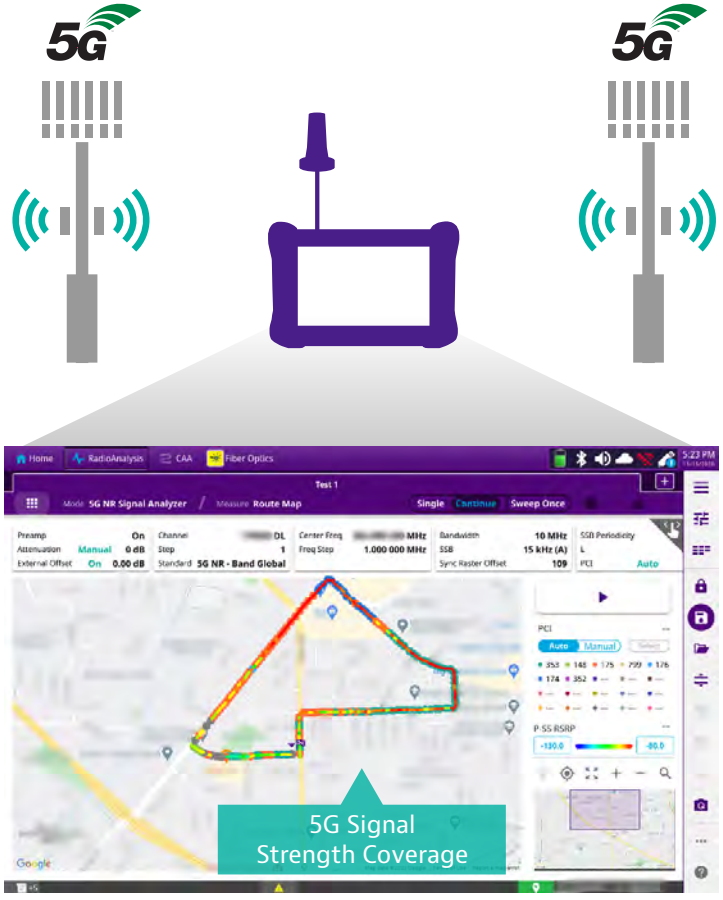
1183.900.0722

OneAdvisor 800 5G Signal Analysis – Beamforming

5G Signal Coverage

Service availability is derived by signal coverage or power level of 5G beam signals (SSB) verifying 3D beamforming by assessing beam availability horizontally and vertically.

5G signal coverage will identify network dead-zones that will cause call drops, as well as areas where beam power levels are close to the UE sensitivity level that might degrade throughput and even cause retransmissions, negatively impacting customer experience.



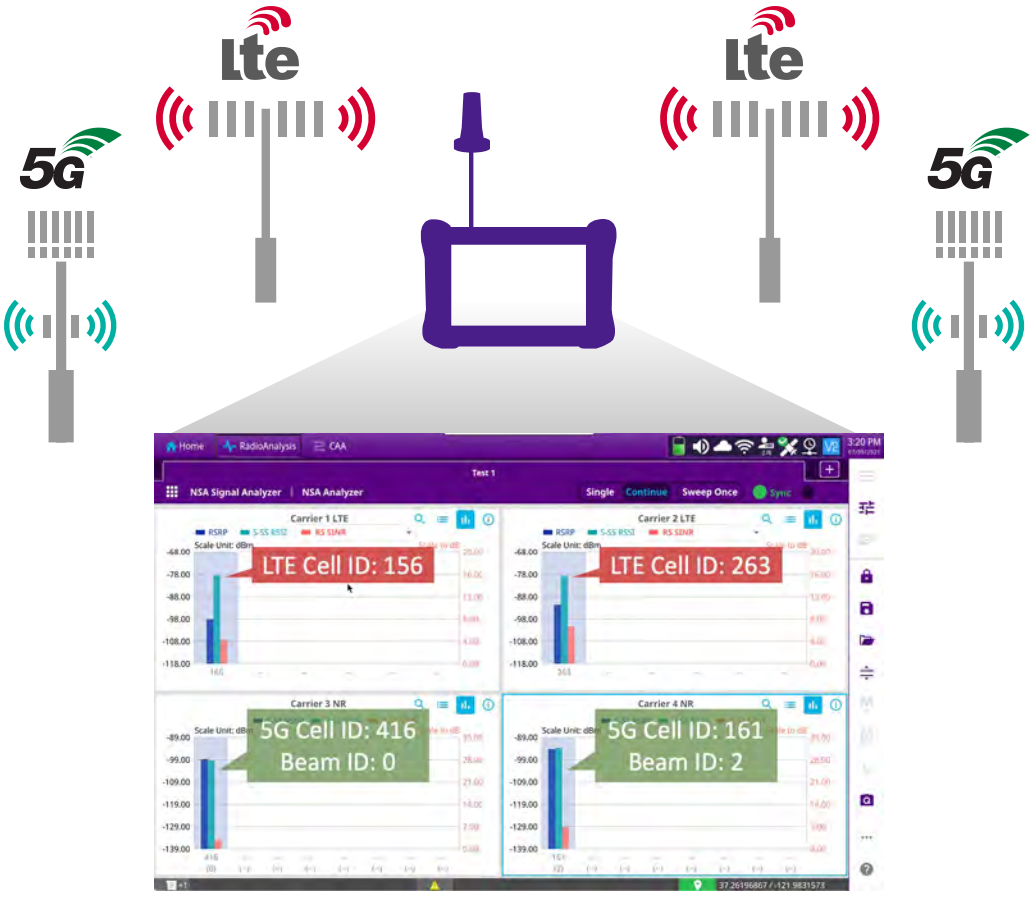
1174.900.0722

5G Signal Coverage

NSA Signal Analysis

OneAdvisor 800 is capable of performing Non-Stand Alone (NSA) signal analysis, analyzing up to 8 different carriers at the same time, of either LTE and/or 5G at any band of any channel bandwidth, covering the following key measurements:

- NSA Analyzer: multi-serving cell and beamforming assessment and power levels.
- NSA Scanner: multi-servicing cell, power levels and signal quality (constellation and EVM)
- NSA Route Map: Service coverage verification.



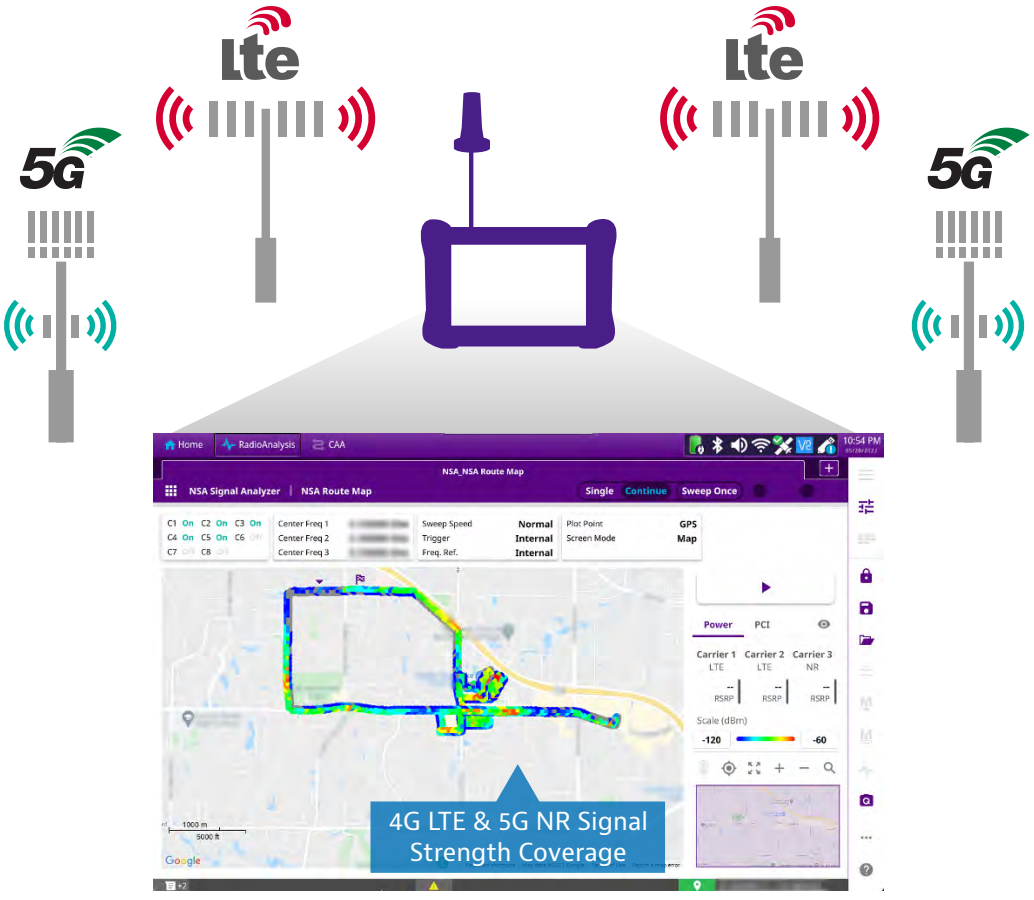
1184.900.0722

OneAdvisor 800 Non-Stand Alone (LTE & 5G) Signal Analysis

NSA Signal Coverage

5G in Non-Standalone (NSA) relies on LTE anchor signals to established connection with mobiles and provide data service over 5G radios. In this case, it is important to assess the availability and signal coverage or both signals LTE and 5G.

5G NSA service coverage will identify network dead-zones that will cause call drops, as well as areas where beam power levels are close to the UE sensitivity level that might degrade throughput and even cause retransmissions, negatively impacting customer experience.



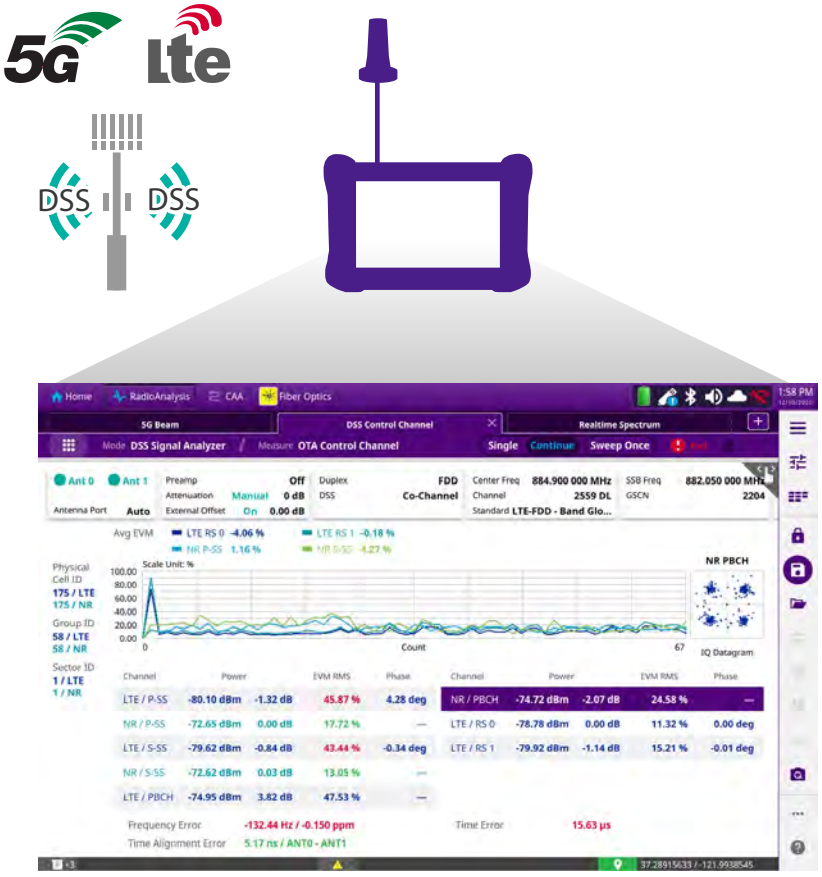
1185.900.0722

5G NSA (LTE and 5G) Signal Coverage

DSS Signal Analysis

OneAdvisor 800 is capable of performing Dynamic Spectrum Sharing (DSS) signal analysis, including the ability to scan multiple DSS carriers, and analyze LTE and 5GNR signals transmitted on each DSS carrier at any band of any channel bandwidth, covering the following key measurements:

- RF Characterization: 3GPP conformance tests including, channel power, occupied bandwidth, and power vs. time (frame and slot).
- DSS Over-the-Air: channel scanner, analyzing multiple DSS carriers; ID scanner, measuring multiple cells (PCI); control channel, validating DSS pilot signals (LTE and 5G), and signal quality; and DSS route map for service coverage verification.



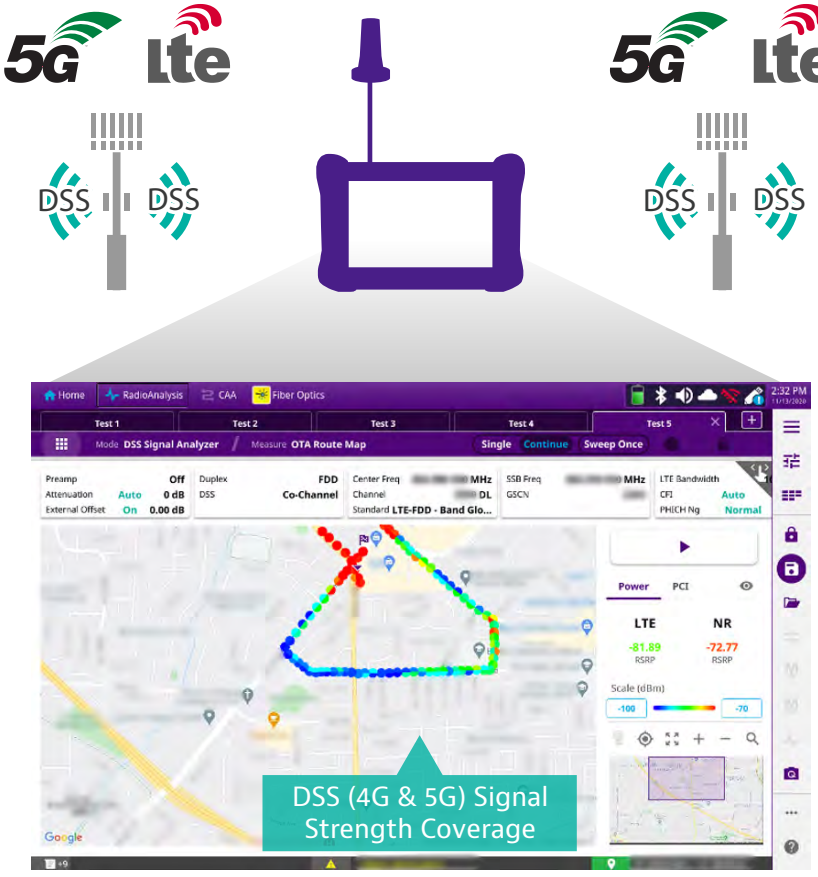
1186.900.0722

OneAdvisor 800 Dynamic Spectrum Sharing (DSS) Signal Analysis

DSS Signal Coverage

Coverage verification allows identification of service gaps or death-zones where pilot signals are below acceptable sensitivity levels of user equipment.

Coverage gaps will cause call drops or fallbacks, impacting throughput of mobile users. DSS coverage is validated by the power level of the specific reference signals of 4G-LTE and 5G-NR



1187.900.0722

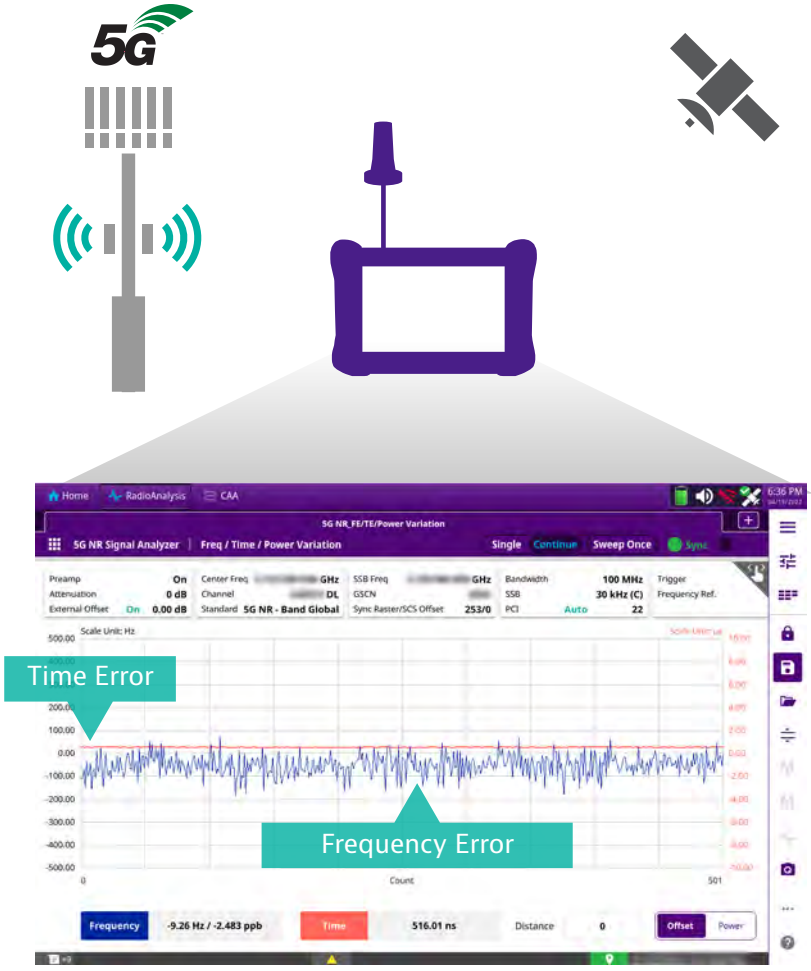
OneAdvisor 800 Dynamic Spectrum Sharing (DSS) Signal Analysis

5G Synchronization and Timing Verification

OneAdvisor 800 is capable of performing synchronization and timing verification of 5G signals, including frequency and time variation of a cell-site, as well as cell phase synchronization of a cluster of cell sites.

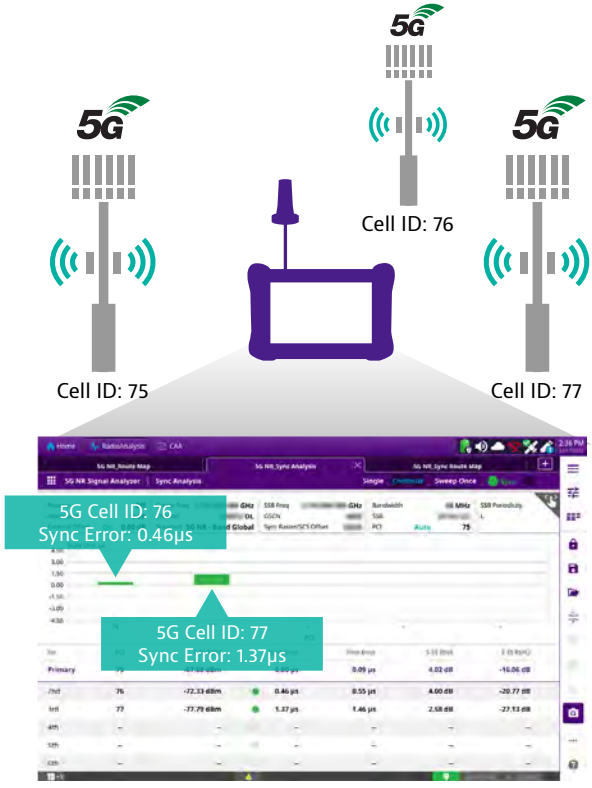
5G radios in C-Band are TDD where the downlink and uplink transmission take place on the same frequency, but at a different timeslot. These timeslots must have the same frame configurations and synchronization to avoid collisions or interference between cell-sites.

- Cell phase synchronization accuracy for TDD is defined as the maximum absolute deviation in frame start timing between any pair of cells on the same frequency that have overlapping coverage areas.
- The cell phase synchronization accuracy measured between cell sites shall be better than 3µs or against a primary reference source the time variation shall be better than ±1.5µs.



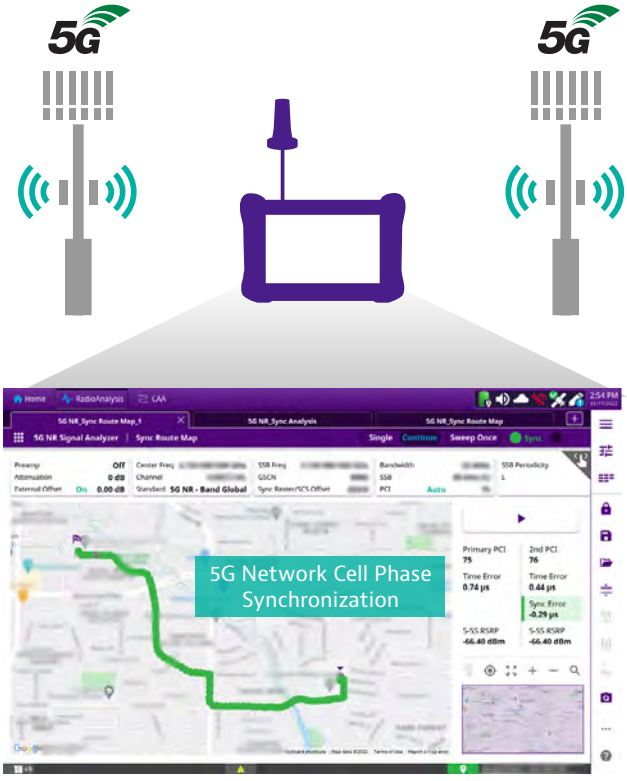
1188.900.0722

Ansolute Frequency and Time Error



1189.900.0722

5G Cell Phase Synchronization



1190.900.0722

5G Cell Phase Synchronization Network Verification

Test Process Automation with Job Manager and StrataSync

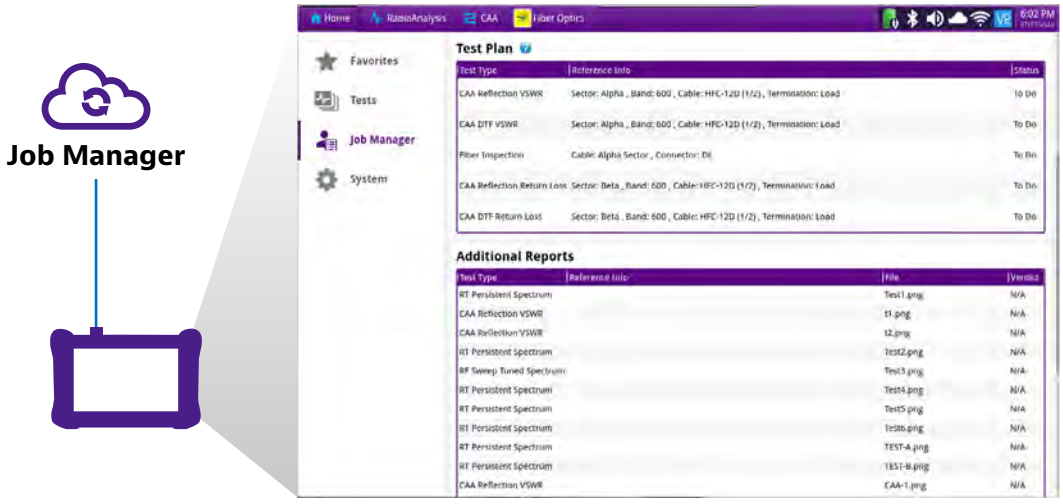
VIAVI Test Process Automation allows cell technicians to perform installation and maintenances tests with confidence:

- In accordance with mobile operator's test criteria
- Covering all radio types (LTE and 5G) and topologies (Macro-cell, Small-cell, C-RAN, and/or DAS)
- Automatically uploading test results to the StrataSync cloud with simple PASS/FAIL indicator

Job Manager

VIAVI Job Manager automates test processes, offering mobile network operations and cell site construction teams a self-guided test solution, improving efficiency in the field for cell-site installation and maintenance.

Job Manager's automates the entire process ensuring the proper test sequence is executed according to mobile operator's requirements, configuration test time is minimized, and results are consistent and consolidated.



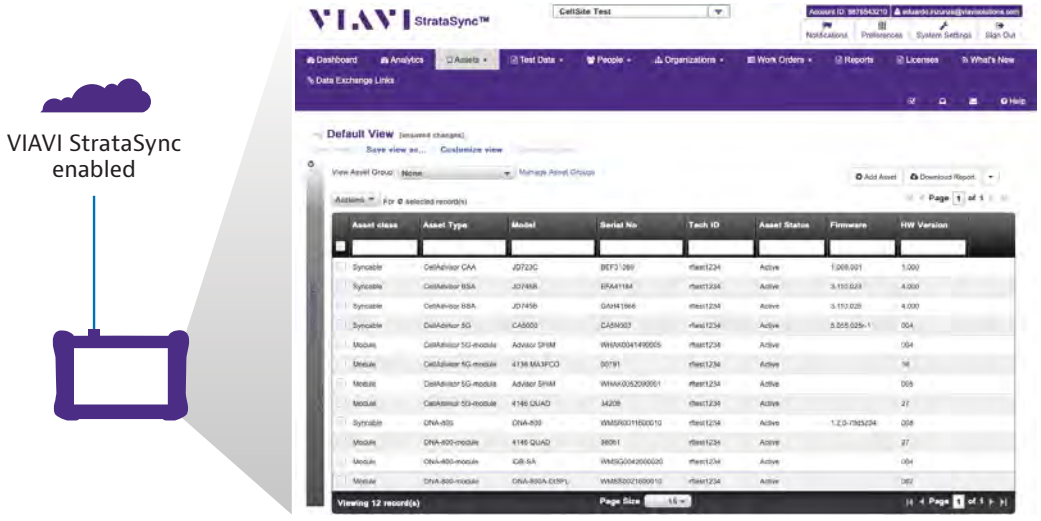
1129.900.0522

OneAdvisor 800 Job Manager

StrataSync

VIAVI Job Manager automates test processes, offering mobile network operations and cell site construction teams a self-guided test solution, improving efficiency in the field for cell-site installation and maintenance.

Job Manager's automates the entire process ensuring the proper test sequence is executed according to mobile operator's requirements, configuration test time is minimized, and results are consistent and consolidated.



1130.900.0522

StrataSync – Asset Management

Faster Work Speed

Eliminate wasted time trying to remember which tests to run and how to run them

Greater Consistency

Drive consistent, repeatable results, regardless of technician skill or experience

Lower Training Costs

New technicians get up to speed quickly with easy-to-follow prompts

Peace of Mind

Test results automatically saved to StrataSync cloud

1129.900.0522

StrataSync – Asset Management

VIAVI Solutions

Contact Us **+1 844 GO VIAVI**
(+1 844 468 4284)

To reach the VIAVI office nearest you,
visit viavisolutions.com/contact

viavisolutions.com