

USA

Fixed Broadband Experience Report

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OPEN SIGNAL

Introduction

In this first Opensignal analysis of the fixed broadband experience in the U.S. we have analyzed our users' real-world experience across six different measures: Broadband Success Rate, Broadband Consistent Quality, Broadband Video Experience, Broadband Download Speed, Broadband Peak Download Speed and Broadband Upload Speed.

Multiple categories are essential to understand how broadband providers' experience compares. No single measure can capture the wide breadth of applications and services that broadband services support, for example: video streaming, gaming, working remotely, downloading application updates, video chatting with friends, sharing photos or videos on social media and, of course, web browsing.

While national scores might seem the obvious guide to the experience users have with different service providers, the nature of the fixed broadband market means users' experience will vary depending on the location of their home, the mix of broadband providers that offer service in that market, and the type of broadband infrastructure that is available. This varies enormously across the nation.

No broadband provider offers service to every home. As a result, any national experience table will in practice miss the most important details for users comparing the broadband experience in their area. For this reason, in this first report we have analyzed the real-world situation, across all users' plans, in 25 major markets to assess the fixed broadband experience. We use metropolitan statistical areas (MSAs) as definitions of each market – each centers around a large city or population center.

Key broadband trends

- **Fixed broadband in the U.S. is undergoing rapid development and modernization.** Consumers have more choice of broadband providers than ever before. Now, cable companies and incumbent telephone companies face competition from new fiber overbuilders and fixed wireless players using the latest 5G technology.
- **5G fixed wireless access (FWA) players are typically middle of the pack across the six essential measures of fixed broadband experience.** Incumbent cable and telecom companies typically comfortably beat the new entrant 5G FWA providers, at least for now.
- **In most markets, cable companies had the highest Broadband Download Speed scores.** This success for cable providers – Spectrum, Xfinity, Optimum, and Cox – was despite the arrival of 5G-based fixed broadband. Fiber players are changing this situation, but in the 25 cities analyzed in this report they lead in a minority.
- **Providers often advertize maximum speeds that are very different to real-world experience.** Claimed speeds are now as high as 2 Gbps or 5 Gbps, with 8 Gbps in 2023. In this report, Opensignal quantifies the experience of users based on real-world measurements.
- **In the peak time of day, now noon to 6pm, Broadband Consistent Quality scores tended to be lower.** However, statistical differences between providers' peak time and average Broadband Consistent Quality are uncommon.
- **Across many markets, it is the incumbent telephone companies that come top for Broadband Upload Speed.** Such companies, for example AT&T, Frontier or Verizon, have substantial leads above the next best provider due to their extensive fiber-to-the-home footprints. Fiber-based players are far ahead of every other type of broadband technology in the Broadband Upload Speed experience category, which has grown in importance since the pandemic as more people work from home.
- **Fiber-to-the-home broadband providers also see difference between users' average broadband download and upload speeds** compared with competitors using hybrid fiber coax (HFC), 5G fixed wireless, or telephone line-based digital subscriber line (xDSL) technologies.
- **Broadband Success Rate scores are similar in most markets, regardless of the underlying technology.** In most cities we observed statistical ties between three or more providers. However, in Houston and San Diego there were clear differences in the extent to which Opensignal users could rely on their broadband connection working when they needed it.

Broadband providers included in this report

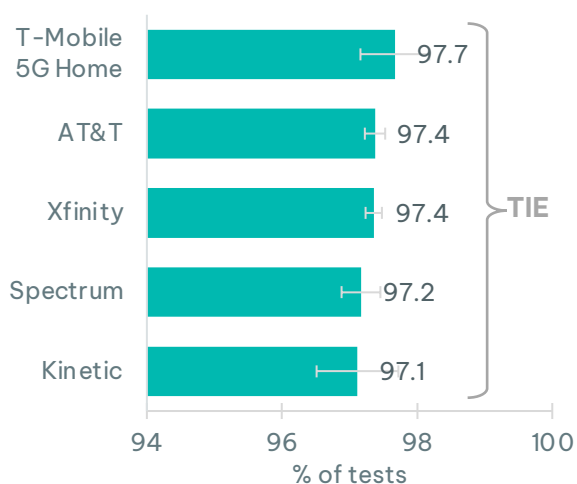
Company	Brand(s) where different
Altice	Optimum
Astound Broadband	
AT&T	
Breezeline	
Charter	Spectrum
Comcast	Xfinity
Comporium	
Consolidated Communications	Fidium
Cox	
Frontier	
Google Fiber	

GVTC	
Lumen	CenturyLink
Mediacom	Xtream
Midco	
Sonic	
T-Mobile	T-Mobile 5G Home Internet
Verizon	FIOS DSL Internet 5G Home*
Windstream	Kinetic
WOW!	
Ziply Fiber	

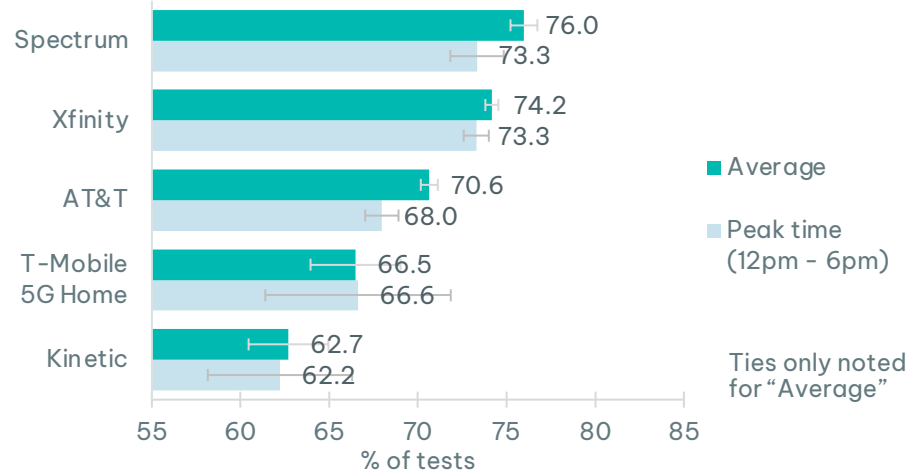
* Verizon 5G Home includes new Verizon LTE Home customers with C-Band 5G Ultra Wideband-ready router.

Broadband Experience: Atlanta-Sandy Springs-Alpharetta, GA

Broadband Success Rate

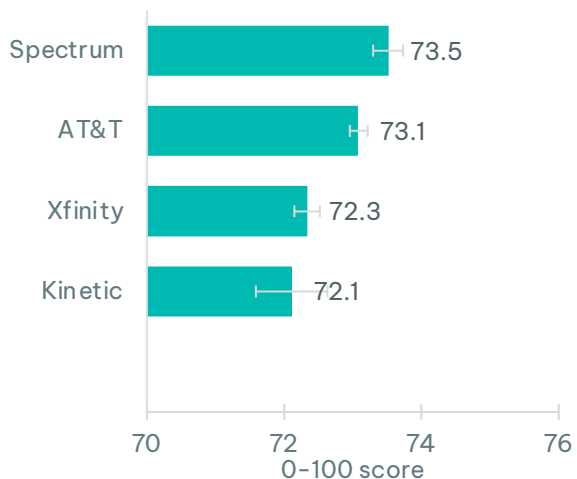


Broadband Consistent Quality

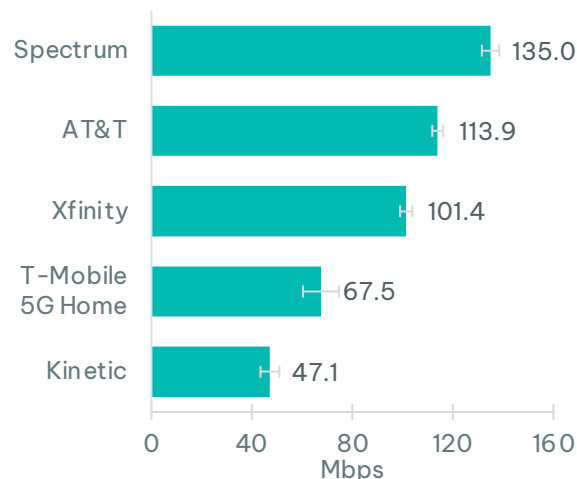


Broadband provider	MSA covered (%)	Tests from fiber-capable areas (%)
AT&T	95.8%	72.0%
Xfinity	84.9%	
T-Mobile 5G Home	33.6%	
Spectrum	19.2%	
Kinetic	5.5%	59.1%

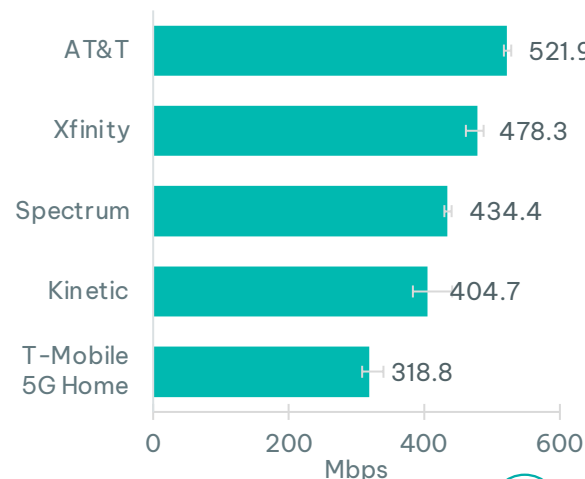
Broadband Video Experience



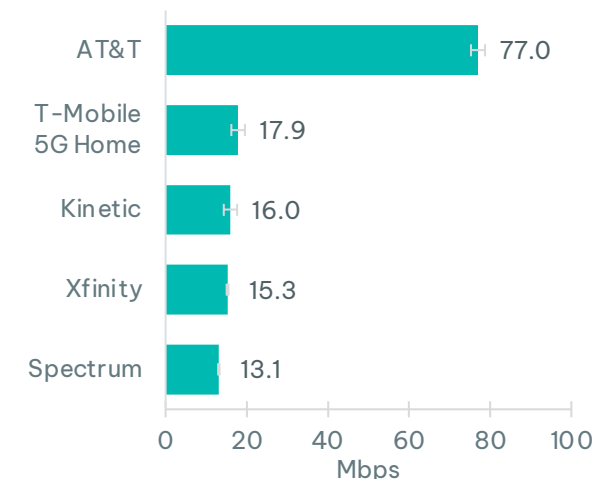
Broadband Download Speed



Broadband Peak Download Speed



Broadband Upload Speed



Broadband Experience: Atlanta-Sandy Springs-Alpharetta, GA

Xfinity and Spectrum beat AT&T and T-Mobile for average Broadband Consistent Quality.

Xfinity, Spectrum and AT&T users all saw faster average and peak download speeds than T-Mobile 5G Home.

No service provider was better than T-Mobile 5G Home on Broadband Success Rate.

AT&T had higher scores than T-Mobile 5G Home on every result, bar Broadband Success Rate and peak time Broadband Consistent Quality where they tie.

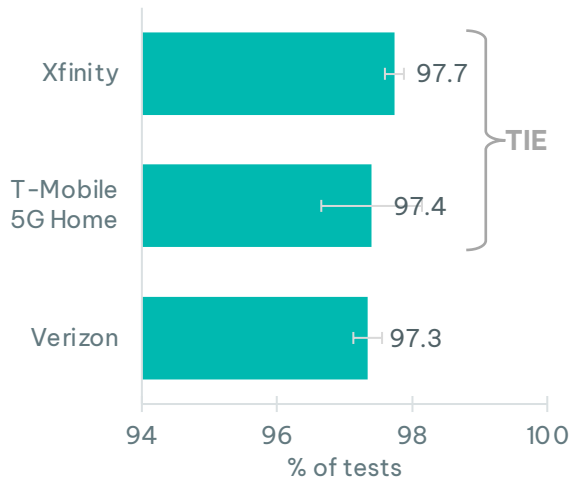
Spectrum had the highest scores for Broadband Video Experience, Broadband Download Speed and average Broadband Consistent Quality.

AT&T had the fastest upload speed and peak download speed scores, and was second on average download speed – it beat Xfinity in all of these categories. In Broadband Upload Speed, our T-Mobile users had a better experience than Xfinity and Spectrum.

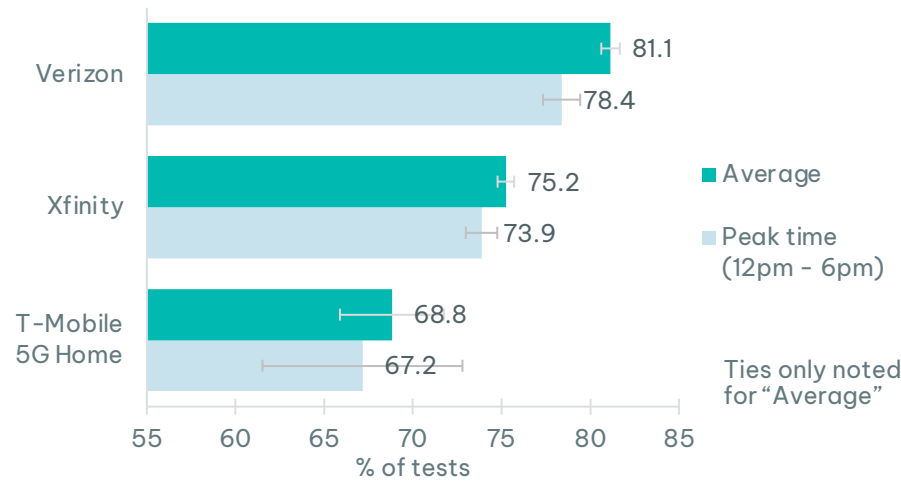
Kinetic, T-Mobile and Xfinity observed no statistically significant differences between their average and peak time Broadband Consistent Quality scores, while AT&T and Spectrum both saw their consistency scores dip during the peak hours.

Broadband Experience: Baltimore-Columbia-Towson, MD

Broadband Success Rate

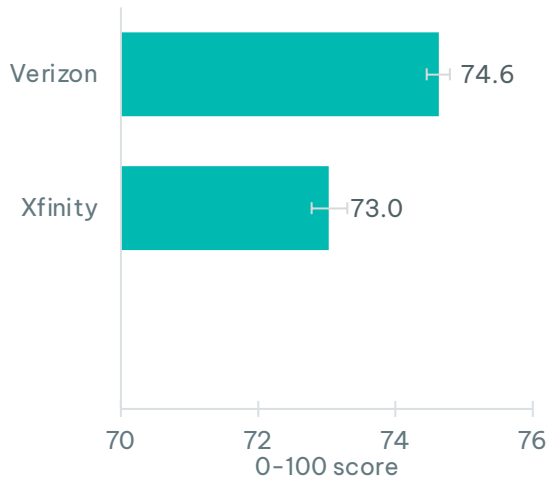


Broadband Consistent Quality

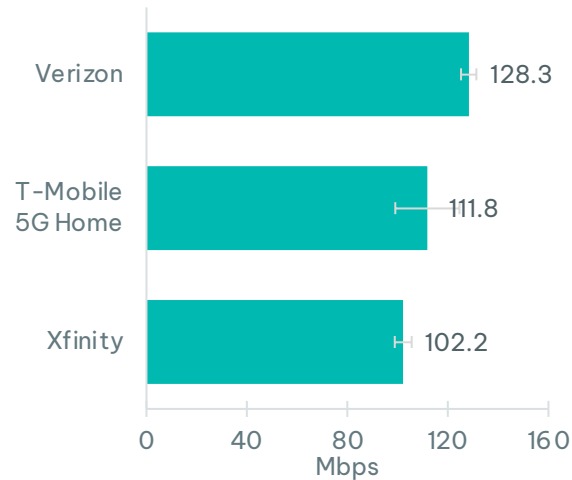


Broadband provider	MSA covered (%)	Tests from fiber-capable areas (%)
Verizon	100.0%	91.3%
Xfinity	94.8%	
T-Mobile 5G Home	32.6%	

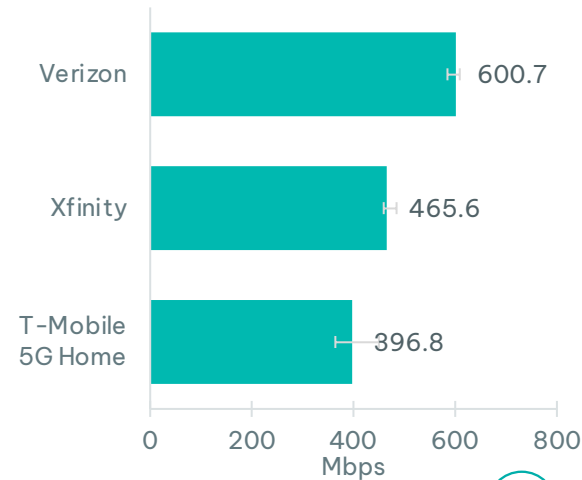
Broadband Video Experience



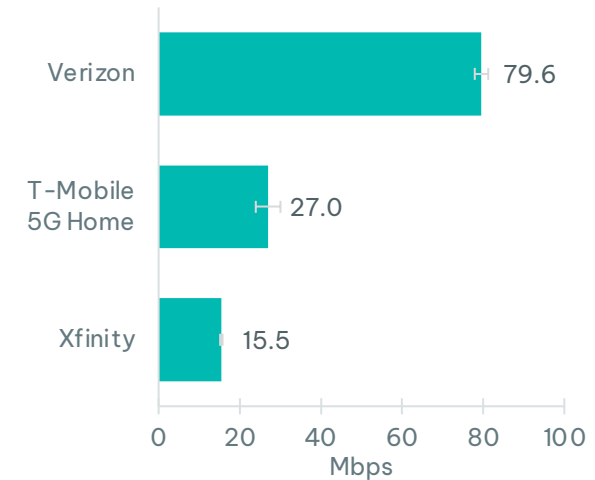
Broadband Download Speed



Broadband Peak Download Speed



Broadband Upload Speed



Broadband Experience: Baltimore-Columbia-Towson, MD

Verizon comes first in five out of six categories, including Broadband Download Experience, Broadband Peak Download Speed, Broadband Upload Speed, Broadband Video Experience and Broadband Consistent Quality (both average and peak time) – as it beat Xfinity in all of these categories.

Xfinity and T-Mobile 5G Home were in a statistical tie for Broadband Success Rate, 0.1-0.4 percentage points ahead of Verizon.

Opensignal users saw the fastest broadband speeds on Verizon's network, with its average Broadband Download Speed clocking in at 128.3 Mbps and its peak download speed hitting the 600 Mbps mark.

Verizon and Xfinity's average Broadband Consistent Quality scores were slightly, but statistically significantly, higher than their peak time scores. However our T-Mobile 5G Home users observed similar consistent quality over the day and during peak hours.

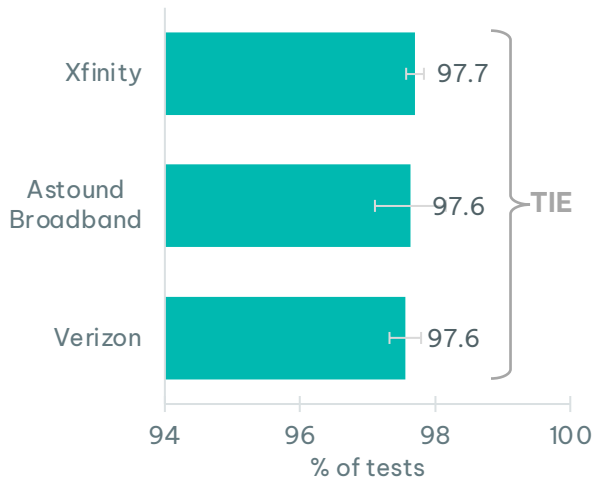
Xfinity comes second for both average and peak time Broadband Consistent Quality, Broadband Video Experience and Broadband Peak Download Speed.

T-Mobile beats Xfinity in Broadband Upload Speed. Both operators were in a statistical tie for Broadband Download Speed with average download speeds exceeding 100 Mbps.

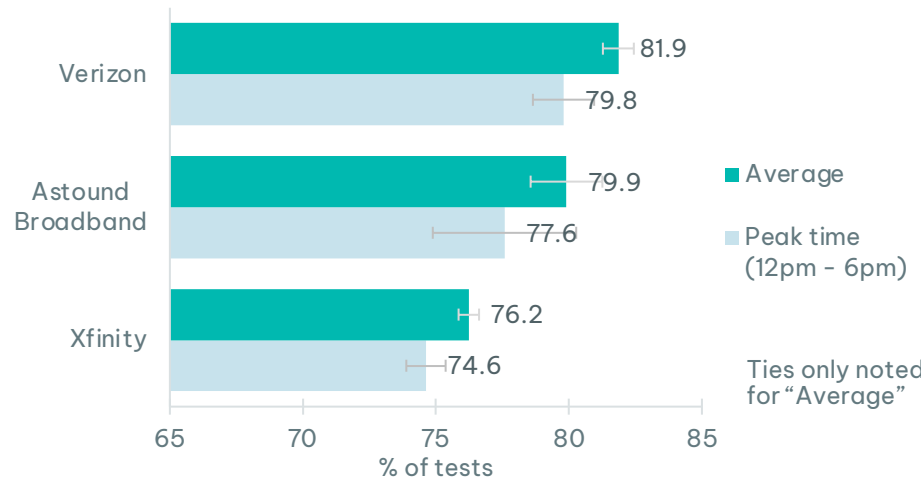
Our Verizon users had higher scores in all three speed categories than T-Mobile 5G Home users.

Broadband Experience: Boston-Cambridge-Newton, MA-NH

Broadband Success Rate

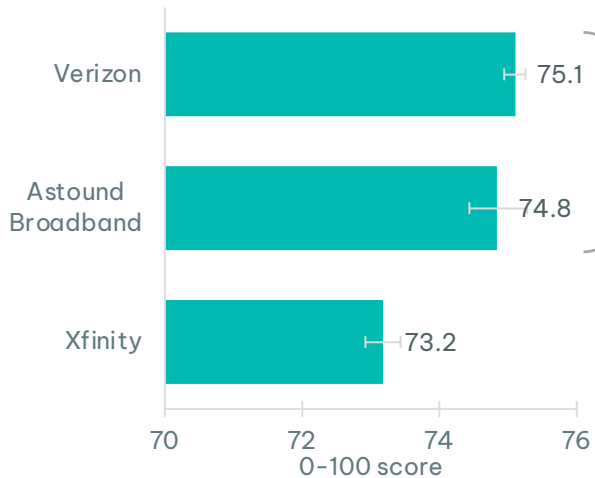


Broadband Consistent Quality

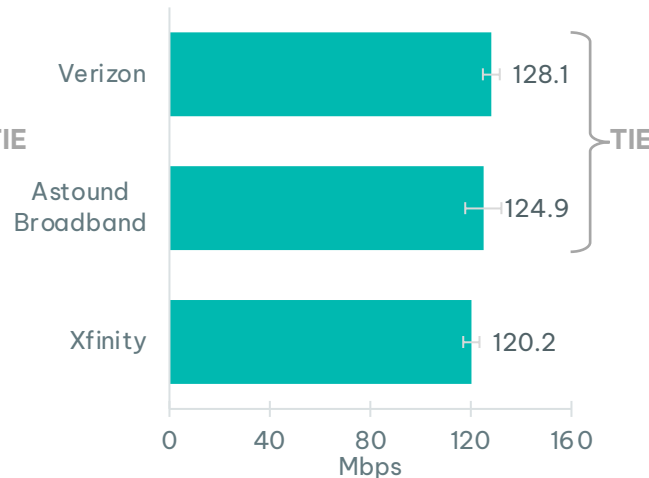


Broadband provider	MSA covered (%)	Tests from fiber-capable areas (%)
Xfinity	98.0%	
Verizon	90.5%	92.6%
Astound Broadband	22.6%	

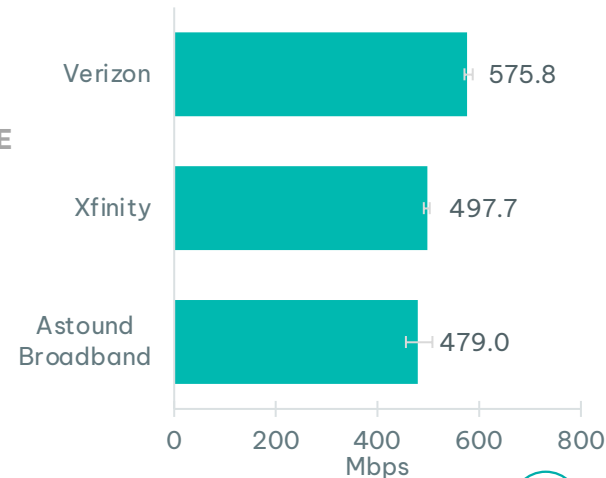
Broadband Video Experience



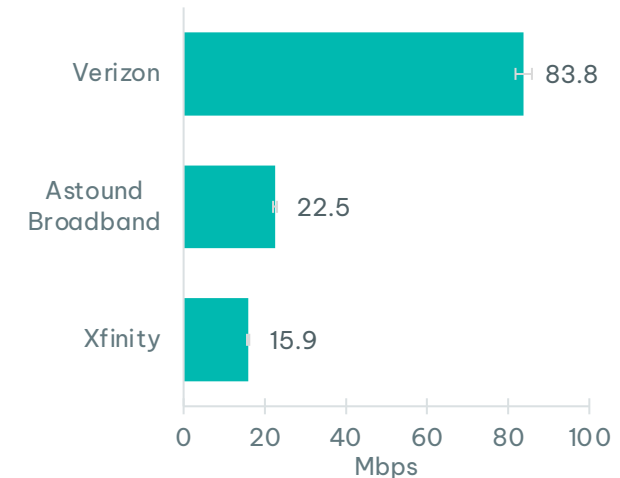
Broadband Download Speed



Broadband Peak Download Speed



Broadband Upload Speed



Broadband Experience: Boston-Cambridge-Newton, MA-NH

In Boston-Cambridge-Newton, Verizon scored a clean sweep as it had the highest or jointly highest score across every metric.

Verizon leads in Broadband Peak Download Speed and Broadband Upload Speed, with nearly four times faster average upload speeds than second placed Astound Broadband.

Both Astound Broadband and Verizon were in a tie for Broadband Video Experience and Broadband Download Speed. Astound beats Xfinity for average Broadband Consistent Quality, Broadband Video Experience and Broadband Upload Speed.

Verizon has higher broadband experience scores than Xfinity in five out of six categories – Broadband Consistent Quality, Broadband Video Experience, Broadband Download Speed, Broadband Peak Download Speed and Broadband Upload Speed. Only in Broadband Success Rate do they tie.

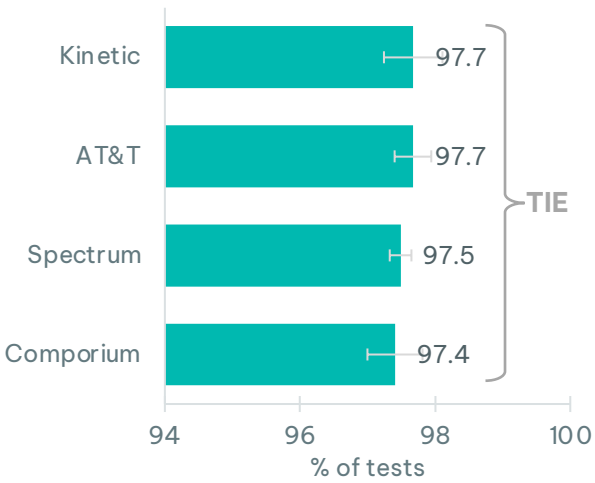
Verizon beat Astound in average Broadband Consistent Quality. At peak times, there was no statistically significant difference between the providers.

Xfinity and Astound Broadband share the second spot for Broadband Peak Download Speed.

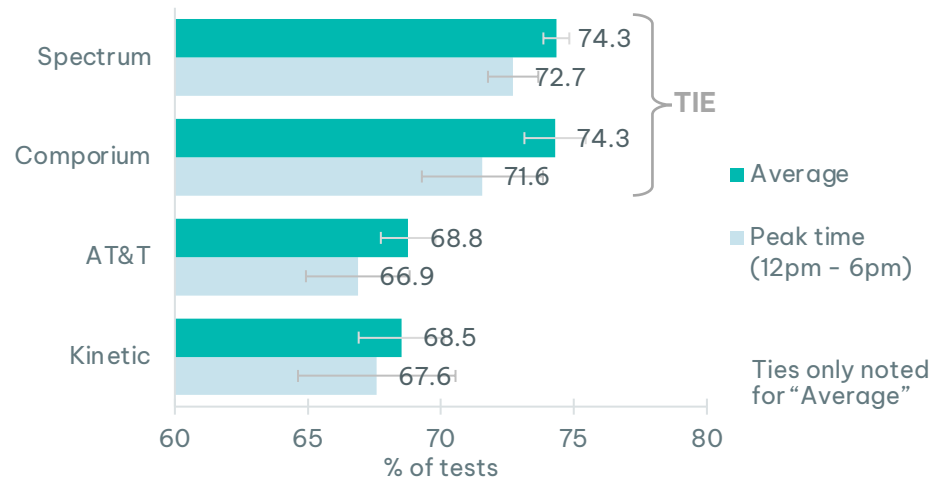
There was no difference in Broadband Success rate between Astound Broadband, Verizon and Xfinity.

Broadband Experience: Charlotte-Concord-Gastonia, NC-SC

Broadband Success Rate

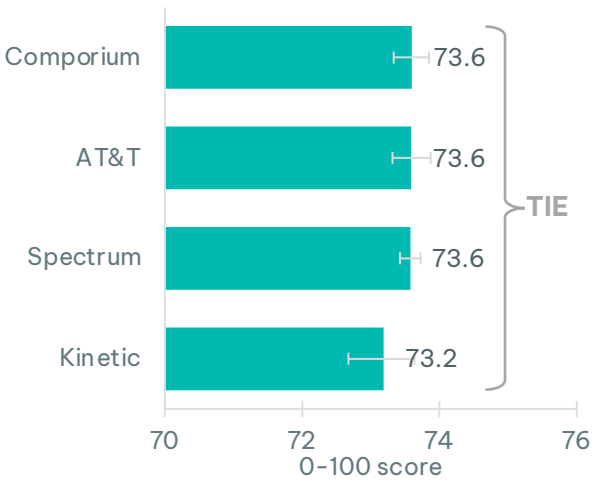


Broadband Consistent Quality

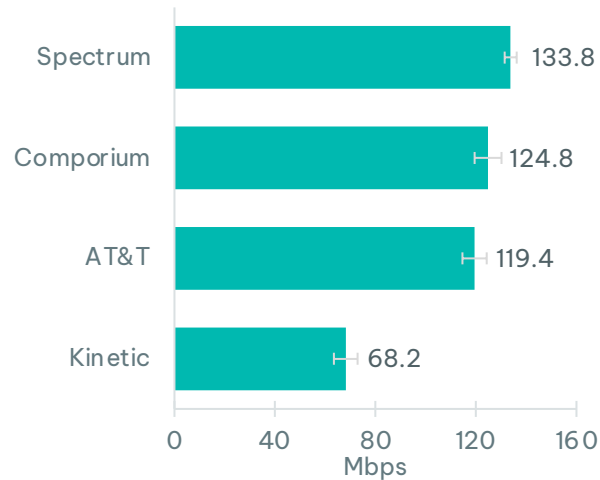


Broadband provider	MSA covered (%)	Tests from fiber-capable areas (%)
Spectrum	87.3%	
AT&T	64.1%	67.3%
Kinetic	24.7%	59.8%
Comporium	14.2%	44.6%

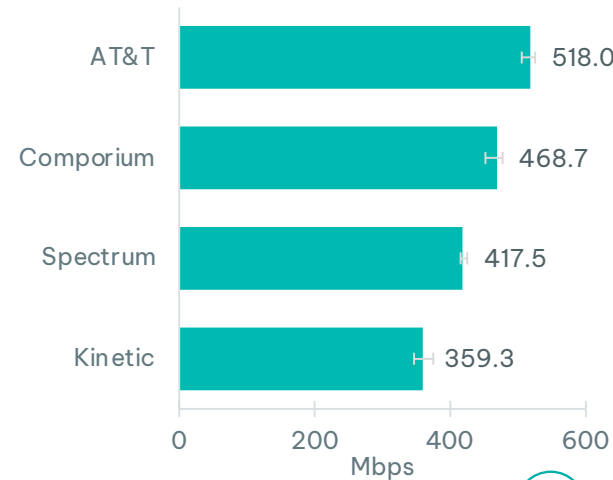
Broadband Video Experience



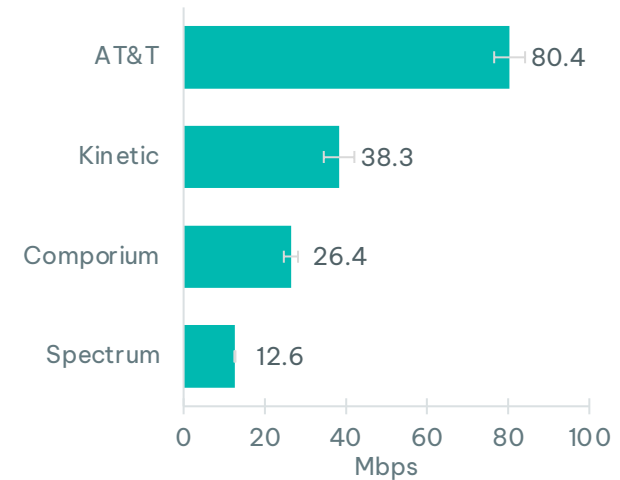
Broadband Download Speed



Broadband Peak Download Speed



Broadband Upload Speed



Broadband Experience: Charlotte-Concord-Gastonia, NC-SC

Spectrum and Comporium had the highest, identical scores of 74.3 points for average Broadband Consistent Quality – beating AT&T and Kinetic by 5.5-5.8 percentage points.

AT&T's Broadband Upload Speed was more than twice as fast as what Opensignal users observed on second-placed Kinetic's network. Both Kinetic and Comporium beat Spectrum in this metric.

Spectrum subscribers enjoyed the fastest Broadband Download Speed in the Charlotte-Concord-Gastonia area, clocking in at 133.8 Mbps – 7.2% faster than Comporium and 12% faster than AT&T.

AT&T users saw the fastest Broadband Peak Download Speed ahead of Comporium.

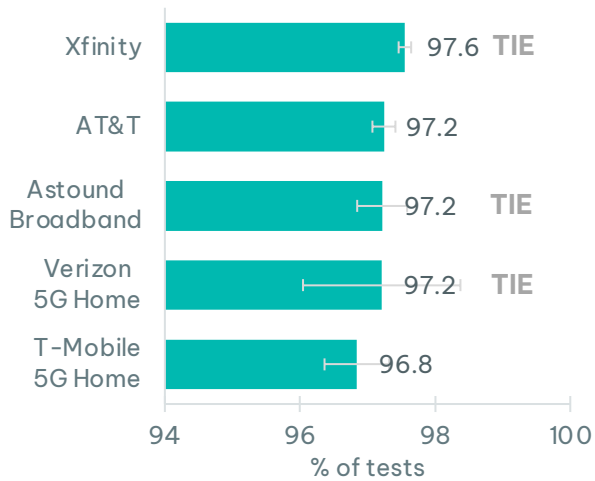
AT&T, Comporium, Kinetic and Spectrum all placed in the Very Good (65-75) category for Broadband Video Experience. There was no difference between their scores, as they were all in a statistical tie.

No broadband provider was better than Spectrum in Broadband Success Rate.

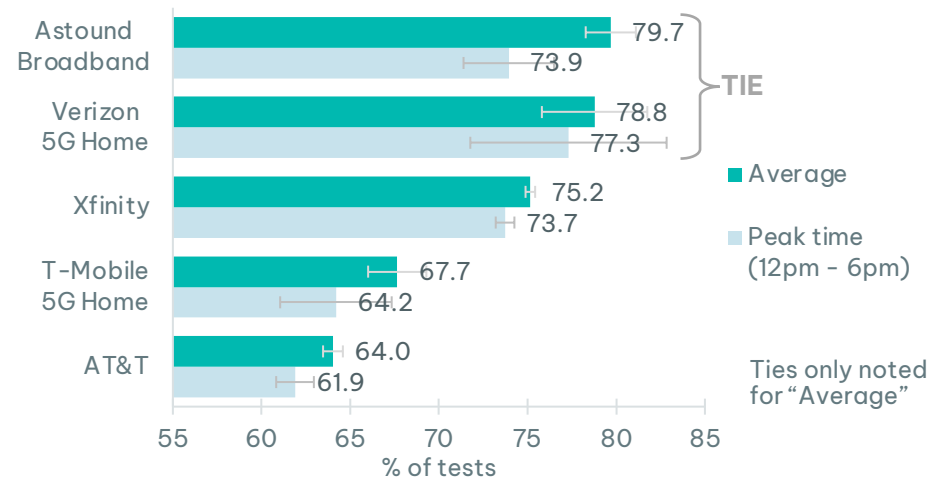
Aside from Spectrum, there was no statistical difference between peak time and overall average scores for Broadband Consistent Quality on all providers.

Broadband Experience: Chicago-Naperville-Elgin, IL-IN-WI

Broadband Success Rate

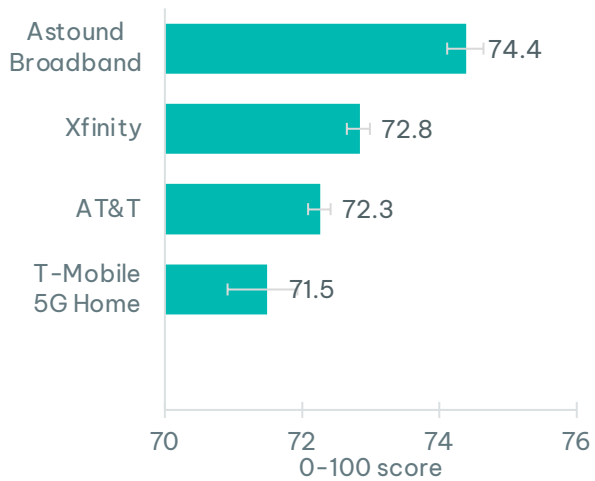


Broadband Consistent Quality

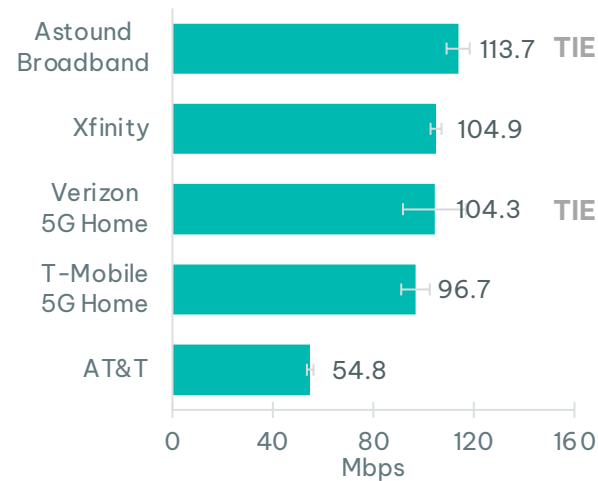


Broadband provider	MSA covered (%)	Tests from fiber-capable areas (%)
AT&T	95.4%	27.3%
Xfinity	94.8%	
T-Mobile 5G Home	28.9%	
Astound Broadband	24.8%	
Verizon 5G Home	21.1%	

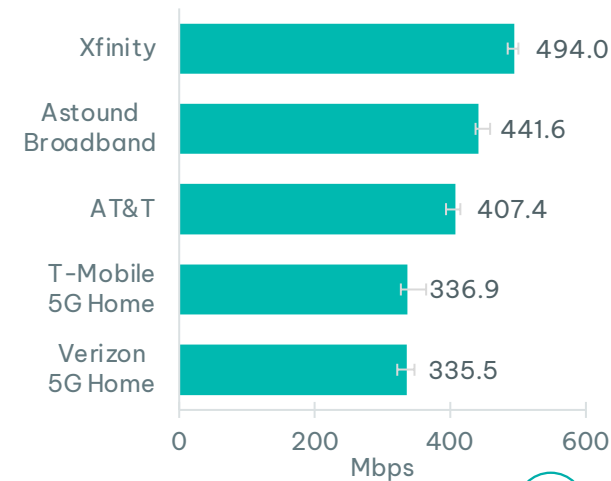
Broadband Video Experience



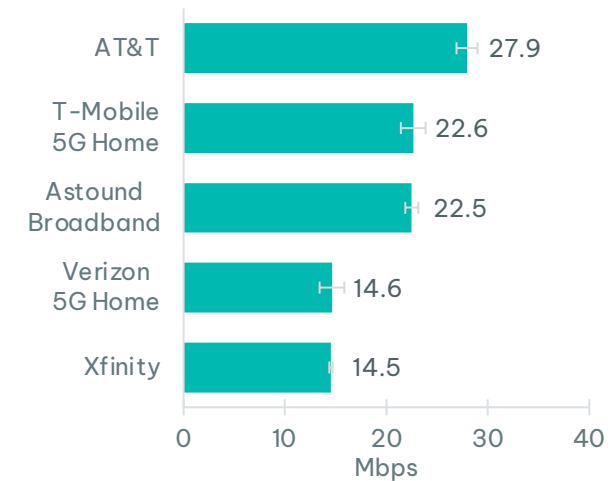
Broadband Download Speed



Broadband Peak Download Speed



Broadband Upload Speed



Broadband Experience: Chicago–Naperville–Elgin, IL–IN–WI

In Chicago, Astound is a leader in three key categories: Broadband Video Experience, Broadband Download Speed and average Broadband Consistent Quality.

Astound Broadband beats Xfinity and AT&T at average Broadband Consistent Quality and Video Experience – while it also had a higher score than Xfinity in Broadband Upload Speed.

Astound Broadband and Verizon 5G Home users saw the fastest average Broadband Download Speed, with statistically tied scores in the 104.3–113.7 Mbps range.

Xfinity leads in Broadband Peak Download Speed, with a score 11.9% faster than Astound Broadband's.

AT&T outperformed other providers in Broadband Upload Speed – including Xfinity – with around 23.8% faster than T-Mobile 5G Home and Astound Broadband, which were in a statistical tie. In the same metric, Astound Broadband beats Xfinity.

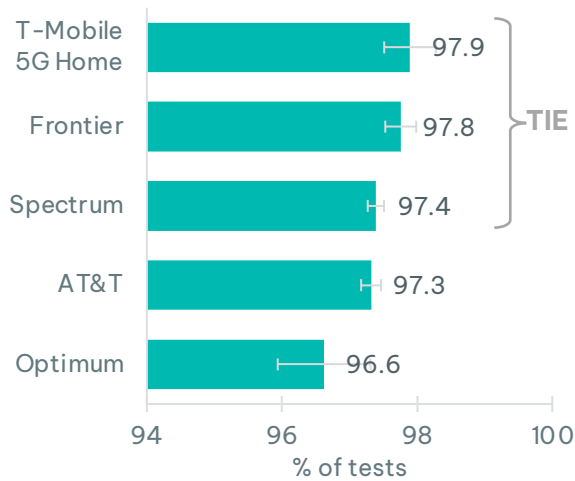
Astound Broadband and Verizon 5G Home had the most consistent broadband quality across the day as both providers were in a statistical tie for average Broadband Consistent Quality. Verizon 5G Home beat Xfinity and AT&T in this metric.

Xfinity, Astound Broadband and Verizon 5G Home tie with the best Broadband Success rate. There is no statistical difference in their scores. All three joint leaders have better scores than T-Mobile 5G Home and AT&T.

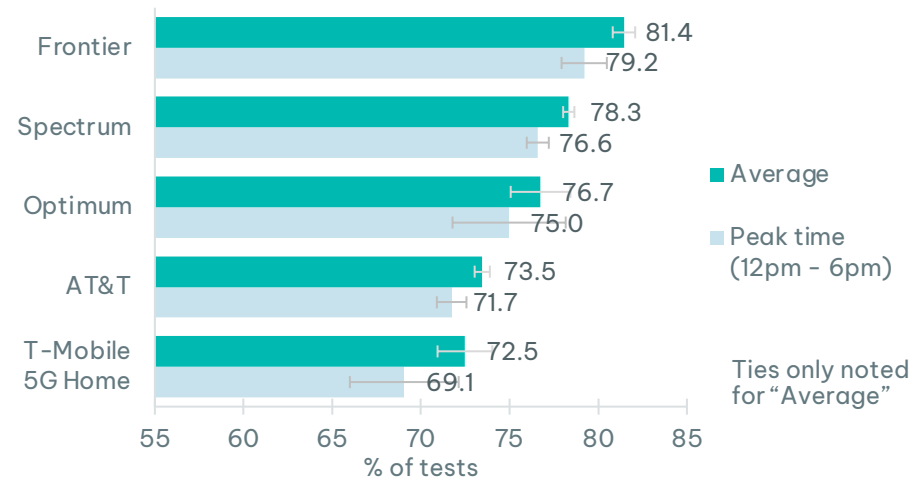
Xfinity had higher scores than AT&T and T-Mobile 5G Home in all the categories – including average Broadband Consistent Quality and Broadband Video Experience – except for Broadband Upload Speed.

Broadband Experience: Dallas-Fort Worth-Arlington, TX

Broadband Success Rate

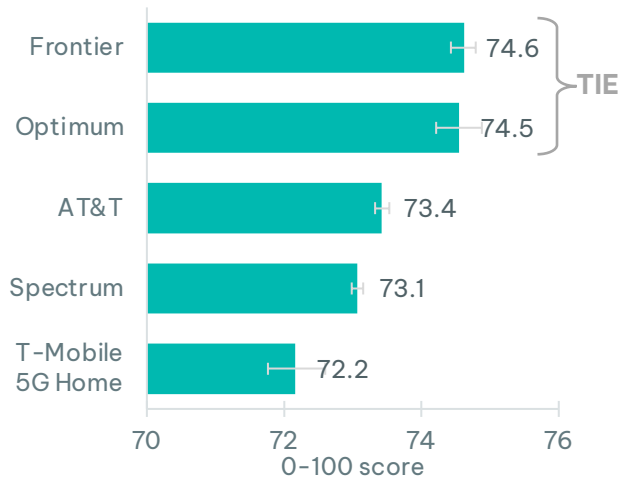


Broadband Consistent Quality

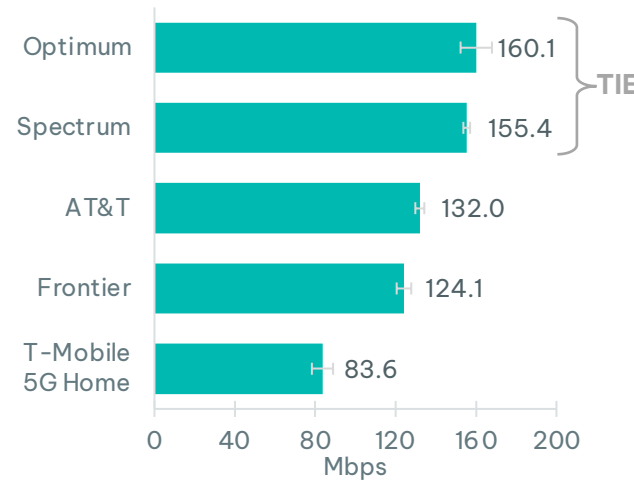


Broadband provider	MSA covered (%)	Tests from fiber-capable areas (%)
Spectrum	85.5%	
AT&T	77.4%	67.9%
T-Mobile 5G Home	36.0%	
Frontier	25.0%	97.1%
Optimum	11.0%	

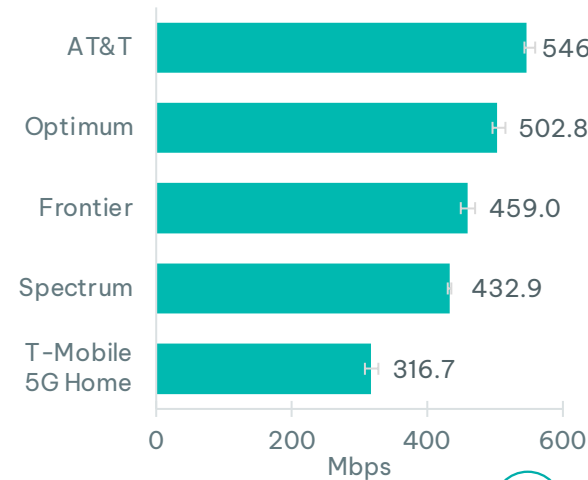
Broadband Video Experience



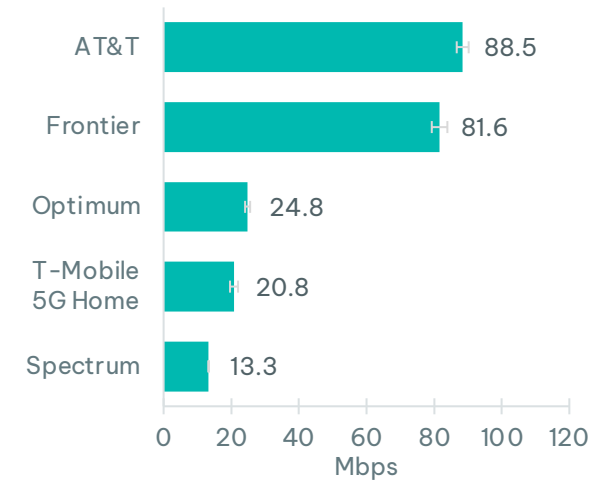
Broadband Download Speed



Broadband Peak Download Speed



Broadband Upload Speed



Broadband Experience: Dallas-Fort Worth-Arlington, TX

In its footprint, Frontier delivers the best Broadband Video Experience and Broadband Consistent Quality, relative to competitors Spectrum and T-Mobile.

Optimum beats AT&T for Broadband Video Experience, but in the same metric, AT&T scored higher than Spectrum.

AT&T leads in two speed categories – Broadband Peak Download Speed and Broadband Upload Speed. It beats Spectrum in the latter, while Frontier had a higher score than Spectrum and Optimum.

Frontier users had the most consistent average experience, as it outperforms its competitors in average Broadband Consistent Quality, beating Spectrum and Optimum. Meanwhile, Spectrum had a higher score than AT&T in the same metric.

Two cable providers Optimum and Spectrum had the highest average Broadband Download Speed scores, exceeding the 150 Mbps mark.

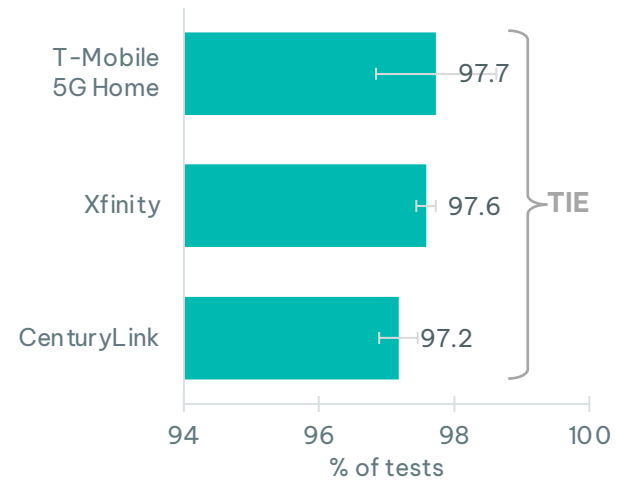
Frontier and Optimum users enjoyed the highest-rated Broadband Video Experience.

T-Mobile 5G Home, Frontier and Spectrum statistically tied for the highest scores for Broadband Success Rate.

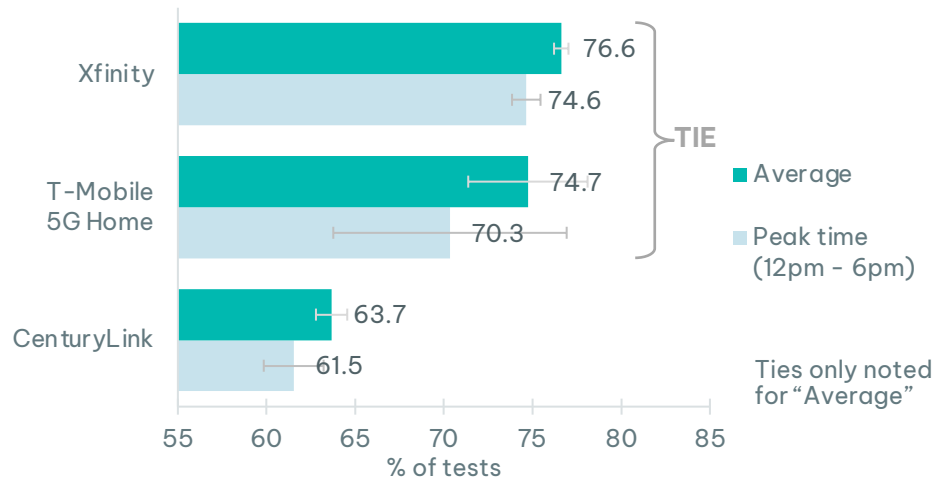
There was no statistically significant difference between average and peak time scores for Broadband Consistent Quality for T-Mobile 5G Home and Optimum users – but for other broadband providers, peak time scores were significantly worse than their day averages.

Broadband Experience: Denver-Aurora-Lakewood, CO

Broadband Success Rate

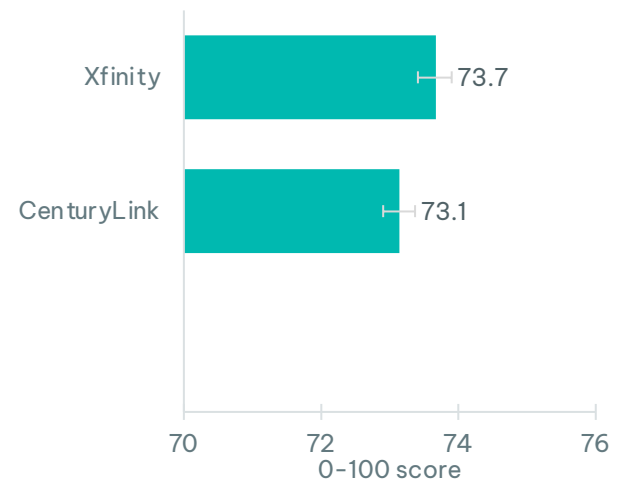


Broadband Consistent Quality

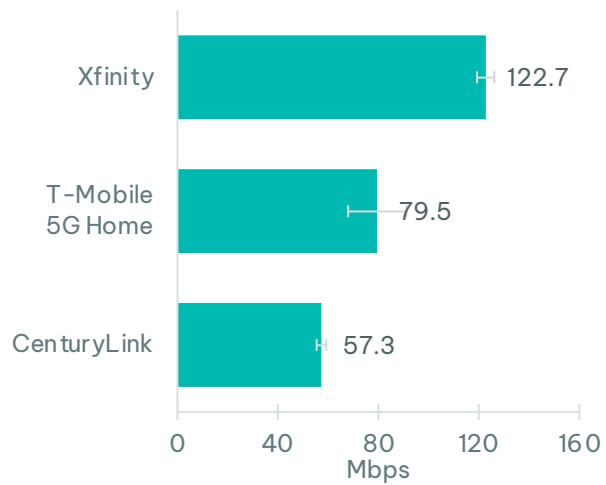


Broadband provider	MSA covered (%)	Tests from fiber-capable areas (%)
CenturyLink	99.3%	61.8%
Xfinity	94.8%	
T-Mobile 5G Home	23.1%	

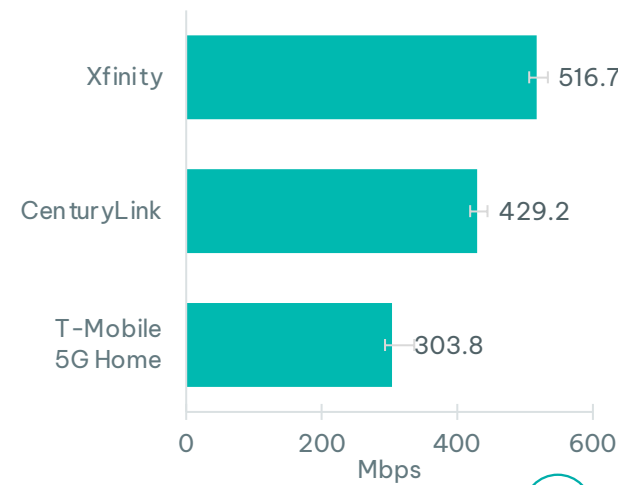
Broadband Video Experience



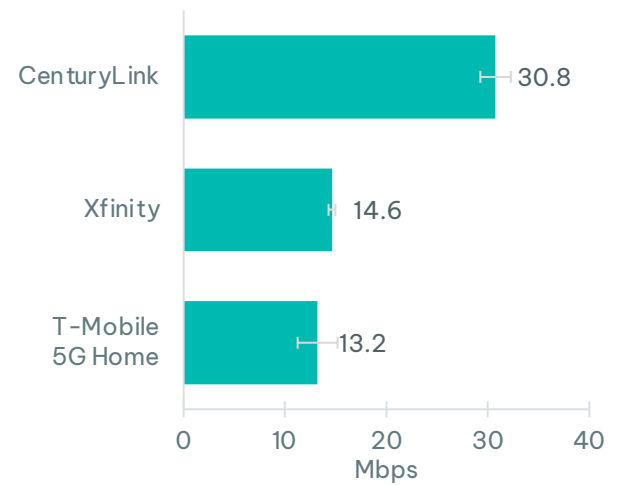
Broadband Download Speed



Broadband Peak Download Speed



Broadband Upload Speed



Broadband Experience: Denver–Aurora–Lakewood, CO

Xfinity takes the top spot in three categories – Broadband Video Experience, Broadband Download Speed and Broadband Peak Download Speed.

Xfinity users saw the highest average Broadband Download Speed in the city area, 54.2% faster than on T-Mobile 5G home.

CenturyLink comes first for Broadband Upload Speed, with a score of 30.8 Mbps – more than twice as high as the upload speeds Xfinity and T-Mobile 5G Home users experienced.

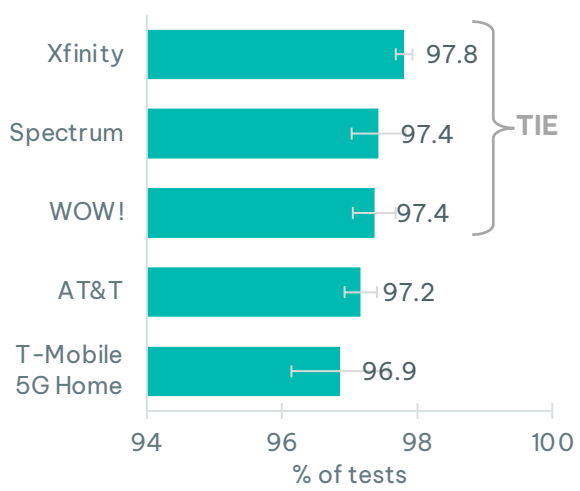
All broadband providers saw statistically tied scores for Broadband Success Rate, of 97.2–97.7%.

Xfinity and T-Mobile 5G Home had the highest, statistically tied scores for average and peak time Broadband Consistent Quality.

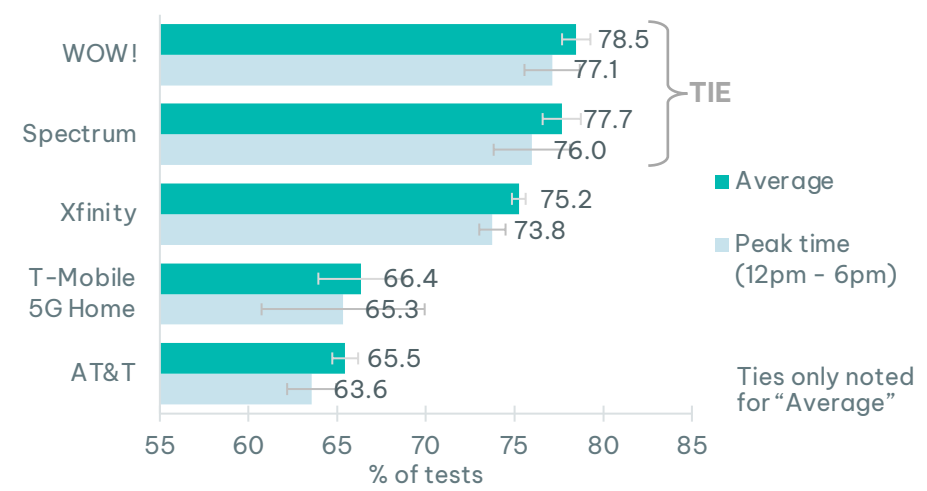
Xfinity had a significantly lower consistent broadband experience during peak hours than the average across all hours of the day, but T-Mobile 5G Home and CenturyLink observed no statistically significant differences between these two scores.

Broadband Experience: Detroit-Warren-Dearborn, MI

Broadband Success Rate

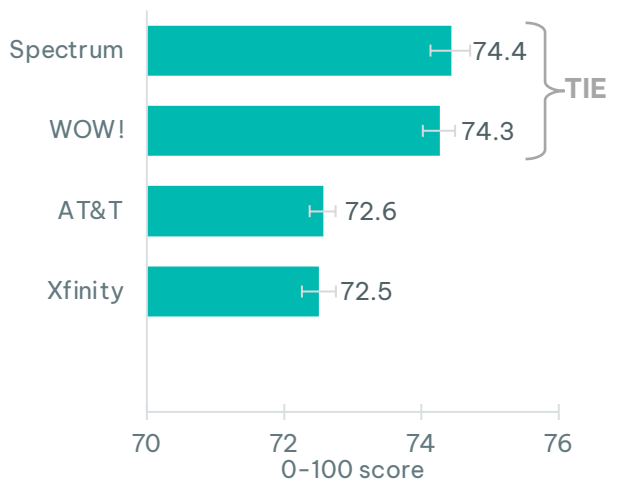


Broadband Consistent Quality

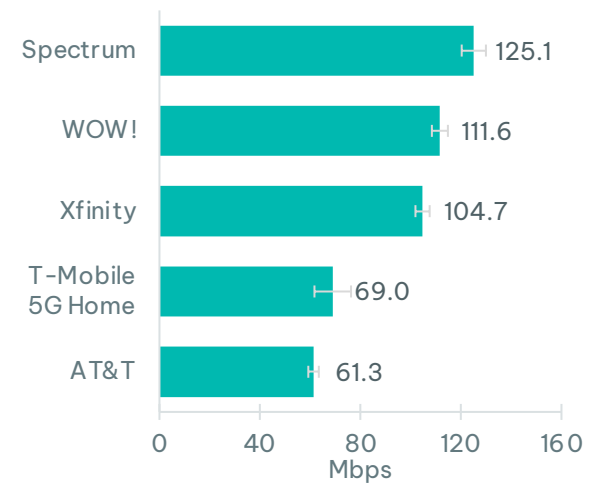


Broadband provider	MSA covered (%)	Tests from fiber-capable areas (%)
AT&T	96.2%	31.2%
Xfinity	87.5%	
WOW!	40.4%	
T-Mobile 5G Home	21.6%	
Spectrum	12.2%	

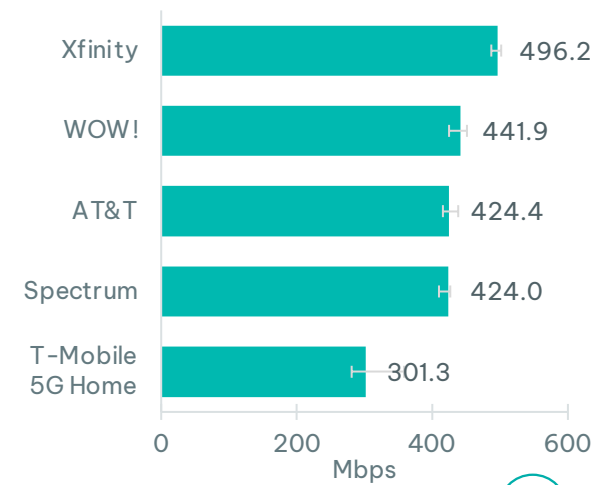
Broadband Video Experience



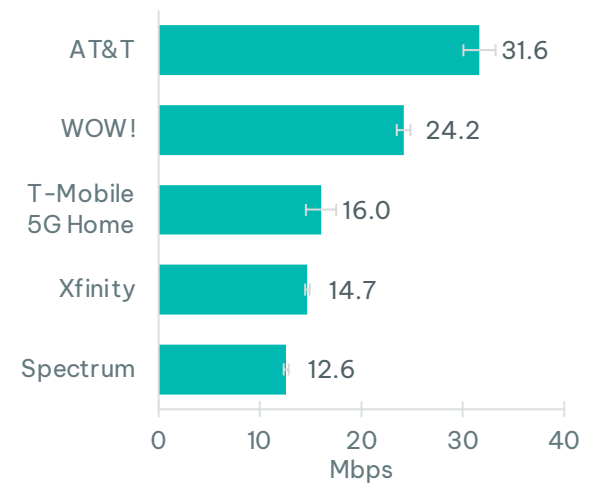
Broadband Download Speed



Broadband Peak Download Speed



Broadband Upload Speed



Broadband Experience: Detroit–Warren–Dearborn, MI

Cable incumbents Spectrum and Xfinity had higher scores than T-Mobile 5G Home in average and peak time Broadband Consistent Quality, Broadband Download Speed, and Broadband Peak Download.

WOW! beat Xfinity and AT&T for average and peak time Broadband Consistent Quality, Broadband Video Experience, and Broadband Download Speed.

Spectrum outperformed other providers in Broadband Download Speed. Both Spectrum and Xfinity significantly outperformed primary telco competitor AT&T.

Spectrum and WOW! had the best Broadband Video Experience results in the city area. Where WOW!'s service overlaps with those from Xfinity and AT&T in Detroit (but not Spectrum's), it is the clear leader for video streaming experience. However, in areas where WOW! and Spectrum compete with each other, our WOW! users had a comparable video experience to users on their cable competitor.

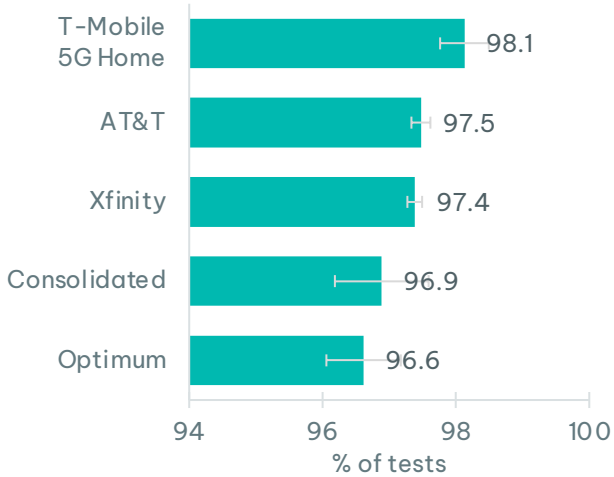
AT&T leads Broadband Upload Speed with a score of 31.6 Mbps – 31% faster than second-placed WOW! and more than twice as fast as Xfinity and Spectrum.

WOW! and Spectrum users saw no statistically significant differences in average and peak time Broadband Consistent Quality between both providers, as both of them had the highest scores in the city area. In both measures of Broadband Consistent Quality, Xfinity outperformed T-Mobile 5G Home.

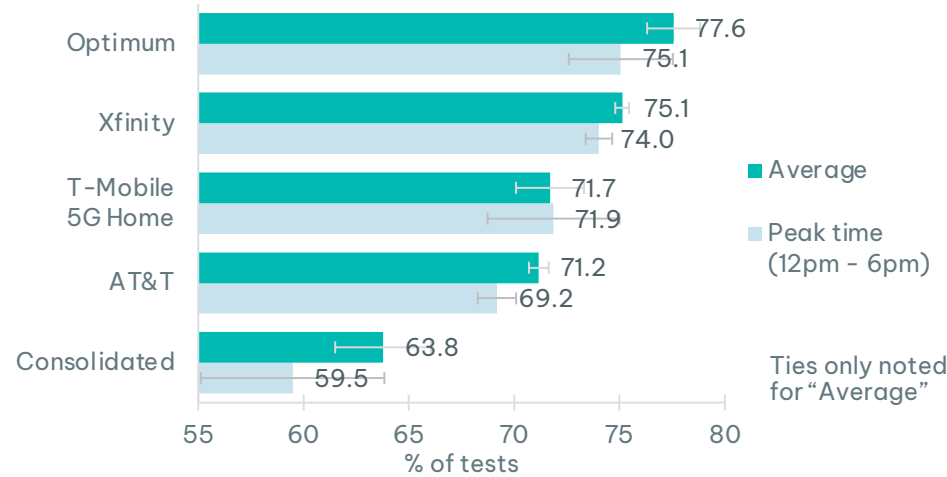
Xfinity, Spectrum and WOW! scored the highest in Broadband Success Rate, ahead of AT&T and T-Mobile.

Broadband Experience: Houston-The Woodlands-Sugar Land, TX

Broadband Success Rate

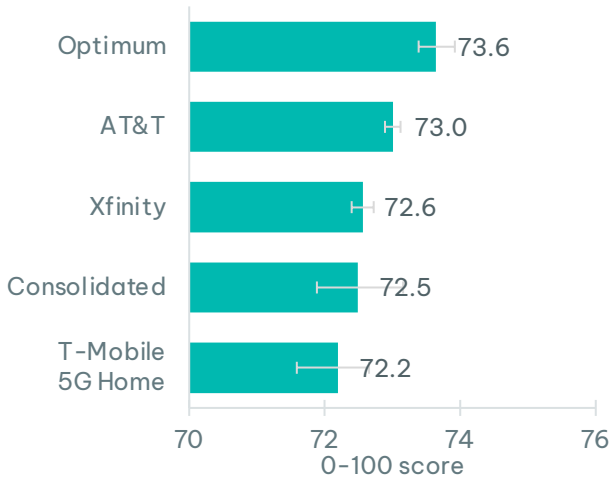


Broadband Consistent Quality

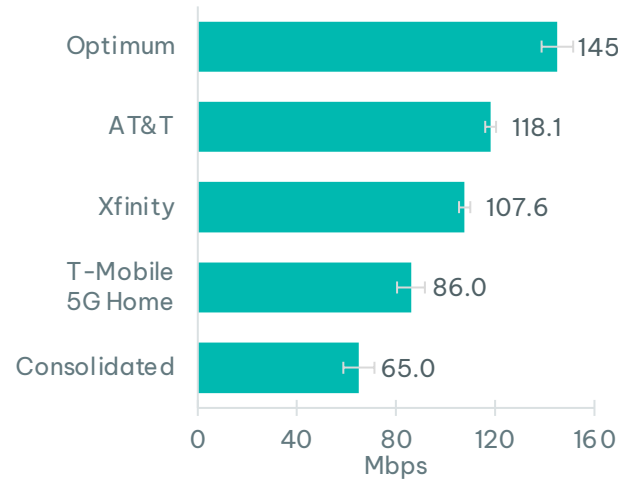


Broadband provider	MSA covered (%)	Tests from fiber-capable areas (%)
Xfinity	89.2%	
AT&T	79.6%	66.1%
T-Mobile 5G Home	44.9%	
Optimum	8.7%	
Consolidated	7.3%	40.9%

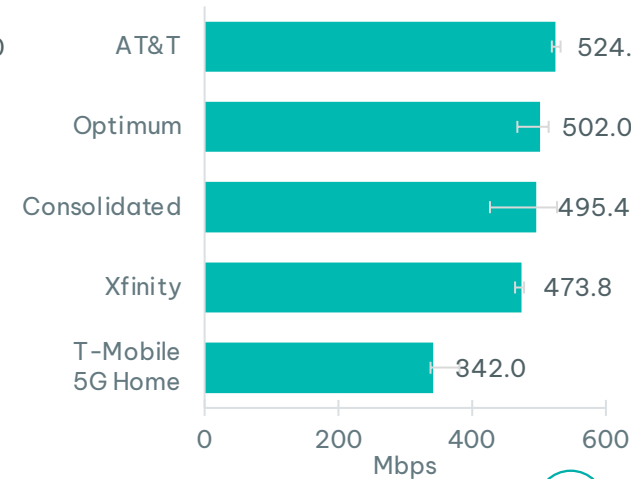
Broadband Video Experience



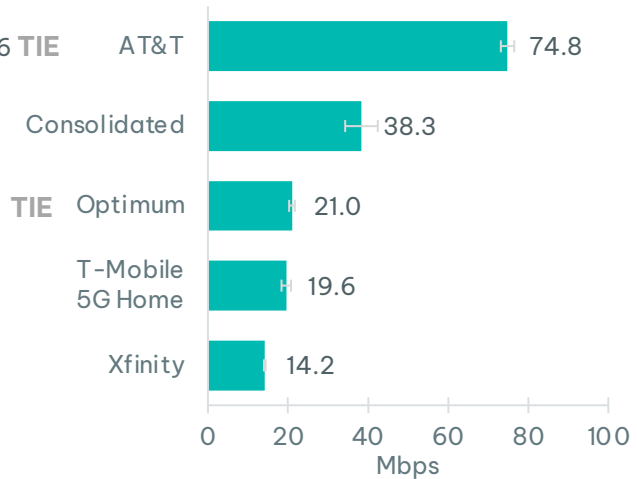
Broadband Download Speed



Broadband Peak Download Speed



Broadband Upload Speed



Broadband Experience: Houston–The Woodlands–Sugar Land, TX

In Houston, AT&T tops primary competitor Xfinity in four out of six categories – Broadband Video Experience, Broadband Download Speed, Broadband Peak Download Speed and Broadband Upload Speed.

T-Mobile 5G Home had the highest score in Broadband Success Rate, of 98.1% – and was not statistically tied with any other broadband provider.

Optimum had the highest scores for average Broadband Consistent Quality, Broadband Video Experience and Broadband Download Speed in the city area. In all of these categories, Optimum outperformed AT&T and in Broadband Download Speed, its average speed was 22.8% faster than AT&T.

AT&T users enjoyed the highest Broadband Upload Speed, with a speed nearly twice as high as the one observed by Consolidated users.

AT&T had higher scores than Xfinity in both Broadband Download Speed and Broadband Upload Speed. Our Consolidated users also enjoyed faster average Broadband Upload Speed than those on Xfinity.

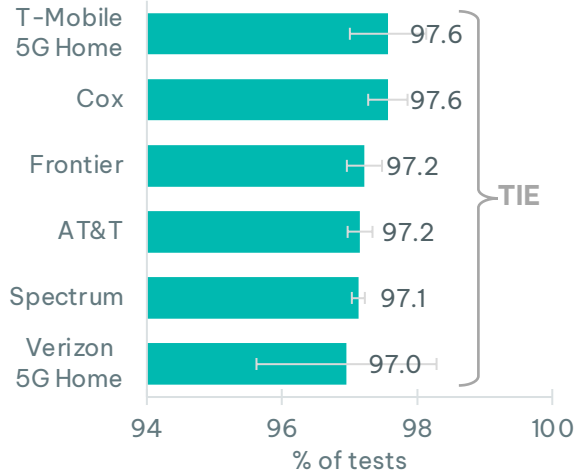
AT&T and Consolidated were in a statistical tie for Broadband Peak Download Speed, with scores in the 495.4–524.6 Mbps range.

AT&T comes second in Broadband Success Rate, Broadband Video Experience and Broadband Download Speed. In Broadband Success Rate, Xfinity and Consolidated tie with AT&T.

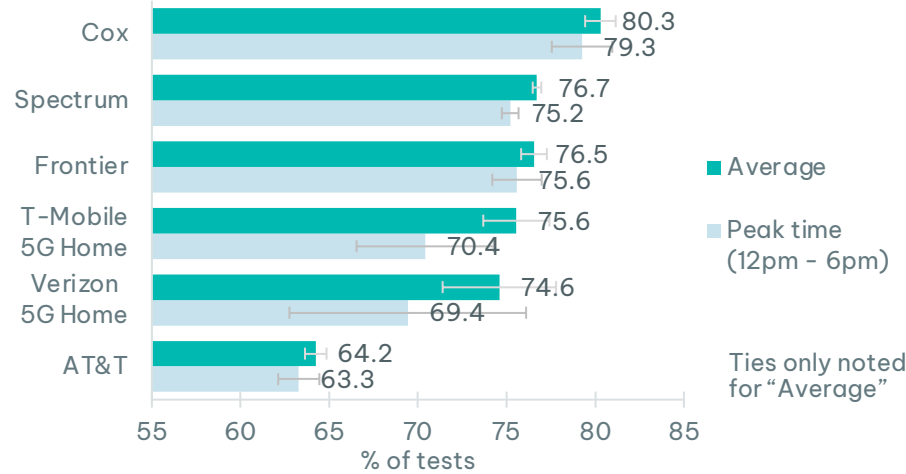
Xfinity beat AT&T for average Broadband Consistent Quality. Xfinity and AT&T's peak time Broadband Consistent Quality scores were significantly worse than their averages seen over the day – but other providers saw no statistically significant difference.

Broadband Experience: Los Angeles-Long Beach-Anaheim, CA

Broadband Success Rate

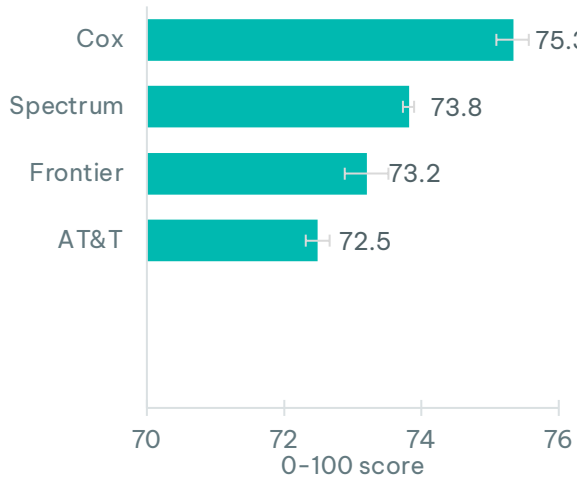


Broadband Consistent Quality

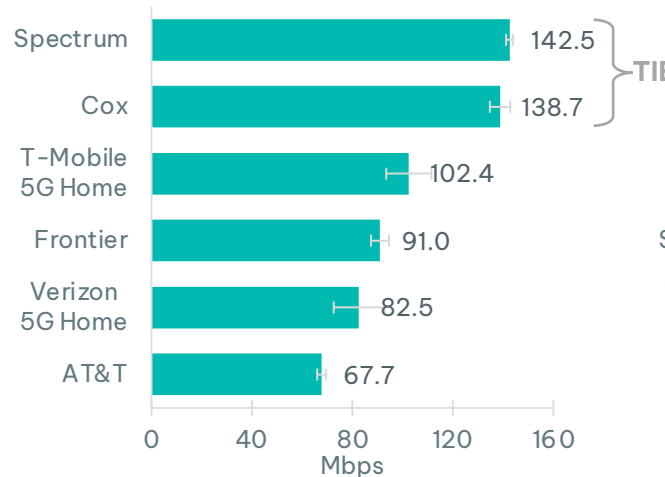


Broadband provider	MSA covered (%)	Tests from fiber-capable areas (%)
Spectrum	90.6%	
AT&T	70.6%	42.8%
Frontier	32.0%	86.5%
T-Mobile 5G Home	25.1%	
Verizon 5G Home	24.6%	
Cox	9.5%	

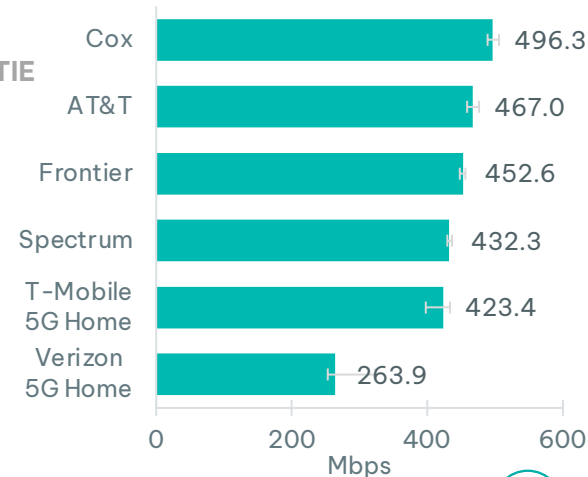
Broadband Video Experience



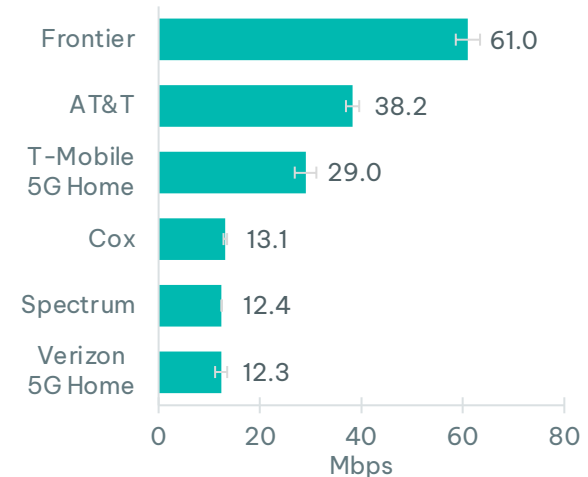
Broadband Download Speed



Broadband Peak Download Speed



Broadband Upload Speed



Broadband Experience: Los Angeles-Long Beach-Anaheim, CA

Although they serve a small part of the market, Cox had the highest results in three categories and shared the top spots in two more. In just one category, Broadband Upload Speed, did other providers surpass the broadband experience of Cox users.

Where Spectrum competes against telcos AT&T and Frontier, they win on two key metrics – Broadband Video Experience and Broadband Download Speed.

Spectrum and Cox users experienced the fastest Broadband Download Speed in the city area, with average broadband speeds in the 138.7-142.5 Mbps range. T-Mobile 5G Home comes third, with average broadband download speed exceeding 100 Mbps. In this metric, Cox outperformed Frontier and AT&T.

In Broadband Consistent Quality, Cox users reported the highest scores for both average and peak time metrics. In this metric, both Spectrum and T-Mobile beat AT&T. All providers bar Spectrum saw no statistically significant difference between their average and peak time scores.

Spectrum beats AT&T in Broadband Consistent Quality, Broadband Video Experience and Broadband Download Speed.

There were no statistically significant differences between all providers for Broadband Success Rate, with our users having a similar experience with cable companies like Cox or Spectrum and wireless players like AT&T, T-Mobile or Verizon.

Cox scored the highest in Broadband Peak Download Speed. In this category, Frontier beat Spectrum by more than 20 Mbps.

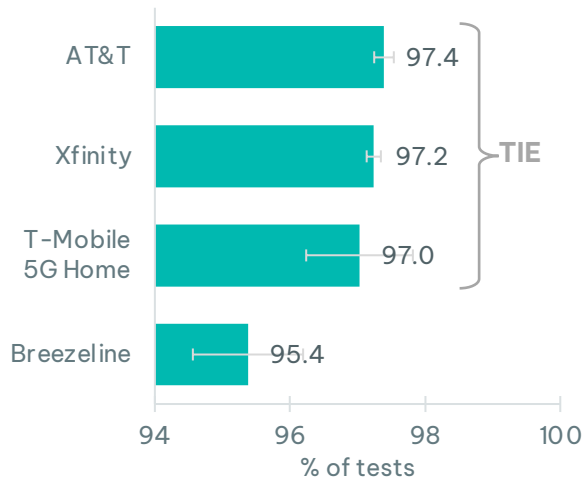
It was Frontier that observed the fastest Broadband Upload Speed, clocking in at 61 Mbps. Frontier and T-Mobile 5G Home had higher scores than Cox and Spectrum in this metric.

T-Mobile 5G Home scores 102.4 Mbps in Broadband Download Speed, comfortably beating established provider AT&T's score of 67.7 Mbps. T-Mobile also outperformed Verizon 5G Home, by 24.1%.

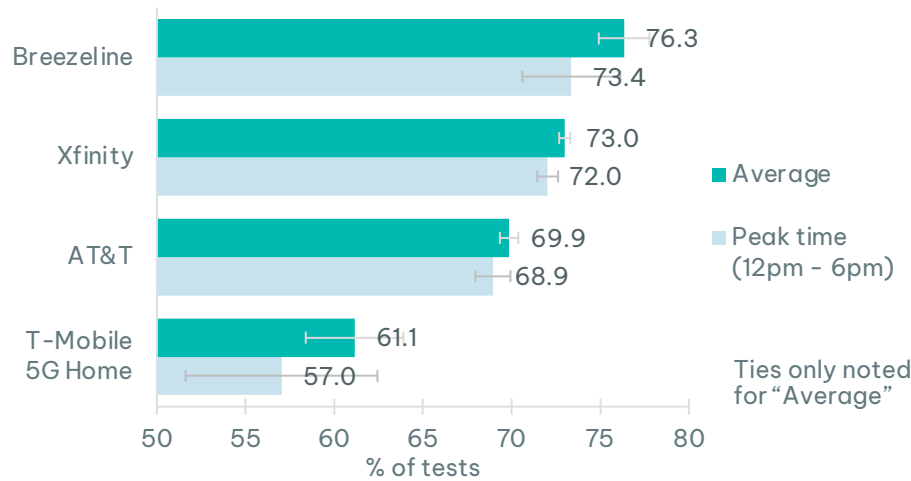
Cox takes the top spot in Broadband Video Experience in Los Angeles with a score of 75.3 and was the only providers in the city area to place in the Excellent (75 or above) category.

Broadband Experience: Miami-Fort Lauderdale-Pompano Beach, FL

Broadband Success Rate

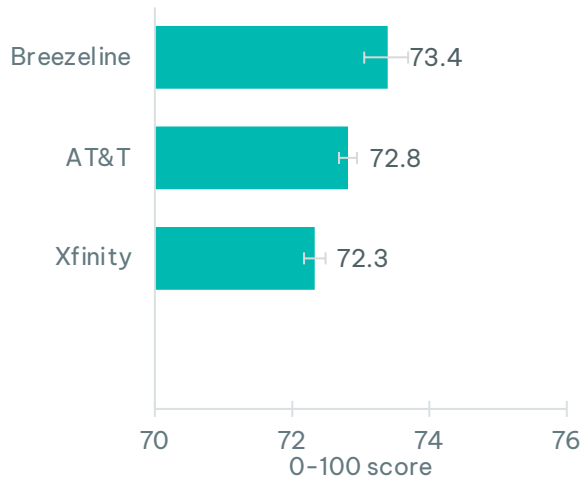


Broadband Consistent Quality

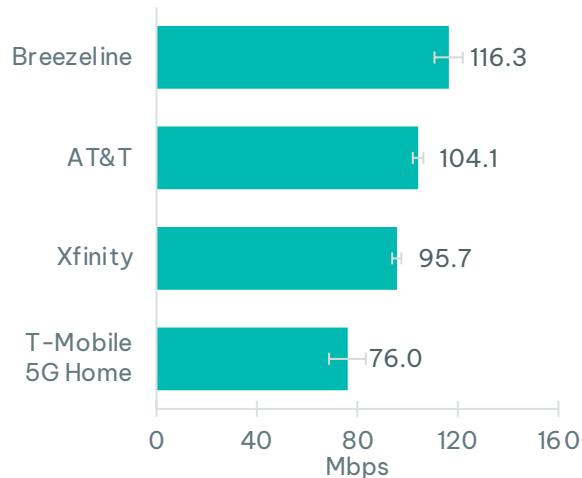


Broadband provider	MSA covered (%)	Tests from fiber-capable areas (%)
AT&T	99.8%	54.7%
Xfinity	93.3%	
T-Mobile 5G Home	26.2%	
Breezeline	9.2%	

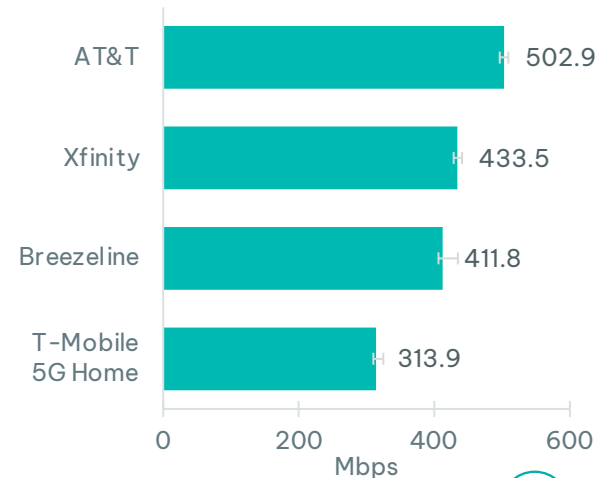
Broadband Video Experience



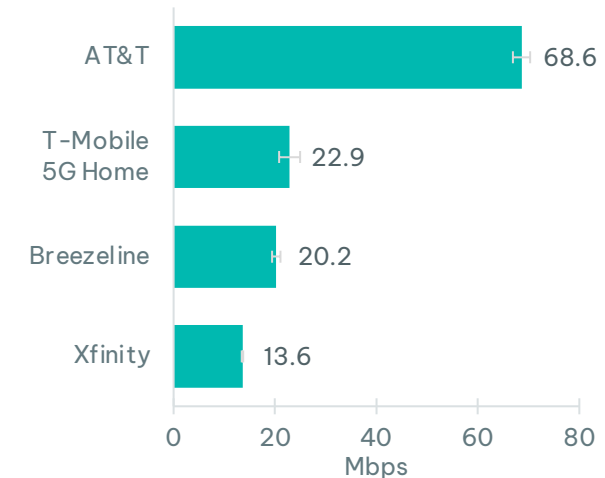
Broadband Download Speed



Broadband Peak Download Speed



Broadband Upload Speed



Broadband Experience: Miami-Fort Lauderdale-Pompano Beach, FL

Breezeline delivers the best experience in greater Miami - Fort Lauderdale across three categories: Broadband Video Experience, Broadband Download Speed and average Broadband Consistent Quality.

Breezeline users enjoyed the fastest Broadband Download Speed in the city area, clocking in at 116.3 Mbps – 11.7% faster than what AT&T users experienced and 21.6% faster than Xfinity customers.

In Broadband Consistent Quality, Xfinity beats both AT&T and T-Mobile 5G Home.

There was no statistical difference in peak time Broadband Consistent Quality between Breezeline and Xfinity, as both providers scored the highest in Miami, with scores of 72-73.4%.

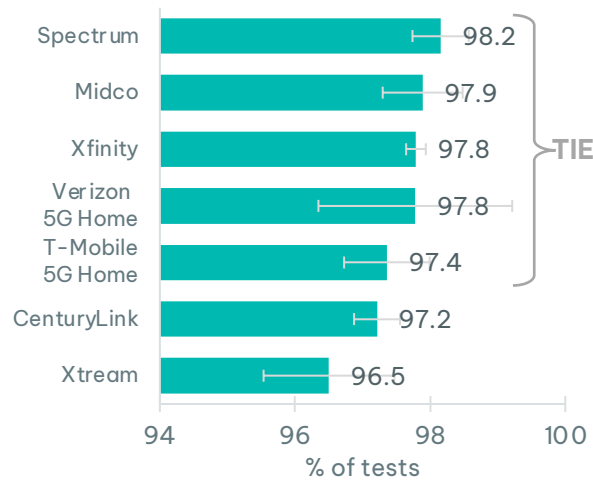
AT&T leads in two speed categories – Broadband Peak Download Speed and Broadband Upload Speed – while it also came second in the third speed metric, Broadband Download Speed. In all of these metrics, AT&T outperformed Xfinity.

AT&T, Xfinity and T-Mobile 5G Home were all in a statistical tie for Broadband Success Rate, with scores of 97-97.4%.

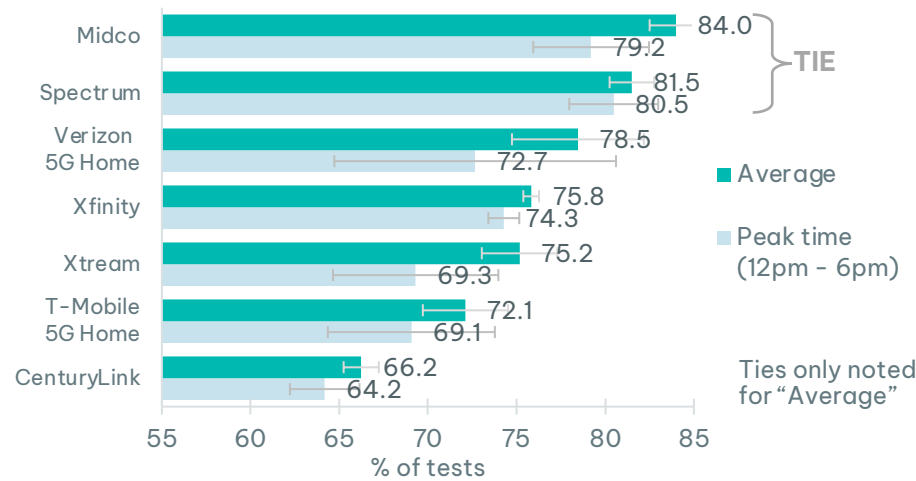
T-Mobile 5G Home comes last, significantly lagging behind Breezeline, Xfinity and AT&T for average and peak time Broadband Consistent Quality, Broadband Download Speed and Broadband Peak Download Speed.

Broadband Experience: Minneapolis-St. Paul-Bloomington, MN-WI

Broadband Success Rate

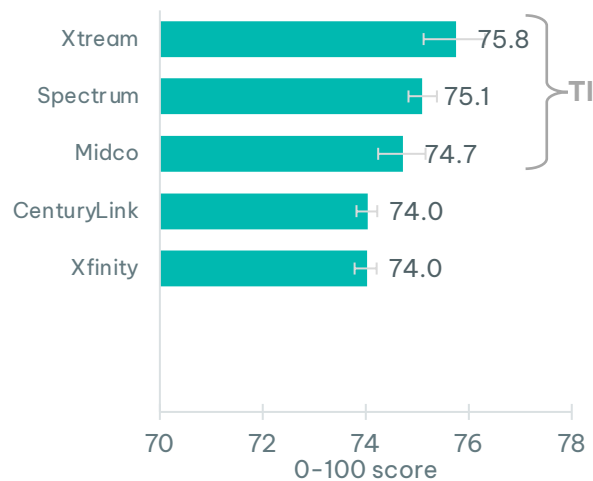


Broadband Consistent Quality

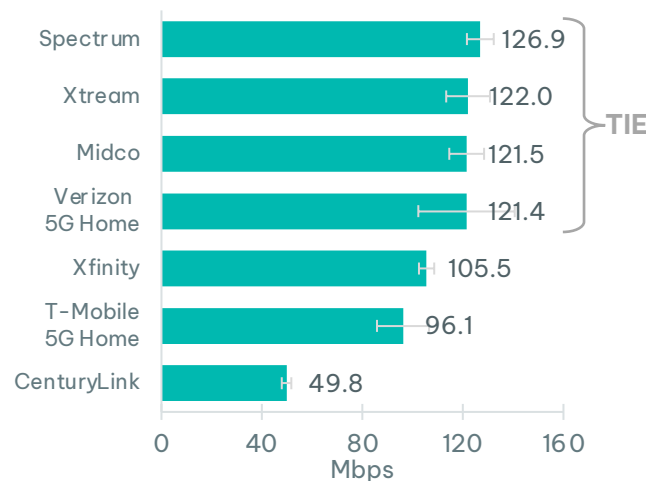


Broadband provider	MSA covered (%)	Tests from fiber-capable areas (%)
CenturyLink	83.3%	46.4%
Xfinity	75.0%	
T-Mobile 5G Home	38.1%	
Verizon 5G Home	29.5%	
Spectrum	8.8%	
Xtream	7.5%	
Midco	5.2%	

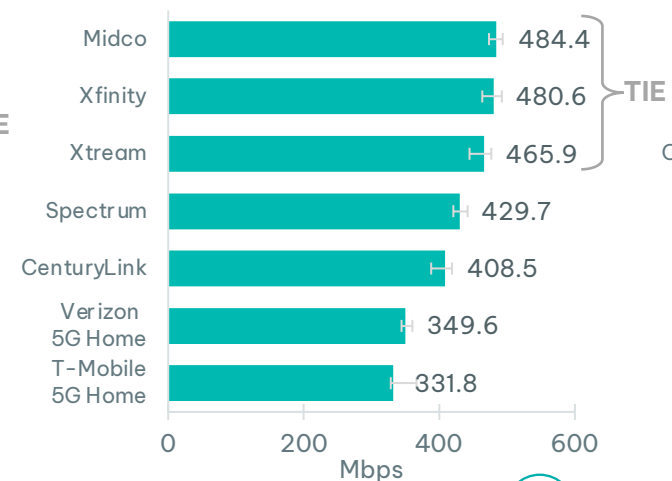
Broadband Video Experience



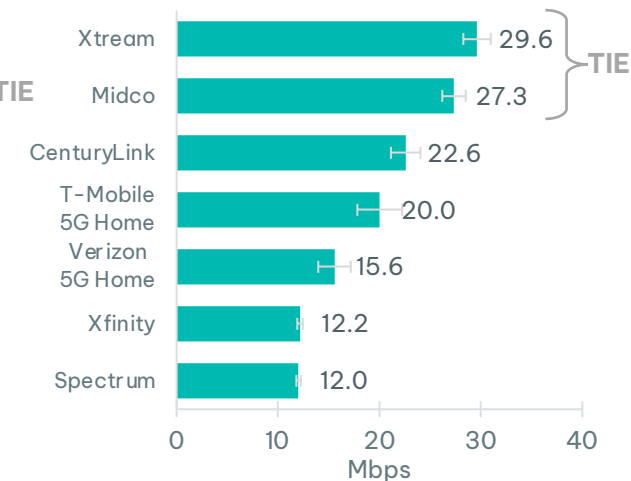
Broadband Download Speed



Broadband Peak Download Speed



Broadband Upload Speed



Broadband Experience: Minneapolis–St. Paul–Bloomington, MN–WI

Regional cable provider Midco tied for the highest scores in all six categories, followed by Spectrum and Xstream (Mediacom) which each had the highest joint scores in four categories.

Looking at the Minneapolis market overall, all cable providers outperform CenturyLink for Broadband Download Speed, Broadband Peak Download Speed and average Broadband Consistent Quality.

Xstream beat CenturyLink for average Broadband Consistent Quality, Broadband Video Experience and Broadband Upload Speed.

Midco, Spectrum and Xstream users enjoyed the best Broadband Video Experience in the city.

Looking at the players with the greatest coverage in the market, Xfinity outperforms CenturyLink on Broadband Download Speed, Peak Download Speed and Broadband Consistent Quality.

Spectrum, Xstream, Midco and Verizon 5G Home were statistically tied for the fastest average Broadband Download Speed in the city area, exceeding 120 Mbps. In this category, T-Mobile 5G home outperformed CenturyLink with speeds that were nearly twice as fast.

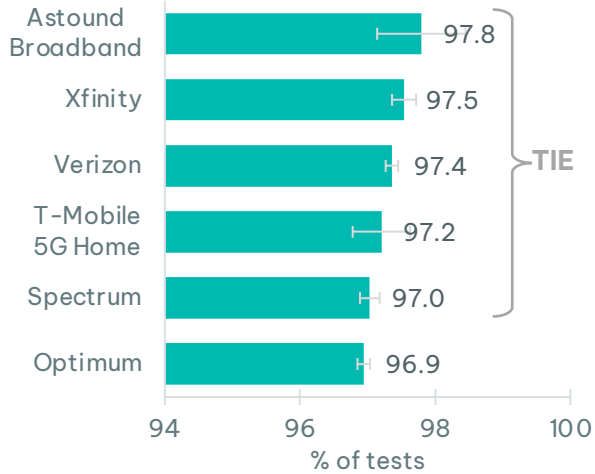
Xstream and Midco are in a statistical tie for Broadband Upload Speed Experience, with scores of 27.3–29.6 Mbps. In Broadband Peak Download Speed, they are both joined by Xfinity.

Midco and Spectrum outperformed other providers for average Broadband Consistent Quality. T-Mobile 5G Home and Xstream both beat CenturyLink in this metric, while Xfinity had a higher score than T-Mobile 5G Home. All providers except for Midco and Xfinity saw no statistically significant difference between their average and peak time scores in Broadband Consistent Quality.

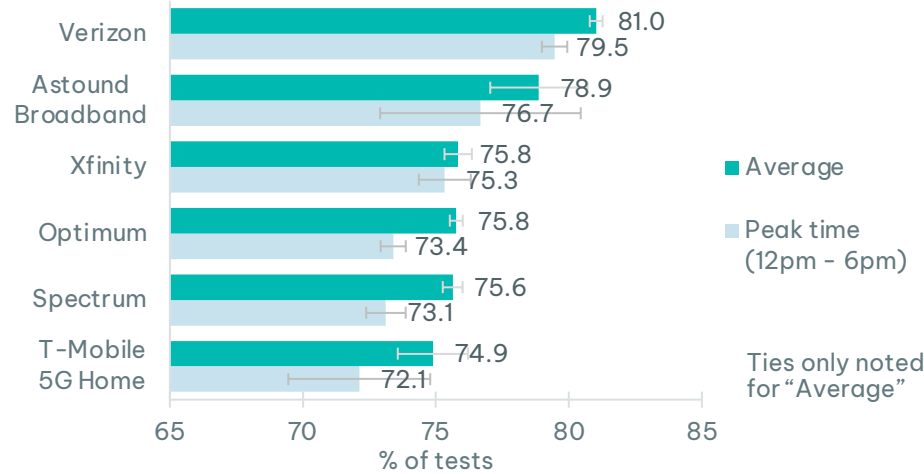
Verizon 5G Home outperforms T-Mobile 5G home for Broadband Download Speed, Peak Broadband Download Speed and average Broadband Consistent Quality.

Broadband Experience: New York-Newark-Jersey City, NY-NJ-PA

Broadband Success Rate

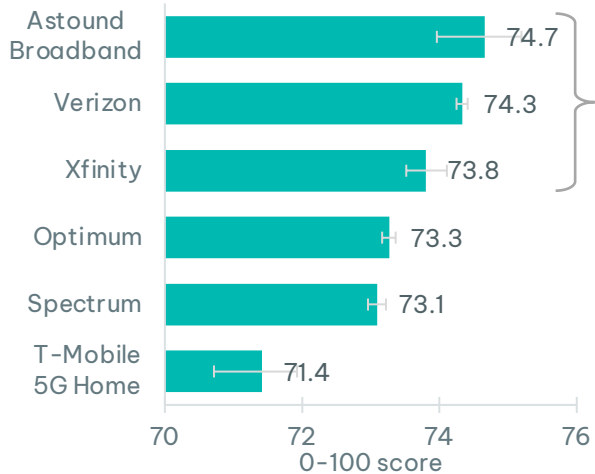


Broadband Consistent Quality

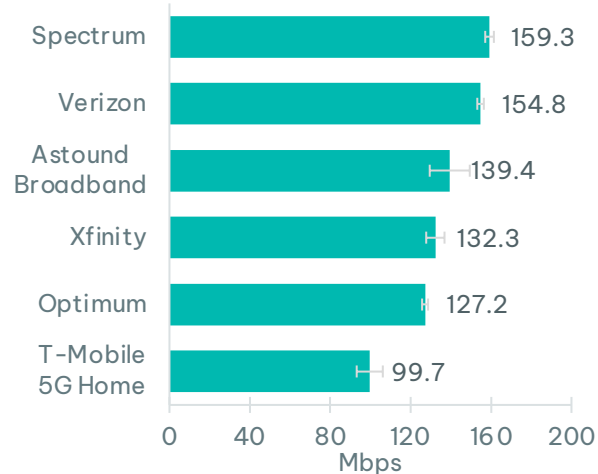


Broadband provider	MSA covered (%)	Tests from fiber-capable areas (%)
Verizon	98.7%	95.7%
Optimum	59.1%	
T-Mobile 5G Home	33.0%	
Spectrum	30.2%	
Xfinity	16.1%	
Astound Broadband	9.0%	

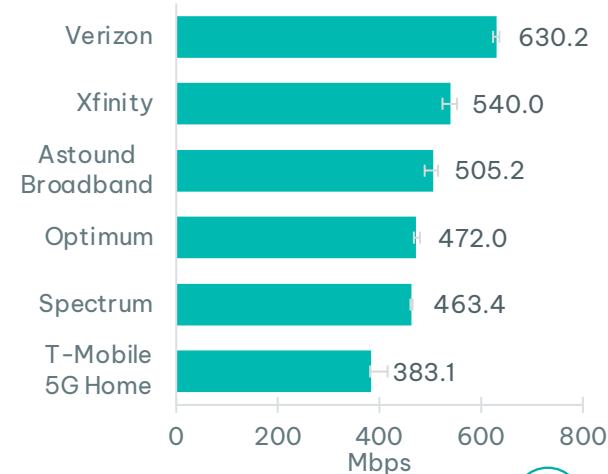
Broadband Video Experience



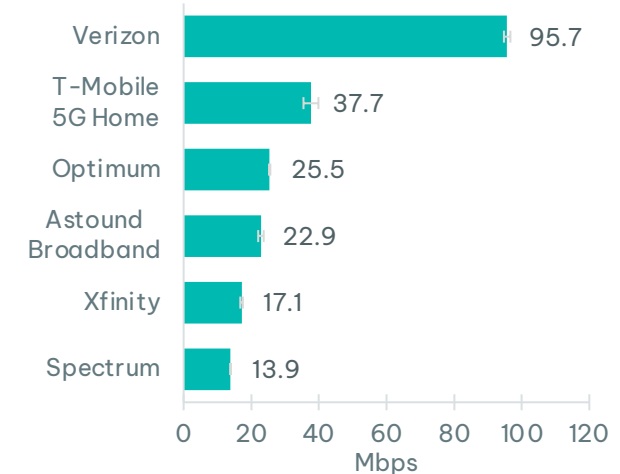
Broadband Download Speed



Broadband Peak Download Speed



Broadband Upload Speed



Broadband Experience: New York–Newark–Jersey City, NY–NJ–PA

Verizon had the highest scores in three categories – Broadband Peak Download Speed, Broadband Upload Speed and average Broadband Consistent Quality. On top of this, it had the joint highest scores in Broadband Success Rate and Broadband Video Experience.

Verizon outperforms Optimum, Xfinity and Spectrum for average Broadband Consistent Quality, Broadband Peak Download Speed and Broadband Upload Speed.

Astound beat Spectrum for average Broadband Consistent Quality and Broadband Upload Speed. Meanwhile, Optimum outperformed T-Mobile 5G Home Broadband at Broadband Video Experience, Broadband Download Speed and Broadband Peak Download Speed.

Astound Broadband and Xfinity were among the providers with the joint highest scores for Broadband Video Experience and Broadband Success Rate. They also ranked second in two categories separately – Astound Broadband for average Broadband Consistent Quality and Xfinity for Broadband Peak Download Speed.

In Broadband Upload Speed, Verizon's score of 95.7 Mbps was more than 2.5 times higher than second-placed T-Mobile of 37.7 Mbps. However, T-Mobile 5G Home beat all of the cable providers – Optimum, Spectrum and Xfinity.

Spectrum users enjoyed the fastest Broadband Download Speed, with a score of 159.3 Mbps – 4.5 Mbps ahead of second-placed Verizon.

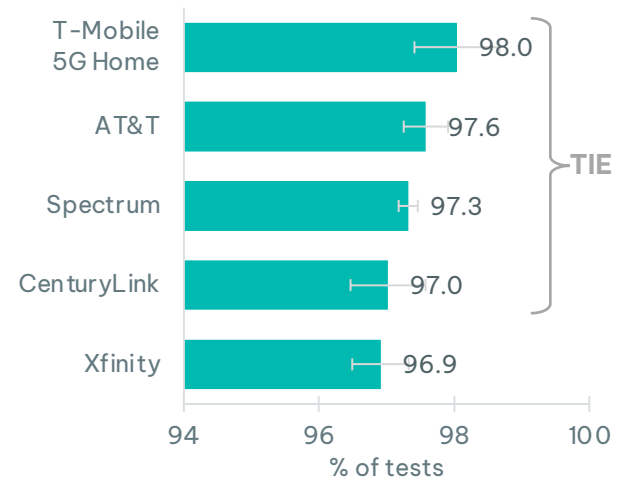
Verizon crossed the 600 Mbps mark in Broadband Peak Download Speed, while Xfinity and Astound Broadband both achieved scores exceeding 500 Mbps.

Except for Optimum, there was no statistical difference between all the providers for Broadband Success Rate.

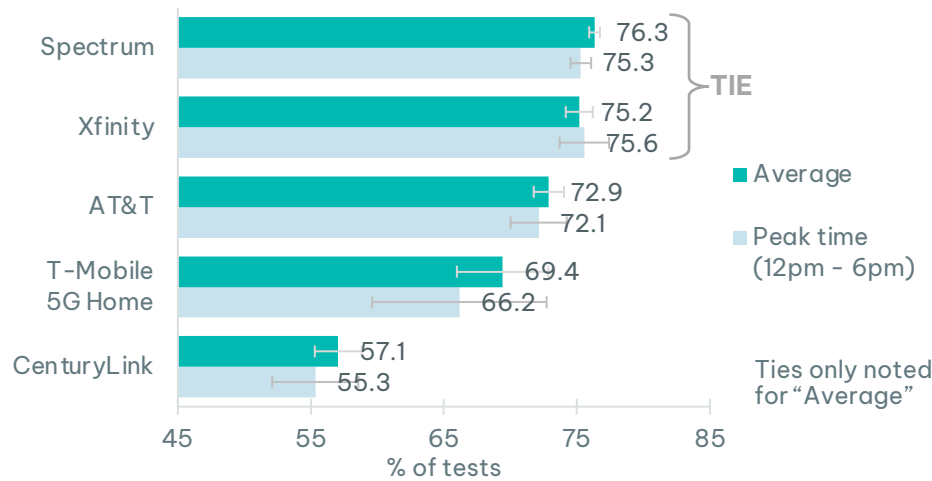
Astound Broadband, Verizon and Xfinity jointly had the highest Broadband Video Experience, ahead of the other providers.

Broadband Experience: Orlando-Kissimmee-Sanford, FL

Broadband Success Rate

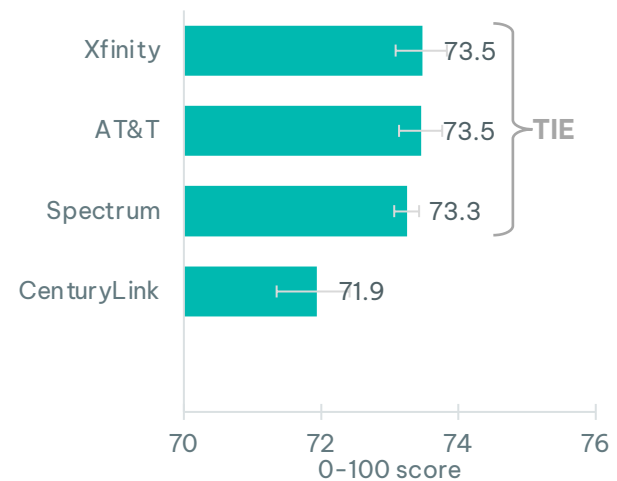


Broadband Consistent Quality

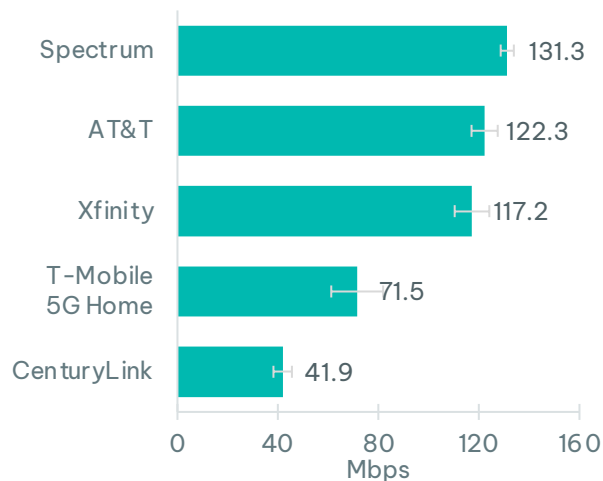


Broadband provider	MSA covered (%)	Tests from fiber-capable areas (%)
Spectrum	89.9%	
CenturyLink	56.3%	32.5%
AT&T	46.1%	57.7%
T-Mobile 5G Home	34.8%	
Xfinity	29.3%	

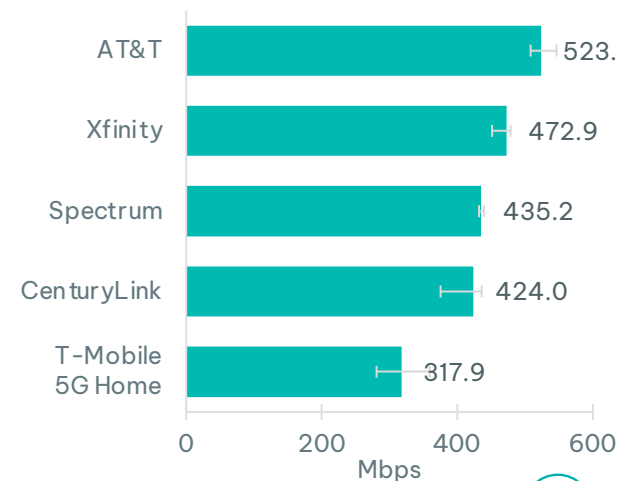
Broadband Video Experience



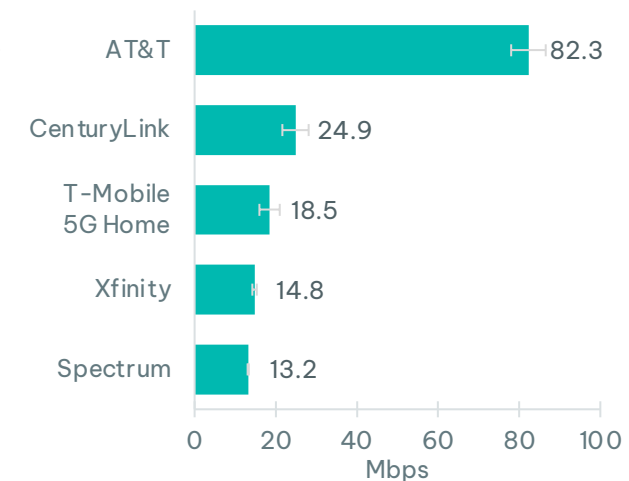
Broadband Download Speed



Broadband Peak Download Speed



Broadband Upload Speed



Broadband Experience: Orlando-Kissimmee-Sanford, FL

Spectrum tops the Broadband Download Speed category, scoring 131.3 Mbps – over three times faster than primary competitor CenturyLink and 9-14 Mbps faster than AT&T and Xfinity. Xfinity significantly outperforms CenturyLink, while being statistically tied with AT&T. Spectrum, AT&T and Xfinity all outperform newcomer T-Mobile 5G Home.

AT&T users enjoyed the fastest Broadband Upload Speed, with a score of 82.3 Mbps – more than three times higher than second-placed CenturyLink's score. However, CenturyLink outperformed T-Mobile 5G Home, Xfinity and Spectrum in this metric.

AT&T was the only broadband provider to exceed 500 Mbps in Broadband Peak Download Speed.

T-Mobile 5G home beat CenturyLink for Broadband Download Speed and for both average and peak time Broadband Consistent Quality.

Spectrum and Xfinity jointly place first for average Broadband Consistent Quality, with scores of 75.2-76.3%. Spectrum outperformed AT&T and CenturyLink in this metric.

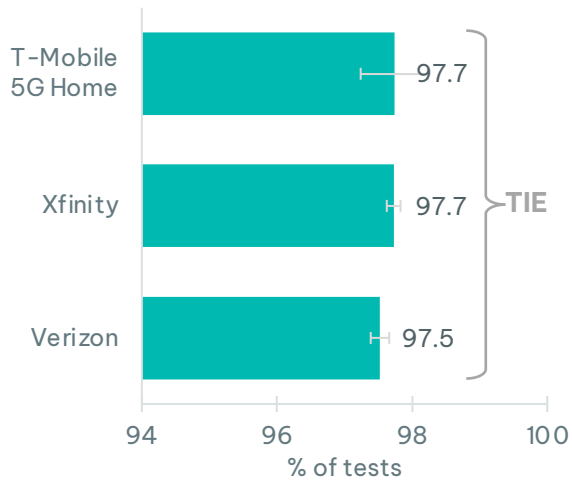
T-Mobile 5G Home, AT&T, Spectrum and CenturyLink were statistically tied for Broadband Success Rate with scores of 97-98%.

Xfinity, AT&T and Spectrum share the top spot for Broadband Video Experience with scores of 73.3-73.5 points on a 100 point scale.

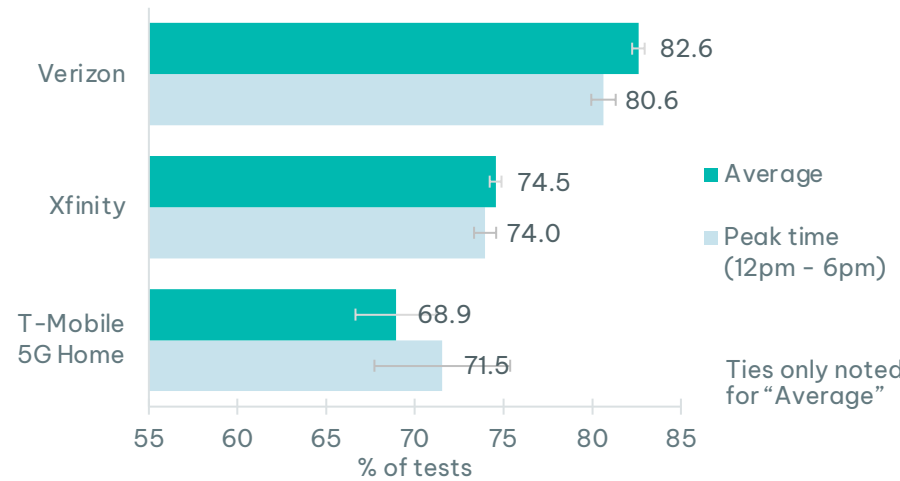
There was no statistically significant difference between providers' average and peak time scores in Broadband Consistent Quality.

Broadband Experience: Philadelphia-Camden-Wilmington, PA-NJ-DE-MD

Broadband Success Rate

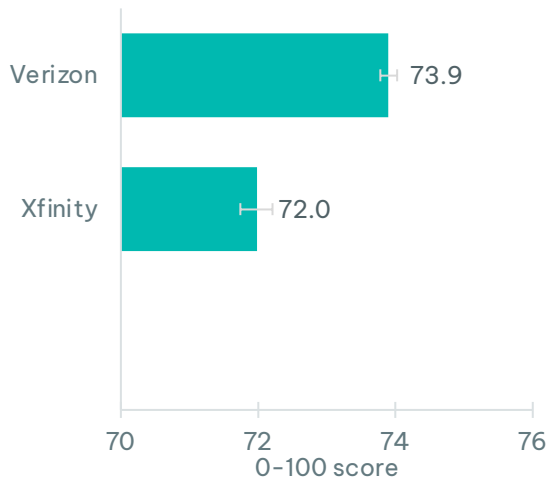


Broadband Consistent Quality

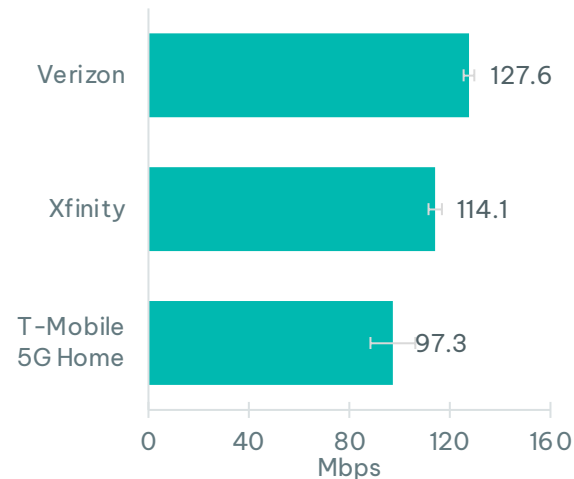


Broadband provider	MSA covered (%)	Tests from fiber-capable areas (%)
Verizon	99.3%	96.3%
Xfinity	97.0%	
T-Mobile 5G Home	22.7%	

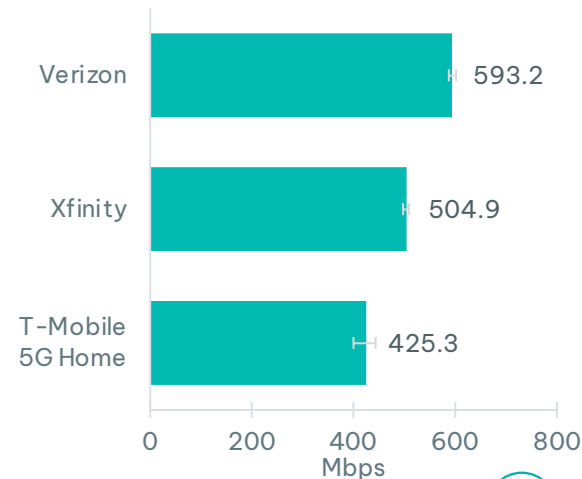
Broadband Video Experience



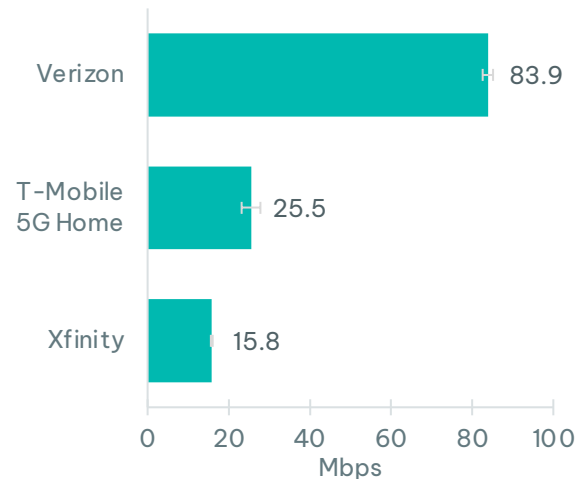
Broadband Download Speed



Broadband Peak Download Speed



Broadband Upload Speed



Broadband Experience: Philadelphia-Camden-Wilmington, PA-NJ-DE-MD

Verizon had the highest or joint highest scores in all metrics in the city. It achieved the highest scores in five categories and was statistically tied with both its competitors – T-Mobile 5G Home and Xfinity – for Broadband Success Rate.

Opensignal users saw the fastest broadband speeds in Philadelphia-Camden-Wilmington on Verizon's network. The provider's Broadband Download Speed was 11.8% faster than Xfinity's and 31.1% faster than T-Mobile 5G Home's.

In Broadband Upload Speed, relative differences between Verizon and others were even wider. Verizon users enjoyed average broadband upload speeds clocking in at 83.9 Mbps – 3.3 times faster than T-Mobile 5G Home users and 5.3 times faster than Xfinity users.

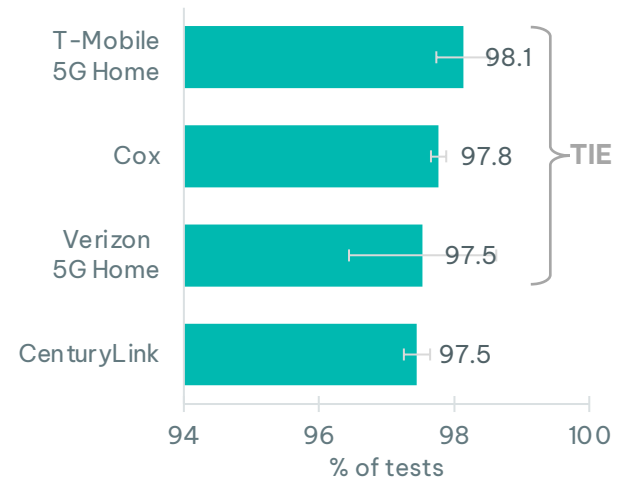
Verizon beat Xfinity for Broadband Video Experience, commanding a lead of 1.9 points.

Xfinity outperformed T-Mobile 5G Home in three metrics – average Broadband Consistent Quality, Broadband Download Speed and Broadband Peak Download Speed. However, T-Mobile 5G Home beat Xfinity in Broadband Upload Speed.

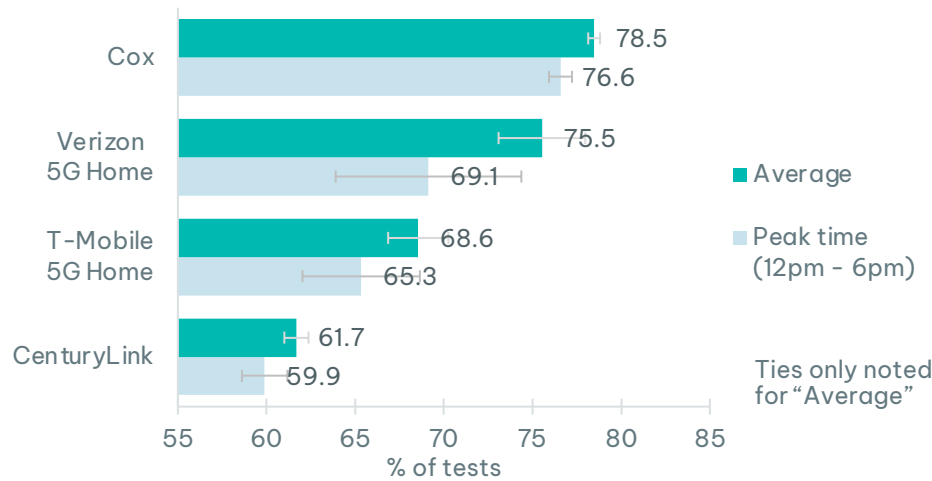
Verizon had the highest average and peak time scores for Broadband Consistent Quality. Our Xfinity and T-Mobile 5G Home users did not observe any statistically significant differences between their average and peak time scores for Broadband Consistent Quality.

Broadband Experience: Phoenix-Mesa-Chandler, AZ

Broadband Success Rate

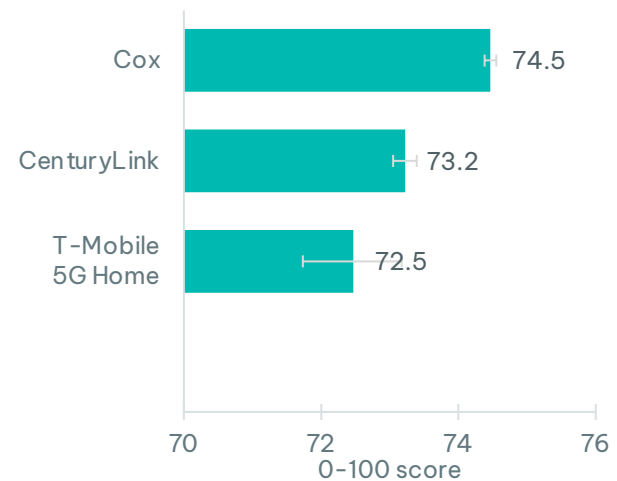


Broadband Consistent Quality

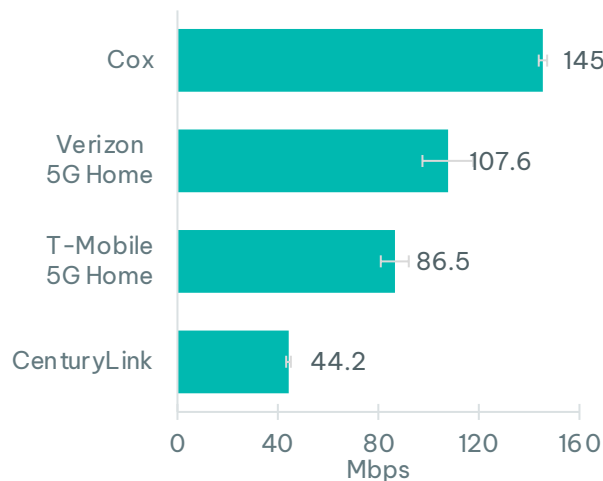


Broadband provider	MSA covered (%)	Tests from fiber-capable areas (%)
CenturyLink	99.5%	38.4%
Cox	92.3%	
T-Mobile 5G Home	36.6%	
Verizon 5G Home	27.0%	

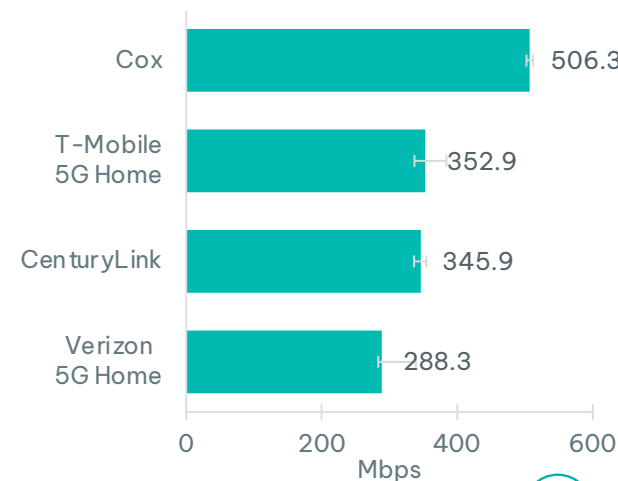
Broadband Video Experience



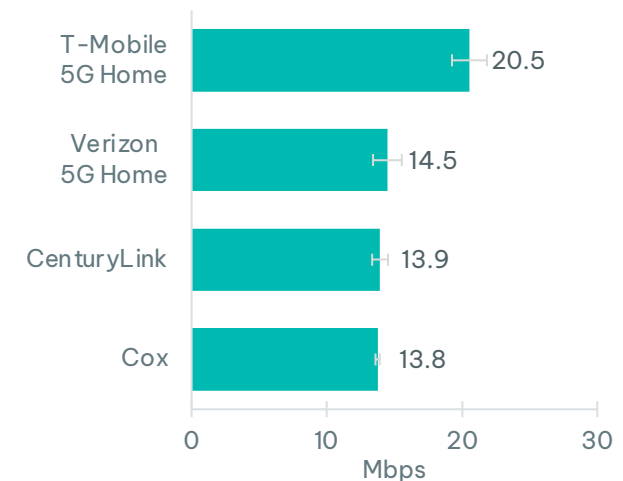
Broadband Download Speed



Broadband Peak Download Speed



Broadband Upload Speed



Broadband Experience: Phoenix-Mesa-Chandler, AZ

Cox is top in four Broadband Experience categories and joint top in a fifth. No other provider is close to Cox's experience in Phoenix-Mesa-Chandler.

Cox users reported the highest score for Broadband Consistent Quality – when looking at our users' measurements during the entire day period, as well as over the peak hours of the day (12pm-6pm).

Cox has the highest score for both average and peak time Broadband Consistent Quality, our Cox users observed the best Broadband Video Experience, the highest Broadband Download Speed, and the highest Broadband Peak Download Speed.

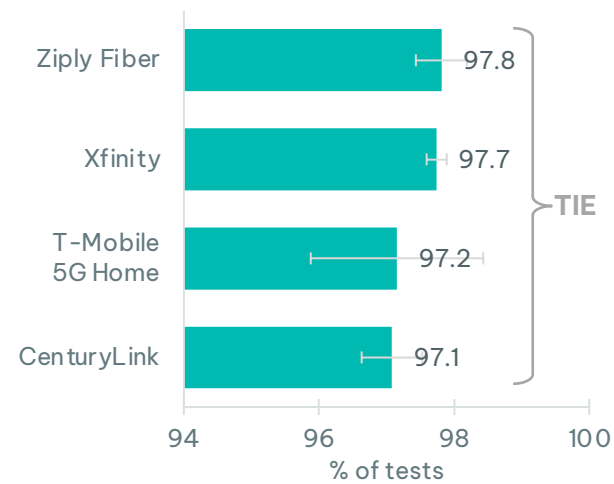
Where available, T-Mobile 5G Home and Verizon 5G Home present strong alternatives to CenturyLink, besting the telco provider on four metrics: Broadband Success Rate, Broadband Consistent Quality, Broadband Download Speed and Broadband Upload Speed.

T-Mobile 5G Home users recorded the highest score for average Broadband Upload Speed – the provider beat Verizon 5G Home in this category, among other ISPs.

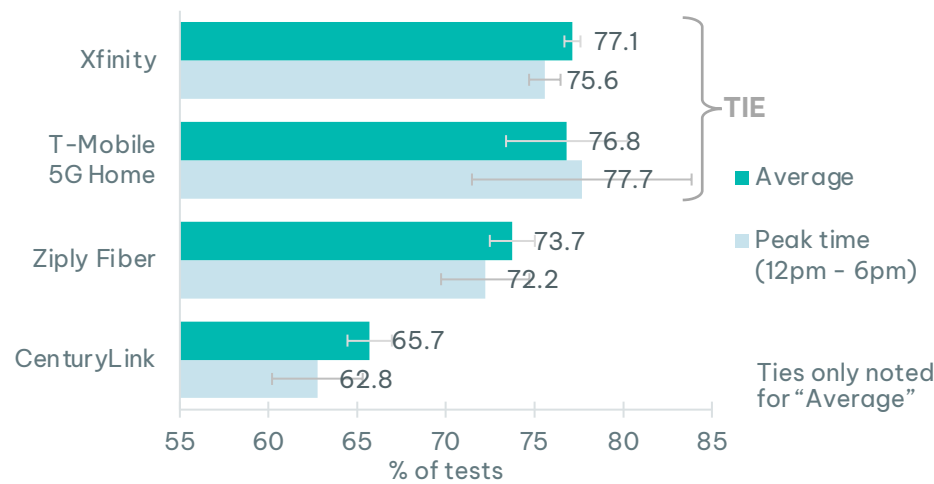
Verizon 5G Home scores higher than T-Mobile 5G Home on average Broadband Consistent Quality. Both Verizon and T-Mobile beat CenturyLink.

Broadband Experience: Portland-Vancouver-Hillsboro, OR-WA

Broadband Success Rate

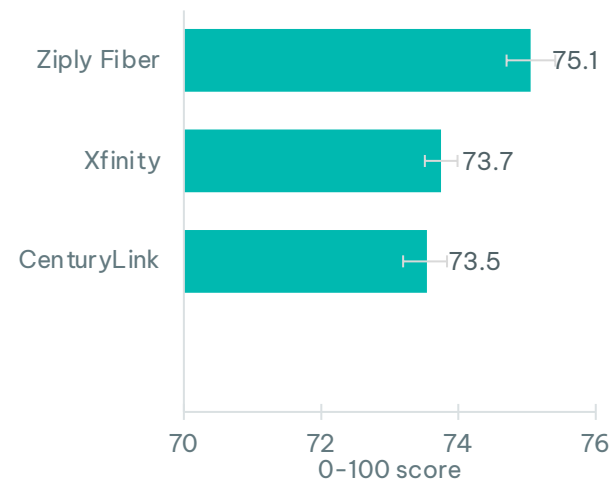


Broadband Consistent Quality

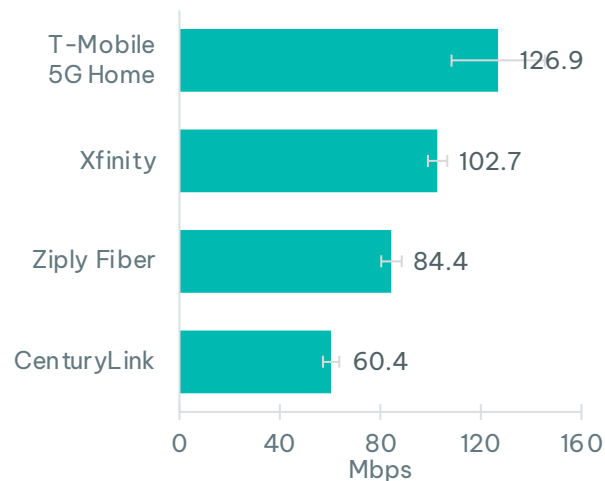


Broadband provider	MSA covered (%)	Tests from fiber-capable areas (%)
Xfinity	91.7%	
CenturyLink	60.7%	71.2%
Ziply Fiber	37.4%	88.4%
T-Mobile 5G Home	23.3%	

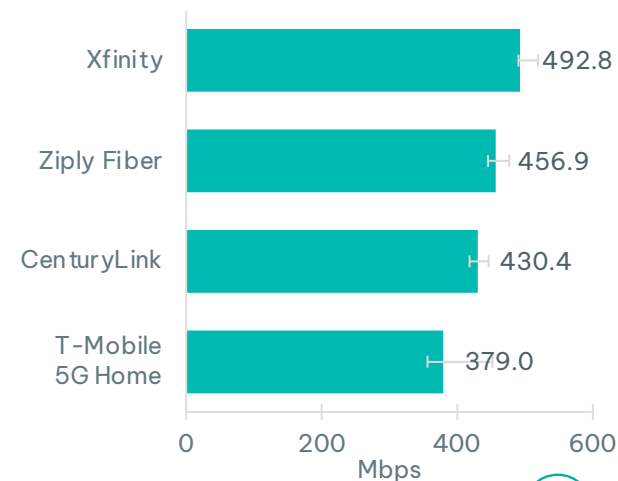
Broadband Video Experience



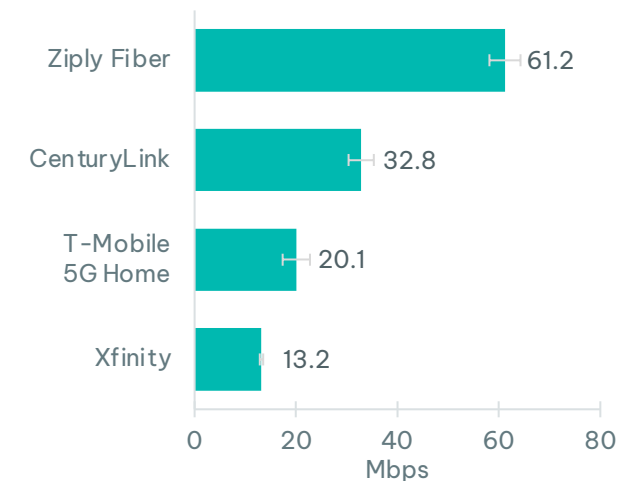
Broadband Download Speed



Broadband Peak Download Speed



Broadband Upload Speed



Broadband Experience: Portland–Vancouver–Hillsboro, OR–WA

T-Mobile 5G Home users recorded the highest average Broadband Download Speed – besting all three wired incumbents.

Ziplay Fiber had the best Broadband Video Experience in Portland, placing in the Excellent (75 or above) category, while its competitors rated as Very Good (65–75).

Our users in Portland saw the fastest average Broadband Upload Speed on Ziplay Fiber’s network, clocking in at 61.2 Mbps – nearly twice as fast as second-placed CenturyLink. Xfinity lagged behind, with a score of 13.2 Mbps.

Xfinity beats competitor Ziplay Fiber for Broadband Download Speed, Broadband Peak Download Speed and average Broadband Consistent Quality.

Xfinity’s users had the highest Broadband Peak Download Speed – an impressive 492.8 Mbps.

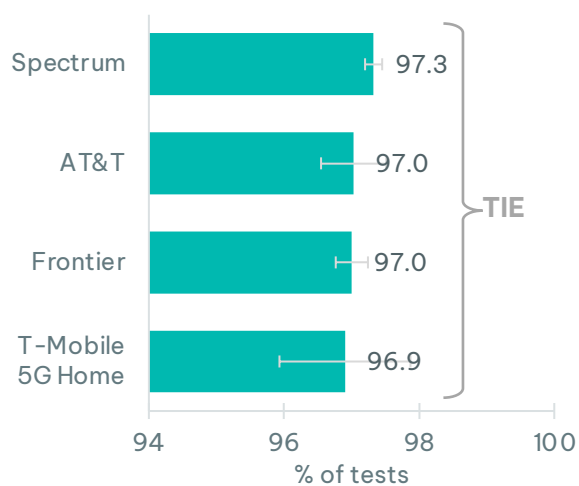
Xfinity and T-Mobile 5G Home’s fixed wireless have tied in average Broadband Consistent Quality, that tracks network sufficiency to support common applications’ requirements.

Over the peak hours (12pm – 6pm), Xfinity and T-Mobile were also in a statistical tie for Broadband Consistent Quality, Ziplay Fiber tied as well.

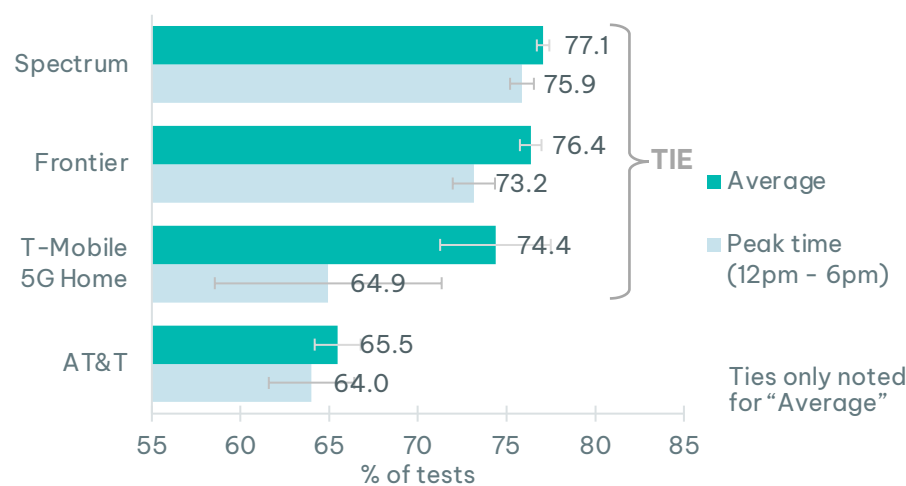
Xfinity tops competitor CenturyLink on Broadband Download Speed, Broadband Peak Download Speed and Broadband Consistent Quality, while they tie on Broadband Video Experience and Broadband Success Rate. Owing to the higher percentage of tests in fiber capable areas, CenturyLink users had significantly faster upload speeds.

Broadband Experience: Riverside-San Bernardino-Ontario, CA

Broadband Success Rate

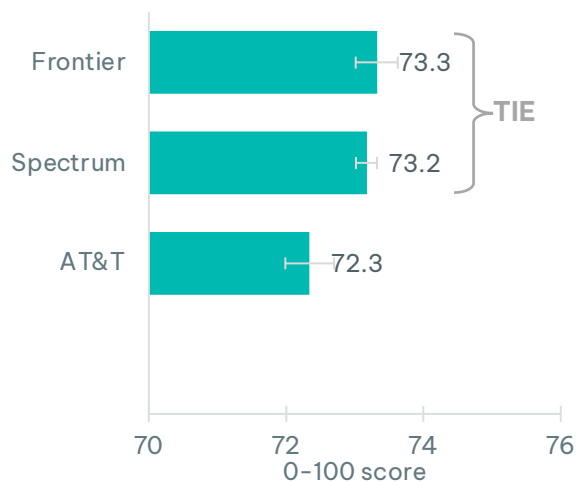


Broadband Consistent Quality

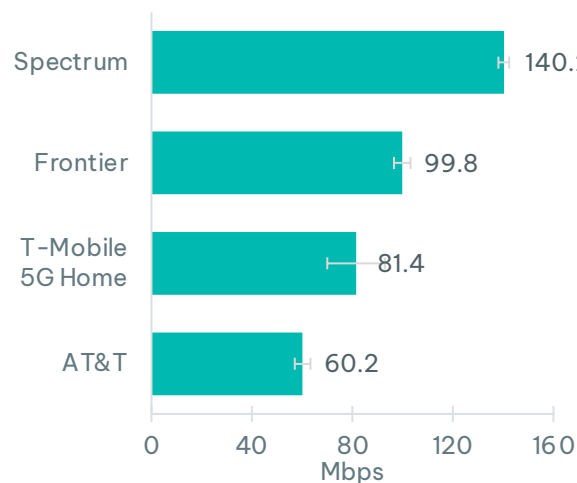


Broadband provider	MSA covered (%)	Tests from fiber-capable areas (%)
Spectrum	94.6%	
Frontier	77.1%	84.8%
AT&T	24.2%	35.6%
T-Mobile 5G Home	20.3%	

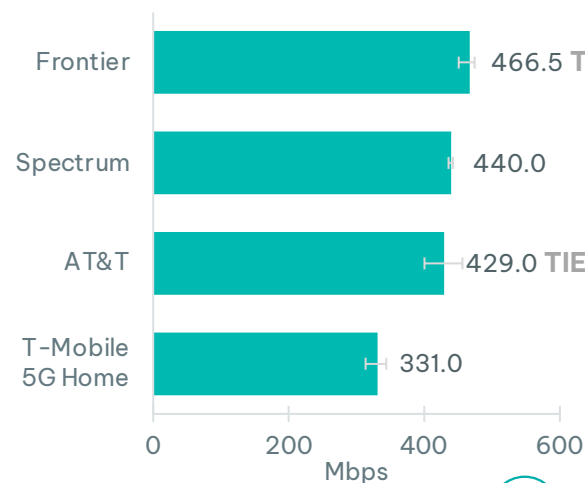
Broadband Video Experience



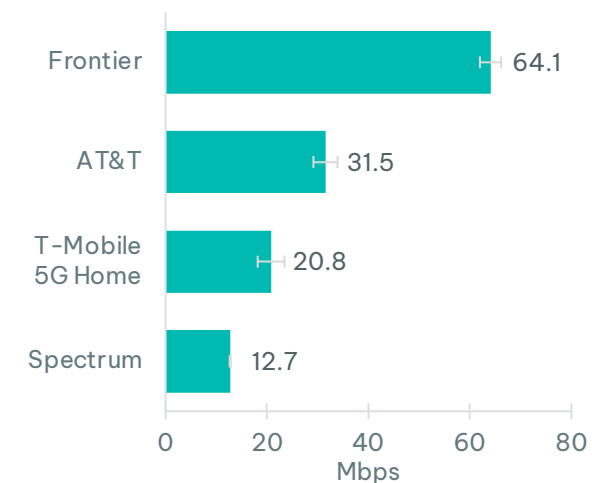
Broadband Download Speed



Broadband Peak Download Speed



Broadband Upload Speed



Broadband Experience: Riverside–San Bernardino–Ontario, CA

Comparing Spectrum to Frontier, our users saw faster download speeds on Spectrum and faster upload speeds with Frontier. The two providers had equivalent experiences on three metrics: Broadband Video Experience, average Broadband Consistent Quality and Broadband Success Rate.

Spectrum tops its other primary competitor in Riverside – AT&T – in all metrics except Broadband Upload Speed and they tied for our Broadband Success Rate measurement.

All providers were equally good on Broadband Success Rate. There was no statistically significant difference between measurements of Broadband Success Rate for providers in the area – the proportion of successfully completed tests.

Spectrum, Frontier, and T-Mobile 5G Home's fixed wireless access network all tied for average Broadband Consistent Quality, which tracks network sufficiency to support common applications' requirements.

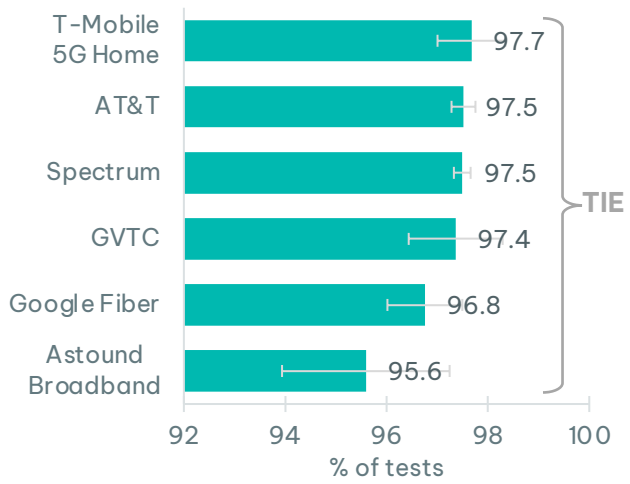
Spectrum leads on Broadband Consistent Quality during peak hours (12–6pm).

Spectrum had the highest Broadband Download Speed in Riverside, beating Frontier and AT&T by 40.5% and 133.1%, respectively.

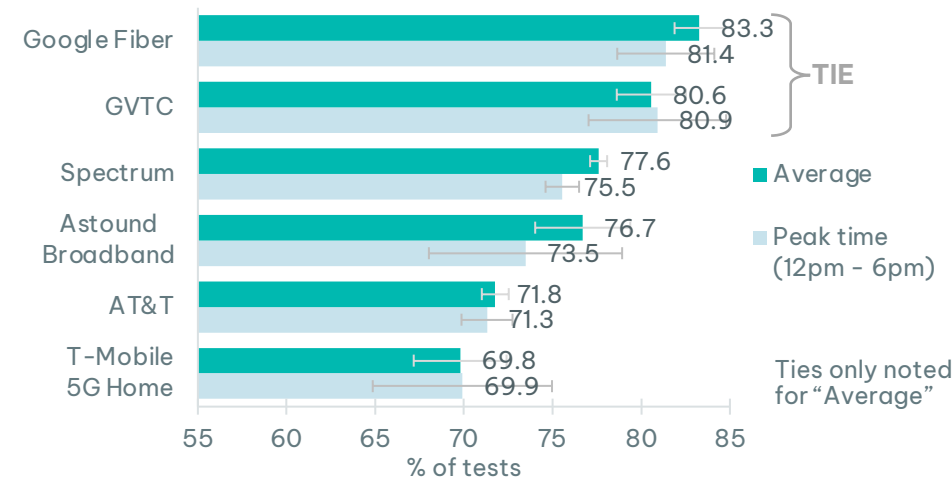
Our users on Frontier enjoyed the fastest average Broadband Upload Speed in the city, clocking in at 64.1 Mbps – more than twice as fast as second-placed AT&T. Frontier, AT&T and T-Mobile 5G Home all outperformed Spectrum in this metric, which lagged behind with a score of 12.7 Mbps.

Broadband Experience: San Antonio-New Braunfels, TX

Broadband Success Rate

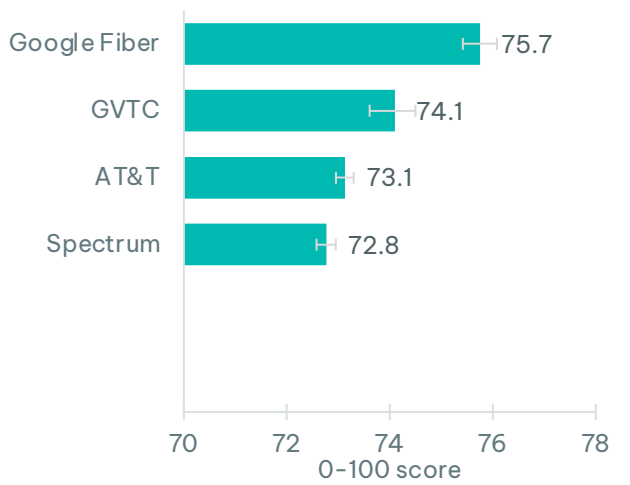


Broadband Consistent Quality

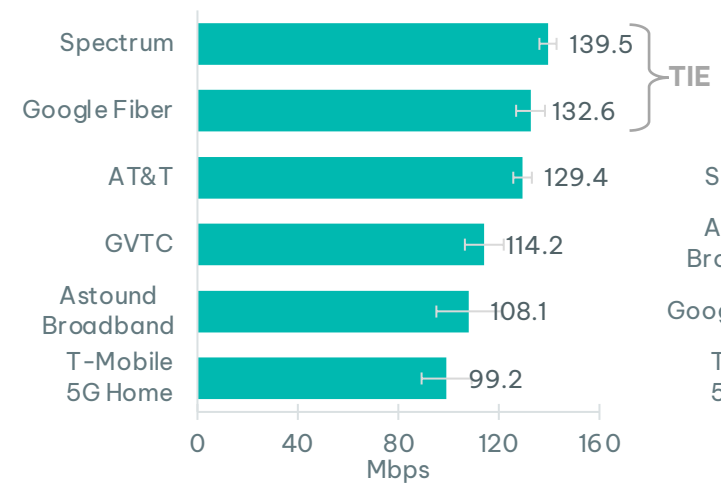


Broadband provider	MSA covered (%)	Tests from fiber-capable areas (%)
AT&T	91.2%	71.8%
Spectrum	88.6%	
T-Mobile 5G Home	42.3%	
Google Fiber	16.7%	100.0%
Astound Broadband	13.8%	
GVTC	7.8%	94.8%

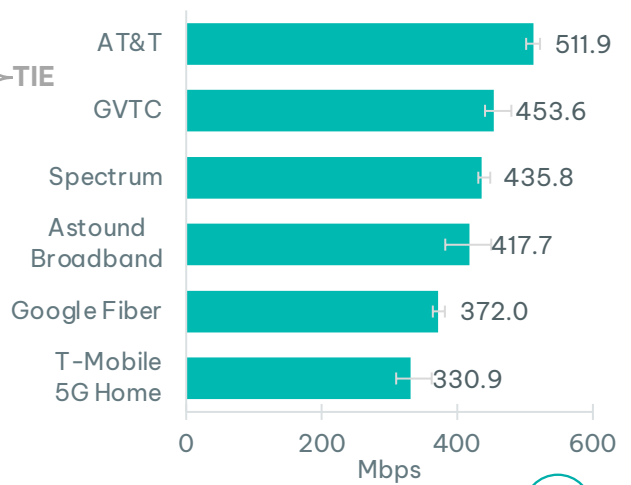
Broadband Video Experience



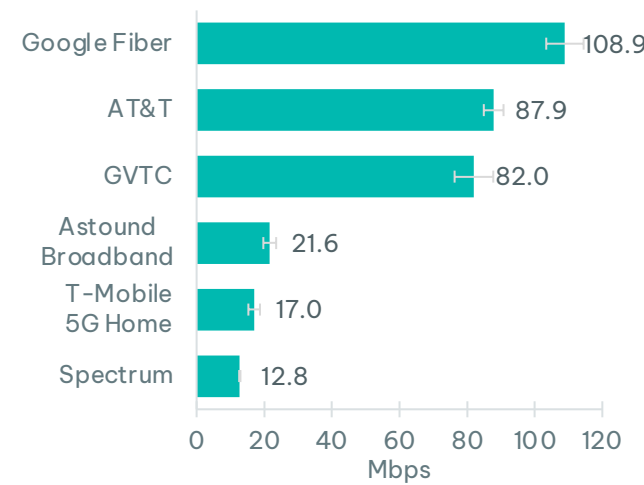
Broadband Download Speed



Broadband Peak Download Speed



Broadband Upload Speed



Broadband Experience: San Antonio–New Braunfels, TX

Google Fiber came top or tied for the lead in every category except Peak Download Speed – AT&T took the crown for that metric.

Google Fiber placed in the Excellent category (75 or above) for Broadband Video Experience, topping all other providers, including Spectrum. All providers bar Google Fiber placed in the Very Good (65–75) category.

With an average of 108.9 Mbps, the capability of Google Fiber’s full fiber footprint was reflected in Broadband Upload Speed results, both far surpassing those of the competition and being the fastest of the 25 markets we measured.

Google Fiber and GVTC tied for the top spot in the measure for average Broadband Consistent Quality, which tracks network sufficiency to support common applications’ requirements. Both operators scored higher than Spectrum – which outperformed AT&T by 5.8 percentage points.

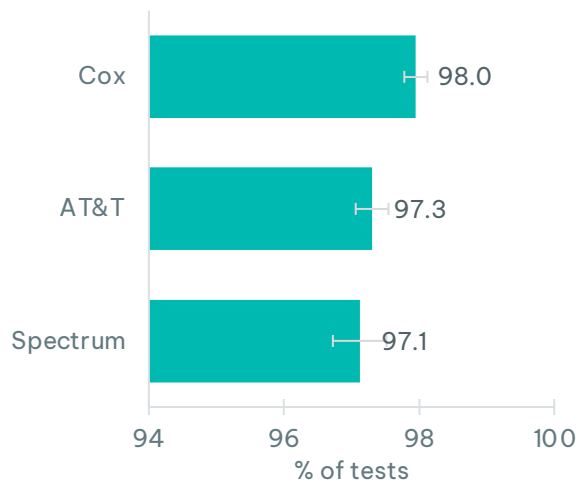
During peak hours (12pm–6pm), Astound, Google Fiber and GVTC tie for the highest Broadband Consistent Quality.

Both Spectrum and Google Fiber were in a statistical tie for Broadband Download Speed, with scores of 132.6–139.5 Mbps.

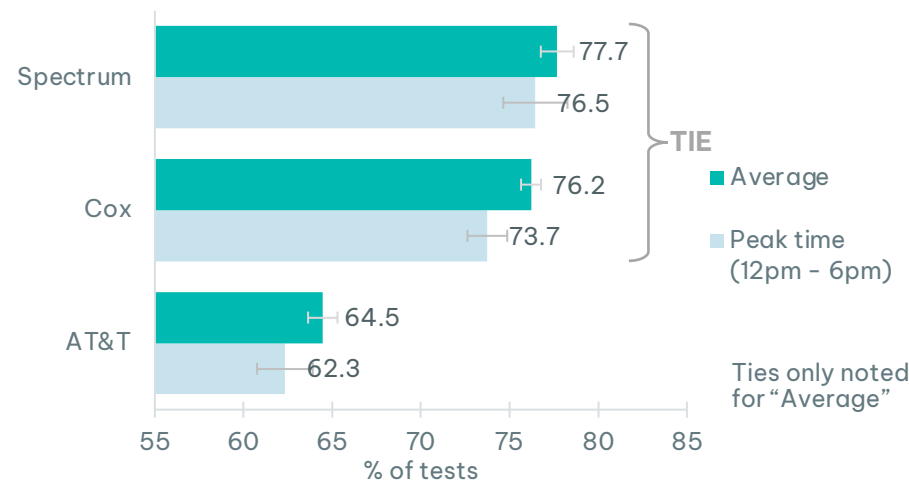
AT&T recorded the highest score for Broadband Peak Download Speed – the only provider to exceed the 500 Mbps mark this time around.

Broadband Experience: San Diego-Chula Vista-Carlsbad, CA

Broadband Success Rate

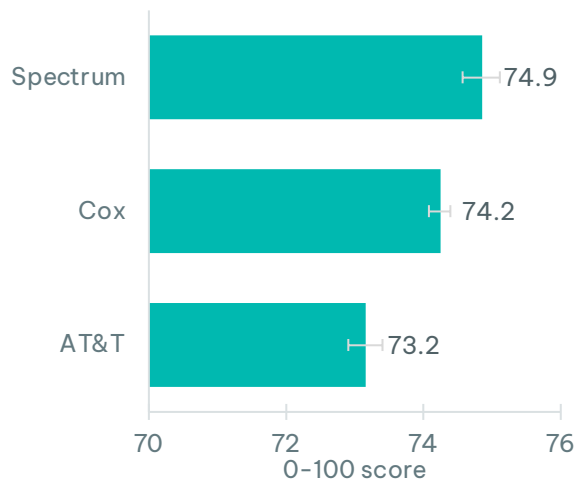


Broadband Consistent Quality

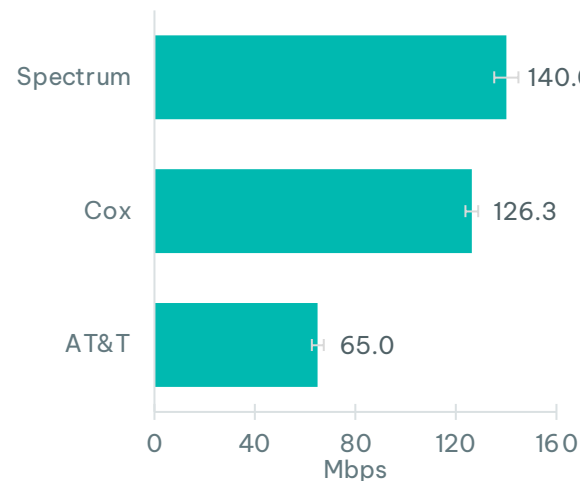


Broadband provider	MSA covered (%)	Tests from fiber-capable areas (%)
AT&T	100.0%	37.5%
Cox	69.0%	
Spectrum	33.9%	

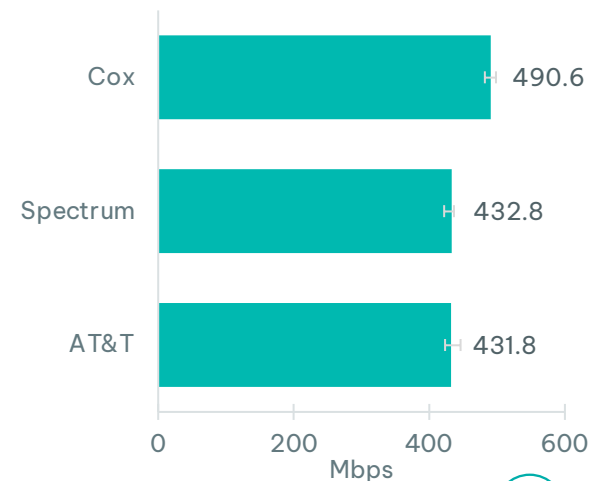
Broadband Video Experience



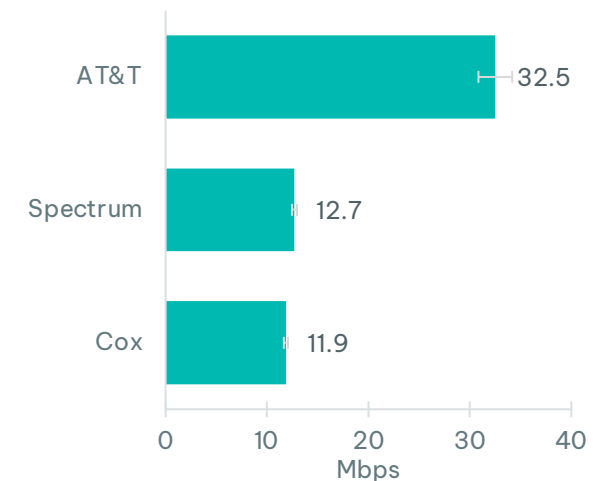
Broadband Download Speed



Broadband Peak Download Speed



Broadband Upload Speed



Broadband Experience: San Diego–Chula Vista–Carlsbad, CA

Cox beats competitor AT&T in five out of six metrics – Broadband Success Rate, average Broadband Consistent Quality, Broadband Video Experience, Broadband Download Speed and Broadband Peak Download Speed.

Spectrum outperforms AT&T for Broadband Video Experience, Broadband Download Speed and Broadband Consistent Quality. Also, Spectrum is in a statistical tie with AT&T for Broadband Peak Download Speed and Broadband Success Rate, while falling to AT&T for Broadband Upload Speed.

Cox had the highest proportion of successfully run tests in the area from our users – making it top for Broadband Success Rate.

AT&T leads in Broadband Upload Speed with a score of 32.5 Mbps and sizable leads over other providers – 2.6 faster than Spectrum and 2.7 faster than Cox.

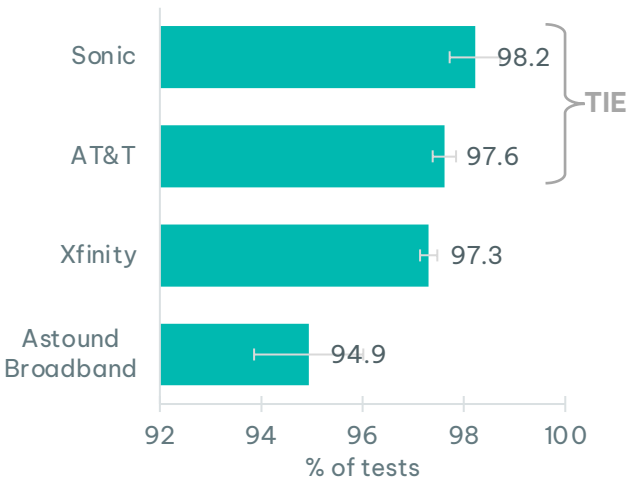
Our Spectrum users had the best available Broadband Video Experience, and the company had the highest score for Broadband Download Speed.

Cox achieved the highest Broadband Peak Download Speed score – 490.6 Mbps, 13.5% faster on average than Spectrum and AT&T which were in a statistical tie for second place.

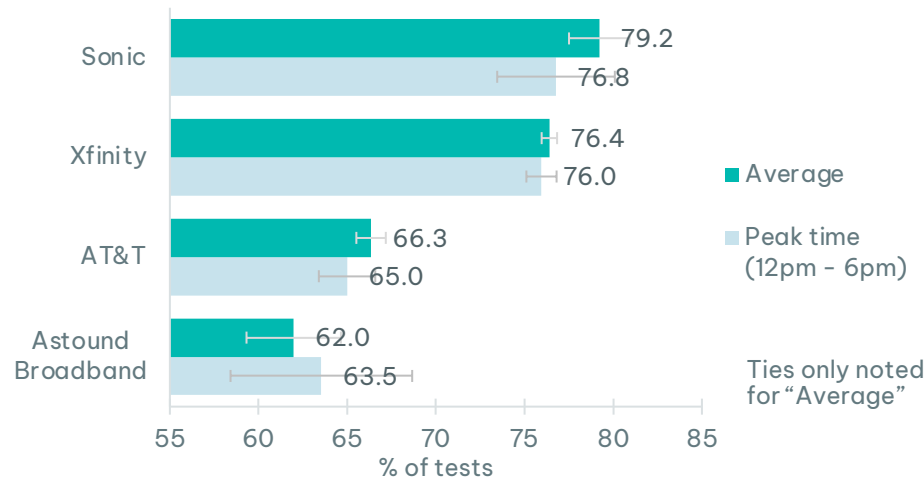
Spectrum and Cox users enjoyed far faster average broadband download speeds than AT&T users. Both saw speeds over the 100 Mbps mark – 140 Mbps and 126.3 Mbps respectively – compared with AT&T's score of 65 Mbps.

Broadband Experience: San Francisco-Oakland-Berkeley, CA

Broadband Success Rate

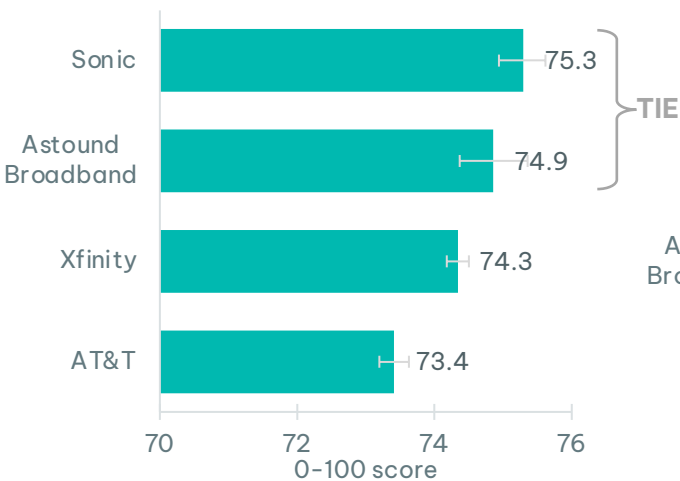


Broadband Consistent Quality

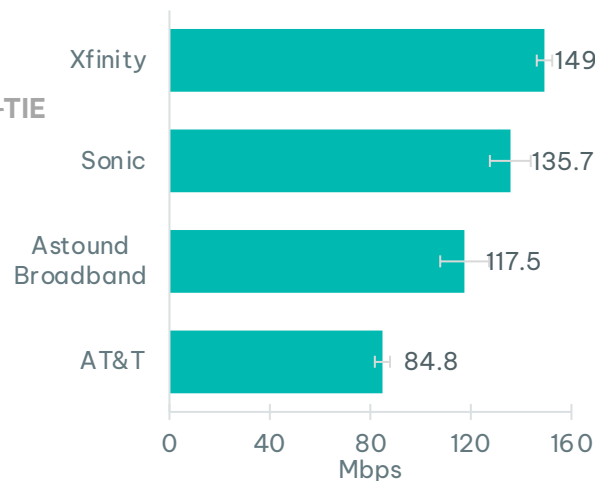


Broadband provider	MSA covered (%)	Tests from fiber-capable areas (%)
AT&T	99.3%	55.3%
Xfinity	98.1%	
Sonic	21.6%	100.0%
Astound Broadband	18.0%	

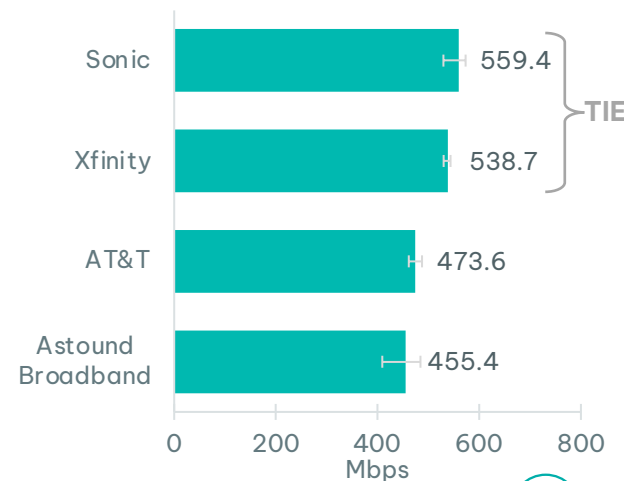
Broadband Video Experience



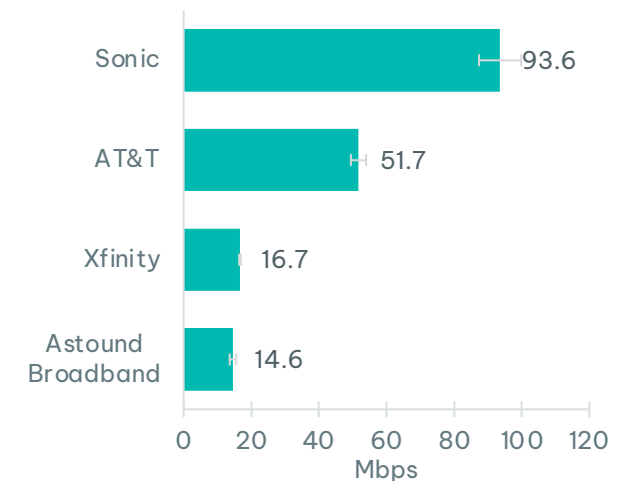
Broadband Download Speed



Broadband Peak Download Speed



Broadband Upload Speed



Broadband Experience: San Francisco–Oakland–Berkeley, CA

All of the tests conducted by our users on Sonic’s network came from its fiber-capable areas, and the power of Sonic’s network showed in the results. Sonic beats or ties market leader Xfinity in five out of six metrics – every metric but Broadband Download Speed where Xfinity takes top honors. Similarly, Sonic beats or ties AT&T in all categories, with Broadband Success Rate being the category where they tie.

Sonic had the fastest Broadband Upload Speed score of 93.6 Mbps, with our Sonic users beating the experience of our users on other ISPs. AT&T (51.7 Mbps) outperformed Xfinity (16.7 Mbps) in this metric.

Sonic received the highest score on average from our users for Broadband Consistent Quality – when looking at their results during the entire day period. Sonic scored a tie with Xfinity when looking only at peak hours of the day (12pm–6pm).

Xfinity achieved the highest Broadband Download Speed with a score of 149.3 Mbps – 10% faster than Sonic and 27% faster than Astound Broadband.

Xfinity and Sonic tied for the highest Broadband Peak Download Speed experienced by Opensignal users, with scores exceeding the 500 Mbps mark.

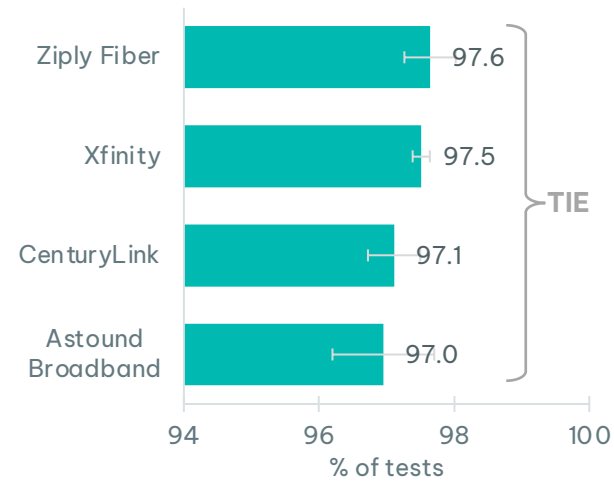
Sonic and AT&T had the highest measure of Broadband Success Rate, the proportion of successfully completed tests from users of the measured networks.

Xfinity outperformed AT&T in Broadband Video Experience and in both average and peak time Broadband Consistent Quality.

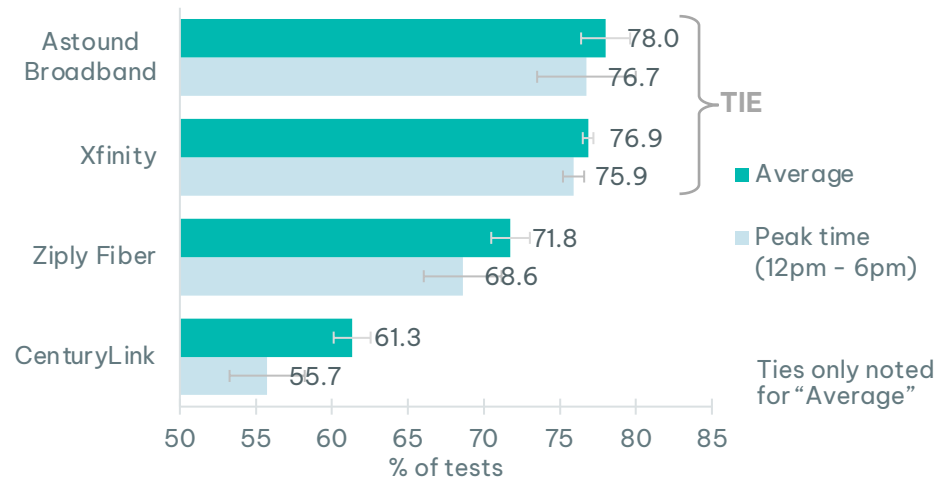
Astound Broadband and Sonic had the highest statistically tied scores for Broadband Video Experience. Xfinity placed third in this category, 0.9 points ahead of last-placed AT&T.

Broadband Experience: Seattle-Tacoma-Bellevue, WA

Broadband Success Rate

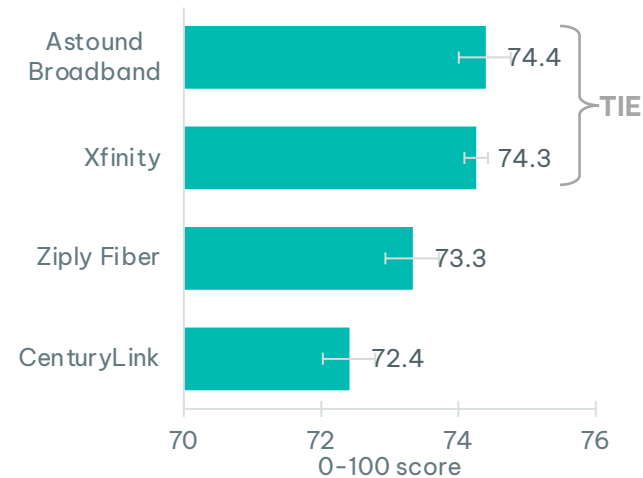


Broadband Consistent Quality

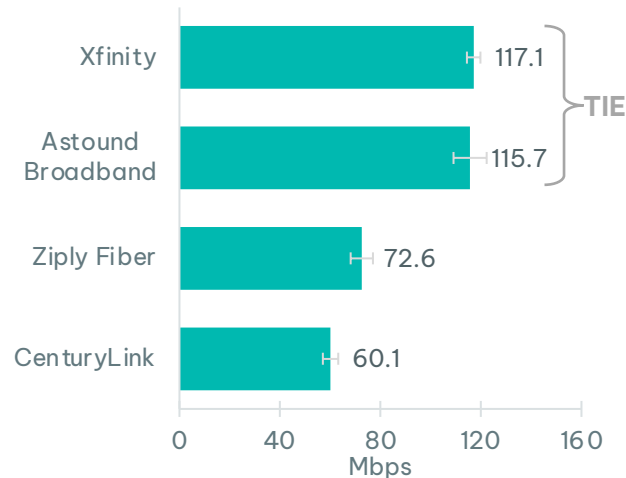


Broadband provider	MSA covered (%)	Tests from fiber-capable areas (%)
Xfinity	95.8%	
CenturyLink	71.7%	57.0%
Ziply Fiber	28.9%	70.9%
Astound Broadband	15.0%	

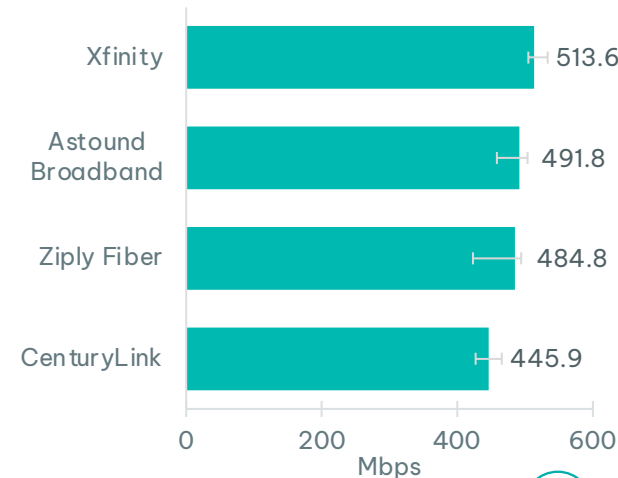
Broadband Video Experience



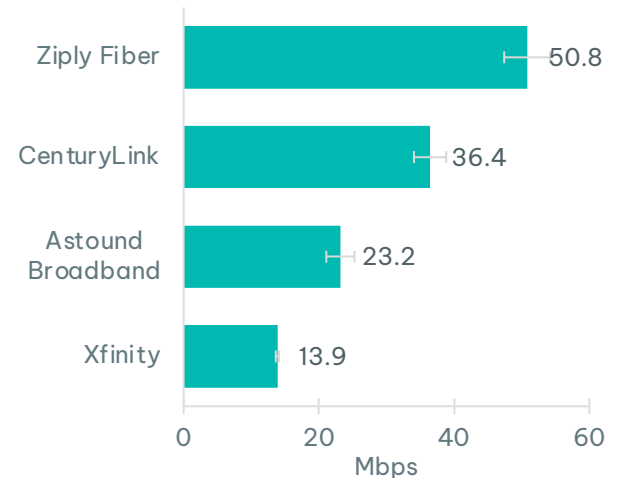
Broadband Download Speed



Broadband Peak Download Speed



Broadband Upload Speed



Broadband Experience: Seattle–Tacoma–Bellevue, WA

A significantly higher number of user tests came from Ziplly Fiber’s fiber-capable area when compared to its rivals, which is reflected in its impressive lead for the Broadband Upload Speed measured by our users.

Xfinity tied with Astound Broadband on results for Broadband Download Speed and Broadband Video Experience, but they were ahead of telco competitors Ziplly Fiber and CenturyLink on average and peak time Broadband Consistent Quality, Broadband Video Experience and Broadband Download Speed.

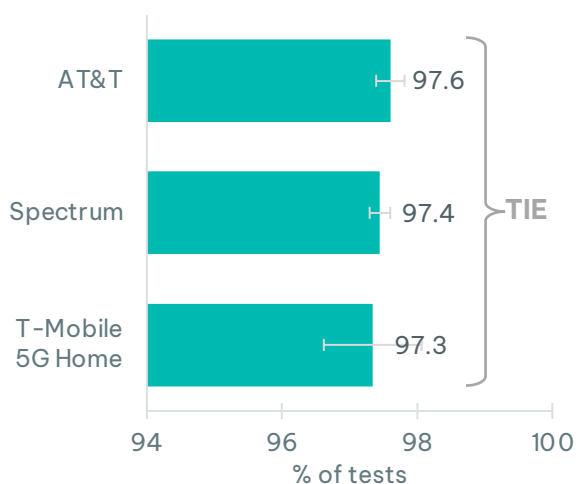
No one beats Xfinity on broadband download speeds in Seattle. Xfinity leads on Broadband Peak Download Speed with a score of 513.6 Mbps. It also ties with Astound Broadband for average Broadband Download Speed, with both operators’ exceeding the 100 Mbps mark – while Ziplly Fiber and CenturyLink did not hit this milestone.

Our Xfinity users also reported the highest Broadband Peak Download Speed. This is impressive given the presence of fiber-based ISPs like Ziplly.

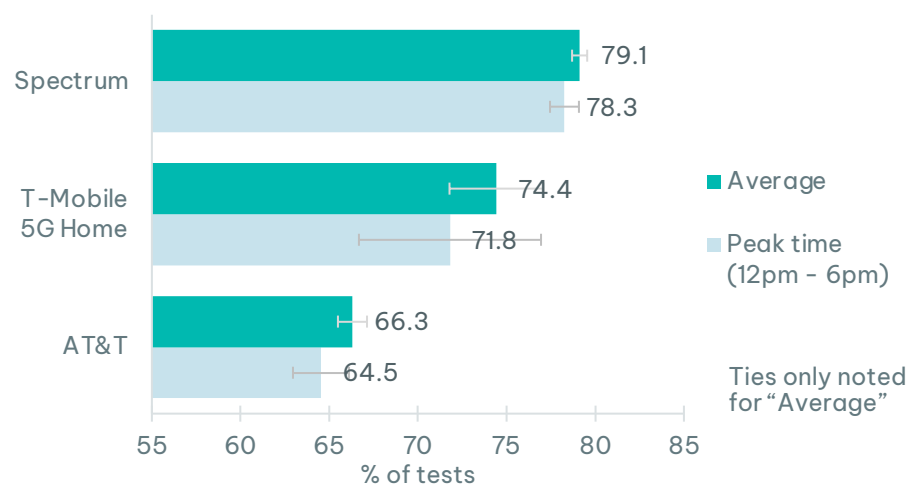
Ziplly Fiber leads Broadband Upload Speed with a score of 50.8 Mbps – nearly 40% faster than second-placed CenturyLink and 3.7 times faster than Xfinity which brings up the rear in this category.

Broadband Experience: St. Louis, MO-IL

Broadband Success Rate

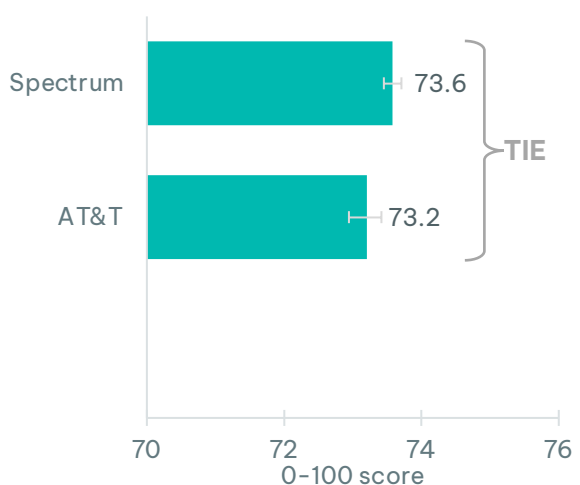


Broadband Consistent Quality

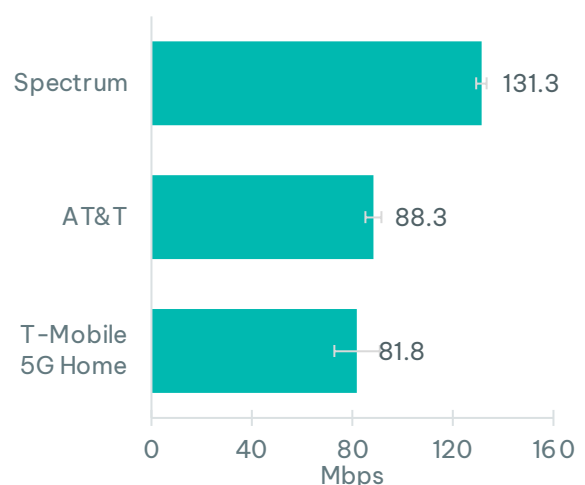


Broadband provider	MSA covered (%)	Tests from fiber-capable areas (%)
Spectrum	90.3%	
AT&T	83.3%	48.0%
T-Mobile 5G Home	24.7%	

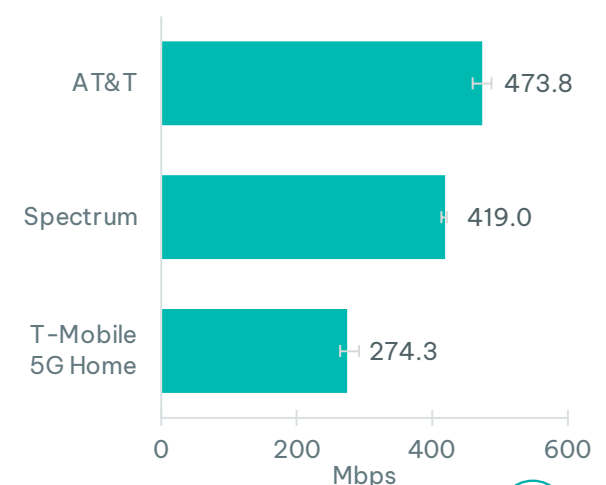
Broadband Video Experience



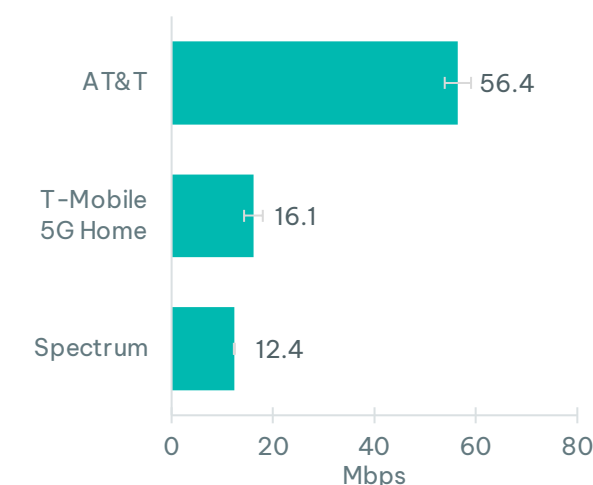
Broadband Download Speed



Broadband Peak Download Speed



Broadband Upload Speed



Broadband Experience: St. Louis, MO-IL

In St. Louis, Spectrum beats or ties competitor AT&T in four of six categories.

AT&T users enjoyed the fastest Broadband Peak Download Speed in St. Louis, clocking in at 473.8 Mbps – 13.1% faster than Spectrum and 72.7% faster than T-Mobile 5G Home.

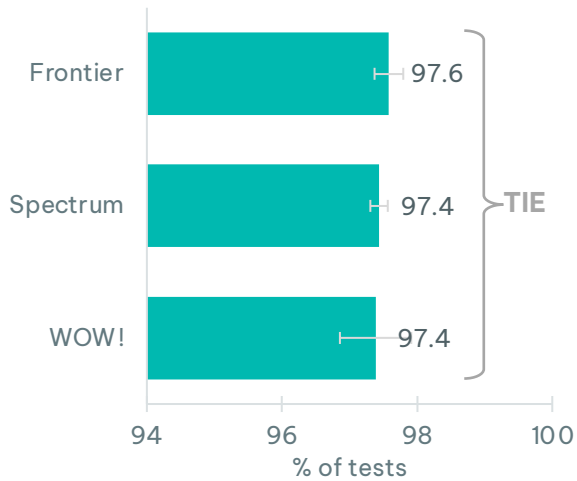
Spectrum was top for Broadband Consistent Quality – a measure of a network’s ability to support common applications’ requirements. This was true both when looking at our users’ results during peak hours (12pm-6pm) and over the entire day period. T-Mobile 5G Home was 4.7 percentage points behind Spectrum for average Broadband Consistent Quality – but 8.1 percentage points ahead of AT&T.

Spectrum ranked highest for Broadband Download Speed with a score of 131.3 Mbps. It had the highest score by a large margin when compared to its competition – 54.5% faster on average than AT&T and T-Mobile 5G Home which were tied for second place. Spectrum was the only provider to pass the 100 Mbps mark.

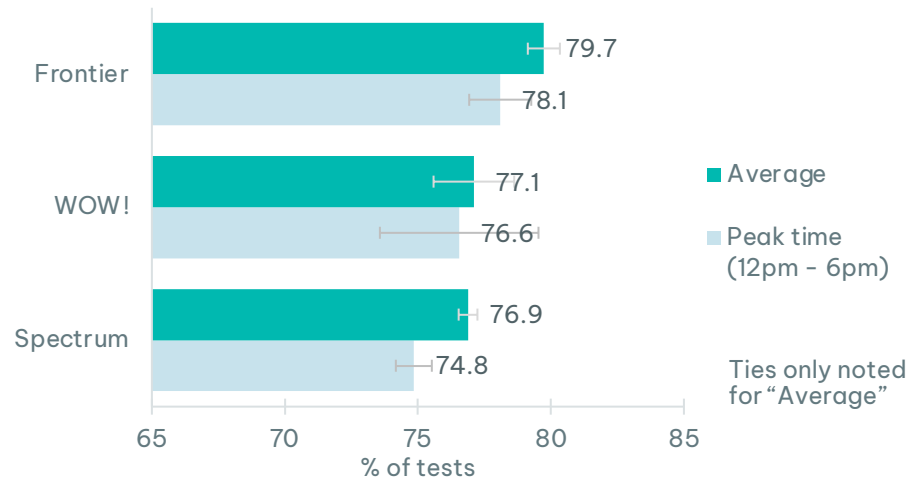
AT&T had by far the highest Broadband Upload Speed score with our users experiencing average speeds of 56.4 Mbps. AT&T’s score exceeded other providers’ scores several fold – 3.5 times faster than T-Mobile 5G Home and 4.6 times faster than Spectrum.

Broadband Experience: Tampa-St. Petersburg-Clearwater, FL

Broadband Success Rate

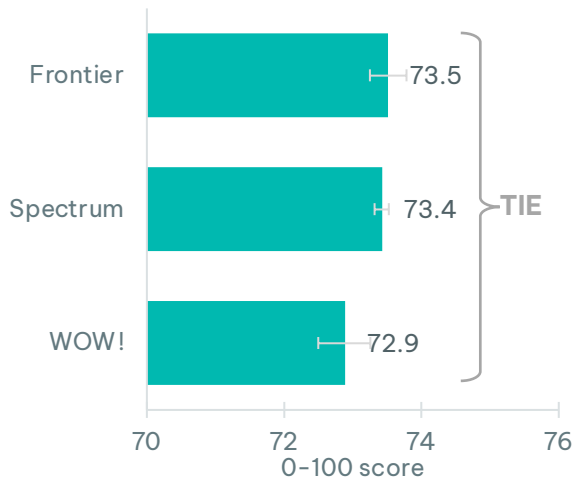


Broadband Consistent Quality

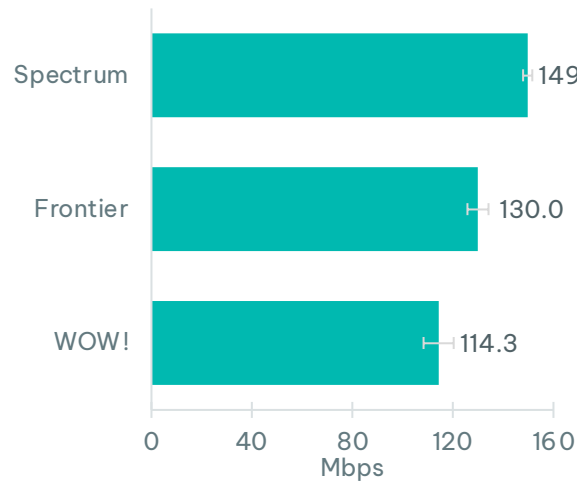


Broadband provider	MSA covered (%)	Tests from fiber-capable areas (%)
Spectrum	99.2%	
Frontier	92.5%	97.4%
WOW!	23.7%	

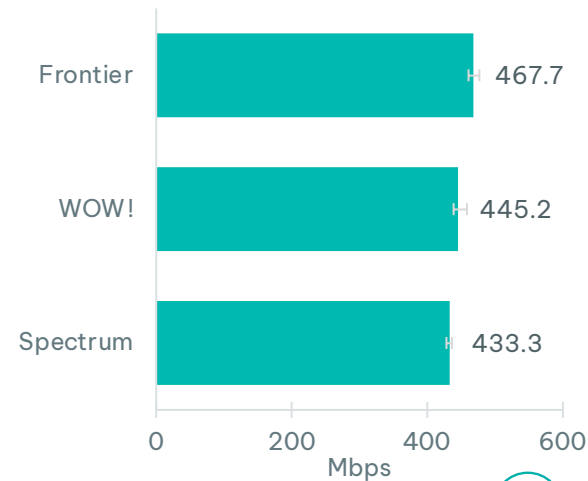
Broadband Video Experience



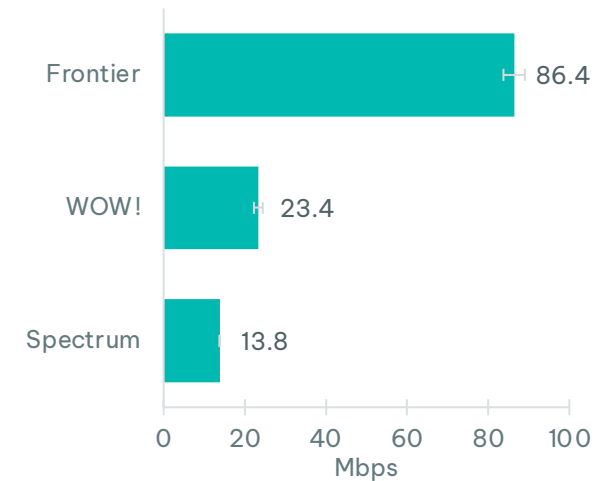
Broadband Download Speed



Broadband Peak Download Speed



Broadband Upload Speed



Broadband Experience: Tampa-St. Petersburg-Clearwater, FL

Frontier leads, or jointly leads, in five out of six measures of broadband experience in Tampa-St. Petersburg-Clearwater. Frontier outperformed Spectrum in average and peak time Broadband Consistent Quality, Broadband Peak Download Speed and Broadband Upload Speed.

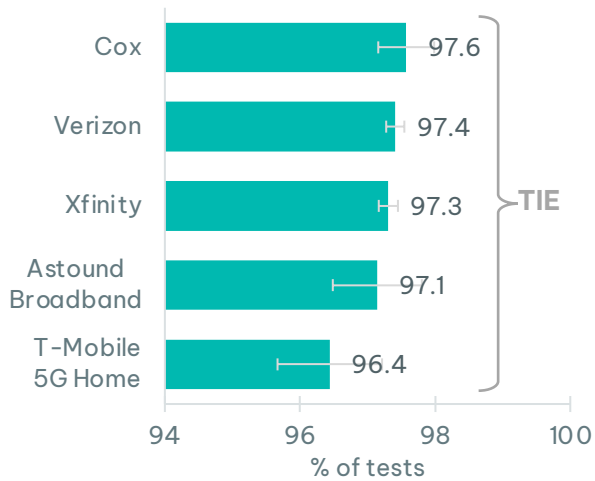
Frontier came top for Broadband Consistent Quality, a measure of network's sufficiency to support common applications' requirements, when looking over the entire day period from our users.

Spectrum has the highest Broadband Download Speed score of 149.7 Mbps. Our Spectrum users' experience beats Frontiers' (130 Mbps), and WOW!'s (114.3 Mbps).

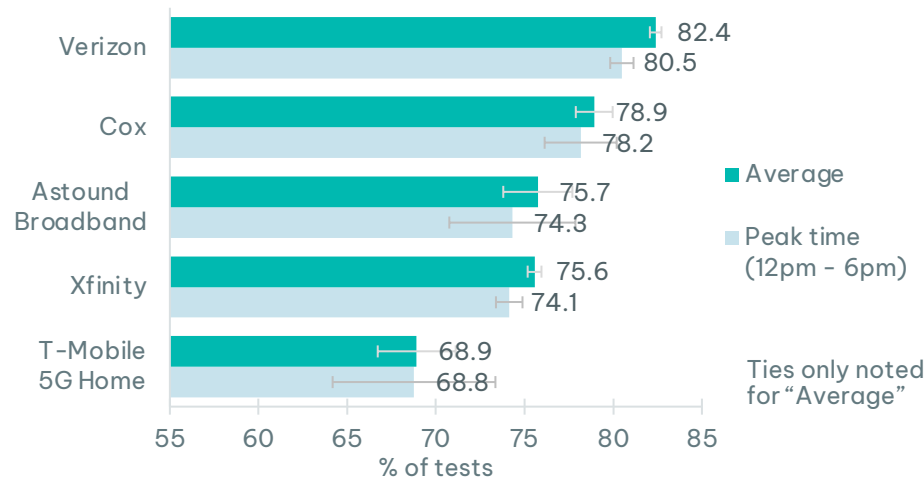
Supported by its fiber network, Frontier has the fastest Broadband Peak Download Speed in the market, clocking in at 467.7 Mbps, and achieved a Broadband Upload Speed score that was several times higher than the speed with any other provider. In the Broadband Upload Speed metric, WOW! outperformed Spectrum by 68.7%.

Broadband Experience: Washington-Arlington-Alexandria, DC-VA-MD-WV

Broadband Success Rate

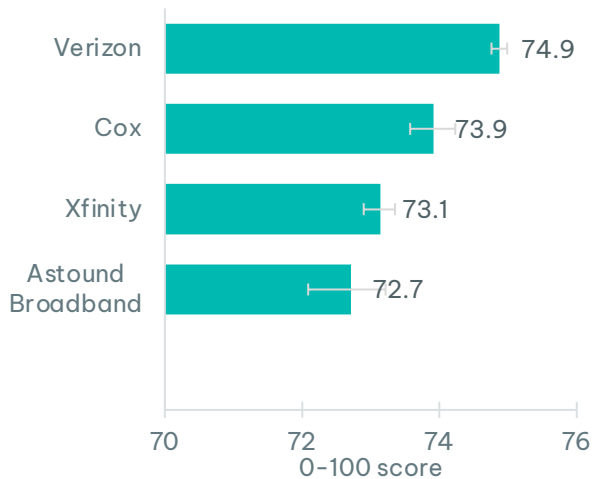


Broadband Consistent Quality

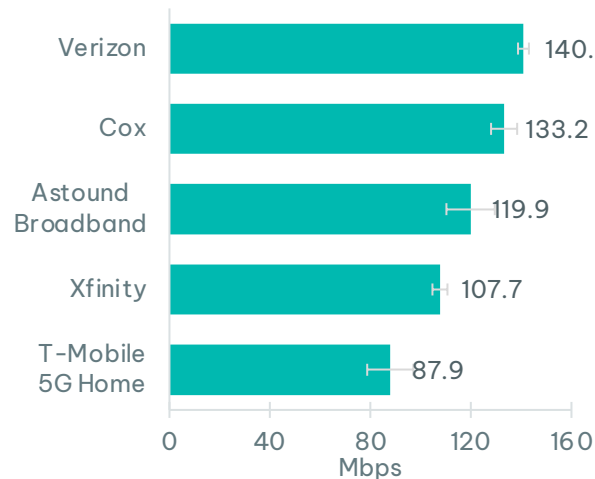


Broadband provider	MSA covered (%)	Tests from fiber-capable areas (%)
Verizon	98.5%	94.3%
Xfinity	81.1%	
T-Mobile 5G Home	37.4%	
Cox	18.6%	
Astound Broadband	12.3%	

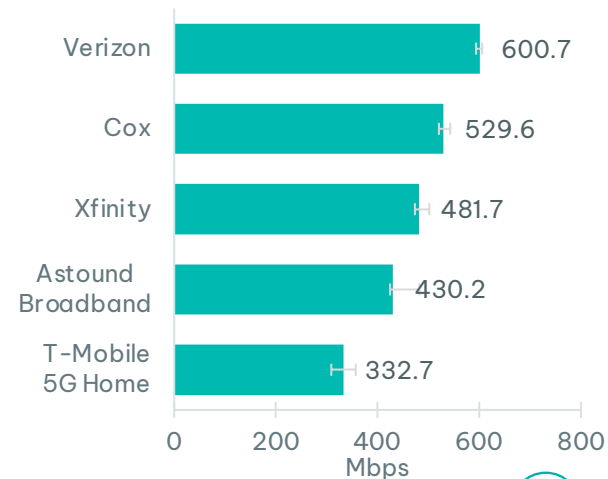
Broadband Video Experience



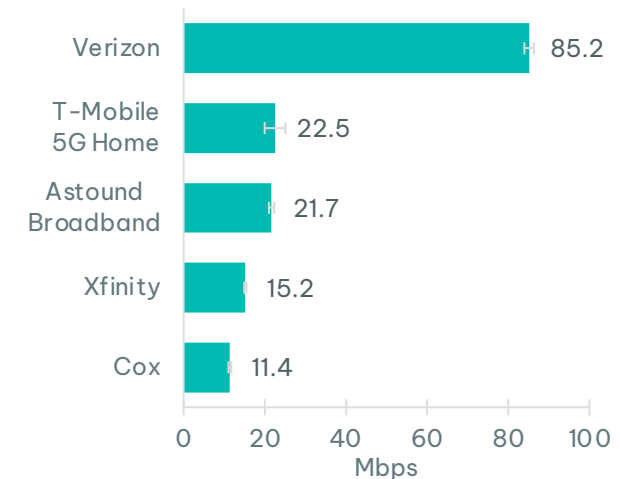
Broadband Download Speed



Broadband Peak Download Speed



Broadband Upload Speed



Broadband Experience: Washington-Arlington-Alexandria, DC-VA-MD-WV

Verizon had the best scores in the market in all the categories, either solely or jointly. It outperformed the competition in almost all the measures of the broadband experience, notably in speed – achieving the fastest measured throughput in Broadband Download Speed, Broadband Peak Download Speed, and Broadband Upload Speed.

Verizon's extensive fiber footprint covered the majority of areas from where users' tests were conducted, which reflected in its Broadband Upload Speed score being several times higher than that of its competition.

There was little difference between measurements of Broadband Success Rate for providers in the area – tracking the proportion of successfully completed tests.

Xfinity outperformed T-Mobile 5G Home in average and peak time Broadband Consistent Quality and Broadband Download Speed. However, T-Mobile 5G Home and Astound Broadband both scored higher than Xfinity and Cox for Broadband Upload Speed.

Cox had the second highest users' measurement for Broadband Peak Download Speed, but it ranked lowest for Broadband Upload Speed.

Verizon achieved the highest score for Broadband Video Experience, as well as for average Broadband Consistent Quality when analyzed across the entire day.

Verizon beat Xfinity on five broadband experience measures: Broadband Consistent Quality, Broadband Video Experience, Broadband Download Speed, Broadband Peak Download Speed and Broadband Upload Speed. On no measure does Xfinity score higher than Verizon.

Xfinity beats T-Mobile 5G Home on Broadband Download Speed, Broadband Peak Download Speed and average Broadband Consistent Quality. T-Mobile tops Xfinity when it comes to Broadband Upload Speed.

Methodology and definitions

Broadband Success Rate

Measure the average proportion of successfully completed tests relative to all the tests executed for each unique Wifi network on each broadband provider.

Broadband Consistent Quality

Measures how often users' experience on a network was sufficient to support common applications' requirements. Excellent Consistent Quality uses six key performance indicators including download and upload speed, latency, jitter, packet loss and time to first byte. Metrics are represented as a percentage of users' tests that have met the minimum recommended performance thresholds to watch HD video, complete group video conference calls and play games.

Average – Consistent quality is measured across all users in all hours of the day.

Peak – By analyzing all tests, across all carriers nationally we can see that on average the 6 hour period between 12pm and 6pm is the busiest. In these areas we see the highest amount of device activity and the largest drops in users' experience relative to the 24 hour average. We have selected these afternoon hours to benchmark a 'peak experience'.

Broadband households passed

% of households within the metropolitan statistical area (MSA) passed by a given provider. This is based on signal based detection and FCC Form 477 inputs that allow us to identify the true footprint and technology at a census block level.

% Samples from fiber-capable areas

Represents the percentage of Opensignal samples which have been measured from within footprint areas in which the carrier states they have fiber presence. This is included for the telco's only as these are the providers with the greatest mix of technologies.

Broadband Video Experience

Opensignal's adaptive video experience quantifies the quality of video streamed to mobile devices by measuring real-world video streams over an operator's network. The metric measures users' adaptive video experience using a Mean Opinion Score (MOS) approach inspired by International Telecommunication Union (ITU) studies which have derived a relationship between technical parameters of adaptive bitrate video streaming and the perceived video experience as reported by real people.

The videos tested are streamed directly from the world's largest video content providers and include a wide selection of resolutions which dynamically match the network conditions, available bandwidth and device performance. Resolutions range from 144p to 2160p, which is also called 4K or UHD (Ultra High Definition). The model calculates a MOS score on a 0 to 100 scale by evaluating a number of parameters, including: the time to start playing the video, the quality of the video, the time playing each resolution, and the time spent re-buffering.

Broadband Download Speed

Measured in Mbps, Broadband Download Speed represents the typical everyday speeds a user experiences across a service provider's network.

Broadband Peak Download Speed

Measured in Mbps, Broadband Peak Download Speed represents the 98th percentile of the user speed distribution. i.e. this is what the users with the highest speeds within the footprint experience.

Broadband Upload Speed

Measured in Mbps, Broadband Upload Speed measures the average upload speeds for each internet service provider observed by our users across their fixed networks. Typically, upload speeds are slower than download speeds but this often depends on the technology used for broadband connections.