

# Methodology used by ViewQwest

The following information provides a look at how Viewqwest undertakes testing to determine the experience of its users when subscribing to our services.

Fibernet - Residential Typical Download Speed Range, for our fibre-optic network rate-plans.

Theoretical Speed (Mbps)	1000 & 2000
Typical Speed Range*(Mbps)	110.4 to 926.5

\* Typical Speed Range refers to the range of download speeds experienced by the user, 80% of the time, based on test conditions and variables cited below.

Testing Time frame: April 2019 to June 2019

Our Methodology for measuring the internet experience which our users have is as follows:

## 1. Equipment used for testing

<b>Fibre-Optic Modem/Router</b>
Zhone zNID-GE-2324A1
1Gbps bridging and routing
<b>Consumer Test Machine</b>
Windows 10
Intel core i7, 16GB RAM & SD
CAT6 Wired network connection

## 2. Sample and Size of Methodology

Both types of test machines were connected to a Fibernet line at geographically diverse exchanges. An hourly download took place from each test website, over a whole day, to provide the basic performance measurements. This was completed each day for a week to capture the changing behaviour through a typical week.

The test machines were connected via a LAN cable to our fibre-optic modem/router, which is then connected by fibre-optic cable to the connection back in the exchange. A download would be initiated every hour from each of the test sites listed.

## 3. Location of Test

A test took place at a connection to Ayer Rajah and East exchanges covering East and West sides of Singapore as part of the NGNBN infrastructure.

## 4. Websites and size of file transfer

A 1000MB file from sites located both in Singapore and overseas were downloaded.

### a) Local - Singapore

Location	Site
Singapore	<a href="ftp://ftp.svw.as6453.net/download/1G">ftp://ftp.svw.as6453.net/download/1G</a>
Singapore	<a href="http://axel-download-eqx-01.vqbn.com/download/1000MB">http://axel-download-eqx-01.vqbn.com/download/1000MB</a>

### b) International

Location	Site
Germany	<a href="https://speed.hetzner.de/1GB.bin">https://speed.hetzner.de/1GB.bin</a>
Germany	<a href="http://mirror.leaseweb.com/speedtest/1000mb.bin">http://mirror.leaseweb.com/speedtest/1000mb.bin</a>

## 5. Computation of typical speed

The range of download speeds for each plan is calculated by using results at the 10<sup>th</sup> and 90<sup>th</sup> percentile from the set of data measuring the time taken to download files from both the local and international sites above. This gives an indication of the likely performance and experience a user will have 80% of the time, based on the test conditions listed on this page.

## 6. Explanation of factors affecting fibre-optic broadband speed.

Whilst the speed on the NGBN is very fast, the vast majority of global internet content is not in Singapore and not on the NGNBN. As a result internet traffic needs to travel across many different networks in many parts of the world, which are using many kinds of technologies. The very fact that it all works seamlessly and the end-user is able to receive content from these locations in mere seconds is a testament to the design of the internet.

However at times the response could fail to meet expectations. There are many elements involved in this. A simple list of some of the major factors include:

- The location of the website being connected to, and the load placed on the website by the other users who are also trying to access information at this moment.
- The software or browser installed on the user's computer, how recent it is, and how well it performs with the version of the Operating System installed.
- If there are any viruses, malware, adware or other performance leeching software installed on the user's computer.
- If any peer-to-peer or file-sharing software is being used to allow other computers to connect to your home computer.
- The number of people in the household who are sharing the internet connection at the same time.
- The configuration of the networking equipment and any computers or smartphones using the line for internet access in the household.
- Whether the connection to the household network is using a wired cable or a wireless connection.