



OPENSIGNAL

# GLOBAL MOBILE NETWORK EXPERIENCE AWARDS 2021

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Opensignal is the independent global standard for analyzing consumer mobile experience. Our industry reports are the definitive guide to understanding the true experience consumers receive on wireless networks.

# Key Findings

## SoftBank and T-Mobile Netherlands are Global Winners for Video Experience

Our users on Japan's SoftBank and T-Mobile Netherlands had the best experience with statistically tied scores of 79 and 78.8 points respectively. Other operators in the Netherlands have also done well, with KPN, Tele2 Netherlands and Vodafone Netherlands recognized as Global Leaders for Video Experience.

## Vodafone Netherlands and SoftBank are top of the pack for Games Experience

In our first global operator comparison of multiplayer mobile Games Experience, Japan's SoftBank and Vodafone Netherlands are joint Global Winners, having statistically tied with scores of 82.9 and 82.3, respectively.

## South Korea's LG U+ is number one in the world for Voice App Experience

Out of all the operators analyzed in this report, our users had the best experience when using over-the-top voice applications on LG U+'s network. The operator scored 83.3 points out of 100 for this measure of the mobile experience, 0.3 points ahead of Japan's SoftBank – the previous winner. All four of Japan's national operators are Global Leaders for Voice App Experience, along with South Korea's KT and SK telecom.

## SK telecom clocked up the highest average download speed of any operator worldwide

Our users on SK telecom's network in South Korea observed incredibly fast overall download speeds that averaged 74.9 Mbps, aided by its increasingly mature 5G network, making it our Global Winner for Download Speed Experience. SK telecom's score was 6.3 Mbps ahead of that of the previous winner, Canada's Telus, and an incredible 3.2 times higher than the global average of 23.6 Mbps.

## Swisscom is the Global Winner for Upload Speed Experience for the second time

Swisscom's dominance remains unchallenged for Upload Speed Experience, its score of 17.2 Mbps was at least 1.4 Mbps (8.6%) faster than that of T-Mobile Netherlands and South Korea's LG U+ who were statistically tied for second place. Swisscom was also the Global Winner for Upload Speed Experience in our [first Global Awards](#) and remains unbeaten.

## LG U+ is the Global Winner for 4G Availability

LG U+'s score for 4G Availability was just 0.3 percentage points away from a perfect score. The top of the chart for this metric is dominated by South Korean, Japanese and Dutch operators, with notable exceptions including Verizon and T-Mobile in the USA, and 4G-only operators – India's Jio and Indonesia's Smartfren. While it's an older technology, 4G remains essential for users to connect to almost all current 5G services because of the use of 5G non-standalone access (NSA).

## Egypt's WE and Banglalink in Bangladesh are Global Rising Stars across all five categories

The operators with the top 30 highest percentage increases are this year's Global Rising Stars in each category when we compare the percentage improvement between the last six months of 2019 and 2020. Impressively, Egypt's WE and Banglalink in Bangladesh are Global Rising Stars for all five of these measures of the mobile experience. A further 14 operators are Global Rising Stars in four out of five categories, including France's Free Mobile, Claro Uruguay, Colombia's Tigo and both of Libya's National operators, Libyana and Al-Madar.

# Opensignal Global Awards 2021

## The Global Winners and Leaders








<p>Video Experience</p>	<p><b>SoftBank</b> Japan</p> <p><b>T-Mobile</b> Netherlands</p>	<p><b>A1</b> Austria</p> <p><b>Tele2</b> Netherlands</p> <p><b>KPN</b> Netherlands</p>	<p><b>Swisscom</b> Switzerland</p> <p><b>NTT DoCoMo</b> Japan</p> <p><b>StarHub</b> Singapore</p>	<p><b>Vodafone</b> Netherlands</p> <p><b>3</b> Austria</p> <p><b>Proximus</b> Belgium</p>	<p><b>Orange</b> Belgium</p>
<p>Games Experience</p>	<p><b>SoftBank</b> Japan</p> <p><b>Vodafone</b> Netherlands</p>	<p><b>T-Mobile</b> Netherlands</p> <p><b>Tele2</b> Netherlands</p> <p><b>StarHub</b> Singapore</p>	<p><b>KPN</b> Netherlands</p> <p><b>Singtel</b> Singapore</p> <p><b>LG U+</b> South Korea</p>	<p><b>SK telecom</b> South Korea</p> <p><b>NTT DoCoMo</b> Japan</p>	
<p>Voice App Experience</p>	<p><b>LG U+</b> South Korea</p>	<p><b>SoftBank</b> Japan</p> <p><b>SK telecom</b> South Korea</p> <p><b>KT</b> South Korea</p>	<p><b>Rakuten</b> Japan</p> <p><b>au</b> Japan</p> <p><b>Vodafone</b> Netherlands</p>	<p><b>NTT DoCoMo</b> Japan</p> <p><b>T-Mobile</b> Netherlands</p> <p><b>Viettel Mobile</b> Vietnam</p>	
<p>Download Speed Experience</p>	<p><b>SK telecom</b> South Korea</p>	<p><b>Telus</b> Canada</p> <p><b>Bell</b> Canada</p> <p><b>T-Mobile</b> Netherlands</p>	<p><b>Vodafone</b> Netherlands</p> <p><b>KPN</b> Netherlands</p> <p><b>Tele2</b> Netherlands</p>	<p><b>StarHub</b> Singapore</p> <p><b>LG U+</b> South Korea</p> <p><b>Rogers</b> Canada</p>	
<p>Upload Speed Experience</p>	<p><b>Swisscom</b> Switzerland</p>	<p><b>T-Mobile</b> Netherlands</p> <p><b>LG U+</b> South Korea</p> <p><b>KPN</b> Netherlands</p>	<p><b>Tele2</b> Netherlands</p> <p><b>Singtel</b> Singapore</p> <p><b>StarHub</b> Singapore</p>	<p><b>SK telecom</b> South Korea</p> <p><b>Salt</b> Switzerland</p> <p><b>Ooredoo</b> Qatar</p>	<p><b>Vodafone</b> Netherlands</p> <p><b>M1</b> Singapore</p>
<p>4G Availability</p>	<p><b>LG U+</b> South Korea</p>	<p><b>au</b> Japan</p> <p><b>SK telecom</b> South Korea</p> <p><b>Jio</b> India</p> <p><b>NTT DoCoMo</b> Japan</p>	<p><b>KT</b> South Korea</p> <p><b>Rakuten</b> Japan</p> <p><b>Smartfren</b> Indonesia</p>	<p><b>SoftBank</b> Japan</p> <p><b>Verizon</b> USA</p> <p><b>T-Mobile</b> Netherlands</p>	<p><b>Vodafone</b> Netherlands</p> <p><b>Tele2</b> Netherlands</p> <p><b>T-Mobile</b> USA</p>

# Opensignal Global Awards 2021



## Global Rising Stars (most improved)

 <b>Video Experience</b>	<b>Hot Mobile</b> Israel <b>Libyana</b> Libya <b>U Mobile</b> Malaysia <b>Bangalink</b> Bangladesh <b>Metfone</b> Cambodia	<b>Entel</b> Peru <b>Al-Madar</b> Libya <b>Indosat</b> Indonesia <b>AIS</b> Thailand <b>3</b> Indonesia	<b>Vietnamobile</b> Vietnam <b>Claro</b> Uruguay <b>Airtel</b> Sri Lanka <b>Etisalat</b> Egypt <b>Ufone</b> Pakistan	<b>Tigo</b> Colombia <b>Globe</b> Philippines <b>Türk Telekom</b> Turkey <b>Vodafone</b> Egypt <b>DTAC</b> Thailand	<b>Grameenphone</b> Bangladesh <b>Robi</b> Bangladesh <b>Oi</b> Brazil <b>Airtel</b> Bangladesh <b>Entel</b> Chile	<b>Bitel</b> Peru <b>Telenor</b> Myanmar <b>Hutch</b> Sri Lanka <b>unifi</b> Malaysia <b>WE</b> Egypt
 <b>Voice App Experience</b>	<b>Metfone</b> Cambodia <b>WE</b> Egypt <b>Vietnamobil</b> Vietnam <b>Smart Axiata</b> Cambodia <b>Robi</b> Bangladesh	<b>Grameenphone</b> Bangladesh <b>Banglalink</b> Bangladesh <b>3</b> Indonesia <b>Personal</b> Argentina <b>Zong</b> Pakistan	<b>Indosat</b> Indonesia <b>Al-Madar</b> Libya <b>Etisalat</b> UAE <b>Hutch</b> Sri Lanka <b>Movistar</b> Uruguay	<b>Smartfren</b> Indonesia <b>Airtel</b> India <b>Airtel</b> Bangladesh <b>Turkcell</b> Turkey <b>U Mobile</b> Malaysia	<b>Cellcard</b> Cambodia <b>Globe</b> Philippines <b>Telenor</b> Myanmar <b>XL</b> Indonesia <b>KT</b> South Korea	<b>Jio</b> India <b>Claro</b> Costa Rica <b>Free Mobile</b> France <b>SK telecom</b> South Korea <b>Tigo</b> Colombia
 <b>Download Speed Experience</b>	<b>Metfone</b> Cambodia <b>Libyana</b> Libya <b>Claro</b> Uruguay <b>Claro</b> Costa Rica <b>Indosat</b> Indonesia	<b>Türk Telekom</b> Turkey <b>MobiFone</b> Vietnam <b>MTN</b> South Africa <b>A1</b> Austria <b>3</b> Ireland	<b>3</b> Indonesia <b>Tele2</b> Netherlands <b>Zain</b> Saudi Arabia <b>U Mobile</b> Malaysia <b>Tigo</b> Colombia	<b>CMHK</b> Hong Kong <b>Telenor</b> Myanmar <b>Banglalink</b> Bangladesh <b>MEO</b> Portugal <b>Al-Madar</b> Libya	<b>Free Mobile</b> France <b>Telenor</b> Bulgaria <b>A1</b> Bulgaria <b>Movistar</b> Uruguay <b>STC</b> Saudi Arabia	<b>Claro</b> Argentina <b>Viettel Mobile</b> Vietnam <b>XL</b> Indonesia <b>WE</b> Egypt <b>unifi</b> Malaysia
 <b>Upload Speed Experience</b>	<b>Libyana</b> Libya <b>Metfone</b> Cambodia <b>Banglalink</b> Bangladesh <b>Robi</b> Bangladesh <b>Claro</b> Uruguay	<b>Airtel</b> Bangladesh <b>WE</b> Egypt <b>Zong</b> Pakistan <b>MTN</b> South Africa <b>MobiFone</b> Vietnam	<b>Tele2</b> Netherlands <b>Claro</b> Costa Rica <b>Indosat</b> Indonesia <b>Etisalat</b> Egypt <b>Bitel</b> Peru	<b>Al-Madar</b> Libya <b>Grameenphone</b> Bangladesh <b>Free Mobile</b> France <b>MEO</b> Portugal <b>Hutch</b> Sri Lanka	<b>Türk Telekom</b> Turkey <b>Oi</b> Brazil <b>Smart Axiata</b> Cambodia <b>Vodafone</b> Egypt <b>Jazz</b> Pakistan	<b>Telenor</b> Myanmar <b>Zain</b> Saudi Arabia <b>Movistar</b> Mexico <b>3</b> Ireland <b>DiGi</b> Malaysia
 <b>4G Availability</b>	<b>Libyana</b> Libya <b>Digi Mobil</b> Romania <b>Banglalink</b> Bangladesh <b>BSNL</b> India <b>Claro</b> Costa Rica <b>Free Mobile</b> France	<b>Hutch</b> Sri Lanka <b>Vodafone</b> New Zealand <b>Mobitel</b> Sri Lanka <b>O2</b> Germany <b>Ufone</b> Pakistan	<b>MobiFone</b> Vietnam <b>U Mobile</b> Malaysia <b>Robi</b> Bangladesh <b>eir</b> Ireland <b>Ooredoo</b> Myanmar	<b>Vodafone</b> Turkey <b>Tigo</b> Colombia <b>WE</b> Egypt <b>Etisalat</b> Egypt <b>Claro</b> Uruguay	<b>Airtel</b> Bangladesh <b>Türk Telekom</b> Turkey <b>Pelephone</b> Israel <b>Spark</b> New Zealand <b>Zong</b> Pakistan	<b>3</b> Ireland <b>Iliad</b> Italy <b>Smart</b> Philippines <b>2degrees</b> New Zealand <b>Telenor</b> Pakistan

# Back by popular demand...

Last year, to celebrate Opensignal's 10th anniversary we ranked the world's operators using our leading measures of the real-world mobile network experience. It was so well received that we've chosen to publish the awards again. In this report, we've expanded the scope of this analysis from our inaugural Global Awards, and for the first time we're also assessing our users' multiplayer mobile Games Experience globally on different operators. Similarly, we've added a new Rising Stars category which assesses the extent to which our users' Voice App Experience around the world changed between the second half of 2019 and the comparable six months in 2020. For more details, see our Global Rising Stars section which starts on page 20.

Once again, operators from the Netherlands and Japan have done extremely well, but this time South Korea's operators have also proven to be a force to be reckoned with. Our SK telecom users observed the fastest average download speeds – an awe-inspiring 74.9 Mbps – making it the sole Global Winner for Download Speed Experience and highlighting the impressive improvements in the user experience that can be achieved through extensive investment in 5G. Also from South Korea, LG U+ is the sole Global Winner for both Voice App Experience and 4G Availability. Both operators were either a Global Winner or Global Leader across five categories and were Global High Performers for Video Experience.

In our 2020 Global Awards, Japan's SoftBank was the sole Global Winner for Voice App Experience but the experience on LG U+ has now overtaken it. SoftBank still wins major awards. This time, SoftBank's haul of accolades includes being a joint Global Winner for both Video Experience and Games Experience. Out of the other Japanese operators, NTT DoCoMo had the second most impressive showing, being a Global Leader in four categories and a Global High Performer for Download Speed Experience.

T-Mobile Netherlands is a joint Global Winner for Video Experience while Vodafone Netherlands is a joint Global Winner for Games Experience. Furthermore, both operators were Global Leaders in all five of the remaining categories. The two other Dutch national operators, Tele2 and KPN, were

Global Leaders in five and four categories respectively, and were Global High Performers for the remaining ones.

Other operators that have made their presence felt across our award tables include Swisscom, which is our Global Winner for Upload Speed Experience for the second time in a row, and Singapore's StarHub. In addition to being a Global Winner, Swisscom is a Global Leader for Video Experience and a Global High Performer in four categories. StarHub is a Global Leader in four categories and a Global High Performer in the remaining two.

Using six measures of the mobile network experience, we have analyzed the data provided by our users over the first 180 days of the second half of 2020 and determined the Global Winner(s) using [confidence intervals](#) in the same way that we do with our country-level reports. If the confidence intervals overlap the result is a statistical tie and we declare two or more operators to be joint winners. We have also used confidence intervals to determine both the Global Leaders and the Global High Performers, which are composed of the top 10 and top 30 scoring operators (excluding the Global Winner(s)). The exact number of operators in these categories vary due to statistical ties between operators' scores.

# Video Experience — Global

Japan's SoftBank and T-Mobile Netherlands jointly win

## ▶ Video Experience – Global



SoftBank – JPN 79.0  
T-Mobile – NLD 78.8



A1 – AUT 78.2  
Tele2 – NLD 78.2  
KPN – NLD 77.6  
Swisscom – CHE 77.5  
NTT DoCoMo – JPN 77.2  
StarHub – SGP 77.2  
Vodafone – NLD 76.8  
3 – AUT 76.6  
Proximus – BEL 76.6  
Orange – BEL 76.5



Singtel – SGP 76.3  
Chunghwa – TWN 76.1  
SK telecom – KOR 76.1  
Magenta – AUT 76.1  
au – JPN 76.0  
Telekom – DEU 75.7  
M1 – SGP 75.2  
Telenet – BEL 75.2  
FarEasTone – TWN 75.1  
Vivacom – BGR 75.0  
KT – KOR 74.9  
Vodafone – PRT 74.5  
Salt – CHE 74.2  
EE – GBR 74.2  
Orange – FRA 74.1  
Movistar – ESP 74.1  
TPG – SGP 74.1  
Telstra – AUS 74.0  
A1 – BGR 73.9  
Vodafone – AUS 73.8  
2degrees – NZL 73.8  
Taiwan Mobile – TWN 73.7  
LG U+ – KOR 73.6

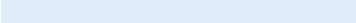
Average – Global (Only highest ranked operators listed on chart) 64.6

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0 20 40 60 80 100

Video Experience score

Data collection period July 1 – December 27, 2020 | © Opensignal Limited



Opensignal's Video Experience quantifies the quality of video streamed to mobile devices by measuring real-world video streams over an operator's network. The videos tested include a mixture of resolutions and are streamed directly from the world's largest video content providers, including YouTube and Akamai.

Our users on Japan's SoftBank and T-Mobile Netherlands are joint Global Winners for Video Experience, having statistically tied with scores of 79 and 78.8 points out of 100, respectively. Other operators in the Netherlands have also done well, with KPN, Tele2 and Vodafone all being recognized as Global Leaders for Video Experience. This is the second time in a row that T-Mobile Netherlands has been a joint Global Winner for this measure of the mobile experience, as it statistically tied with Austria's A1 in our first Global Awards.

Our Global High Performers were at least 9 points (13.9%) ahead of the global average of 64.6 points out of 100. In addition, our users observed an Excellent Video Experience when using our Global Winners' networks, along with those of our Global Leaders and 10 of our Global High Performers. An Excellent Video Experience indicates a very consistent experience across all users, video streaming providers and resolutions tested, with fast loading times and almost non-existent stalling. In contrast, the global average of 64.6 points translates into a Good Video Experience, meaning a less consistent experience than that enjoyed by users receiving an Excellent or Very Good experience, even from the same video streaming provider and particularly for higher resolutions.

Impressively, a small majority (53%) of operators placed in either the Excellent or Very Good category for Video Experience, while only 2% of operators were included in the Poor category for this measure of the mobile experience.

Once again, European operators are heavily represented at the top of the global Video Experience table, this time making up eight out of 10 Global Leaders. European Global Leaders included 3 and A1 in Austria, Belgium's Orange and Proximus, as well as Swisscom. Canada's Telus had the highest Video Experience score in North America with 72.8 points.



# Games Experience — Global

Japan's SoftBank and Vodafone Netherlands jointly win

## Games Experience – Global



SoftBank – JPN 82.9  
Vodafone – NLD 82.3



T-Mobile – NLD 82.1  
Tele2 – NLD 81.5  
StarHub – SGP 81.4  
KPN – NLD 81.3  
Singtel – SGP 81.0  
LG U+ – KOR 81.0  
SK telecom – KOR 80.4  
NTT DoCoMo – JPN 79.7



au – JPN 79.2  
Swisscom – CHE 79.1  
A1 – AUT 78.7  
KT – KOR 78.3  
M1 – SGP 78.3  
Rakuten – JPN 78.1  
Orange – BEL 77.8  
Proximus – BEL 75.9  
Magenta – AUT 75.8  
Salt – CHE 75.3  
3 – AUT 74.1  
Telstra – AUS 73.7  
Optus – AUS 73.6  
Vodafone – AUS 73.4  
Telekom – DEU 73.4  
Viettel Mobile – VNM 72.9  
Chunghwa – TWN 72.4  
Taiwan Mobile – TWN 71.9  
FarEasTone – TWN 71.6  
O2 – DEU 71.6  
Vodafone – PRT 71.1  
Vodafone – DEU 71.0  
EE – GBR 70.9  
2degrees – NZL 70.6  
Telenet – BEL 70.6

Average – Global (Only highest ranked operators listed on chart) 56.8

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0 20 40 60 80 100

Games Experience score

Data collection period July 1 – December 27, 2020 | © Opensignal Limited

Opensignal's Games Experience is a measure of how mobile users experience real-time multiplayer mobile gaming on an operator's network. Measured on a scale of 0-100, it analyzes how the multiplayer mobile Games Experience is affected by mobile network conditions including latency, packet loss and jitter to determine the impact on gameplay and the overall Games Experience.

This is the first time we have assessed operators globally for mobile gaming. Our inaugural joint Global Winners for Games Experience are Japan's SoftBank and Vodafone Netherlands, with statistically tied scores of 82.9 and 82.3 points out of 100, respectively. Interestingly, all three of Vodafone Netherlands' domestic rivals are Global Leaders for Games Experience, with the remaining Global Leaders hailing from Japan, Singapore and South Korea.

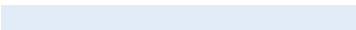
The global average across all operators we analyzed was 56.8 points, which indicates a Poor Games Experience. The Games Experience scores reported for our Global High Performers were at least 13.8 points (24.3%) higher than the average. All of our Global Winners and Global Leaders along with 10 out of 25 Global High Performers placed in the Good category, while the remainder of our Global High Performers had a Fair rating.

Across all the operators that Opensignal analyzed, 65% had a Poor or Very Poor rating for this measure of the mobile experience, while 35% had either a Fair or Good Rating. None made it into our highest category for Games Experience (Excellent). This highlights the work and investment that still has to be done to bring users' Games Experience to the point where factors such as latency, jitter and packet loss cease to have a perceptible impact on the multiplayer gaming experience.

Looking at the regions, SoftBank had the highest score for Games Experience in the Asia Pacific region. However, in South East Asia StarHub and Singtel are statistically tied for top, with scores of 81.4 and 81 points, respectively.

Mobile gaming is popular with smartphone users but much of the activity still happens on Wifi connections, not cellular. With many mobile operators increasingly supporting the eSports scene hoping to attract mobile gamers, and using mobile gaming to market the benefits of 5G, it will be interesting to see how quickly operators can improve the cellular Games Experience to meet the needs of gamers.

A Good Games Experience means that most of our users deemed the experience acceptable. The gameplay experience was generally controllable and the user received immediate feedback between their actions and the outcomes



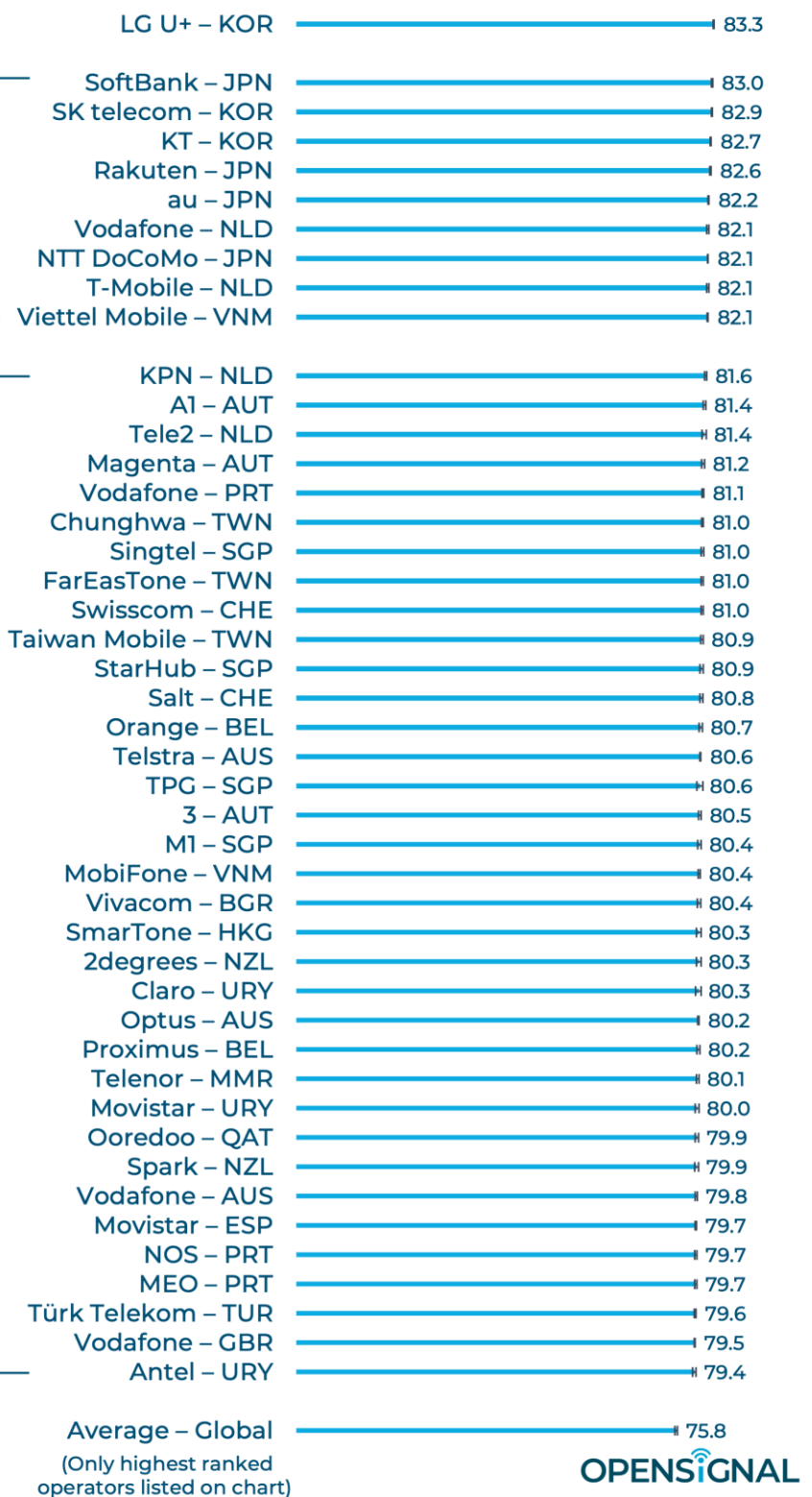
in the game. Most users did not experience a delay between their actions and the game.

In contrast, a Poor Games Experience indicates that most users found their level of experience unacceptable. The majority of users reported seeing a delay in the gameplay experience and they did not receive immediate feedback on their actions. Many users felt a lack of controllability in the Games Experience.

# Voice App Experience — Global

South Korea's LG U+ comes top

## Voice App Experience – Global



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0 20 40 60 80 100

Data collection period July 1 – December 27, 2020 | © Opensignal Limited

Voice App Experience score

Opensignal's Voice App Experience measures the quality of experience for over-the-top (OTT) voice services – mobile voice apps such as WhatsApp, Skype, Facebook Messenger, etc. – using a model derived from the International Telecommunication Union (ITU)-based approach for quantifying overall voice call quality and a series of calibrated technical parameters.

South Korea's LG U+ is the sole Global Winner for Voice App Experience, with a score of 83.3 out of 100 – at least 0.3 points ahead of the previous Global Winner – Japan's SoftBank – and SK telecom, which are statistically tied for second place. Japanese and South Korean operators made up six out of our nine Global Leaders – including relative newcomer Rakuten – with the only exceptions being Vodafone and T-Mobile from the Netherlands and Vietnam's Viettel Mobile.

LG U+'s winning score was 7.5 points (9.8%) higher than the global average of 75.8 points. Our users on LG U+, together with those on all of the Global Leaders' networks and those on 25 out of 35 of our Global High Performers had a Good Voice App Experience, with the remainder having an Acceptable Voice App Experience. The average Voice App Experience observed by our users placed in the Acceptable category. Our Global High Performers' scores were at least 3.6 points (4.7%) higher than the global average of 75.8 points.

A Good Voice App Experience means that many users were satisfied, although some of them experienced minor quality impairments. Sometimes the background was not quite clear, it could be either hazy or not loud enough. Clicking sounds or distortion were very occasionally present.

An Acceptable Voice App Experience indicates that users were satisfied. However, some experienced perceptible call quality impairments. Short duration of clicking sounds or distortion could be heard, and/or the volume may not have been sufficiently loud. Listeners were generally able to comprehend without repetition.

Generally speaking, there is some room for improvement as no operators achieved an Excellent or Very Good rating for Voice App Experience and only 20% of them placed in the Good category. However, 70% placed in either the Good or Acceptable categories and only 5% of operators were in one of the three lowest categories (Very Poor, Unintelligible, Impossible to Communicate).

Regionally, Vietnam's Viettel Mobile managed to claw its way past all of Singapore's operators to grab the top spot in South East Asia with a score of 82.1 points.

# Download Speed Experience — Global

SK telecom's score of 74.9 Mbps is 3.2 times the average

↓ **Download Speed Experience – Global**



SK telecom – KOR 74.9



Telus – CAN 68.6  
 Bell – CAN 63.9  
 T-Mobile – NLD 62.3  
 Vodafone – NLD 59.9  
 KPN – NLD 59.5  
 Tele2 – NLD 58.5  
 StarHub – SGP 56.5  
 LG U+ – KOR 55.7  
 Rogers – CAN 54.4



NTT DoCoMo – JPN 53.1  
 KT – KOR 53.0  
 AI – AUT 52.1  
 Swisscom – CHE 50.7  
 Singtel – SGP 48.8  
 au – JPN 48.6  
 Telstra – AUS 46.6  
 Etisalat – ARE 45.6  
 Telekom – DEU 44.5  
 Orange – FRA 43.4  
 SoftBank – JPN 42.1  
 AI – BGR 41.3  
 Chunghwa – TWN 41.3  
 Telenet – BEL 39.2  
 Spark – NZL 38.8  
 Ooredoo – QAT 38.0  
 Proximus – BEL 37.8  
 Optus – AUS 37.4  
 Sunrise – CHE 36.9  
 Vodafone – NZL 36.6

Average – Global 23.6  
 (Only highest ranked operators listed on chart)



0 20 40 60 80 (Mbps)

Data collection period July 1 – December 27, 2020 | © Opensignal Limited

The world has a new king of speed in the form of SK telecom. Our users on its network observed average download speeds of 74.9 Mbps – 6.3 Mbps (9.2%) higher than the Download Speed Experience score of the previous Global Winner, Canada’s Telus.

To put SK telecom’s achievement into perspective, its score is a staggering 51.3 Mbps – or 3.2 times – faster than the global operator average of 23.6 Mbps. 5G helped SK telecom because of high 5G adoption in South Korea and [fast 5G download speeds](#). While South Korea’s operators launched their 5G networks back in April 2019, Canada’s operators only began their commercial launches a year later in 2020.

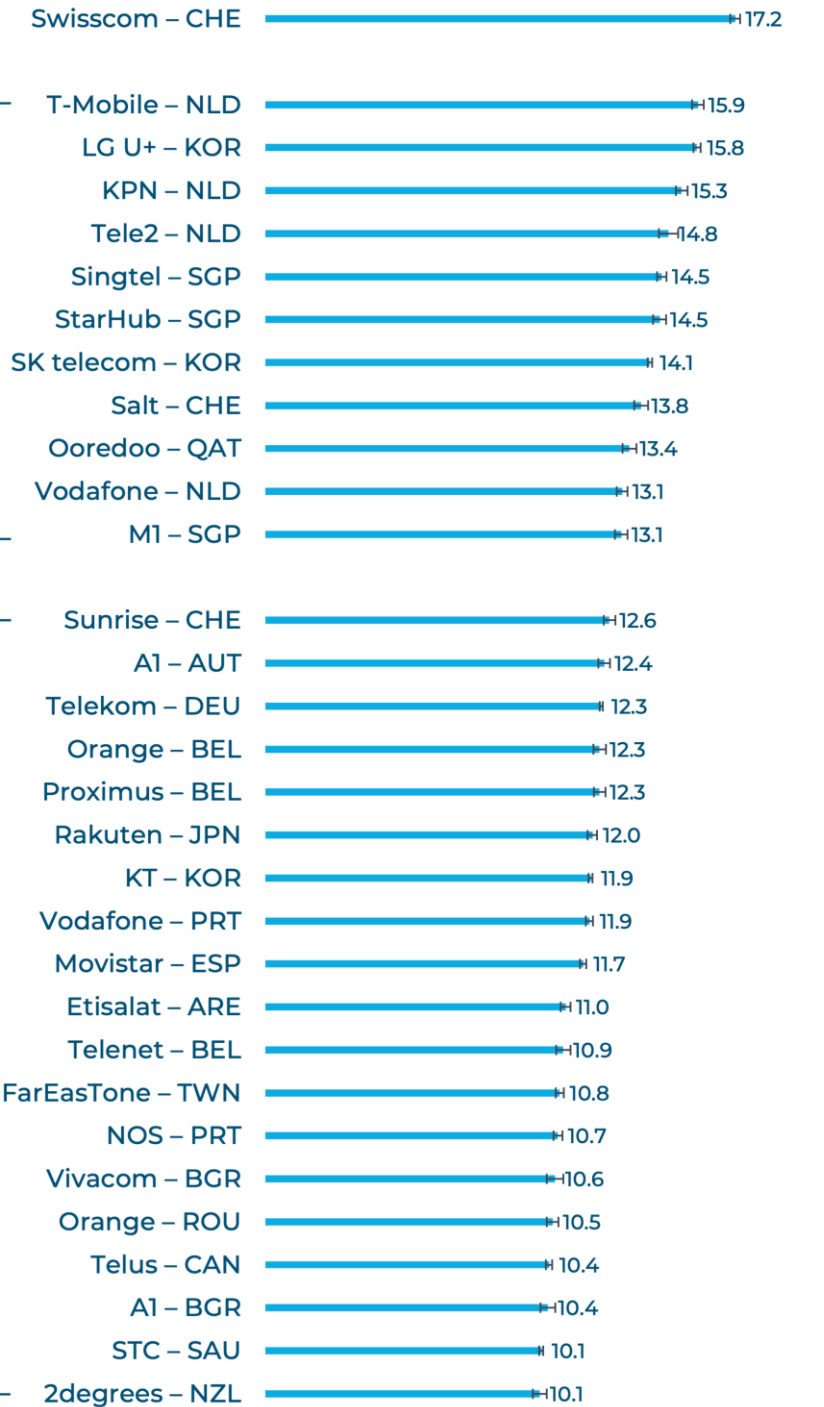
Of our nine Global Leaders, all but two – Singapore’s StarHub and South Korea’s LG U+ – hailed from either Canada or the Netherlands. All of Canada and the Netherlands’ national operators are Global Leaders for Download Speed Experience. Moving down the table, the average download speeds observed by our users connecting with the Global High Performers were at least 13 Mbps (55%) faster than the global average of 23.6 Mbps.

Breaking down the analysis by region, StarHub’s score of 56.5 Mbps pushed it to the top in South East Asia, while T-Mobile Netherlands had the highest score out of all the European operators with 62.3 Mbps. The UAE’s Etisalat led in Africa and the Middle East with a score of 45.6 Mbps, while our North American users observed their fastest average download speeds on Telus’ network.

# Upload Speed Experience — Global

## Swisscom is again the Global Winner

### ↑ Upload Speed Experience – Global



Average – Global 7.5

(Only highest ranked operators listed on chart)

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0 5 10 15 20 (Mbps)

Data collection period July 1 – December 27, 2020 | © Opensignal Limited

(Mbps)



Traditionally much of the focus on mobile network speeds has been on download speeds given consumers' increasing use of data-intensive services such as video streaming. This is changing now as upload speeds are becoming more important with the rise of social media and cloud services which encourage users to upload photos, videos and other rich content.

Switzerland's Swisscom has held onto its crown as it remains the sole Global Winner for Upload Speed Experience. It won by a lead of at least 1.4 Mbps (8.6%) over the two operators who were statistically tied for second-place – T-Mobile Netherlands and South Korea's LG U+.

Upload Speed Experience saw our first Global Leader to hail from the Middle East, Qatar's Ooredoo. The leaders also include all four of Netherlands' national operators, Singapore's operators (with the exception of relative newcomer TPG), plus Salt from Switzerland.

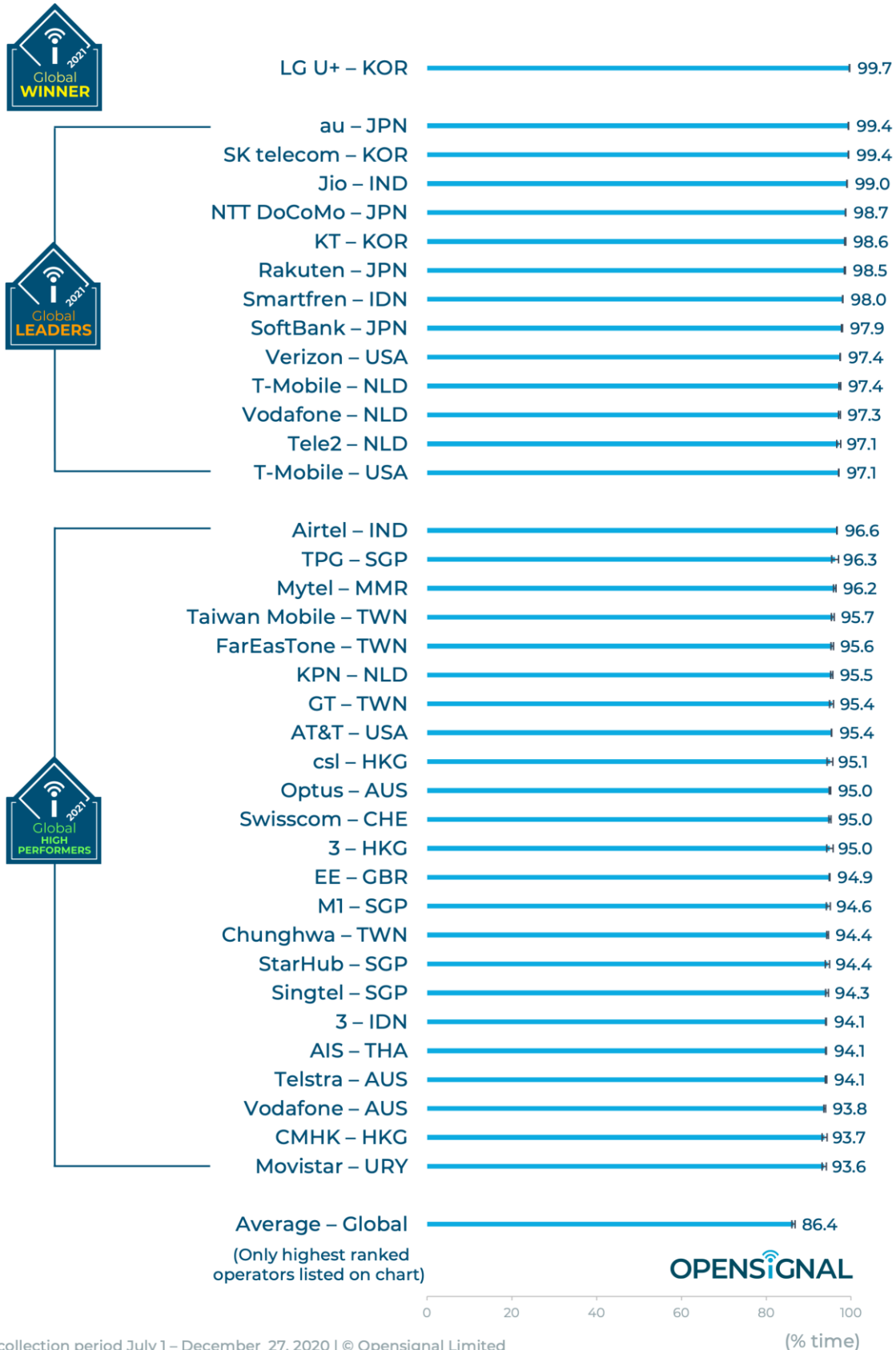
Moving further down the table, Opensignal users on the Global High Performer operators observed average overall upload speeds that were at least 2.6 Mbps or 34.4% faster than the global operator average of 7.5 Mbps. Swisscom's Upload Speed Experience score was a remarkable 9.7 Mbps (130%) faster than the global operator average.

At the regional level, Singapore's Singtel and StarHub were tied for the top spot in South East Asia, but it was LG U+ which came up top in both Asia Pacific and North East Asia. Meanwhile, Telus' score of 10.4 Mbps gave it the upper hand in North America.

# 4G Availability — Global

## LG U+ has a nearly perfect score

### 4G Availability – Global



Data collection period July 1 – December 27, 2020 | © Opensignal Limited

4G Availability is the percentage of time that our users spend connected to 4G service. While it's an older technology, 4G remains essential for users to connect to almost all current 5G services because of the use of 5G non-standalone access (NSA).

South Korea's LG U+ has excelled for 4G Availability. Our users connecting with LG U+ spent a staggering 99.7% of their time connected to 4G, just 0.3 percentage points away from a perfect score. Our Global Leaders for this measure of the mobile experience include LG U+'s domestic rivals, SK telecom and KT, as well as all four of Japan's national operators – including relative newcomer Rakuten and the previous Global Winner au.

India's Jio, as well as Verizon and T-Mobile from the U.S. are also among the Global Leaders for 4G Availability. In addition, three out of four of the Netherlands' national operators are Global Leaders, with KPN placing further down the table as a Global High Performer.

The average global 4G Availability across all operators with a 4G network was 86.4% – which LG U+ exceeded by a remarkable 13.2 percentage points. A sizable 39% of operators had a 4G Availability score that was 90% or more, with 15% having a score that was 95% or higher. Our Global High Performers had scores that were at least 7.2 percentage points higher than the global operator average for 4G Availability. Three of the Netherlands' operators – T-Mobile, Tele2 and Vodafone – were statistically tied for the highest 4G Availability score in Europe.

# Opensignal's 2021 Global Rising Stars

The time has come to take a look at our Global Rising Stars: the top 30 operators around the world on whose networks our users have seen the greatest improvement in their mobile network experience in the last year. We compare their experience between the second half of 2019 and the same period in 2020.

We have Global Rising Stars awards for five key measures of the real-world mobile network experience: the four that featured in our last report – Video Experience, Download Speed Experience, Upload Speed Experience and 4G Availability – and Voice App Experience for the first time.

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

Two operators are Global Rising Stars for all five of these measures of the mobile experience, namely Egypt's WE and Banglalink in Bangladesh. A further 14 operators were Global Rising Stars in four out of five categories, including France's Free Mobile, Claro Uruguay, Colombia's Tigo and both of Libya's National operators, Libyana and Al-Madar.

When an operator's investment in its 4G network significantly increases the proportion of time that our users spend connected to 4G services, our users typically experience an improvement across many of our metrics because of 4G's enhancements over the older 3G standard. Indeed, out of the 14 operators that featured in four of our five Rising Stars categories, 10 were Global Rising Stars for 4G Availability.

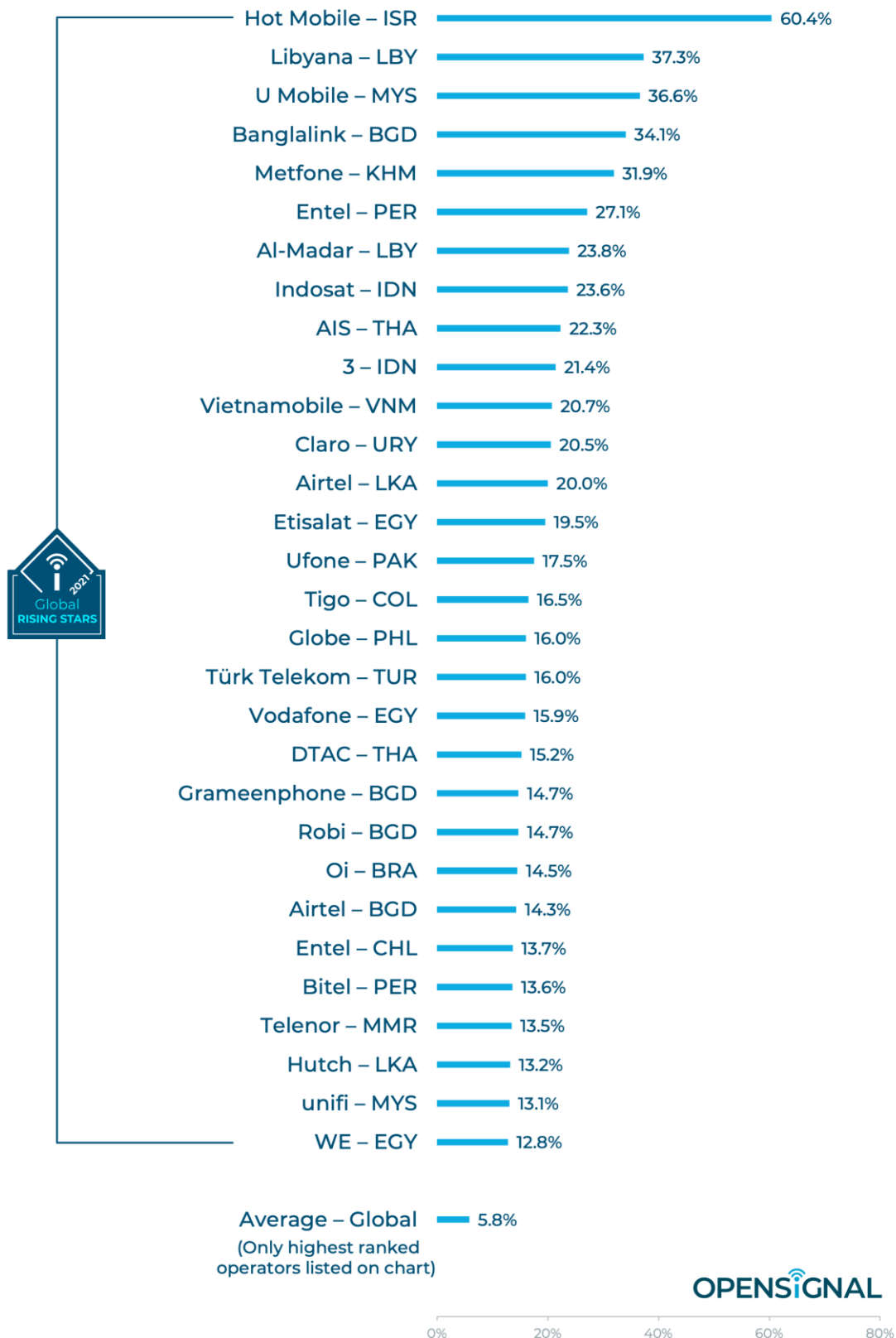
Cambodia's Metfone continues to be making extremely rapid progress. The operator had the highest percentage increase in both Voice App Experience (20.2%) and Download Speed Experience (125.2%) and also had the second highest improvement for Upload Speed Experience (80.8%).

To be one of the top 30 operators in the world for year-on-year percentage improvement in even a single metric is an impressive achievement, especially when we consider the challenges created by the COVID-19 pandemic.

# Video Experience — Global Rising Stars

Hot Mobile's Video Experience score has risen by 60.4%

## ▶ Video Experience – Most Improved



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Video Experience change

Our users on Israeli operator Hot Mobile's network saw their Video Experience score rise by a blisteringly fast 60.4% in the last year, making it the operator with the most improved Video Experience. Hot Mobile's score rose from 33.6 out of 100 to 53.9, an increase of 20.3 points. As a result, our Hot Mobile users' Video Experience has moved up a category, from Poor (under 40) to Fair (40-55).

Of our 30 Global Rising Stars for Video Experience, 17 are from the Asia Pacific region, while six are based in Latin America and seven hail from Africa and the Middle East. All of our Global Rising Stars for Video Experience increased their scores by at least seven percentage points over the global average of 5.8%.

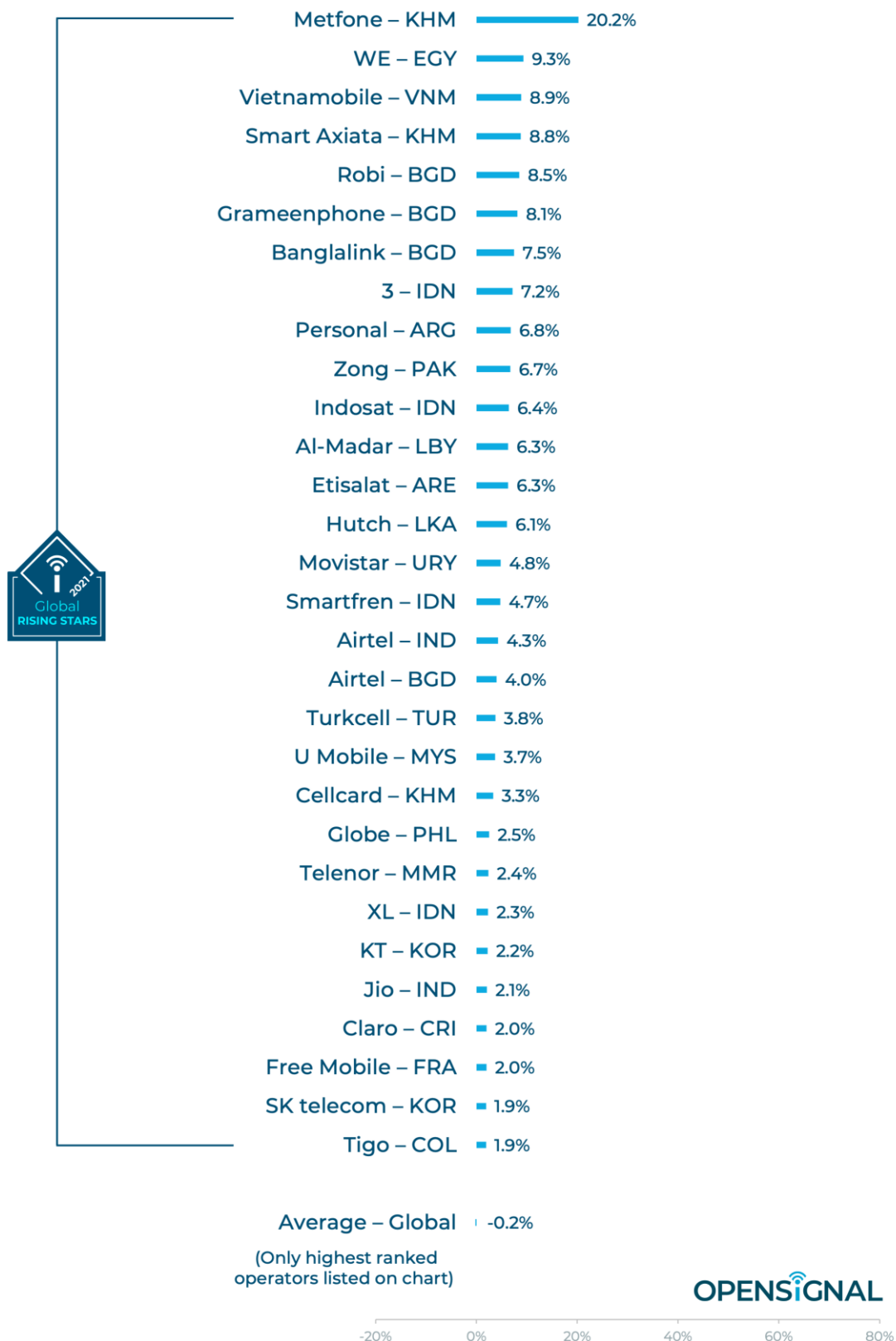
While Hot Mobile's progress is truly impressive, it wasn't the only operator on which our users observed a substantial improvement in their Video Experience. Four operators – Libyana, U Mobile in Malaysia, Banglalink and Cambodia's Metfone – saw their scores rise by more than 30% per cent. While Peru's Entel fell a little short of this, our users on its network saw the largest percentage increase in their Video Experience in Latin America.

Over in the Asia Pacific, Malaysia's U Mobile recorded the largest improvement out of all the operators in the region – an impressive feat given the number of Asian Pacific operators that made it through to our top 30.

# Voice App Experience — Rising Stars

70% of our Global Rising Stars hail from the Asia Pacific

## Voice App Experience – Most Improved



Data collection period July 1 – December 27, 2019 & 2020 | © Opensignal Limited Voice App Experience change

Our first look at how the Voice App Experience has evolved between 2019 and 2020 at the global operator level shows that Cambodia's Metfone has made great strides in this measure of the mobile experience. The operator's score rose by a remarkable 20.2%, while the operator with the next largest improvement – Egypt's WE – was some way behind with an increase of 9.3%. Metfone's score rose by 12.9 points from 63.6 out of 100 a year ago to 76.5 now. This caused Metfone to move up two categories – from Very Poor (60-66) to Acceptable (74-80).

Asia Pacific operators accounted for 21 out of 30 Global Rising Stars for Voice App Experience, along with eight operators equally split between Africa and the Middle East and Latin America. The sole European operator to make the list was France's Free Mobile and it was the only European operator on which our users observed an improvement in their Voice App Experience. Similarly, South Korea's operators were the only ones in North East Asia on which our users saw their Voice App Experience improve.

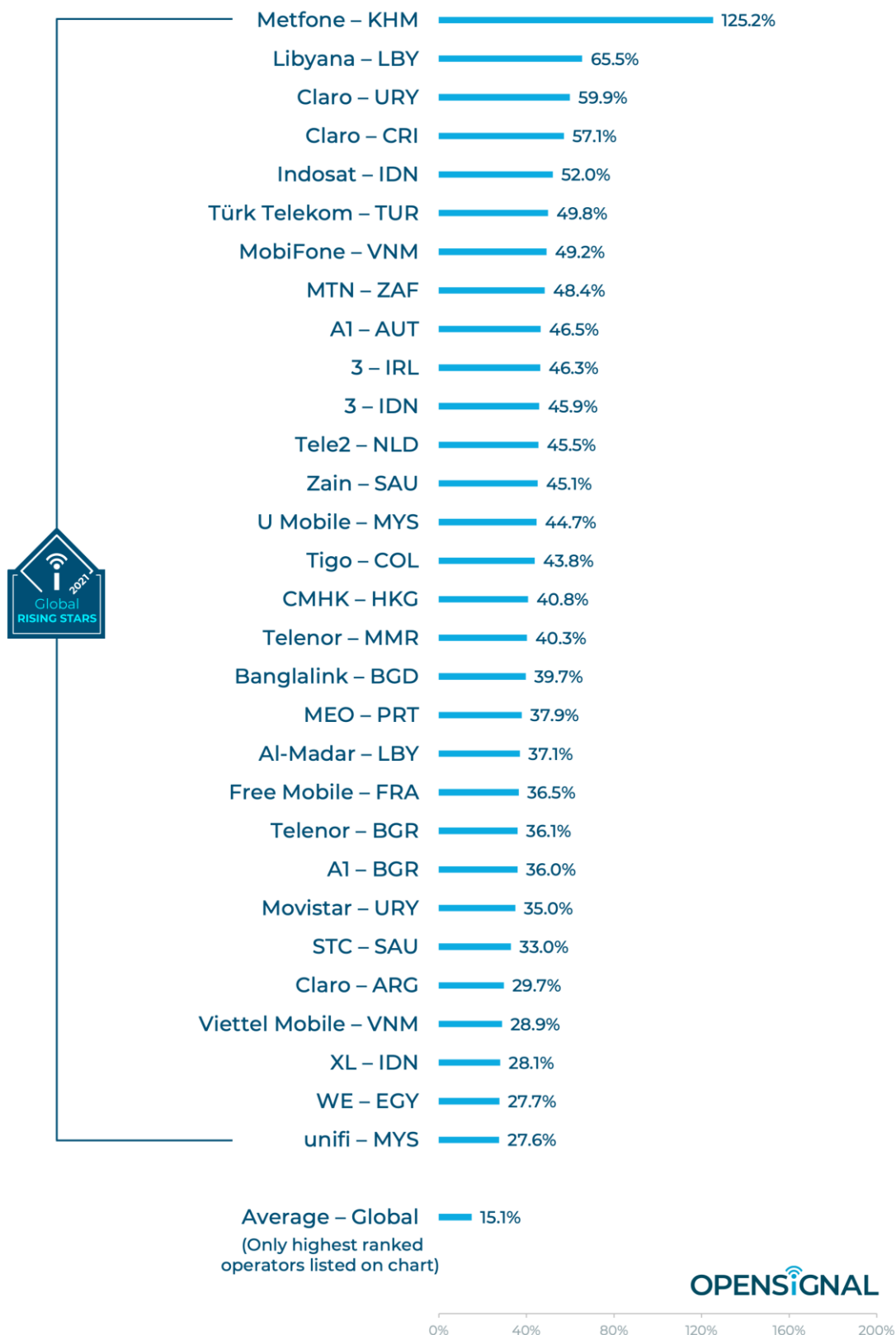
All of our Global Rising Stars for Voice App Experience increased their scores by at least 2.1 percentage points more than the global average of -0.2%. However, 14 out of 30 of our Global Rising Stars for Voice App Experience saw their scores improve by more than six percentage points.



# Download Speed Experience – Rising Stars

17 operators' scores have improved by over 40%

## Download Speed Experience – Most Improved



Data collection period July 1 – December 27, 2019 & 2020 | © Opensignal Limited

Download Speed Experience change

In our first Global Awards report, Cambodia's Metfone stole the show when it came to year-on-year improvement in Download Speed Experience and this time round, the operator is still in a league of its own as far as percentage improvement in average download speeds is concerned. Metfone's Download Speed Experience score increased by 125.2% – from 4.8 Mbps a year ago to reach 10.9 Mbps now.

Our users saw their average download speeds improve by more than 50% on four other operators' networks – Libyana, Claro in both Uruguay and Costa Rica, and Indonesia's Indosat. Four Global Rising Stars achieved double-digit improvements in their Download Speed Experience scores, namely Tele2 in the Netherlands (18.3 Mbps), A1 in both Austria (16.5 Mbps) and Bulgaria (10.9 Mbps), and South Africa's MTN (10.3 Mbps).

As was the case last year, the most heavily represented region is the Asia Pacific which accounts for 11 out of 30 Global Rising Stars for Download Speed Experience, with operators from Africa and the Middle East, Europe and Latin America making up the balance. All of our Global Rising Stars for Download Speed Experience increased their scores by at least 12.5 percentage points more than the global average of 15.1%.

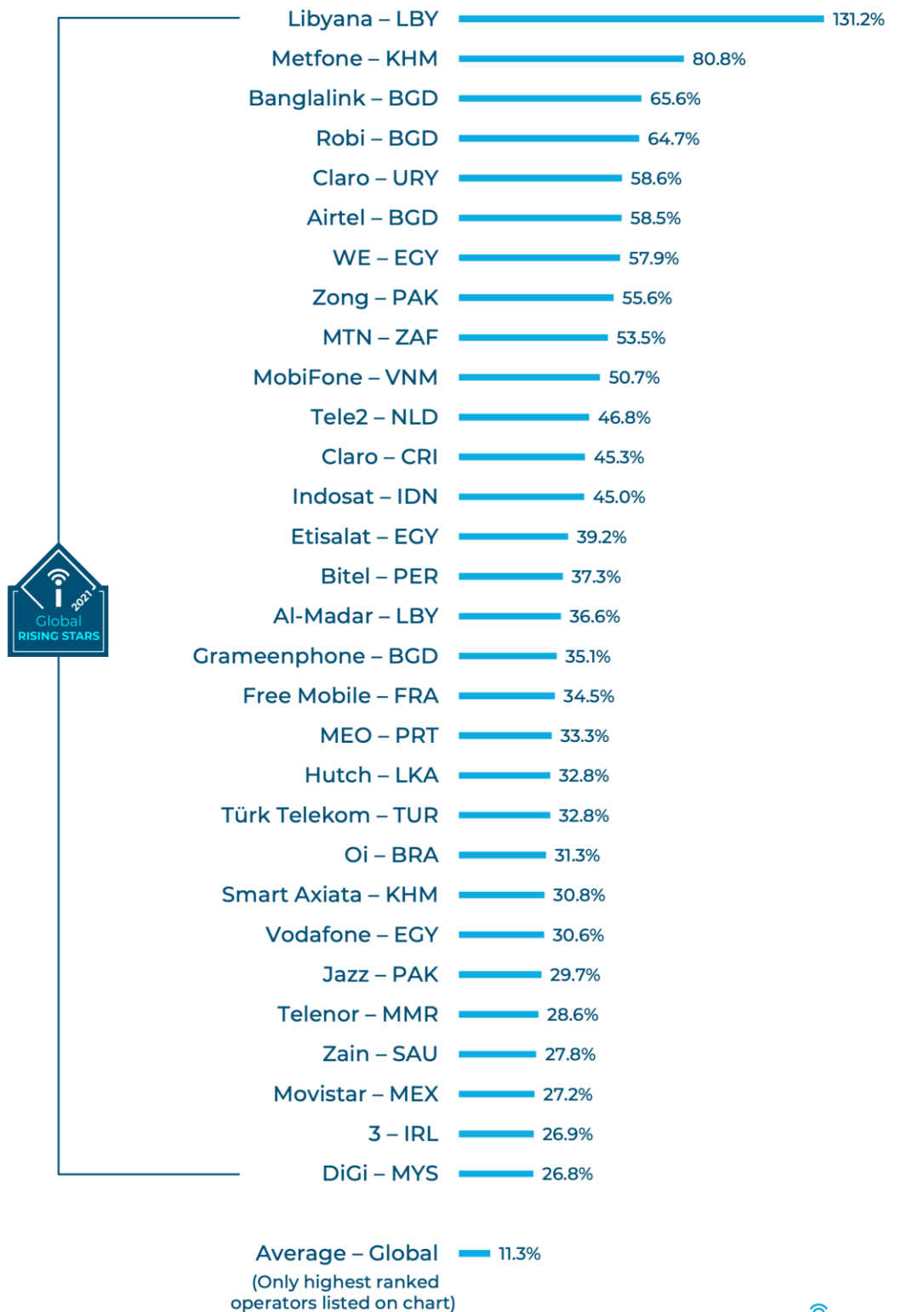
In North East Asia, our users on CMHK's network saw the most improvement – with the operator's Download Speed Experience score improving by 40.8%, 14 percentage points higher than the operator in the region with the next highest improvement – Taiwan's FarEasTone.

Over in Europe, remarkably three operators' scores rose by over 45%, namely A1 in Austria which was Europe's highest scorer with an increase of 46.5%, Irish 3 and Netherlands' Tele2. While in Latin America our Claro users in both Uruguay and Costa Rica saw their average download speeds increase by more than 57%.

# Upload Speed Experience — Rising Stars

More than a quarter come from Africa & the Middle East

## ↑ Upload Speed Experience – Most Improved



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0% 40% 80% 120% 160%

Upload Speed Experience change

Data collection period July 1 – December 27, 2019 & 2020 | © Opensignal Limited

Our Libyan users on Libyana's network saw their average upload speeds improve by a remarkable 131.2%. Metfone followed just behind with an increase of 80.8%.

Rising Stars Tele2 Netherlands, Vietnam's Mobifone and South African MTN saw large improvements in both percentage and absolute terms. Their Upload Speed Experience scores rose by 46.8% 50.7% and 53.5% respectively and equated to increases of 4.7 Mbps, 3.4 Mbps and 3.2 Mbps, respectively.

All of our Global Rising Stars for Upload Speed Experience increased their scores compared with the previous year by at least 15.5 percentage points more than the global average of 11.3%.

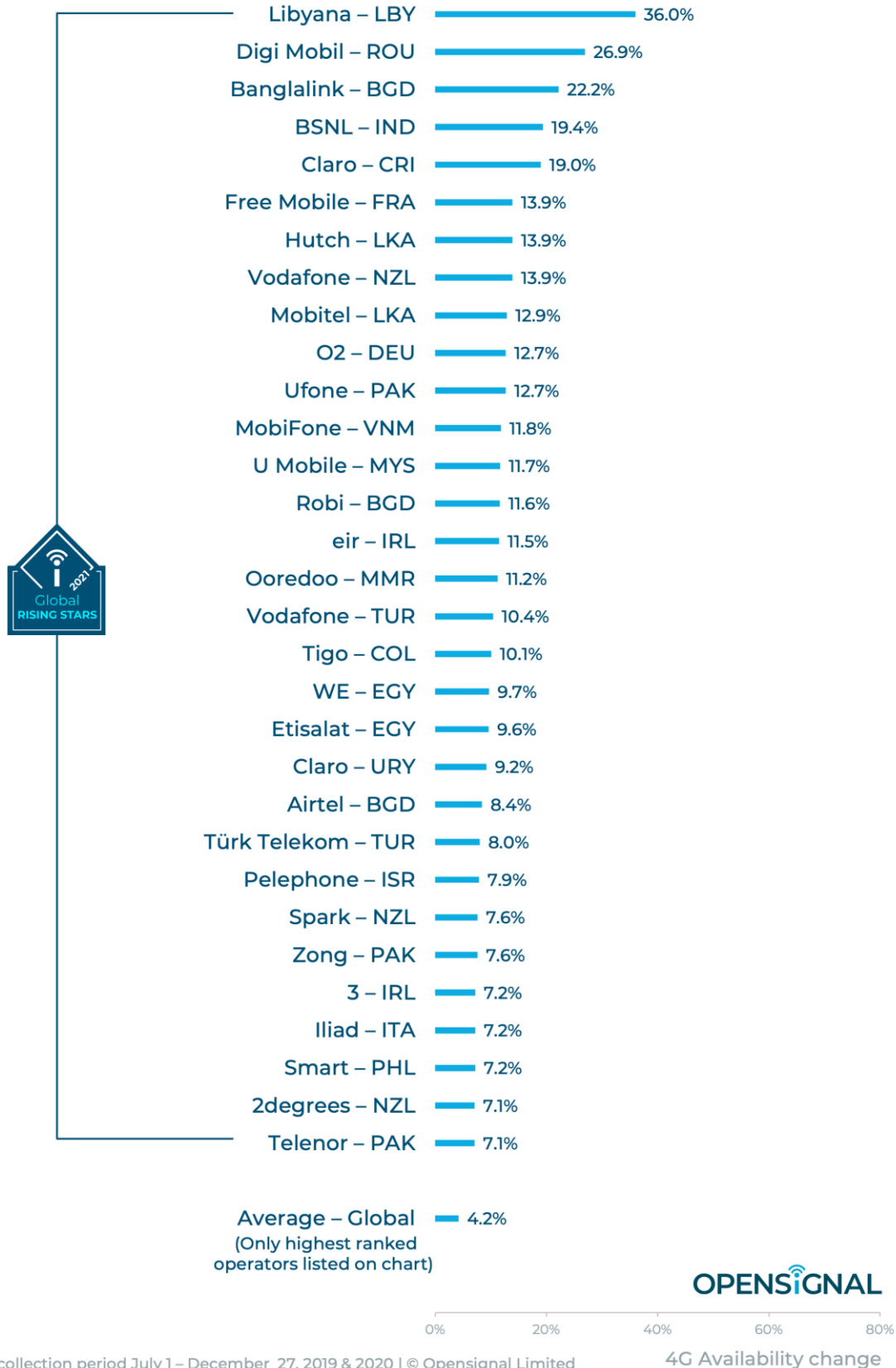
In our last report Swisscom was the only European operator to win a Global Rising Star for Upload Speed Experience, but this time there are four European operators that are Global Rising Stars for Upload Speed Experience: Ireland's 3; Portugal's MEO; French Free Mobile; and Dutch Tele2. Of these, our Tele2 Netherlands users observed the largest increase out of all the European operators in this analysis, with their average upload speeds rising by an impressive 46.8%.

While 13 out of 30 Upload Speed Experience Global Rising Stars hail from the Asia Pacific region, this is the only category where we have a Global Rising Star from North America. Mexico's Movistar saw its Upload Speed Experience score rise by 27.2% to win a Global Rising Star award. Claro Uruguay came top in Latin America followed by Claro Costa Rica, but our Claro Uruguay users saw much more improvement with the score rising by 58.6% compared with the 45.3% seen in Costa Rica using Claro.

# 4G Availability — Global Rising Stars

Libyana users again have the largest increase

## 4G Availability – Most Improved



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In our inaugural Global Awards report, Libya dominated the chart for improvement in 4G Availability. Again, this time round it remains at the top – with an increase of 36% – and well ahead of the next highest placed operators, Romania’s Digi Mobil and Banglalink.

Operators from Asia Pacific have the largest showing with 16 hailing from the region. Europe together with Africa and the Middle East both have six Global Rising Stars for 4G Availability, while Latin America has three. Our Digi Mobil users in Romania observed the largest percentage improvement in the proportion of time that they spent connected to 4G services in Europe, with an increase of 26.9%, followed by those on France’s Free Mobile with a more modest – but still impressive – improvement of 13.9%.

There are 31 Opensignal Global Rising Stars for 4G Availability because we have included Pakistan’s Telenor as it achieved the same percentage improvement as the 30th Global Rising Star 2degrees in New Zealand. All 31 operators increased their scores by at least 2.9 percentage points more than the global average of 4.2% compared with a year earlier.

# 5G is picking up a head of steam

Judging by our Global Rising Stars, many operators have been able to improve users' mobile experience despite the many unique challenges 2020 has provided. The combination of vaccination efforts aimed at getting COVID-19 under control coupled with the increasingly mature and affordable range of 5G handsets and major investments in 5G networks all bode well for those seeking improvements in their mobile experience.

5G is already making its influence felt in our measures of the mobile experience. All of our award categories in this report include 5G measurements from 5G users. For example, in this report we see a change in the Global Winner for Download Speed Experience – the impressive speed of Telus' 4G network and its relatively recent 5G network launch couldn't overcome the advantage that SK telecom possesses. In South Korea all the operators launched their 5G networks back in April 2019 compared with Telus' launch in mid-June 2020.

5G's impact on our overall metrics will only grow given the technological improvements of this latest generation of mobile technology and the ability for 5G to tap into new previously unused spectrum capacity. Regulators concerned about the position of their country's operators in global rankings should minimize barriers to 5G deployments, for example around the availability and cost of new spectrum suited for 5G.

Some countries have been relatively late to the 5G party, even those that were leaders in previous network generations such as Japan or Sweden who were first movers for 3G and 4G technologies respectively. Japan's operators launched 5G a year after those in South Korea and while Sweden's operators were closer to eighteen months behind.

Despite the fact that it is nearly two years since operators first commercially deployed 5G for smartphone users, we are still very much at the start of the 5G journey. We are even further away from the time when 5G becomes the dominant network technology. However, with 5G handsets effectively being the default option for mobile users upgrading to a 2021 premium or high-mid tier smartphone model and with Apple having made 5G a standard feature on all iPhone 12 models, many of the barriers that were limiting 5G adoption are crumbling away.

Opensignal is already seeing the improved experience brought by 5G. But the uplift in experience is far from uniform and depends on which spectrum bands operators are able to use for 5G among other factors. At Opensignal we are following this aspect closely and you can expect many insights from us on how 5G influences the real-world user experience in the months and years to come. Most likely next year's Opensignal Global Winners will all have successful 5G deployments with many 5G users.



# Operators analyzed

2degrees – New Zealand  
3 – Austria  
3 – Hong Kong  
3 – Indonesia  
3 – Ireland  
3 – United Kingdom  
A1 – Austria  
A1 – Bulgaria  
Airtel – Bangladesh  
Airtel – India  
Airtel – Sri Lanka  
AIS – Thailand  
Al-Madar – Libya  
Antel – Uruguay  
AT&T – Mexico  
AT&T – United States of America  
au – Japan  
Banglalink – Bangladesh  
Beeline – Russian Federation  
Bell – Canada  
Bitel – Peru  
Bouygues – France  
BSNL – India  
Celcom – Malaysia  
Cell C – South Africa  
Cellcard – Cambodia  
Cellcom – Israel  
Chunghwa – Taiwan  
Claro – Argentina  
Claro – Brazil  
Claro – Chile  
Claro – Colombia  
Claro – Costa Rica  
Claro – Peru  
Claro – Uruguay  
CMHK – Hong Kong  
csl – Hong Kong  
Dialog – Sri Lanka  
DiGi – Malaysia  
Digi Mobil – Romania  
DTAC – Thailand  
du – United Arab Emirates  
EE – United Kingdom  
eir – Ireland  
Entel – Chile  
Entel – Peru  
Etisalat – Egypt

Etisalat – United Arab Emirates  
FarEasTone – Taiwan  
Free Mobile – France  
Globe – Philippines  
Golan Telecom – Israel  
Grameenphone – Bangladesh  
GT – Taiwan  
Hot Mobile – Israel  
Hutch – Sri Lanka  
Iliad – Italy  
Indosat – Indonesia  
Jazz – Pakistan  
Jio – India  
Kölbli – Costa Rica  
KPN – Netherlands  
KT – South Korea  
LG U+ – South Korea  
Libyana – Libya  
M1 – Singapore  
Magenta – Austria  
Maxis – Malaysia  
MegaFon – Russian Federation  
MEO – Portugal  
Metfone – Cambodia  
MobiFone – Vietnam  
Mobily – Saudi Arabia  
Mobitel – Sri Lanka  
Movistar – Argentina  
Movistar – Chile  
Movistar – Colombia  
Movistar – Costa Rica  
Movistar – Mexico  
Movistar – Peru  
Movistar – Spain  
Movistar – Uruguay  
MPT – Myanmar  
MTN – South Africa  
MTS – Russian Federation  
Mytel – Myanmar  
NOS – Portugal  
NTT DoCoMo – Japan  
O2 – Germany  
O2 – United Kingdom  
Oi – Brazil  
Ooredoo – Myanmar  
Ooredoo – Qatar  
Optus – Australia

Orange – Belgium  
Orange – Egypt  
Orange – France  
Orange – Poland  
Orange – Romania  
Orange – Spain  
Partner – Israel  
Pelephone – Israel  
Personal – Argentina  
Play – Poland  
Plus – Poland  
Proximus – Belgium  
Rakuten – Japan  
Robi – Bangladesh  
Rogers – Canada  
Salt – Switzerland  
SFR – France  
Singtel – Singapore  
SK telecom – South Korea  
Smart – Philippines  
Smart Axiata – Cambodia  
Smartfren – Indonesia  
SmarTone – Hong Kong  
SoftBank – Japan  
Spark – New Zealand  
StarHub – Singapore  
STC – Saudi Arabia  
Sunrise – Switzerland  
Swisscom – Switzerland  
T Star – Taiwan  
T-Mobile – Netherlands\*  
T-Mobile – Poland  
T-Mobile – United States of America  
Taiwan Mobile – Taiwan  
Telcel – Mexico  
Tele2 – Netherlands\*  
Tele2 – Russian Federation  
Telekom – Germany  
Telekom – Romania  
Telenet – Belgium  
Telenor – Bulgaria  
Telenor – Myanmar  
Telenor – Pakistan  
Telkom – South Africa  
Telkomsel – Indonesia

Telstra – Australia  
Telus – Canada  
Tigo – Colombia  
TIM – Brazil  
TIM – Italy  
TPG – Singapore  
TrueMove H – Thailand  
Türk Telekom – Turkey  
Turkcell – Turkey  
U Mobile – Malaysia  
Ufone – Pakistan  
unifi – Malaysia  
Verizon – United States of America  
Vi – India  
Vietnamobile – Vietnam  
Viettel Mobile – Vietnam  
Vinaphone – Vietnam  
Vivacom – Bulgaria  
Vivo – Brazil  
Vodacom – South Africa  
Vodafone – Australia  
Vodafone – Egypt  
Vodafone – Germany  
Vodafone – Ireland  
Vodafone – Italy  
Vodafone – Netherlands  
Vodafone – New Zealand  
Vodafone – Portugal  
Vodafone – Qatar  
Vodafone – Romania  
Vodafone – Spain  
Vodafone – Turkey  
Vodafone – United Kingdom  
WE – Egypt  
WindTre – Italy  
WOM – Chile  
XL – Indonesia  
Yoigo – Spain  
Zain – Saudi Arabia  
Zong – Pakistan

\* These two operators are now trading as a single brand, T-Mobile.

# Our Methodology

Opensignal measures the real-world experience of consumers on mobile networks as they go about their daily lives.

We collect billions of individual measurements every day from many millions of smartphones worldwide. Our measurements are collected at all hours of the day, every day of the year, under conditions of normal usage, including inside buildings and outdoors, in cities and the countryside, and everywhere in between. By analyzing on-device measurements recorded in the places where subscribers actually live, work and travel, we report on mobile network service the way users truly experience it. We continually adapt our methodology to best represent the changing experience of consumers on mobile networks and, therefore, comparisons of the results to past reports should be considered indicative only.

## Confidence Intervals

For every metric we calculate statistical confidence intervals indicated on our graphs. When confidence intervals overlap, our measured results are too close to declare a winner. In those cases, we show a statistical draw. For this reason, some metrics have multiple operator winners.

In our bar graphs we represent confidence intervals as boundaries on either sides of graph bars. In our supporting-metric charts we show confidence intervals as +/- numerical values.

# Our Metrics

## Video Experience

Measures the average video experience of Opensignal users on 3G and 4G networks for each operator. Our methodology involves measuring real-world video streams and uses an ITU-based approach for determining video quality. The metric calculation takes picture quality, video loading time and stall rate into account. We report video experience on a scale of 0-100.

## Voice App Experience

Measures the quality of experience for over-the-top (OTT) voice services – mobile voice apps such as WhatsApp, Skype, Facebook Messenger etc. – using a model derived from the International Telecommunication Union (ITU)-based approach for quantifying overall voice call quality and a series of calibrated technical parameters. This model characterizes the exact relationship between the technical measurements and perceived call quality. Voice App Experience for each operator is calculated on a scale from 0 to 100.

## Games Experience

Measures how mobile users experience real-time multiplayer mobile gaming on an operator's network. Measured on a scale of 0-100, it analyzes how the multiplayer mobile Games Experience is affected by mobile network conditions including latency, packet loss and jitter to determine the impact on gameplay and the overall multiplayer Games Experience.

## Download Speed Experience

Measures the average download speed experienced by Opensignal users across an operator's 3G, 4G and 5G networks. It doesn't just factor in 3G, 4G and 5G speeds, but also the availability of each network technology. Operators with lower 5G or 4G Availability tend to have a lower Download Speed Experience because their customers spend more time connected to slower generation networks.

## Upload Speed Experience

Measures the average upload speed experienced by Opensignal users across an operator's 3G and 4G networks. Upload Speed Experience doesn't just factor in 3G and 4G speeds, but also the availability of each network technology. Operators with lower 4G Availability tend to have a lower Upload Speed Experience because their customers spend more time connected to slower 3G networks.

## 4G Availability

Measures the average proportion of time Opensignal users spend with a 4G connection on each operator's network.

## 4G Coverage Experience

Measures how mobile subscribers experience 4G coverage on an operator's network. Measured on a scale of 0-10, it analyzes the locations where customers of a network operator received a 4G signal relative to the locations visited by users of all network operators.