



**Co-financed by the European Union** Connecting Europe Facility

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

October 2, 2018 Budva, Montenegro



## 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

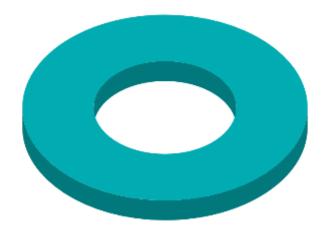


# Data in focus of the EU

By 2020:

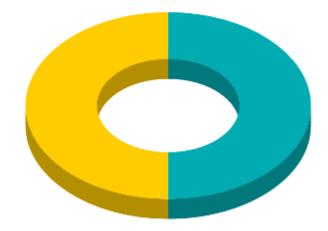
100% of Households 30+ Mbps

30+ Mbps



• 50% of Households 100+ Mbps

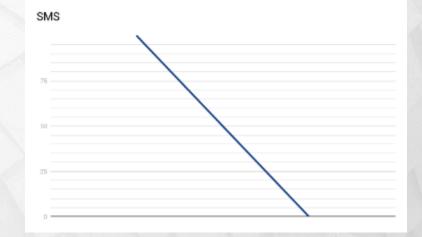
100+ Mbps

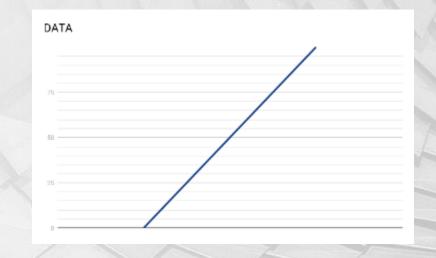




## Data as SMS killer

- '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

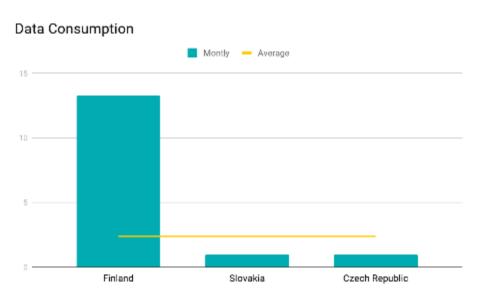
- All-IP transition
- VoIP
- VoLTE
- VoWiFi





# 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</li>
- Quality of service (speed) is becoming the main competitive factor
- Regulators quality as a means for assessing wholesaleretail 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



# 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: 2<sup>nd</sup> best national project in Czech Republic





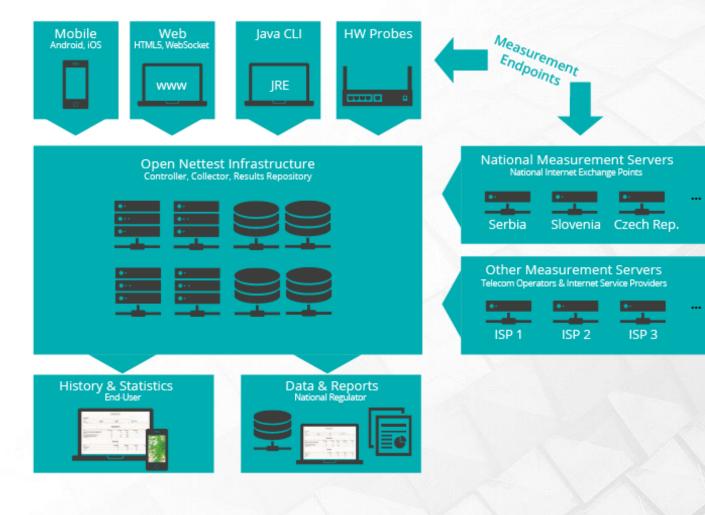
## Own Data + Import of available Open Data

7 169 000 Measurements15 300 Daily tests4 495 500 Unique devices





### MoQoS - Open Nettest Architecture



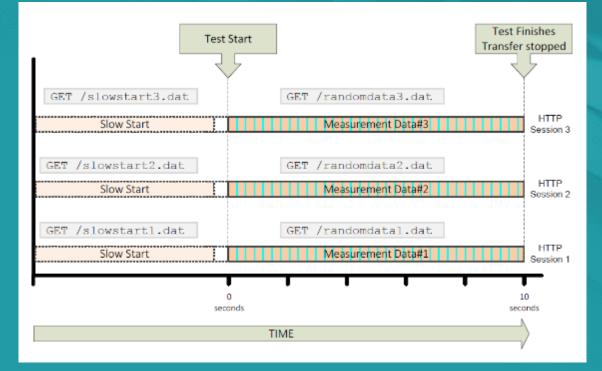


### **BEREC Standards and Recommendations**





## Suggested measurement method - Speedtest



Source: BoR (17) 178

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



#### 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

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Sources: ctu.cz & lupa.cz

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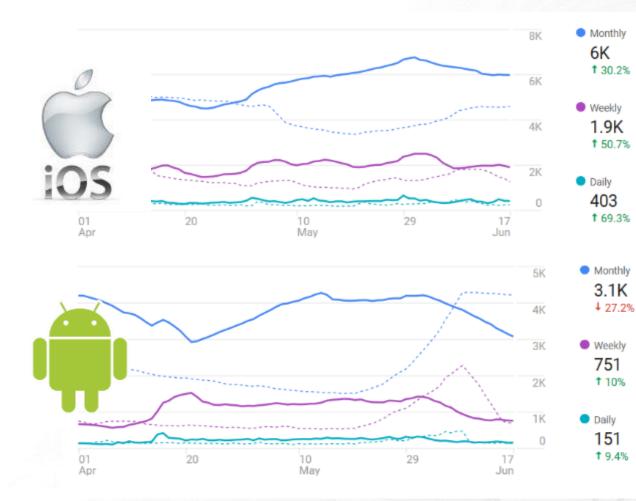
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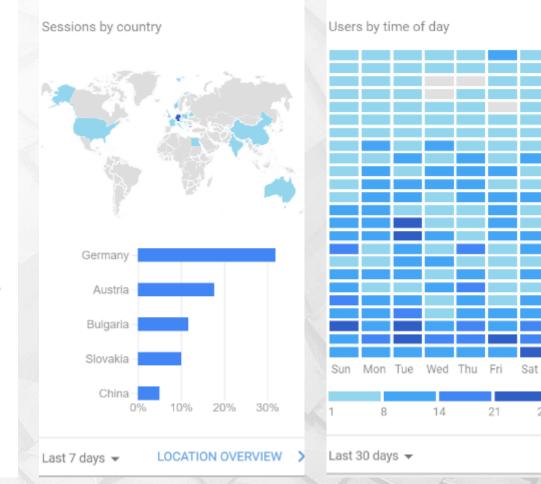
CTU and ATAT

CTU and AT&T V4 Hackathon 2017 Grand Prize USD \$10,000

AT&T

## **Active Users**





12am

2am

4am

6am

8am

10am

12pm

2pm

4pm

6pm

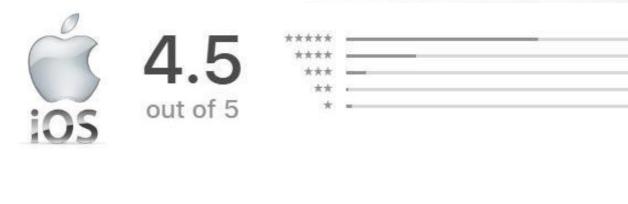
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10pm

27



# **User Ratings**



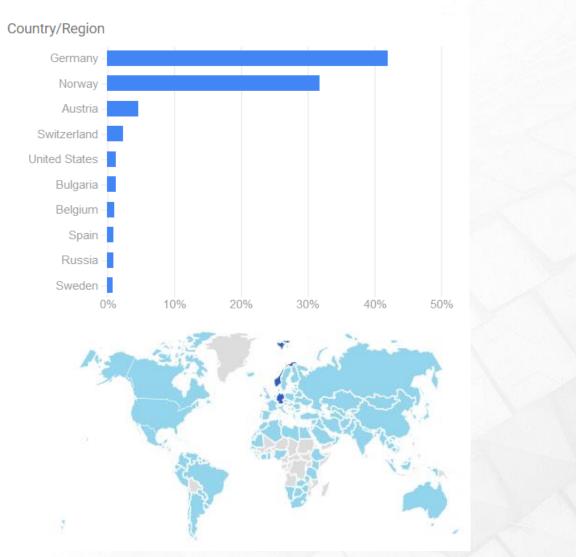


5 ★	84
4 ★	10
3 ★	6
2 ★	5
1 ★	9

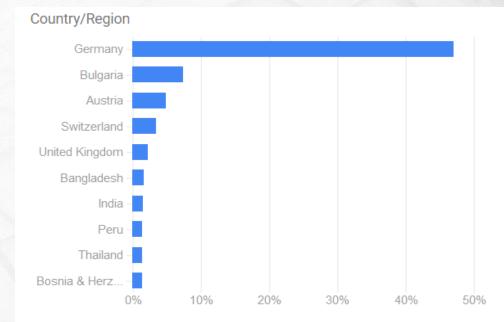


#### User reviews - iOS

#### **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)

#### $\star$ $\star$ $\star$ $\star$

"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)

#### $\star \star \star \star \star$

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

#### $\star \star \star \star \star$

"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)

#### $\star \star \star \star \star$

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

#### $\star\star\star\star\star$

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

