



Global Wireless
Solutions, Inc

THE STANDARD FOR BENCHMARKING™



DATA BENCHMARKING

Packet data is one of the greatest opportunities and greatest challenges for the wireless industry today. New packet data services drive subscriber and revenue growth. Operators use advertising to present competing packet data coverage claims to customers. Regulators carve out spectrum to encourage the growth of high speed wireless data in their country. Infrastructure vendors chase new technology contracts to secure future revenue growth. GWS began providing Data Benchmarking during the rollout of GPRS and 1XRTT in the United States, enhanced the offering in conjunction with major 3G operators and were the first to provide benchmarking services for fledgling 4G networks. Today, as operators continue to deploy advanced LTE features while transitioning to 5G, GWS is busy testing, measuring and providing benchmarking services across all generations of network technologies.

GWS' Data Benchmarking reports allow operators to compare performance between competitors, markets and technologies; evaluate performance trends over time; identify focus areas for competitive improvement; and evaluate Quality of Service problems. Data Benchmarking reports utilizes key parameters that are independent of technology for comparison including:

(RF) Connection Accessibility: A metric of the user's ability to successfully activate a PDP session on the network.

(RF) Connection Retainability: A metric of the user's ability to successfully deactivate a PDP connection on the network.

Task Accessibility: A metric of the user's ability to successfully start a task. The successful task initiation rate is detailed by protocol and direction (HTTP, FTP downlink, FTP uplink).

Task Retainability: A metric of the user's ability to successfully complete a task. The successful task termination rate is detailed by protocol and direction.

Throughput: Throughputs are detailed per task type.

Ping Delay: Ping delay (round-trip) mean, percent of ping delay < 1 second and graphical distributions.

These industry leading Data Benchmarking reports provide extensive in depth analysis of collected, multi operator data including numerous figures, charts and maps such as:

EVENTS

- Reselection Successes per task
- Percentage of Technology Changes
- Percentage of Tasks with high number of Reselections
- Effect on Mean Application Throughputs
- No Service Tasks
- Failed Tasks

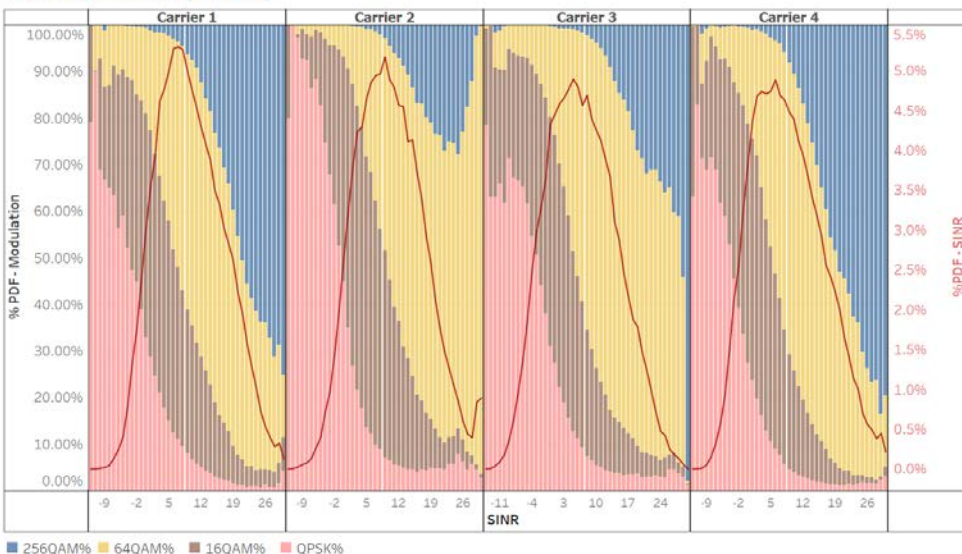
FOLLOW DATA

- RSSI
- Application Task Mean Throughputs (downlink and uplink)
- Application Momentary Throughputs (downlink and uplink)
- RxLev versus Throughput
- Signal Quality versus Throughput

MAPS

- Session Results (No Service Regions, RF Setup Fails, Session Setup Fails, RF Channel Drops, Session Timeouts)
- Application-level throughput (downlink and uplink)
- Reselection Count per Task (downlink and uplink)
- Mean Signal Quality (downlink only)
- RSSI
- Timeslot Usage
- Roaming
- Technology Usage

Modulation vs SINR (DL tasks)



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EXPERIENCE MATTERS

Benchmarking for
24 YEARS


Services provided in
25 COUNTRIES


Tested
14,500 LOCAL MARKETS


Driven and walked
13 MILLION MILES


ABOUT GWS


GWS is the world leader in testing wireless markets. Services include:

 **Voice and data benchmarking** – Network data and engineering analysis through drive, venue, and in-building testing

 **MobiStat™** – Interactive web-based reporting and mapping tool

 **OneMeasure™** – Configurable app for mobile and Wi-Fi network performance testing

 **OneScore™** – Network performance ranking combining engineering data with consumer research

 **Big Data Analytics** – Large scale network evaluations using big data tools and techniques