

# WLAN Benchmarking Best Practices for Performance

## by The Tolly Group



Tolly Report #218502 v1.0 April 2018

The goal of this paper is to outline considerations and methods for empirical evaluation.

### Executive Summary

Mobile and business users expect and demand WLAN connectivity that is both high-performance and reliable. The best way to assure good performance is to benchmark your WLAN infrastructure before deployment. Only then will you be able to have full confidence in your WLAN solution.

WLAN technology is standards-based and, thankfully, interoperability is rarely seen as an issue. It is expected that every WLAN environment will include access points (APs) and client hardware and software from a variety of vendors. Generally, deployments will see a mix of different generations of WLAN client hardware with different capabilities.

Along with a different mix of WLAN gear, the physical environment and quantity of users will impact performance. Finally, the types of applications run by the users will impact performance. Video streaming requires much more bandwidth than voice over IP (VoIP) sessions. But VoIP sessions require low latency and low packet loss in order to avoid garbled conversations with unacceptable voice quality.

Various WLAN infrastructure solutions might also offer specialized traffic management capabilities designed to deliver appropriate service levels to different types of users. Other vendors might optimize roaming or other functionality important to your environment. Benchmarking is the best (and, really, only) way to exercise and prove the effectiveness of these and other features and functions.

The best practice is to benchmark what is important to YOUR company requirements. Ultimately, that is what really matters. In these pages, Tolly will outline how WLAN solutions can be evaluated empirically before deployment so that the most appropriate solution can be selected and unpleasant, post-deployment “surprises” can be avoided.



## Contents

*Concept-in-a-Nutshell*

*Scope*

*Benchmarking Goals*

*No Standard Tests*

*Caveat: Do Not Compare Results of Different Tests*

*Lab/Environment Requirements*

*Benchmarking Decisions: Usage Scenario*

*Benchmarking Decisions: Standards/Frequency*

*Benchmarking Decisions: Mix or Match Generations*

*Benchmarking Decisions: 5GHz, 2.4GHz or both*

*Benchmarking Decisions: Channel Bandwidth 20/40/80MHz*

*Benchmarking Decisions: Unidirectional or Bidirectional Traffic*

*Benchmarking Decisions: Security On/Off*

*Benchmarking Decisions: GbE, NBASE-T or 10GbE Uplink*

*Test Environment: Faraday Cage*

*Test Environment: RF Isolation Chamber*

*Test Environment: "The Room"*

*Benchmarking Tools: Commercial*

*Benchmarking Tools: Open Source*

*Test Metrics*

*Throughput vs Goodput*

*Test Metrics: Throughput - AP Aggregate*

*Test Metrics: Throughput - Fairness Per-Client*

*Test Metrics: QoS - "Unfair" Throughput QoS in Wireless: WMM*

*QoS in Wireless: Deep Packet Inspection*

*Test Metrics: Throughput- Rate vs. Range*

*Test Metrics: Delay*

*Test Metrics: Voice Quality*

*Test Metrics: Roaming Time/Effectiveness*

*Test Metrics: Association Count*

*Room Configuration: Key Attributes/Impairments*

*Test Preparation*

*WLAN AP Configuration*

*AP-Based Traffic Monitoring*

*Caveats*

*Test Groups*

*Test Scope Appropriateness*

*Test Group #1a: AP Aggregate Throughput - Packet Level*

*Test Group #1b: AP Aggregate Throughput - Application Level*

*Test Group #2: Fairness/Quality-of-Service*

*Test Group #3: Rate vs. Range*

*Test Group #4: Roaming*

*Test Group #5: AP Association Capacity*

*Benchmarking Advanced Features*

*Future Tests: #1 Power Save*

*Future Developments: 802.11ax*

## Concept-in-a-Nutshell

WLAN Performance has several important aspects including maximum throughput, rate vs distance, roaming and support for newly-introduced standards. The relative importance of each depends on your implementation needs.

Generally, you will be concerned about the overall, aggregate throughput that a WLAN AP can deliver. Coupled with that, you will be concerned about how fairly that total bandwidth can be divided up among the users. For many customers performance will also include a quality component. Typically this will be related to quality for VoIP and session quality

### About The Tolly Group

**IT experts with over 30 years of experience**  
We provide product benchmarking and analyst services to the end-user and vendor community.  
[info@tolly.com](mailto:info@tolly.com) [www.tolly.com](http://www.tolly.com)

## Tolly Analyst Reports

The Tolly Group is a vendor neutral organization and works hands-on with a wide range of strategic information technology.

Tolly analyst reports tap into decades of experience in a range of cutting edge technology that is critically important to businesses ranging from SMB to global enterprises and to service providers.

Tolly's "Benchmarking Best Practices" series brings to bear unique hands-on experience and integrates insights from vendor experts.

Tolly "Market Insights" series provide a multi-vendor look at key decision making criteria for specific vendors and products.

For more information, or to contact Tolly about your specific technology insight needs, please email [sales@tolly.com](mailto:sales@tolly.com).