

# Mobile networks performance in Turkey January 2021

## About SpeedChecker

Since 2008 we have helped millions of users get a better understanding of how to make their Internet go faster. Our solutions empower mobile and fixed operators, regulators and researchers in making their Internet infrastructure better and more available for everyone.

We do that by providing end-users tools such as websites or mobile apps and offer crowdsourcing systems and data to the businesses and organizations.

We collect real world end user experience through our passive and active measurement technology, combined with unique regional and global partnerships with thousands of apps.

More about SpeedChecker [here](#)



**SPEEDCHECKER**

## About the data

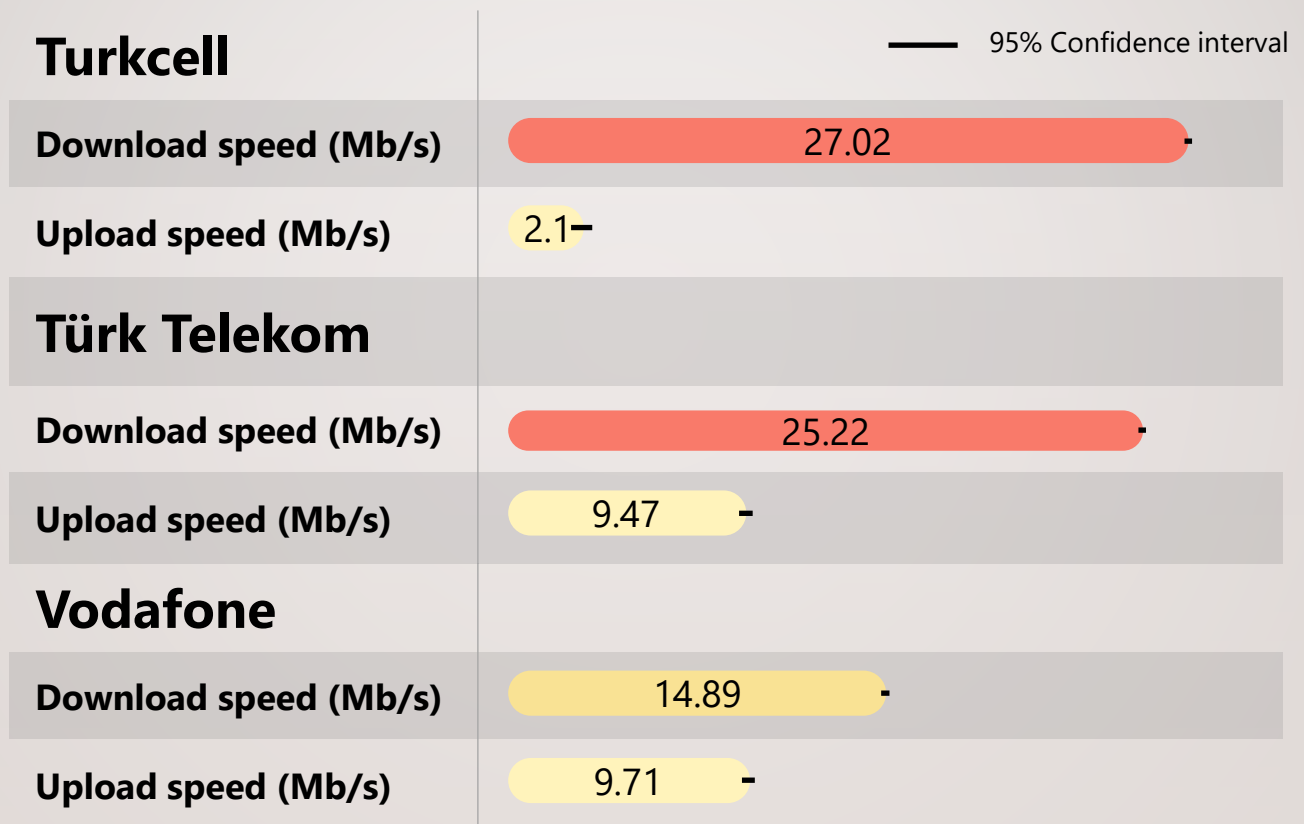
**Total number of samples:** 89,410

**Total number of unique devices:** 29,697

**Data collection period:** 07 January - 31 January 2021

See our [data collection](#) & [measurement methodology](#)

## MNO speed benchmark





# MNO 4G and 3G download speed benchmark

The following comparison has been made only on the data collected from Android devices.

## Turkcell

— 95% Confidence interval

4G Download speed (Mb/s)

27.25

3G Download speed (Mb/s)

9.12

## Türk Telekom

4G Download speed (Mb/s)

27.04

3G Download speed (Mb/s)

10.83

## Vodafone

4G Download speed (Mb/s)

14.29

3G Download speed (Mb/s)

5.48

## MNO latency benchmark

— 95% Confidence interval

### Turkcell

Latency (ms)

100.9

### Türk Telekom

Latency (ms)

105.4

### Vodafone

Latency (ms)

105.1

## MNO 4G Availability benchmark

### Turkcell

4G availability (%)

94.44

### Türk Telekom

4G availability (%)

98.64

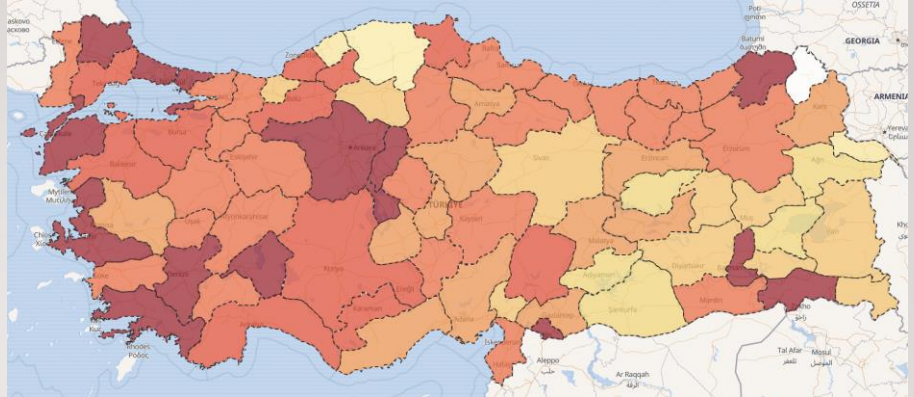
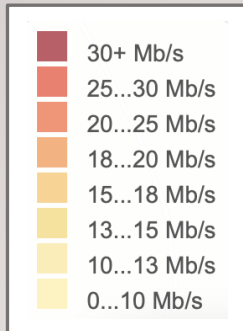
### Vodafone

4G availability (%)

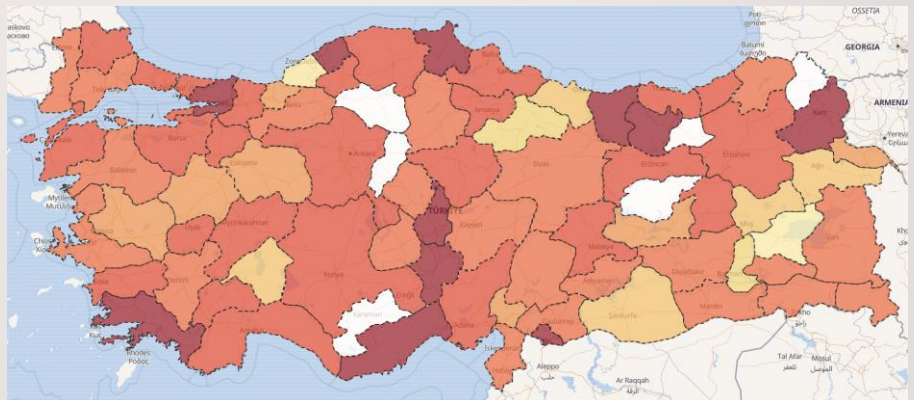
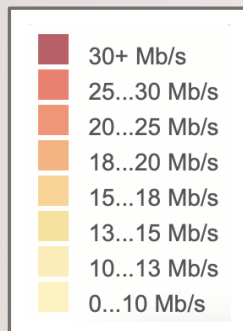
94.22

# Regional comparison of MNO download speed performance

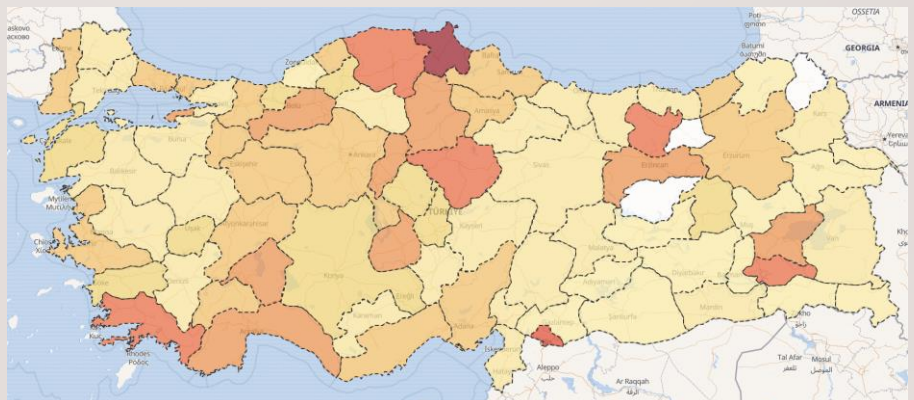
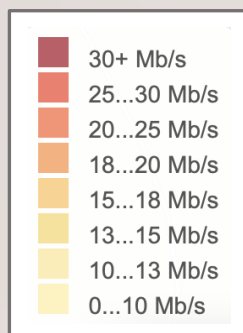
## Turkcell



## Türk Telekom



## Vodafone





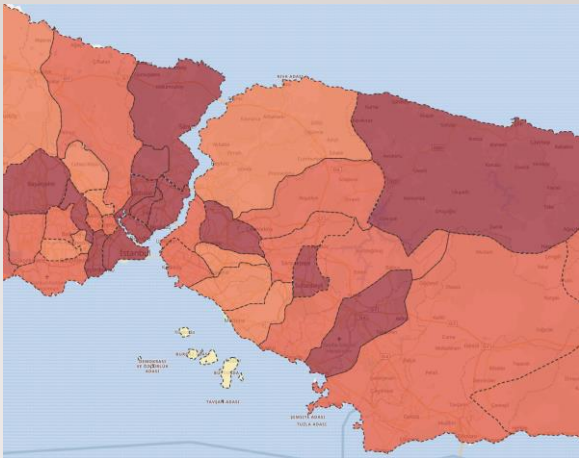
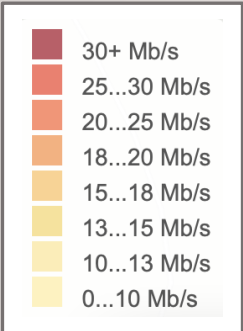
Following table shows average download speeds in different regions of Turkey. The 2<sup>nd</sup> column is an average of all MNOs in a particular region.

The fastest regions are at the top of the table.

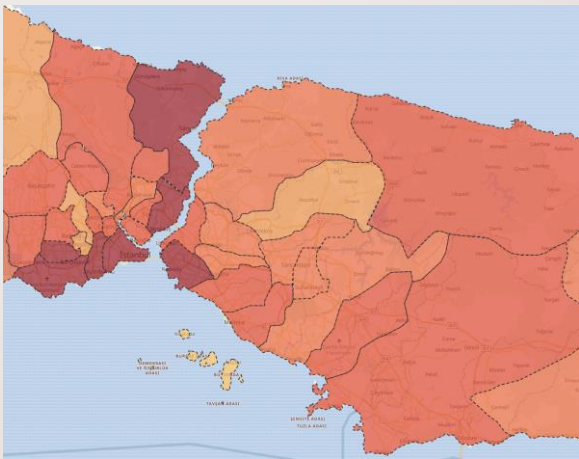
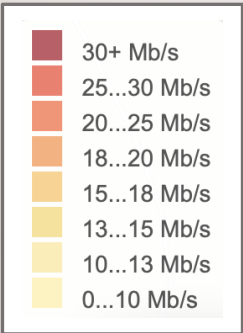
District	All operators	Türk Telekom	Türkcell	Vodafone	Test count #
Sinop	34.69	53.78	25.55	34	104
Mugla	33.27	35.3	44.17	20.17	1357
Gümüşhane	32.98	41.58	20.14	21.84	58
Kilis	32.75	40.24	30.32	27.81	125
Yalova	31.32	28.96	41.91	18.79	247
Çanakkale	29.15	28.39	45.18	14.54	586
Artvin	26.57	23.74	40.98	9.2	115
Ardahan	26.36	33.42	24.8	18.1	20
Bayburt	26.22	56.12	21.24	21.2	32
Istanbul	25.39	27.04	31.03	17.27	28220
Antalya	25.18	29.44	28.03	18.5	3519
Ankara	25.13	25.08	33.37	16.03	6140
Rize	24.5	27.8	24.72	17.59	186
Kars	23.31	30.7	19.68	12.82	94
Denizli	23.1	22.09	33.97	12.22	645
Izmir	22.56	21.44	30.58	16.79	6284
Kırıkkale	22.41	24.74	31.22	18.39	50
Trabzon	21.97	28.12	24.14	12.89	711
Kırklareli	21.83	27.51	32.42	12.68	344
Bilecik	21.83	27.15	21.18	15.52	239
Uşak	21.74	27.69	22.57	13.63	250
Bolu	21.74	22.14	25.12	18.95	334
Afyon	21.72	27.49	22.61	15.83	460
Kocaeli	21.69	30.31	24.89	11.54	3361
Konya	21.52	26.75	26.62	14.08	1506
Yozgat	21.44	26.8	19.9	21.83	130
Isparta	21.34	17.24	30.23	19.36	344
Mersin	21.22	30.09	19.98	15.41	1778
Karabük	21.12	26.69	25.43	13.95	143
Neveşehir	21.08	45.34	18.46	14.19	214
Samsun	21.06	28.54	23.04	15.71	1055
Hatay	21.01	23.26	24.18	10.81	1192
Çorum	20.92	20.3	23.75	19.11	233
Erzincan	20.85	29.61	18.4	19.84	135
K. Maras	20.53	24.01	26.25	11.48	696
Erzurum	20.52	27.51	20.17	16.03	441
Burdur	20.5	25.57	24.08	16.67	179
Eskişehir	20.48	18.85	24.77	17.51	959
Aydın	20.46	26.57	22.58	14.17	1065
Bingöl	20.29	29.13	16.77	14.89	161
Adana	19.97	25.43	19.44	15.43	2134
Sakarya	19.95	27.07	20.05	15.08	1091
Amasya	19.79	27.92	19.27	15.97	180
Karaman	19.77	28.72	25.93	12.14	107
Bartın	19.7	38.51	11.58	15.52	100
Silivri	19.59	21.21	16.48	20.52	142
Aksaray	19.54	21.15	18.23	18.72	242
Bursa	19.41	25.8	25.1	10.39	3472
Giresun	19.07	30.61	21.27	11.75	222
Balıkesir	19.05	22.94	26.48	11.74	1220
Kayseri	18.95	21.36	24.7	11.43	854
Niğde	18.79	31.3	22.82	12.09	170
Sivri	18.65	20.73	32.1	7.1	261
Edirne	18.53	22.29	20.49	16	318
Malatya	18.51	26.01	19.72	11.17	428
Kastamonu	18.41	27.67	7.8	23.58	329
Kirsehir	17.8	22.55	21.24	13.72	140
Sivas	17.59	23.77	17.45	11.81	356
Gaziantep	17.49	22.04	18.35	9.74	1849
Mardin	17.08	20.68	23.6	10.26	614
Kütahya	16.98	19.88	24.61	10.69	409
Tekirdag	16.85	21.5	25.35	11.47	1328
Manisa	16.81	18.98	19.07	10.95	1242
Ordu	16.81	16.92	21.85	10.88	605
Düzce	16.68	18.05	17.99	13.67	339
Çankiri	16.68	58.62	17.06	11.29	52
Adıyaman	16.58	23.08	13.88	5.76	310
Tokat	16.53	14.28	20.57	12.18	212
Diğer	16.5	23.06	17.51	9.73	1131
Elazığ	15.3	19.25	18.06	5.58	366
Van	15.26	20.75	16.48	10.04	671
Batman	15.18	14.58	31.89	7.42	408
Zonguldak	14.92	10.43	25.68	8.23	544
Bitlis	14.34	9.46	14.16	19.89	130
Hakkari	14.32	20.58	16.28	7.55	168
Osmaniye	13.94	18.99	15.19	12.2	286
Mus	13.35	16.39	17.09	7.54	102
Iğdır	13.26	20	11.19	9.34	98
Tunceli	12.54	17.26	14.14	5.83	23
Agri	12.34	17.72	13.43	7.46	212
Sanliurfa	11.54	17.57	13.35	7.61	1959

# MNO download speed performance in Istanbul

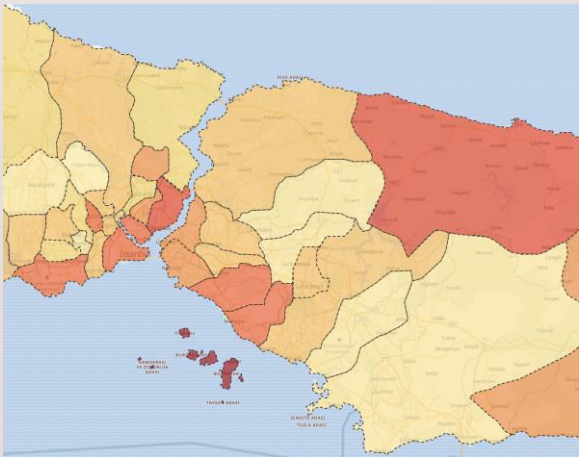
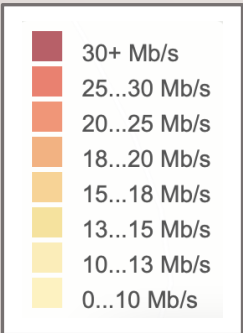
## Turkcell



## Türk Telekom



## Vodafone



## ARE YOU LOOKING FOR MORE DETAILED CROWDSOURCED DATA IN TURKEY ?

What you see in this free report is a high-level snapshot of the crowdsourced data we offer to our clients. Our crowdsourcing system contains billions of data points collected from mobile devices worldwide. Unlike our competitors, we can sell access to the data with different granularity: Our clients can pick data they need with significant cost savings associated with a reduced scope.



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# Flexibility is in our DNA

Our customers value our flexible and modular approach in delivering our solutions. There is no one size fits all in providing crowdsourcing projects. Customers increasingly require tailored solutions which will satisfy all technical, operational and legal requirements.



With reduced scope comes reduced price. Our Basic KPI set is a more cost effective way to get speed test data. Our Advanced KPI set is more comprehensive with 100+ active and passive KPIs.



Crowdsourcing is about trade-offs. Do you want more tests or do you want tests to run longer ? Do you want to collect data passively without impacting the network and user bandwidth or run active tests which will stress and assess the capacity better?



Do you want us to host the solution for fast & easy deployment or require data to be within your data center for compliance reasons.



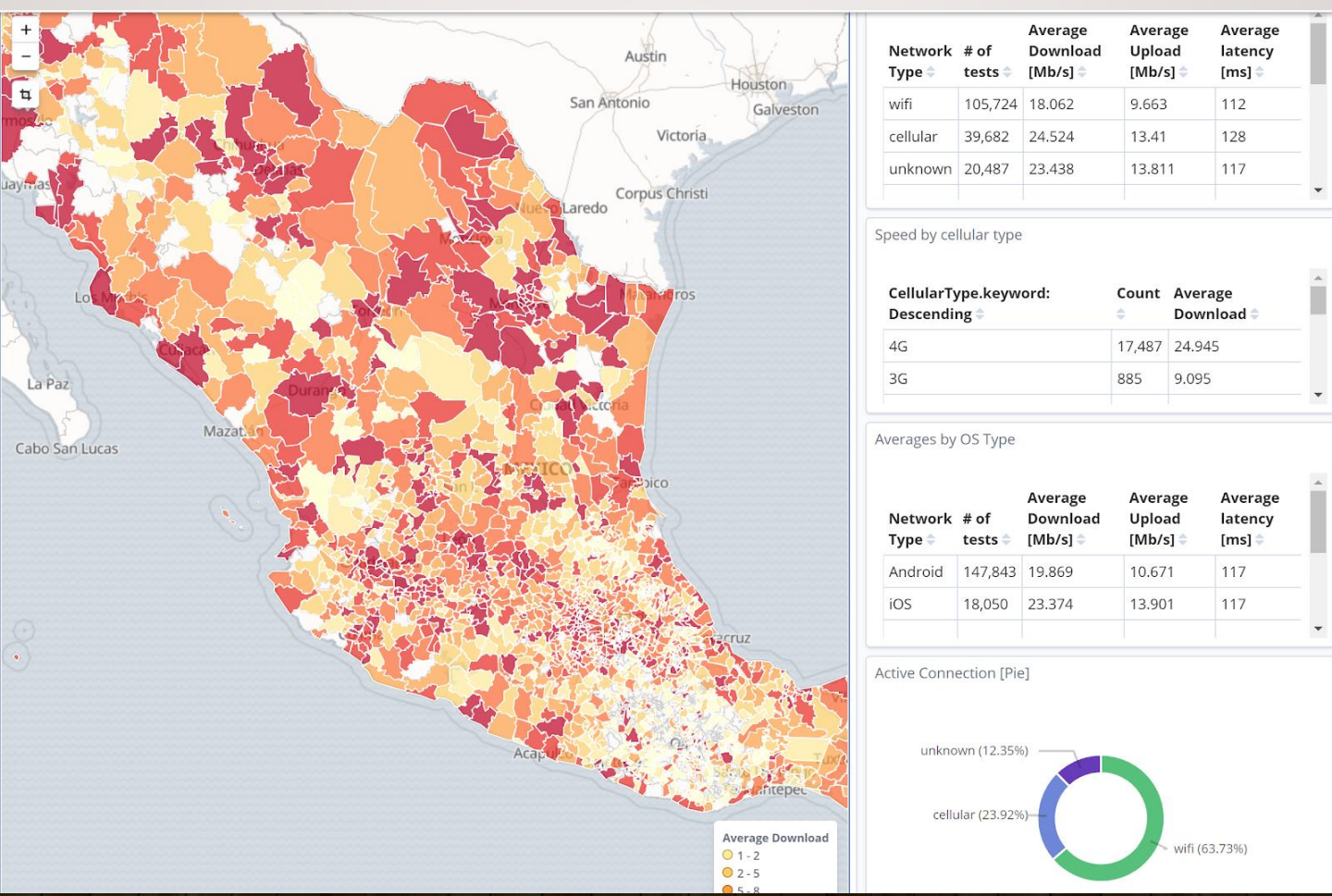
You not only want the data but you also want your own app or web-based tester? We can do it all. Our team can produce iOS, Android, HTML, Windows and MAC clients tailored to your specific needs.



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# Basic Crowdsourcing System

System offers full analytical options like our Advanced system but with the limitation of a smaller Basic KPI set. Basic KPIs include speed test data along with device and network information but do not contain detailed Radio KPIs nor passive measurements.



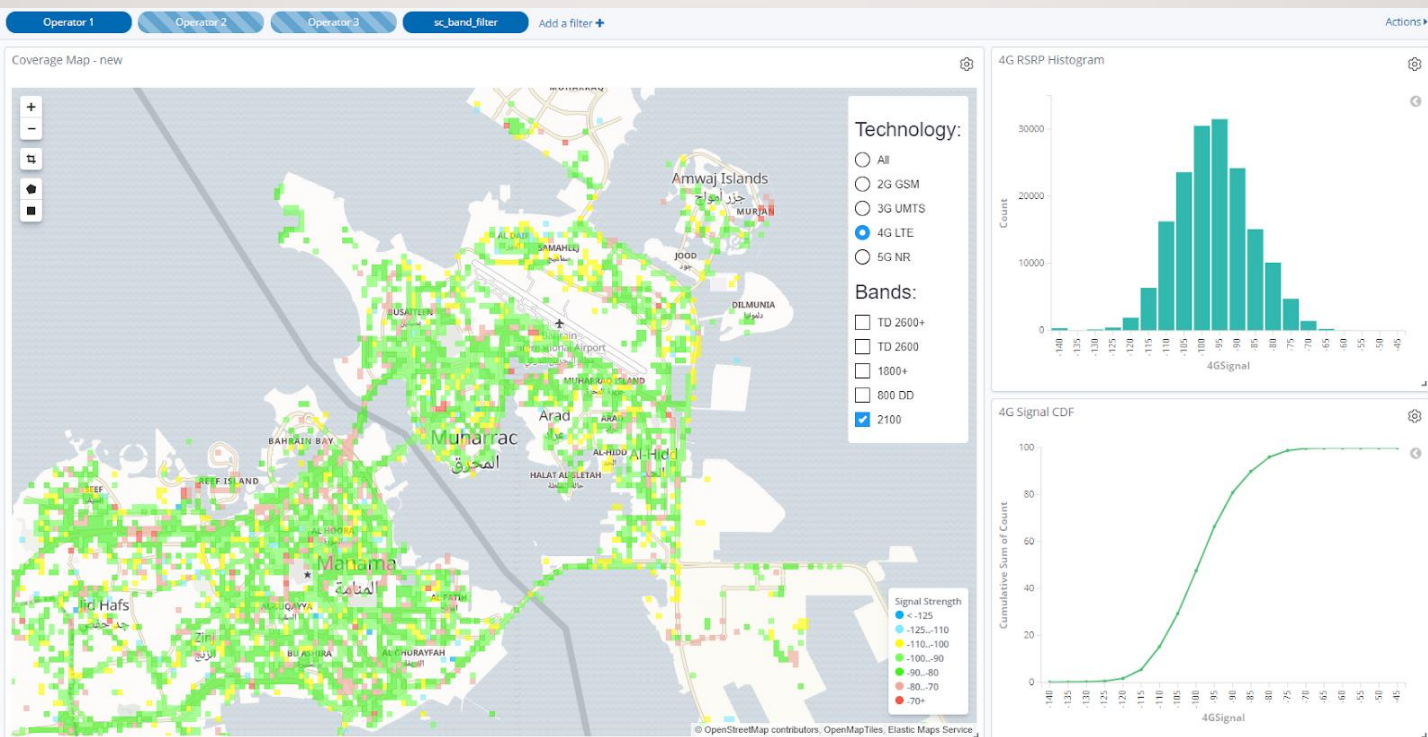


# Advanced Crowdsourcing System

Step up from our Basic system to our Advanced Crowdsourcing system with more than 100+ KPIs to analyse

## Coverage Analysis Dashboard

- ✓ Statistical research on basis of millions of crowdsourced samples
- ✓ Multiple signal metrics RSRP, RSRQ, SNR, RSSI, CQI
- ✓ Split by MNO, Radio Access Type, Band (down to individual ARFCN)
- ✓ Possibility to filter by: speed (e.g. High-Speed Train Scenarios)
- ✓ Possibility to separate samples between Indoor/Outdoor

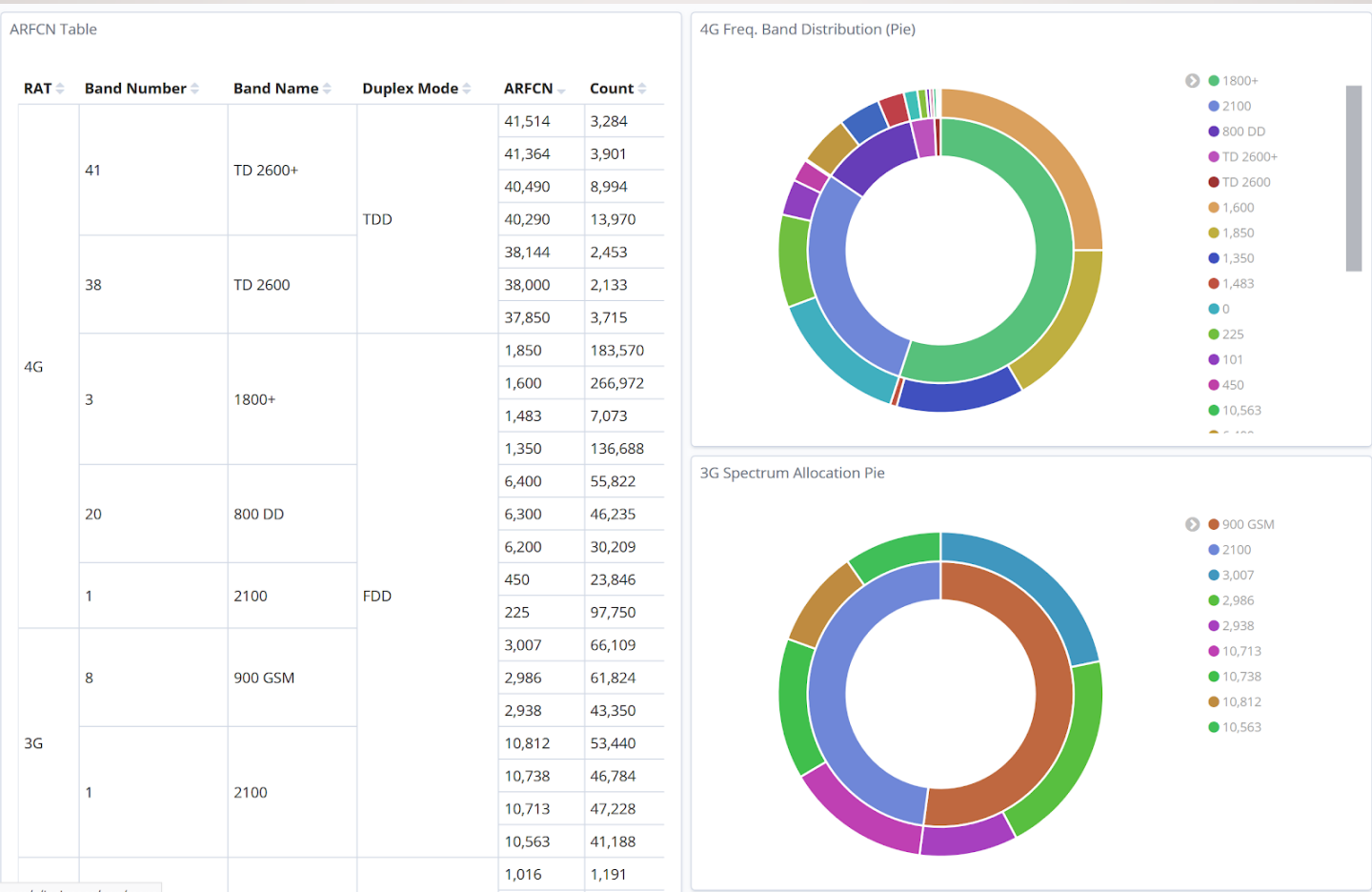




# Advanced Crowdsourcing System

## Frequency Bands Dashboard

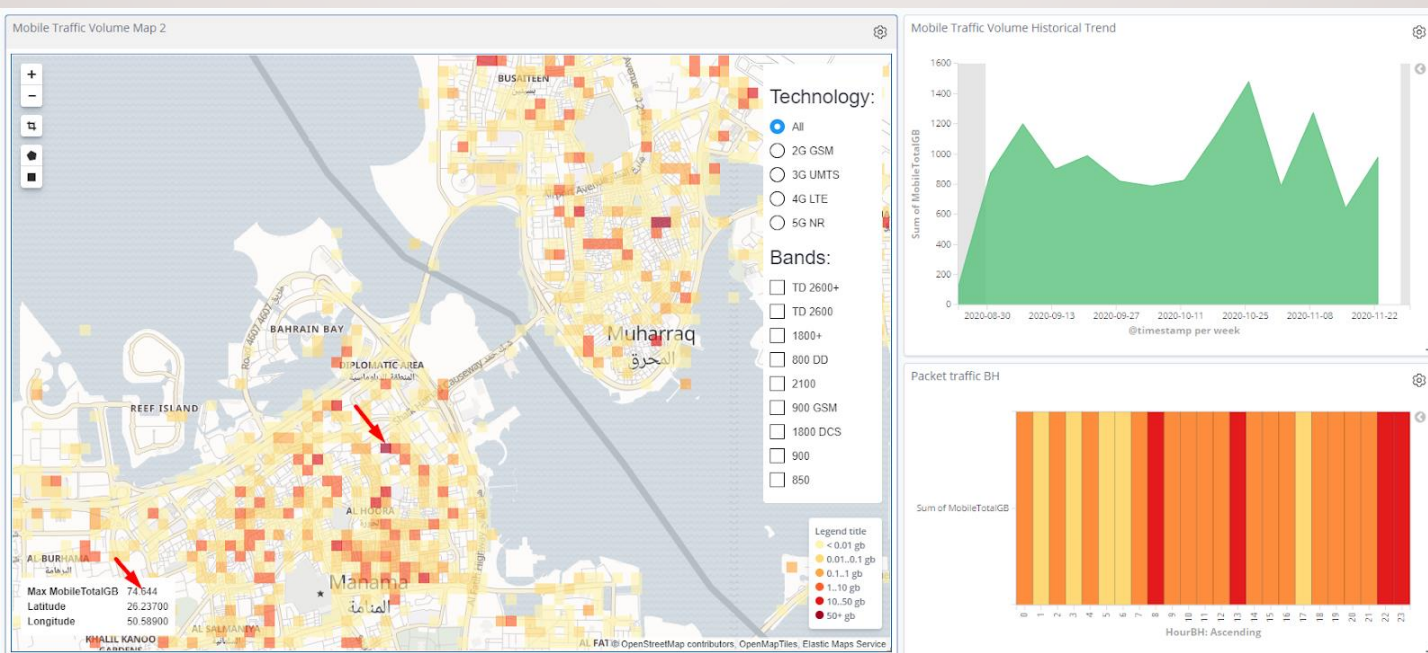
The Frequency Bands Dashboard reveals frequency usage for different areas and comparison between operators. It is grouped by RAT, band number and ARFCN.



# Advanced Crowdsourcing System

## Cellular Data Usage Dashboard

The Cellular Data Usage dashboard shows the locations with the highest traffic demands to suggest to the operators which areas would benefit from additional investment or where network expansion might be required.







# Advanced Crowdsourcing System

## Video Experience dashboard

Streaming video apps such as YouTube or Netflix are being increasingly used by consumers who expect the best video quality with low start-up time and no rebufferings. Our data can contain metrics such as video download speed, streaming bit rate, start-up time and more.

Youtube by ISP

ISP	# of tests	Start time [ms]	Rebuffer rate [#]	Speed [Mb/s]
Operator 1	16,370	3014	0.156	41.65
Operator 2	14,433	3208	0.237	30.309
Operator 3	7,024	3009	0.183	31.67

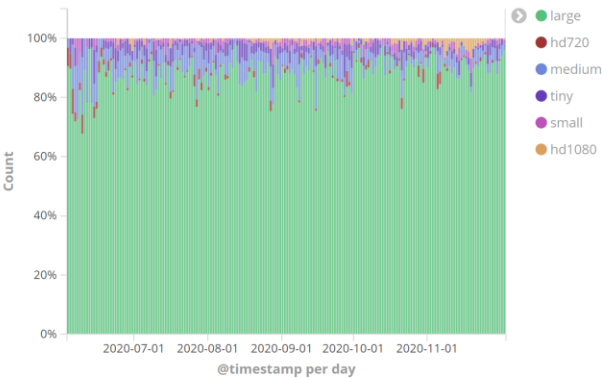
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Youtube by Network Type

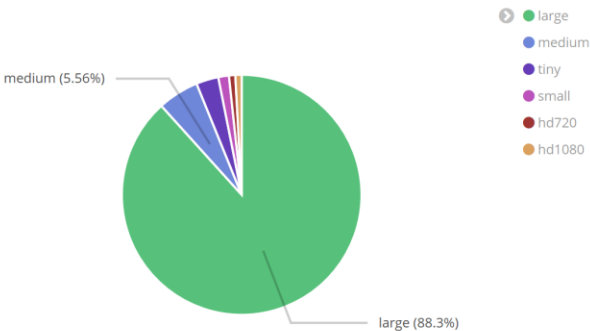
ISP	# of tests	Start time [ms]	Rebuffer rate [#]	Speed [Mb/s]
WIFI	26,946	3070	0.199	38.184
4G	8,971	3177	0.178	32.701
3G	2,609	3104	0.167	16.128
5G	4	1564	0	38.33

Export: [Raw](#) [Formatted](#)

Youtube by Last Bitrate [Bar]



Youtube by Last Bitrate [Pie]

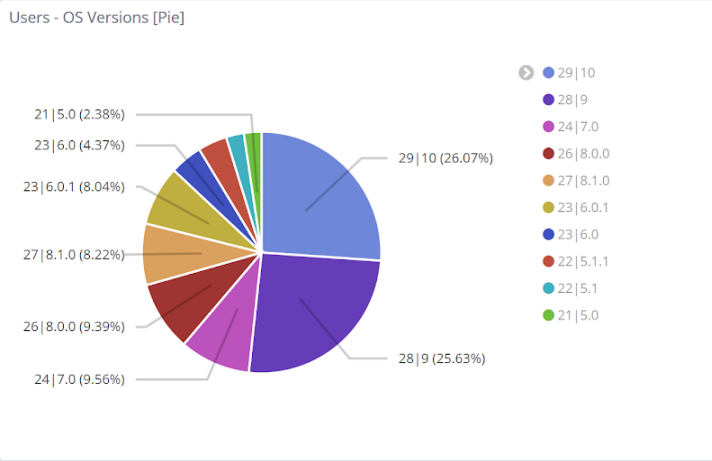
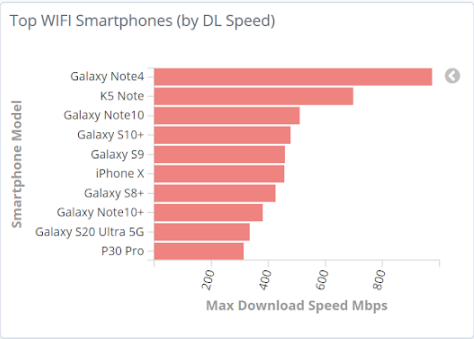
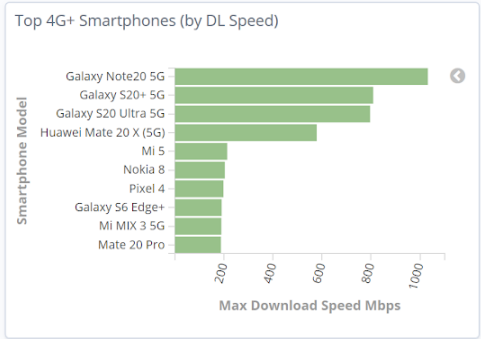
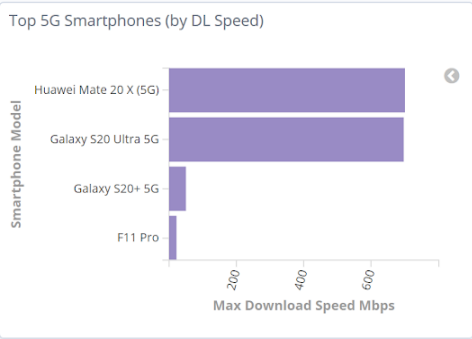


# Advanced Crowdsourcing System

## Device Information Dashboard

The Device Information dashboard contains information about devices that are in use for each operator as well as all the performance KPIs. Specific relevant device KPIs are:

- ✓ Model name
- ✓ Manufacturer
- ✓ OS version
- ✓ Platform (iOS/Android)
- ✓ Top 5G / 4G / Wifi smartphones



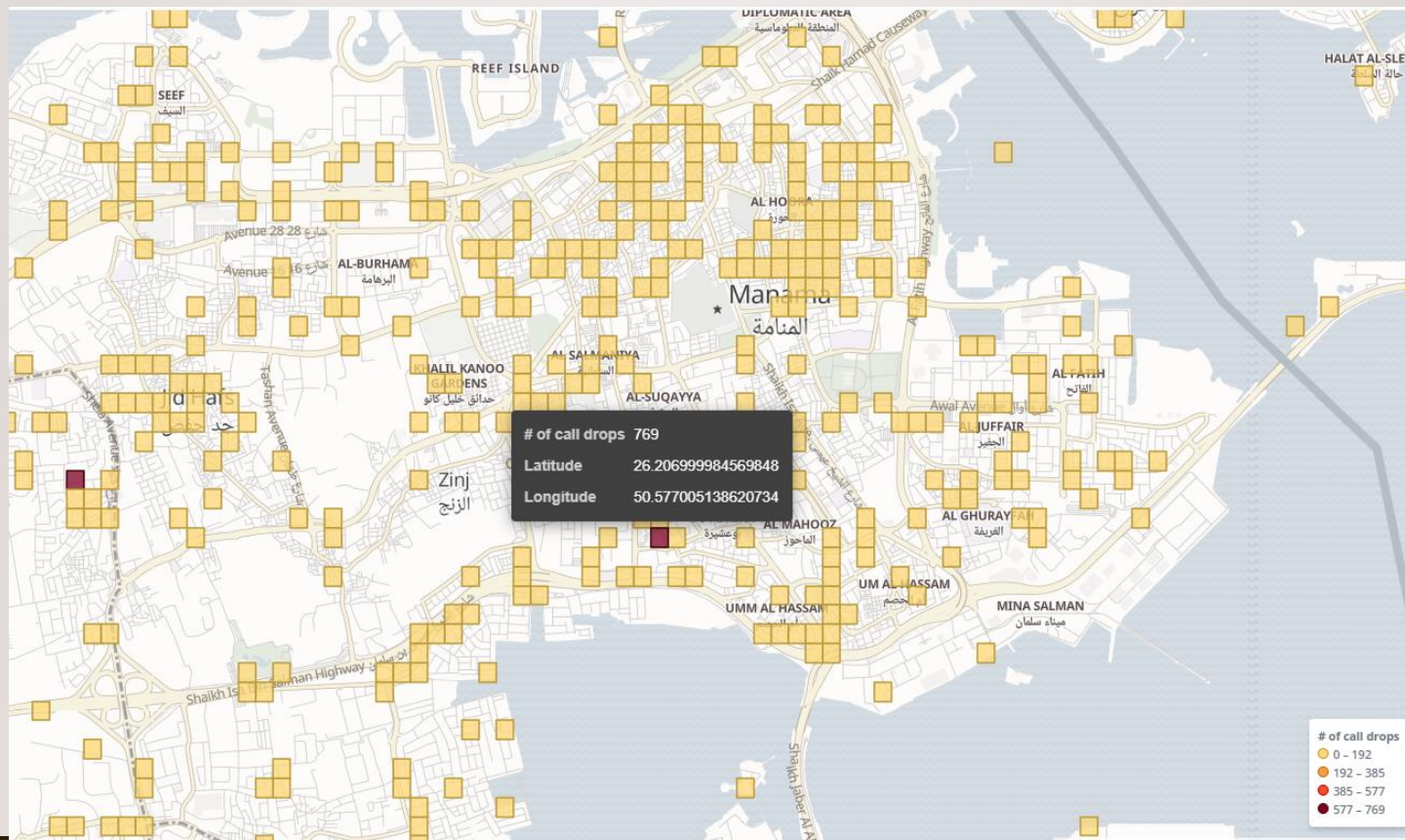
Users - OS Versions [Table]

OS Version	Users
29 10	1427
28 9	1403
24 7.0	523
26 8.0.0	514
27 8.1.0	450
23 6.0.1	440
23 6.0	239
22 5.1.1	215
22 5.1	132
21 5.0	130

# Advanced Crowdsourcing System

## Voice Quality Dashboard

The Voice Quality dashboard shows the user issues visualized on a map to spot any areas where users are making calls and their quality is not satisfactory or calls are being dropped. In the example below we see two areas where the call drop is particularly high and may benefit from further investigation.





## Data collection methodology

Our data is collected from end user devices running Android and iOS systems. All measurements are executed towards a CDN which has a large geographical footprint and hosts a significant part of the content that is being accessed by the users. This ensures our results are a good approximation of the user's actual quality of experience.

All measurements must contain accurate location information using GPS or wi-fi geolocation method. Measurements are considered only from the apps that have been approved by SpeedChecker. Submitted measurements are checked if they are within expected ranges and additional security precautions are implemented to ensure measurement data is not being manipulated.

The data collection process aims to deliver a single measurement sample from every device in our crowdsourcing system device pool and we strive to remove all duplicates. Due to privacy settings on some users phones we cannot reliably detect unique devices therefore some devices have contributed to more than 1 measurement into this dataset.



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# Measurement methodology

The methodology is based on the concept of the [ITU-T Q.3960 \(2016\)](#), "Framework of Internet related performance measurements" and "Supplement 71 to ITU-T Q-series Recommendations".

This test methodology aims at delivering an accurate measurement of the maximum bandwidth available over a given internet connection. This is achieved by transferring multiple parallel data streams over separate TCP connections within a predefined amount of time. The transferred data consists of randomly generated data with high entropy.

#	Parameter	Unit	ITU Range	Current Setting
1	Number of parallel threads	#	$1 \leq n \leq 10$	Dynamic addition from 1 to 10
2	Duration of pre-test	s	$0 \leq T_p \leq 5$	1s
3	Duration of the downlink test	s	$5 \leq T_d \leq 15$	5s
4	Duration of the uplink subtest	s	$5 \leq T_u \leq 15$	5s
5	Number of 'pings' during delay subtest	s	$5 \leq p \leq 20$	$p = 10$



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