

# A look at 5G in South Korea: consumers enjoying incredible 5G availability and speeds

RootMetrics®

South Korean operators continue to set the global standard for 5G



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RootMetrics has tested 5G performance in South Korea multiple times dating back to initial deployments in 2019, and our results continue to show a common theme: South Korean mobile operators continue to provide users with a stellar combination of 5G availability, speed, and latency that far surpasses what we're seeing in other countries.

As the first country to launch 5G on a broad scale, South Korea's 5G performance been outstanding, and as the networks have matured and expanded over time, 5G in the country has continued to become even faster and more widely available.

In fact, 5G in South Korea could help unlock new and exciting use cases that require great speeds and low latency, from immersive AR/VR applications to IoT use cases and even the Metaverse at large.

To check in on the progress of 5G in South Korea, we tested KT, LG U+, and SK Telecom in both Busan and Seoul in the first half of 2022. All three operators provided users with broad 5G availability and excellent speeds in both cities, and our testing also showed continued progress since our previous round of testing in the first half of 2021.

Read on to see how the operators performed during testing in Busan and Seoul in early 2022.

# Benchmarking what matters most

To provide a holistic view of each operator's real-world performance, we've included visuals showing 5G availability and other performance results along with key insights for the end-user experience in the two 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). However, to provide the most accurate view of a true 5G experience and to allow for the most direct comparisons between operators, the 5G availability metrics in this report reflect results recorded entirely on 5G and do not factor in mixed mode results.



## Overall median download speeds

Unless specifically noted as a "5G median download speed," the median download speeds in this report reflect the overall speeds we recorded across all network technologies, including 5G, mixed mode, and 4G LTE. Since users may switch between different network technologies while using their smartphones, 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, we've included speeds recorded only on 5G to show what to expect when a user connects to 5G. It's worth noting that the International Mobile Telecommunications Union (**IMT-2020**) has set expectations for "true" 5G median download speeds as those consistently reaching or exceeding 100 Mbps, and all operators in South Korea surpassed that mark in both cities.

To assure our testing matches with the well-established methodology followed by the South Korean government's testing, all speed results within this report reflect Sustained Median Download Speeds. This approach allows for more direct comparisons between our testing and results reported by the Ministry of Science and ICT.



## 5G contribution to overall ENDC speeds

**ENDC** (E-UTRAN New Radio - Dual Connectivity) is a **non-standalone** 5G architecture that allows smartphones to access both 5G and 4G LTE networks at the same time. ENDC combines the bandwidth of both 5G and 4G LTE, allowing operators to boost 5G availability, improve reliability, and provide faster speeds.

Using our "lower-layer" data, which allows for deeper-dive analysis and insights, we looked at how 5G contributed to overall ENDC median download speeds for each operator across both indoor and outdoor testing. For more on ENDC, please see the appendix for more information.



## Latency

Latency refers to 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 secure web and app latency testing, which characterizes use cases that require continuous data usage such as gaming, streaming videos, and AR/VR applications over secure connections. The lower the latency, the better the end-user experience. As a frame of reference, major cloud gaming platform **Microsoft Xbox Game Pass recommends** latency below 60ms for optimal mobile cloud gaming.

## Executive summary

# South Korea testing overview

To show what to expect from South Korean mobile operators in Seoul and Busan in 1H 2022, we measured mobile performance indoors and outdoors in both cities where and when people most often use their smartphones: tourist areas, business districts, and other areas at times of peak mobile usage. Tests were conducted while walking and driving and are designed to represent the end-user's real-world mobile experience.



Where we tested  
**Seoul and Busan**



Dates of testing  
**26 April 2022 – 14 May 2022**



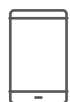
Total test samples collected  
**74,388**



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



Indoor locations visited  
**169**



Device used  
**Samsung Galaxy S22+ 5G**



Kilometers driven  
**3,659**



Executive summary

# 5G in Seoul: operator improvements lead to nearly universal 5G availability in 1H 2022

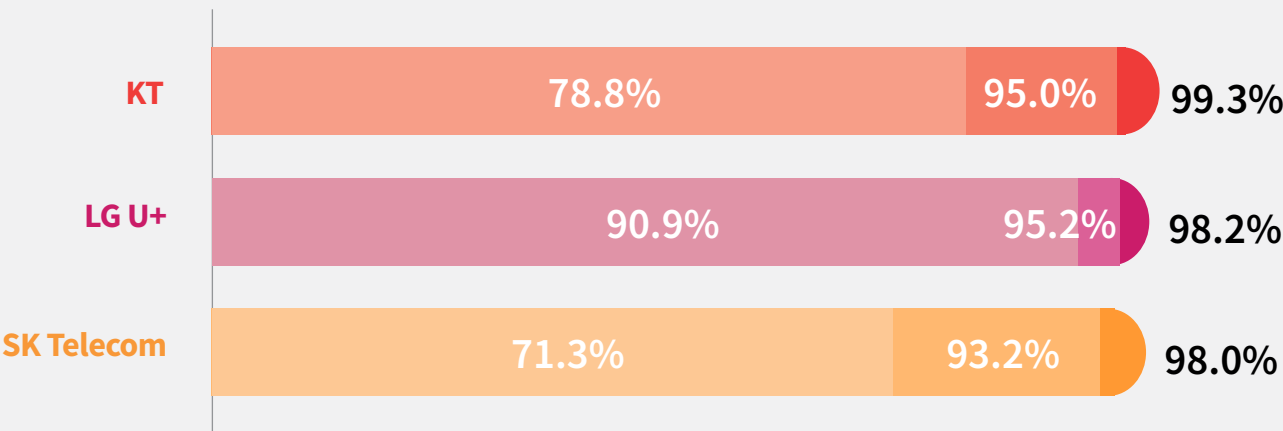
During our previous testing in Seoul in 1H 2021, all three operators recorded 5G availability of at least 93.2%, with LG U+ leading the way at 95.2%. While those numbers didn't leave much room for improvement, the operators nevertheless improved over the past year: in the first half of 2022, for instance, 5G availability was close to 100% for each operator. Moreover, two out of three operators delivered faster speeds since 1H 2021.

5G availability in Seoul on the rise and providing users with nearly universal access to 5G

While 5G availability in Seoul has been impressive from the start, the operators have steadily expanded their 5G networks in the city over the past few years. 5G availability was particularly widespread in 1H 2022, with all three operators recording availability of at least 98.0%. In contrast, during the second half of 2020, 5G availability ranged from 71.3% to 90.9%, while in early 2021, 5G availability was above 93% for all three networks. In short, consumers in Seoul continue see higher and higher 5G availability over time, allowing users to enjoy the operators' excellent and improved speeds more often.

5G availability (%) | Seoul

2H 2020 — 1H 2021 — 1H 2022

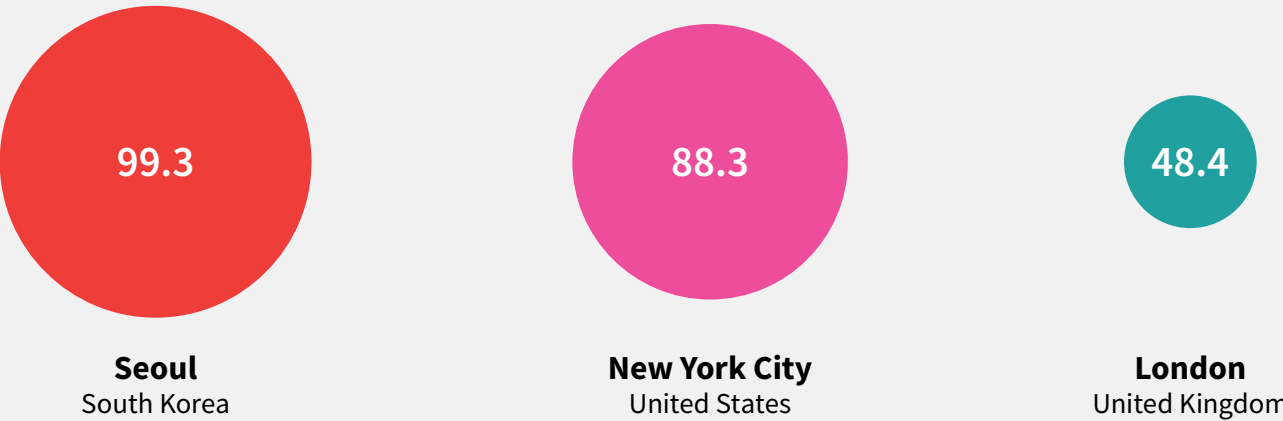


Consumers in Seoul enjoying far higher 5G availability than users in other major cities

KT registered the highest 5G availability in Seoul at 99.3%, but LG U+ and SK Telecom weren't far behind, with only about one percent separating all three operators' 5G availability in the city. In comparison, 5G availability didn't reach 90% in either London or New York City.

Highest 5G availability in major cities (%)

KT T-Mobile EE



# Executive summary

## 5G availability and latency by operator

### 5G availability

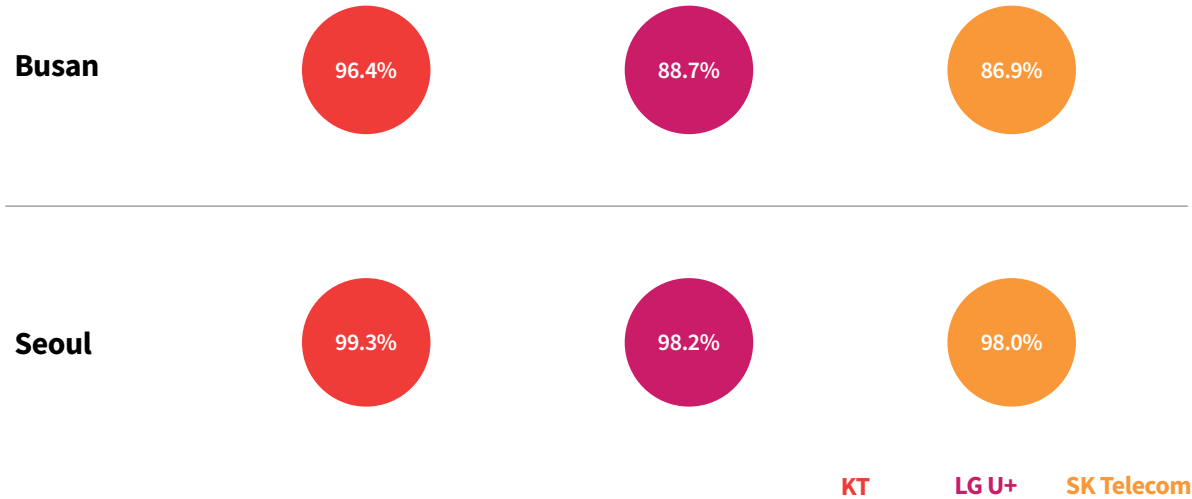
**5G availability in South Korea was remarkable:** While 5G availability was widespread for all three operators, KT stood out as the only operator whose 5G availability exceeded 90% in both cities, at 96.4% in Busan and 99.3% in Seoul. It's also worth noting that most of our results showed KT using its **standalone 5G network**, a form of 5G that doesn't rely on 4G LTE as the foundation of the 5G experience and should provide faster speeds and lower latency than non-standalone (NSA) 5G networks.

**5G availability in Seoul was especially widespread:** 5G availability in Busan was impressive (at least 86.9%), but the operators took it to another level in Seoul. Each operator posted 5G availability of 98.0% or higher, allowing consumers in Seoul to access 5G nearly all the time.

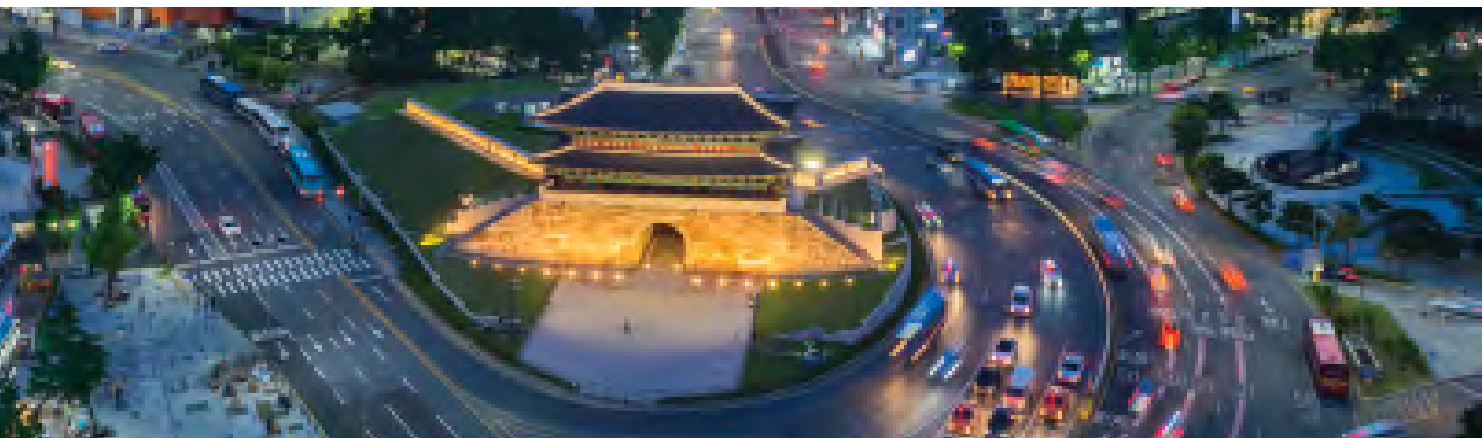
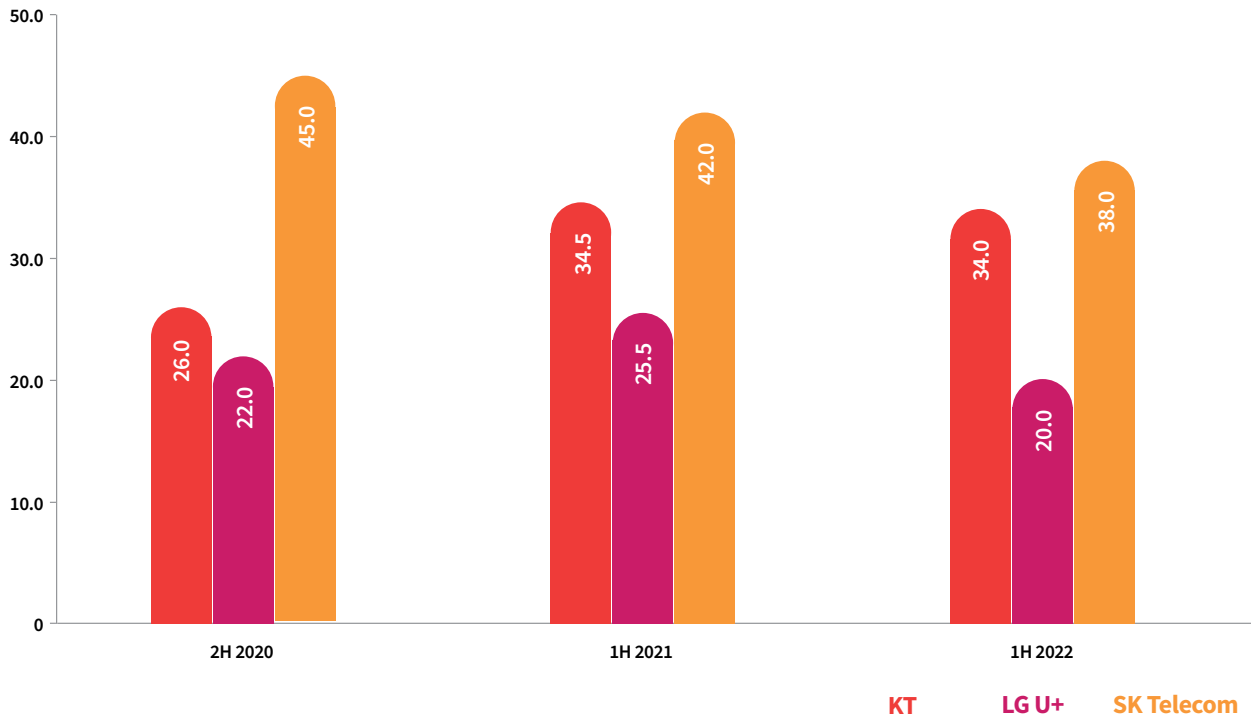
### Latency

**Latency improves for all networks in Seoul:** When latency is below roughly 50-60 ms, consumers should be able to enjoy responsive gaming and HD video streaming with little to zero delay. The good news for users in Seoul is that latency didn't exceed 38.0 ms on any operator's network. LG U+ registered the lowest latency in either city tested at 20.0 ms in Seoul (an improvement from 25.5 ms in 1H 2021), while KT and SK Telecom both delivered improved latency results compared to those in 2021.

### 5G availability (%)



### Latency (ms) – Seoul



Executive summary

# Overall median download speeds and bandwidth used by operator

Consumers in Seoul enjoying median download speeds over 580 Mbps for all networks

Looking back to the second half of 2020, mobile users in Seoul have benefited from continued investment in 5G infrastructure. Indeed, the operators' speeds have shown significant improvements since 2020. LG U+ was particularly fast, clocking in at 663.4 Mbps, marking a huge increase of more than 200 Mbps since 2H 2020.

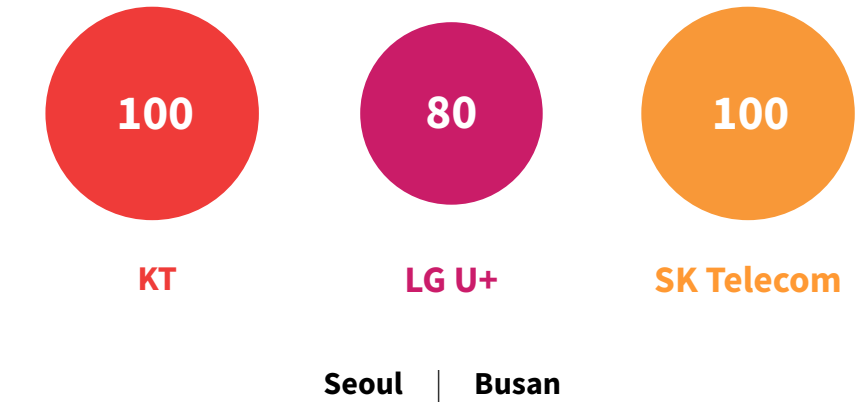
**KT improves its speeds in Seoul:** KT's overall median download speed of 585.5 Mbps trailed those of LG U+ (663.4 Mbps) and SK Telecom (614.8 Mbps) but was still impressive. KT's overall median download speed improved considerably from 403.1 Mbps in 2020 to nearly 600 Mbps in 2022.

**LG U+ leads for speed in Seoul:** LG U+ delivered outstanding results in Seoul. LG U+'s median download speed of 663.4 Mbps was not only the fastest in the city, but it also marked a huge jump from its speed of 459.7 Mbps in 2020. At 663.4 Mbps, LG U+ users could download a 600MB video from Netflix in just eight seconds.

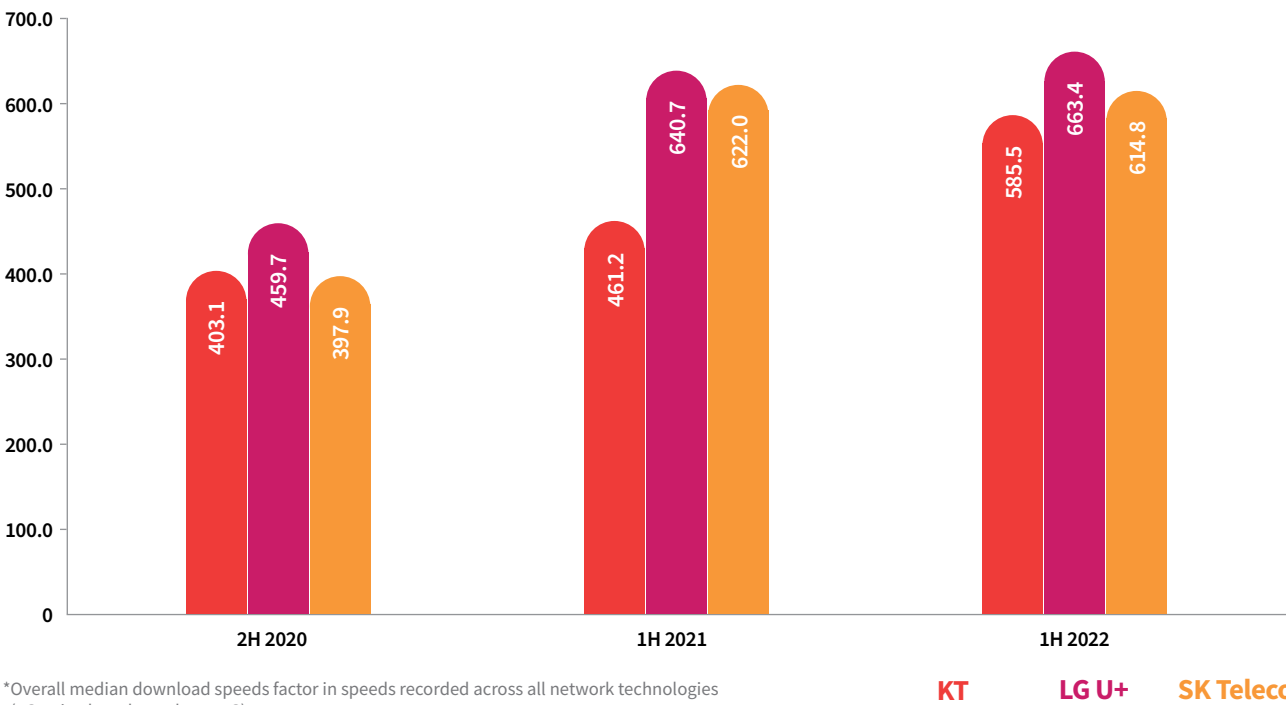
**SK Telecom delivers fast speeds in Seoul:** SK Telecom continued to deliver fast median download speeds. SK Telecom's median download speed of 614.8 Mbps in Seoul trailed that of only LG U+ and represented a significant improvement from 397.9 Mbps in 2020.

**LG U+ in Seoul uses its 5G bandwidth more efficiently than the other operators:** While LG U+ had less 5G bandwidth (80 MHz) than either KT or SK Telecom (100 MHz each) in Seoul, our results showed that LG U+ made the most efficient use of its 5G bandwidth in the city.

5G bandwidth used (MHz)



Overall median download speed (Mbps) Seoul – 2020 to 2022



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

5G results by city

# A look at operator performance in Seoul and Busan



# Seoul

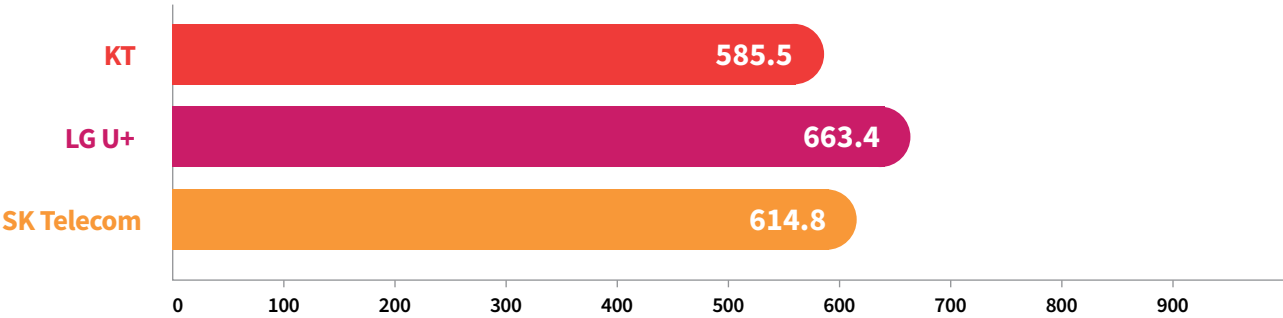
LG U+ leads the way in Seoul, with the fastest median download speed, the lowest latency, and 5G availability above 98%.

**KT posts the highest 5G availability in Seoul, with strong speeds and low latency:** All three operators offered outstanding 5G availability of at least 98.0% in Seoul, but KT led the way at 99.3%, with most of KT’s tests recorded on its standalone 5G network (the only such network currently available in South Korea). While KT’s overall median download speed of 585.5 Mbps was the “slowest” in the city, it was still quite fast and represented an increase from 461.2 Mbps in 1H 2021. KT’s latency of 34.0 ms was also impressive and low enough for smooth HD video streaming and responsive gaming.

**LG U+ shines in Seoul:** LG U+ clocked the fastest overall median download speed in Seoul at 663.4 Mbps (up from 640.7 Mbps last time), the lowest latency at 20 ms, and excellent 5G availability of 98.2%. In short, LG U+ users should find almost universal access to 5G, along with low latency and speeds fast enough for incredibly quick access to content.

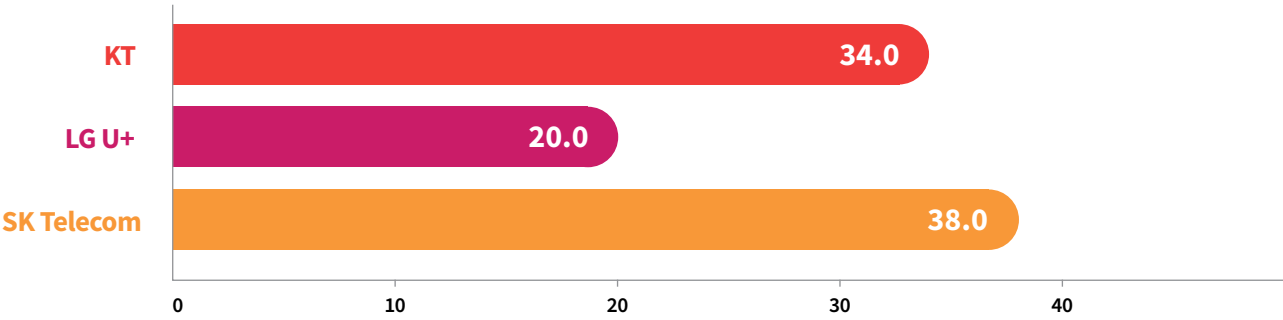
**SK Telecom exceeds 600 Mbps with low latency:** SK Telecom’s overall median download speed of 614.8 Mbps, while down slightly from 622.0 Mbps in 1H 2021, was the second fastest in Seoul, surpassing that of KT (585.5 Mbps) but trailing that of LG U+ (663.4 Mbps). SK Telecom’s latency of 38.0 ms, meanwhile, was the “highest” in the city but still easily low enough for excellent gaming. With 5G availability of 98.0%, SK Telecom customers in Seoul should enjoy incredibly widespread access to 5G, along with fantastic speeds and low latency.

Overall median download speeds (User experience across all network types)  
Scale: 0-1,000 Mbps



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

Latency (ms)  
Scale: 0-50



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

5G availability (%)



## Contribution of 5G (NR) to overall median download speeds

Our testing measures speed results from multiple angles. 5G networks today use a technology called EN-DC (E-UTRA NR – Dual Connectivity). The key benefit of EN-DC is that it allows mobile network operators to send data to your 5G device over both 4G (LTE) and 5G (NR) radio air interface from the network. The addition of 5G (NR) to existing 4G (LTE) spectrum increases the overall data speed available to end users. The charts on this page show the 5G (NR) data throughput side of EN-DC only to help understand the improvements in performance 5G (NR) technology is bringing to end consumers Korea in addition to underlying 4G (LTE) deployed Radio Access Network. To learn more about ENDC, see page 4 above or visit our [blog](#).

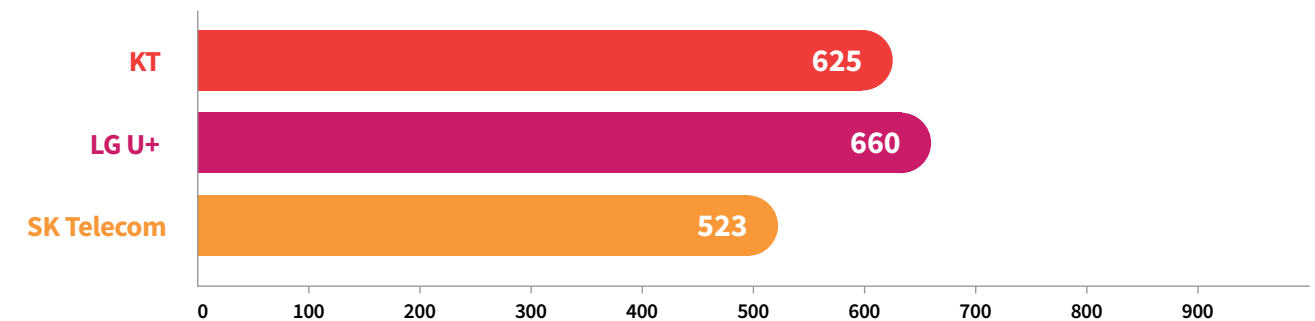
**KT was fast but slightly trails LG U+:** KT clocked in at 625 Mbps while on 5G, which was ahead of SK Telecom but slightly behind LG U+. KT performed especially well during indoor testing, where the operator edged past LG U+ to post the top indoor 5G speed of any operator.

**LG U+ leads for both 5G efficiency and speed in Seoul:** LG U+'s median download speed of 660 Mbps while on 5G was the fastest of any operator in Seoul, and LG U+ also registered the fastest 5G speed during outdoor testing. LG U+'s strong showing was largely due to its high level of network efficiency. 5G spectrum efficiency is a measure of speeds delivered for each physical resource block (PRB) of 5G spectrum, and LG U+ was the most efficient network in Seoul, coming in at 3.2 Mbps/PRB, compared to 2.4 Mbps/PRB for KT and 2.0 Mbps/PRB for SK Telecom.

**SK Telecom delivers strong and consistent 5G performance:** SK Telecom posted a great median download speed of 523 Mbps while on 5G, and the operator's 5G speeds during indoor and outdoor testing both exceeded 500 Mbps.

### Contribution of 5G to overall median download speeds

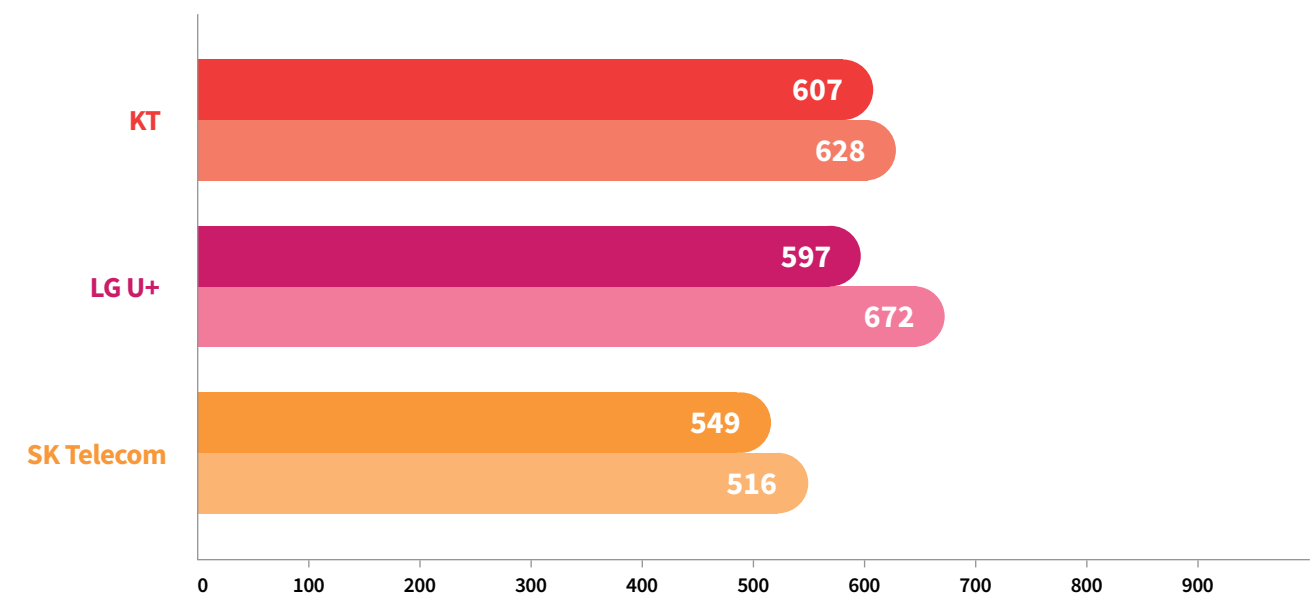
Scale: 0-1,000 Mbps



### Contribution of 5G to indoor and outdoor speeds

Scale: 0-1,000 Mbps

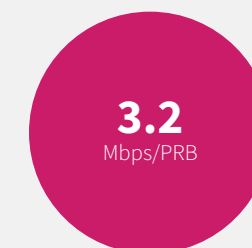
Indoors — Outdoors



### 5G spectrum efficiency in Seoul



KT



LG U+



SK Telecom

# Busan

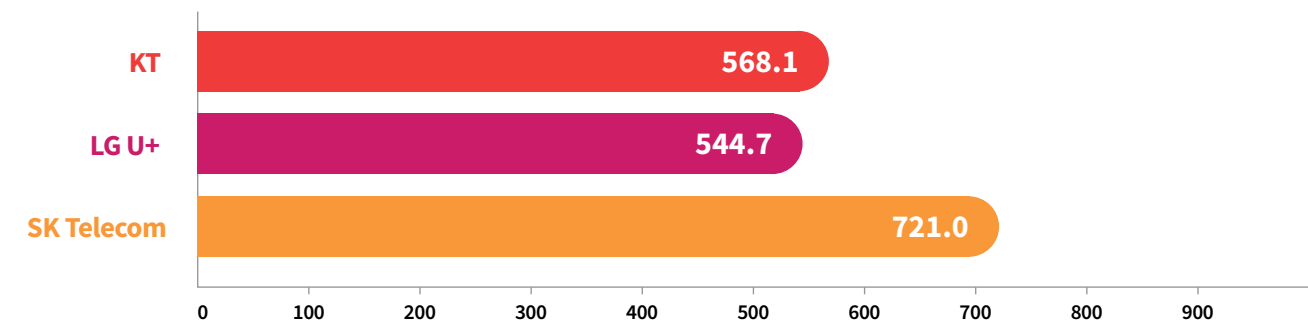
SK Telecom clocks the fastest overall median download speed in Busan, while KT offers the highest 5G availability.

**KT posts the most widespread 5G availability and second-fastest speed in Busan:** KT registered the highest 5G availability in Busan at 96.4%, and KT’s strong overall median download speed of 568.1 Mbps marked a significant improvement from 460.7 Mbps in 1H 2021. KT’s speed was a bit faster than that of LG U+ (544.7 Mbps) but much slower than that of SK Telecom (721.0 Mbps). KT’s latency of 40.5 ms, meanwhile, was nearly identical to that of SK Telecom (39.5 ms) and low enough for users to enjoy smooth gaming and video streaming.

**LG U+ shows broad 5G availability and fast speeds:** LG U+ users in Busan should see a strong combination of 5G availability plus speed. LG U+’s overall median download speed of 544.7 Mbps was over 100 Mbps faster than it was in 2021 (436.3 Mbps), and with 5G availability of nearly 90%, users should see great speeds nearly all the time. LG U+’s latency of 105.0 ms, however, was the highest in the city but low enough for most casual games and some multiplayer titles. Overall, LG U+’s results in Busan were excellent, and the operator performed even better in Seoul.

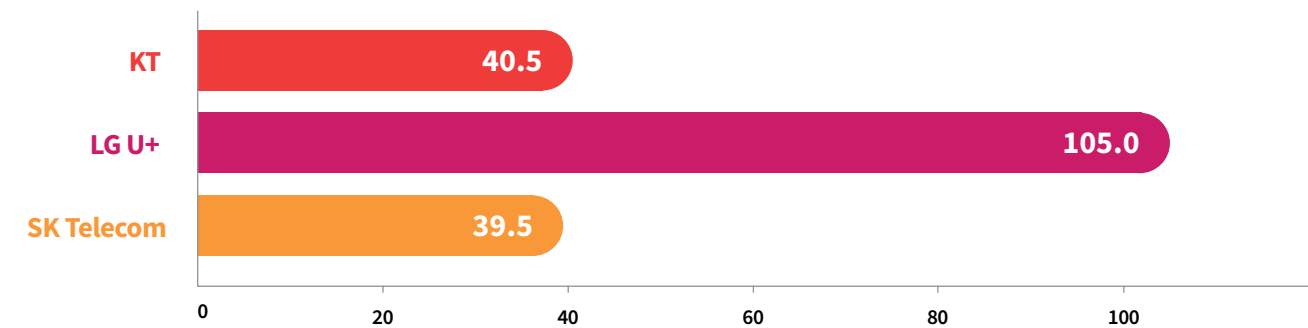
**SK Telecom was easily the fastest operator in Busan:** SK Telecom’s overall median download speed of 721.0 Mbps improved by nearly 90 Mbps since last time (632.4 Mbps). SK Telecom also offered the lowest latency in the city at 39.5 ms, which was well below that of LG U+ (105.0 ms) and slightly lower than that of KT (40.5 ms).

Overall median download speeds (User experience across all network types)  
Scale: 0-1,000 Mbps



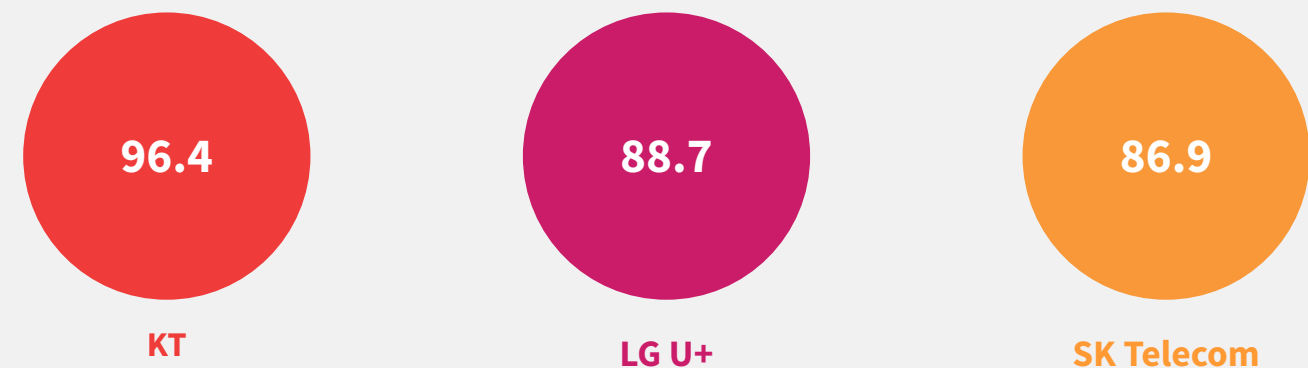
\*Median download speeds factor in speeds recorded across all network technologies (5G, mixed mode, and non-5G).

Latency (ms)  
Scale: 0-120



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

5G availability (%)



### Contribution of 5G (NR) to overall median download speeds

Our testing measures speed results from multiple angles. 5G networks today use a technology called EN-DC (E-UTRA NR – Dual Connectivity). The key benefit of EN-DC is that it allows mobile network operators to send data to your 5G device over both 4G (LTE) and 5G (NR) radio air interface from the network. The addition of 5G (NR) to existing 4G (LTE) spectrum increases the overall data speed available to end users. The charts on this page show the 5G (NR) data throughput side of EN-DC only to help understand the improvements in performance 5G (NR) technology is bringing to end consumers Korea in addition to underlying 4G (LTE) deployed Radio Access Network. To learn more about ENDC, see page 4 above or visit our [blog](#).

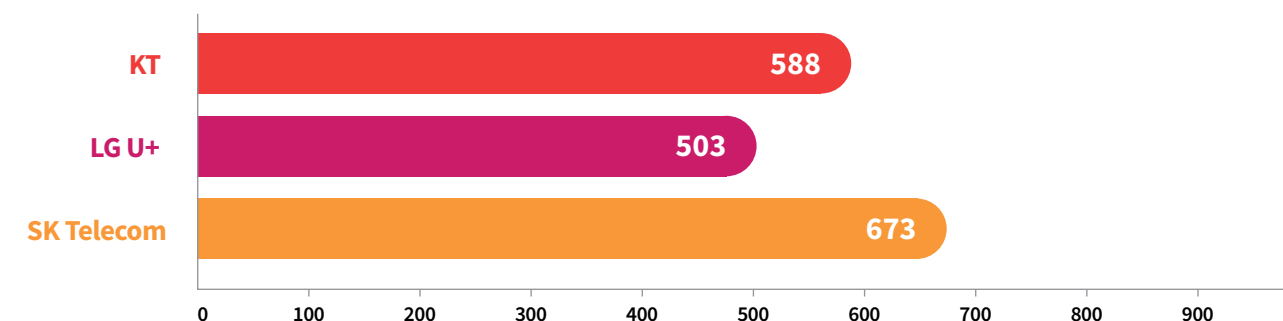
**KT faster than LG U+ but trails SK Telecom:** KT's speeds while on 5G impressed, nearly hitting 600 Mbps. KT's 5G was especially fast during indoor testing, posting a speed of 631 Mbps. While KT's 5G speeds were clearly strong, they trailed those of the city's speed leader SK Telecom.

**LG U+ posts slightly slower 5G speeds in Busan than in Seoul:** Although LG U+'s speeds in Busan trailed those of KT and SK Telecom, the operator's 5G performance was fast enough to provide users with quick file downloads and a fast experience in general.

**SK Telecom was the fastest and most efficient in Busan:** SK Telecom's speeds on 5G were the fastest both indoors and outdoors, and SK Telecom was the most efficient operator in Busan. 5G spectrum efficiency is a measure of speeds delivered for each physical resource block (PRB) of 5G spectrum, and as the visual below shows, SK Telecom was the most efficient network in Busan, delivering 2.7 Mbps/PRB, compared to 2.2 Mbps/PRB for KT and 2.4 Mbps/PRB for LG U+.

### Contribution of 5G to overall median download speeds

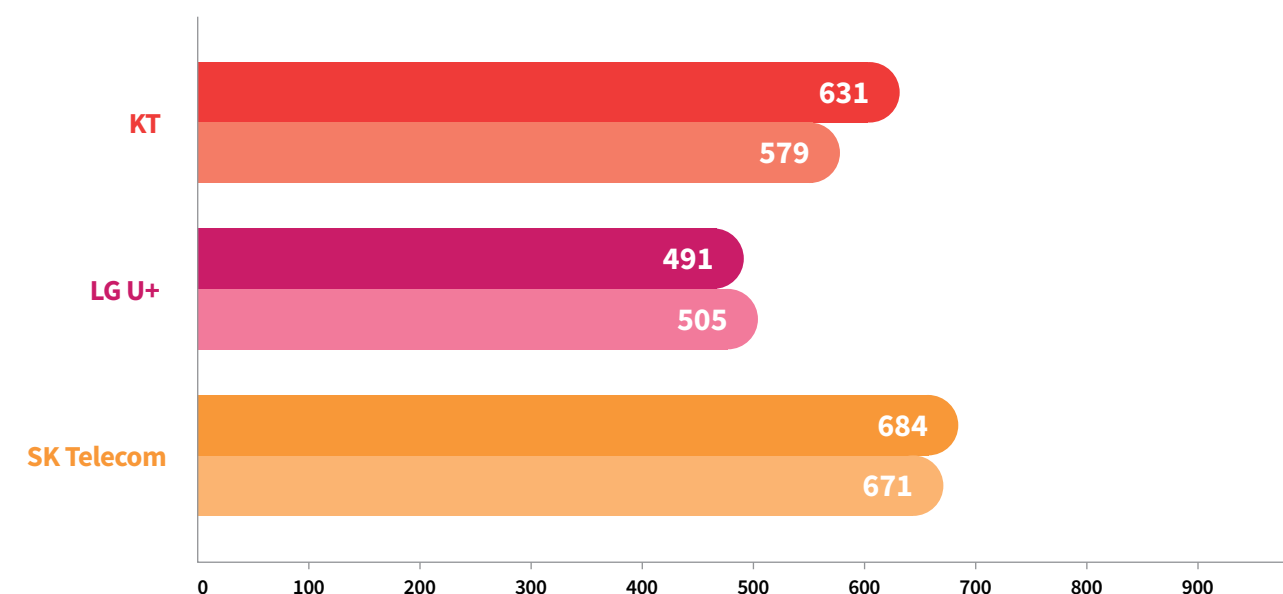
Scale: 0-1,000 Mbps



### Contribution of 5G to indoor and outdoor speeds

Scale: 0-1,000 Mbps

Indoors — Outdoors



### 5G spectrum efficiency in Busan



# Conclusion and looking ahead

The first half of 2022 marks the fifth time we've tested 5G in South Korea, and the operators once again delivered brilliant performances that top what we're seeing in other countries around the world. Indeed, 5G in South Korea could do more than serve as a blueprint for 5G deployments across the world; it could also enable a host of new and innovative use cases and perhaps prove critical in powering the growing Metaverse movement.

While we're seeing 5G improve and expand quickly in other countries, 5G in South Korea remains far ahead of the global competition. South Korean operators not only continue to provide users with widespread access to 5G, fast speeds, and low latency, but they've also shown strong improvements over time.

While KT currently has the country's first standalone 5G network, LG U+ and SK Telecom will soon deploy their own SA 5G networks. Once SA 5G becomes more widespread in Seoul and other cities, users should see even faster speeds, lower latency, and stronger overall 5G performance than what they're enjoying today.

# Appendix

## How we test

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 S22+ 5G to test the networks of KT, LG U+, and SK Telecom in both Busan and Seoul in the first half of 2022. The smartphones we used during testing were purchased off the shelf from operator stores to test both 5G and 4G LTE performance. Tests were conducted during the day and night while walking and driving.

To ensure 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 utilize 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, 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.

## A note about ENDC speeds

The ENDC speed results in this report reflect physical-layer (PDSHC) results, while all other speeds are application-level results. While physical-layer results are often more instructive for deeper-level analysis, application-level speeds are more representative of the real-world consumer speed experience.

That said, application-level speed results can often be up to 35% different than physical-layer speeds, so the ENDC speeds in this report likely won't match with other speed metrics in this report. Also note that unless specially stated as an "ENDC" speed, all other speed results in this report reflect application-level speeds. To learn more about ENDC, visit our [5G FAQ blog](#).