

## RF SIGNAL MEASUREMENTS

*As a service provider for a wireless network, a broadcaster, or the owner of telecommunication sites, you face a multitude of challenges in today's fast changing radio-frequencies telecommunications world. Growing customer demands force you to evolve towards improved technologies and to offer clear and reliable performance.*

*Everyday, you therefore face the planning, optimization, and maintenance challenges for your network or infrastructures. At the same time, you seek to improve the quality of service while reducing the costs and evolving towards the next generations of communications products. The air interface requires special care to ensure optimal performance. RF signal measurements provide important information and are critical to testing the air interface and help operators meet their objectives.*

### Measurements for the PLANNING phase

Many elements can contribute to the good or poor propagation of RF signals. Propagation prediction software tools are based mainly on terrain effects, which gives a somewhat loose approximation of reality. To gain better accuracy than prediction tools can provide and thus refine the coverage prediction parameters used, it is beneficial for operators to perform field propagation measurements during the planning phase of new sites. Field measurements (fixed or mobile) will allow the engineer to move from a guessing-game scenario to the reality of having useful measured data from a transmitted signal for review and analysis and help predict or validate the optimal location for a new site.

### Measurements for the OPTIMIZATION phase

During optimization, the operator must view the network or station from the perspective of its user. Drive testing can be viewed as the first step in the optimization process, with the goal of collecting measurement data as a function of location. Once the data has been collected over the desired RF coverage area, it is output to post-processing software where the actual coverage of one or more site can be mapped. This data provides a solid tool to help identify the real market reached and also for the optimization group in its quest for a problems free network. Is a new site required? Where should it be located? Where are the interference or coverage problem areas? Field measurements can help answer these questions and assist in the problem solving process.

### Measurements for the MAINTENANCE phase

Ongoing maintenance is essential in order to maintain the quality of service users and subscribers demand. RF signal measurements provide essential information about a network or a station for continuous monitoring and to evaluate users' complaints.



With fixed measurements, the RF signal is measured at one or more selected locations with a calibrated antenna. RF signal measurements can be done outdoor or indoor (see YRHspectrum vol 1 # 3), in order to validate the quality of the RF signal at a given location.



Mobile measurements provide geocoded data through the use of a GPS. During the planning phase, a test transmitter (previously authorized) can be placed at the location of a future site to provide insight on the performance that it will yield.



Benchmarking is a method of mobile measurement that requires sophisticated equipment (as shown above) and a well-equipped vehicle.

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## Drive testing for wireless networks....

The data collected during field measurements can include information such as:

- Signal intensity
- Signal quality
- Dropped or Blocked calls
- Other anomalous events
- Call statistics
- GPS location co-ordinates

Network independent measurements are also critical to obtain a complete picture of the RF environment. That is, to detect neighbouring cell sites/ sectors and measure interference both from within the network and from external sources. Benchmarking offers a complement to the evaluation of a network. With the use of benchmarking tools, network comparisons and positioning information can be obtained to evaluate the performance of a network with respect to its competitors.

## And for broadcasting...

As for wireless networks, the evolving world of broadcasting can benefit from RF signal measurements to ensure an optimal operation of their systems. Furthermore, to assist broadcasters in efficiently performing the transition to the digital world, signal coverage measurements can be performed to help gain a good understanding of the quality and effectiveness of the digital signal delivered to the market. Field measurements can also help guarantee that changes such as a modification to the transmission parameters, a relocation of the transmitting antenna, or the sharing of a site, will not lead to a degradation of the original coverage footprint.

## Presenting the results

A good presentation of the data collected and an in-dept analysis of the results allow all parties involved to determine the necessary procedures to benefit from the advantages of field measurements. Data post-processing and site positioning are made easier by the use of mapping and propagation software.

## To conclude

Performing, presenting, and analyzing RF signal measurements require specialized equipment and software, well equipped vehicles, and naturally, qualified and efficient personnel.

At YRH, we own various test equipment and measuring tools, and have developed an expertise in the following fields:

- Fixed or mobile (drive-test) measurements of RF signals
- Predictions with the use of propagation tools
- Mapping of data with GIS software
- Benchmarking of signals (GSM, TDMA, CDMA, Etc...)

**Contact us for more information!**

Various types of equipment for RF signal measurements.

### RF Signal Generator



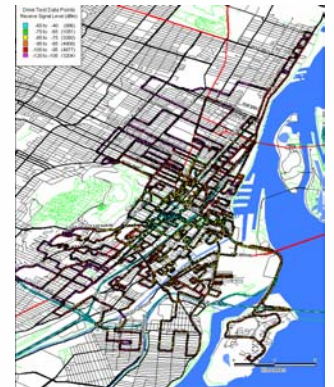
### Spectrum Analyser



### Fast Scanner/Receiver for RF measures



With a mapping software, mobile measurements of RF signals are easily visualised at each point.



With the use of propagation tools, the collected data can be interpolated to yield great quality presentation and also, a simulation of the normal signal fading as a function of its environment.

