ZYXEL Setup and Proceed Throughput Test Owner's Manual

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Contents

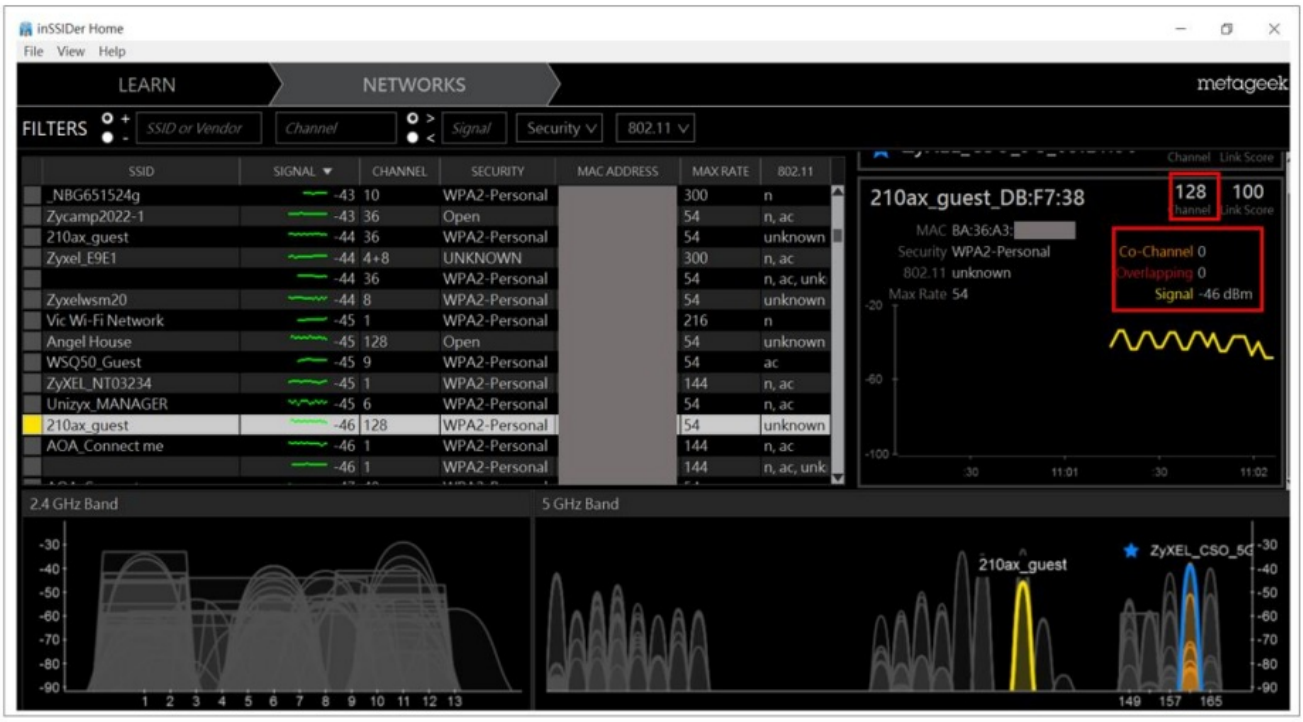
Background

"Throughput" is an indicator to evaluate the performance of a network and devices within, and widely used to compare the capability between different brand products (either access point or client devices). However, the value can be easily interfered by lots of factors, and cause user's misunderstanding. Hence, this document provides a comprehensive process for throughput test, including "setup test environment", "ensure good connection quality", and "select appropriate test tool". By following the process, we hope all our customers can get the reliable and precise test result.

Setup Appropriate Test Environment – Wireless Channel
All devices in the same channel share the wireless resources together, so the first thing we need to do is to select a clean or less noisy channel, making sure the test isn't affected by other devices.

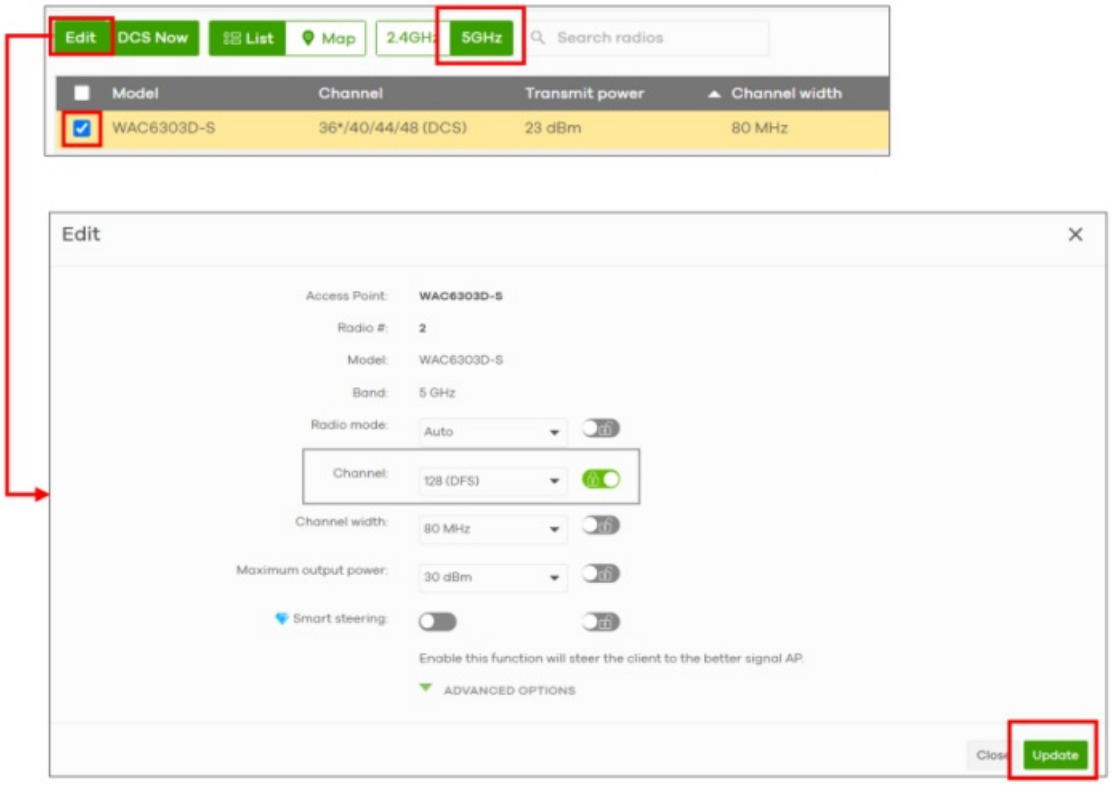
1. Select ideal environment through spectrum monitor software

   We can use some software to monitor the Wi-Fi environment (such as “inSSIDer” for Laptop or “Wi-Fi Analyzer” for Android smartphone), and select the least-used channel according to the monitor result. Like the picture below, the channel with stronger and more signal indicates to higher interference, so we should avoid those channels to get more stable performance.



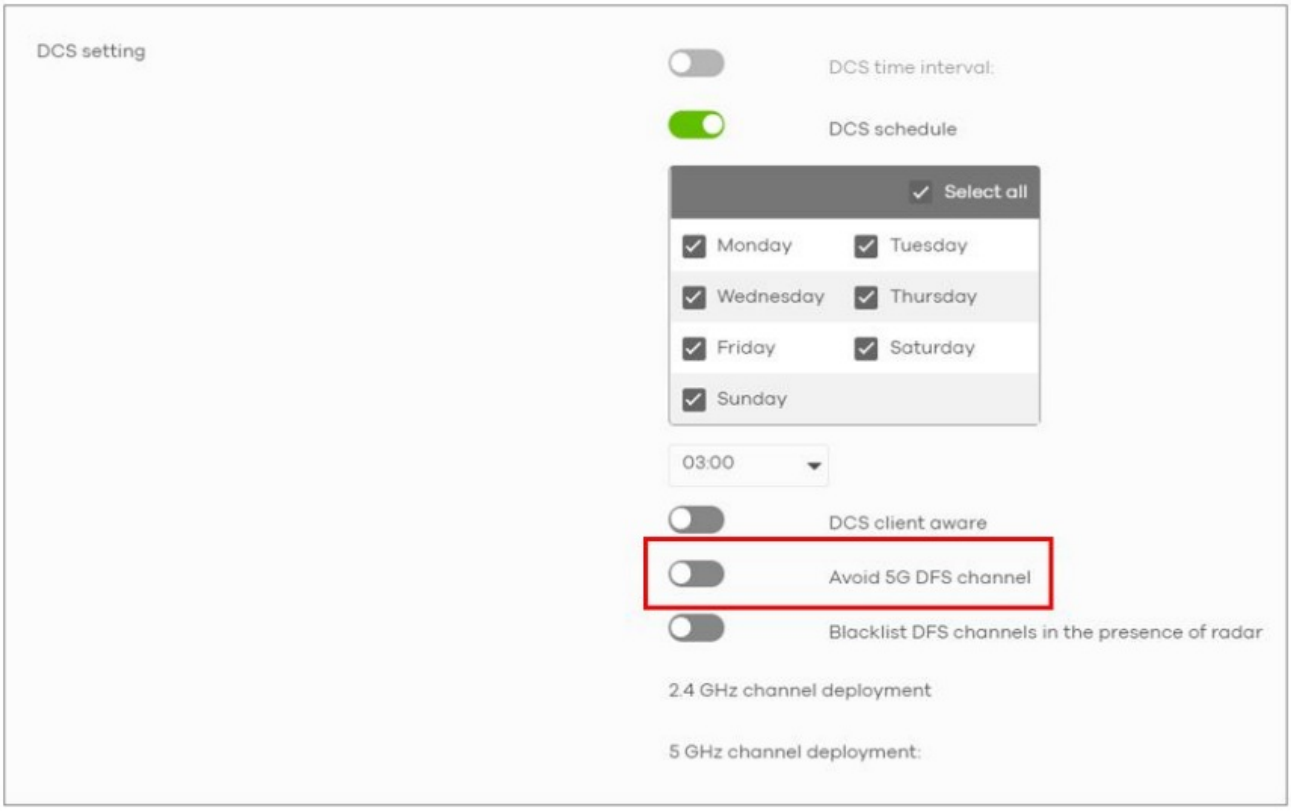
(In the example given above, we can see that Channel 128 is less used, with “0” co-channel and overlapping signals, which indicates a good environment for wireless- transmission)

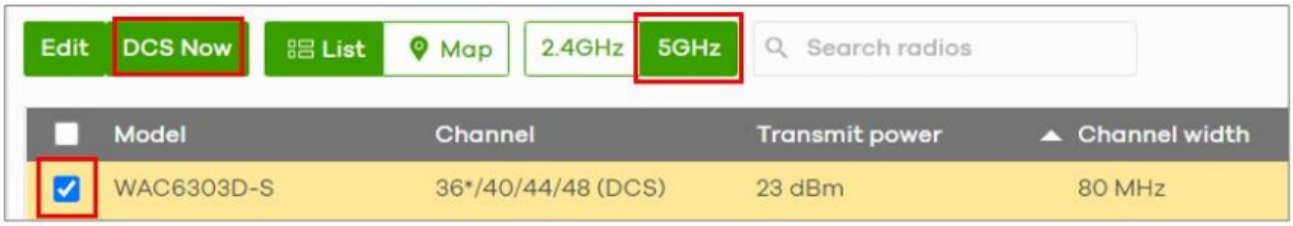
After selecting the channel, we can configure it on the [Access Point > Configure > Radio setting]. In the bottom of the page, we can specify the channel of each radio, and wait 2 to 3 minutes to let AP apply the configuration.



Select ideal environment by “Dynamic Channel Selection” of AP

Another option to select the ideal environment is to use the “DCS” function on the access point, where AP can auto-evaluate all available channels, and select the least interfered one.
In the same “radio setting” page, we need to first uncheck “avoid 5G DFS Channel” to let AP use more channels, and in the bottom of the page, select the AP, and click “DCS Now” to let AP proceed the process.





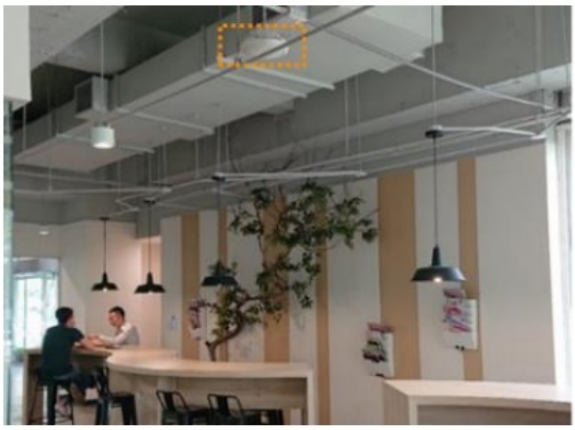
Setup Appropriate Test Environment – Other Factors

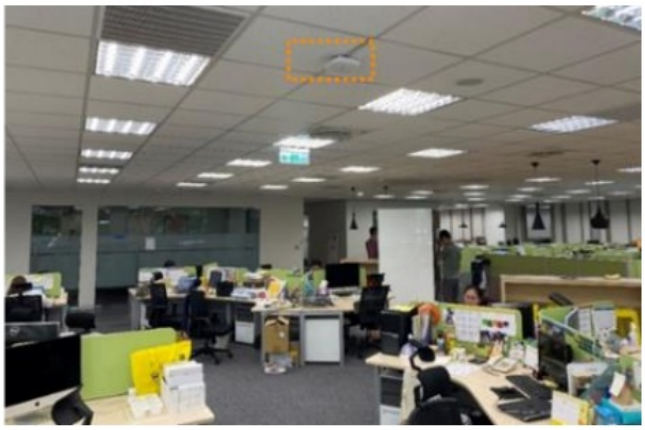
1. Ensure only the test device connects to access point
   In the last section, we mentioned that access points in the same channel would share the resources. Besides, other wireless clients connecting to the same AP will also share the resources and degrade the throughput. Therefore, the ideal condition during the test period is only the test device connecting to the access point. In the [Access Point > Monitor > Clients] page, we can see if there is other online clients connecting to the **AP.**

   Note: If it is hard to disconnect all wireless clients, please at least ensure them connecting with signal strength larger than -65 dBm, with the capability 11ac or 11ax.
2. Placement/Location of access point and test device
   Each access point has its own signal propagation pattern. So before proceeding the test, we should deploy it in the right location to get the best result.
   > Place the access point on the desk and facing up
   > Place the access point on the ceiling and facing down

> Do not place the access point behind TV, metal rack, or other obstacles.

> Make sure the test device is in the line-of-sight to the access point

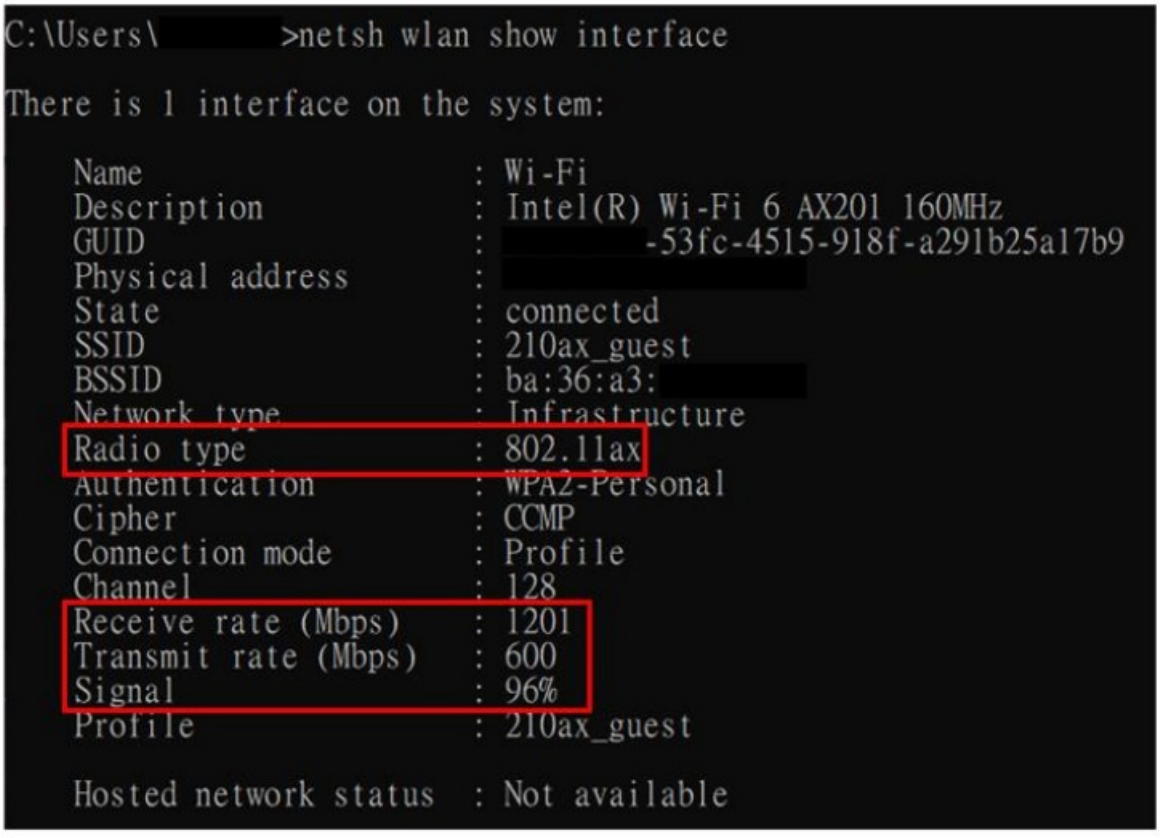




Evaluate connection quality

After optimizing the test environment through the process mentioned above, we then connect our test device to the AP. Before proceeding the throughput test, we can check some indicators to verify if the setup and connection status is correct and healthy enough for the test.
> Signal Strength
> Link rate (Tx/Rx rate)
> Client Capability

1. For windows laptop, we can use “netsh wlan show interface” in the cmd window:



2. For the android phone, we can click [show advanced setting] in the Wi-Fi page.
3. On NCC, we can also check the client information on the [Access Point > Monitor > Clients] page.

Note: the link rate displayed is the theoretical maximum speed, which does not equal to the actual throughput due to packet encapsulation and other factors. Here we just use this value to evaluate the signal strength and negotiation result between access point and wireless client.

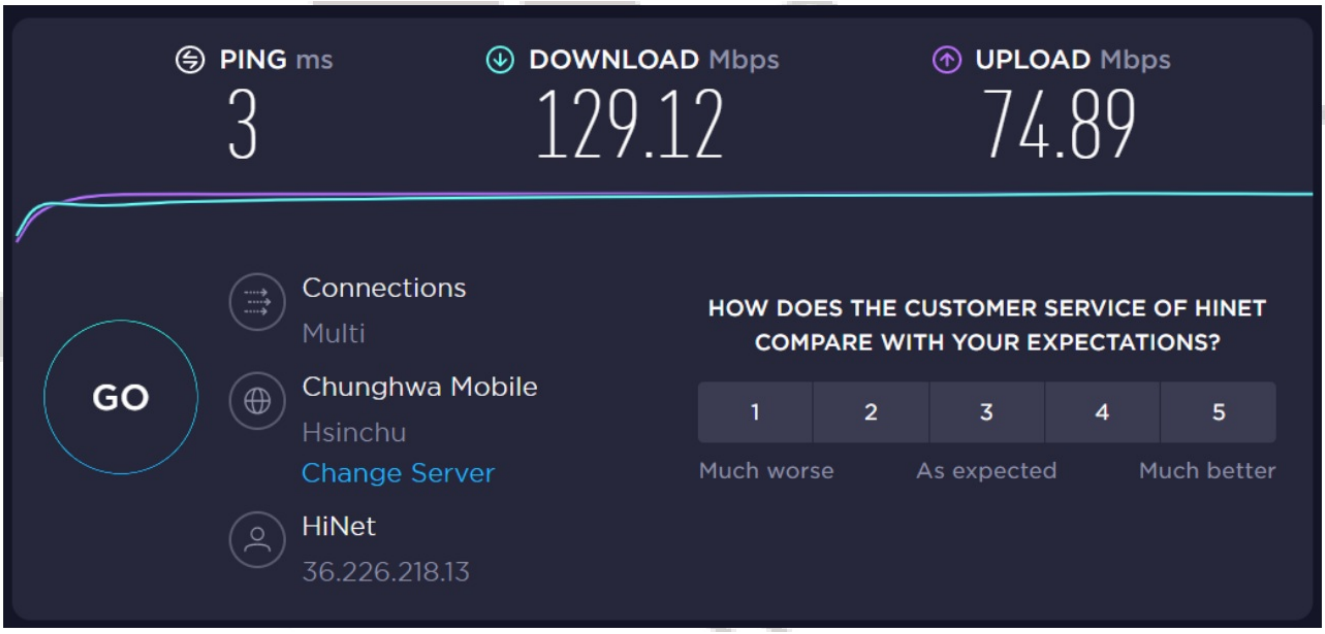
Choose the tool and proceed test

Different speed test tool has its own implementation, hence in the same environment; we might get different test result on different tools.
Here we recommend two commonly used tools for testing:
“Speedtest.net” and “iPerf”.

1. **speedtest.net**

   Support Platform: PC, Laptop, Smartphone (Android, iOS) Benefit: Can be easily executed through browser

   Shortcoming: Since the test traffic passes through the Internet, the result is relatively unstable. (Due to the ISP and regional network issue)

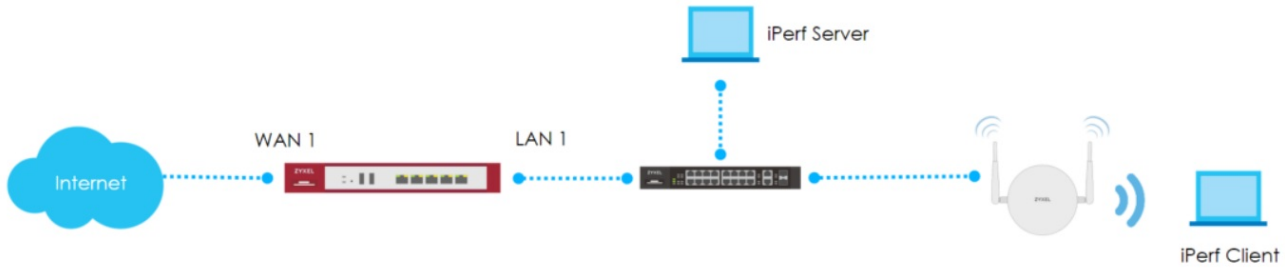


2. iPerf

   Support Platform: PC

   Benefit: The test can be done under Intranet, so the test environment is simple, clean without lots of interference

   Shortcoming: More complicated and steps are required for test



Step 1: Run iPerf on STA1 as Server
Step 1-1: Drag the .exe file to cmd
Step 1-2: Add “ -s” in the command line
Step 1-3: Press Enter

```
C:\Users\ >D:\iperf-3.1.3-win64\iperf-3.1.3-win64\iperf3.exe -s
-----------------------------------------------------------
Server listening on 5201
-----------------------------------------------------------
```

Step 2: Run iPerf on STA2 as Client
Step 2-1: Drag the .exe file to cmd
Step 2-2: Add “iPerf -c <Server IP> -w4M -l 65535 -P 10”
Step 2-3: Press Enter

```
C:\Users\NT03164>D:\iperf-3.1.3-win64\iperf-3.1.3-win64\iperf3.exe iPerf -c 192.168.1.43 -w4M -l 65535 -P 10
Connecting to host 192.168.1.43, port 5201
[  4] local 192.168.1.41 port 55556 connected to 192.168.1.43 port 5201
[  6] local 192.168.1.41 port 55557 connected to 192.168.1.43 port 5201
[  8] local 192.168.1.41 port 55558 connected to 192.168.1.43 port 5201
[ 10] local 192.168.1.41 port 55559 connected to 192.168.1.43 port 5201
[ 12] local 192.168.1.41 port 55560 connected to 192.168.1.43 port 5201
[ 14] local 192.168.1.41 port 55561 connected to 192.168.1.43 port 5201
[ 16] local 192.168.1.41 port 55563 connected to 192.168.1.43 port 5201
[ 18] local 192.168.1.41 port 55564 connected to 192.168.1.43 port 5201
[ 20] local 192.168.1.41 port 55565 connected to 192.168.1.43 port 5201
[ 22] local 192.168.1.41 port 55566 connected to 192.168.1.43 port 5201
```

```
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bandwidth
[  4]   0.00-10.01  sec  77.7 MBytes  65.1 Mbits/sec                  sender
[  4]   0.00-10.01  sec  73.8 MBytes  61.8 Mbits/sec                  receiver
[  6]   0.00-10.01  sec  71.1 MBytes  59.6 Mbits/sec                  sender
[  6]   0.00-10.01  sec  67.1 MBytes  56.3 Mbits/sec                  receiver
[  8]   0.00-10.01  sec  65.1 MBytes  54.5 Mbits/sec                  sender
[  8]   0.00-10.01  sec  61.0 MBytes  51.2 Mbits/sec                  receiver
[ 10]   0.00-10.01  sec  66.4 MBytes  55.6 Mbits/sec                  sender
[ 10]   0.00-10.01  sec  62.4 MBytes  52.3 Mbits/sec                  receiver
[ 12]   0.00-10.01  sec  71.2 MBytes  59.7 Mbits/sec                  sender
[ 12]   0.00-10.01  sec  67.2 MBytes  56.4 Mbits/sec                  receiver
[ 14]   0.00-10.01  sec  59.1 MBytes  49.6 Mbits/sec                  sender
[ 14]   0.00-10.01  sec  55.1 MBytes  46.2 Mbits/sec                  receiver
[ 16]   0.00-10.01  sec  74.2 MBytes  62.2 Mbits/sec                  sender
[ 16]   0.00-10.01  sec  70.2 MBytes  58.9 Mbits/sec                  receiver
[ 18]   0.00-10.01  sec  77.6 MBytes  65.1 Mbits/sec                  sender
[ 18]   0.00-10.01  sec  73.6 MBytes  61.7 Mbits/sec                  receiver
[ 20]   0.00-10.01  sec  65.1 MBytes  54.6 Mbits/sec                  sender
[ 20]   0.00-10.01  sec  62.3 MBytes  52.3 Mbits/sec                  receiver
[ 22]   0.00-10.01  sec  56.7 MBytes  47.5 Mbits/sec                  sender
[ 22]   0.00-10.01  sec  52.6 MBytes  44.1 Mbits/sec                  receiver
[SUM]   0.00-10.01  sec   684 MBytes   574 Mbits/sec                  sender
[SUM]   0.00-10.01  sec   645 MBytes   541 Mbits/sec                  receiver

iperf Done.
```

As the result, the iPerf shows 574/541 Mbps in Upload/Download, comparing to 129/74 Mbps displayed on the speed test. It’s because other network components, such as switch/cable/Internet network connection quality, cause to the difference.
Note:

- Do not test multiple devices’ throughput together
- For each test device, please do multiple tests and calculate the average value
- When comparing the throughput between multiple devices, please ensure the test environment is the same. (Better to proceed the test consecutively in the near time point)

Documents / Resources

	ZYXEL Setup and Proceed Throughput Test [pdf] Owner's Manual Setup and Proceed Throughput Test, Proceed Throughput Test, Throughput Test

References

- Speedtest by Ookla - The Global Broadband Speed Test
- Zyxel Networks, Your Networking Ally | Zyxel Networks