



Republic of Poland

Office of Electronic Communications

# **Regulatory perspective and technical tools and platforms to measure QoS - COUNTRY EXPERIENCES**

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## Agenda

### **Regulatory perspective**

1. QoS rules of EU Framework 2009 and their transposition into the Polish law

### **Technical tools and platforms to measure QoS - KPIs for broadband QoS**

2. Memorandum on cooperation for QoS in the telecommunications market
3. UKE's measurement of the quality indicators (measurement systems, the scope of the measurement and publication of its results)



- Universal Service Directive

EU Framework 2009

## Quality of Service

### Member States' rights and obligations (public service requirements)

- to require undertakings that provide publicly available electronic communications networks and/or services to **publish comparable, adequate and up-to-date information for end-users on the quality of their services** and on measures taken to ensure equivalence in access for disabled end-users,
- to **specify, inter alia, the quality of service parameters** to be measured and the content, form and manner of the information to be published,
- to **set minimum quality of service requirements** on an undertaking or undertakings providing public communications networks.



- BEREC activities for monitoring quality of Internet access services

[http://berec.europa.eu/eng/document\\_register/subject\\_matter/berec/reports/](http://berec.europa.eu/eng/document_register/subject_matter/berec/reports/)

- Draft BEREC report on monitoring quality of Internet access services in the context of net neutrality, 18 February 2014, BEREC

- **Regulatory approaches to quality monitoring**
  - Co-regulation

„Under some circumstances, **NRAs may find it appropriate to establish joint regulator-stakeholders systems, rather than imposing implementation merely on ISPs.** Under such a scheme, cooperation with stakeholders may be useful to meet specific needs and/or regulatory objectives, such as:

- i. system development by **independent research institutions**;
- ii. **performing measurement campaigns** with the help of consumer organisations;
- iii. **publishing results** on “third party comparison websites”



- **Implementation aspects**

- Measurement metrics

„Many of the metrics currently used **to evaluate quality of the Internet Access Service (IAS)** help end users to choose an appropriate IAS offer.

The metrics also allow NRAs to evaluate the performance of IAS offers in their respective markets.

**Standards developing organizations (SDOs) have specified various parameters** which can be used to evaluate quality of the IAS as a whole.

**Nevertheless, this information is often too technical to allow end users to choose an IAS offer suitable for their usage of the Internet.**„



## Implementation aspects - Measurement metrics

**Popular applications by non-professional users and the relevance of the quality parameters for the performance of those applications.**

<http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCREP195.PDF>

*In the table below, the relevance goes from ‘-’ (not relevant) to ‘+++’ (very relevant).*

Application	Data transmission speed		Delay	Delay variation	Packet loss	Packet error
	Downstream	Upstream				
Browse (text)	++	-	++	-	+++	+++
Browse (media)	+++	-	++	+	+++	+++
Download file	+++	-	+	-	+++	+++
Transactions	-	-	++	-	+++	+++
Streaming media	+++	-	+	-	+	+
VoIP	+	+	+++	+++	+	+
Gaming	+	+	+++	++	+++	+++

Source: Based on ETSI EG 202 057-4, ITU-T Rec. Y.1541 and ITU-T Rec. G.1010



## Changes to the Polish Regulations

### Improved quality of services

Together with the provision of access to telecommunications services and affordable prices, the Regulator undertook steps to ensure adequate quality of telecommunications services by:

- **changes to the Telecommunications Act,**
- **Memorandum** on cooperation for improving the quality of services in the telecommunications market provided to users.



## Regulatory Strategy of the President of UKE in the scope of QoS

### OBJECTIVES OF THE PRESIDENT OF UKE

#### AREA: PRO-CONSUMER POLICY

- OBJECTIVE - Strengthening the position of consumers and providing a required level of the quality of service:
  - Increasing consumer awareness of their rights and obligations,
  - **Supporting quality, transparency and security of services,**
  - Identifying and monitoring the needs of service users,
  - Improving Poles' skills regarding the use of new technologies.





## Memorandum on cooperation for QoS in the telecommunications market

Memorandum on cooperation for improving the quality of services in the telecommunications market provided to users,

proposed in May by the President of UKE and eventually signed with other entities on 26 October 2012, in accordance with the provisions of the Universal Service Directive, stipulates that:

- **contracts for services** should be structured in a clear, understandable, easily accessible form,
- **published information on the quality of services** provided by telecommunications undertakings should be comparable, relevant and up to date,
- **the user shall have access to** comprehensive, comparable, reliable **information** presented in a friendly form,
- **measurable indicators of quality of service shall be identified, as well as the content, form and method of providing information to be published,**
- **minimum quality requirements** shall be identified in order to prevent deterioration of the quality of service in public networks.



## Memorandum – technical & administrative indicators of QoS

### Fixed and Mobile Services

- *Successful call ratio* (**ETSI EG 202 057-2 p.5.1 i ETSI EG 202 057-3 p.6.4.1**)

### Mobile Services

- *Speech quality ratio* (**ETSI EG 202 057-2 p.5.3**)
- *Dropped call ratio* (**ETSI EG 202 057-3 p. 6.4.2**)

### Internet Access (Fixed and Mobile) Services

- *Data transmission speed* (**ETSI EG 202 057-4 p.5.2**)
- *Delay* (**ETSI EG 202 057-4 p.5.5**)

### All Telecommunication Services

- *Average response time for operator services* (**ETSI EG 202 057-2 p. 5.6**)
- *Bill correctness rate* (**ETSI EG 2002 057-2 p. 5.11 i 5.12**)



## Monitoring quality of public services in the context of net neutrality

The following threshold values were adopted for individual indicators:

<b>Indicator</b>	<b>Range for good quality</b>	<b>Range for satisfactory quality</b>	<b>Range for poor quality</b>
Average response time for operator services	<= 60 s	Longer than 60s but shorter than 120s	120s or more
Bill correctness rate	Above 97.5%	from 95.1 to 97.5% inclusive	Below 95.1%
Successful call ratio	Above 98%	from 95 to 98% inclusive	Below 95%
Dropped call ratio	Below 2%	from 2 to 5% inclusive	Above 5%
Speech quality ratio	Above 90%	from 80 to 90% inclusive	Below 80%

<http://en.uke.gov.pl/not-only-price-transparent-quality-of-service-indicators-13285>



## Monitoring quality of Internet access services in the context of net neutrality

### Measurements of data transmission speed

List of services with assigned threshold values for data transmission speed and delay

<b>Group of applications</b>	<b>Transmission speed not lower than</b>	<b>Delay not greater than</b>
WWW browsing	1 Mb/s DL	200 ms
SD videos watching	2 Mb/s DL	200 ms
HD videos watching	6 Mb/s DL	200 ms
HD video talks	1.5 Mb/s DL and UL	150 ms
VoIP telephony	64 kb/s DL and UL	150 ms
Multiroom services (3x HD video)	18 Mb/s DL	200 ms
On-line real time games	2 Mb/s DL and 1.5 Mb/s UL	30 ms
Other on-line games (chess, ...)	1 Mb/s DL and UL	200 ms

\* DL - downlink; UL – uplink.



## Monitoring quality of Internet access services in the context of net neutrality

Depending on the percentage share of samples complying with the minimum criteria of applications, the Internet Access Service will be classified as below:

<b>Result of classification of samples for applications</b>	<b>Quality of IAS</b>
Below 70%	Poor quality
From 70 to 90%	Satisfactory quality
Above 90%	Good quality

In case only one of the above threshold values is not met, a given sample should be qualified as negative.



Monitoring quality of Internet access services in the context of net neutrality

## Rules for measurements in mobile networks

One of the objectives defined in the Memorandum is **to ensure comparability of measurement results**. For this purpose the following rules on mobile network measurements were adopted:

- ✓ **simultaneity** - tests (measurements) are conducted at the same time, using the same measurement unit or units in parallel for all operators and all measured services;
- ✓ area and time of measurements is **the same for all operators**;
- ✓ measurements will be conducted by an **independent entity**;
- ✓ measurement campaigns will be conducted periodically, in accordance with the adopted reporting period;
- ✓ the President of UKE has a monitoring and supervisory functions.

In order to launch measurement campaigns and further operations a **Steering Committee for Mobile Network Measurements is established**. It is composed of telecommunications undertakings affected by the measurements and UKE on equal footing.



Monitoring quality of Internet access services in the context of net neutrality

## Rules for measurements in mobile networks

**The choice of a measurement route** should take account of population distribution patterns, traffic patterns and the area of service provision.

The minimum duration of the measurement campaign is 800 hours.

At least 80% of the measurements are conducted in motion and the measurements will be conducted for the following categories of areas:

- large urban areas - 6 largest cities in Poland and cities within Upper Silesia Industrial District and Tricity,
- towns - towns with at least 50,000 inhabitants, excluding large urban areas,
- highways - sections of domestic highways outside administrative borders of large urban areas and towns.



## Monitoring quality of Internet access services in the context of net neutrality

### **Publication of measurement results**

The telecommunications undertakings will have the **obligation to publish up-to-date results of quality of service measurements for their networks**. The UKE website will contain summarised benchmarks of quality of service indicators for particular reporting periods submitted by telecommunications undertakings.

**The first measurement campaign started in 2015** and service providers who have joined the Memorandum will submit the results of quality of service measurements to UKE twice per calendar year.

**Memorandum is open to all interested parties and unlimited in time** - every telecommunications undertaking may at any time join the initiative of the President of UKE and the Signatories, committing themselves to apply the solutions and standards agreed for the benefit of subscribers and their own companies.

**The final Report is addressed not only to the Memorandum Signatories**. The document is public and the solutions therein may be used also by other telecommunications undertakings when elaborating their own quality of service measurement systems.





UKE's measurement of the quality indicators – fixed, mobile, IP public services

Monitoring of the compliance by Operators with the indicators identifying the quality of service (QoS), using **UKE's monitoring systems**:

1) continuous tests of telephone networks; reports

- a special system built by the National Institute of Telecommunications (AWP IŁ) – QoS of PSTN, PSTN to GSM networks;

2) on the occasion of special events

- system ROMES - ROHDE&SCHWARZ - QoS of mobile networks,
- system nGenius - Netscout Systems Inc (USA) - QoS of IP networks.



## UKE's measurement of the quality indicators – mobile networks

### Example of examination of the GSM900/1800 and UMTS networks

➤ Measurement of the parameters of the network in voivodeship cities and on the main routes between the cities:

The examination was performed from 1 February to 26 March 2010 in the voivodeship cities and it concerned mobile telephony networks working in GSM900/1800 and UMTS standards.

Subject of the examination:

- level of the received signals RxLev (dBm) for GSM900/1800 and Ec/Io (dB) for UMTS which determine **the network coverage**,
- level of the **connection realisation**, taking into consideration blocked and dropped connections (NQA),
- perceptual assessment of **speech quality** (PESQ).



## UKE's measurement of the quality indicators – mobile networks

### **Example of monitoring the quality of mobile networks on selected railway routes**

➤ Coverage and quality of calls and data transmission in mobile networks operating in GSM 900/1800 and UMTS standards, on the main routes of movement of fans during Euro 2012.

Under the agreement signed on 5 May 2011 between the President of UKE and the President of the Office of Railway Transportation, analysis of coverage and quality of calls and data transmission in mobile networks operating in GSM 900/1800 and UMTS standards, on the main routes of movement of fans during Euro 2012 was carried out.

The study was performed on 10-13 May between 8.00-20.00 on the following routes: Warsaw-Wroclaw, Wroclaw-Gdynia, Gdynia-Warsaw, Warsaw-Poznan.