Regulatory challenges related to the Quality of Service and Experience

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Why Quality of Service (QoS) is important in a digital world?

Global ICT developments, 2001-2016

Note: * Estimate
Source: ITU World Telecommunication /ICT Indicators database
Why QoS is important in a digital world?

1  Korea (Rep)
25  Austria
33  Slovenia
39  Greece
40  Croatia
44  Poland
50  Bulgaria
51  Serbia
59  Romania
60  Macedonia
65  Montenegro
69  Turkey
77  BiH
94  Albania
167  Chad

Source: ITU
Why Quality of Service (QoS) is important in a digital world?
Online activities

Active users by social platform, January 2015 (in millions)

Source: ITU
Consumers, QoS and NRA

• The operator shall be required to publish the quality parameters for service provision which shall be in user contract, in an appropriate manner at their retailer’s and on their website or info-channel, depending on the type of service provided. The operator shall indicate in the general conditions pertinent to service provision the way in which the users can obtain information on quality parameters;

• The operator shall indicate the data on the minimum level of quality of service provision in the user contract;

• The contract between the operator and user shall stipulate the manner in which the user will be informed of any changes in the service provision quality and conditions, and/or in which they can obtain information on these changes (website, information-channel, etc.).

NRA may prepare the guidelines which inform customers and operators about their rights.
Network performance, QoS and QoE

<table>
<thead>
<tr>
<th>Quality of Experience (QoE)</th>
<th>Quality of service (QoS)</th>
<th>Network Performance (NP)</th>
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</thead>
<tbody>
<tr>
<td>User oriented</td>
<td>Provider oriented</td>
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<td>User behavior attribute</td>
<td>Service attribute</td>
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<tr>
<td>Focus on user expected effects</td>
<td>Focus on user observable effects</td>
<td>Focus on planning, development (design) operation and maintenance</td>
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<td>User subject</td>
<td>Between (at) service access points</td>
<td>End-to-end or network elements capabilities</td>
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</table>
QoS criteria which provide a general QoS framework

- **Speed** (refers to all service functions),
- **Accuracy** (e.g., speech quality, call success ratio, bill correctness, etc.),
- **Availability** (e.g., coverage, service availability, etc.),
- **Reliability** (e.g., dropped calls ratio, number of billing complaints, etc.),
- **Security** (e.g., fraud prevention),
- **Simplicity** (e.g., easy of software updates, easy of contract termination),
- **Flexibility** (e.g., easy of change in contract, availability of different billing methods such as online billing, etc.).
The physical aspects and the role of standards

The basis for setting the quality parameters for publicly available electronic communication services shall be technical recommendations, standards, technical specifications and guidelines of the

- International Telecommunication Union (ITU);
- International Organization for Standardization (ISO);
- International Electrotechnical Commission (IEC);
- European Conference of Postal and Telecommunications Administrations (CEPT);
- European Telecommunications Standards Institute (ETSI);
- European Committee for Standardization (EN);
- European Committee for Electrotechnical Standardization (CENELEC);
- Body of European Regulators for Electronic Communications (BEREC).
The physical aspects and the role of standards

ITU-T Study Group 12 is the expert group responsible for the development of international standards (ITU-T Recommendations) for performance, quality of service (QoS) and quality of experience (QoE).

- **E.800-E.899**: Quality of telecommunication services: concepts, models, objectives and dependability planning
- **E.800-E.809**: Terms and definitions related to the quality of telecommunication services
- **E.800**: Definitions of terms related to quality of service
- **E.801**: Framework for Service Quality Agreement
- **E.802**: Framework and methodologies for the determination and application of QoS parameters
- **E.803**: Quality of service parameters for supporting service aspects
- **E.804**: Quality of service aspects for popular services in mobile networks
- **E.807**: Definitions, associated measurement methods and guidance targets of user-centric parameters for call handling in cellular

Quality of service, as important topic, find place in the Final Acts of the World Conference on International Telecommunications (WCIT-12)
Why regulate QoS?

Some Governments define, by Law, obligation about QoS to NRA. Examples are:

- **PTA, NRA in Pakistan**

- **TRAI, NRA in India**
  - [http://www.trai.gov.in/content/Regulation/0_3_REGULATIONS.aspx](http://www.trai.gov.in/content/Regulation/0_3_REGULATIONS.aspx)

- **MCNC, NRA in Malaysia**

- **BTRC, NRA in Bangladesh**

- **NCA, NRA in Ghana**
Why regulate QoS?

QoS regulation can be also a part of *consumer protection*. In that case main purposes are:

- Helping customers be aware of the QoS provided by telecom operators/ISP through networks (mobile & fixed),
- Checking claims by operators,
- Understanding the state of the market,
- Maintaining / improving the QoS in presence of competition,
- Maintaining / improving the QoS in absence of competition,
- Helping operators to achieve fair competition;
- Making interconnected networks work well together.
Role of National Regulatory Authority (NRA)

For the purpose of ensuring quality in the provision of publicly available electronic communication services and the protection of users, the NRA shall be authorized to:

• Specify in detail the quality parameters of certain publicly available services, and the manner of notification of consumers about the offered service quality;

• Determine the minimum quality for the provision of certain services by the public communications network operator.

• The NRA shall keep an updated database of prices, conditions of access and use (including limitations), and the quality of public communication networks and services. Also, the NRA shall update and make publicly available this data on its website providing the possibility of comprehensive database browsing capacity.
Mapping is a key element of planning public Next Generation Networks (NGN) and provides the basis for state aid assessment.

- **Infrastructure mapping**: Geo-referenced and structured data of physical infrastructure, e.g.: ducts/fiber/nodes, antenna towers/masts, and other relevant infrastructures energy, transport or water supply. A number of European countries perform infrastructure mapping initiatives: Austria, Belgium, Denmark, Estonia, France, Poland, Switzerland and United Kingdom.

- **Quality of service (supply) mapping**: Map information on the supply side of broadband service provision including the available bandwidths and the quality of service, technologies, operators/service providers. A number of European countries perform service mapping initiatives: Belgium, Denmark, Finland, Germany, Greece, Hungary, Ireland, Norway, Poland, Spain, Sweden, Switzerland and United Kingdom.

- **Demand and Quality of Experience (Demand) mapping**: Data on actual latency/speeds experienced by users; data usage (per household); expectations regarding quality of service and experience and willingness to pay by different user groups. Two European countries perform demand mapping initiatives: Sweden and United Kingdom.

- **Investment mapping**: Information related to prospective public and private investment of high speed broadband during the next three years (in line with EC Broadband State Aid Guidelines).
Regulatory frameworks and tools

• *Regulated public or private monopolies* – command and control approach with the intent to encourage improvements in efficiency and service, in effect regulations simulated competition,

• *Basic reform* – partial liberalization and privatization across the layers, focused on ensuring the incumbent made its infrastructure available in a nondiscriminatory, manner, often under pressure to look after the interests of government shareholdings,

• *Enabling investment, innovation and access* – with full privatization and a move towards service rather than infrastructure competition, dual focus on stimulating competition in service and content delivery, and consumer protection,

• *Integrated regulation* – led by market, technology developments, economic and social policy. This step includes: universal access to broadband networks, consumer protection, spectrum management, cooperation and collaboration, consultation and balanced and innovative regulation.
QoS regulatory framework

- **Standards**
  - e.g. ITU, ETSI, National Standards, Industry Standards, Other standardization bodies

- **License Regulation**
  - License condition
    - e.g. India, Pakistan,
  - Regulation
    - e.g. India, Malaysia, Pakistan, Singapore, Tanzania
  - Industry guidelines
    - e.g. Australia

- **KPI Measurement Techniques**
  - Technical
    - e.g. Call drop, call success rate, connection speed, SMS quality
  - Customer focused
    - e.g. Billing accuracy, fault
  - Guideline
    - e.g. Measurement methods

- **Monitoring Survey**
  - Technical
    - e.g. Network auditing, drive tests
  - Customer survey
    - e.g. Network auditing, drive tests

- **Enforcement**
  - Regulatory notice
    - e.g. Website, Press release, Directive
  - Publication
    - e.g. Website, newspaper
  - Penalty
  - Dispute

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QoS regulatory framework

Source: ITU
Who’s in Charge of QoS Standards setting and monitoring?

Source: ITU
Main regulatory issues related to QoS for publicly available electronic communication services

Services subject to quality of service monitoring, 2015

Source: ITU
Main regulatory issues related to QoS for publicly available electronic communication services

QoS monitoring required in 92% of the countries worldwide

Source: ITU

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Main regulatory issues related to QoS for publicly available electronic communication services

Measurements to be defined must be

- **Practical for operators**
  - The measurements defined for QoS monitoring by the NRA need to be implementable by operators for reasonable costs in reasonable times using consistent measurement and audit procedures.
  - If possible the measurements should be the same as or similar to ones that operators already make for their own purposes.

- **Important to customers**
  - The measurements must be done for the most popular service used by customers
  - The measurements should be reviewed, to see whether they need to be changed, as the market changes and different aspects of services become most important

- **Comparable between operators**
  - The details of measurement methods may need to be discussed between operators before they can be settled.
  - The measurement methods should be precise enough that differences in interpretation and implementation should not lead to differences in measurements.
Reporting and Monitoring Tools
Main regulatory issues related to QoS in the context of Internet access

Regarding use of the transmission capacity over the end-user’s broadband connection, two kinds of services are provided:

*Internet access services* are a publicly available electronic communications services that provides connectivity to the Internet.

*Specialized services* are electronic communications services that are provided and operated within closed electronic communications networks using the Internet Protocol. Examples are:

- VoLTE (*high quality voice calling on mobile network*);
- *linear (live) broadcasting IPTV services with specific quality requirements*;
- *real – time health services*;
- *VoIP blocking*;
- *Peer-to-Peer (P2P) and*
- *prioritization of traffic from specific Content and Application Providers (CAP)*
Main regulatory issues related to QoS in the context of Internet access

Monitoring

1. Are there situations that needs attention?
   - Degradation of IAS as a whole?
   - Degradation of individual applications using IAS?
   - Dynamic comparison of service offers
   - Detection of blocking and/or throttling

2. Is regulatory intervention needed?
   - Market level situation, number of end-users affected by degradation of IAS as whole?
   - Availability of alternative IAS offers with sufficient quality?
   - Market level situation. High penetration of restricted IAS offer?
   - Availability of unrestricted IAS offers?

3. Selection of regulatory tool?
   - Can other tools like transparency or promotion of competition help?
   - Availability of unrestricted IAS offers?

4. Conclusion to minimum QoS req
   - Decide on type of requirements
   - Draft decision Notification
   - Final decision Monitor compliance?

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Regulatory guidelines and recommendation

**Monitoring and reporting obligations** to ensure that providers of electronic communications to the public, including providers of Internet access services, comply with their obligations concerning the safeguarding of open internet access. Those include the obligation to ensure sufficient network capacity for the provision of high quality non-discriminatory internet access services.

- **Impose requirements** concerning technical characteristics, minimum quality of service requirements and other appropriate measures on all or individual providers of electronic communications to the public if this is necessary to ensure compliance with the provisions of open internet access or to prevent degradation of the general quality of service of internet access services for end-users.

- **Provide an annual report** to the Government Ministry responsible for electronic communications of their findings regarding the implementation of these QoS rules and recommendations. Also summarize main findings of these annual reports and put them public on website.