

4. Data Processing and Analysis of Test Results

This section describes the background to the categorization of data gathered for this report, and the methods employed to collect and analyze the test results.

A. Background

i. Time of Day

One of the key factors that affects broadband performance is usage-based congestion. At peak hours, defined for this study as the period on weekdays between 7:00 pm and 11:00 pm local time, there are more people attempting to use the Internet simultaneously, giving rise to the potential for congestion if any of these points are provisioned on a contended basis. When congestion occurs, users' performance will suffer.

ii. ISP and Service Tier

A sufficient sample size is necessary to allow meaningful statistical analysis and the ability to robustly compare the performance of specific ISP packages. The study achieved statistically meaningful sample sizes for the following download and upload speeds²⁶ (listed in alphabetical order):

Download Speeds:

- AT&T DSL's 768 kbps, 1.5 Mbps, 3 Mbps, and 6 Mbps tiers;
- AT&T U-verse's 1.5 Mbps, 3 Mbps, 6 Mbps, 12 Mbps, 18 Mbps, and 24 Mbps tiers;
- Cablevision's 15 Mbps and 30 Mbps tiers;
- CenturyLink's 1.5 Mbps, 3 Mbps, 5 Mbps, and 10 Mbps tiers;
- Charter's 12 Mbps, 18 Mbps, and 47 Mbps tiers;
- Comcast's 1 Mbps, 6 Mbps, 12 Mbps, 16 Mbps, 22 Mbps, and 24 Mbps tiers;
- Cox's 3 Mbps, 12 Mbps, 15 Mbps, 16 Mbps, 20 Mbps, and 25 Mbps tiers;
- Frontier's 3 Mbps tier;
- Insight's 10 Mbps tier;

²⁶ Due to the large number of different combinations of upload/download speed tiers supported by ISPs where, for example, a single download speed might be offered paired with multiple upload speeds or vice versa, upload and download test results were analyzed separately to produce enough samples to provide statistically valid data.

- Mediacom's 12 Mbps tier;
- Qwest's 1.5 Mbps, 7 Mbps, 12 Mbps, and 20 Mbps tiers;
- TimeWarner Cable's 768 kbps, 2 Mbps, 7 Mbps, 10 Mbps, and 15 Mbps tiers;
- Verizon DSL's 0.768 Mbps, 1 Mbps, 1.5 Mbps, 3 Mbps, and 7 Mbps tiers;
- Verizon Fiber's 10 Mbps, 15 Mbps, 20 Mbps, 25 Mbps, and 35 Mbps tiers; and
- Windstream's 1.5 Mbps, 3 Mbps, 6 Mbps and 12 Mbps tiers.

Upload Speeds:

- AT&T DSL's 128 kbps, 256 kbps, 384 kbps, 512 kbps, and 768 kbps tiers;
- AT&T U-verse's 1 Mbps, 1.5 Mbps, and 3 Mbps tiers;
- Cablevision's 2 Mbps and 5 Mbps tiers;
- CenturyLink's 256 kbps, 512 kbps, 640 kbps, 768 kbps, and 896 kbps tiers;
- Charter's 1 Mbps, 2 Mbps, and 3 Mbps tiers;
- Comcast's 384 kbps, 1 Mbps, 2 Mbps, 4 Mbps, and 5 Mbps tiers;
- Cox's 384 kbps, 1 Mbps, 1.5 Mbps, 2 Mbps, and 4 Mbps tiers;
- Frontier's 384 kbps tier;
- Insight's 1 Mbps tier;
- Mediacom's 1 Mbps tier;
- Qwest's 896 kbps tier;
- TimeWarner's 384 kbps, 512 kbps, 768 kbps, 1 Mbps, 2 Mbps, and 5 Mbps tiers;
- Verizon DSL's 128 kbps, 384 kbps, and 768 kbps tiers;
- Verizon Fiber's 2 Mbps, 5 Mbps, 15 Mbps, 25 Mbps, and 35 Mbps tiers; and
- Windstream's 768 kbps tier.

Statistical averages for the validated March 2011 data are found at: <http://www.data.fcc.gov/downloads/measuring-broadband-america/statistical-averages-2011.xls>. The results within these bands are further broken out by ISP and service tier. Where an ISP does not offer a service tier within a specific band or a representative sample could not be formed for tier(s) in that band, the ISP will not appear in that speed band.