

OPEN SIGNAL

# 5G Global Mobile Network Experience Awards 2023

October 2023

Sam Fenwick, Principal Analyst

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# Introduction

Once again, Opensignal sheds light on the difference in the 5G experience seen by our users on different operators across the globe – to better inform users, operators and regulators – and to celebrate the mobile industry’s collective efforts.

While [5G adoption and deployments](#) have been rising quickly, the maturity of 5G networks varies widely between markets. Some have completed foundational deployments, and are driving into the next phase of 5G by deploying standalone access technology which enables advanced use cases like network slicing or leveraging mmWave to drive more differentiated experiences. Other markets are at an earlier stage in their 5G journey due to a combination of spectrum policy and availability, together with the amount of capital that their operators can invest. This complexity means that it remains as important as ever to understand the real-world 5G experience. Everyone wishes to quantify what 5G really means for mobile users.

5G is making a massive difference in many markets – dramatically increasing users’ download speeds and improving their experience when streaming video and playing multiplayer mobile games. In our recent [5G global benchmark insight](#), we found that typically, in markets where 5G is well established with sizable adoption, the improvement in average download speeds with 5G is 3-6 times faster than 4G. Similarly, users see significant – but smaller – boosts in their video streaming and multiplayer gaming experience with 5G.

Whether they are later or earlier in their 5G evolution, the challenge facing operators today – particularly in the current macroeconomic environment – is how to take advantage of the uplift in user experience that 5G provides to maximize their return on investment. This is best achieved by chief network officers targeting their next round of investment in the areas that create the most customer opportunity while chief marketing and revenue officers focus their offensive tactics in the areas where their mobile experience is superior to their competitors. While this report compares operators across markets – and in doing so highlights those that the mobile industry can learn the most from – Opensignal can go into far more granular detail if required, making it the perfect partner for those seeking to make the most from their investments in 5G.

This year we have decided to take a slightly different approach from previous 5G Global Awards. As it is a hugely different – and more difficult – undertaking to roll out 5G across a vast territory than across a small nation or city-state, we have split operators into two groups. Group I contains operators from markets with a land area of more than 200,000km<sup>2</sup> while Group II consists of operators whose home market is below this threshold. This allows for more meaningful comparisons and better reflects the difficulties associated with deploying 5G across large swathes of lightly populated terrain.

We have examined four key measures of the 5G experience and determined the 5G Global Winners for each group using confidence intervals as we do with all of our reports. If the confidence intervals overlap then the result is a statistical tie and we declare two or more operators to be joint winners. For each measure we have created a group of 5G Global Leaders – the operators that are in second through to fifth place, taking confidence intervals into account. The number of Global Leaders in each category varies due to statistical ties between operators’ scores. Given the rapid pace of change in 5G experience we have also compared how it has changed year-on-year. We’ve analyzed the difference between the first half of 2022 and the first half of 2023 and recognized the 15 operators in each group with the highest percentage improvements in our users’ experience in three categories – 5G Availability, 5G Download Speed, and 5G Games Experience.

## Key Findings

### T-Mobile USA and Puerto Rico triumph on 5G Availability

Our T-Mobile USA and Puerto Rico 5G users spend the greatest proportion of time with an active 5G connection in their respective groups (I and II), with scores of 56.1% and 65.3%. 5G Availability is an important measure of the mobile experience as users can only benefit from the superior experience that 5G provides when they have a 5G connection. Both operators beat the competition by impressive margins as the runners-up in Group I and II – India's Jio and South Korean KT score 41.6% and 49%, respectively.

### Sweden's Telenor, Malaysia's Unifi and South Korea's SK telecom are this year's kings of speed

Our Telenor and Unifi users observe the fastest average 5G Download Speeds in Group I, making the two operators 5G Global Winners with statistically tied scores of 407.4–421.7Mbps. They are followed by three 5G Global Leaders: Brazil's Vivo, Malaysia's Digi and TIM Brazil. In Group II, SK telecom is the sole 5G Global Winner with a score of 458.5Mbps – the other two South Korean operators – KT and LG U+ are 5G Global Leaders, along with Singapore's M1 and A1 Bulgaria.

### Across Group I markets, our users with Japan's SoftBank and Malaysia's Digi have the best experience when playing multiplayer mobile games on 5G

SoftBank and Digi share the top spot in Group I for 5G Games Experience with statistically tied scores of 89.7–90.2 points on a 100-point scale. Two other Malaysian operators are Global Leaders in Group I – Celcom and U Mobile, alongside Indonesia's Telkomsel. Singapore's Singtel reigns supreme in Group II with 93.7 points while its local rivals, StarHub and M1 are 5G Global Leaders as are Hong Kong's csl, 3, and CMHK.

### In Group I, Sweden's Telenor and Tele2 come top for 5G Video Experience

Swedish Telenor and Tele2 are Group I's 5G Global Winners with statistically tied scores of 78–78.6 points on a 100-point scale. The only 5G Global Leader in Group I which is not European, is Japan's SoftBank with

a score of 77.8 points. A much tighter race in Group II has resulted in a remarkable nine-way tie for the top spot consisting of Slovenia's Telemach, Telekom Slovenije and A1, Singapore's StarHub and Singtel, Magenta and A1 in Austria, Swisscom in Switzerland along with O2 in Slovakia.

### The Philippines' Globe and Denmark's Telia have made the most improvement in 5G Games Experience

In Group I, our Globe users observed the largest year-on-year (YoY) percentage increase in 5G Games Experience – a rise of 30.3%, followed by fellow 5G Global Rising Stars Movistar Chile with 26.7% and French Free Mobile with 26.1%. Turning to Group II, the greatest improvement was seen by our Telia users in Denmark – a rise of 23.1%, ahead of A1 Bulgaria's and Danish Telenor's increases of 19.8% and 19.2%.

### Brazilian 5G download speeds rocket upwards, while M1 and StarHub users see the largest boost in Group II

Brazilian operators take the first three places for the YoY percentage improvement in 5G Download Speed in Group I. Vivo tops the list of 5G Global Rising Stars, with an incredible increase of 829%, followed by TIM with 546.7% and Claro with 469.7%. These improvements were mainly driven by the ongoing rollout of 5G in the 3.5GHz band, which [began in Brasilia in mid-2022](#). In Group II, the gains were more modest, with Singapore's StarHub topping the table with a rise of 114%, followed by its 5G consortium partner, M1, with 103.8%.





### TIM Brazil and 3 Denmark top the charts for rises in 5G Availability

Our TIM users in Brazil observed the largest percentage improvement in 5G Availability across Group I – a rise of 559.8%, followed by Italy's Iliad with 461.4% and fellow Brazilian operator Vivo with an increase of 222.7%. In Group II, the operator with the largest YoY improvement in 5G Availability is Denmark's 3 with a rise of 175.1%, followed by M1 and StarHub with rises of 161.1% and 112.7%, respectively.

# Opensignal 5G Global Awards 2023 – Group I

## The Global Winners and Leaders



 5G Availability	T-Mobile USA	Jio India  WOM Chile	Vodafone Australia  Yes Malaysia	U Mobile Malaysia  DNA Finland
 5G Download Speed	Telenor Sweden  Unifi Malaysia	Vivo Brazil  Digi Malaysia	TIM Brazil	
 5G Games Experience	Digi Malaysia  SoftBank Japan	Celcom Malaysia  U Mobile Malaysia	Telkomsel Indonesia	
 5G Video Experience	Telenor Sweden  Tele2 Sweden	Telia Sweden  SoftBank Japan	3 Sweden  Telenor Norway	Telia Norway




Group I consists of operators in markets with a land area of more than 200,000km<sup>2</sup>

## Opensignal 5G Global Awards 2023 - **Group I**

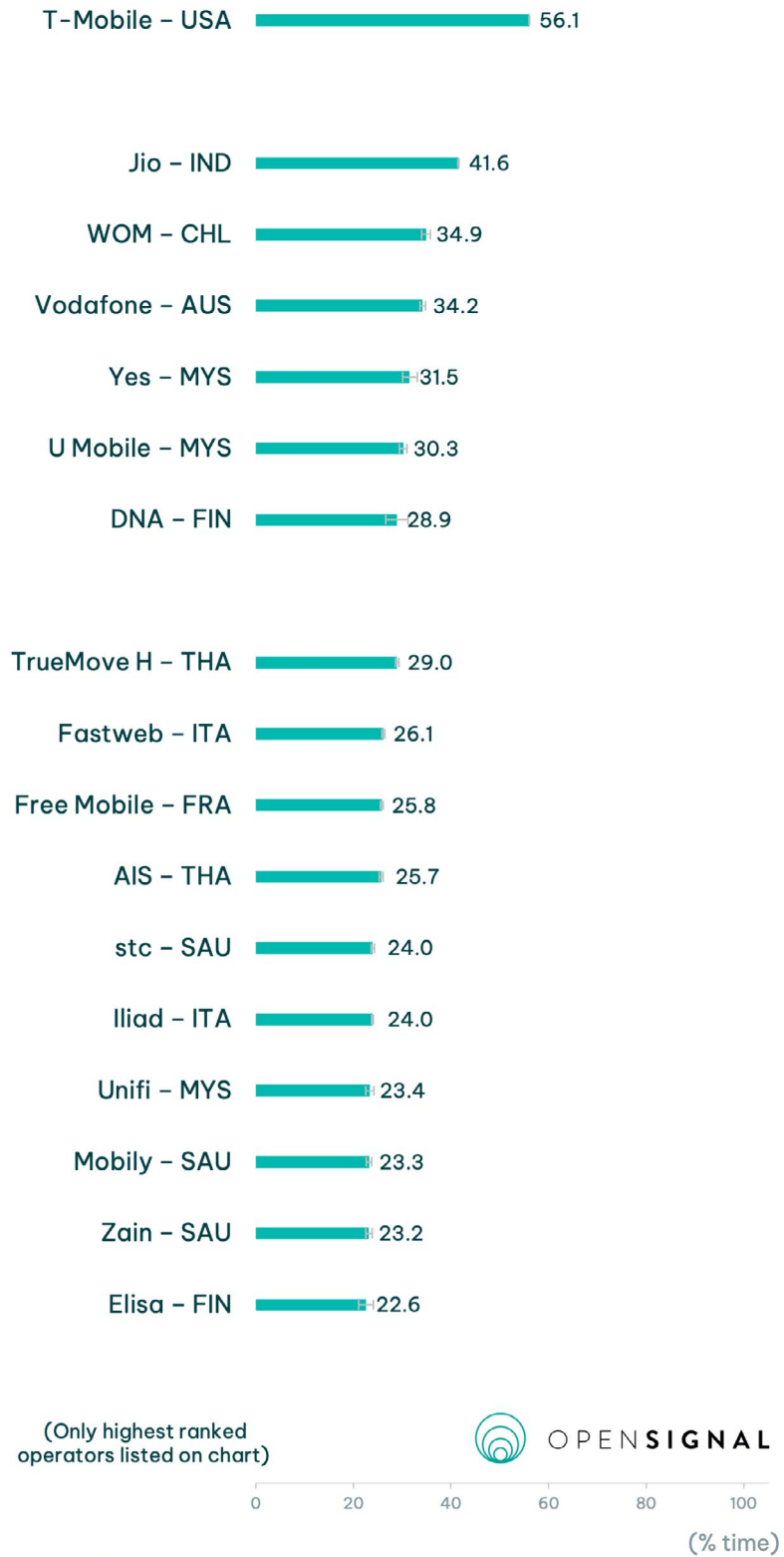
### The Global Rising Stars

(Most Improved Year-on-Year)



 <b>5G Availability</b>	TIM Brazil	Tele2 Sweden	AT&T Mexico	au Japan	Entel Chile
 <b>5G Download Speed</b>	Vivo Brazil	DTAC Thailand	Vodacom South Africa	Yoigo Spain	Entel Peru
 <b>5G Games Experience</b>	Globe Philippines	Vivo Brazil	Orange France	Mobily Saudi Arabia	stc Saudi Arabia
	Iliad Italy	Telenor Sweden	Telia Sweden	Orange Spain	One NZ New Zealand
	Claro Brazil	WindTre Italy	AT&T USA	Verizon USA	T-Mobile Poland
	Movistar Chile	SFR France	Iliad Italy	Ooredoo Oman	Play Poland
	Vivo Brazil	Vodafone Spain	DNA Finland	Vodafone Australia	Yoigo Spain
	TIM Brazil	Movistar Spain	Rogers Canada	Bouygues France	Vodafone Italy
	Free Mobile France	NTT docomo Japan	Bouygues France	Movistar Spain	T-Mobile Poland

Group I consists of operators in markets with a land area of more than 200,000km<sup>2</sup>


**5G Availability – Group I**


Group I consists of operators in markets with a land area of more than 200,000km<sup>2</sup>  
 Data collection period 1 January – 29 June 2023 | © Opensignal Limited

Opensignal's 5G Availability assesses the amount of time 5G users spent on 5G – the higher the percentage, the more time users on a network have an active 5G connection. It is an important measure of the 5G experience as users can only benefit from the superior performance that 5G can provide when they are connected to 5G.

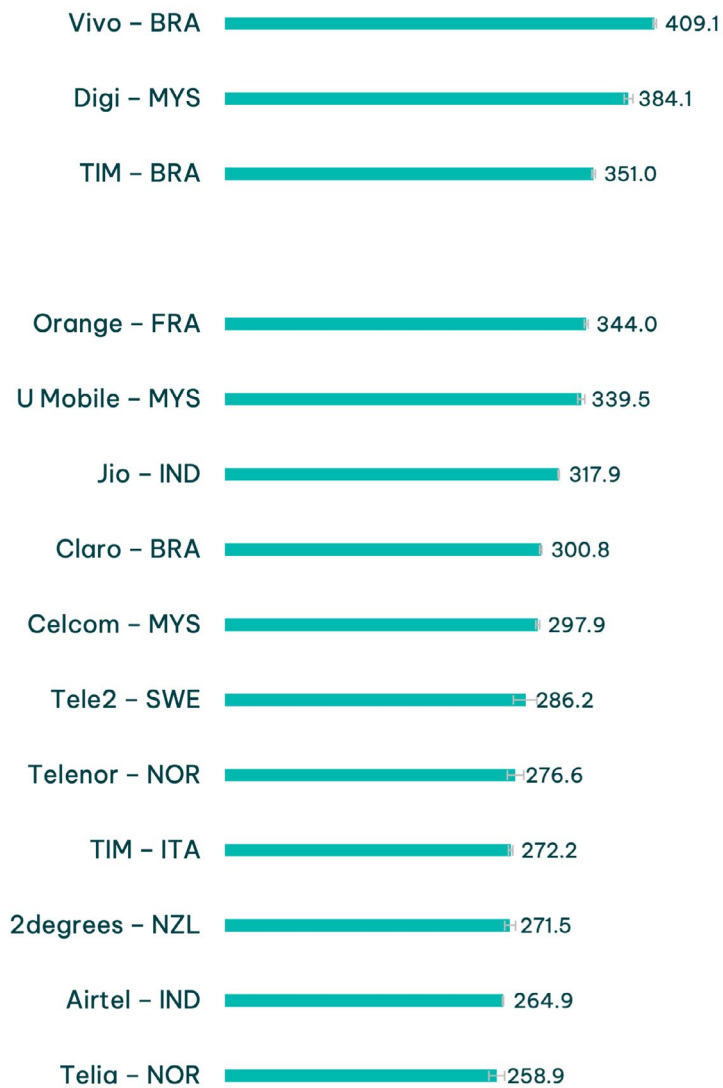
T-Mobile USA is the only 5G Global Winner in Group I, coming top with a score of 56.1% – well ahead of the immediate runner-up, Jio India, given the latter's 41.6%. Both scores are impressive achievements, given the sheer size of the countries in which they operate. In addition, it has only been just over a year since [Jio launched 5G](#) in the world's largest democracy by population.

Two Malaysian operators – Yes and U Mobile are also 5G Global Leaders with statistically tied scores of 30.3-31.5%. The only Australian operator to win the same accolade is Vodafone Australia with a score of 34.2%.

WOM Chile is the only operator from South and Central America to be recognized as a 5G Global Leader in Group I, with a score of 34.9%, while the only European operator in the same category is DNA Finland, given its score of 28.9%.

While they fall short of the 5G Global Leader category this time around, all three operators from Saudi Arabia aren't that far behind with scores of 23.2-24%.




**5G Download Speed – Group I**


(Only highest ranked operators listed on chart)

0 100 200 300 400 500

(Mbps)

Group I consists of operators in markets with a land area of more than 200,000km<sup>2</sup>  
 Data collection period 1 January – 29 June 2023 | © Opensignal Limited

Our users with Sweden's Telenor and Malaysia's Unifi see the fastest average 5G download speeds out of all the operators in Group I – with statistically tied scores of 407.4-421.7Mbps making these two operators 5G Global Winners. Unifi's local peers also perform strongly, with Digi being a 5G Global Leader with a score of 384.1Mbps – while U Mobile and Celcom narrowly fail to hit the same mark this time around.

Malaysian users have been benefitting from the relatively light load on the country's single wholesale 5G network, the Digital Nasional Berhad (DNB), partly as the last operator to join it – Maxis – only launched 5G [in August 2023](#).

Two of the three 5G Global Leaders in this category are Brazilian – Vivo with 409.1Mbps and TIM with 351Mbps. Vivo is not a 5G Global Winner as unlike Unifi, its upper confidence interval does not overlap with Telenor's lower confidence interval. 5G Speeds in Brazil have been boosted significantly due to the ongoing rollout of 5G in the 3.5GHz band, which [began in Brasilia in mid-2022](#).


**5G Games Experience – Group I**


Digi – MYS 90.2

SoftBank – JPN 89.7



Celcom – MYS 89.3

U Mobile – MYS 88.3

Telkomsel – IDN 87.6

2degrees – NZL 87.1

Rogers – CAN 86.9

XL – IDN 86.6

Unifi – MYS 86.2

Yes – MYS 86.1

Vodafone – DEU 86.0

Telekom – DEU 85.1

Telus – CAN 84.8

Tele2 – SWE 84.6

Telia – SWE 84.4

Telia – NOR 84.4

Telenor – SWE 84.2

(Only highest ranked operators listed on chart)



0 20 40 60 80 100

5G Games Experience score

Group I consists of operators in markets with a land area of more than 200,000km<sup>2</sup>  
 Data collection period 1 January – 29 June 2023 | © Opensignal Limited

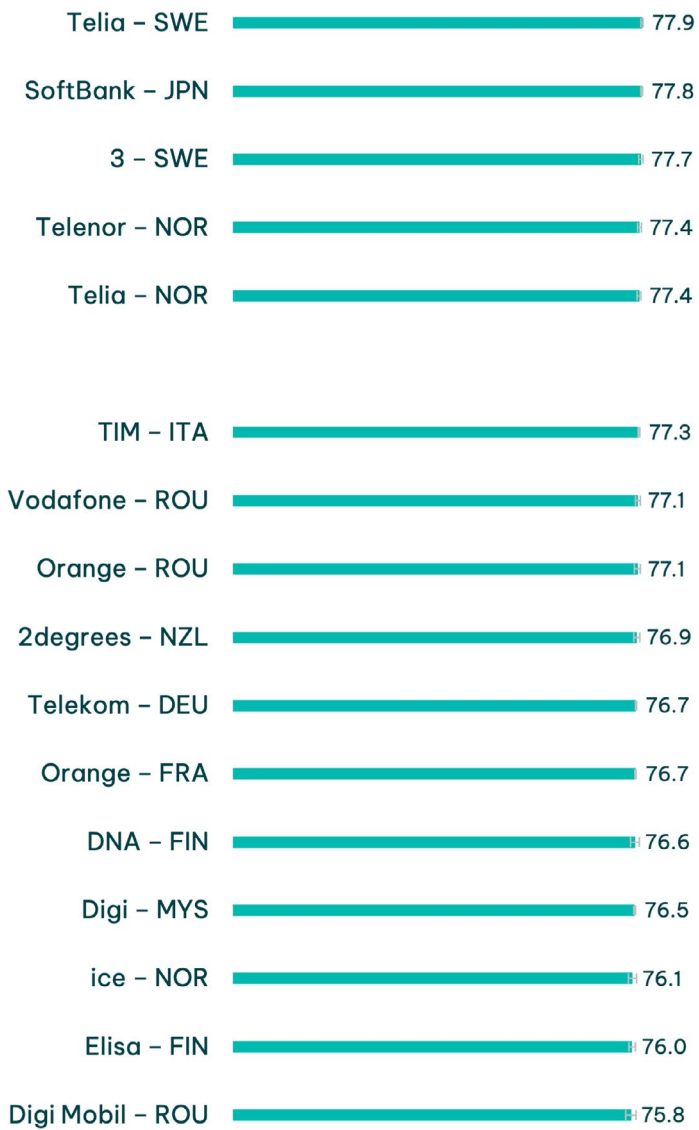
Two operators are tied for the top spot in Group I for 5G Games Experience – Malaysia’s Digi and Japan’s SoftBank with statistically tied scores of 89.7–90.2 points on a 100–point scale.

Opensignal’s 5G Games Experience measures how mobile users experience real-time multiplayer mobile gaming on an operator’s 5G network. Measured on a scale of 0–100, it analyzes how our users’ multiplayer mobile gaming experience is affected by mobile network conditions including latency, packet loss and jitter.

There are three 5G Global Leaders – Malaysia’s Celcom with a score of 89.3 points, followed by U Mobile and Indonesia’s Telkomsel with statistically tied scores of 87.6–88.3 points.

Five operators place immediately below the 5G Global Leaders with statistically tied scores of 86.1–87.1 points: 2degrees New Zealand, Canada’s Rogers, XL Indonesia, Malaysia’s Unifi and Yes.

All of the 5G Global Winners and 5G Global Leaders for 5G Games Experience in Group I achieve the highest possible rating – Excellent (85 or above). This means that the vast majority of users deem this 5G network experience acceptable. Nearly all respondents feel like they have control over the game and they receive immediate feedback on their actions. There is not a noticeable delay in almost all cases.


**5G Video Experience – Group I**


(Only highest ranked operators listed on chart)



0 20 40 60 80 100

5G Video Experience score

Group I consists of operators in markets with a land area of more than 200,000km<sup>2</sup>  
 Data collection period 1 January – 29 June 2023 | © Opensignal Limited

Two Swedish operators are 5G Global Winners for 5G Video Experience in Group I – Telenor and Tele2, with statistically tied scores of 78-78.6 points on a 100-point scale. Their local rivals Telia and 3 also place highly, being recognized as 5G Global Leaders alongside Japan’s SoftBank, and two Norwegian operators – Telenor and Telia.

The two 5G Global Winners in this Group are the only ones to place in the highest possible category for 5G Video Experience – Excellent (78 or above). This means that our Swedish Telenor and Telia users are, on average, able to stream video at 1080p or better with fast loading times and no stalling when connected to 5G.

All of the 5G Global Leaders place one category lower – Very Good (68-78), which means that users are, on average, able to stream video at 1080p or better with satisfactory loading times and little stalling when connected to 5G.

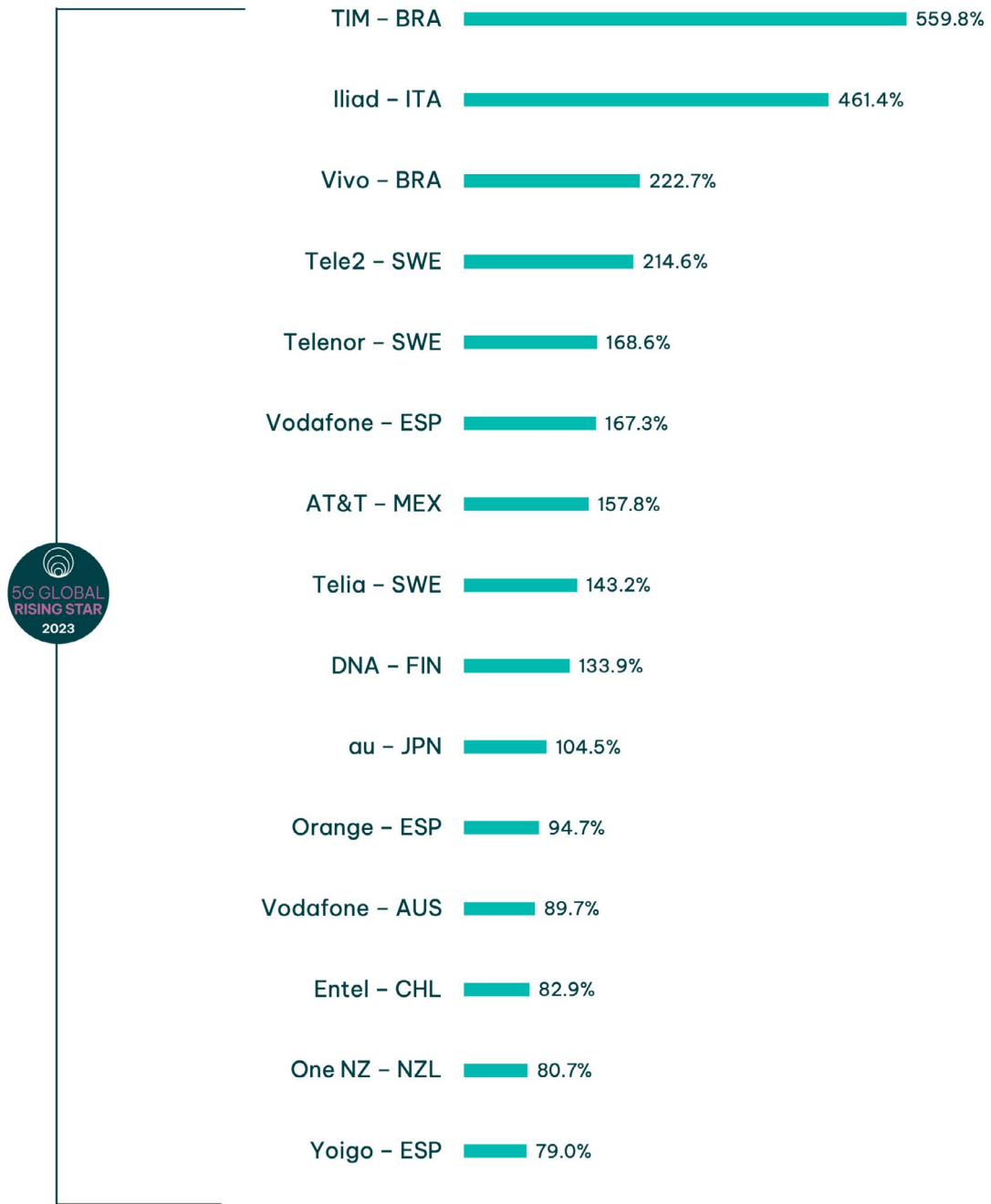
Opensignal’s 5G Video Experience quantifies the quality of video streamed to mobile devices by measuring real-world video streams over an operator’s 5G network. The scores account for [adaptive bitrate streaming \(ABR\)](#), a technology that allows Opensignal to accurately represent users’ real video experience including video streams up to 4K quality.

## Opensignal's 2023 Group I - 5G Global Rising Stars

We now take a look at the 5G Global Rising Stars: the top 15 operators in Group I with which our users have seen the greatest percentage improvement in their 5G experience in the last year. We compare their experience between the first half of 2023 and the same period in 2022. We have 5G Global Rising Stars awards for three key measures of the real-world mobile network experience: 5G Availability, 5G Download Speed and 5G Games Experience.

Brazil's Vivo is the only operator in Group I to be a 5G Global Rising Star across all three categories. Just six operators are 5G Global Rising Stars across two categories: TIM Brazil, France's Bouygues, Iliad in Italy, T-Mobile Poland, and two Spanish operators – Movistar and Yoigo.

5G Global Rising Stars celebrate the recent achievements of those operators that have made rapid progress in improving the 5G experience of their users in a short period of time. By contrast, Opensignal's 5G Global Winner awards highlight the fruits of years of cumulative effort and investment by comparing the current state of users' 5G experience across different operators.


**5G Availability – Group I – Most Improved Year on Year**


(Only highest ranked operators listed on chart)

0% 100% 200% 300% 400% 500% 600%

Change in 5G Availability

Group I consists of operators in markets with a land area of more than 200,000km<sup>2</sup>  
 Data collection period 1 January – 29 June 2022 & 2023 | © Opensignal Limited

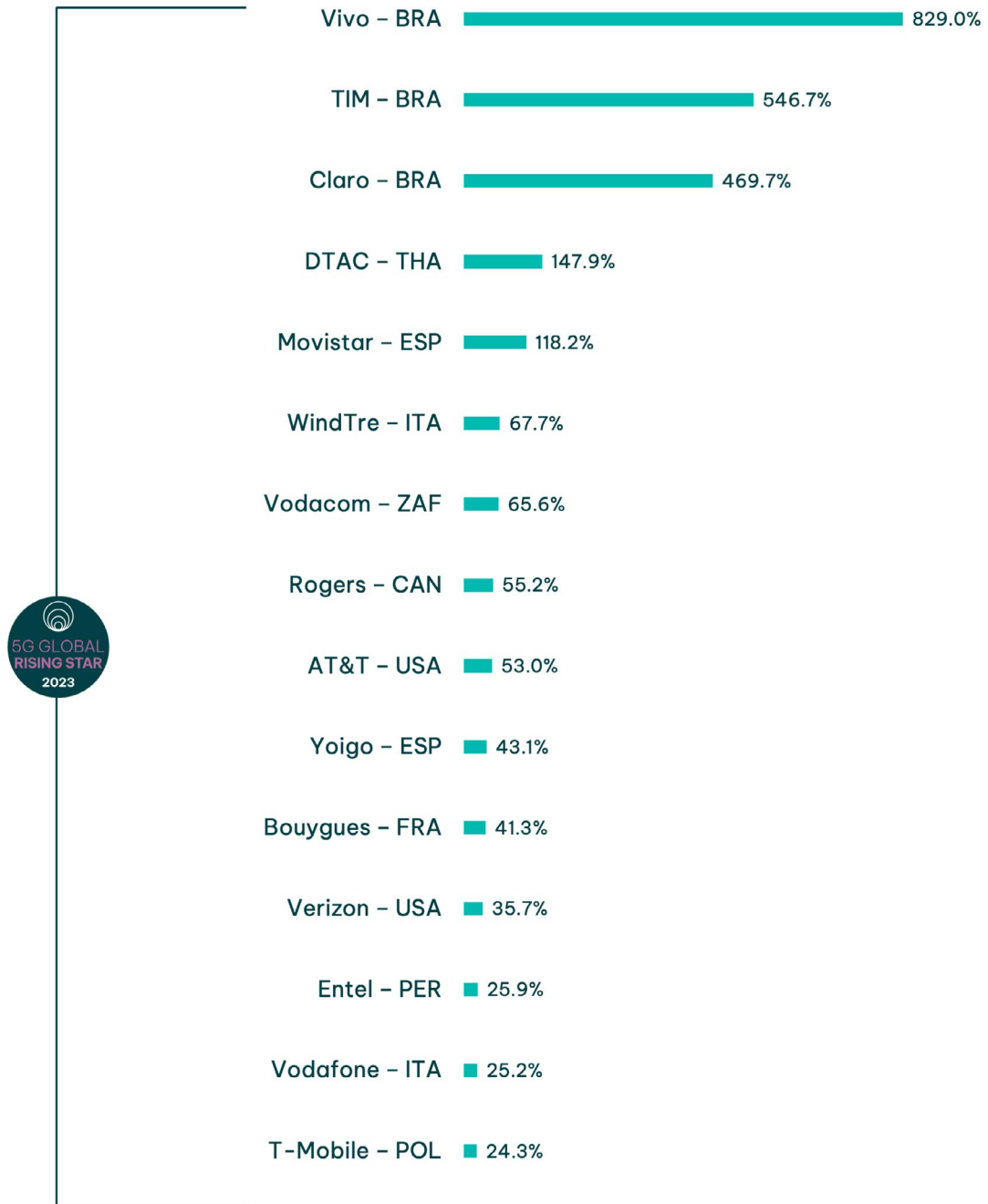


Looking at the operators on whose networks our 5G users saw the largest YoY percentage increase in the proportion of time they spent with an active 5G connection – TIM Brazil tops the list in Group I with a remarkable increase of 559.8%. Italy's Iliad follows immediately behind with 461.4% while Vivo, TIM's local rival, is next with a rise of 222.7%. Three out of four Swedish operators are 5G Global Rising Stars for 5G Availability, Tele2 leads the charge with an improvement of 214.6%, followed by Telenor on 168.6% and Telia with 143.2%.

Similarly, out of Spain's four operators, only one – Movistar – hasn't made it into the top 15, with our Spanish users on Vodafone, Orange and Yoigo reporting increases of 167.3%, 94.7% and 79%, respectively.

Only two operators from the Asia Pacific have made it through to the top 15 – Japan's au with a YoY rise of 104.5% and One NZ with a rise of 80.7%.

Mexico's AT&T is the only North American operator to be a 5G Global Rising Star for 5G Availability, with its YoY increase of 157.8%.


**5G Download Speed – Group I – Most Improved Year on Year**


(Only highest ranked operators listed on chart)

0% 100% 200% 300% 400% 500% 600% 700% 800% 900%

Change in 5G Download Speed

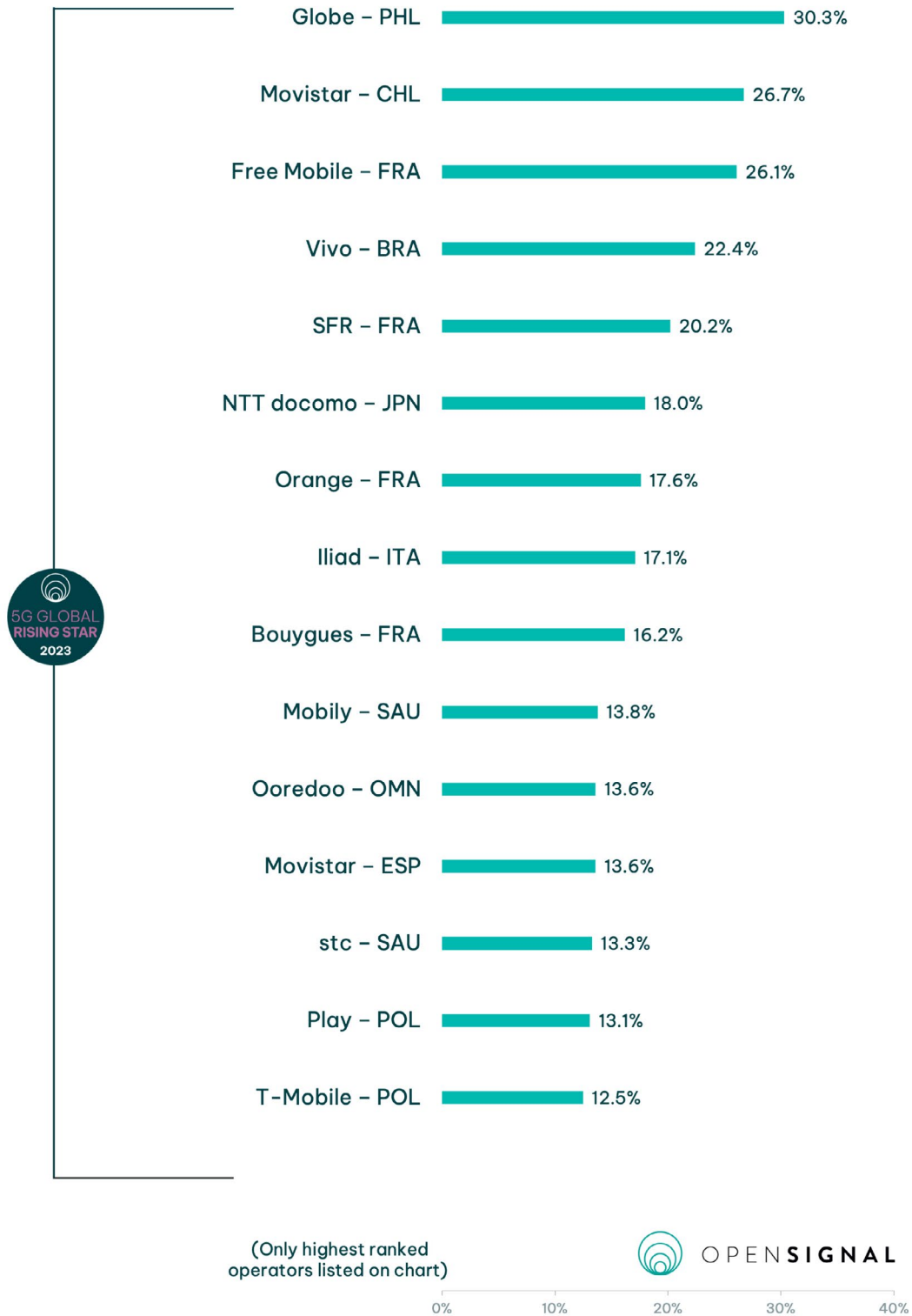
Group I consists of operators in markets with a land area of more than 200,000km<sup>2</sup>  
 Data collection period 1 January – 29 June 2022 & 2023 | © Opensignal Limited

5G Brazil's operators – Vivo, TIM and Claro – occupy the top three slots for the YoY percentage improvement in our users' average 5G download speeds in Group I, with spectacular rises of 829%, 546.7% and 469.7%, respectively.

Thailand's DTAC comes next with a more modest – but still impressive – rise of 147.9%. Two out of three U.S. operators are 5G Global Rising Stars for 5G Download Speed, as AT&T and Verizon's scores have risen by 53% and 35.7%, respectively. The only other North American operator to earn the same recognition is Canada's Rogers with a rise of 55.2%.

Other operators to be the only ones to receive this recognition from their home country include South Africa's Vodacom (65.6%), France's Bouygues (41.3%), Peru's Entel (25.9%) and T-Mobile Poland (24.3%).

Two Italian operators – WindTre and Vodafone make the grade, as their scores have risen YoY by 67.7% and 25.2% respectively. Similarly, Spain's Movistar and Yoigo are 5G Global Rising Stars with increases of 118.2% and 43.1%, respectively.


**5G Games Experience – Group I – Most Improved Year on Year**


Change in 5G Games Experience

Group I consists of operators in markets with a land area of more than 200,000km<sup>2</sup>  
 Data collection period 1 January – 29 June 2022 & 2023 | © Opensignal Limited

Our Globe users in the Philippines have seen the largest YoY percentage improvement in 5G Games Experience across all the operators in Group I – an impressive rise of 30.3%.

Globe is followed by Movistar Chile, given the latter's increase of 26.7%, while France's Free Mobile is next with 26.1%. All of Free Mobile's local rivals, SFR, Orange and Bouygues are also 5G Global Rising Stars for 5G Games Experience, with increases of 20.2%, 17.6% and 16.2%, respectively.

NTT docomo is the only operator in Japan to be recognized as a 5G Global Rising Star for 5G Games Experience, as our users on its network observed the sixth highest YoY improvement in Group I – a rise of 18%.

Similarly, Iliad is the only Italian operator to earn this recognition due to a YoY increase of 17.1% in the average 5G download speeds seen by our users on its network.

Two out of three Saudi operators have received the same distinction – Mobily with 13.8% and stc with 13.3%.

Two Polish operators take the last two spots – Play with 13.1% and T-Mobile with 12.5%.

## Operators Analyzed - Group I




2degrees – New Zealand	Jio – India	Tele2 – Sweden
3 – Sweden	Mobily – Saudi Arabia	Telekom – Germany
3 – UK	Movistar – Chile	Telenor – Norway
Airtel – India	Movistar – Peru	Telenor – Sweden
AIS – Thailand	Movistar – Spain	Telia – Finland
AT&T – Mexico	MTN – South Africa	Telia – Norway
AT&T – USA	NTT docomo – Japan	Telia – Sweden
au – Japan	O2 – Germany	Telkomsel – Indonesia
Bell – Canada	O2 – UK	Telstra – Australia
Bouygues – France	Omantel – Oman	Telus – Canada
Celcom – Malaysia *	One NZ – New Zealand	TIM – Brazil
China Mobile – China	Ooredoo – Oman	TIM – Italy
China Telecom – China	Optus – Australia	TrueMove H – Thailand
China Unicom – China	Orange – France	U Mobile – Malaysia
Claro – Brazil	Orange – Poland	Unifi – Malaysia
Claro – Peru	Orange – Romania	Verizon – USA
Digi – Malaysia *	Orange – Spain	Vivo – Brazil
Digi Mobil – Romania	Personal – Argentina	Vodacom – South Africa
DNA – Finland	Play – Poland	Vodafone – Australia
DTAC – Thailand	Plus – Poland	Vodafone – Germany
EE – UK	Rakuten Mobile – Japan	Vodafone – Italy
Elisa – Finland	Rogers – Canada	Vodafone – Romania
Entel – Chile	SFR – France	Vodafone – Spain
Entel – Peru	Smart – Philippines	Vodafone – UK
Fastweb – Italy	SoftBank – Japan	WindTre – Italy
Free Mobile – France	Spark – New Zealand	WOM – Chile
Globe – Philippines	stc – Saudi Arabia	XL – Indonesia
ice – Norway	T-Mobile – Poland	Yes – Malaysia
Iliad – Italy	T-Mobile – USA	Yoigo – Spain
Indosat – Indonesia	Telcel – Mexico	Zain – Saudi Arabia

\* Celcom and Digi merged [in late 2022](#) but as the two brands continue to exist, we have reported on them separately.


# Opensignal 5G Global Awards 2023 - Group II

## The Global Winners and Leaders



 <b>5G Availability</b>	<p>T-Mobile Puerto Rico</p>	<p>KT South Korea</p> <p>stc Kuwait</p>	<p>Ooredoo Kuwait</p> <p>GT Taiwan</p>
 <b>5G Download Speed</b>	<p>SK telecom South Korea</p>	<p>KT South Korea</p> <p>LG U+ South Korea</p>	<p>M1 Singapore</p> <p>A1 Bulgaria</p>
 <b>5G Games Experience</b>	<p>Singtel Singapore</p>	<p>StarHub Singapore</p> <p>cs1 Hong Kong</p> <p>M1 Singapore</p> <p>O2 Czechia</p>	<p>3 Hong Kong</p> <p>T-Mobile Czechia</p> <p>O2 Slovakia</p> <p>Slovak Telekom Slovakia</p> <p>CMHK Hong Kong</p> <p>SK telecom South Korea</p>






 <b>5G Video Experience</b>	<p>Telemach Slovenia</p> <p>StarHub Singapore</p> <p>Magenta Austria</p>	<p>Telekom Slovenije Slovenia</p> <p>Singtel Singapore</p> <p>A1 Austria</p>	<p>Swisscom Switzerland</p> <p>O2 Slovakia</p> <p>A1 Slovenia</p>
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Group II consists of operators in markets with a land area of less than 200,000km<sup>2</sup>

**Opensignal 5G Global Awards 2023 - Group II**
**The Global Rising Stars**

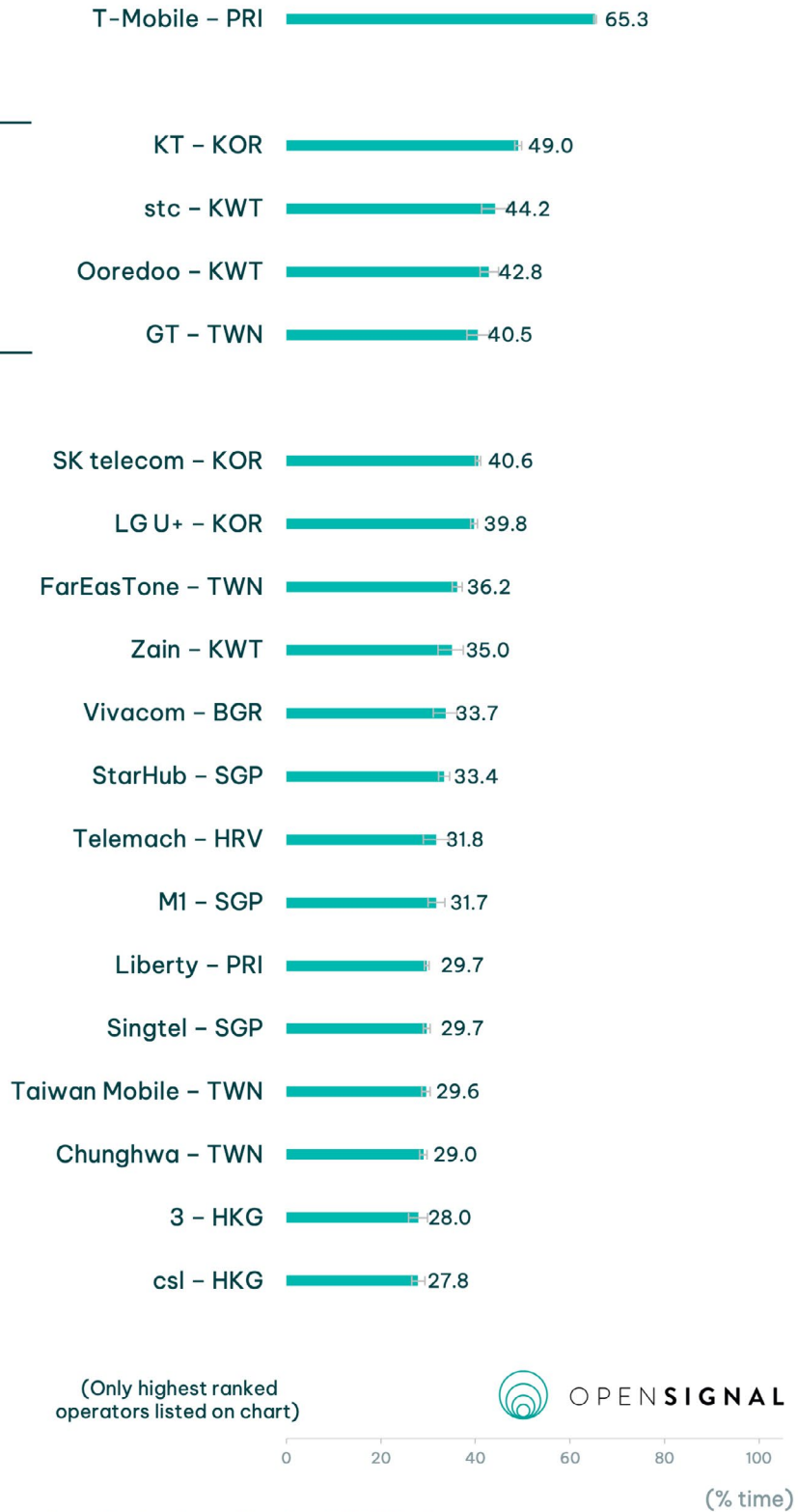
(Most Improved Year-on -Year)



 <b>5G Availability</b>	3 Denmark  M1 Singapore  StarHub Singapore	3 Ireland  Telekom Hungary  Salt Switzerland	Vodafone Hungary  Ooredoo Kuwait  Vodafone Ireland	Slovak Telekom Slovakia  O2 Czechia  A1 Slovenia	Vodafone Portugal  KT South Korea  O2 Slovakia
 <b>5G Download Speed</b>	StarHub Singapore  M1 Singapore  Telia Denmark	3 Denmark  Telenor Denmark  Pelephone Israel	HT Croatia  Proximus Belgium  Yettel Hungary	Singtel Singapore  Nova Greece  Zain Kuwait	Slovak Telekom Slovakia  Yettel Bulgaria  Vodafone Qatar
 <b>5G Games Experience</b>	Telia Denmark  A1 Bulgaria  Telenor Denmark  Partner Israel	stc Kuwait  M1 Singapore  3 Hong Kong	T Star Taiwan  Pelephone Israel  Proximus Belgium	Magenta Austria  Telemach Croatia  Zain Kuwait	Singtel Singapore  SmarTone Hong Kong  Ooredoo Kuwait

 Group II consists of operators in markets with a land area of less than 200,000km<sup>2</sup>

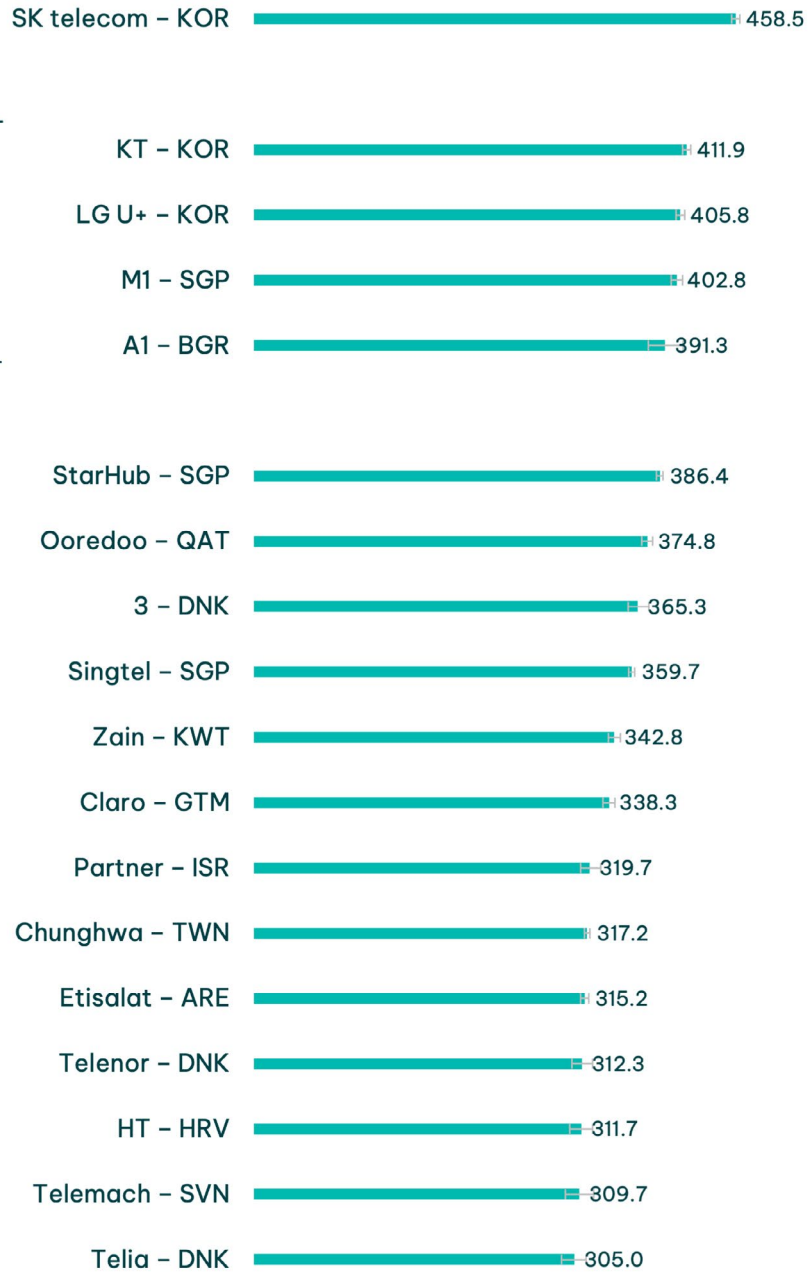



**5G Availability – Group II**


Group II consists of operators in markets with a land area of less than 200,000km<sup>2</sup>  
 Data collection period 1 January – 29 June 2023 | © Opensignal Limited

There is only one 5G Global Winner for 5G Availability in Group II – T-Mobile Puerto Rico with a score of 65.3%. It leads the runner-up, South Korea's KT, by more than 15 percentage points. KT is the highest scoring 5G Global Leader in this category, while stc and Ooredoo in Kuwait statistically tie with Taiwan's GT with scores of 40.5-44.2%. SK telecom doesn't place as a 5G Global Leader as unlike GT, its upper confidence interval does not overlap with stc's lower confidence interval.

Opensignal's 5G Availability assesses the amount of time 5G users spent on 5G – the higher the percentage, the more time users on a network have an active 5G connection. It is an important measure of the 5G experience as users can only benefit from the superior performance that 5G can provide when they are connected to 5G.


**5G Download Speed – Group II**


(Only highest ranked operators listed on chart)



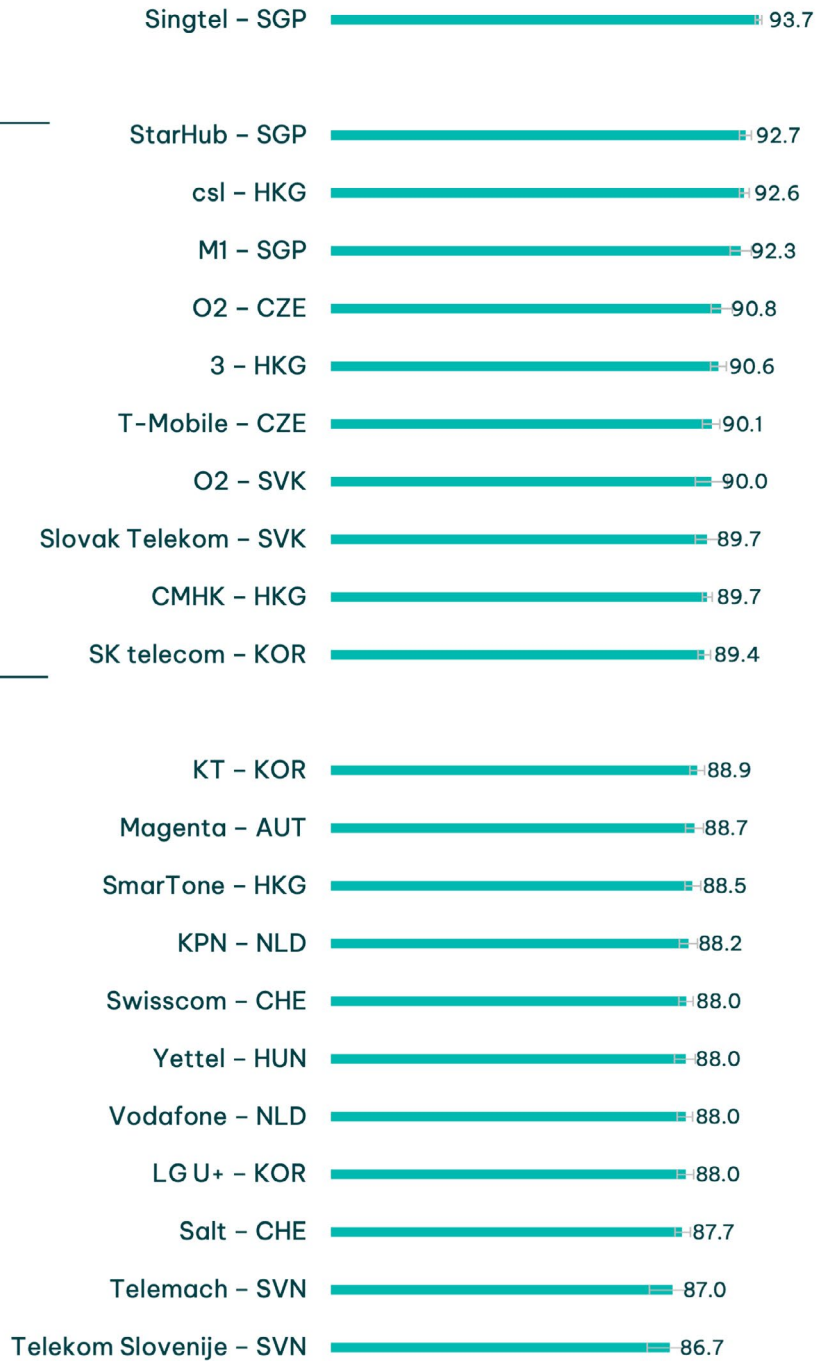
0 100 200 300 400 500

(Mbps)

Group II consists of operators in markets with a land area of less than 200,000km<sup>2</sup>  
 Data collection period 1 January – 29 June 2023 | © Opensignal Limited

SK telecom rules the roost in Group II when it comes to the average 5G download speeds observed by our users. Its score clocks in at a remarkable 458.5Mbps. Three 5G Global Leaders share second place with statistically tied scores of 391.3-411.9Mbps – SK telecom’s domestic rivals, KT and LG U+, along with A1 Bulgaria. Singapore’s M1 takes the next rank down as unlike A1, its upper confidence interval does not overlap with KT’s lower confidence interval.

Two other Singaporean operators place highly in the Group II rankings – StarHub with 386.4Mbps and Singtel with 359.7Mbps, but their scores put them in sixth and ninth place, respectively – putting them out of contention for a 5G Global Leader award.


**5G Games Experience – Group II**


(Only highest ranked operators listed on chart)

60 80 100

5G Games Experience score

Group II consists of operators in markets with a land area of less than 200,000km<sup>2</sup>  
 Data collection period 1 January – 29 June 2023 | © Opensignal Limited

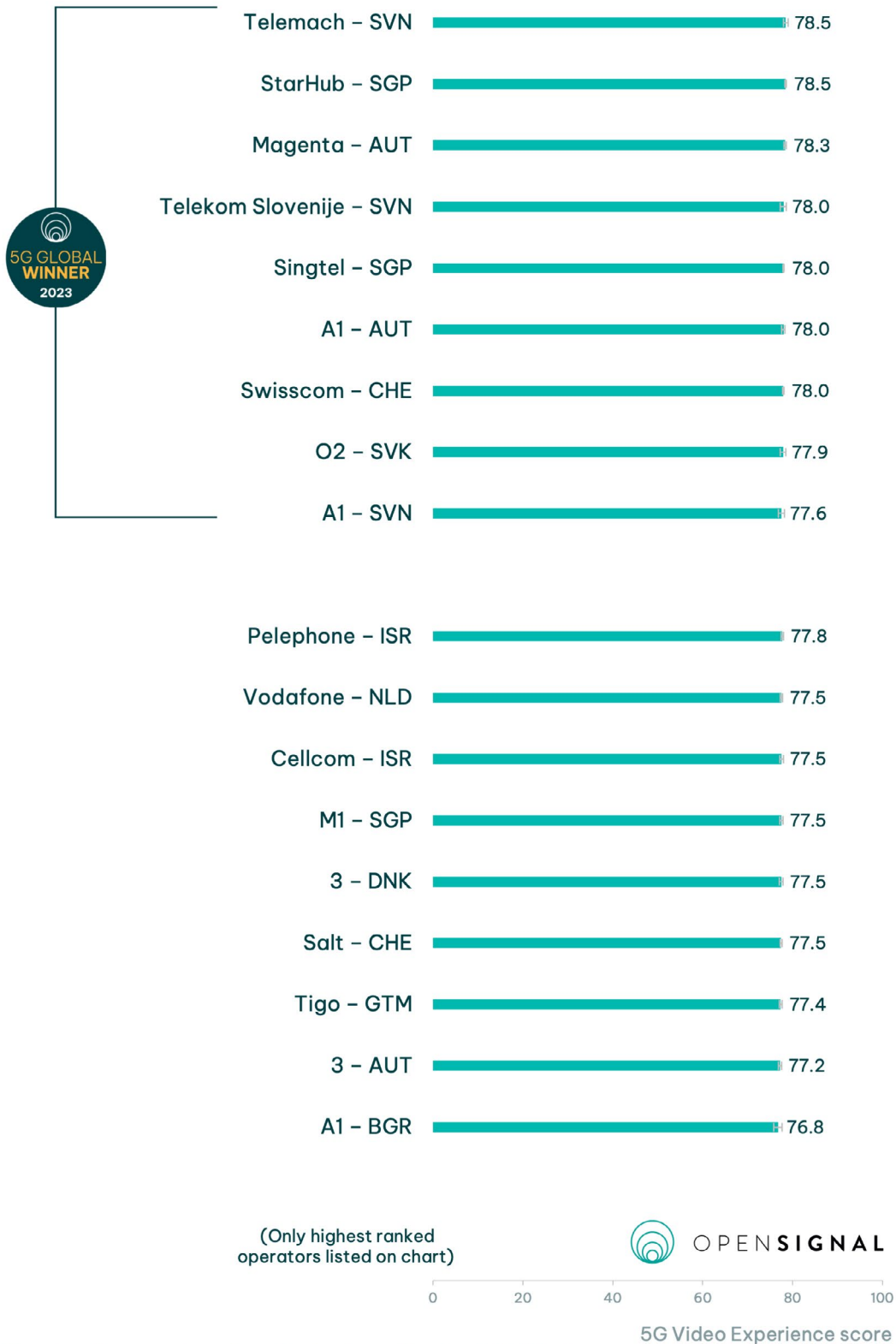
Singapore's Singtel does the city-state proud, being Group II's 5G Global Winner for 5G Games Experience, due to its score of 93.7 points on a 100-point scale.

Two other Singaporean operators are 5G Global Leaders – StarHub and M1. They are part of a three-way statistical tie for second place alongside Hong Kong's csl with scores of 92.3-92.7 points.

Another seven 5G Global Leaders share fifth place with statistically tied scores of 89.4-90.8 points – Czechia's O2 and T-Mobile; Hong Kong's 3 and CMHK; Slovakia's O2 and Slovak Telekom; and South Korea's SK telecom.

All of the 5G Global Winners and 5G Global Leaders in Group II achieve the highest possible rating for 5G Games Experience – Excellent (85 or above). This means that the vast majority of users deem this 5G network experience acceptable. Nearly all users feel like they have control over the game and they receive immediate feedback on their actions. There is not a noticeable delay in almost all cases.

Opensignal's 5G Games Experience measures how mobile users experience real-time multiplayer mobile gaming on an operator's 5G network. Measured on a scale of 0-100, it analyzes how our users' multiplayer mobile gaming experience is affected by mobile network conditions including latency, packet loss and jitter.


**5G Video Experience – Group II**


Group II consists of operators in markets with a land area of less than 200,000km<sup>2</sup>  
 Data collection period 1 January – 29 June 2023 | © Opensignal Limited

The competition in Group II over the top spot for 5G Video Experience has been remarkably tight, with nine operators sharing the award due to statistically tied scores of 77.6–78.5 points on a 100–point scale.

The nine 5G Global Winners are: Slovenia’s Telemach, Telekom Slovenije and A1, Singapore’s StarHub and Singtel, Magenta and A1 in Austria, Swisscom in Switzerland along with O2 in Slovakia.

Because there are so many 5G Global Winners in this category, we have not recognized any operators as 5G Global Leaders.

The winning operators’ scores indicate that the average experience observed by our users on their networks is on the border between Very Good (68–78) and Excellent (78 or above) – the latter being the highest category possible.

An Excellent rating indicates that users are, on average, able to stream video at 1080p or better with fast loading times and no stalling when connected to 5G. Placing in the Very Good category indicates that users are, on average, able to stream video at 1080p or better with satisfactory loading times and little stalling when connected to 5G.

Opensignal’s 5G Video Experience quantifies the quality of video streamed to mobile devices by measuring real–world video streams over an operator’s 5G network. The scores account for [adaptive bitrate streaming \(ABR\)](#), a technology that allows Opensignal to accurately represent users’ real video experience including video streams up to 4K quality.



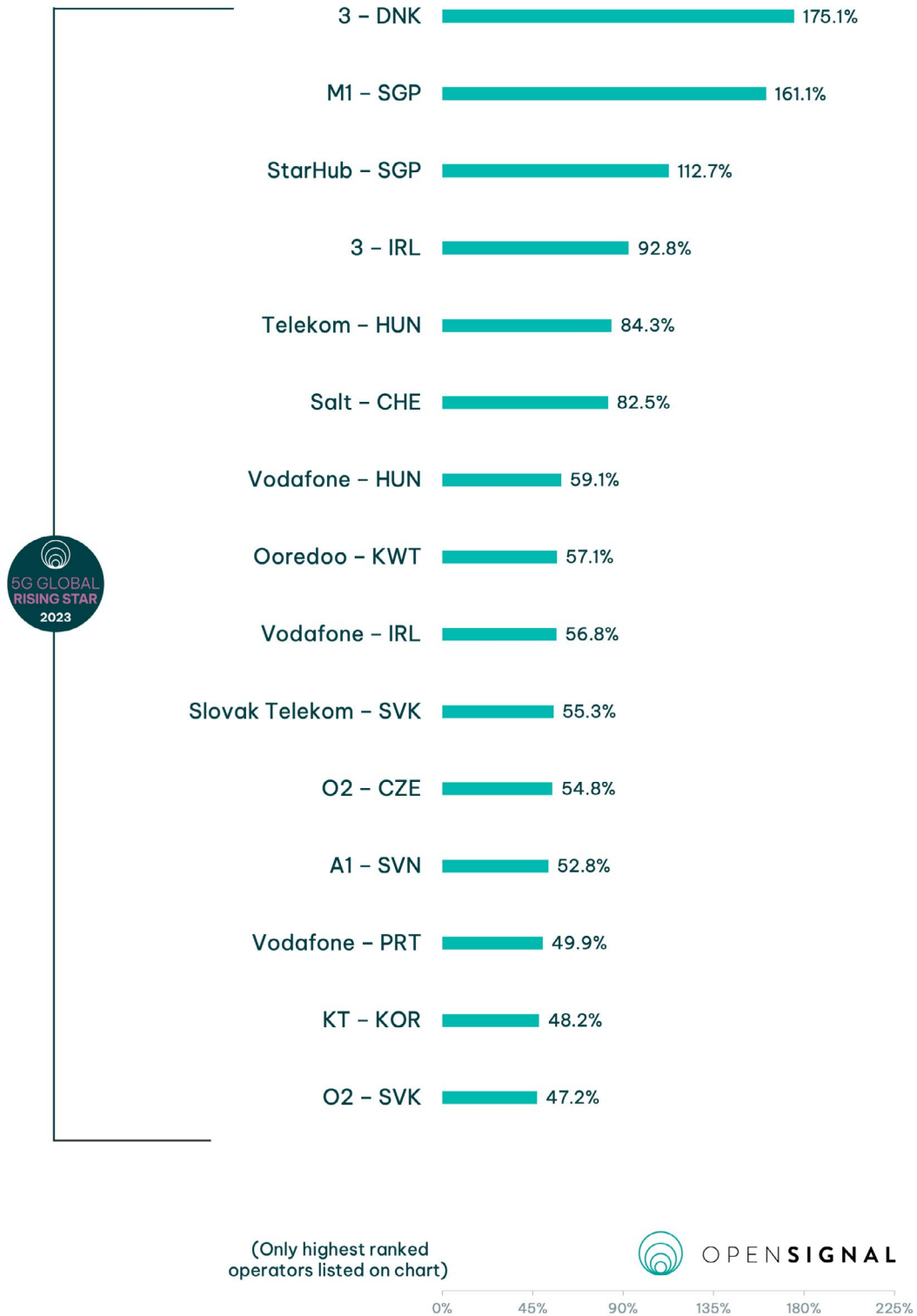
## Opensignal's 2023 Group II - 5G Global Rising Stars

We now turn to the 5G Global Rising Stars: the top 15 operators in Group II with which our users have seen the greatest percentage improvement in their 5G experience in the last year. We compare their experience between the first half of 2023 and the same period in 2022. We have 5G Global Rising Stars awards for three key measures of the real-world mobile network experience: 5G Availability, 5G Download Speed and 5G Games Experience.

Only one operator – Singapore's M1 – has been recognized as a 5G Global Rising Star in Group II across all three categories. Two other Singaporean operators earn the same recognition in two categories – Singtel (5G Games Experience and 5G Download Speed) and StarHub (5G Availability and 5G Download Speed).

Two out of Kuwait's three operators are 5G Global Rising Stars in two categories – Ooredoo (5G Availability and 5G Games Experience) and Zain (5G Download Speed and 5G Games Experience). The country's stc is a 5G Global Rising Star for 5G Games Experience.

5G Global Rising Stars celebrate the recent achievements of those operators that have made rapid progress in improving the 5G experience of their users in a short period of time. By contrast, Opensignal's 5G Global Winner awards highlight the fruits of years of cumulative effort and investment by comparing the current state of users' 5G experience across different operators.

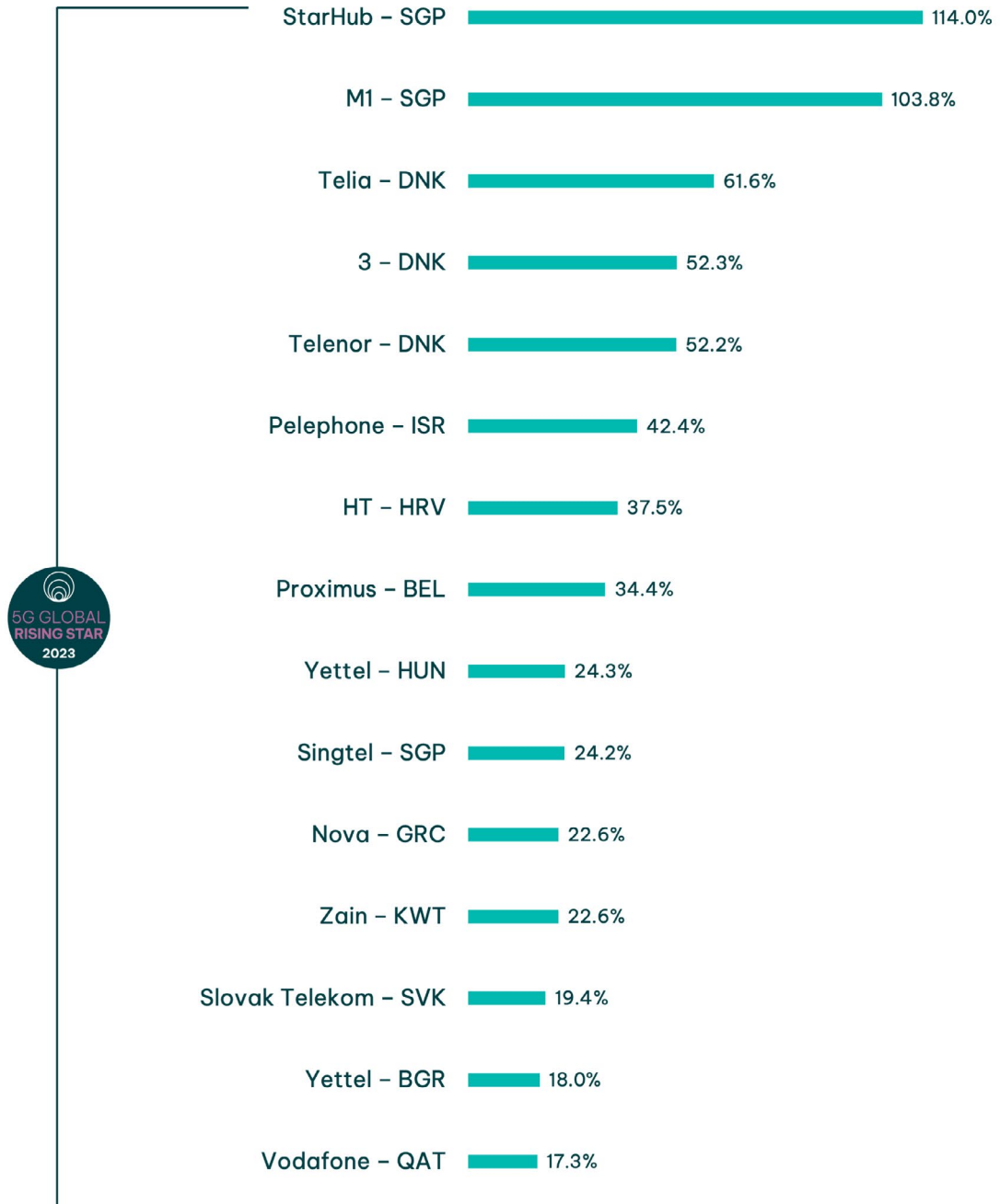

**5G Availability – Group II – Most Improved Year on Year**


Group II consists of operators in markets with a land area of less than 200,000km<sup>2</sup>  
 Data collection period 1 January - 29 June 2022 & 2023 | © Opensignal Limited

Denmark's 3 comes top in Group II for the YoY percentage improvement seen by our users in terms of 5G Availability – the proportion of time that 5G users spend with a 5G connection. Its impressive rise of 175.1%, is followed closely by Singaporean operator M1 with 161.1%, followed by M1's 5G consortium partner StarHub's 112.7%.

Our users with Ireland's 3 see the fourth largest YoY increase – a rise of 92.8% and fellow Irish operator Vodafone is also a 5G Global Rising Star with an improvement of 56.8%. Two Hungarian operators – Telekom and Vodafone are 5G Global Rising Stars for 5G Availability, with rises of 84.3% and 59.1%, respectively. Similarly, the award table includes two operators from Slovakia: Slovak Telekom and O2.

KT is the only South Korean operator to earn this distinction as the 5G Availability experienced by our KT users has risen by 48.2%, while LG U+'s and SK telecom's scores rose by 40.9% and 24.7% – not enough to get into the top 15 given the impressive improvements seen by other operators in Group II.


**5G Download Speed – Group II – Most Improved Year on Year**


(Only highest ranked operators listed on chart)

0% 20% 40% 60% 80% 100% 120%

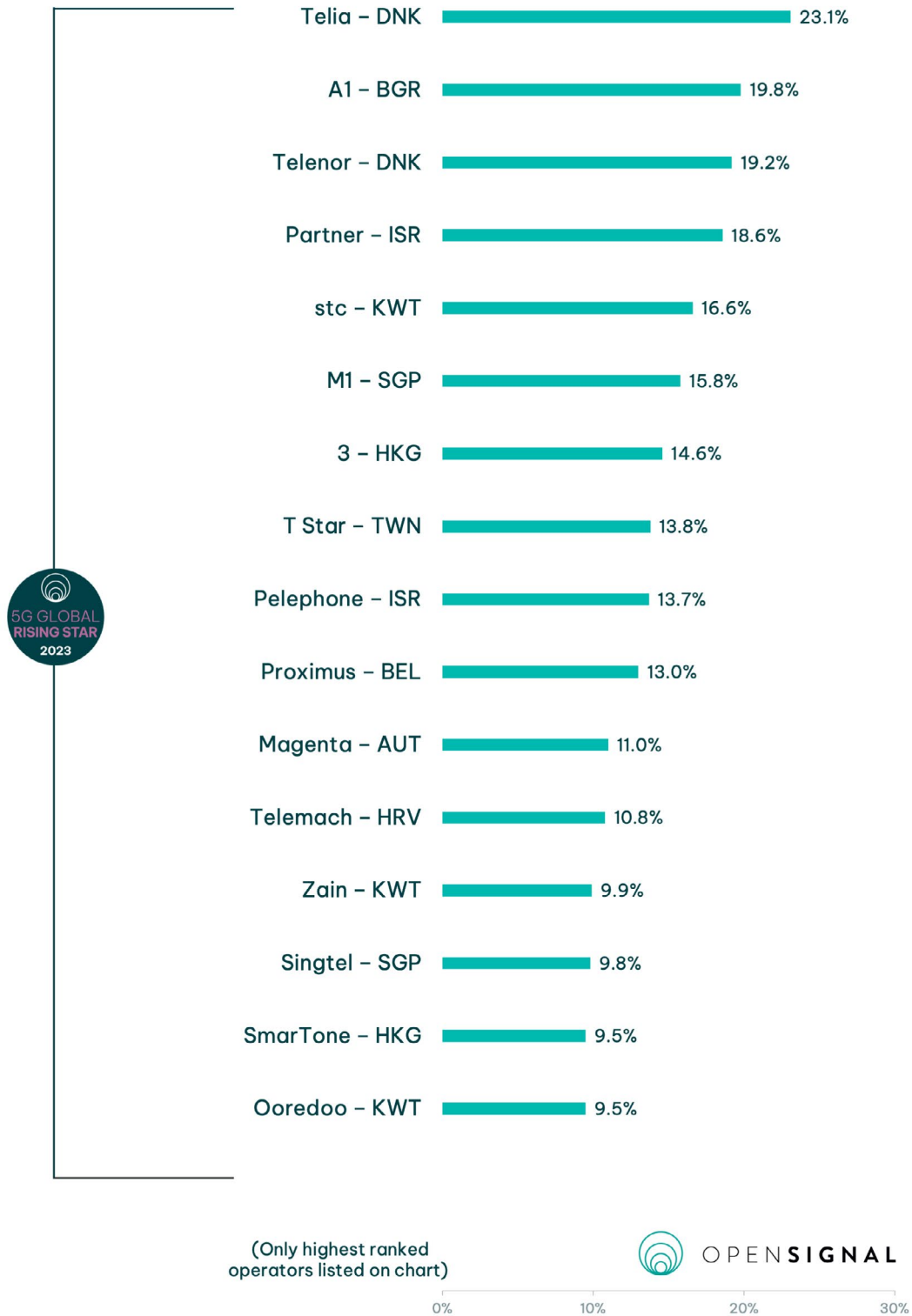
Change in 5G Download Speed

Group II consists of operators in markets with a land area of less than 200,000km<sup>2</sup>  
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Singapore's StarHub tops the table of the 15 operators in Group II with the largest YoY percentage improvement in 5G Download Speed, with a rise of 114%. Fittingly, StarHub is immediately followed by its 5G consortium partner, M1, with 103.8%. Singtel is also a 5G Global Rising Star in this category, but further down the table with a rise of 24.2%.

The third, fourth and fifth spots are all taken by Danish operators – Telia with 61.6%, 3 with 52.3% and Telenor with 52.2%.

The rest of the 5G Global Rising Stars for 5G Download Speed in Group II all hail from different markets and include Israel's Pelephone, Croatia's HT and Belgium's Proximus. Vodafone Qatar brings up the rear with a still impressive rise of 17.3% in the average 5G download speeds observed by our users.


**5G Games Experience – Group II – Most Improved Year on Year**


Group II consists of operators in markets with a land area of less than 200,000km<sup>2</sup>  
 Data collection period 1 January - 29 June 2022 & 2023 | © Opensignal Limited

Our users across Group II saw their largest YoY percentage improvement in 5G Games Experience with Denmark's Telia – given its rise of 23.1%. A1 Bulgaria comes next with 19.8%, followed by Danish Telenor with 19.2%.

All three Kuwait operators, stc, Zain and Ooredoo are 5G Global Rising Stars for 5G Games Experience with percentage increases of 16.6%, 9.9% and 9.5%, respectively.

Two Singaporean operators – M1 and Singtel – earn this recognition with improvements of 15.8% and 9.8%, respectively.

T Star is the only operator in Taiwan to be a 5G Global Rising Star in this category as its 5G Games Experience score has risen by 13.8% YoY.

In contrast to the other categories, there are 16 – rather than 15 – 5G Global Rising Stars for 5G Games Experience in Group II as Ooredoo Kuwait and SmarTone Hong Kong have the same percentage increase – 9.5%.

## Operators Analyzed - Group II

3 – Austria	Nova – Greece	Telenor – Denmark
3 – Denmark	O2 – Czechia	Telia – Denmark
3 – Hong Kong	O2 – Slovakia	Tigo – Guatemala
3 – Ireland	Odido – Netherlands *	Vivacom – Bulgaria
A1 – Austria	Ooredoo – Kuwait	Vodafone – Czechia
A1 – Bulgaria	Ooredoo – Qatar	Vodafone – Greece
A1 – Croatia	Orange – Belgium	Vodafone – Hungary
A1 – Slovenia	Orange – Slovakia	Vodafone – Ireland
Cellcom – Israel	Partner – Israel	Vodafone – Netherlands
Chunghwa– Taiwan	Pelephone – Israel	Vodafone – Portugal
Claro – Guatemala	Proximus – Belgium	Vodafone – Qatar
Claro – Puerto Rico	Salt – Switzerland	Yettel – Bulgaria
CMHK – Hong Kong	Singtel – Singapore	Yettel – Hungary
Cosmote – Greece	SK telecom – South Korea	Zain – Kuwait
csl – Hong Kong	Slovak Telekom – Slovakia	
du – UAE	SmarTone – Hong Kong	
eir – Ireland	StarHub – Singapore	
Etisalat – UAE	stc – Kuwait	
FarEasTone – Taiwan	Sunrise – Switzerland	
GT – Taiwan	Swisscom – Switzerland	
Hot Mobile – Israel	T Star – Taiwan	
HT – Croatia	T-Mobile – Czechia	
KPN – Netherlands	T-Mobile – Puerto Rico	
KT – South Korea	Taiwan Mobile – Taiwan	
LG U+ – South Korea	TDC – Denmark	
Liberty – Puerto Rico	Telekom – Hungary	
M1 – Singapore	Telekom Slovenije – Slovenia	
Magenta – Austria	Telemach – Croatia	
MEO – Portugal	Telemach – Slovenia	
NOS – Portugal	Telenet – Belgium	

\*In September 2023, T-Mobile Netherlands rebranded to Odido



### **How Opensignal measures mobile network experience**

We report as accurately as possible the real-world mobile experience as recorded by mobile network users. To make decisions based on our market insights, network operators, regulators, analysts and consumers need to know the facts we present are accurate and that the comparisons we make are valid. Please visit:

<https://www.opensignal.com/methodology-overview>

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[press@opensignal.com](mailto:press@opensignal.com)