

The future of 5G in practice: South Korean operators leading the worldwide 5G race



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5G in South Korea

Providing users with widespread access to 5G, fast speeds, and setting an example for the rest of the world

As today's connected communities continue to grow and we move closer to a society in which everything from kitchen appliances to streetlights and even entire cities are connected, the need for the potential of 5G to become a reality is becoming more and more important.

While transformative use cases like driverless cars and remote surgery are likely several years away from becoming the new normal, the good news is that the 5G results we've seen in South Korea suggest that a hyper-connected future once only imagined in science fiction movies could be closer than you might think.

Simply put, 5G performance in South Korea is outstanding, has shown huge improvement in a relatively short period of time, and is generally much better than the 5G results we've seen to date in Switzerland, the UK, and the US. In the second half of 2020, we tested South Korean operators KT, LG U+, and SK Telecom across seven major South Korean cities, and not only did the South Korean operators provide their subscribers with broad 5G availability and excellent speeds in every city we visited, they also showed significant improvement in the city of Seoul compared to what we found in South Korea's capital city in 2019.

While 5G has shown encouraging results in other countries that should only get better over time, it's clear that the operators in South Korea are leading the way when it comes to the end-user 5G experience. With 5G poised for continued expansion and improvement in South Korea and other countries, the results we recorded in South Korea could be a harbinger of better things to come in Switzerland, the UK, and the US going forward as our connected communities continue to become more and more fundamental to everyday life.

Read on to see how KT, LG U+, and SK Telecom performed during testing across seven South Korean cities in 2H 2020, including how 5G performed indoors versus outdoors in each city. We've also provided a look at the improvements we saw in Seoul since 2019 along with a high-level overview of how 5G performance in Seoul compares to that in major cities across the world.

Benchmarking what matters most

To provide a holistic view of each operator's real-world 5G performance, we've included visuals showing 5G availability and speed results along with key insights for the end-user experience in each of the seven cities we tested. Taken together, this complementary information provides a full picture of the current end-user 5G experience in South Korea.



5G availability

Our 5G availability results provide an understanding of how often we connected to 5G across our suite of data tests (download, upload, and web and app testing). During data activities, consumers may switch between 5G, 4G LTE, and mixed mode (the user experience of switching between 5G and 4G LTE during the same data activity). Performance during mixed mode is typically not as strong as that on 5G-only. Therefore, to provide the most accurate view of a true, full 5G experience and to assure the most direct comparisons between operators, the 5G availability metrics in this report reflect results recorded purely on 5G and do not factor in mixed mode results.



Overall median download speeds

The median download speeds in this report reflect the overall speeds we recorded across all network technologies, including 5G, mixed mode (the user experience of switching between 5G and 4G LTE during the same data activity), and 4G LTE. Unless specified as "5G median download speeds," all speeds within this report reflect overall median download speeds across all network technologies. Since users may switch between different network technologies while using their smartphone, median download speeds across all network technologies represent the most typical user experience.



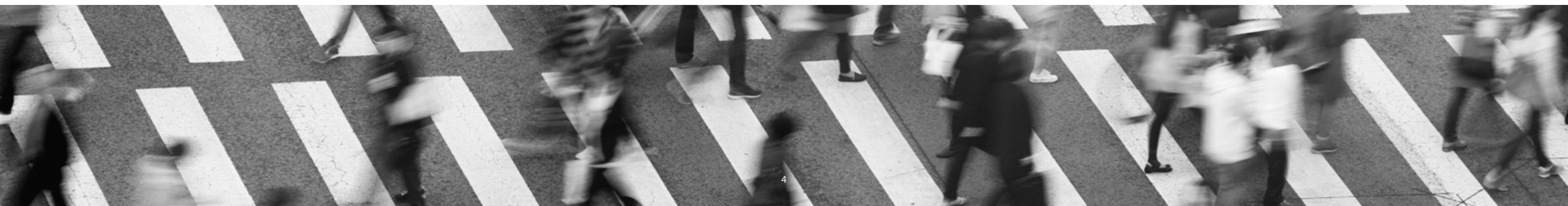
5G median download speeds

The 5G median download speeds in this report represent speeds recorded entirely on 5G. While end users won't access 5G all the time—and will often move between 5G, mixed mode, and/or 4G LTE—we've included speeds recorded entirely on 5G to show what to expect when a user connects purely to 5G.



Latency

Latency refers to the response time or delay between a user request and an action being taken by a simple function, application, or machine. The latency metrics in this report are from our web and app latency testing, which characterize use cases that require continuous data usage such as gaming, streaming videos, and AR/VR applications, among others. Our results reflect latencies recorded across all network technologies, including 5G, mixed mode, and 4G LTE. The lower the latency, the better the end-user experience.



Executive summary

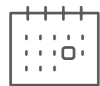
South Korea testing overview

To show what to expect from South Korean operators across the seven cities we tested in the Fall of 2020, we measured 5G performance indoors and outdoors in each city where and when people most often use their smartphones: tourist areas, business districts, and other areas at times of peak mobile usage. All tests were performed while walking and driving and were designed to represent the end-user's real-world 5G experience.



Where we tested

Busan, Daegu, Daejeon, Gwangju, Incheon, Seoul, Ulsan



Dates of testing

Sept 15 – Oct 12, 2020



Total test samples collected

79,693



Operators tested

**KT, LG U+,
and SK Telecom**



Indoor locations visited

175



Device used

Samsung Galaxy S20+ 5G



Kilometers driven

4,055



*See appendix for city-specific testing dates and figures.

Executive summary

5G in Seoul: a story of massive improvement from 2019 to 2020

In 2019, the 5G availability we recorded in Seoul was, at the time, relatively widespread compared to what we'd seen in other countries. Likewise, the 5G median download speeds we recorded in Seoul were impressive across the board. The results we found in 2020, however, showed that the operators certainly didn't rest on their laurels, with each network delivering much broader 5G availability and faster speeds this year.

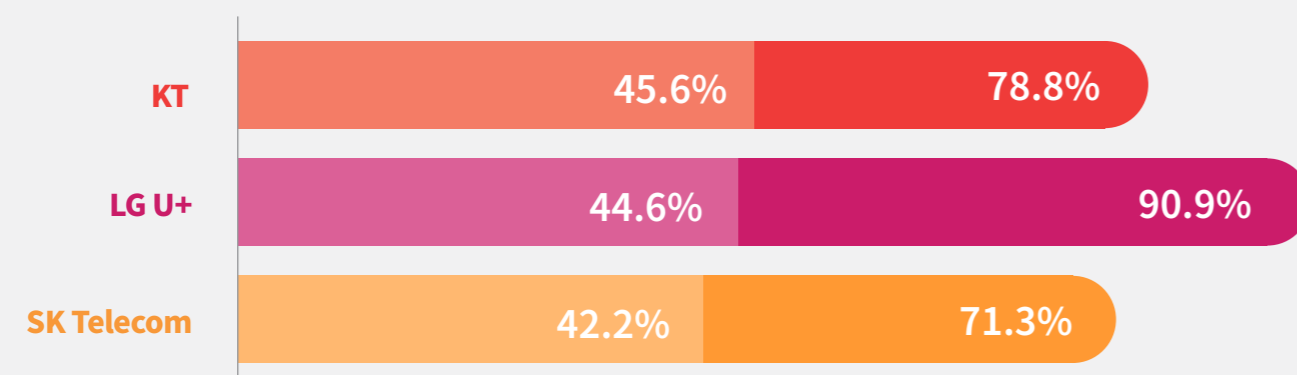
5G availability on the rise and providing users with broad access to 5G

Our tests showed that users in Seoul are benefiting from a massive jump in 5G availability. In 2019, 5G availability in Seoul was below 46% for all carriers. In 2020, on the other hand, 5G availability ranged from SK Telecom's robust 71.3% to an eye-catching 90.9% for LG U+.

While the 5G availability we found last year in Seoul was impressive by 2019 standards, the results we found in 2020 could mark a true tipping point on the path toward 5G ubiquity, as users on any operator's network have widespread access to 5G (and the fast speeds that come with it), with LG U+ customers able to connect to 5G almost anytime they use their smartphones.

5G availability (%) | Seoul

2019 — 2020

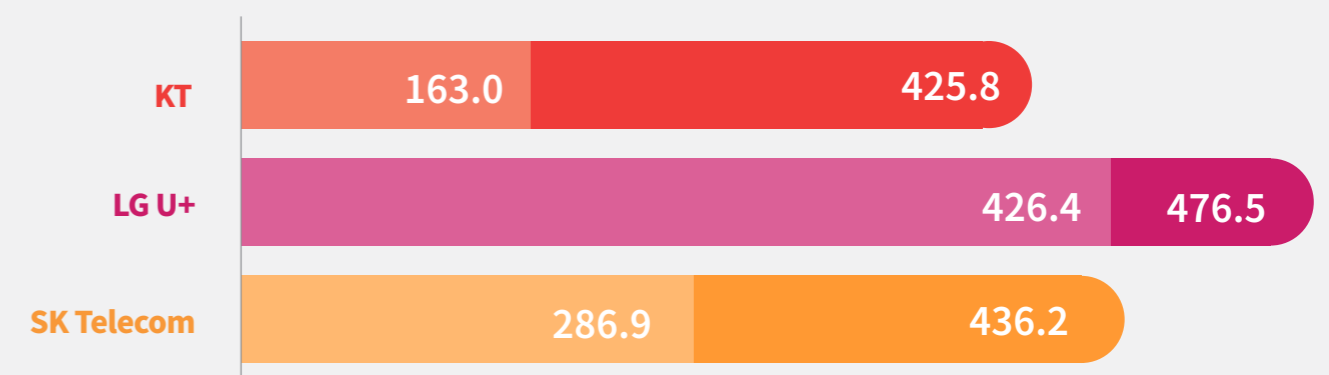


5G speeds improve across the board, allowing users to get their content quickly

5G median download speeds showed a similar story of improvement since 2019. LG U+ led the way with a 5G median download speed of 476.5 Mbps (50 Mbps faster than in 2019). At that speed, consumers can download a 600MB movie like Oscar-winner Parasite in only 11 seconds. KT and SK Telecom also impressed. KT's 5G median download speed of 425.8 Mbps nearly tripled its speed of 163.0 Mbps in 2019, while SK Telecom's 5G speed improved by an outstanding 149 Mbps since 2019.

5G median download speeds (Mbps) | Seoul

2019 — 2020



Executive summary

Worldwide 5G availability and speeds: South Korea leading the way

South Korean mobile operators were the first in the world to deploy 5G on a wide scale, doing so in early April of 2019, so it's perhaps unsurprising that the 5G results we've seen in South Korea have been outstanding and generally better than those in Switzerland, the UK, or the US.

To see how 5G performance compares in major cities around the world, we looked at the highest 5G availability and fastest 5G median download speeds in South Korea's biggest city (Seoul) as well as in the most populated cities in Switzerland, the UK, and the US.

As the visuals below show, the 5G availability and speed results we recorded in Seoul were stronger than those in London, New York City, or Zurich.

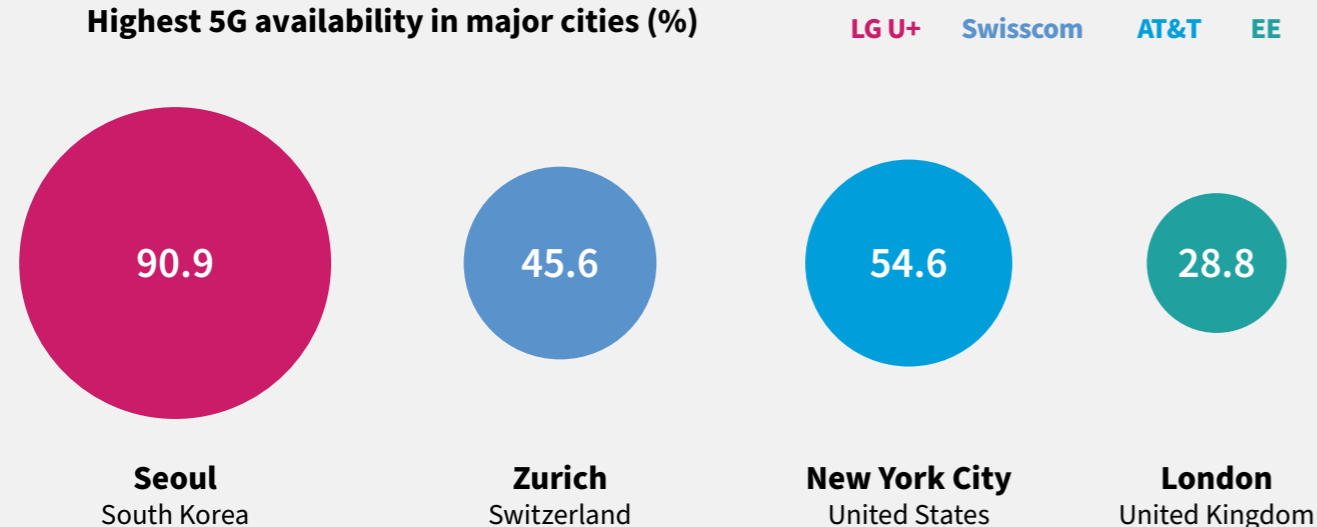
LG U+ providing users in Seoul with far more widespread access to 5G than networks in NYC, London, or Zurich.

In Seoul, LG U+ users have nearly universal access to 5G, allowing subscribers to take advantage of the operator's incredibly fast 5G median download speed of 476.5 Mbps almost anytime they use their smartphones. In contrast, 5G availability was below 55% in every other major city we tested around the globe.

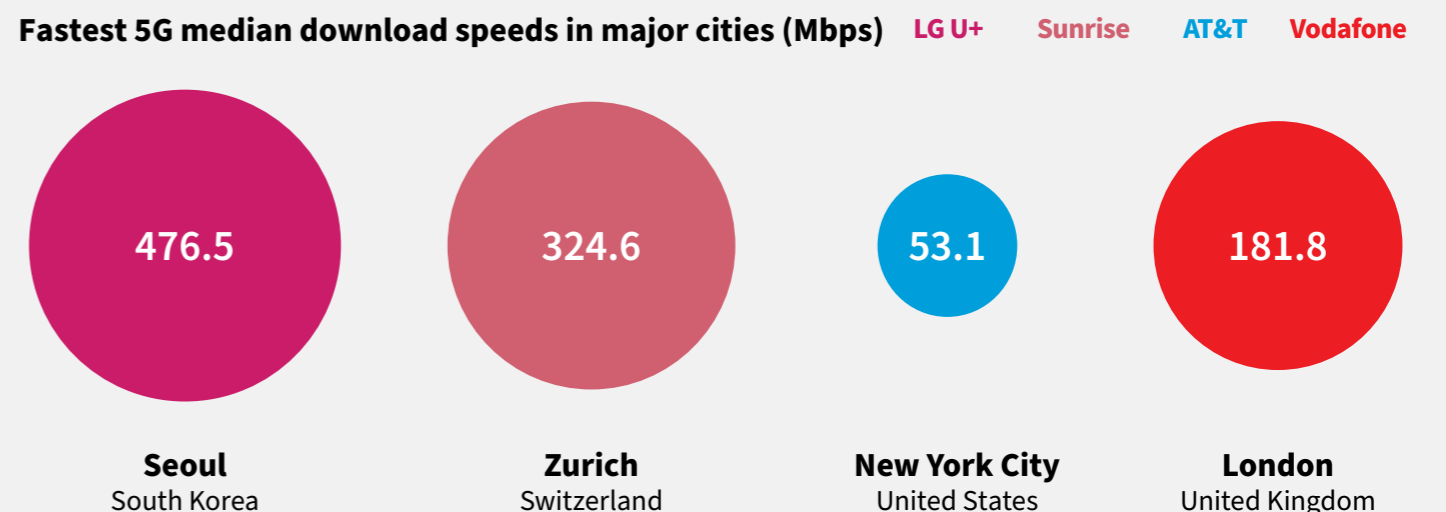
Fastest 5G median download speed in Seoul faster than those in major cities across the world.

In short, 5G is FAST in South Korea. Consumers in Seoul, for example, can access content faster than those in London, New York City, or Zurich. At LG U+'s 5G median download speed of 476.5 Mbps in Seoul, users can download a 600MB video from Netflix in about 11 seconds, slightly quicker than at Sunrise's speed in Zurich (16 seconds). On the other hand, downloading the same movie at the fastest 5G median download speed we recorded in New York City would take about one minute, while accessing the same video at the fastest 5G speed in London would take around 27 seconds.

Highest 5G availability in major cities (%)



Fastest 5G median download speeds in major cities (Mbps)



Note: London 5G availability and speed results are from 1H 2020, while all other results are from 2H 2020.

Executive summary

5G availability and latency by operator

5G availability

5G availability was generally widespread in every city: LG U+ led the way with incredible 5G availability of 94.5% in Incheon and 90.9% in Seoul, providing subscribers in both cities with almost ubiquitous access to 5G. At the other end of the spectrum, 5G availability was still encouraging, with the lowest 5G availability we recorded across all seven cities (54.8% for LG U+ in Daegu) higher than what we found in NYC, London, or Zurich.

Latency

Low latency in South Korea means smooth video streaming and lag-free gaming: The lower the latency, the better, and when latency is below roughly 50-60ms, consumers should be able to play mobile games or stream movies without any delays. KT stood out for recording latency of 30.0ms or lower in all seven cities, while SK Telecom delivered latency below 45.5ms in every city. Meanwhile, LG U+ registered its lowest latency of 22.0ms in Seoul, and with a few exceptions, each operator's latency was generally outstanding.

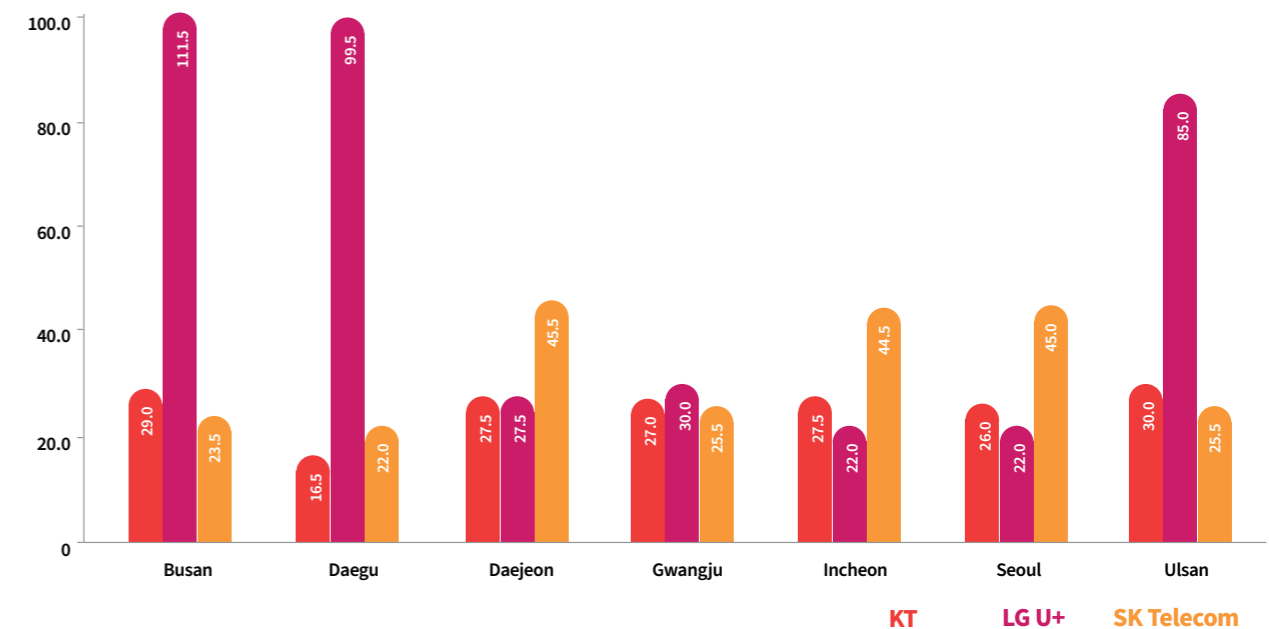
5G availability (%)

Scale: 0-100%



Latency (ms)

Scale: 0-100ms



Executive summary

Overall median download speeds and bandwidth used by operator

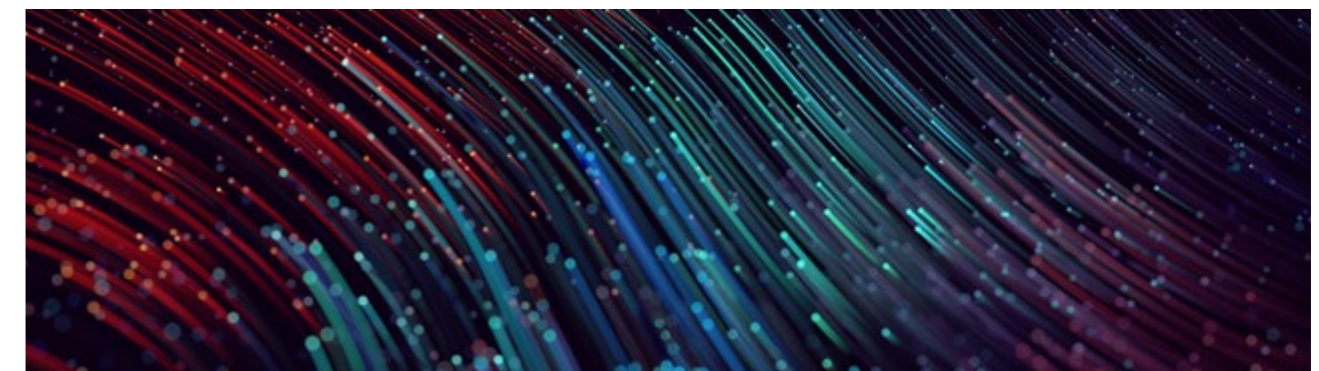
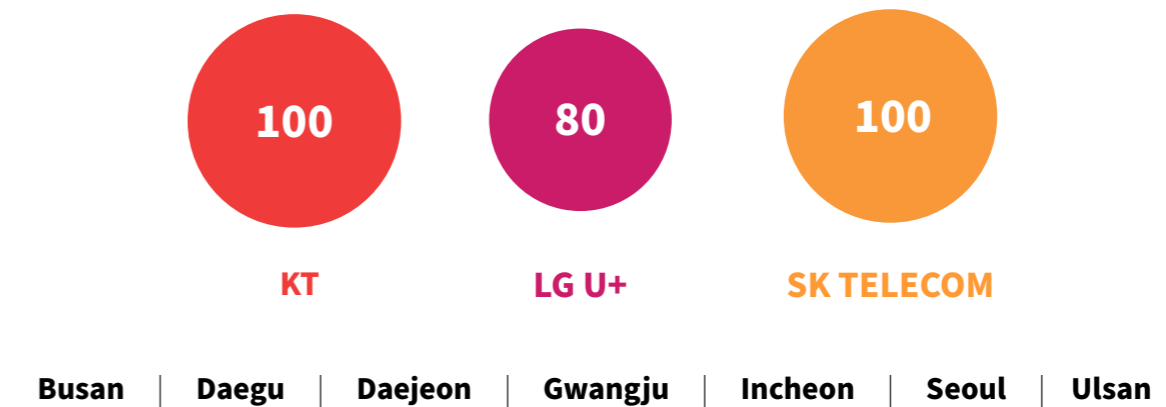
KT was fast in general—even at the slow end: KT delivered its best performance in Busan, where the operator registered the fastest median download speed of any operator in any city at an outstanding 481.7 Mbps. At that speed, KT users can download their favorite film (at a file size of 600MB) from Netflix in only 11 seconds. KT’s speeds were strong across the board, delivering median download speeds above 400 Mbps in six out of seven cities, and even its “slowest” median download speed of 387.3 Mbps in Daejeon will allow users to access content incredibly quickly.

LG U+ performs especially well in Seoul and Incheon: LG U+ offered an excellent performance in Seoul, where the operator’s remarkable median download speed of 459.7 Mbps would allow users to download a 600MB movie in just 11 seconds. LG U+’s success wasn’t just limited to Seoul, however: LG U+ also delivered outstanding results in Incheon, registering an impressive median download speed of 430.8 Mbps. LG U+ clocked median download speeds above 400 Mbps in four out of seven cities, and with strong speeds across the board, LG U+ subscribers should enjoy a fast mobile experience in any of the seven cities we tested.

SK Telecom impresses in Daejeon and Gwangju: SK Telecom delivered the fastest median download speeds of any operator in both Daejeon and Gwangju, with nearly identical speeds of 457.7 Mbps and 457.9 Mbps, respectively. While SK Telecom didn’t register speeds above 400 Mbps in as many cities as either KT or LG U+, the operator’s speeds were clearly impressive. In Ulsan, for instance, where SK Telecom clocked its “slowest” median download speed of 349.0 Mbps, users can download their favorite movie in only 15 seconds.

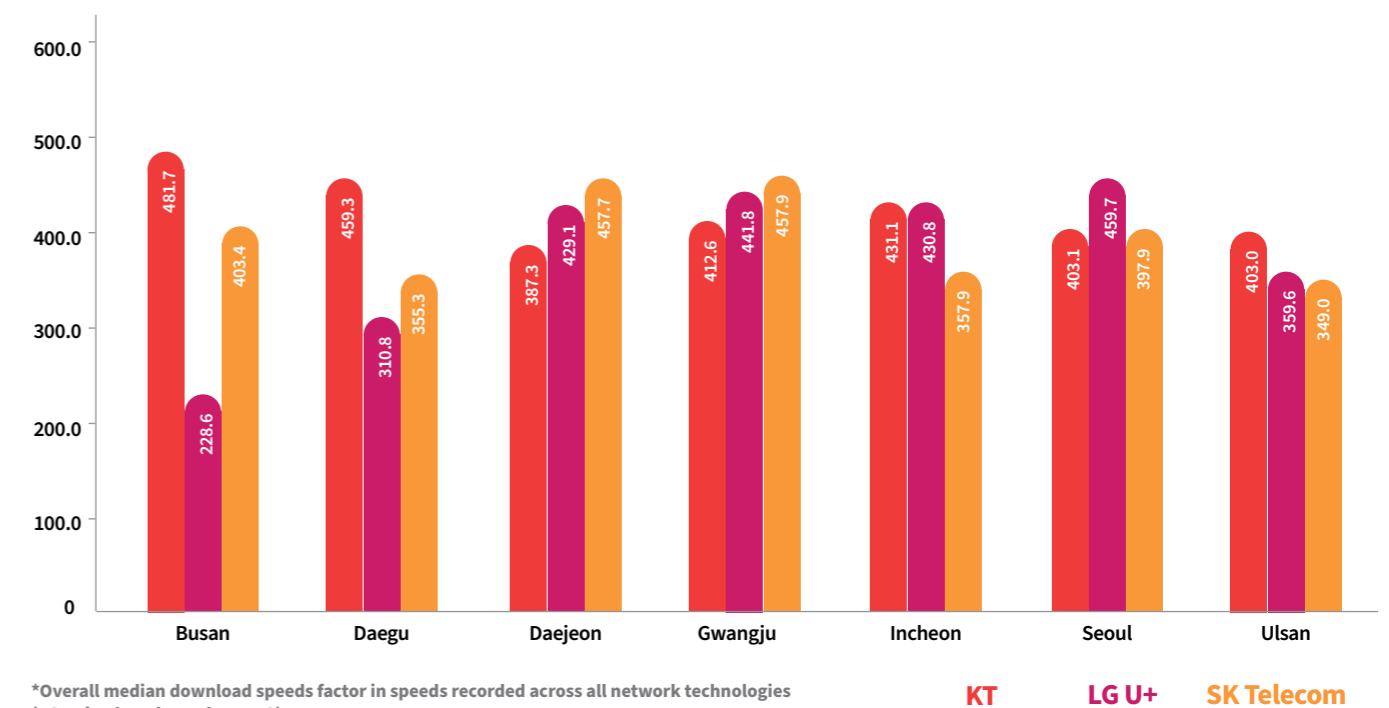
LG U+ uses its bandwidth more efficiently than the other operators: While both KT and SK Telecom used more bandwidth than LG U+ in each of the seven cities we tested, our results showed that LG U+ made the most efficient use of bandwidth of any operator across all seven cities.

5G bandwidth used (7 cities) (MHz)



Overall median download speed (Mbps)

Scale: 0-600 Mbps



*Overall median download speeds factor in speeds recorded across all network technologies (5G, mixed mode, and non-5G).

KT LG U+ SK Telecom

5G results by city

A look at 5G performance in:

Busan, Daegu, Daejeon, Gwangju, Incheon, Seoul, Ulsan



Busan

KT impresses in Busan, delivering the highest 5G availability, the fastest median download speed, and low latency.

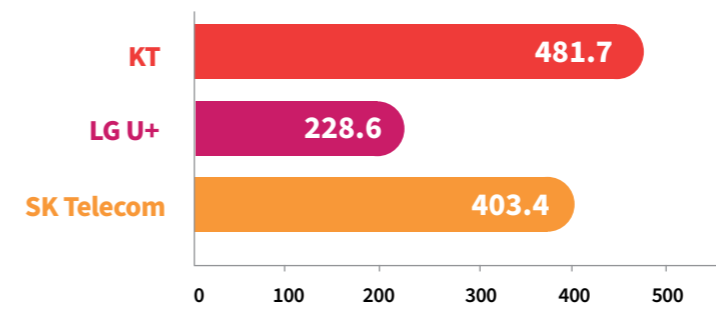
KT posts outstanding results in Busan: KT's 5G availability of 87.1% was much higher than that of either LG U+ or SK Telecom, and the operator's impressive median download speed of 481.7 Mbps was the fastest in the city. In short, KT subscribers should be able to access 5G more often than users of any other network and enjoy the fastest access to content and entertainment in the city. KT also registered low latency of 29.0ms, which while a bit higher than that of SK Telecom, should provide users with smooth video streaming and lag-free mobile gaming.

LG U+ trails the other operators in Busan but still offers fast speeds: LG U+ registered the lowest 5G availability, the slowest median download speed, and the highest latency in Busan. That said, the operator's median download speed of 228.6 Mbps was fast enough for users to download or stream content quickly, and while LG U+ recorded comparatively high latency of 111.5ms, fans of casual games like Tetris or Words with Friends should find a pleasant gaming experience. On the other hand, gamers interested in more complex games that require precision and perfect chat functionality could experience some delays.

SK Telecom delivers fast speeds and low latency in Busan: SK Telecom's 5G availability of 62.7% was broad enough to provide users with 5G the majority of the time, and its impressive median download speed of 403.4 Mbps will provide users with quick file downloads and a fast experience in general. Meanwhile, SK Telecom's latency of 23.5ms was excellent and the lowest in the city, allowing subscribers to enjoy entertainment on their smartphones with little or no delays.

Overall median download speeds (Mbps)

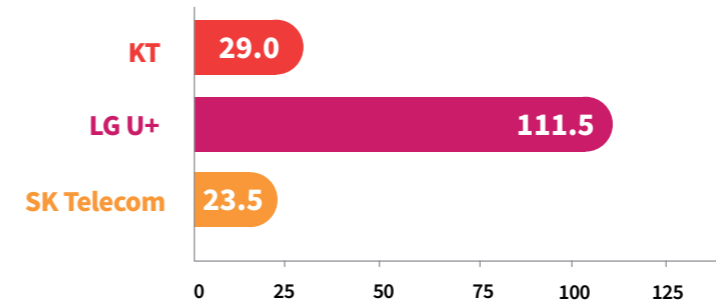
Scale: 0-500 Mbps



*Median download speeds factor in speeds recorded across all network technologies (5G, mixed mode, and non-5G).

Latency

Scale: 0-125



*Latency factors in web and app latency results recorded across all network technologies (5G, mixed mode, and non-5G).

5G Availability (%)



KT



LG U+



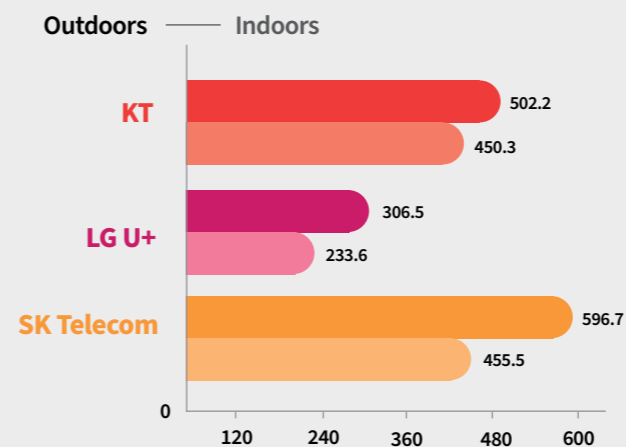
SK TELECOM

A look at 5G outdoors vs. indoors

KT in particular excelled during outdoor testing, registering the highest 5G availability at 93.6% and an outstanding 5G median download speed of 502.2 Mbps. While all three operators delivered faster 5G speeds outdoors compared to those recorded indoors, KT was the only operator whose 5G availability was higher during outdoor testing.

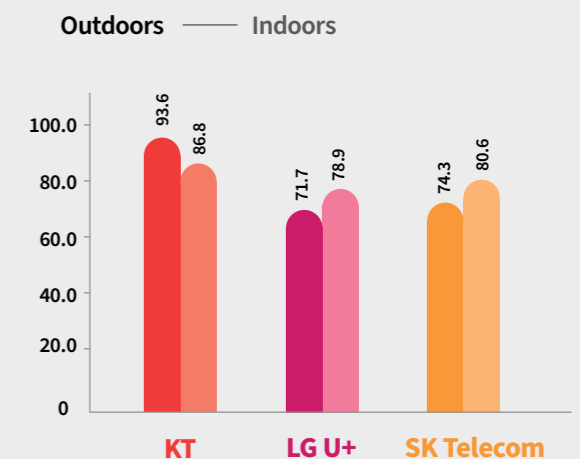
5G median download speeds (Mbps)

Scale: 0-600 Mbps



5G availability (%)

Scale: 0-100%



Daegu

KT provides excellent results in Daegu, with the fastest median download speed and lowest latency.

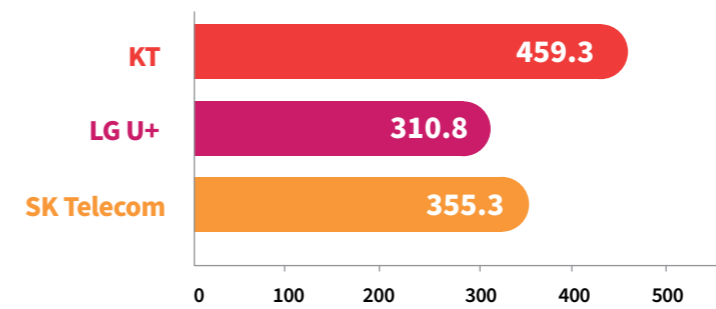
KT stands out in Daegu: While KT's 5G availability of 63.0% was slightly lower than that of availability leader SK Telecom (64.9%), it was nearly 10% higher than that of LG U+ and will provide users with generally widespread access to 5G. Meanwhile, KT's median download speed of 459.3 Mbps was at least 100 Mbps faster than that of any other operator, providing its users with the quickest access to content in the city. What's more, KT's latency of 16.5ms was the lowest in the city and will let users play video games, watch movies, and much more without interruption.

LG U+ delivers fast speeds but high latency: LG U+ registered the lowest 5G availability in the city along with the slowest median download speed and highest latency. That said, LG U+'s median download speed of 310.8 Mbps is fast and will allow users to download a 600MB movie from Netflix in about 16 seconds (compared to roughly 11 seconds for speed leader KT). On the other hand, LG U+'s latency of 99.5ms was well over four times higher than that of either KT or SK Telecom.

SK Telecom delivers solid results in Daegu: SK Telecom's 5G availability of 64.9% was a tick ahead of that of KT, and the operator's median download speed of 355.3 Mbps was strong and will provide users with quick access to content. Meanwhile, SK Telecom's latency of 22.0ms was impressive and should lead to smooth content streaming, mobile gaming, and a delay-free mobile experience in general.

Overall median download speeds (Mbps)

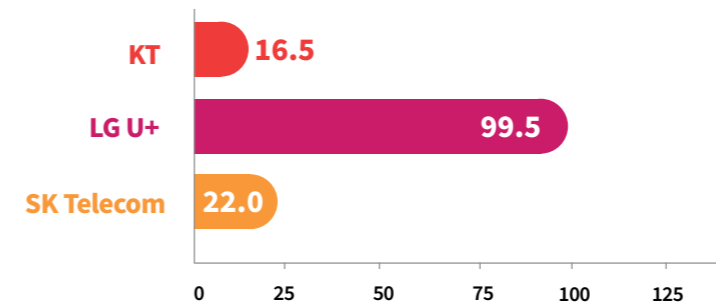
Scale: 0-500 Mbps



*Median download speeds factor in speeds recorded across all network technologies (5G, mixed mode, and non-5G).

Latency

Scale: 0-125



*Latency factors in web and app latency results recorded across all network technologies (5G, mixed mode, and non-5G).

5G Availability (%)



KT



LG U+



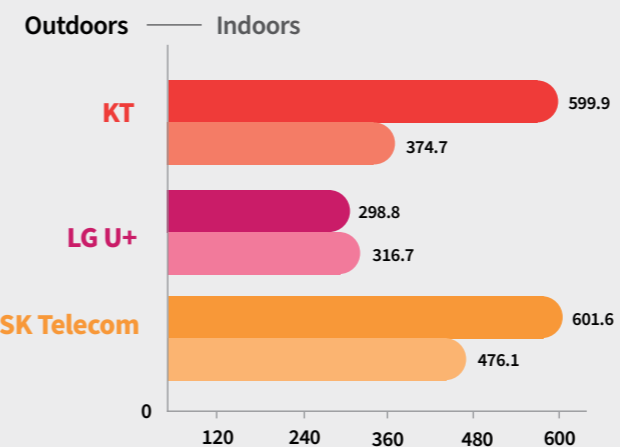
SK TELECOM

A look at 5G outdoors vs. indoors

5G speeds were generally better outdoors in Daegu, with KT and SK Telecom faring especially well outside, delivering 5G speeds of about 600 Mbps each. Each operator's 5G availability, on the other hand, was higher indoors than outdoors.

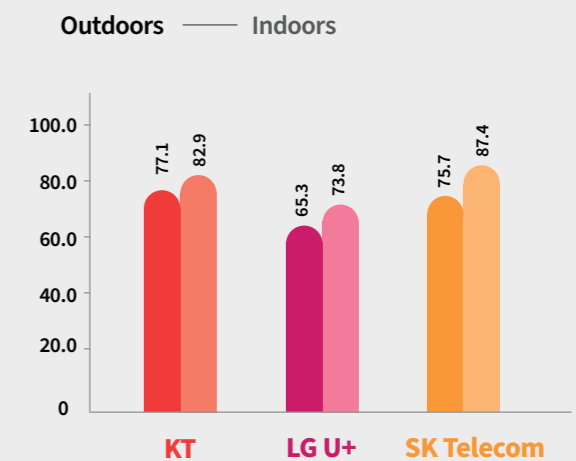
5G median download speeds (Mbps)

Scale: 0-600 Mbps



5G availability (%)

Scale: 0-100%





Daejeon

SK Telecom records the highest 5G availability and fastest speeds, while LG U+ also impresses in Daejeon.

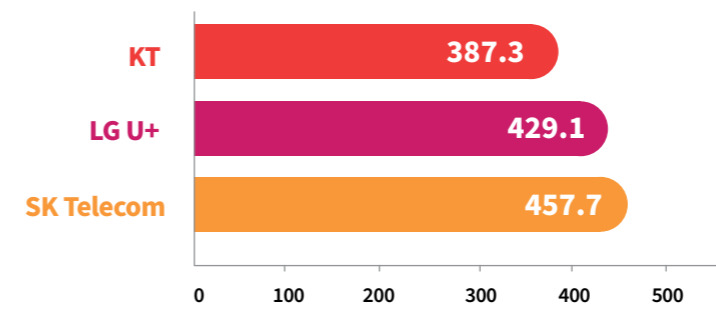
KT registers low latency, but its speed trails those of the other networks: KT recorded the lowest 5G availability in Daejeon at 66.8% and the slowest median download speed at 387.3 Mbps, but the operator’s latency of 27.5ms tied with that of LG U+ for the lowest in the city. Despite KT’s median download speed trailing those of the other networks, it will still provide users quick access to content, and the operator’s low latency should allow users to stream movies, play mobile video games, and much more with few if any delays.

LG U+ delivers a strong performance in general: While LG U+’s 5G availability of 76.3% and its median download speed of 429.1 Mbps both fell short of those of SK Telecom, LG U+’s results were nevertheless impressive. LG U+ users should be able to access 5G most of the time and get their content and entertainment quickly. LG U+ also provided the lowest latency in the city at 27.5ms, which should provide users with a generally smooth and delay-free mobile experience.

SK Telecom offers broad 5G availability and the fastest speed in Daejeon: SK Telecom’s 5G availability of 78.1% was the highest in Daejeon, providing its subscribers with the most 5G in the city. Moreover, the operator delivered the fastest median download speed at 457.7 Mbps. At that speed, users can download a 600MB video in about 11 seconds. That said, SK Telecom’s latency of 45.5ms was much higher than the 27.5ms recorded by both KT and LG U+ and could cause minor issues for fans of complex games that rely on precision, accuracy, and perfect chat functionality.

Overall median download speeds (Mbps)

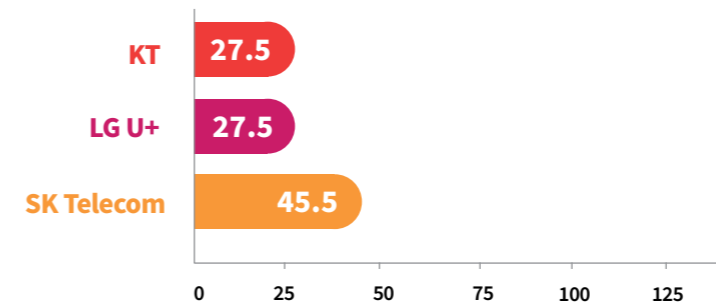
Scale: 0-500 Mbps



*Median download speeds factor in speeds recorded across all network technologies (5G, mixed mode, and non-5G).

Latency

Scale: 0-125



*Latency factors in web and app latency results recorded across all network technologies (5G, mixed mode, and non-5G).

5G Availability (%)



KT



LG U+



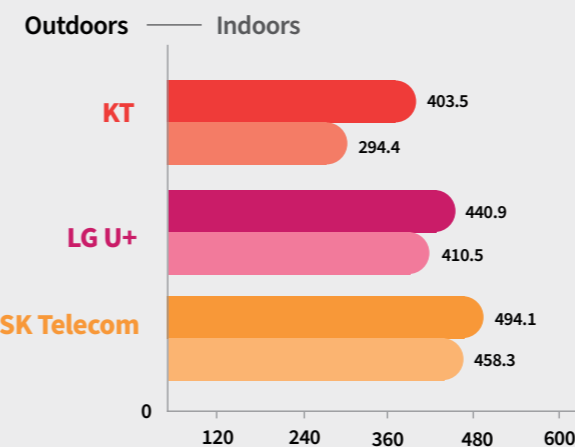
SK TELECOM

A look at 5G outdoors vs. indoors

All three operators delivered faster 5G speeds outdoors compared to those recorded indoors, but the differences in 5G availability weren’t as clear cut. The 5G availability of KT and SK Telecom were similar both outdoors and indoors, but LG U+’s 5G availability indoors was almost 10% higher than its outdoor 5G availability.

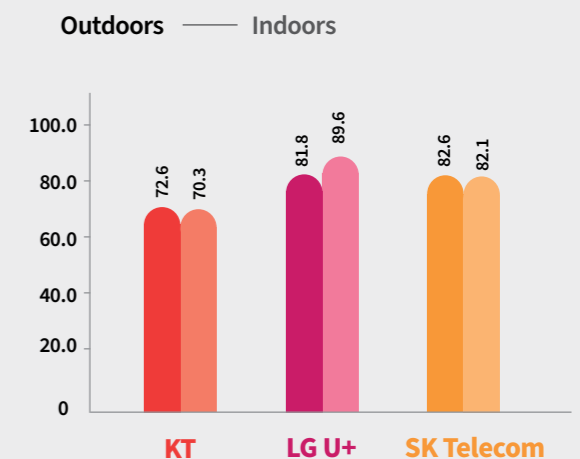
5G median download speeds (Mbps)

Scale: 0-600 Mbps



5G availability (%)

Scale: 0-100%





Gwangju

SK Telecom delivers the fastest speed in Gwangju, but performance was strong across the board.

KT offers strong results in general, though its speed trailed those of LG U+ and SK Telecom:

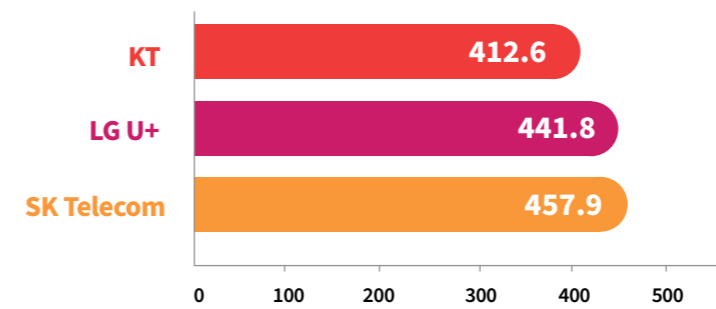
KT's 5G availability of 73.2% was effectively identical to that of LG U+ (73.1%) and will allow users to connect to 5G most of the time in Gwangju. While the operator's median download speed of 412.6 Mbps was the slowest in the city, KT subscribers will nonetheless find quick access to content. Meanwhile, KT's latency of 27.0ms was impressive and will provide users with minimal delays while using their smartphones.

LG U+ performs well in Gwangju, delivering broad 5G availability and fast speeds: LG U+'s 5G availability of 73.1% will provide users with extensive access to 5G in Gwangju, and the operator's impressive median download speed of 441.8 Mbps will allow for fast file downloads and quick streaming. LG U+ also offered low latency of 30.0ms, which while a bit higher than that of either KT or SK Telecom, will provide subscribers with a generally seamless mobile experience.

SK Telecom registers the fastest speed in the city and strong results across the board: SK Telecom's median download speed in Gwangju clocked in at an excellent 457.9 Mbps, which is great news for users who want incredibly fast access to content. SK Telecom also led the way in terms of latency, recording the lowest latency in the city at 25.5ms, and the operator's 5G availability of 72.5% was strong and similar to those of the other operators. In short, SK Telecom users should enjoy fast speeds, extensive access to 5G, and very few, if any, delays while using their smartphones.

Overall median download speeds (Mbps)

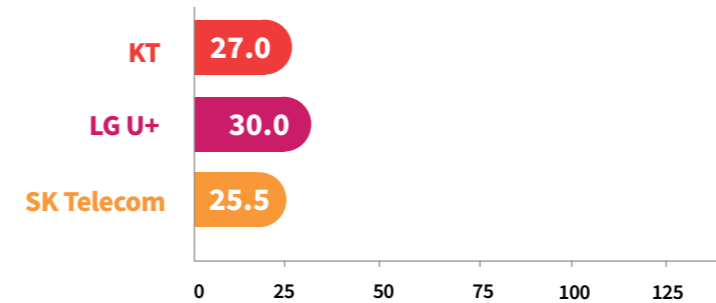
Scale: 0-500 Mbps



*Median download speeds factor in speeds recorded across all network technologies (5G, mixed mode, and non-5G).

Latency

Scale: 0-125



*Latency factors in web and app latency results recorded across all network technologies (5G, mixed mode, and non-5G).

5G Availability (%)



KT



LG U+



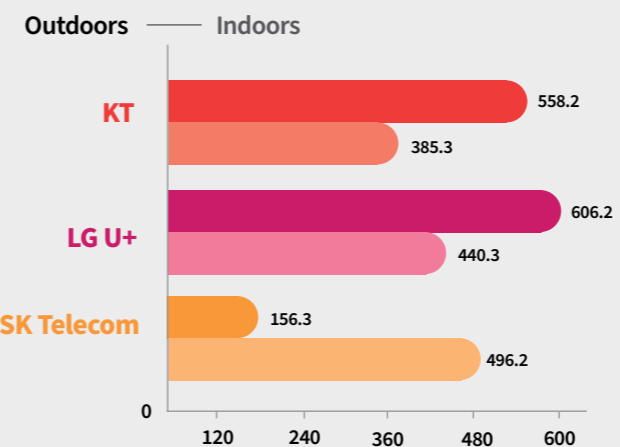
SK TELECOM

A look at 5G outdoors vs. indoors

5G performance was generally much better outdoors than indoors in Gwangju, though SK Telecom's 5G speed outdoors (156.3 Mbps) was a clear outlier. LG U+ was especially impressive outdoors, clocking a 5G median download speed in excess of 600 Mbps.

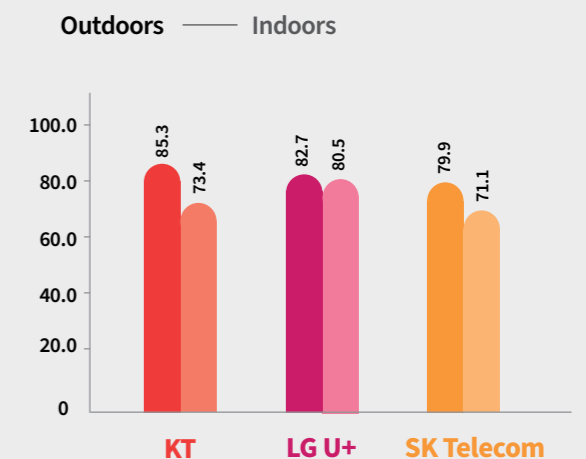
5G median download speeds (Mbps)

Scale: 0-600 Mbps



5G availability (%)

Scale: 0-100%





Incheon

LG U+ posts outstanding results across the board in Incheon.

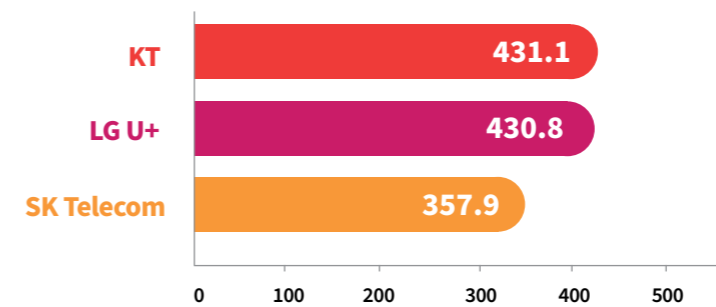
KT provides fast speeds and low latency in Incheon: While KT's 5G availability of 70.5% was the lowest in Incheon, users will still be able to connect to 5G most of the time in the city. Meanwhile, the operator's excellent median download speed of 431.1 Mbps, which was nearly identical to that of LG U+, will let users download content incredibly quickly, and KT's low latency of 27.5ms will provide a generally seamless mobile experience.

LG U+ offers by far the most 5G in Incheon, along with fast speeds and low latency: LG U+'s 5G availability of 94.5% will give users nearly universal access to 5G in Incheon, and the operator's impressive median download speed of 430.8 Mbps will allow for speedy access to content and entertainment. LG U+ also offered the lowest latency in the city, providing users with a smooth mobile experience across a host of activities, from streaming videos to mobile gaming and much more.

SK Telecom offers strong speeds but the highest latency in the city: SK Telecom's 5G availability of 75.9% was generally expansive and a bit higher than that of KT, and while the operator's median download speed of 357.9 Mbps was the slowest in the city, SK Telecom subscribers should still experience fast downloads. Meanwhile, SK Telecom's latency of 44.5ms was much higher than those of the other operators.

Overall median download speeds (Mbps)

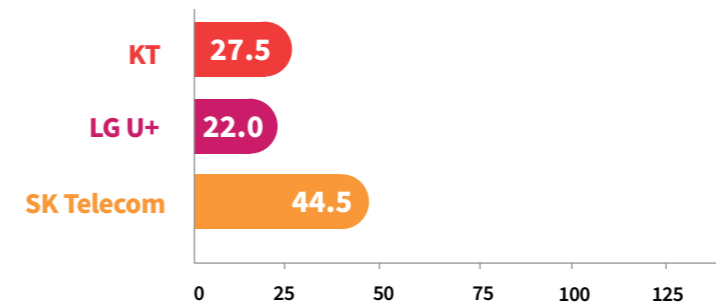
Scale: 0-500 Mbps



*Median download speeds factor in speeds recorded across all network technologies (5G, mixed mode, and non-5G).

Latency

Scale: 0-125



*Latency factors in web and app latency results recorded across all network technologies (5G, mixed mode, and non-5G).

5G Availability (%)



KT



LG U+



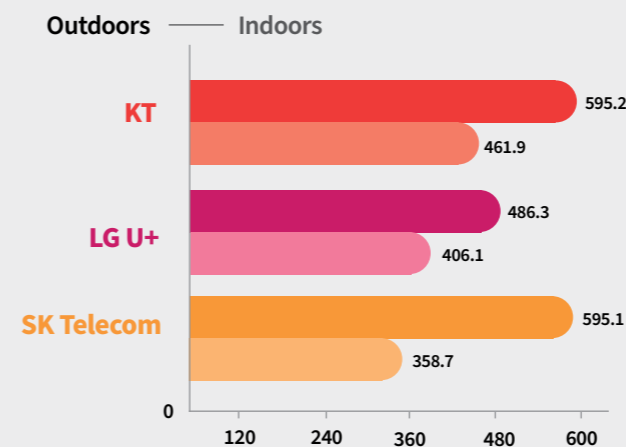
SK TELECOM

A look at 5G outdoors vs. indoors

While 5G speeds in Incheon were much faster outdoors than indoors, the differences in 5G availability generally weren't as stark, with both LG U+ and SK Telecom registering similar 5G availability both outdoors and indoors. Notably, LG U+'s 5G availability of 99.7% outdoors was particularly impressive.

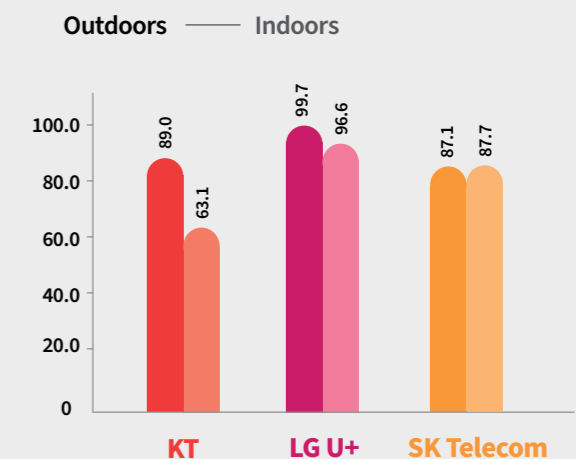
5G median download speeds (Mbps)

Scale: 0-600 Mbps



5G availability (%)

Scale: 0-100%



Seoul

LG U+ leads the way in Seoul, registering the highest 5G availability, fastest median download speed, and lowest latency.

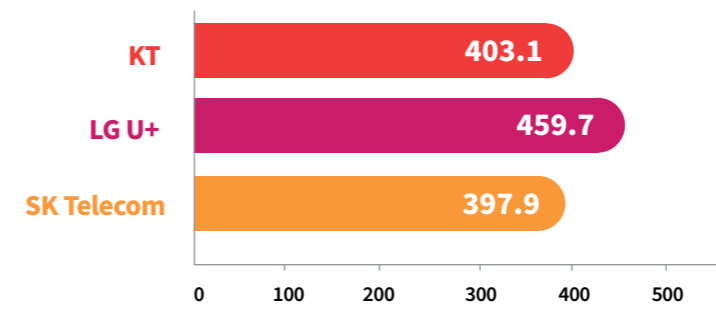
KT registers impressive 5G availability, strong speeds, and low latency: KT's 5G availability of 78.8% was higher than that of SK Telecom but much lower than that of LG U+. Likewise, KT's median download speed was a bit faster than that of SK Telecom and should provide users with quick access to content. Meanwhile, KT's latency of 26.0ms was low and should allow subscribers to stream movies or play video games without delays.

LG U+ posts exceptional results in Seoul: LG U+ shined in Seoul, registering the highest 5G availability at 90.9%, the fastest median download speed at 459.7 Mbps, and the lowest latency at 22.0ms. In short, LG U+'s impressive speeds will provide users with the quickest access to content of any operator in the city, and LG U+ subscribers should find nearly universal access to 5G.

SK Telecom delivers the lowest 5G availability, slowest median download speed, and highest latency: SK Telecom's 5G availability of 71.3% was the lowest in Seoul, and its median download speed of 397.9 Mbps was the slowest in the city. That said, the operator's speed was still strong and should provide users with fast file downloads. On the other hand, SK Telecom's latency of 45.0ms was easily the highest in the city.

Overall median download speeds (Mbps)

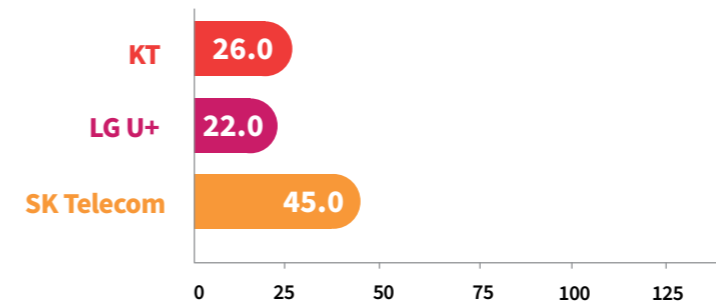
Scale: 0-500 Mbps



*Median download speeds factor in speeds recorded across all network technologies (5G, mixed mode, and non-5G).

Latency

Scale: 0-125



*Latency factors in web and app latency results recorded across all network technologies (5G, mixed mode, and non-5G).

5G Availability (%)



KT



LG U+



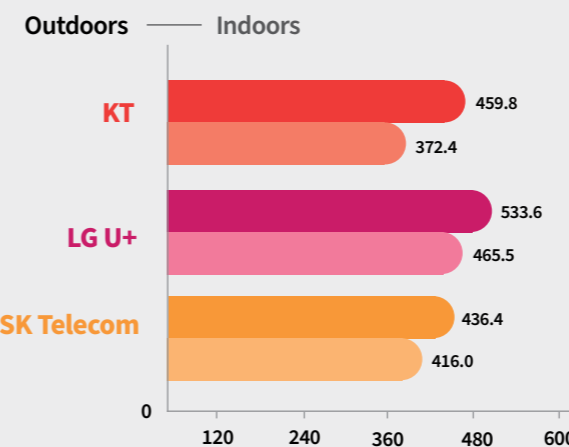
SK TELECOM

A look at 5G outdoors vs. indoors

All operators in Seoul registered higher 5G availability and faster 5G median download speeds during outdoor testing, though LG U+ in particular excelled outdoors.

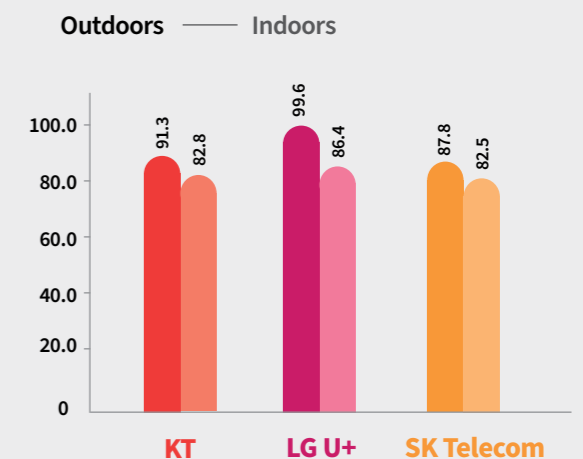
5G median download speeds (Mbps)

Scale: 0-600 Mbps



5G availability (%)

Scale: 0-100%



Ulsan

KT delivers the highest 5G availability and fastest speeds in Ulsan.

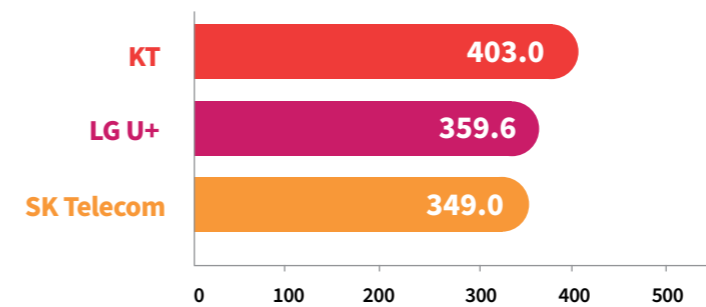
KT provides the highest 5G availability in Ulsan with the fastest speed: KT's 5G availability of 85.0% in Ulsan was the highest in the city and will give users extensive access to 5G. KT also delivered the fastest median download speed at 403.0 Mbps, providing subscribers with the fastest access to content of any network in Ulsan. The operator's latency of 30.0ms, meanwhile, was low and should allow for a seamless mobile experience.

LG U+ offers the lowest 5G availability in Ulsan but a solid speed: LG U+ recorded the lowest 5G availability in the city at 59.4%, a median download speed at 359.6 Mbps, and the highest latency at 85.0ms. That said, LG U+ users should connect to 5G the majority of the time in Ulsan, and the operator's speed will let users download files quickly. On the other hand, LG U+'s latency of 85.0ms was much higher than that of any other operator in the city.

SK Telecom delivers the lowest latency in Ulsan with a strong speed: SK Telecom's latency of 25.5ms was the best of any network in the city and will provide users with smooth mobile gaming and a delay-free experience across a host of data activities. Meanwhile, the operator's 5G availability of 63.4% was a bit higher than that of LG U+ but much lower than that of KT, and while SK Telecom's solid median download speed of 349.0 Mbps was the slowest in the city, it was still fast enough to allow for quick file downloads.

Overall median download speeds (Mbps)

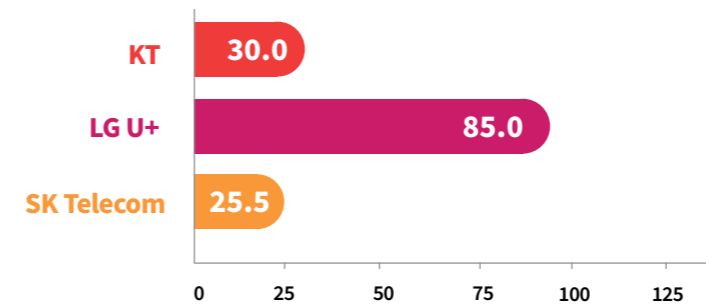
Scale: 0-500 Mbps



*Median download speeds factor in speeds recorded across all network technologies (5G, mixed mode, and non-5G).

Latency

Scale: 0-125



*Latency factors in web and app latency results recorded across all network technologies (5G, mixed mode, and non-5G).

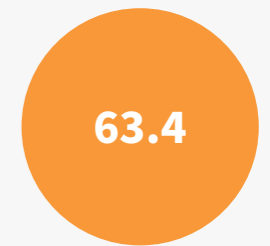
5G Availability (%)



KT



LG U+



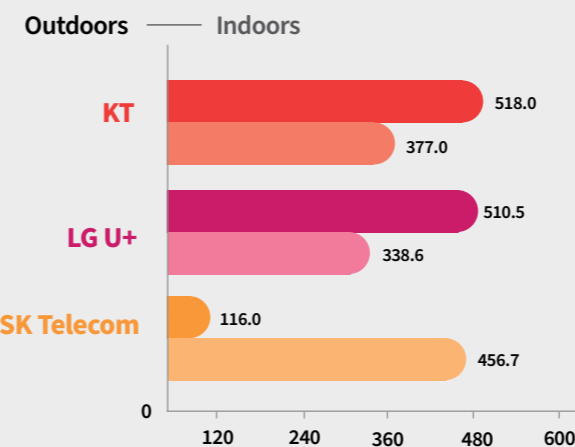
SK TELECOM

A look at 5G outdoors vs. indoors

5G speeds were generally better outdoors than indoors in Ulsan, though SK Telecom's 5G speed outdoors was much slower than its indoor speed. 5G availability, on the other hand, was typically better indoors, with both LG U+ and SK Telecom recording higher 5G availability indoors.

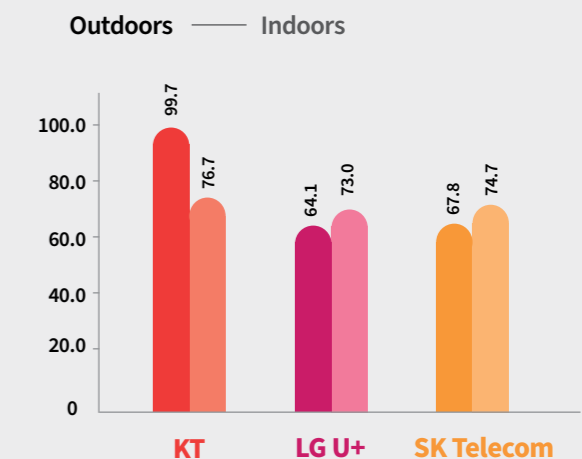
5G median download speeds (Mbps)

Scale: 0-600 Mbps



5G availability (%)

Scale: 0-100%



Conclusion and looking ahead

5G performance in South Korea was brilliant and could serve as a blueprint for 5G deployments in other cities across the world as our connected communities continue to grow. Not only are South Korean operators providing users with expansive access to 5G, fast speeds, and low latency, they're also leading the worldwide 5G race, and at least for now, they've built a commanding lead.

The improvements we saw in Seoul over the past year were also incredibly impressive and show that the operators remain steadfast in their goals to provide users with an optimal 5G experience. While 5G in South Korea remains far ahead of that in Switzerland, the UK, and the US, the fact that the South Korean operators showed such dramatic improvements in relatively short order suggest that networks in other countries could follow suit, which would level the worldwide 5G playing field.

In addition to the continued expansion and improvements to 5G networks in South Korea and beyond, the recent release of the iPhone 5G could also help bring further parity to the global 5G landscape. In the meantime, stay tuned to [RootMetrics.com](https://www.rootmetrics.com) for more insights on the real-world 5G experience in cities across the world.

How we test & appendix

We believe that real-world results come from real-world testing. All RootMetrics testing is conducted from the consumer's point of view. We used a Samsung Galaxy S20 5G to test the networks of KT, LG U+, and SK Telecom in each of the seven South Korean cities we tested in the second half of 2020. The smartphones we used during testing were purchased off the shelf from operator stores to test both 5G and 4G LTE performance, and tests were conducted during the day and night while walking and driving.

To assure results reflect the typical consumer experience, testing utilized a regional AWS server located within South Korea. To minimize the impact of significant outlier results (i.e., a single excessively fast or slow test result) and provide insight into the most likely experience, RootMetrics always reports on median rather than average speeds.

We utilized random sampling techniques to ensure our results offer a robust, objective, and accurate characterization of performance in the places consumers most often use their smartphones in South Korea, and all testing is designed to reflect the real-world end-user experience. To learn more about our testing, visit the [methodology page](#) of our website.

Appendix: city-specific testing facts and figures

| City | Dates | Total tests | Kilometers driven | Indoor locations tested |
|---------|--------------|-------------|-------------------|-------------------------|
| Busan | 10/9 - 10/12 | 10,415 | 481 | 22 |
| Daegu | 10/5 - 10/8 | 10,527 | 538 | 24 |
| Daejeon | 9/15 - 9/18 | 10,584 | 447 | 25 |
| Gwangju | 9/19 - 9/22 | 10,145 | 491 | 22 |
| Incheon | 9/26 - 9/29 | 9,333 | 504 | 20 |
| Seoul | 9/16 - 9/24 | 18,573 | 1,114 | 39 |
| Ulsan | 9/23 - 9/26 | 10,116 | 481 | 23 |



For more information, visit

