5G NR Wireless Network Optimization

Nemo Wireless Network Solutions

Introduction

Evolving networks require constant optimization, troubleshooting, and fine-tuning. Our optimization solution offers tools for every stage of your network’s lifecycle, be it on-site troubleshooting and maintenance in outdoor or indoor spaces or collecting quality of service (QoS) and quality of experience (QoE) metrics for network verification through drive or walk testing.

Keysight offers a full set of Nemo-branded 5G NR network optimization tools, covering measurements as well as data analysis and post-processing. The tools provide an understanding of the network status through a single, cloud-based UI that enables monitoring and analyzing measurement data on a map in real time.

Benefits

• Ensure that the 5G network quality is implemented throughout all actors in the value chain
• Minimize churn
• Optimize 5G networks both outdoors and indoors through integrated field measurement and analytics product portfolio
• Ensure technology functionality with unique 3D visualization for 5G beamforming
5G NR Network Optimization Features

Keysight’s 5G NR network optimization tools provide a comprehensive view of 5G network quality and coverage.

- By optimizing networks, operators can minimize the churn caused by quality issues and ensure the high capacity of their 5G networks. Also, new 5G NR technologies, such as beamforming and mMIMO, can be verified with the 5G NR wireless network optimization tools.

- Nemo solutions offer a holistic view of the network coverage and quality, enabling effective troubleshooting and optimization with automated reporting.

- Nemo tools come with an easy-to-use GUI with over 2000 KPIs and support for the latest technologies, such as 5G NR NSA/SA, LTE-A, NB-IoT, and LTE-M.

- Nemo optimization tools support features such as:
  - Coverage analysis
  - Interference analysis
  - Handover performance
  - Neighbor cell analysis
  - Overspilling
  - Cross feeder analysis

- Optimization tests reflect the latest 5G NR network performance of:
  - voice and video quality, e.g. Call Setup Success Rate, Completed Call Rate, Dropped Calls, Blocked Calls, Call Setup Time, MOS, Call Failure Reason Analysis, and
  - data connection, e.g. File Download Speed, File Upload Speed, Network Latency, Web Browsing Time, Data Connection Failure Reason Analysis, OTT Applications Performance.
5G NR Network Advanced Optimization Features

Nemo optimization tools include advanced optimization features such as:

- **Beam Coverage Visualization**
  - Keysight’s 3D Visualizer add-on helps in seeing the signal behavior in practice related to the environmental objects. 3D Visualizer allows you to verify beam configurations by comparing measurement data to the planned beam structure. Both horizontal and vertical beams can be analyzed by combining street-level walk or drive tests to UAV measurements. This will help you understand the signal behavior when combined with the 3D model of the surrounding elements. 3D Visualizer is sold as an add-on with our post-processing tool Nemo Analyze.

- **5G-LTE coverage comparison**
- **Low coverage detection**
- **High interference detection**
- **Pilot pollution analysis**
- **Cell dominance analysis**
- **Network slicing testing and analysis**
- **mMIMO result analysis**
- **o-RAN network troubleshooting and analysis**
  - Verify o-RAN on the field and benchmark it against traditional networks. Keysight offers a full set of testing capabilities such as end-to-end quality of service, mobility, benchmarking against traditional RAN, link adaptation performance, etc.

- **Qualcomm Binary Logging**
  - When the Qualcomm binary logging is enabled in Nemo measurement tools, the resulting log files can be played back in correlated view with Nemo Outdoor or any other Nemo post-processing software.
  - Log files can be played back with QXDM.

- **Dynamic Spectrum Sharing (DSS) for 5G**
  - DSS enables the quick and cost-effective build out of robust 5G services, with broad coverage areas, using existing spectrum in mid- and low-band frequencies. Keysight provides an end-to-end solution for testing the DSS capability of your base stations, both in the field and in the lab, to ensure the simultaneous transmission of LTE and 5G New Radio (NR) services in the same 4G band.
The 5G NR network optimization solution covers a wide range of products from the Nemo product portfolio: Nemo Outdoor, Nemo Handy, Nemo Walker Air, Nemo Autonomous Probe, Nemo Cloud, and Nemo Analyze. Each product is especially suitable for specific use cases as described in the table below.

<table>
<thead>
<tr>
<th>Product</th>
<th>In-Building &amp; Walk Testing</th>
<th>Outdoor &amp; Drive Testing</th>
<th>Automated Testing</th>
<th>Post-Processing</th>
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</thead>
<tbody>
<tr>
<td>Nemo Outdoor</td>
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<td>Laptop-based 5G NR drive test solution</td>
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<td>Nemo Handy</td>
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<td>Android-based handheld measurement solution</td>
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<td>Nemo Walker Air</td>
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<td>Android-based in-building measurement solution</td>
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<tr>
<td>Nemo Autonomous Probe</td>
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<td>Unattended measurement solution</td>
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<td>Nemo Cloud</td>
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<td>Remote control and monitoring solution</td>
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<td>Nemo Analyze</td>
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<tr>
<td>Intelligent analytics solution</td>
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Figure 1. Keysight's 5G NR network optimization solution product portfolio matrix
5G NR Network Optimization Use Cases

Keysight’s 5G NR network optimization solution offers various optimization use cases:

- Remote management of 5G measurements and measurement solutions with **Nemo Cloud**
- 5G NR Drive testing with **Nemo Outdoor**
- In-building (and walk testing) 5G measurements with **Nemo Handy** and **Nemo Walker Air**
- Unattended 5G measurements with **Nemo Autonomous Probe**
- Post-processing of data with **Nemo Analyze**

![Figure 2. Keysight’s Nemo portfolio for optimizing networks](image)

Learn more at: [www.keysight.com](http://www.keysight.com)

For more information on Keysight Technologies’ products, applications or services, please contact your local Keysight office. The complete list is available at: [www.keysight.com/find/contactus](http://www.keysight.com/find/contactus)