**Evaluating the Effects of the Corona Virus Pandemic on Internet Bandwidth Speeds**

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**Abstract:**

 It has come to our attention that many New Yorkers are experiencing issues with their internet bandwidths. Though there could be a plethora of explanations. Using a laptop and ethernet cable we went around several neighborhoods to test their current internet speeds and compare it to the advertised speeds, as well as records of performance prior to the Corona Virus Pandemic. We found that Internet speeds were indeed slower than advertised and that people were experiencing faster bandwidth prior to the pandemic. Our results have led us to conclude that here is a dire need for New York City’s internet infrastructure to be improved.

**Introduction**

 Internet technology plays an integral role in the movement of everyday society. Whether you are a consumer making an online purchase or a day-trader watching the stock market, if you use the internet, then speeds matter to you. Internet speed is referred to as bandwidth and this measures a unit of data over a unit of time for which a second(s) is usually the standard (*What is Internet Bandwidth?*). These data units are bits(b), which are not to be confused with bytes(B) which measures an amount of data stored. Bandwidth is important because of the expanding reach of technology in our lives. Internet Service Providers (ISPs) like Verizon provide several plans with claims of bandwidths up to 940 Mbps.

 With the onset of the Corona Virus Pandemic, many people have reported subsequent changes in their bandwidth. Numerous factors may be causes to reported decreases or increases, such as the present infrastructure being overloaded by the large amounts now at home relying on video conferencing technology, or that ISP’s throttle consumer’s bandwidth to ease the load on their infrastructure. We wish to test the internet speed at several locations around the city and compare them to the speeds advertised by their ISP, as well as any record of internet speeds before the pandemic, or at its start. We believe that it is important to spread awareness of how bandwidth relates to our everyday lives, and to hold ISP’s to the standards that they market.

**Materials and Procedures:**

 Several New York City neighborhoods were explored where entrance was asked into common households and residences in order to test their internet speeds. Because random apartments were entered, proper social distancing was maintained in a vigilant manner, and all participants were wearing masks and gloves. Using a laptop with an Ethernet port (LAN port) and an ethernet cable (Cat 7 and rated at 10 Gbps), either of which can be found on websites like Amazon, a connection was established between the device and the internet via the Modem. Though routers could be used, there are many factors which may skew the data recorded from that source.

Using the website <https://www.speedtest.net/> provided by Ookla their internet bandwidth was tested. Internet download and upload speeds were recorded onto an excel spreadsheet. Information was collected on each household’s ISP as well as what plan they have purchased. Any documents which display internet speeds before the pandemic were collected as well. We then recorded each household’s address, and all the data was grouped by neighborhood and borough to help with further analysis.

**Results:**

(Graph 1: Comparing measured internet speeds across the 5 Boroughs and the advertised speeds)

As depicted by Graph 1, internet speeds in Manhattan are 6.0% lower than advertised, in Brooklyn 5.2%, The Bronx 9.3%, Queens 4.7%, and Staten Island at 8.6% lower than advertised for those with 940Mbps (Giga-bit) plans with both Spectrum and Verizon.

Internet speeds in Manhattan are 6.7% lower than advertised, in Brooklyn 5.5%, The Bronx 7.4%, Queens 4.9%, and Staten Island at 8.5% lower than advertised for those with 300 Mbps plans with Spectrum and Verizon.

**Discussion:**

 We found that overall, internet speeds were lower than advertised. We have also found that in the cases of people with previous records, their download speeds have gotten worse. We do not believe that ISP’s are throttling internet connections because these discrepancies were noticed across several providers. We think that this may be due to the increased amount of people who must now rely on the internet for work and school. We think that this research shows that there is a great need to improve the existing infrastructure is internet technology is to play a key role in our lives. According to research done in Italy, 109.3% more people are using the internet and download speeds have gone down by 35.4% (Bergman, 2020). Their experiments showed that in situations where the infrastructure was ill-equipped, bandwidth greatly suffered.

**Conclusion:**

We set out on this experiment to see if bandwidth speeds were actually as fast as advertised and whether it may have been affected by this recent pandemic. We hypothesized that internet speeds would not be as fast as advertised due to prior research that we have done. We found that the bandwidth offered by ISPs were disproportionately lower than the speeds advertised. We also found that download speeds were faster before the pandemic.

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