



## How can I check the throughput of a wireless LAN device?

### WLAN Market and Technology Trends

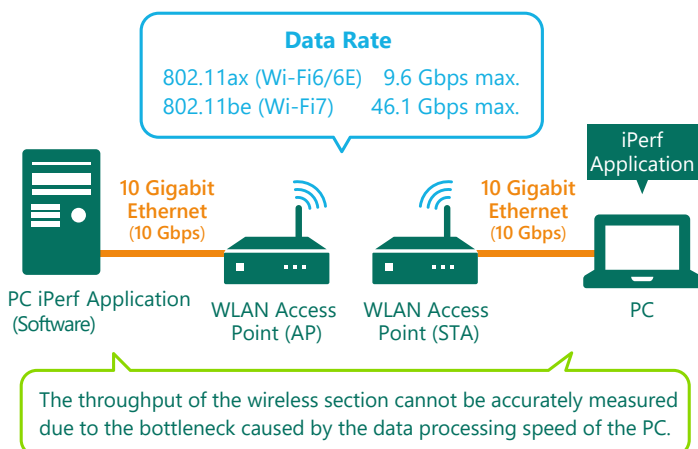
In the WLAN market, two technologies are expected to become mainstream: IEEE 802.11ax (Wi-Fi 6/6E), which will enable data rates of up to 9.6 Gbps, and IEEE 802.11be (Wi-Fi 7), which will achieve data rates of up to 46.1 Gbps, a significantly higher speed. These high-speed, high-capacity wireless communication technologies provide a fast and stable communication environment for applications such as 4K and 8K video streaming, VR/AR, and low-latency gaming.

- ◆ **Enterprises:** WLAN communication equipment vendors, in-vehicle wireless equipment vendors
- ◆ **Key challenges:** WLAN throughput performance may be difficult to accurately evaluate when using iPerf applications.
- ◆ **Solution:** Accurate and stable throughput measurement independent of the performance of the PC or server used to evaluate throughput
- ◆ **Results:** Throughput can be accurately measured. The solution automates throughput measurement according to RFC6349 and reduces the evaluation time.

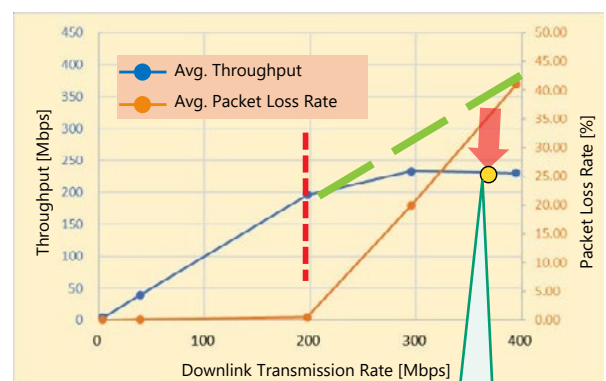
### Key Challenges

The iPerf software is commonly used to evaluate the data transfer rate (throughput) of a network. Throughput is obtained from the data stream of Transmission Control Protocol (TCP) or User Datagram Protocol (UDP). However, this method may be limited by the processing power of the PC used for the evaluation at higher data transfer rates, such that throughput may not be measured correctly.

In particular, with Wi-Fi 5 and later, data rates may exceed 6 Gbps, depending on the combination of the channel bandwidth being used and the MIMO configuration. Therefore, to accurately measure throughput at such data transmission rates, a dedicated measuring instrument is required.



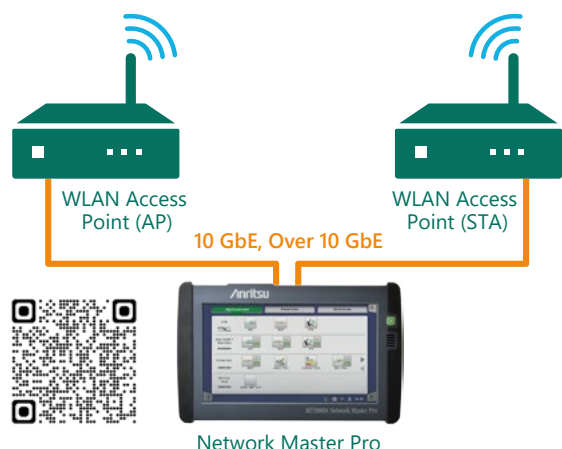
Measurement Example Using PC (iPerf)



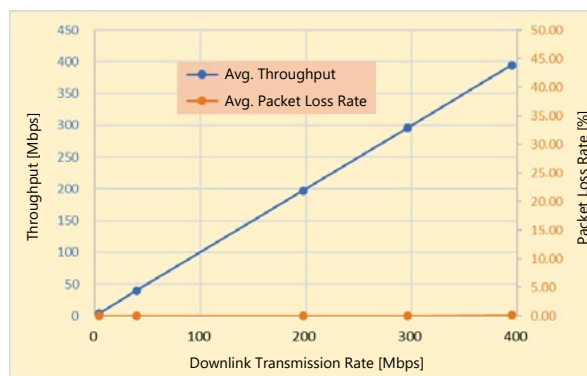
Measured throughput appears lower than the actual value.

## Solutions to Challenges

The Network Master Pro MT1000A is an Ethernet tester capable of evaluating the communications quality of network devices and networks. Using the MT1000A, which measures throughput via hardware processing, enables measurement of high throughputs that would be difficult to measure using iPerf.



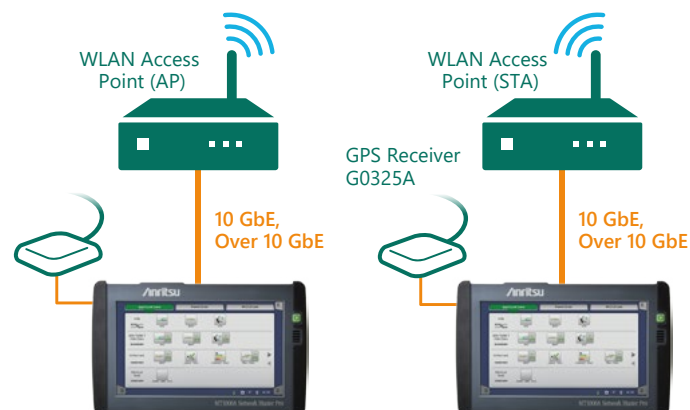
Measurement Example Using MT1000A



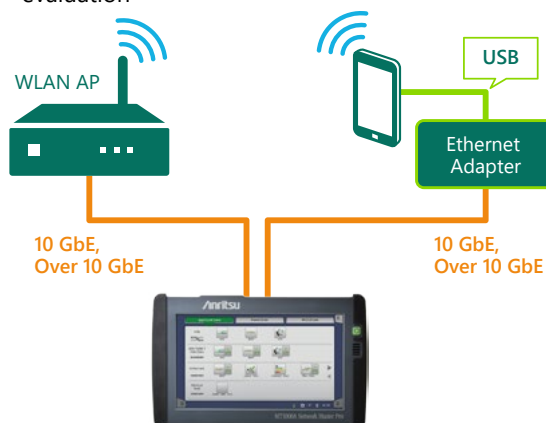
Throughput can be measured even at high transmission rates.

## Examples of WLAN Throughput Evaluation Configuration

Case 1: WLAN AP throughput performance evaluation with time synchronization by GPS



Case 2: WLAN AP-to-device throughput performance evaluation\*1



\*1: In this case, either the device's data processing capacity or the Ethernet adapter (USB to Ethernet converter) may become a bottleneck to the throughput.

By using UDP, packet jitter and Round Trip Time (RTT) can be measured at the same time as throughput measurement.

For reference, the following table compares the items measured using iPerf and Ping on a PC with those that can be measured with the network master.

| Measurement Item                | Measurement Using PC |      | MT1000A |
|---------------------------------|----------------------|------|---------|
|                                 | iPerf                | Ping |         |
| UDP throughput*2                | ✓                    | —    | ✓       |
| UDP throughput*2                | ✓                    | —    | ✓       |
| UDP packet jitter (avg.)*2      | ✓                    | —    | ✓       |
| UDP packet jitter (max./min.)*2 | —                    | —    | ✓       |
| UDP latency measurement*2       | —                    | —    | ✓       |
| RTT (Round Trip Time)           | —                    | ✓    | ✓       |
| TCP throughput measurement*2    | ✓                    | —    | ✓       |

\*2: Both uplink and downlink directions

The MT1000A measures TCP throughput using the method defined in RFC6349 Framework for TCP Throughput Testing. This method involves measuring the maximum transmission size and RTT in advance, and the throughput is measured while changing the TCP window size. By using the MT1000A, throughput measurement can be automated, thus reducing the amount of work required for testing.

For a detailed explanation of the evaluation method, please click here. [TCP Throughput Tests](#)