



**We provide unparalleled levels
of clarity on service and network
performance.**

Spire. Applied intelligence.





Spire. Applied intelligence.

The only geospatial intelligence provider to offer mobile operators an integrated, unified and vendor-independent view of both network performance and its impact on the subscriber.





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Evolution doesn't wait. Neither do we.

With tireless innovation, foresight and a determination to be first to market, we'll continue to drive mobile telecommunications forward.



A fertile new landscape.

As digital technology reshapes our world, the 'internet of things' is fast becoming a reality. For network operators, the proliferation of devices and applications offers limitless potential. Yet our connected world brings with it twin challenges – heightened competition and a greater demand for broadband services. This in turn demands a more robust subscriber offering.

With the customer's eye on quality of service and experience, rather than technology and price, forward-thinking operators know that they must find ever cleverer ways to acquire subscribers. Just as importantly, operators must arm themselves with the insights to keep them.

Our approach.

Spire provides proprietary, technology-agnostic tools to monitor and optimise wireless service delivery across multiple devices, mobile services, technologies and vendors. But it's that priceless human ingredient that makes our technology sing and dance.

By overlaying network performance with customer insight, our consultants help to piece the data puzzle together. In doing so, we bring unparalleled levels of clarity, revealing how network performance impacts on customers. As a result, subscribers can enjoy peerless service quality.

Operators, infrastructure vendors, device manufacturers and regulators rely on us for our wealth of expertise, which spans consulting, design and development, systems integration, engineering and training. Uniquely, we offer an integrated, unified and vendor-independent view. And significantly, our proven solutions are both modular and scalable. Coupled with faster turnaround times for custom modifications and feature development, this brings substantial cost savings and operational benefits.

Our vision.

Every day, Spire explores the possibilities of this connected world. We imagine where tomorrow might take us and focus our efforts on accelerating progress. Propelled by tireless innovation and a determination to be first to market, we'll continue to play a leading role in the evolution of mobile telecommunications. With our prescient advice and our ongoing collaborative support, Spire's customers can anticipate trends, identify opportunities and gain that all-important, competitive edge.

Spire. Applied intelligence.

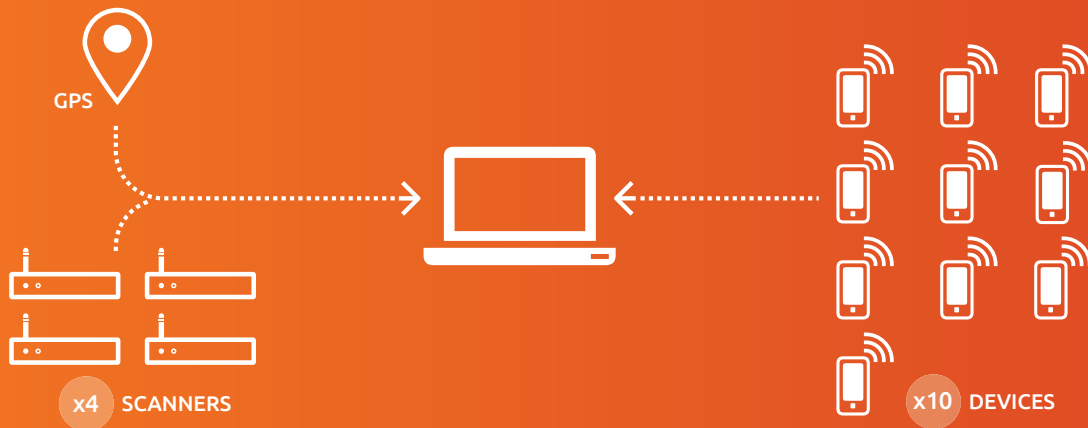


NETIMIZER DML™

The next generation of drive-test tool.

NETIMIZER DML (Diagnostic Monitoring and Logging) is the next generation of drive-test tool. The biggest operators rely on NETIMIZER DML to calibrate, maintain, monitor, measure and optimise their services. NETIMIZER DML automatically detects any degradation in performance, without the need for any 'engineering mode' devices. It supports all major technologies and, thanks to its modular licensing, can be configured to suit requirements at minimal expense. NETIMIZER DML provides a complete range of test options and is compatible with all major devices such as Category 3 to 9 and VoLTE.

Configuration



Use Cases

- Measure network performance to see how it compares with rival networks.
- Test end-to-end applications – e.g. VoLTE, MOS scores, MMS, SMS, video.
- Drive-test for service verification and assess upgrades ahead of network rollout
- Utilise a variety of scanners – e.g. JDSU scanner, PCTel, R&S etc.
- Perform numerous data sessions on each test terminal.
- DML is compatible with all established chipsets.
- Perform QoS measurements that are ITU-certified and standards-based.
- Test both indoor and outdoor network performance.
- Drastically improve handover performance.
- The smart way to manage huge volumes of drive-test data.

Benefits

- Use off-the-shelf commercial devices, instead of costly 'engineering mode' ones.
- Transform RoI by using a universal platform to assess different technologies – GSM, CDMA, EV-DO, CDMA2000, WiMAX, WCDMA, HSDPA, HSUPA, HSPA+, DC-HSDPA, LTE (TDD, FDD) and LTE-A.
- User-friendly and requires minimal (if any) training.
- Modifications are welcomed and realised via yearly maintenance.
- Utilise a solitary platform to measure VoLTE, QoS and MOS.
- Flexible and robust.

Key Parameters

- NETIMIZER DML supports all major parameters. This includes L1, L2 and L3 data packet messages containing RTP for VoLTE, and Bluetooth messaging to precisely examine voice-call tests.

Innovations

- Reduce the need for costly benchmarking equipment with the support of ten simultaneous LTE devices.
- Regularly ranked as the 'most stable' product in operator-lead assessments.
- Precise, dependable results with ITU-certified MOS testing for voice.
- Replay log-files with an offline map reference.
- Using Spire's proprietary algorithms, receive dynamic bandwidth measurements.

System Requirements

Item	Minimum Requirements	Recommended Requirements
CPU	Pentium dual core processor, 1.5GHz or higher processor.	Core i5 or higher processor.
Monitor	1024*768 (16bit) or above.	1280*1024 (32bit) or above.
RAM	2GB or above.	4GB or above.
Hard Drive	80GB (7200 RPM) or larger hard disk for collecting data.	120GB or larger hard disk
Operation System	Windows XP or higher (Not support windows server).	Windows XP or higher (Not support windows server).



NETIMIZER DMA™

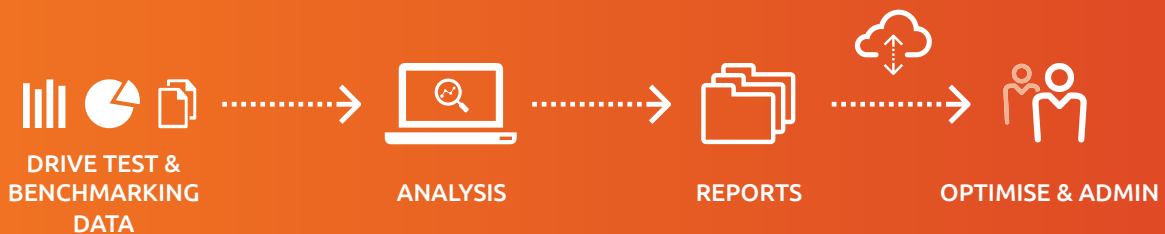


The industry's most advanced network analytics and optimisation platform.

Powerful and flexible, NETIMIZER DMA is an analysis platform that enables the user to collate, assess and report data captured in DML. Compatible with all wireless standards and established third-party data formats, NETIMIZER DMA is offered as either an enterprise-grade client-server solution or as a stand-alone platform.

Easy to maintain and configure, NETIMIZER DMA reduces costs and automates the entire troubleshooting process. Paired with DML, DMA brings unmatched simplicity to network performance analysis and optimisation.

Configuration



Use Cases

- Get a view of service and network performance geospatially.
- Create and provide KPI reports enterprise-wide.
- Analyse trends and complex statistics.
- Assess huge amounts of drive-test data to get to the heart of issues affecting service performance.
- Gauge radio / application-level metrics.
- Deliver in-depth reports.

Benefits

- Make swift decisions thanks to automated reports.
- Technology-agnostic.
- Easily manage and extract huge amounts of drive-test data via a robust data-management system.
- Compatible with all established wireless technology: GSM, EDGE, EVDO Rev.0, Rev.A, Rev.B, GPRS, WiMAX, CDMA2000, TD-SCDMA, WCDMA, HSDPA, HSUPA, HSPA+, DC-HSDPA, LTE and LTE-A.
- Rely on a platform that's both stable and scalable.
- Modifications are welcomed and realised via yearly maintenance.
- Intuitive and economical.
- Flexible and robust.

Key Features

- Offers user-configurable reports with one-click.
- Ensures the post-processing of shorts and overs and compares data between scanner and handset.
- If numerous windows are open and an area of data is allocated in a single window, other windows display the same time zone. This enables multidimensional post-processing of data.
- Replays data in the same manner as it was logged – in tables, message windows, maps and graphs.
- Abstracts data that meets specific conditions.
- Imports data via CSV file for post-processing. Exports data to Google Maps, CSV, MIF, Excel or text formats.
- Pilot Pollution post-processing: Abstracts polluted areas.



Innovations

- Multi-dimensional KPI visibility – key statistics for accessibility, retainability, mobility, quality and packet-switched data performance.
- Swift, thorough and configurable one-click reporting.
- Analyse ESP packet messages, which is essential for optimisation of VoLTE.
- Google Earth is supported along with numerous other map formats.
- Share in-depth reports on service-specific and general network performance.
- Measure radio / application-level metrics.
- Create and present KPI reports enterprise-wide.
- Scrutinise trends and conduct statistical analysis.
- Easily manage and extract huge volumes of data.

System Requirements

Item	Minimum Requirements	Recommended Requirements
CPU	Pentium dual core processor, 1.5GHz or higher processor.	Core i5 or higher processor.
Monitor	1024*768 (16bit) or above.	1280*1024 (32bit) or above.
RAM	2GB or above.	4GB or above.
Hard Drive	80GB (7200 RPM) or larger hard disk for collecting data.	120GB or larger hard disk.
Operation System	Windows XP or higher.	Windows XP or higher.



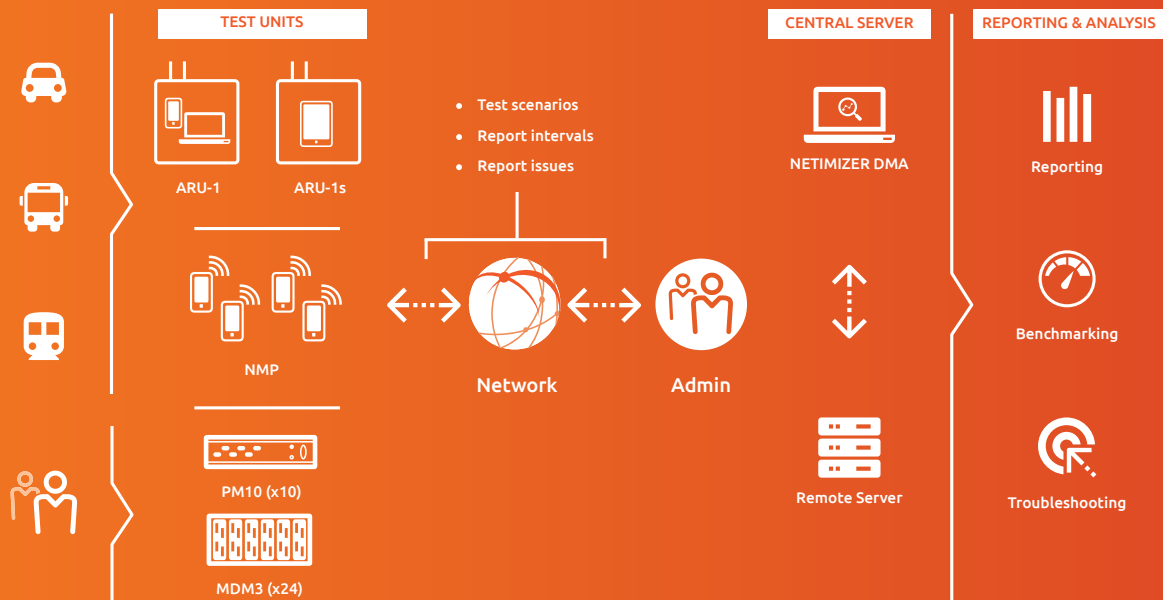


NETIMIZER DML-Auto™

Efficient, remote-controlled measurements.

NETIMIZER DML-Auto offers a cost-effective measurement process, reducing the cost of attended network-tests by as much as 70%. NETIMIZER DML-Auto doesn't require the permanent installation of test devices and can be deployed in many locations, such as a moving vehicle, to perform dynamic tests. Test devices are controlled remotely, and automatically upload status reports and measurement files to a central server, allowing real-time monitoring of in-field test units.

Configuration



Use Cases

- A range of remote test units can be supported: NMP, DML, PM10, MDM3 and Spire's proprietary ARU (Auto Remote Unit), specifically designed to ensure that no human intervention is required during tests.
- Maximise revenue and minimise churn, utilising the user's view of the network.
- Predict and fix issues instead of merely collecting data.
- Test for voice and data service quality.
- Supports all major scanners.
- Capture network data (both yours and your competitors') to measure and troubleshoot network and service performance.
- Offer ongoing customer-centric feedback on your network's QoS.
- Capture QoS and performance data automatically across all major vendors, services and wireless technologies, 24/7.
- Analyse statistics and data to identify configuration issues and root cause of capacity bottlenecks.

Benefits

- Technology-agnostic – 2G, 3G, LTE and LTE-A.
- Employ off-the-shelf commercial devices, not costly 'engineering mode' ones.
- Ongoing and economical network testing.
- Remote-controlled measurements – no need to supervise a drive-test engineer.
- Test-probes automatically send measurement files (via FTP) to the server.
- Fully automated data processing chain.
- Schedule and create measurement scripts easily with DML's calendar view.
- Assign test devices with particular measurement scripts, with a focus on multiple geographical polygon zones.
- Send server settings via SMS to remotely add new probes to the system.



Key Features

- **Auto Remote Unit-1 (ARU-1).**
Designed to be connected to an ARU-1 (Auto Remote Unit). ARU-1 is a ruggedised box that houses the test device. It's accompanied by a mini-PC to handle the logging and ensure stability during tests. It's also used to power the device on if required.
- **Auto Remote Unit-1s (ARU-1s).**
ARU-1 can also be offered without a mini-PC, in the form of ARU-1s. ARU-1s is operated by NETIMIZER Mobile Pro, containing L1 to L3 decoding and packet data, and can be connected in parallel with other ARU-1s units.
- **Test multiple devices.**
Existing hardware products can be used in addition to ARUs, e.g. DML, NMP, PM10 and MDM3.
- **Measure, analyse and report remotely.**
Test units can be remotely operated to check status, upgrade software, control test scripts and upload log-file data. The uploaded log file is analysed by the central server, which generates the report with analysed data. The report is then delivered to pre-defined customers.
- **Monitor autonomously.**
Using unattended test units, the solution provides 24/7 data and continuous monitoring without the expense of 24/7 employees.
- **Centralised system deployment.**
Regions can remotely access centralised databases – NETIMIZER DML-Auto provides a centralised storage system and data processing.
- **Broad spectrum of measurements.**
NETIMIZER DML-Auto captures a broad spectrum of measurements (from RF to end-user experience measurements).
- **Vehicle-deployed, fixed or handheld test units.**
Attach test units to moving vehicles or place them in fixed locations. Use NETIMIZER DML or NETIMIZER Mobile Pro (NMP) to monitor individual-subscriber QoE.
- **Status indicator (real-time).**
In-vehicle display enables local in-field management of probes with support for status and KPI monitoring, test-script control, and map-view with tracking / coverage information.
- **Uninterrupted power supply (UPS).**
Tough and lightweight, this device ensures a reliable and continuous flow of power to ARU base units. The UPS is invaluable in installations lacking a direct connection between the ARU and the test vehicle's battery.
- **Support for Qualcomm devices.**
The Samsung Galaxy series and numerous other devices can be connected to NETIMIZER DML-Auto for on-device testing.
- **Supported technology.**
GSM, GPRS, EDGE, WCDMA, HSDPA, HSPA+, Dual Carrier HSDPA, HSUPA, LTE and LTE-A.

Innovations

- ARU's can be powered on and off remotely, without any manual intervention. This includes powering devices on and off.
- Precise, dependable results with ITU-certified MOS testing for voice.
- Can be interfaced with PANDORA to provide performance reports and benchmarking studies.
- 100% logging data capture and transfer over the air without any data loss through the use of the embedded mini-PC.
- Robust and carrier-grade housing for devices.

System Requirements

- For detailed technical specifications:
See NETIMIZER DML





NETIMIZER Mobile Lite™

Non-intrusive Customer Experience Management (CEM).

In order to provide a flawless customer experience, operators must have a thorough understanding of their customers' network experience. To provide a comprehensive view of this, Spire's end-to-end CEM solution combines an array of data sources, including OSS KPIs, coverage, drive test and site data, along with data captured directly (and non-intrusively) from the subscribers' handset via the NML app.

The subscriber data captured includes high-level KPIs and service-based information, and the app automatically detects issues that would ordinarily go undetected. Instead of calling Customer Services to complain, the subscriber can, with one click, report the issue directly. In this way, operators can obtain insights into network and service performance right across their customer base. Available in a variety of modes, NML comes with flexible licensing terms, e.g. direct or indirect / operator branded etc.

- NML Customer – subscriber-centric application, user-friendly GUI, survey / problem reporting, QoS metrics / other KPIs.
- NML Engineer – for engineering use and for in-field employees. It offers richer features (such as in-door measurement and data capture) and a broader set of KPIs.
- iNML – QoS / QoE for iPhone.

Configuration



Use Cases

When paired with PANDORA QoS for data mining and storage, NML can be put to good use in a number of ways:

- Get an in-depth view of the subscriber's actual experience, by subscriber type, device type, geography and more.
- Support Customer Service teams with key network data / user history / experience history / fault resolutions.
- Arm the Marketing department with rich data on user-behaviour.
- Provide business intelligence enterprise-wide, by learning, for example:
 - Whether customers enjoy a satisfactory quality of service.
 - Whether customers access the network for specific tasks.
 - Whether KPIs / SLAs are being broken for particular segments.
- Whether an issue is device-, network- or user-related.
- Which devices / operating systems are performing (see how they compare to others).
- Aided by PANDORA QoS, operators can employ a range of dashboards / diagnosis tools to understand and resolve customers complaints – and in doing so, prevent churn and protect the relationship.
- Value to the subscriber:
 - QoS / coverage calibration.
 - Report coverage black spots.
 - Problems reported to the operator directly.
 - Survey participation.
 - Understand operators' coverage plans.
 - Understand app usage (vital for managing network traffic).

Benefits

- Conduct large scale QoS, QoE analysis.
 - Reduce expenditure on test-tools to lower OPEX.
 - Automatically upload data over cellular (3G, 4G) or via WiFi.
 - Automate tests with centralised, remote-controlled / preconfigured measurements of field units for unattended network testing.
 - Measure and monitor mobile applications QoS/QoE, GSM, WCDMA, HSDPA, HSUPA, HSPA+, DC-HSDPA, WiFi (heterogeneous networks) and LTE/LTE-A (3 Band CA).
 - Regulate the performance of network services (FTP, Voice, Latency, SMS, Web).
 - Technology-agnostic: 2G, 3G, WiFi, LTE and LTE-A etc.
 - Simple to use and designed for mass deployment.
 - Requires minimal batter power.
- Can be adapted to meet operator requirements (including KPIs).
 - Active and passive testing (via Ninja Mode) runs behind the scenes without interfering with the subscriber's use of services.
 - Modular and extensible:
 - Customer Experience Testing features, e.g. throughput / MOS values etc.
 - E2E CEM system.
 - The PANDORA reporting / visualisation server-system can be:
 - Tailor-made to precisely meet client needs.
 - Provided either as a service in the cloud (OPEX) or purchase (CAPEX).
 - Measurement scenario can be configured and transferred from central server.

Key Features

- User-configurable measurement scenarios.
- Ninja-mode allows for passive (background) data collection that is non-intrusive and secure.
- Active mode and Passive mode testing.
- Automatically upload the log file to the central server to mine data.

Innovations

- A broad range of user-centric and network / service-centric KPIs.
- Use commercial, off-the-shelf devices without the need to root.
- User-configurable scripting.
- Optimised for efficient usage with minimal impact on device battery life – even when used full out.
- Rich user experience analysis and reporting.
- Survey features that include current and anticipated network coverage.
- Interface to PANDORA server for comprehensive QoS, QoE analysis, troubleshooting and reporting across the enterprise.

Supported Platforms

- iOS: Support up to iOS 6.0.
- Android: Support up to 4.1.1 (Kit Kat)



 **NETIMIZER Mobile Pro™**

QoS at your fingertips.

Robust and discrete, NETIMIZER Mobile Pro (NMP) assesses the performance of radio access networks (indoor and outdoor) and can be installed on any Android device. NMP intelligently monitors QoS and test services across all major technologies including LTE and LTE-A.

All signalling and RF data is stored to the phone's memory, whilst log files are presented in Spire's file format, enabling straightforward playback and post-processing with either NETIMIZER DMA or third-party tools.

Configuration



Use Cases

- Measure network and service performance e.g. FTP, SMS, voice, video.
- Minimise expenditure on test tools to lower OPEX.
- Capture RF parameters to improve RAN performance.
- Deliver performance data to NETIMIZER DMA for trending and analysis.
- Analyse QoS and QoE.
- Use both indoors and outdoors.
- Gauge and assess mobile application QoS and QoE over CDMA, EVDO, GSM, WCDMA, HSDPA, HSUPA, HSPA+, DC-HSDPA, WiFi, LTE and LTE-A (3 Band CA).
- Perform automated tests.

Benefits

- High RoI, low-cost and user-friendly.
- Comprehensive data-capture, visualisation and analysis in real time.
- Vendor-independent.
- Technology-agnostic – 2G, 3G, WiFi, LTE and LTE-A.

Key Features.

- Minimum size, maximum efficiency. NMP can be installed on any Android device. Despite its small size, it supports full diagnostics monitoring (full DM) and packet.
- Broad analysis – the log file generated by NMP can be analysed via NETIMIZER DMA or the PANDORA server.
- MOS measurement does not require any extra equipment.

Innovations

- Measurement scripts that are user-configurable.
- An array of user-definable widgets on-screen.
- User-definable graph UI.
- Voice Quality (POLQA) measurement.
- Test 'attach' and 'detach' with 'Airplane' mode.
- Handle serving band.
- In-depth analysis of all messages (L1, L2, RRC, NAS, TCP, IP, SIP, RTP etc.).
- Use with Pandora-DV to automate VoLTE testing, monitor service and optimise voice and data performance.

Supported Platforms

iOS: Support up to iOS 6.0.

Technology.	2G/3G/LTE.
Main features.	Automated test: Voice, FTP, HTTP and Multi-RAB.
RF parameters.	RF View (map, graph and table), In-building, call statistics and others.

Android: Support up to 4.1 - 4.3.1.

Technology.	Wi-Fi, CDMA/EVDO, GSM/GPRS, 3G (HSDPA, HSUPA, HSPA+ and DC-HSDPA), LTE and LTE-A.
Main features.	Automated test: Voice, SMS, FTP, HTTP, YouTube, e-mail, i-perf, VoLTE* POLQA measurement*, RF View (map, graph and table), display all layer messages, In-building, call statistics, RTP Analysis in VoLTE, TCP/IP packet capture and Band/RAT Lock* (*on certain devices).
RF parameters.	WCDMA – RxPower, TxPower, TxAdjust, Ec/Io, RSCP, BLER, UL Interface. HSDPA – CQI, Requested Physical Layer Throughput, Physical Layer (served) Throughput, Physical Layer (scheduled), Throughput, Throughput measured in MAC-hs Layer, Number of Codes. HSUPA – RG, AG Index, E-TFCI, UE Pwr Headroom, SF Codes, Non-Serving Cell ACK, Happy Bit. LTE – Rx power, Tx power, PCI, RSRP, RSRQ, SINR, CQI, RI, RB Num, MCS, PDSCH BLER, PUSCH BLER, Cell ID and others.

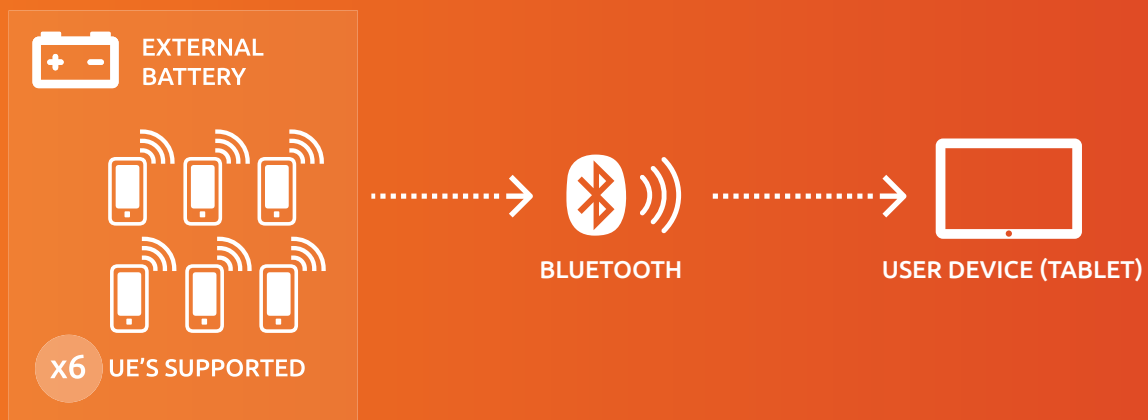




The next level of network benchmarking.

NMP Manager is a portable benchmark tool that can be used indoors and outdoors. It synchronises air-interface measurements with up to six test devices that have NMP installed. The NMP Manager tablet can then perform numerous checks on test-terminals measurements. This means that log files can be uploaded to the FTP / HTTP server and then analysed using NETIMIZER DMA.

Configuration



Use Cases

- Automated test scenarios.
- Script events and align indoor measurements.
- Indoor / outdoor walk-tests for QoS and QoE optimisation.
- Indoor map using markers / geodetic coordinates.
- Fast, simple set-up.
- Google Maps-based navigation.

Benefits

- Access tricky locations without the burden of a full drive-test kit.
- Highly portable.
- Comprehensive log messages.

Key Parameters

- Layer 1 to 3.
- Compatible with Qualcomm chipset devices.

Innovations

- Offers full diagnostic data for all layers.
- Support measurements of CSFB (sound), VoLTE and FTP, HTTP, Ping WiFi...
- Supports POLQA and PESQ voice quality testing.
- Real-time diagnostic visualisation.

System Requirements

Qualcomm chipset-based Android OS devices.



NETIMIZER VOLT™

The smallest, most flexible VoLTE QoS and KPI measurement tool on the market.

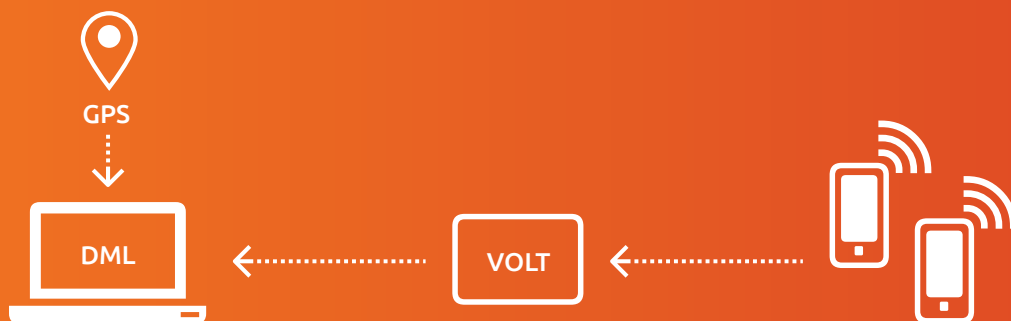
Voice over LTE (VoLTE) has arrived. It promises HD-quality voice services along with a superior quality of service compared to Over the Top solutions (OTT). VoLTE brings with it the ability to offer new services including rich communications, and provides new opportunities to free up legacy spectral capacity.

Deploying VoLTE successfully is a complex business. So for operators, field-testing VoLTE services is fundamental both pre- and post-launch. Spire offers comprehensive and cost-effective solutions for both testing and monitoring VoLTE. Proven in the field, these solutions can be tailored to meet specific needs, and have been deployed by some of the world's biggest operators. NETIMIZER VOLT is a small yet integral part of this offering.

The smallest and most flexible VoLTE QoS tool around, NETIMIZER VOLT is a portable device that's used to connect up to two (x2) devices to measure M2M audio MOS in-field. Thanks to the fact that it's driven by NETIMIZER DML, all radio data and other QoS metrics can be measured in tandem. This proprietary device supports an array of auto-call scenarios and is effortlessly simple to operate.

All devices with an earphone jack (or aux-line) can be used to measure audio-MOS scores – so NETIMIZER VOLT supports all major smartphone devices regardless of the OS, including Apple devices.

Configuration



Use Cases

- Calibrate VoLTE MOS measurements in-field.
- Conduct in-building M2M VoLTE MOS measurements.
- Observe radio and other QoS / QoE measurements in real time.
- Use any mobile device with an aux-line / earphone jack.
- Supports all major KPIs.
- A vital component of PANDORA-DV, which allows for E2E monitoring of VoLTE and data services, including QoS monitoring, competitive benchmarking and root-cause problem analysis / reporting.

Benefits

- Supports both POLQA and PESQ algorithm for voice MOS measurements.
- ITU-certified MOS results.
- Compatible with all major smartphones.
- Enjoy unparalleled levels of stability during VOLT testing.
- Light, portable and doesn't require a battery (use indoors and outdoors).
- Simultaneously measure QoS KPIs – such as delay, RTP jitter / loss – and other underlying radio conditions.
- External USB port to provide additional flexibility in configuration.

Key Features

- Easy configuration of Voice quality measurement.
- External USB ports provide additional flexibility in set-up.
- Standards-based voice quality measurements.

Innovations

- Lightweight and highly portable. Designed for in-field and indoor use.
- Supports a range of additional QoS measurements including FTP, HTTP, Ping, VoD, iperf, etc.
- Battery not required.

System Requirements

Interfaces

- Interfaces – USB 2port to connect with PC.
- Micro USB 2port to connect with UE.
- Audio 2port to connect with UE.
- Spare USB female 1port for GPS.
- Installed Bluetooth module.

Power Supply

- None necessary. All you need is laptop connectivity.



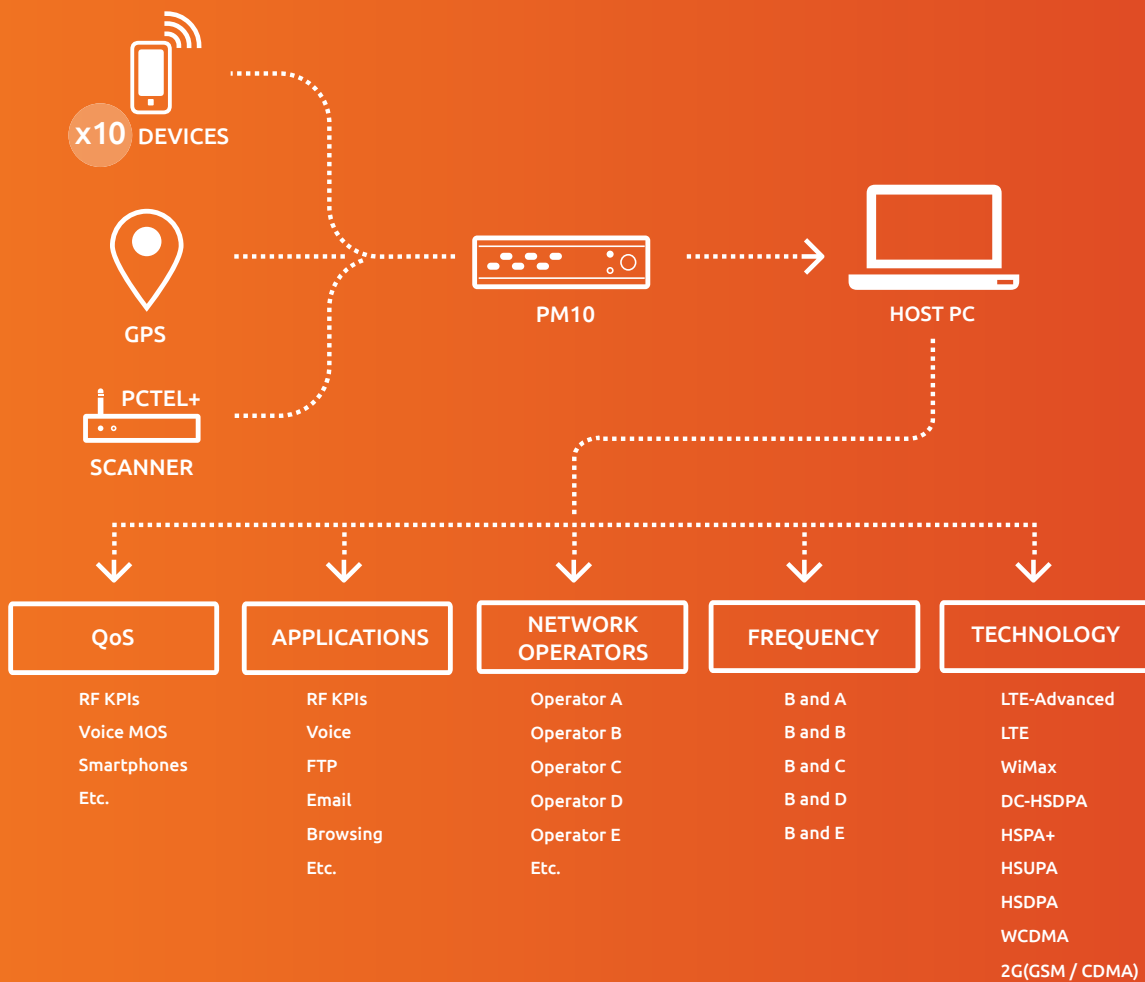


NETIMIZER PM10™

The world's smallest benchmark tool.

NETIMIZER PM10 is designed to effectively measure a customer's overall service and call quality. Compact yet powerful, it facilitates drive tests, unattended benchmarking and in-building tests. And because it's portable it can easily be used for walk tests.

Configuration



Use Cases

- Benchmark and troubleshoot both manually and autonomously.
- Calibrate and optimise uploads / downloads, web browsing, video and audio streaming, MMS and SMS.
- Perform a variety of application testing and analysis.



Benefits

- Battery pack operates for five hours, fully loaded.
- A scalable platform that supports up to ten (x10) test mobiles simultaneously.
- When PM10 is combined with PANDORA QoS, it can assess and audit network performance. This results in:
 - Seamless network application testing.
 - Reduced costs, with a single, scalable platform.
 - Improved test detail and precision.
 - Easy management of significant live services.
 - Enhanced time-to-market for new services.
- Smartphone-friendly.
- Upload KPIs and test results in real time
- Conduct standards-based Voice MOS tests for voice quality analysis.
- Supports HSUPA, EVDO Rev.A, Rev.B, CDMA2000, GSM, EDGE, GPRS, WCDMA, HSDPA, HSUPA, HSPA+, DC-HSDPA, WiMax, LTE (TDD and FDD) and LTE-A. Bluetooth/MOS cable-friendly.
- Compatible with a variety of handsets – feature phones and smartphones.

Key Features

- Comprehensive in-building features.
- Real-time UE measurement, logging and display.
- Simple measurement plan (Data, Voice, MOS).
- Compatible with all technologies, from 2G to LTE and LTE-A.
- In-depth diagnostic user-interface for experienced users.
- Straightforward and stable device connection.
- Full Log Mask.
- Layer 1/2/3 message logging / display / parsing / analysis.
- ITU-certified voice quality analysis ITU P.862, P.862.1 and P.863 (POLQA).

Hardware Specifications

Item	Specifications
Dimensions	320(W) x 130(D) x 33(H) mm
Weight	930 g
Input power	DC 12V 6A (AC/DC adaptor)
Port	10 ports for mobile (7 USB 2.0, 3 USB 3.0), 2 extra USB 2.0 ports
PC interface	1 USB 2.0, 1 USB 3.0

Hardware Features

- Provides easy and simple device connection to laptop.
- 10 high quality integrated DM cable with audio I/O and Bluetooth support.
- Real time power charging to 10 mobiles.
- Voice quality (MOS) measurement for 10 mobiles.
- Bluetooth interface support to 10 mobiles. (Supports Bluetooth-based auto call test for voice/data).
- ITU-T certified MOS test device.
- Can be used with AC power (AC/DC adaptor).
- Portable with external portable battery.
- Useful for both drive tests and indoor tests.



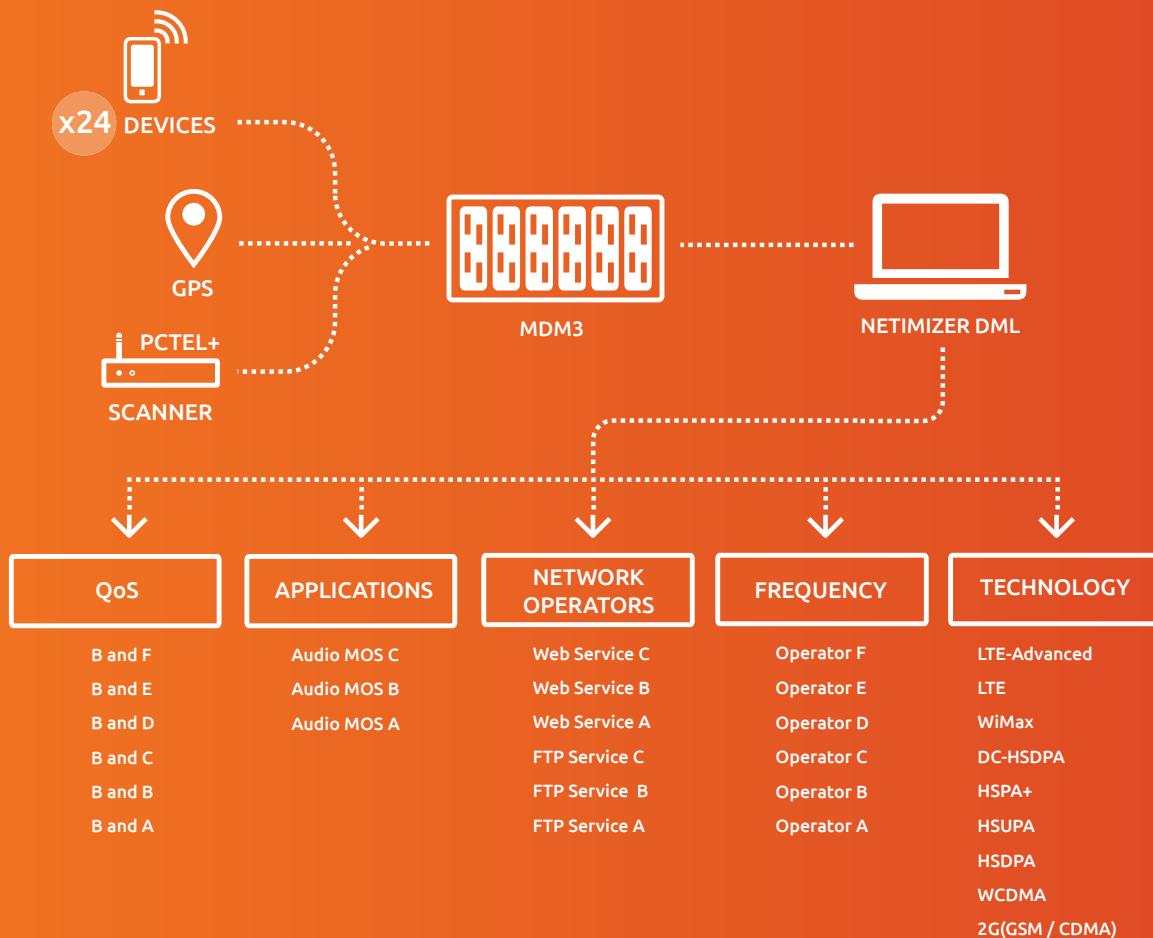


NETIMIZER MDM3™

A revolution in precision benchmarking.

NETIMIZER MDM3 supports all major technology standards and offers comprehensive support to provide incredibly accurate benchmarking. Specially crafted to perform both load and capacity tests, NETIMIZER MDM3 enables users to measure, maintain and maximise wireless voice / data networks and systems. This ultra-compatible measurement device helps to save time, money and manpower.

Configuration



Use Cases

- Officially adopted by the Korean regulator Telecommunications Technology Associate (TTA) and the ITU for voice-quality measurement and benchmarking.
- Simultaneous support for 24 mobile devices.
- Measure voice and data call quality regardless of mobile device.
- Support, measure and test the quality of VoLTE by auto call.
- Log, display and save data-capture in real time with App Control.
- Utilise the latest hardware and OS (40GB SSD, Windows 7 Standard, Intel Core-i7 CPU).
- Supports an array of modem chipsets, e.g. Qualcomm, Samsung, Infineon, LGE, GCT, and Altair.



Key Features

- Support real-time results capture (app basis mode).
- Compatible with Mouse-to-Ear Delay measurement.
- Compatible with both alternation mobile and equipment-to-equipment testing.
- Reliable support for devices with all major chipsets.
- Record and analyse signal / packet messages.
- Various UI: Time graph, table, map, statistics chart, list and more.
- FTP upload / download throughput performance testing.
- Auto Call test / statistics.
- Compatible with 2G / 3G voice calls, 1x or 3G CSFB, SVLTE and VoLTE.
- Compatible with app / equipment basis measurement.

- Requires minimal use of mobile rescors – less than 15% of CPU share.
- Test web-surfing time / performance.
- Compatible with all major technology standards.
- Perceptual voice quality measurement algorithm: PESQ (ITU-T P.862, P.862.1, P.862.2) & POLQA (ITU-T P.863).

Innovations

- AC/DC adapter is included in system.
- 24 high quality integrated DM cable with audio I/O and Bluetooth support.
- Voice quality (MOS) measurement for 24 mobiles.
- ITU-T certified MOS test device.

Hardware Specifications

Item	Specification	Notes
Support UE	24	Every port support Voice & Data call test
Power	AC 220V / 3A	AC/DC Adaptor included AC power direct connect
Power Consumption	Max. 300W	In case of 24UEs connected
Size	260(W) × 165(H) × 350(D)	
Weight	8 Kg	AC/DC Adaptor included
Connection	1Gbps Ethernet	With PC
Slot	4	6UE/1Slot
CPU	Intel Core i7	
Memory	8 GB	
OS	Windows 7 Standard 64-bit	
Storage	40 GB SSD	



PANDORA QoS™

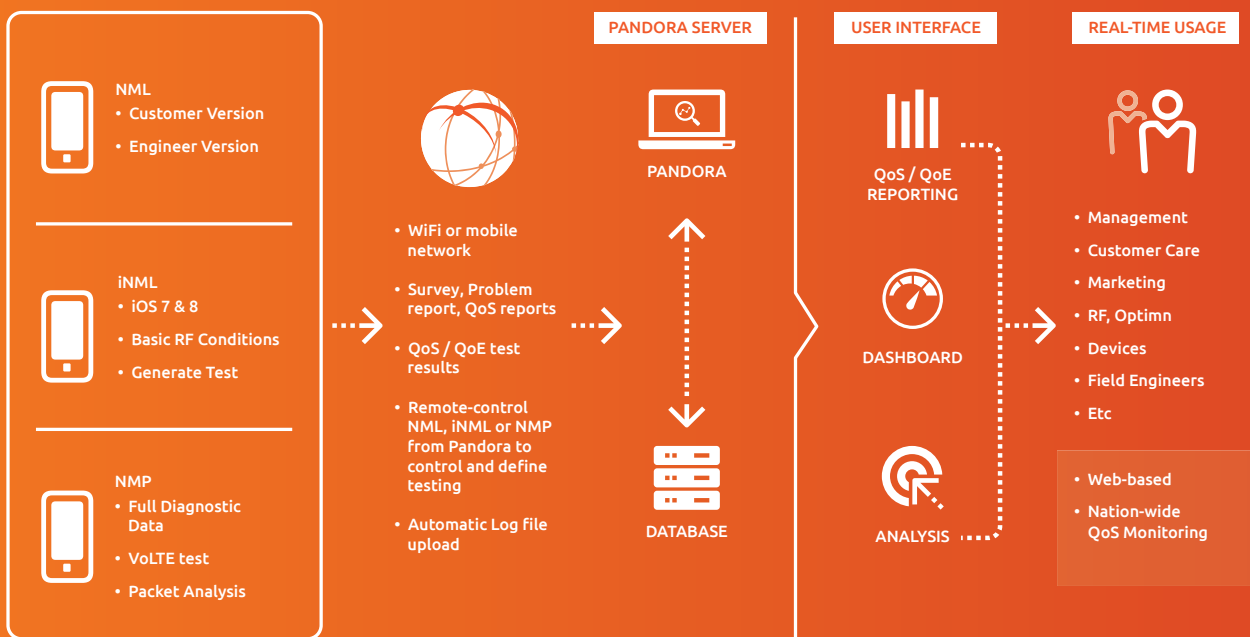
Network-wide QoS and QoE.

Solid customer relationships reduce churn and lead to increased average revenue per user (ARPU). So an operator's success hinges on a focused QoS and QoE strategy.

When it comes to QoS and QoE monitoring and optimisation, PANDORA QoS places the subscriber front and centre. It includes a small app – NETIMIZER Mobile Lite (NML) – that is downloaded onto a subscriber's device without impacting on either the service delivered, or the subscriber's experience. The app records QoS and QoE metrics and uploads them to PANDORA's server for further scrutiny so that any issues can be resolved proactively.

PANDORA utilises a scalable client-server architecture. This not only means that thousands of subscribers can be supported simultaneously, it also means that actions to address service impediments can be resolved swiftly and seamlessly. The app can be installed by the subscriber or installed Over the Air (OTA) by the operator in no time. Spire supports all Android-based devices, plus iOS 7 and 8.

Configuration



Use Cases

- Ninja Mode runs behind the scenes with no impact on the subscriber.
- Non-intrusively log high-level KPIs, QoS, QoE and radio metrics from subscribers.
- Automatically upload data via cellular (3G, 4G) or WiFi.
- Relay captured data to a secure service.
- User-friendly – developed for mass use.
- Lessen the time needed to detect and resolve problems.
- Tailor to fit user needs (including KPIs).
- Foster a subscriber-centric understanding between Customer Care, Network Operations and Marketing.

Benefits

Marketing

- Apply trend analysis (with years of amassed data) to inform marketing.
- Granular statistics generation of marketing data (establish the subscribers' utilisation pattern).
- Identify areas of investment for network expansion.
- Competitor benchmarking.
- Comprehensive application usage stats.
- Safeguard SLA delivery to VIPs and corporate clients.
- Wide usage:
 - Customer version.
 - Engineer version.
 - iOS version.
 - Professional version.
- Deal with emergency cases proactively: Assign actions to the relevant team, identify issues with a specific model of device and request improvements.
- Reports are simple to configure.
- Acquire an understanding of heavy traffic-generating apps.
- Supports up to 50 sessions and 10,000 licenses simultaneously – limited only by the server capacity.
- Re-use DML log-files.

Subscribers

- Self-test:
 - Without app: Subscriber doesn't know if the issue is device- or network-related.
 - With app: Both device and network quality can be checked.
- View of coverage:
 - Without app: User isn't aware of the network coverage of a particular area.
 - With app: Run the app – view map of coverage.
- Identify and report problems:
 - Without app: Call Customer Care and make a complaint.
 - With app: Run the app – report problem.

Customer Care

- QoS transparency.
- Superior QoE.
- Superior net-promoter scores.
- Customer-centric network.
- Deal with complaints faster.
- Administer VoC to prevent customers leaving.
- Mutual language with networks / O&M departments.
- Reduced churn.
- Lower rebates.
- Fewer repeat calls.

Network Operations

- Establish user numbers / traffic load for each cell site / area.
- Use NMP for rich RF data logging to obtain precise network measurements.
- Install in airports, shopping centres etc, and manage remotely from CMS.
- Recognise network issues before they have an impact on subscribers.
- Deploy an engineer to carry out precise field-quality measurements.
- Determine the network expansion plan, based on reports from real subscribers.
- Utilise trend-analysis (based on the accumulated data) for site management.

Key Features

- Compatible with Android, iOS 7 and iOS 8.
- Available in Subscriber and Engineering modes:
 - Subscriber mode enables active / passive (Ninja mode) tests.
 - Engineering mode offers in-depth radio metrics / indoor tests / test-scenario editor.
- Control the app remotely to start / stop test scenarios.
- Upload automatically compressed log files via the network / via WiFi.
- Operator has complete, Over-the-Air (OTA) control for remote installation.

- Synchronised referencing system gives Customer Care QoE feedback options.
- Roaming support.
- Customer usage versus engineering usage.
- Log-file compression.
- Range of user metrics, e.g. throughput versus different UE types / models.
- Multi-layered coverage map – so an area where a small cell needs to be deployed / optimised can easily be found.



Innovations

Establish the context of QoS / QoE deterioration:

- Discover what the user was doing at the time.
- QoE.
- Area.
- Device / firmware version.
- Service / task / application utilised.

Select cell conditions:

- 2G / 3G / 4G / WiFi.
- Radio metrics.

Examine subscriber history:

- Establish whether the customer is high- or low-value.
- Learn whether this is a recurring issue.

Replicate and resolve issues much quicker:

- Recreate the issue.
- Report the issue to technical / tier 2 support.

Identify:

- Which KPIs reveal which QoE issues.
- Whether the network is performing to a standard that will satisfy customers.



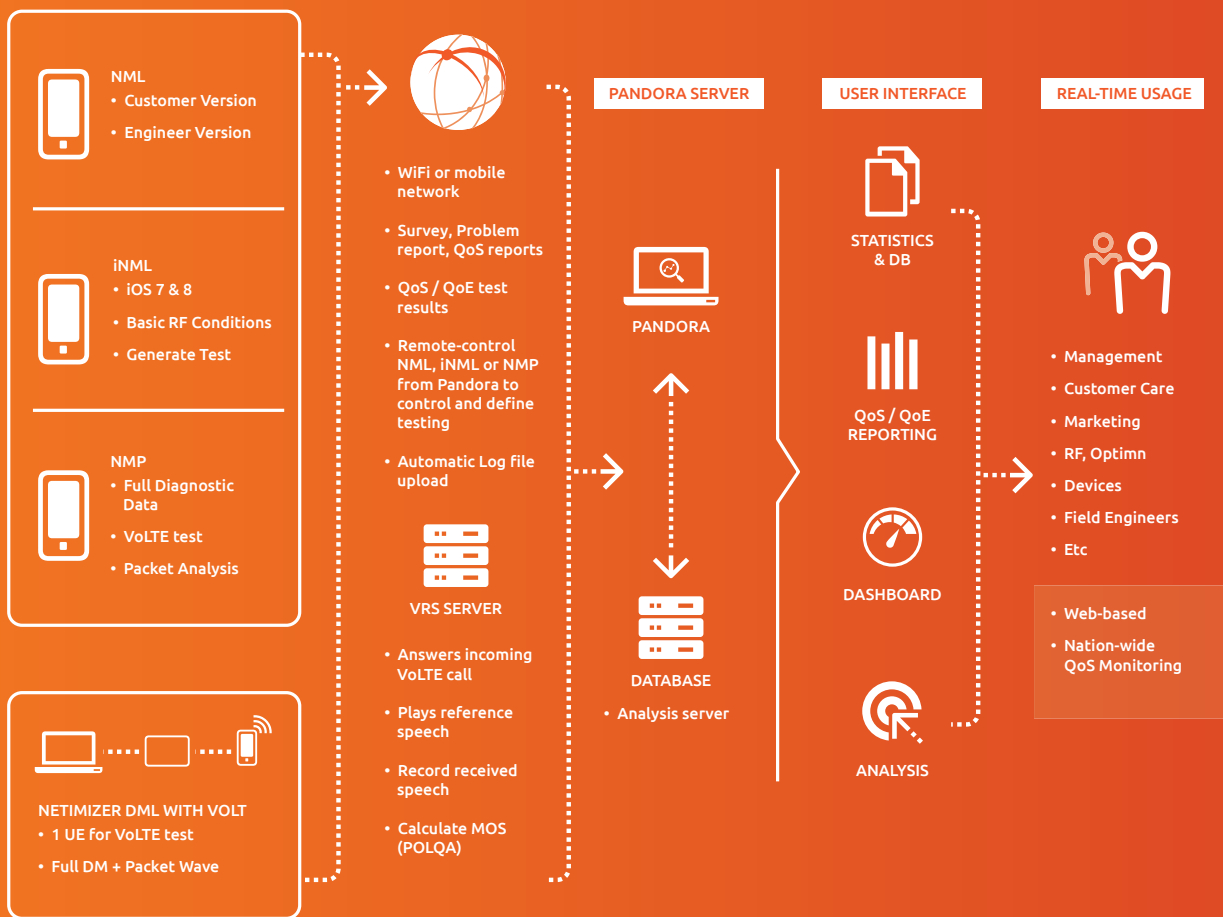
PANDORA DV™

The smart way to monitor trends by area, vendor or operator.

PANDORA can be deployed to automate E2E voice quality and data-testing over LTE / LTE-A networks. PANDORA DV enables operators to use any LTE-enabled device with DML, NMP or VOLT to make test calls to the network in order to gauge voice / data quality and identify root causes of issues.

Calibrate Mean Opinion Scores (MOS) for VoLTE and carry out end-to-end analysis of data performance network-wide. Then compare subscriber-perceived quality against network-defined quality by overlaying this data in PANDORA. In this way, any inconsistencies can be addressed in a more efficient manner.

Configuration



Use Cases

- Make numerous calls to the network at the same time (manually / remotely).
- Clearly distinguish the deterioration of MOS scores network-wide.
- Spot problems that lead to impaired data and voice performance.
- Automate data and voice quality over LTE.
- Carrier aggregation coverage, corresponding the ratio on the map.
- Conduct an array of tests, e.g. FTP download / upload, throughput tests, VoLTE voice quality test with MOS scores, and HTTP tests.
- MOS values.
- Messages analysis (UE L1 - L3 and packet).
- Record and review real VoLTE calls to the network on demand.
- Benchmark tests and statistics.
- Remote measurement control configuration board.



Benefits

- View trends by area, operator and before / after network upgrades / changes.
- Substantial cost-savings with efficient VoLTE quality and data tests.
- Reduce Opex:
 - Voice Call Test with one device.
 - Only one POLQA licence per server.
- Benchmark operators' data and VoLTE services continuously and in real time.
- Obtain quality metrics via centralised management of VoLTE and data quality – centralised MOS scoring system.
- Straightforward detection of problems.
- Trend MOS and data quality scores over time by vendor, area and more.
- Observe MOS scores / data quality across the organisation in one united view.

Key Features

- View user metrics, such as throughput or MOS against different UE models, PCI and more.
- Minimal integration needed with IMS.
- Remote measurement control.
- Numerous exportable qualities:
 - Packet to PCAP.
 - Sound source to WAV.
 - Raw diagnostic data from DML or NMP.
- Overlay an eNB call release cause:
 - Root cause analysis.
- Initiate calls with DML / VoLT, using any device that supports VoLTE.
- Carrier aggregation coverage, matching the ratio on the map.

Innovations

- Measure how voice quality improves in areas, amass results and view trends.
- Establish network suitability prior to enabling VoLTE services into the network on a variety of devices.
- Operators can test VoLTE and get performance metrics when new sites are integrated across the network (with only NMP and VOLT hardware).
- A centralised MOS scoring system means you can make economical use of DML and POLQA licences when compared to traditional systems. Acquire these values in a more flexible way using a single handset with VOLT hardware.
- Overlay a data cell trace and NMS log files for any vendor to get to the heart of issues causing degradation in quality.
- MOS testing without extra hardware equipment via NMP.
- Call event analysis with system call release cause for root cause analysis and resolution.

Replicate and resolve issues much quicker:

- Recreate the issue.
- Report the issue to technical / tier 2 support.

Identify:

- Which KPIs reveal which QoE issues.
- Whether the network is performing to a standard that will satisfy customers.



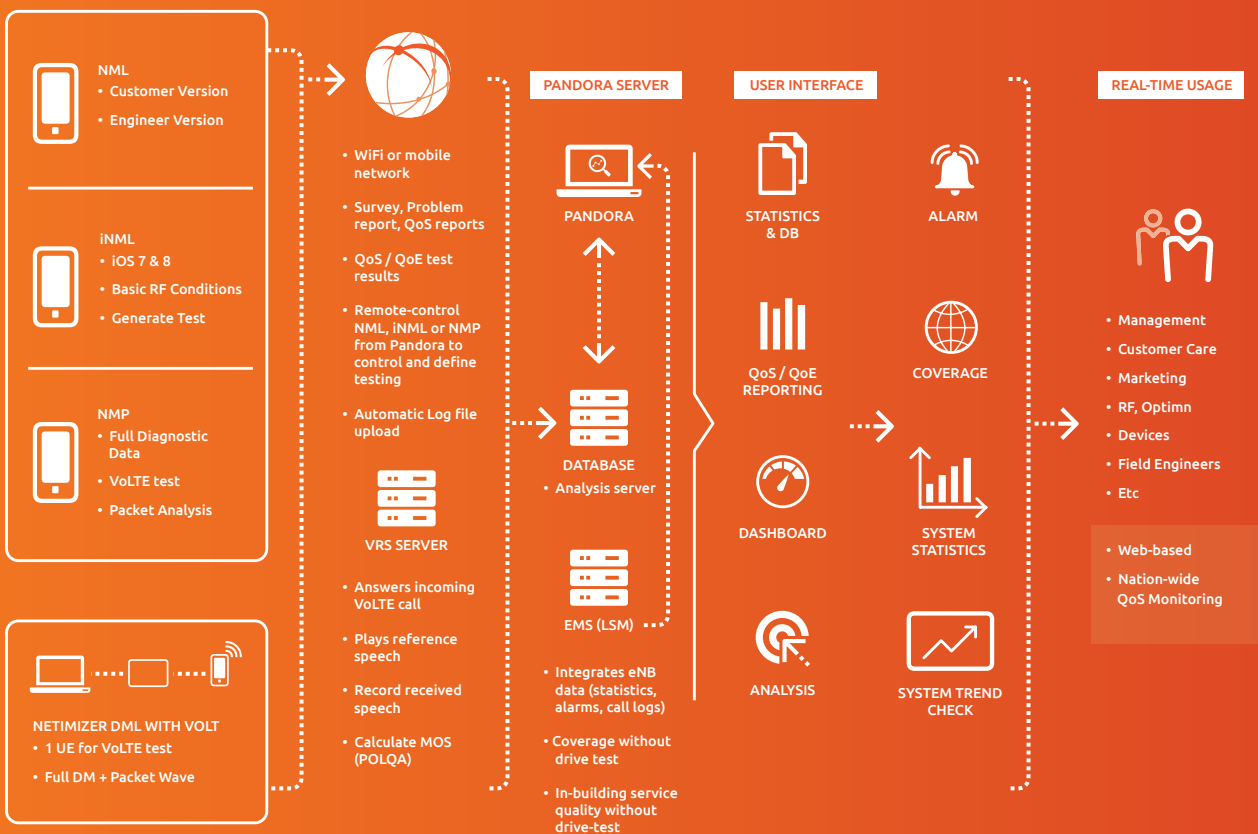
PANDORA Enterprise™

E2E QoS and QoE monitoring.

Incorporating both PANDORA QoS and PANDORA DV functionality, PANDORA Enterprise enables additional data-feeds from the BSS / OSS, which means operators can:

- Analyse issues that impair QoS and QoE from a network perspective.
- Observe network alarms in one integrated view, across numerous vendors.
- Conduct and analyse multiple trend tests that can be envisaged geospatially.
- Observe end-to-end network QoS and QoE over 4G.
- Eradicate drive-tests by measuring network-wide QoS indicators.
- Proactively detect and resolve issues before they negatively impact subscribers.
- Build a database of frequent network problems and resolutions.

Configuration



Use Cases

- Evaluate the effect of small cell deployments on QoS and QoE.
- Overlay QoS / QoE KPIs with likely root-causes in the network.
- Eradicates nationwide drive tests.
- Deliver a reliable, holistic view of trouble tickets for multiple vendors.
- Assess QoS / QoE across 4G networks.
- Enhance QoS, QoE and throughput.
- Geographically segregate network problems.



Benefits

- Scale-up the system as the user base grows.
 - Understand how issues in the network directly impact QoS and QoE.
 - Foster a better understanding between Operations and Maintenance, Customer Care, RF teams and Marketing.
 - Multi-vendor support for LTE – Samsung, Ericsson, NSN etc.
 - Build a database of network problems and resolutions.
 - Automate tests from crowd-sourced data on a network-wide scale.
- See how / where network upgrades affect network accessibility.
 - Decrease CAPEX and OPEX.
 - Drastically reduce the need for drive testing.
 - Automatically monitor all LTE vendors' QoS and QoE nationwide.
 - Network-wide quality monitoring.
 - Map-based network alarm tracking.
 - Accurate in-building and outdoor coverage measurements without the need to drive test.

Key Features

- QoS coverage with measurement report generated by device.
- System statistics alarm.
- In-building QoS without a direct testing.
- Trend and performance checks before and after network upgrades.
- Troubleshooting notes and knowledge database to ensure that best issue resolution can be recorded and shared.

Innovations

- Synchronised, multi-vendor network alarm views in a unified platform.
- Calibrate impact of alarms and network outages on subscribers.
- Accurate and geo-located coverage using MR.





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