

## Application Note – Wireless Network Drive Testing

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Carriers needing to verify that real world signal strength meet projected figures will turn to drive testing in order to meet this requirement. Drive testing is a method of measuring and assessing the coverage, capacity and Quality of Service (QoS) of a mobile radio network using an over the air interface. The optimum solution combines network-independent RF measurements using a digital receiver with traditional phone-based measurements. A typical collection system includes a digital RF Receiver, phone, PC, GPS receiver and antenna. There are numerous benefits in conducting periodic drive tests:

- ❖ The drive test helps with the optimization of the various cell sectors to maximize coverage
- ❖ Identifies gaps in coverage
- ❖ Identifies quality and capacity of cellular sectors through the use of a Mobile Radio Network Air Interface
- ❖ Helps carrier make directed changes to the network to increase customer coverage and service
- ❖ Tests the interfaces with OEM handsets to ensure that a “real-world” experience is replicated

Drive testing parameters that can be tested are:

- ❖ Signal intensity
- ❖ Signal quality
- ❖ Interference
- ❖ Dropped calls
- ❖ Blocked calls
- ❖ Anomalous events
- ❖ Call statistics
- ❖ Service level statistics
- ❖ QoS information
- ❖ Handover information
- ❖ Neighboring cell information
- ❖ GPS location co-ordinates

Network Drive Testing can be of three general types

- ❖ Benchmarking (establishing a baseline)
- ❖ Optimization & Troubleshooting (Searching for gaps in coverage or sites with limited capacity)
- ❖ Service Quality Monitoring (validating that the carrier is meeting benchmarks)

Benchmarking can be done for several reasons

- To provide directly comparable metrics for comparative studies between carriers
- Outlines strengths and weaknesses between carriers
- Provides comparable coverage maps
- Used primarily for marketing purposes
- Is the only way mobile companies can collect competitive data

Optimization & Troubleshooting

- Information is typically used during rollout phase
- Deployment may also be localized as a response to customer feedback issues such as:
  - Dropped calls
  - Bad handoff (hard vs. soft handoff)
  - Poor reception
  - Unintended roaming

Service Quality Monitoring

- Usually consists of a series of fixed tests based on mean opinion score (MOS)
- Mean opinion score is a base line QoS established through customer feedback and polling
- Service quality monitoring is usually automated in nature and covers a longer time period to gather a long view of the network and identify any potential gradual network degradation.

Drive-testing is the first step in the process, with the goal of collecting measurement data as it relates to a user's location. Once the data has been collected over the desired RF coverage area, the data is output to a post-processing software tool. Engineers can use the post processing and collection tools to identify the causes of potential RF coverage or interference problems and analyze how these problems can be solved. Once the problems, causes, and solutions are identified, action can be taken to solve the problem.