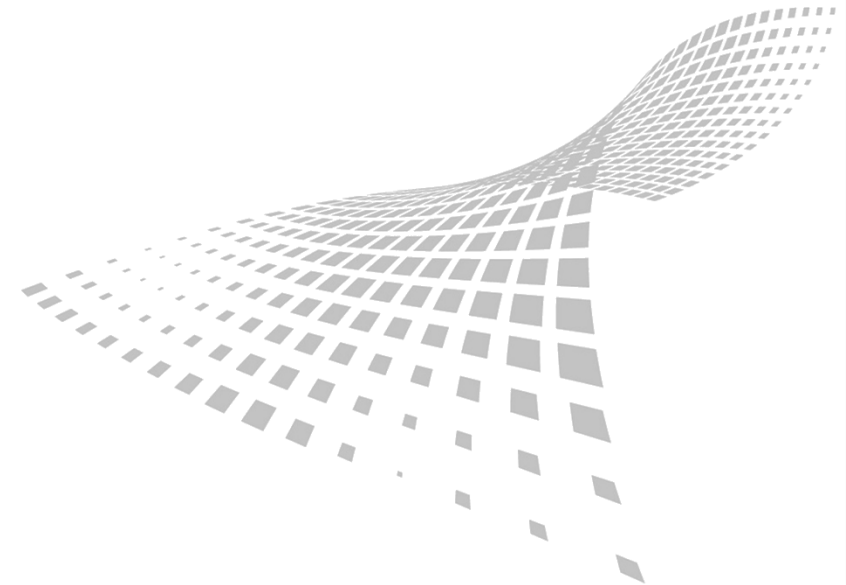# Wireless Network Planning and Optimization Solution

Transcom Instruments

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TSP Transmitter

TSP Transmitter is an engineering instrument applicable to simulation and testing of indoor and outdoor signal coverage and evaluation and testing of signal interference. It is mainly used for simulating and outputting CW and modulation signals, i.e. pilot signals transmitted by the base station. Common application includes propagation model tuning, network coverage testing, and in-building coverage planning, etc

TSP Scanner

TSP Scanner optimized analysis system is an integrated platform based on all-standard scanner and analysis software. It is used for automatically sweeping and scanning signals at high speed, such as GSM, CDMA2000/EVDO, TD-SCDMA, WCDMA, FDD/TD-LTE signals. Widely used in network reconnaissance, planning, construction and optimization

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TSP Transmitter

- Support 700MHz-2,700MHz output in the standalone mode, with adjustment increase of 10kHz

- Support GSM, TD-SCDMA, CDMA2000, WCDMA, LTE, NB-IoT and RoLa modulation signals and CW signals output

- In CW mode, frequency and power are adjustable

- In modulation mode, frequency and power are adjustable, and the BSIC code of GSM, Midamble code of TD-SCDMA, PN code of CDMA2000, scrambling code of WCDMA, power of CPICH and Channel, PCI and bandwidth of LTE, and PCI of NB-IoT can be set; the modes of Standalone, In-band and Guard-band are available; and the PCI and S7-S12 waveform file of RoLa can be configured

- 0-43dBm (20W) and -10-33 dBm (2W) power adjustment range in the standalone mode, with increase of 0.5dB

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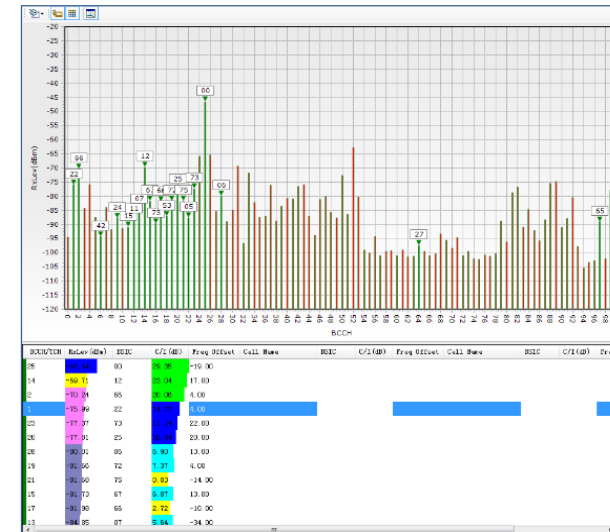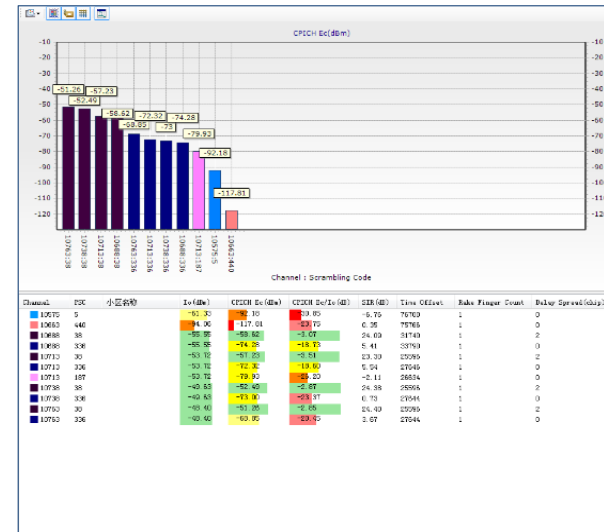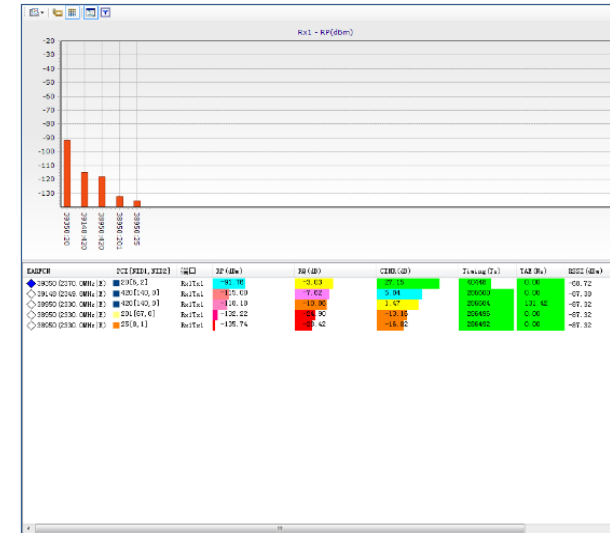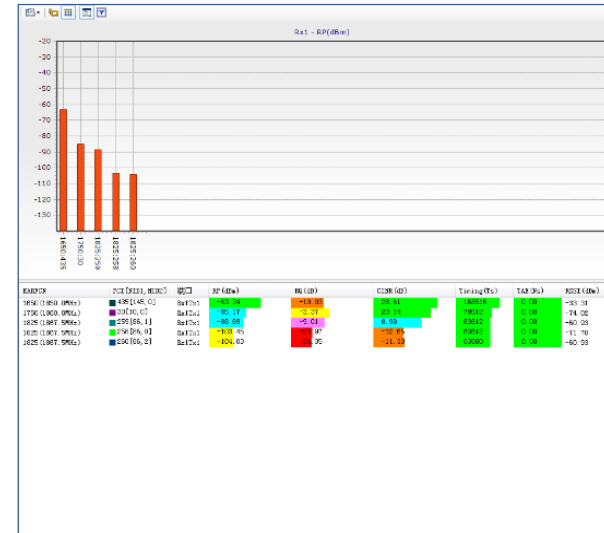
TSP Transmitter

- Frequency range, power and protocol all can be customized

- TSP transmitter can be controlled by cellphone APP within 10 meters, facilitating remote operation and avoiding radiation injury caused by radio waves in high-power transmission of signals

- Small size (200×60×230 mm) and light weight (2kg). With external battery, TSP Transmitter can continuously work for 5-8 hours, applicable for outdoor complex environments

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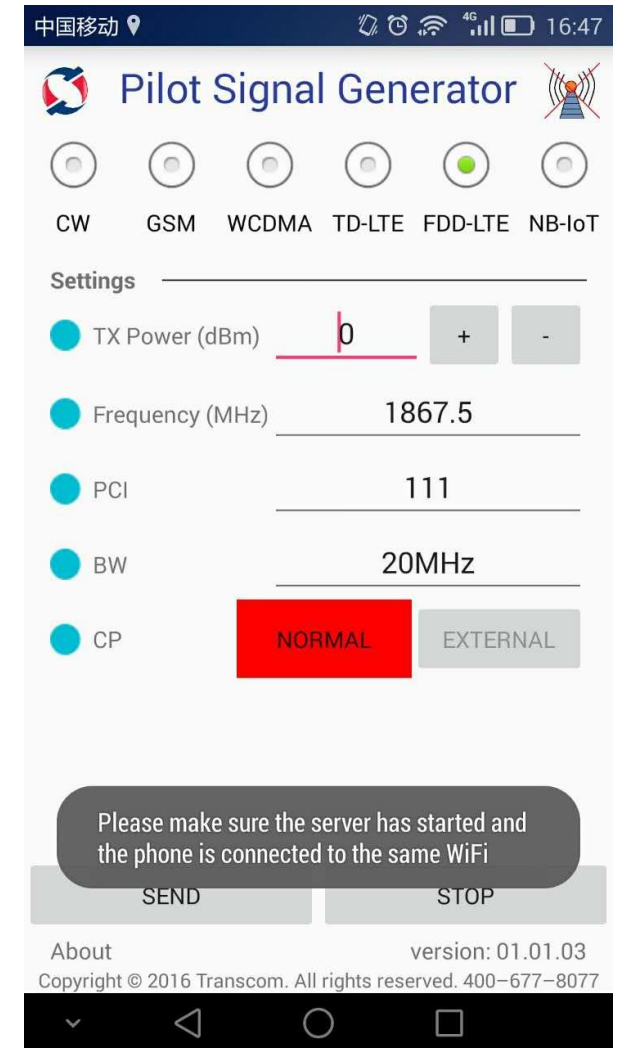
TSP Scanner

- Support full-frequency tests within 2MHz-3GHz

- Support simultaneous tests of multi-system and multi-frequency GSM, CDMA/EVDO, TD-SCDMA, WCDMA, TDD-LTE, FDD-LTE signals

- Support SISO, SIMO, MIMO (2x2) antenna

- 100ms-level measurement rate

- LTE Top N Scan Dynamic Range≥ 25dB

- Test sensitivity≤-140dBm

- Support high-speed SIB decoding as decoding success rate is more than 90% if CINR is more than 0
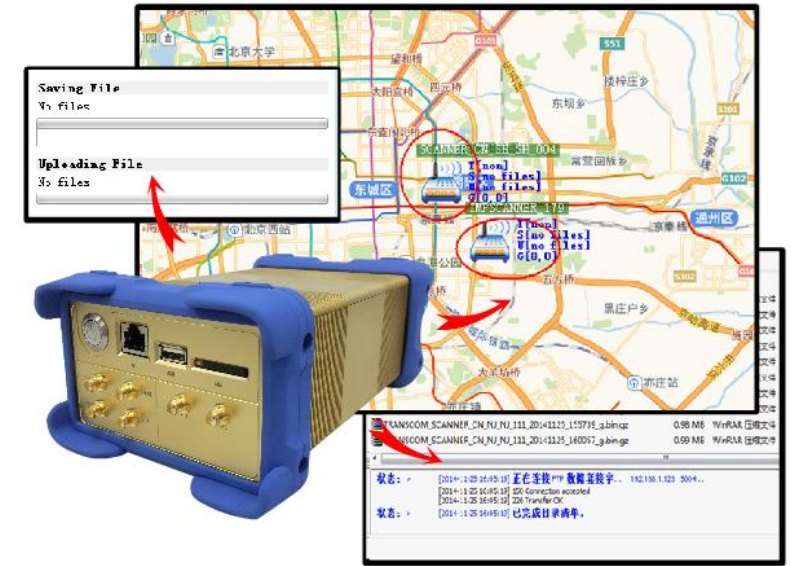
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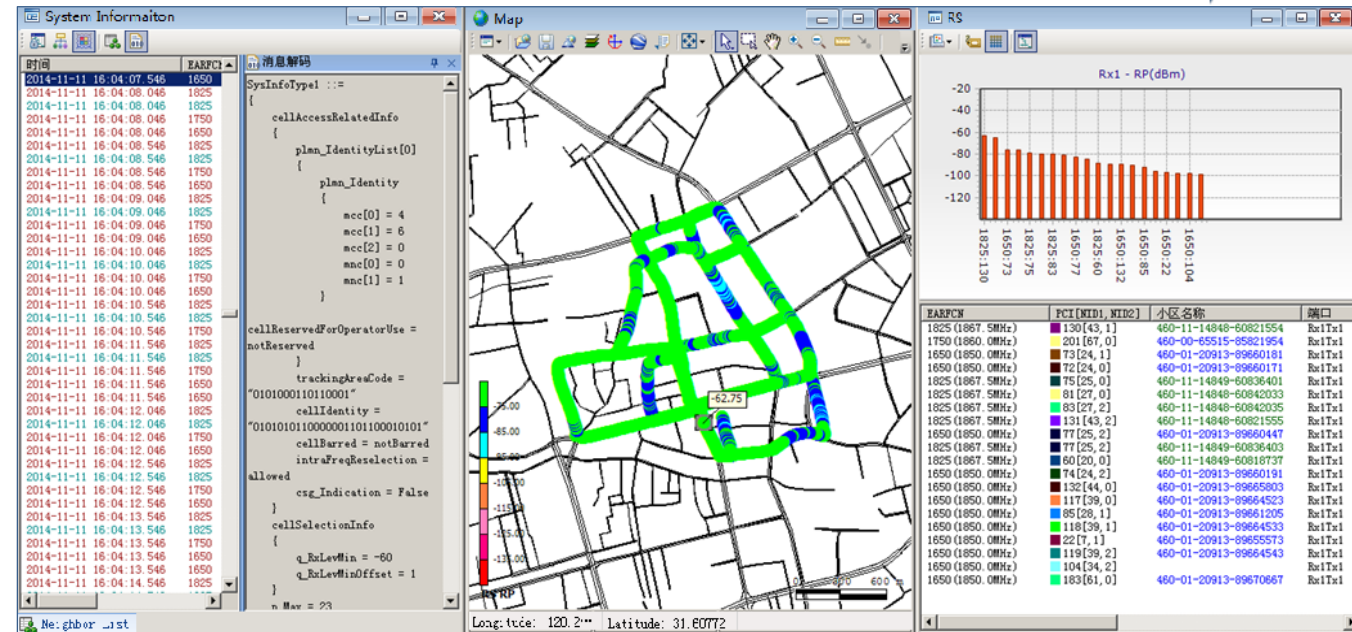
Multiple Application

- Auto data return system, sweeping and scanning can be remotely controlled

- Combined with spectrum, demodulation and layer decoding mode

- "One-Key" slot interference test mode

- RB testing mode

- Zero-span function

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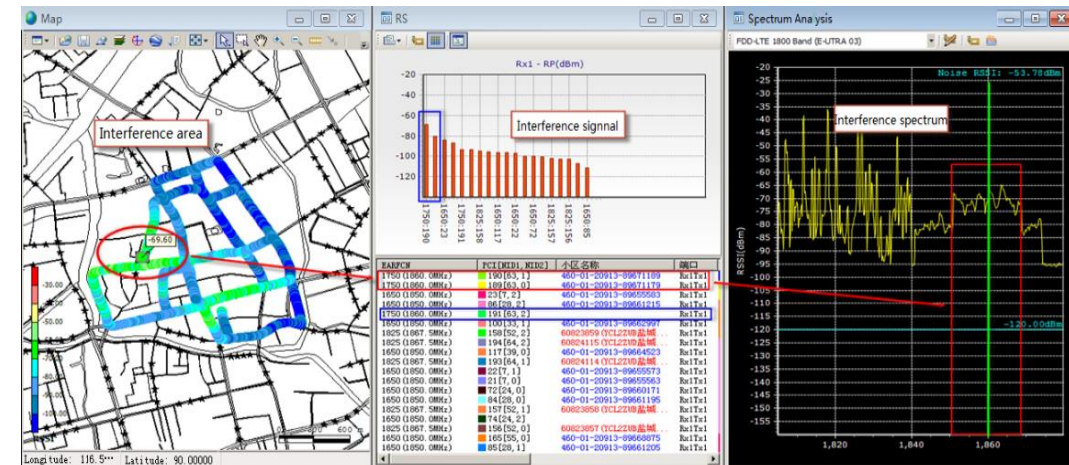
Wireless Network Planning and Optimization Solution

Propagation Model Tuning

Propagation model is the study of slow fading caused by obstacles shadow effect on a given propagation path. Propagation model tuning is necessary when put a propagation model into different areas, where some of the parameters need to be changed to fit the actual environment

Solution

TSP Transmitter is used to transmitting CW signals for TSP Scanner to receive and analyze geographical signal strength data through road testing, then further input into planning software for modify model parameters

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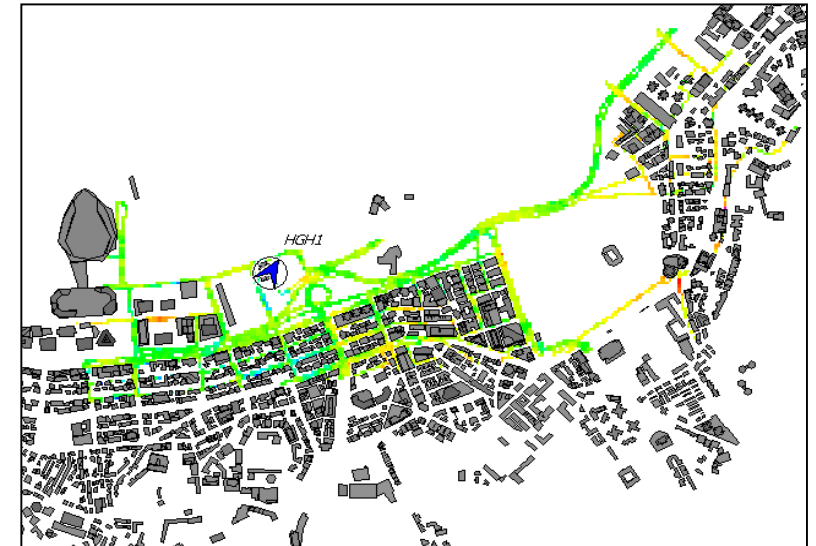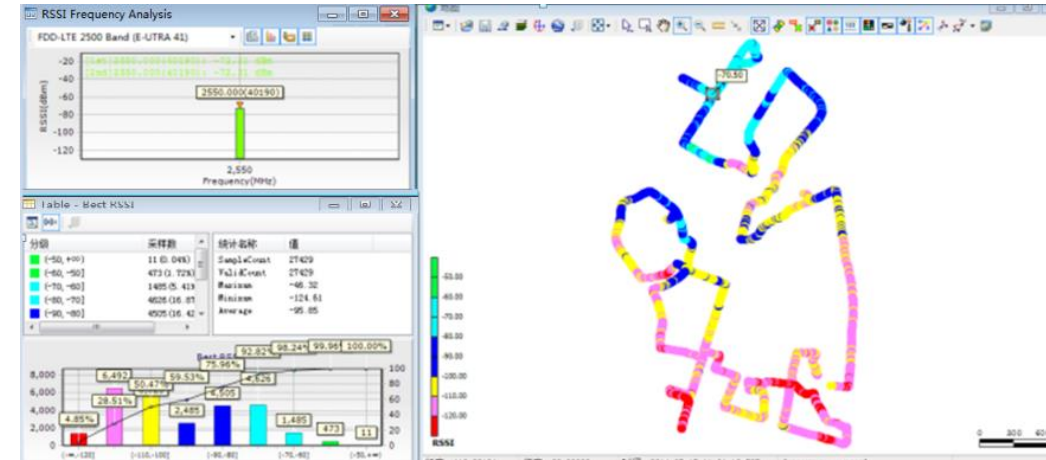
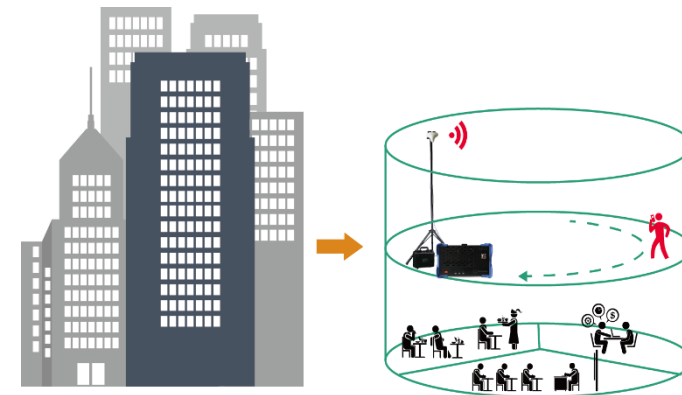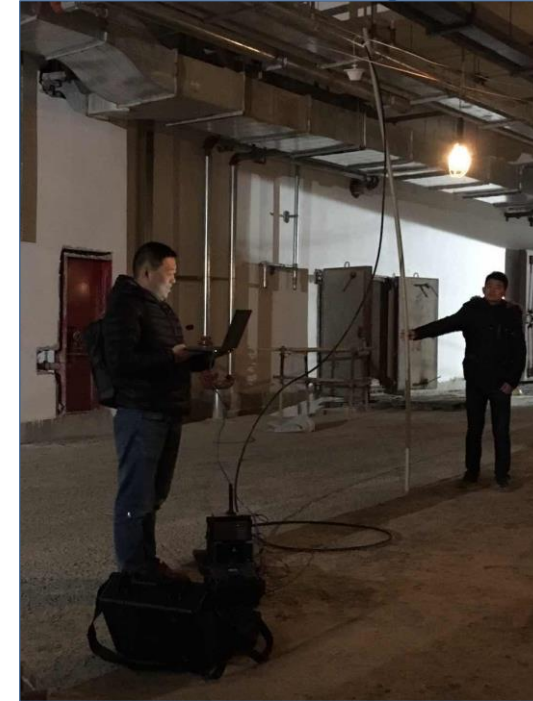# Wireless Network Planning and Optimization Solution

In-building Distribution System

CW signal testing result often varies compare to actual performance in terms of narrow and non-identical indoor environment that leads to RSSI difference. In contrast, pilot signal behaves identical with the actual signal and can be further evaluate by CINR ratio. Thus pilot signal is the primary requirement for micro base station distribution planning

Solution

TSP Transmitter is able to output modulation signals of operating system of LTE and other existing networks. By using TSP scanner road testing to collect signal intensity data and evaluate base station signal coverage. User can easily make in-building distribution system planning base on the base station location and quantity

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Frequency Check

Before network set up in new frequency range, the full range needs to be tested and evaluated by using sweeping and scanning instruments. Frequency check helps evaluate interference level of any new frequency range and locate the interference source. Then further frequency range as well as reduce network bottom noise.

Solution

TSP Scanner is able to run spectrum testing through analyzing target interference range and location, thus further evaluate frequency range condition for network implementation

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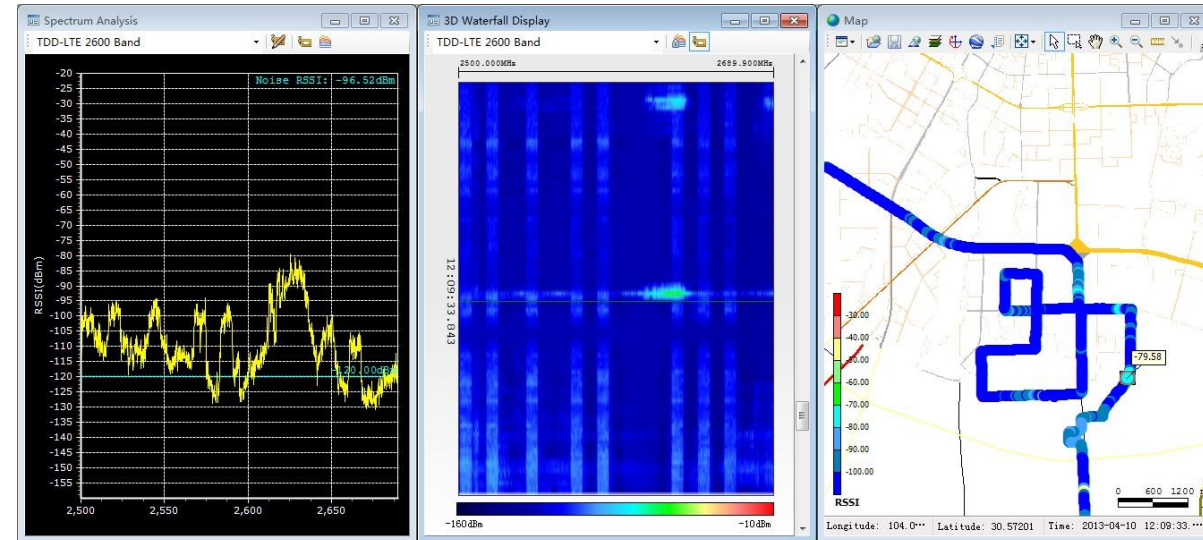
Wireless Network Planning and Optimization Solution

Wireless Network Coverage Optimization

Wireless communication network coverage is formed by individual area coverage. The ideal perfect network coverage is precise area coverage without overlap, yet in reality, overlap happens all the time. Wireless network coverage optimization is the key factor for the stable performance of network structure

Solution

Use TSP Scanner as a data collection hardware and combined with the analysis software to output wireless network structure in a target area. Each area coverage can be analyzed and visualized in the software, and further instruct users for network coverage optimization

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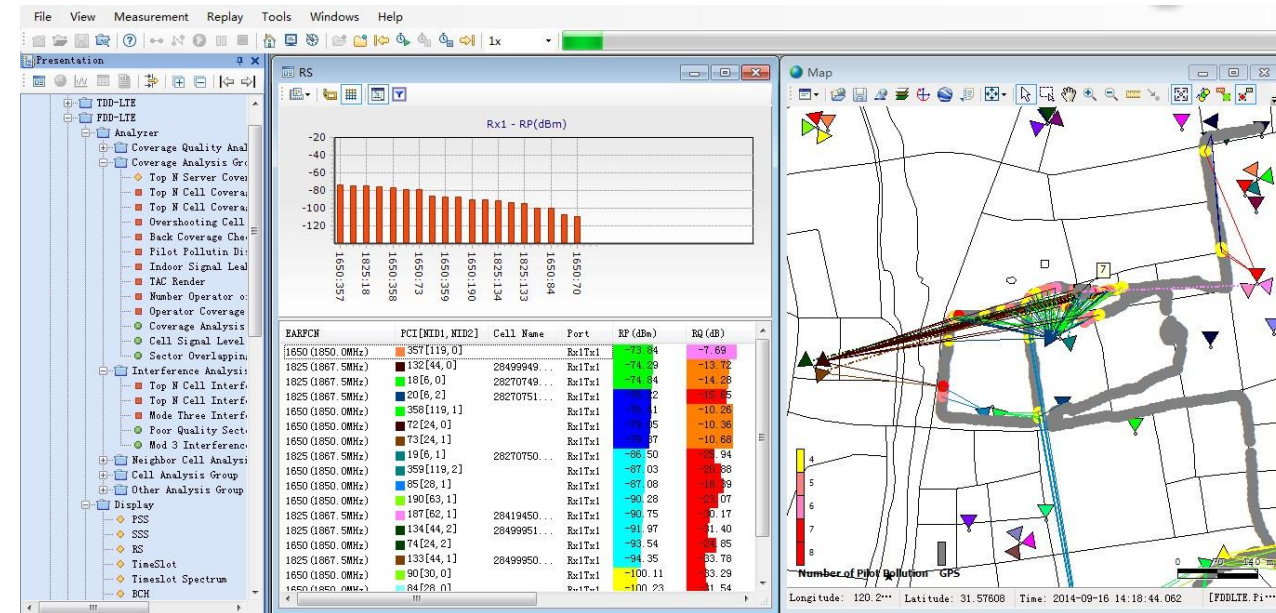
Wireless Network Planning and Optimization Solution

Operators Network Coverage Comparison Analysis

Normally network is operated by mutiple operators where different operator often mutually influence on the same area. To understand competitor coverage helps operator to further optimize their own network and serve end user better

Solution

TSP Scanner is able to obtain network coverage of various operators by a single test, and distinguish the attributes of operators based on frequency, SIB and MNC. Thus further evaluate each operator network coverage and interference level

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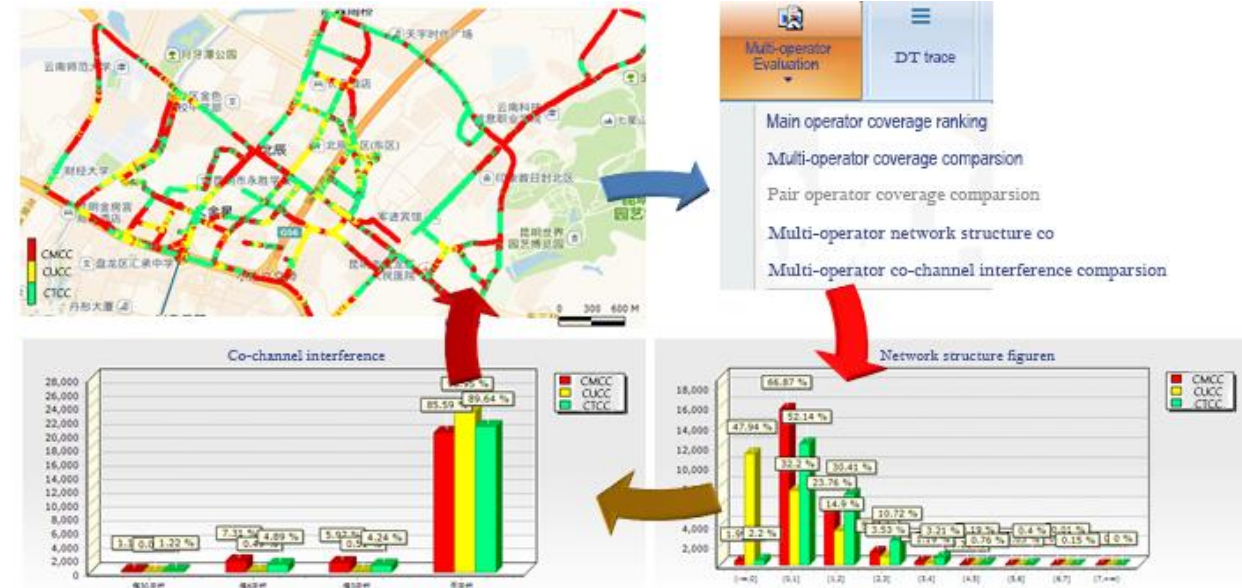
Overshooting

As geographic environment constantly changing, overshooting becomes a serious problem in network optimization

TSP Scanner presets the distance, strength and absolute value for connecting target area and highlighting the potential overshooting base station, thus users can easily identify the location and coverage are of the overshooting base station

Setting overshooting threshold value (Ex：RSRP ≥-95dBm; Distance≥0.8km; Power level below Top N ≤6dB). It generates overshooting verification trajectories map, overshooting coverage analysis and more

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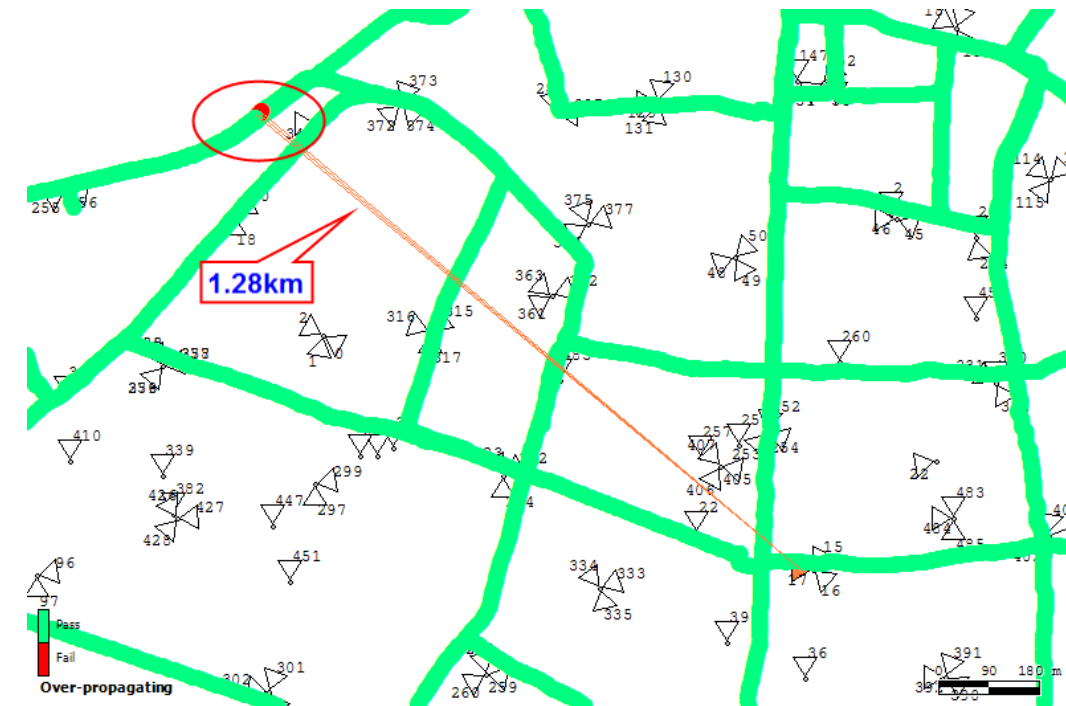
Time-Slot Interference Early Warning Solution

Different subframe and delay settings in TD-LTE network often cause identical/adjacent frequency time-slot interference, where data transmission quality reduced in a significant amount

TSP scanner offers "one-key" solution for time-slot interference with automatically detecting and alerting potential interference

🔴 show high risk of co-channel interference when over the threshold

🟡 show minor risk of co-channel interference when within the threshold

🟢 show NO risk of co-channel interference when below threshold

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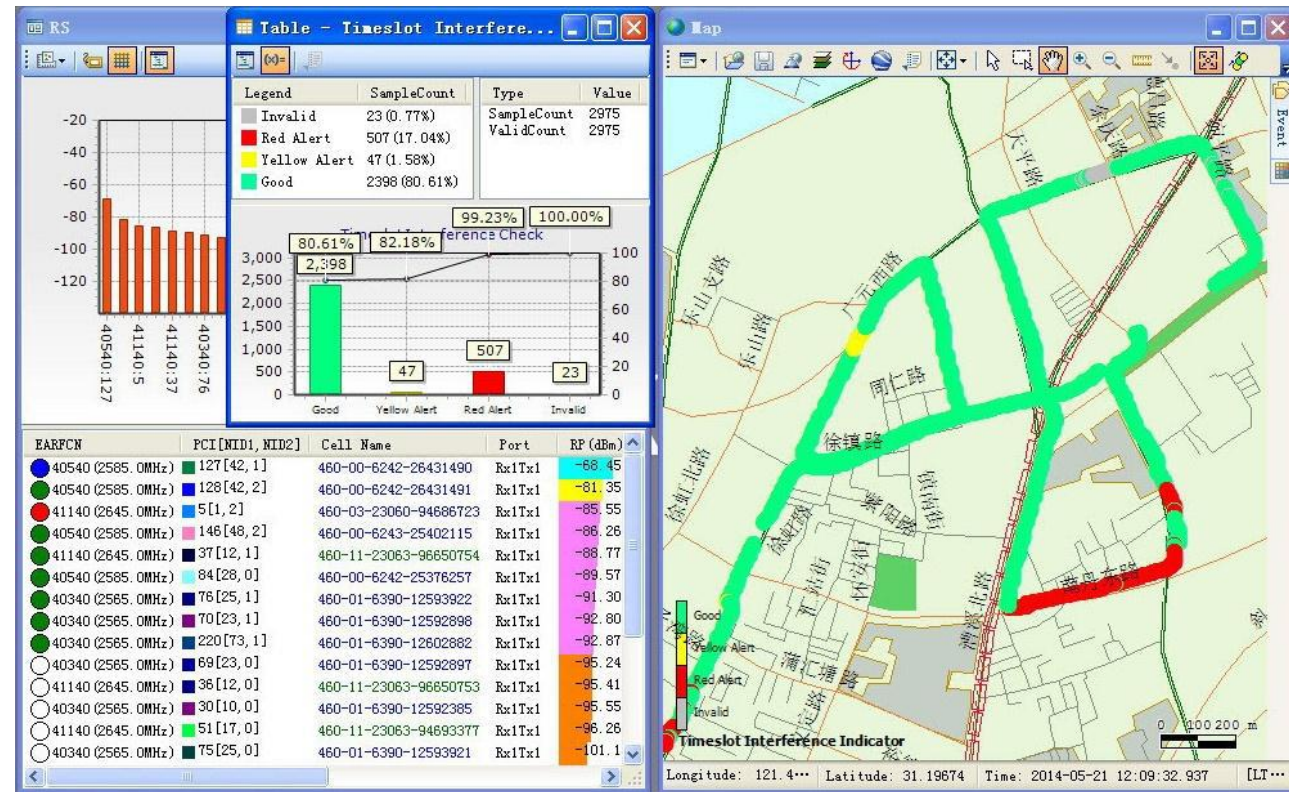
Co-channel Interference

Similar ID(0,1,2) in both main channel and area channel leads to inaccurate connection of end users

Generate co-channel interference verification map and site analysis report, screening and investigation by setting co-channel interference threshold (such as below 6dB of Top N signal) on replay of data

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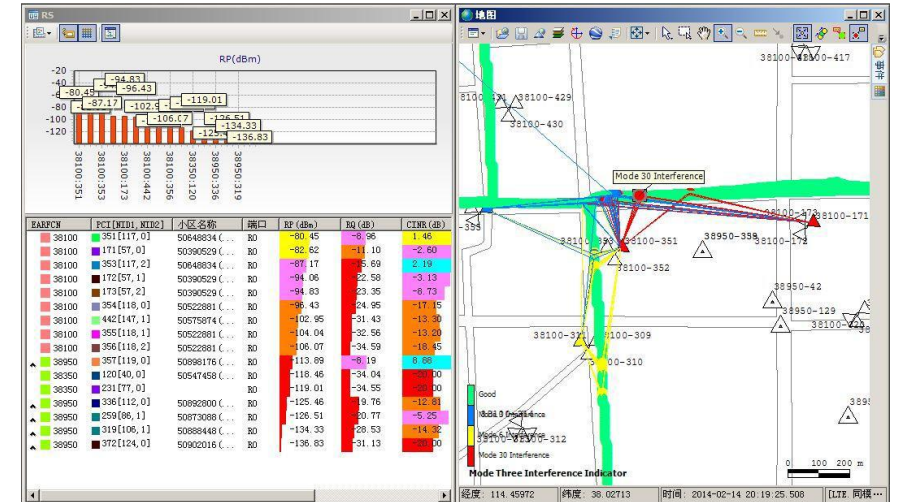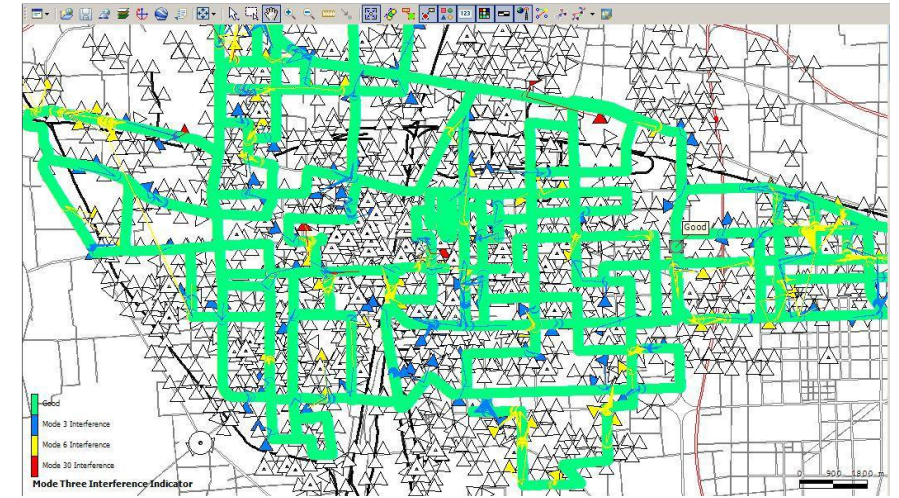
Case 2 : Interference

Interference Analysis by Time-domain

Establish a spectrum data libraries on determine the signal type and spectral characteristics with the time-domain zero-span function

- Discover a narrow bandwidth signal near the LTE signal in spectrum mode

- Mark the frequency, set SPAN=0 , observation time domain signal characteristics: frequency, signal interval, time slot width. Can identify the signal type

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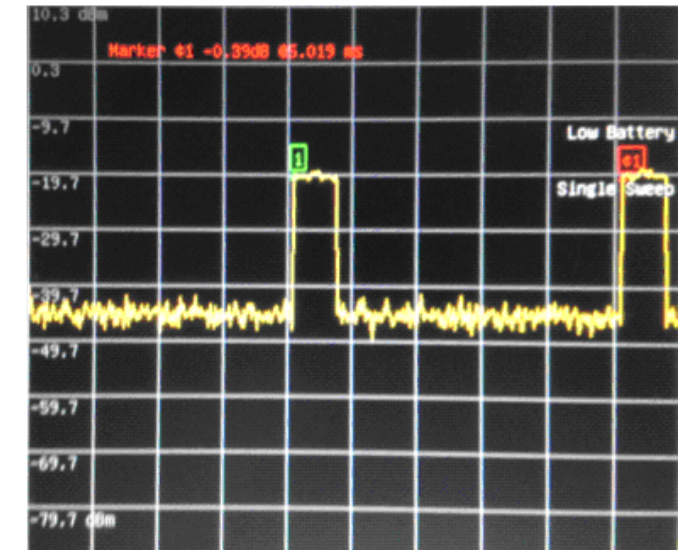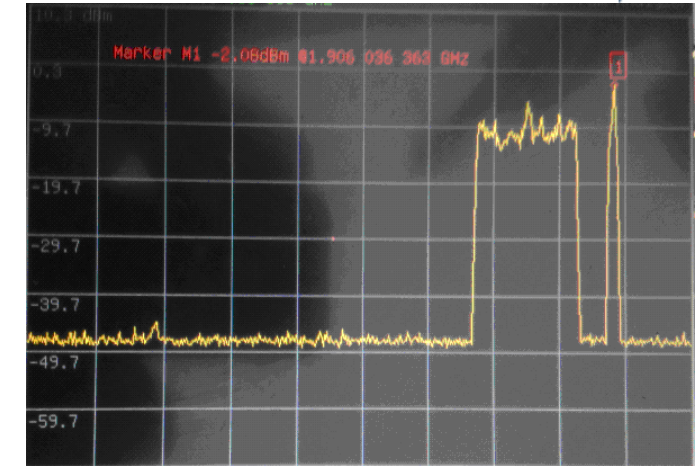
Neighbourhoods Analysis

Combining cell file and neighbourhoods threshold basic settings (such as field strength, quality, distance and direction), neighbourhoods site analysis report automatic generate

Supporting multi-network neighbourhoods optimization such as CSFB in LTE/GSM

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