



Lessons learnt in establishment of a normative QoS/QoE measurement tool in various European countries



Agenda

- Trends
- QoS Measurements
- Project MoQoS
- Tool details

Trends

- **Data** ever more in focus of all market players
- **Market** is saturating
- **Customers** are getting ever more sophisticated and demanding
- Continuous pressure from **regulators**
- **EU** seeking welfare of citizens and technology advancement

Cellular Data

Data in Focus

- Revenue driver
- Universal service changer
- SMS killer
- Voice eater
- New technologies trigger

Data as revenue driver

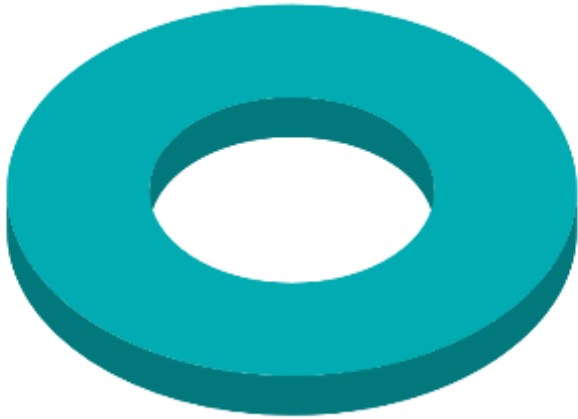
- Deutsche Telekom: operating revenues up by 1.5 percent, while mobile data revenues up 16.5 percent (report Q3 2017)
- Vodafone sees mobile data as 'growth engine'; although reported service revenue was down from EUR 21.81 bln in H1 16/17 to EUR 20.59 bln in H1 17/18, data consumer ARPU was up 3.3 percent
- Orange group revenues up 0.9 % yoy in Q3/17; interestingly revenues from fixed services were growing faster than from mobile services (+1.9% vs +0.8%); but fixed includes fixed LTE

Data in focus of the EU

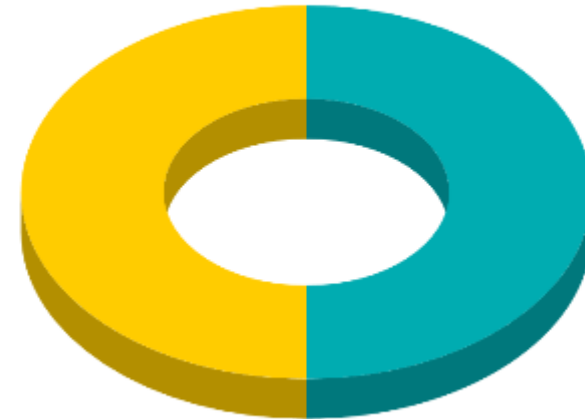
By 2020:

- 100% of Households 30+ Mbps
- 50% of Households 100+ Mbps

30+ Mbps

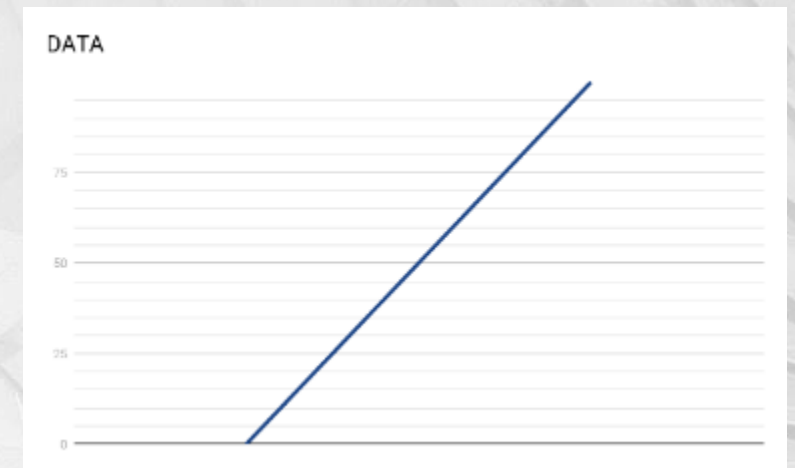


100+ Mbps



Data as SMS killer

- 'SMS is dying'
- Poland – 100m Christmas SMS in 2016 down to 90m in 2017
- LTE traffic up
- O2 Slovakia saw 300% increase in New Year's Eve traffic



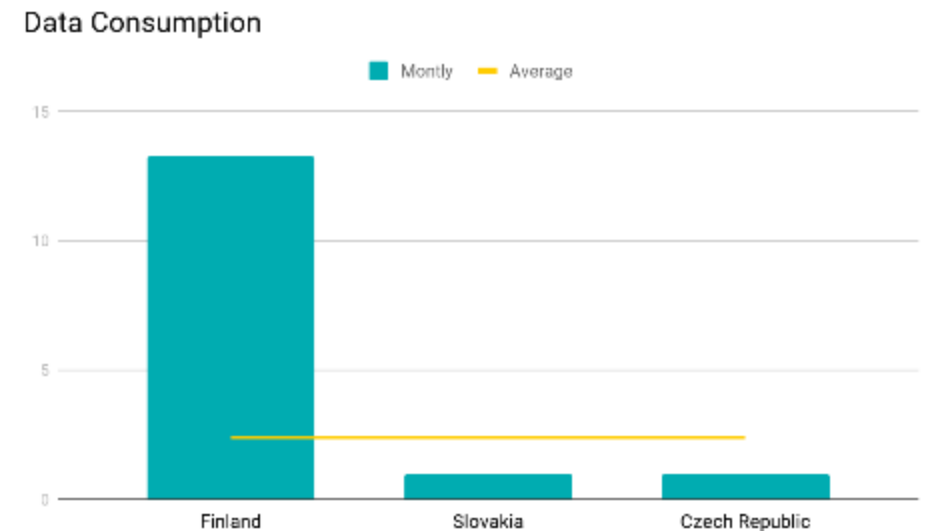
Data as voice eater

- All-IP transition
- VoIP
- VoLTE
- VoWiFi



FUP vs QoS

- EU average data consumption: 2.4 GB per SIM (source: Global Data)
- Top: Finland with 13.3 GB
- Czech Republic, Slovakia < 1 GB a month
- Quality of service (speed) is becoming the main competitive factor
- Regulators – quality as a means for assessing wholesale-retail relations, consumer protection
- Customers sign contracts with operators serving quality



Sophisticated customer

- Requires quality of connection defined by variety of parameters (speed, latency, ...)
- Measures internet quality himself, comparing results of several tools
- Compares test results with his contract
- Confronts test results published by operators with their experience
- In doubts contacts his operator and claims his rights
- If not successful, addresses the regulator and asks for remedies

Different approaches

- measurement vehicles
- Crowdsourcing
- Open-source
- Open data –measurement data can be used for other purposes

Solution

An objective QoS measurement tool:

- Compliant with BEREC regulation
- Crowdsourced
- Open-source
- Transparent methodology
- Open data



Generally
accepted



A man in a dark suit and purple tie is standing and leaning over a table, pointing at a document. He is smiling and looking towards a group of people. In the foreground, the back of a man's head with glasses is visible on the left, and a woman's head is on the right. Another man is sitting at the table, looking at the presenter. The room has a whiteboard and a map on the wall in the background.

Project MoQoS

Unified Platform | Partnership | Open Data

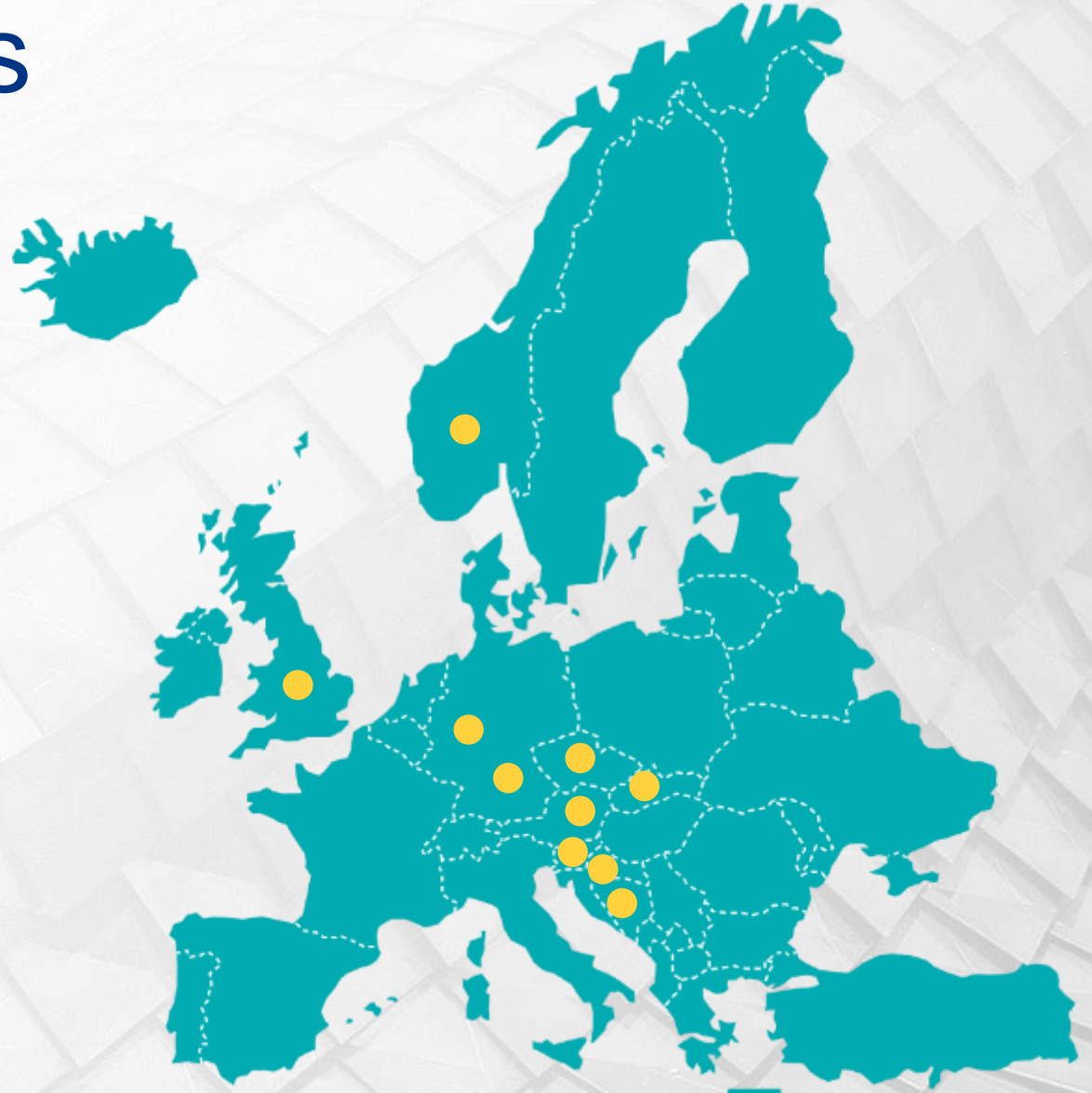
MoQoS Participants

Project participants - Regulators:

- AKOS - Slovenia
- CTU - Czechia
- RU – Slovakia

Other participants – Technical partners:

- CZ.NIC
- Specure



Government Award

E-Government The Best 2017:
2nd best national project
in Czech Republic

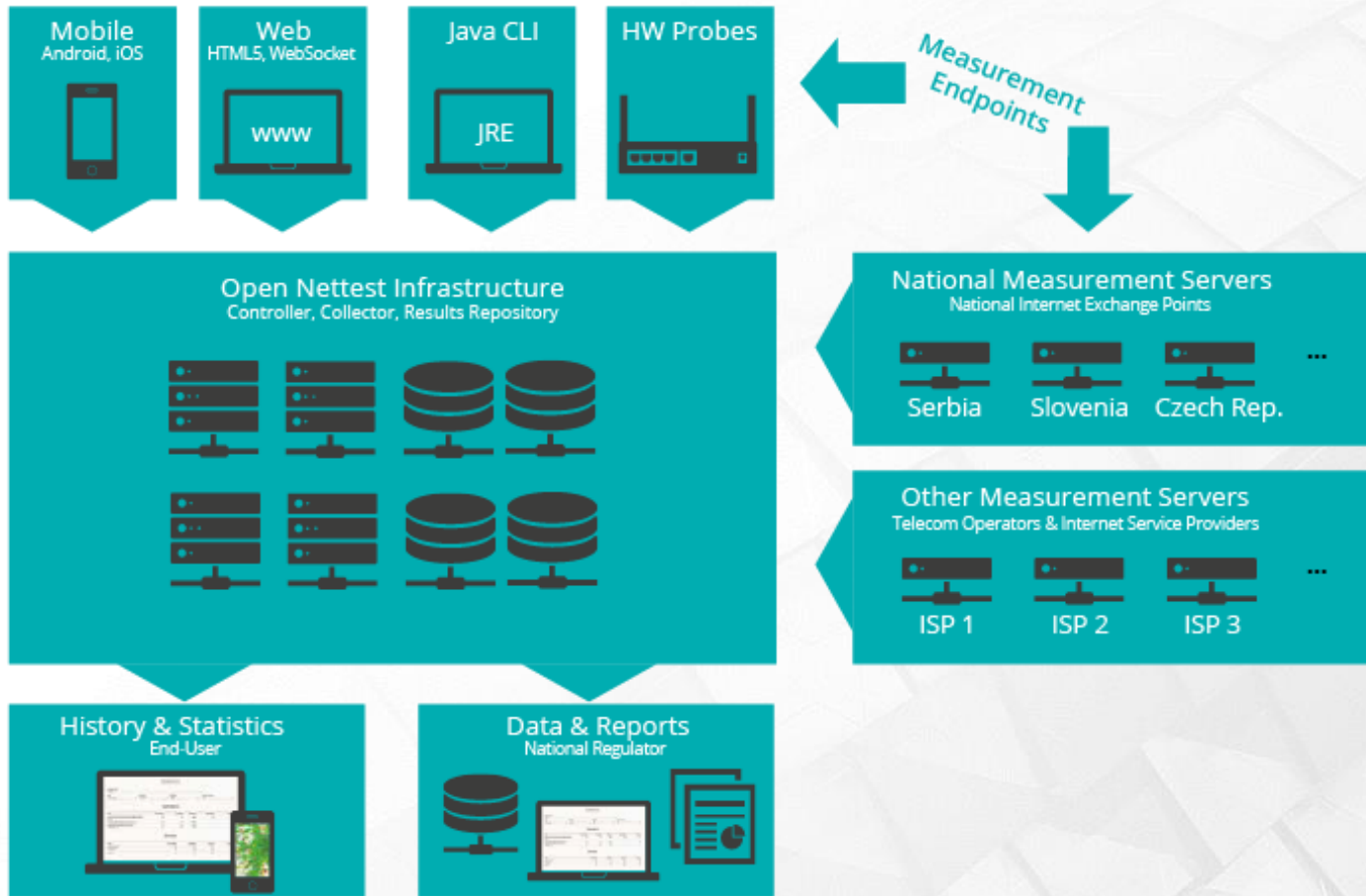


Own Data + Import of available Open Data

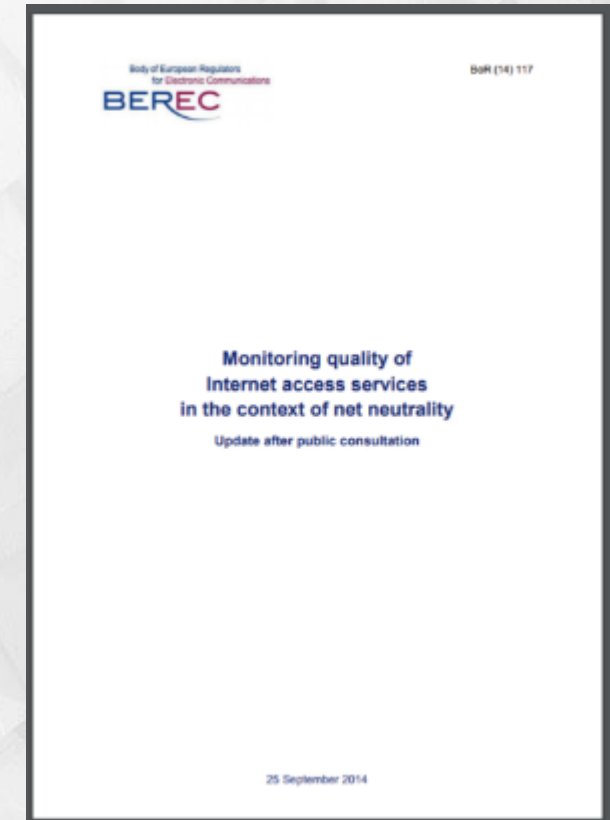
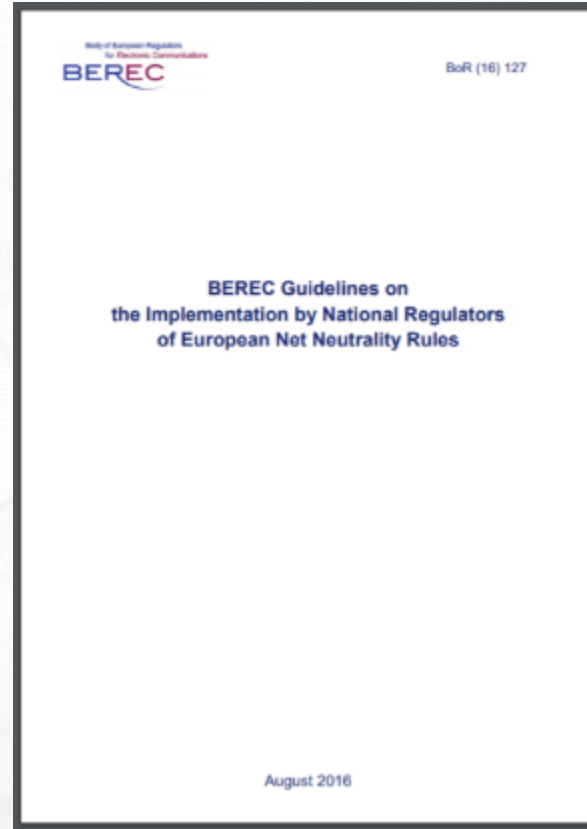
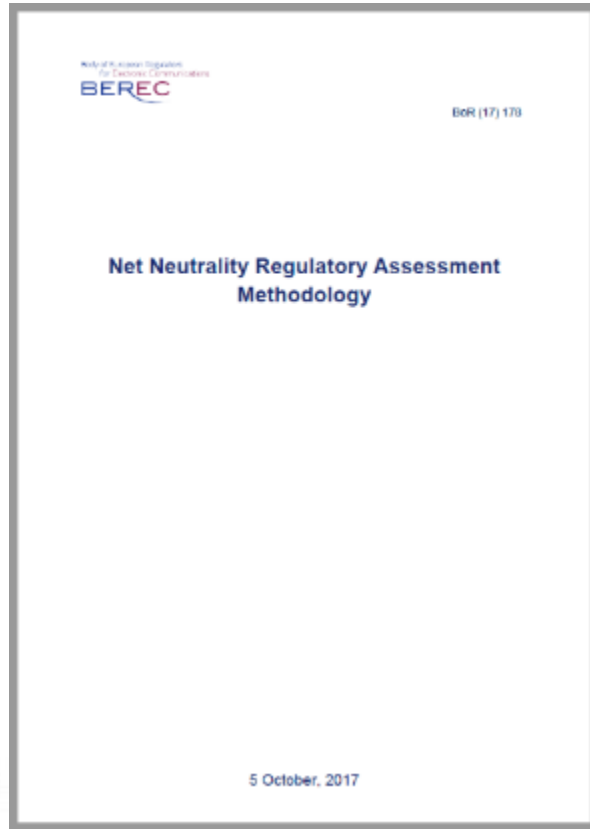
7 169 000 Measurements
15 300 Daily tests
4 495 500 Unique devices



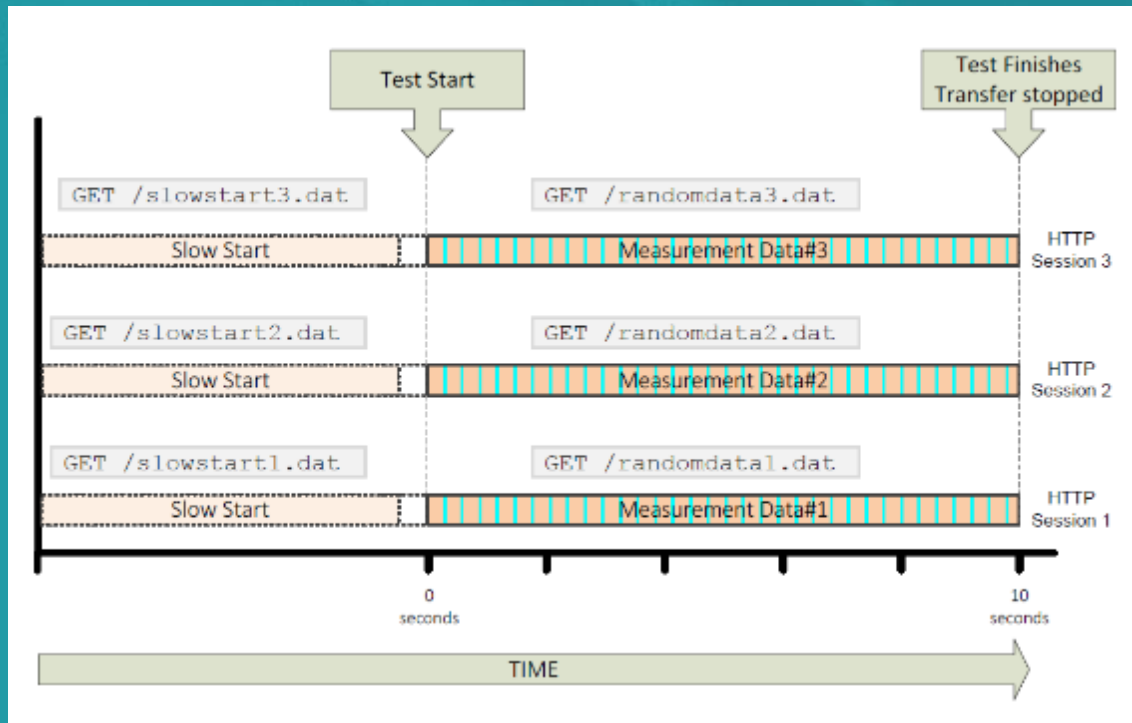
MoQoS - Open Nettek Architecture



BEREC Standards and Recommendations



Suggested measurement method - Speedtest



Methodology proposed by BoR (17) 178	Compliance Status
Slow-start phase	Compliant
Multiple threads	Compliant
Servers outside of IAS network	Compliant

Source: BoR (17) 178

Other elements of the proposed methodology

Methodology proposed by BoR (17) 178	Compliance Status
Delay and delay variation measurements	Compliant
Packet loss measurements	Compliant
Blocked ports TCP / UDP	Compliant
IP addresses blocking	Not available yet
DNS manipulation	Compliant
Detection of an HTTP proxy	Compliant
Web browsing	Compliant

Methodology proposed by BoR (17) 178	Compliance Status
Video streaming	Not available yet
Other use cases - VOIP	Compliant
Overload protection of the measurement server	Compliant
Crowdsourcing data validation	Compliant
Market level aggregation – Maps, Statistic etc.	Compliant
Monitoring the general IAS quality	Compliant
Effect of specialised services on IAS	Not available yet



Open Data

Data can be used for other purposes

Open Data Export

- Only anonymized data are published
- Open Nettest data are licensed under CC BY 4.0 license

Home

Insert

Page Layout

Formulas

Data

Review

View

From File/Folder

From HTML

From Text

New Database Query

Refresh All

Connections

Properties

Edit Links

24

AZ

Filter

Clear

Advanced

Text to Columns

Remove Duplicates

Data Validation

Consolidate

What-If Analysis

Group

Ungroup

Subtotal

Show Detail

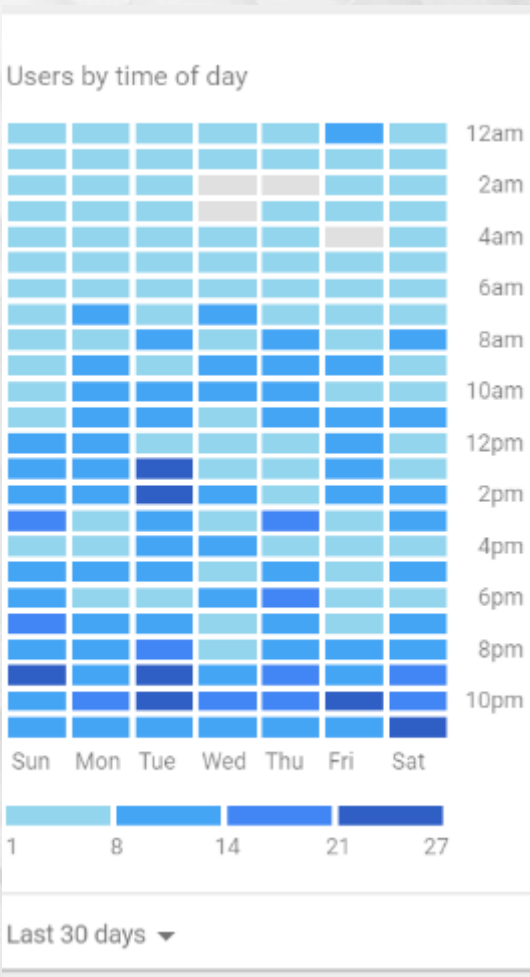
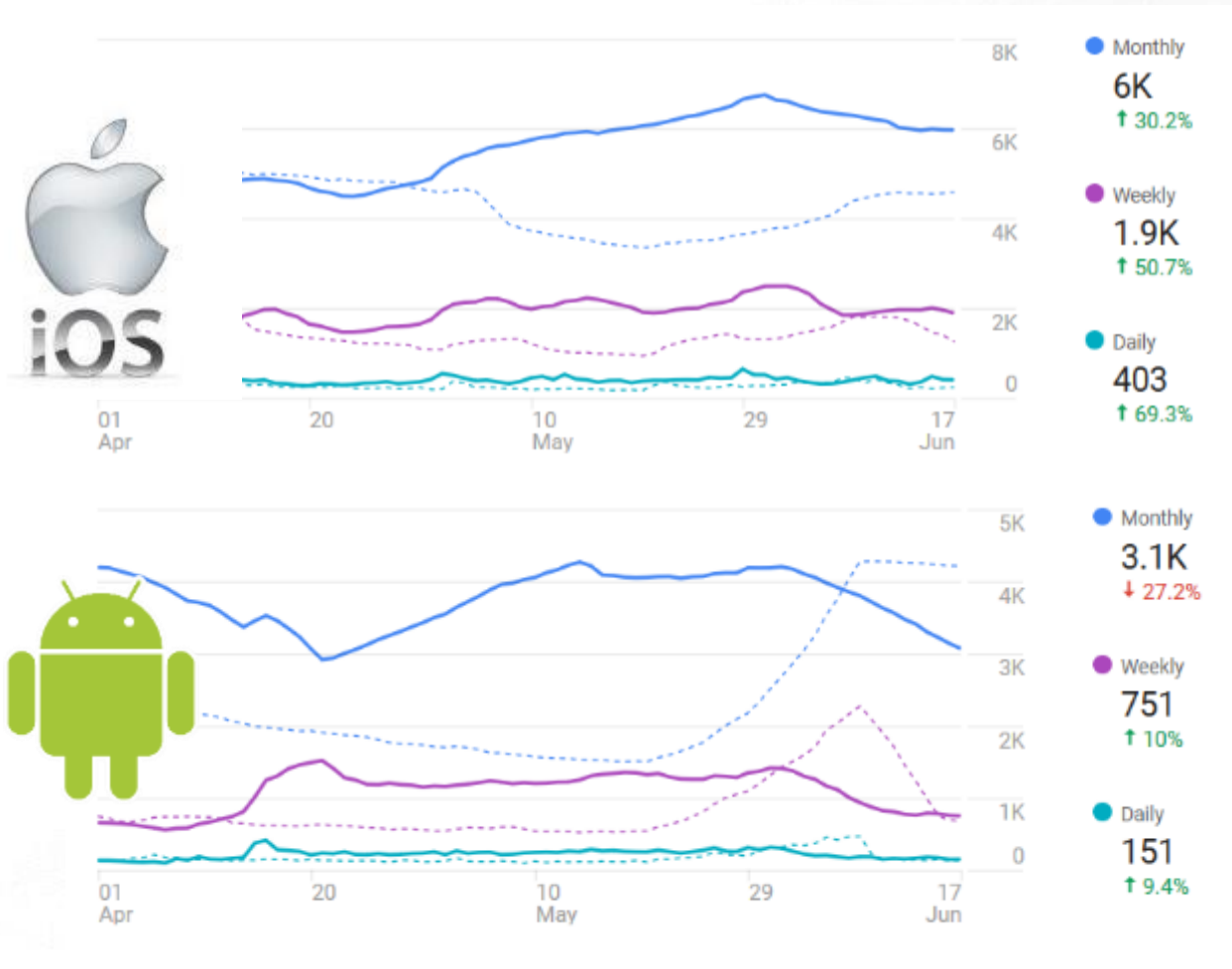
nettest-opendata-2017-11

Z12

</



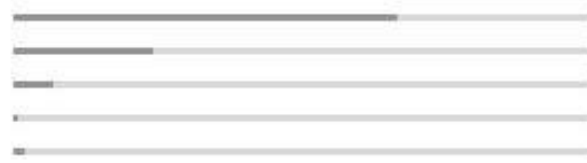
Active Users



User Ratings



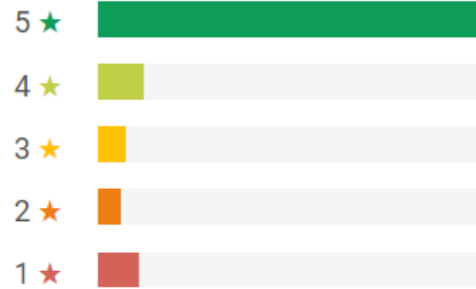
4.5
out of 5



427
154
43
8
14

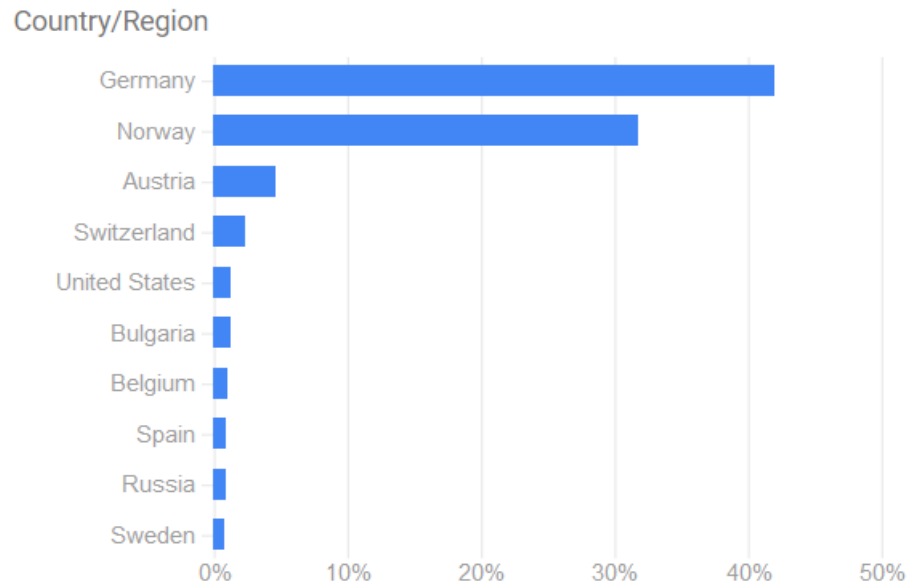


4,360

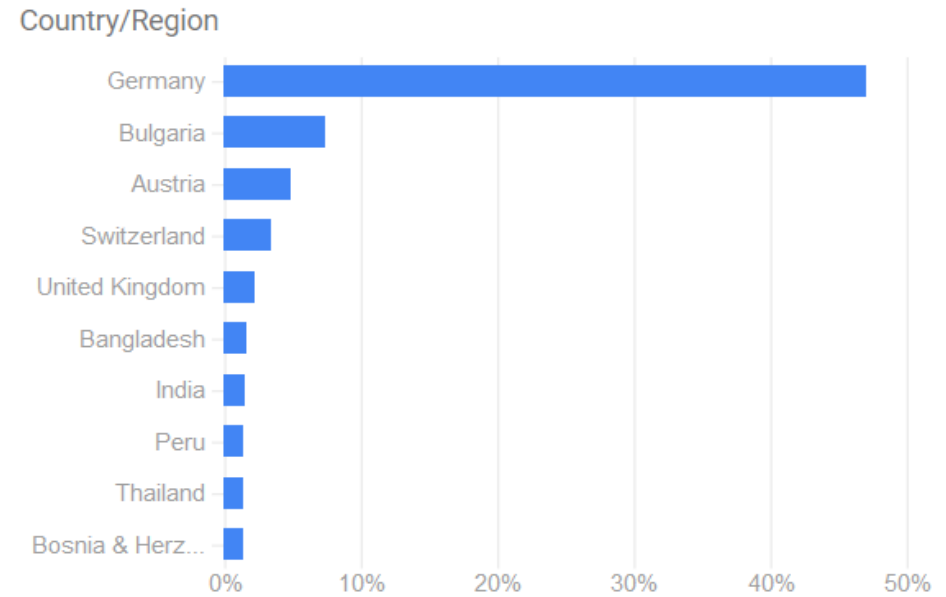


84
10
6
5
9

User reviews - iOS



User reviews - Android



User reviews



This app is certainly more objective about the quality of the network and the way your data is processed. Probably the most complete in terms of tests. I really like it so far anyway ..." (geekax)



"It is a pure app for data theft. It wants to know everything about the personal data. It does not work itself. If you press the start button nothing happens, it is a dead button. But the app wants to collect a lot of data. FINGER WAY FROM IT" (Herpes)



"Wanted a simple speed test app without the bloat or ads. This is perfect, thanks." (Yashvir)



"5 stars if you guys of the better project open sourcing network data uses open source maps for displaying results instead of proprietary Google maps."



"...without ads..." (Michael)



"...lot of parameters affecting speed and quality measured..." (Mary)



"Please add possibility to change app language in settings" (Сергей)