

Large-scale QoS/QoE testing in the New York subway with the Freerider



The test in summer 2015 revealed the best QoS/QoE at the Fifth Ave./59th Street station. This is a stop on the Q Line – the line with the best overall results.

At a glance

With 1.7 billion passengers annually, New York City's subway system is one of the busiest in the world. By 2018, every station in the system will feature access to wireless communications and Wi-Fi. Global Wireless Solutions, Inc. (GWS), an independent wireless communications benchmarking specialist, uses the portable Freerider multichannel backpack solution from SwissQual to periodically check the network coverage quality achieved to date.

Executive summary

- **Customer:** [Global Wireless Solutions, Inc. \(GWS\)](#), USA
- **Task:** Benchmarking campaign to test the mobile and WiFi network performance (QoS/QoE) in the New York subway system
- **Technical solution:** QualiPoc Freerider
- **Key advantages of this solution:** Inconspicuous backpack system, simultaneous measurement of all standards and networks, assessment of numerous KPIs, easy configurability, future readiness

The situation

The ambitious plan of the Metropolitan Transit Authority (MTA), the subway system operator, calls for wireless communications availability at all stations by 2018. Transit Wireless, a New York-based company established specifically for this project, has been contracted to install the infrastructure. Every station will be equipped with a distributed antenna system (DAS) linked to a local RF access point (AP). The APs communicate with the central wireless transit backend via fiber-optic cable. The backend has been dubbed the "base station hotel", as it houses the operator base stations (AT&T, Sprint, T-Mobile USA and Verizon) that receive customer data and feed them into the individual networks. In addition to the cellular multi-standard mobile network, Transit Wireless is installing a cost-free Wi-Fi infrastructure in the stations. This is also operated from the base station hotel. Transit Wireless is confident it can complete the installation project before 2017, i.e. one year earlier than required.

The task

In the summer of 2014, GWS, a leading independent wireless communications benchmarking specialist based in Dulles, Virginia, carried out an initial coverage test in the limited number of stations equipped at that time. The measurements were repeated one year later to demonstrate the progress of the project. GWS chose 67 stations based on Transit Wireless's announcement of their network readiness and the station's proximity to Manhattan. The portable QualiPoc Freerider benchmarking system from SwissQual was used for the job. The test team evaluated coverage quality along individual subway lines, in order to make the results easily understandable to the typical passenger. Incidentally, the best coverage was found on the Q Line, which runs from the southernmost tip of New York City across Brooklyn and through central Manhattan. The Freerider was operated by a trained GWS engineer who conducted the assessment tests and obtained upload and download speeds from the packet data networks of Tier 1 carriers, including AT&T, Sprint, T-Mobile and Verizon.



DAS with RF access point and antennas in the Fifth Ave. / 53rd Street station. Additional antennas are mounted on the back side of the wall. (Courtesy of Wikimedia Commons)

The solution

The QualiPoc Freerider was developed for measurement tasks like these. It is a portable, smartphone-based system integrated into a backpack and supports all wireless communications technologies including Wi-Fi. The QualiPoc Freerider is perfect for limitless walk and drive test campaigns designed to reflect the complete status of wireless networks. For example, a field engineer can use the instrument's internal and external antennas to conduct a brief drive test on the way to an indoor measurement location. Once indoors, the engineer simply puts on the lightweight backpack for the indoor campaign and uses the tablet to control and monitor tests and measurements. The trip back can be used for another drive test. Flying to a test location is no problem either, as the QualiPoc Freerider can be carried as hand luggage. By the end of the day, the engineer will have collected a full range of measurements – more than possible with any other portable solution in the time period. The optionally embedded R&S®TSME RF scanners make it possible to leverage the data collected for both benchmarking and optimization.

Benefits of the QualiPoc Freerider in New York City subway use case

- Portable multitechnology, multichannel solution that supports all global mobile network technologies
- Extensive functionalities to test voice, data, video, and apps to assess quality of service (QoS) and quality of experience (QoE) from a real end-user perspective, including complete physical RF environmental information
- Hot-swappable batteries for infinite power autonomy
- Inconspicuous design for usage in public areas

"The Rohde & Schwarz portable benchmarking solution enabled us to determine just how successful the rollout has been so far. GWS looks forward to working with Rohde & Schwarz in the next round of NYC subway Wi-Fi network testing to see the progress NYC and Transit Wireless have made." Dr. Paul Carter, CEO of Global Wireless Solutions



The QualiPoc Freerider is conveniently operated from a tablet that also stores and processes measurement data. The system can record up to six QualiPoc smartphones and two RF scanners (2x2 MIMO), enabling simultaneous measurement of all receivable networks, wireless communications standards and local RF conditions. The instrument's power supply, ventilation and weather protection are designed to make it possible to work a full day under any environmental conditions.



Enhanced map monitor

The enhanced map monitor offers comprehensive and valuable benefits to simplify indoor measurements:

- ▀ Combined indoor and outdoor navigation on a single monitor
- ▀ Integration of georeferenced floor plans to reduce complexity of combined indoor and outdoor measurements in locations such as shopping malls and airports



User-friendly campaign management

Campaign management is an exclusive feature of the SwissQual QualiPoc platform designed to maximize operational efficiency:

- ▀ Intuitive graphical user interface on the controlling master tablet to clearly structure and efficiently configure complex measurement campaigns
- ▀ Preconfiguration of standard measurements in a user-specific library



Configurable benchmarking monitors

The Freerider offers customizable monitors to simplify benchmarking campaigns and instantly visualize key reference values:

- ▀ Competitive network status of up to six QualiPoc slaves (measurement channels) displayed in realtime
- ▀ Quality of service KPIs and RF parameters from up to six test devices (smartphones) displayed simultaneously in line, bar, pie and radar charts or on protocol and event monitors

Service that adds value

- ▮ Worldwide
- ▮ Local and personalized
- ▮ Customized and flexible
- ▮ Uncompromising quality
- ▮ Long-term dependability

About Rohde & Schwarz

The Rohde & Schwarz electronics group offers innovative solutions in the following business fields: test and measurement, broadcast and media, secure communications, cybersecurity, radiomonitoring and radiolocation. Founded more than 80 years ago, this independent company has an extensive sales and service network and is present in more than 70 countries. The electronics group is among the world market leaders in its established business fields. The company is headquartered in Munich, Germany. It also has regional headquarters in Singapore and Columbia, Maryland, USA, to manage its operations in these regions.

Mobile Network Testing

Rohde & Schwarz is a leading global supplier of mobile network testing solutions. The company's extensive and diverse product portfolio provides sophisticated, cost-effective test solutions for mobile operators, infrastructure vendors, testing service providers, installation companies and government regulators. The products address every test scenario in the network lifecycle – from base station installation to network acceptance and network benchmarking; from optimization and troubleshooting to interference hunting and spectrum analysis; from IP application awareness to QoS and QoE of voice, data, video and app-based services. Rohde & Schwarz mobile network testing solutions provide all the hardware, software and resources that the industry needs to efficiently deliver better services with higher quality for customers while enabling suppliers to increase the value of their networks and products.

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