



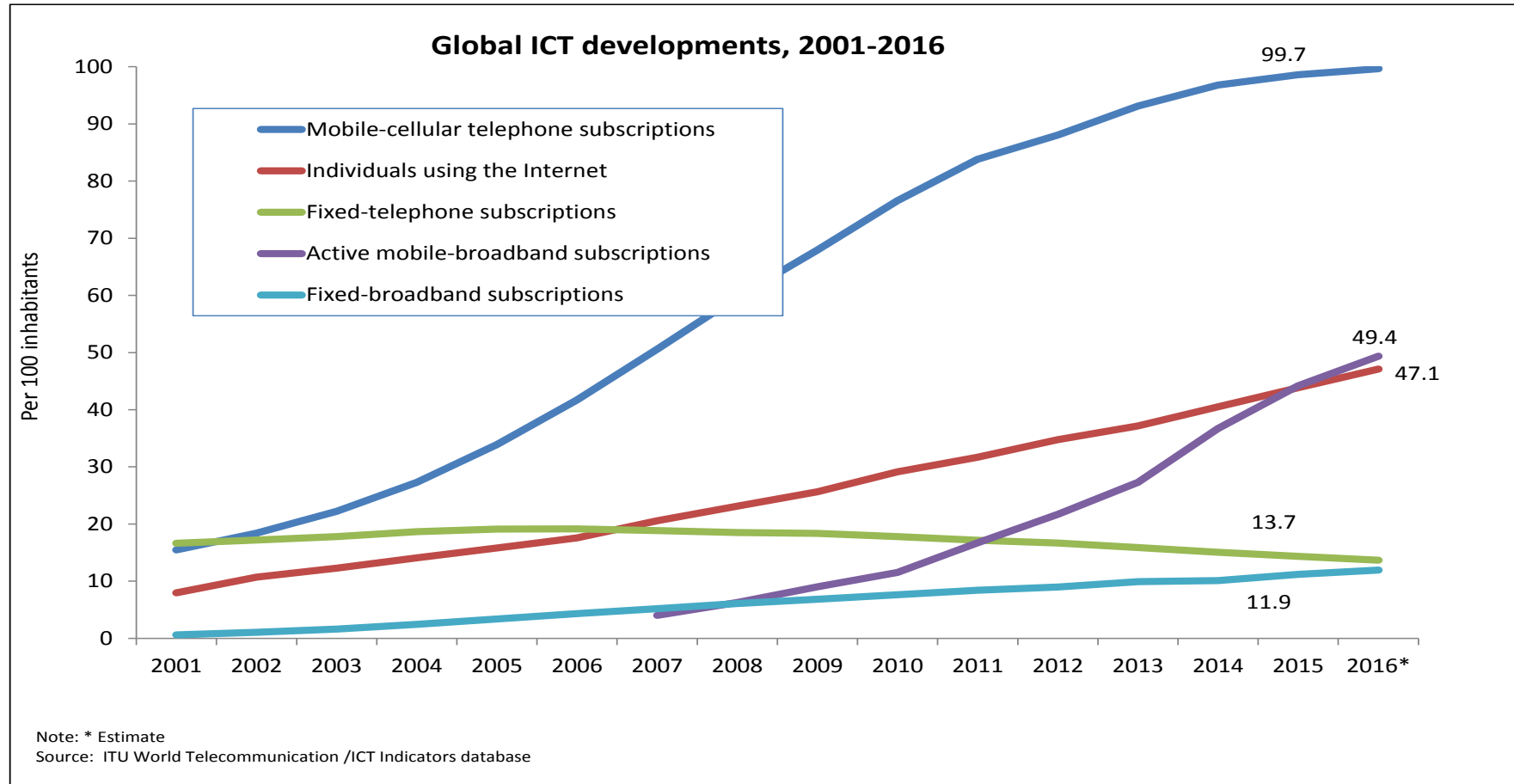
Regulatory challenges related to the Quality of Service and Experience

**International Regulatory Conference for Europe
Regulating Electronic Communication Market
26-27 September 2016**

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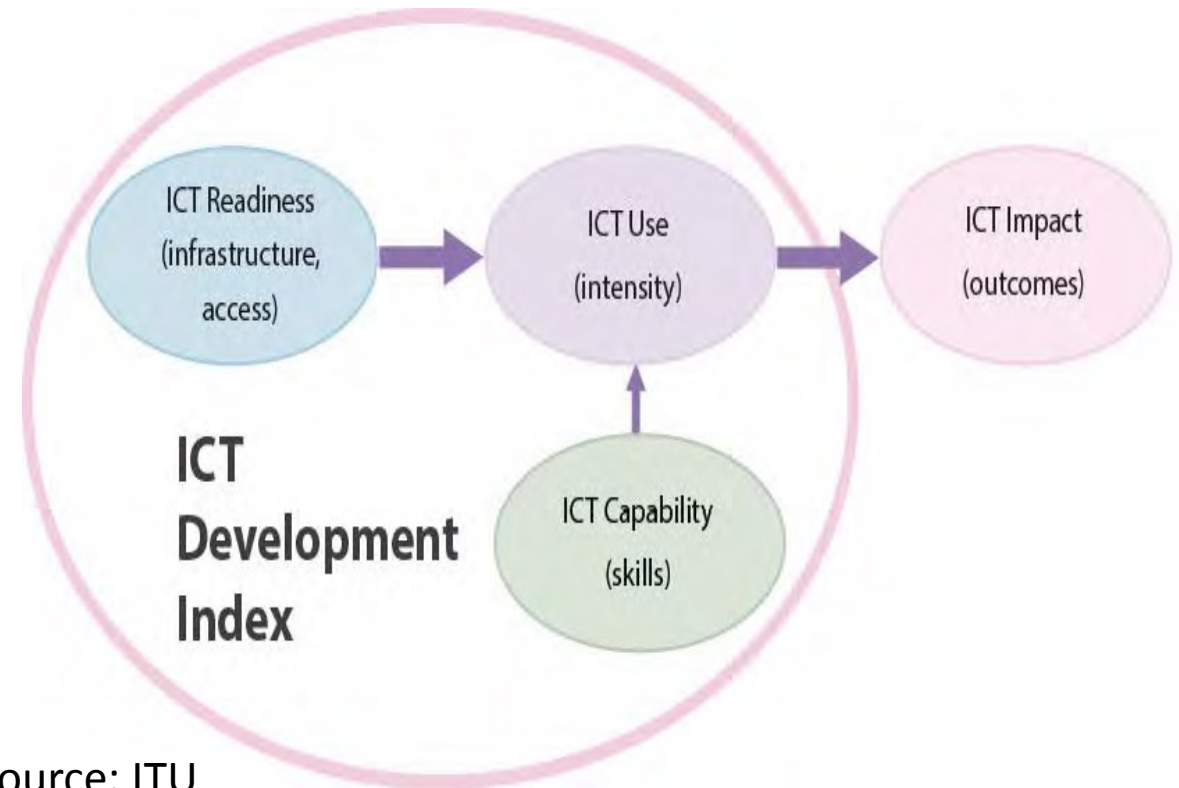
Why Quality of Service (QoS) is important in a digital world?





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**

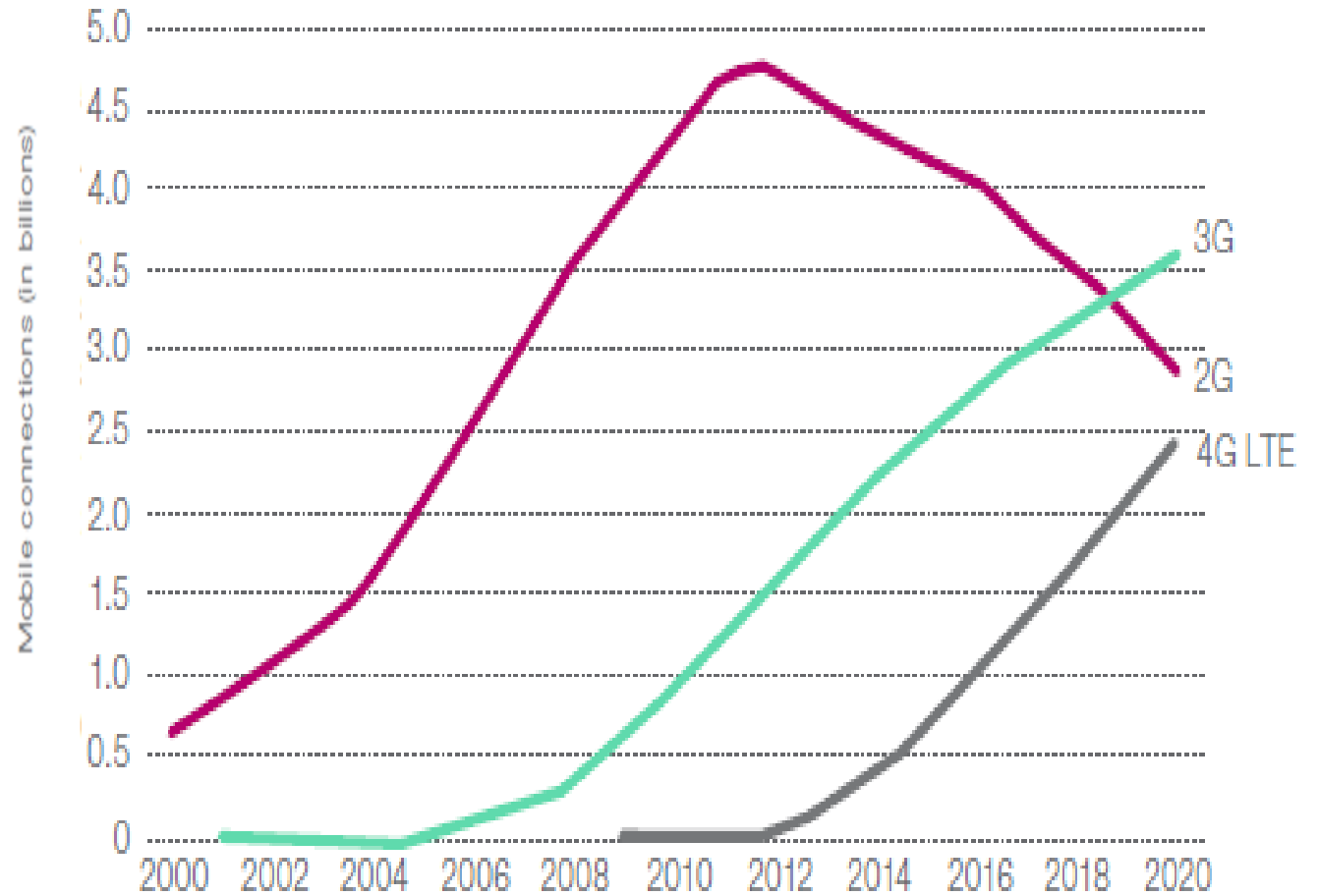
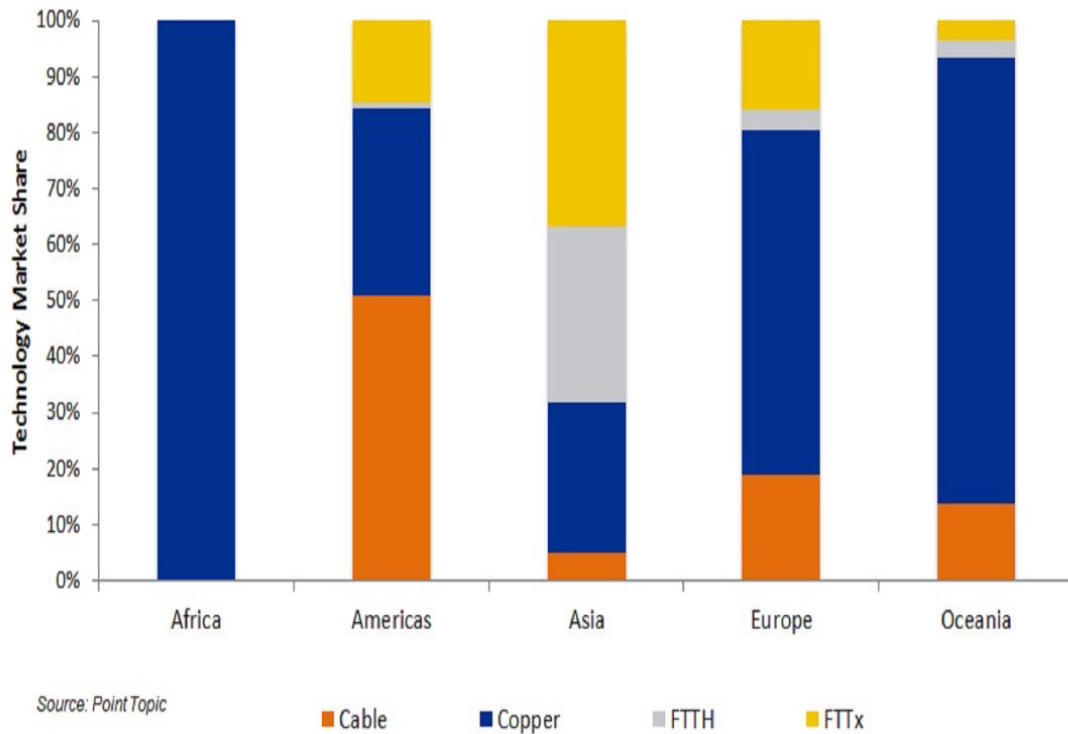


Source: ITU



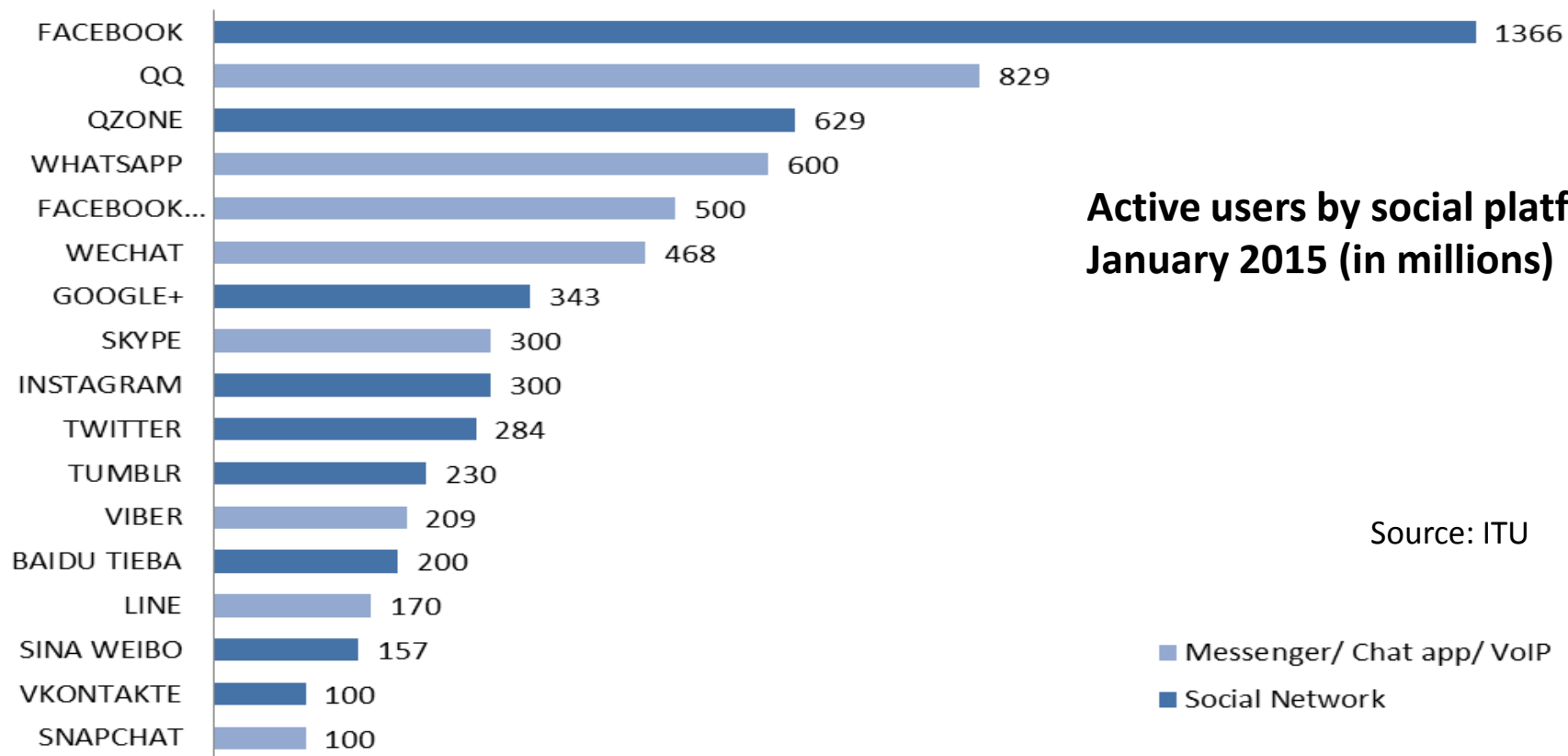
Why Quality of Service (QoS) is important in a digital world?

Technology market share by region
Q2 2015





Online activities





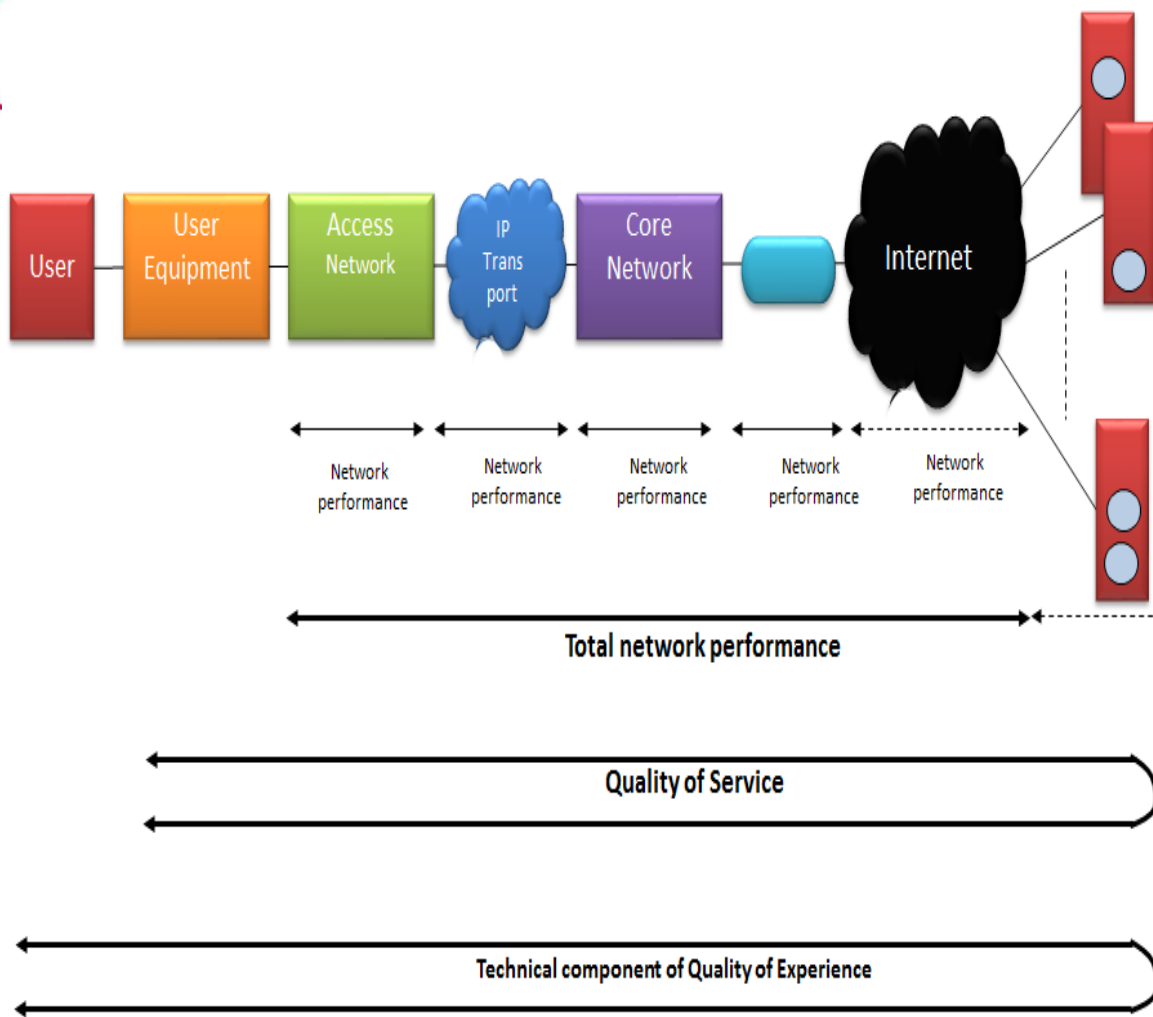
Consumers, QoS and NRA

- 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



Quality of Experience (QoE)	Quality of service (QoS)	Network Performance (NP)
User oriented		Provider oriented
User behavior attribute	Service attribute	
Focus on user expected effects	Focus on user observable effects	Focus on planning, development (design) operation and maintenance
User subject	Between (at) service access points	End-to-end or network elements capabilities



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***
- Pakistan QoS regulation for Broadband, Pakistan Telecommunication Authority: http://www.pta.gov.pk/bb_qos_regs_2014.pdf
- Pakistan QoS regulation for Broadband, Pakistan Telecommunication Authority: http://www.pta.gov.pk/bb_qos_regs_2014.pdf
- ***TRAI , NRA in India***
- http://www.trai.gov.in/content/Regulation/0_3_REGULATIONS.aspx
- ***MCNC, NRA in Malaysia***
- Malaysia Communications and Multimedia Commission: <http://www.mcmc.gov.my/Sectors/Telco/Quality-of-Service.aspx> http://www.skmm.gov.my/skmmgovmy/media/General/pdf/Guidelines_MSQoS-Public-Cellular-Service.pdf
- ***BTRC, NRA in Bangladesh***
- ***NCA, NRA in Ghana***
- <http://www.nca.org.gh/51/136/QoS-Reports.html>



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.**



Infrastructure development (sharing, mapping)

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).

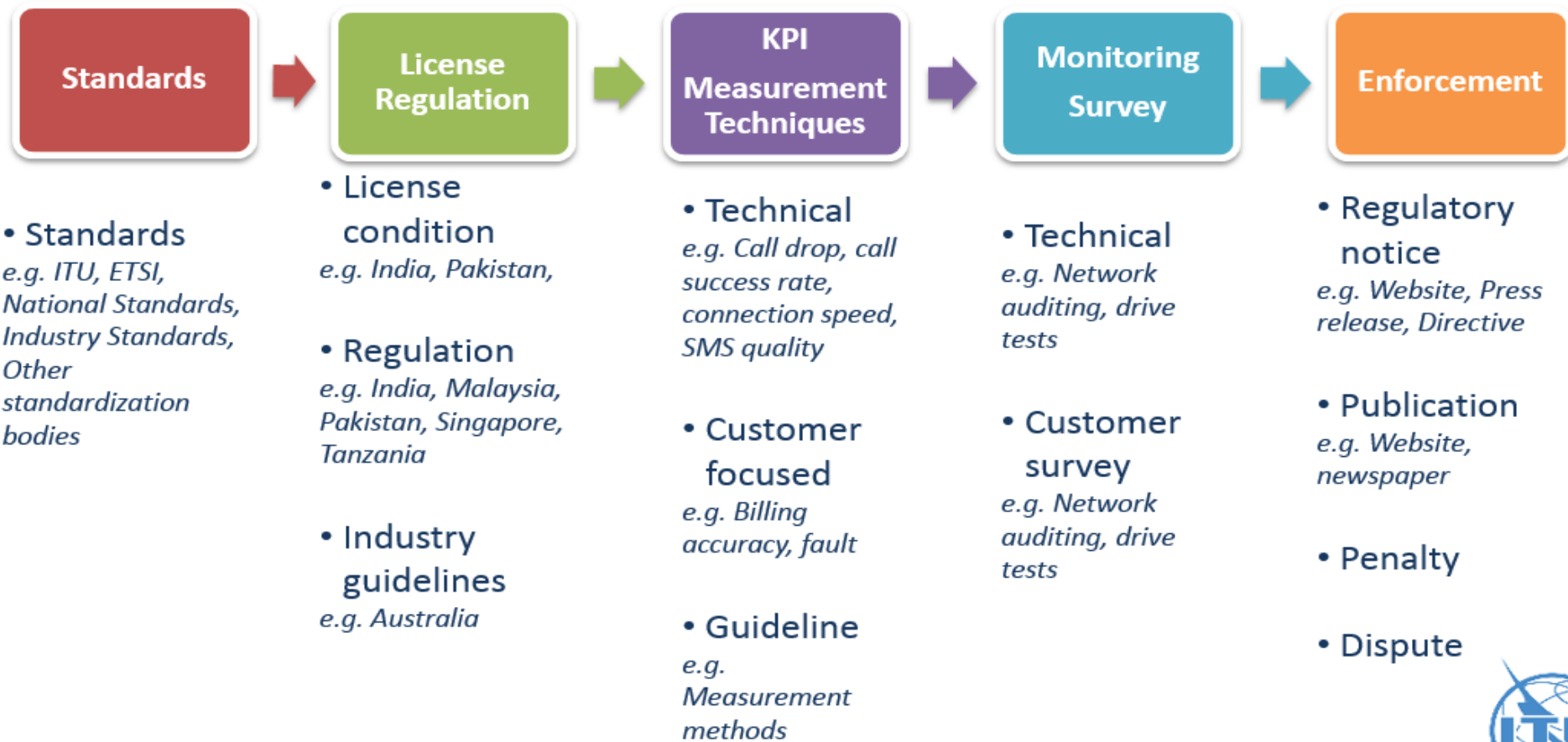


Regulatory frameworks and tools

- ***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.



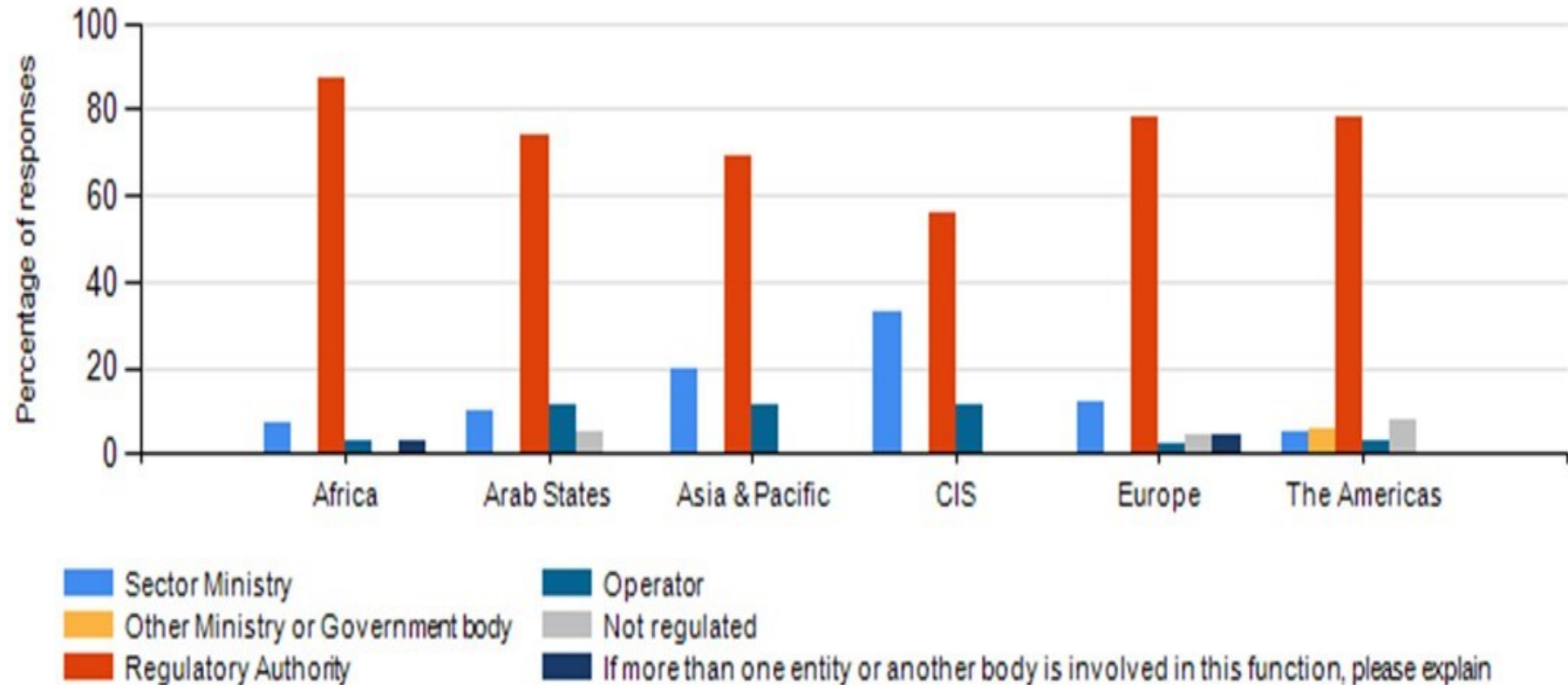
QoS regulatory framework





QoS regulatory framework

Entity in charge of enforcement of quality of service obligations, 2015

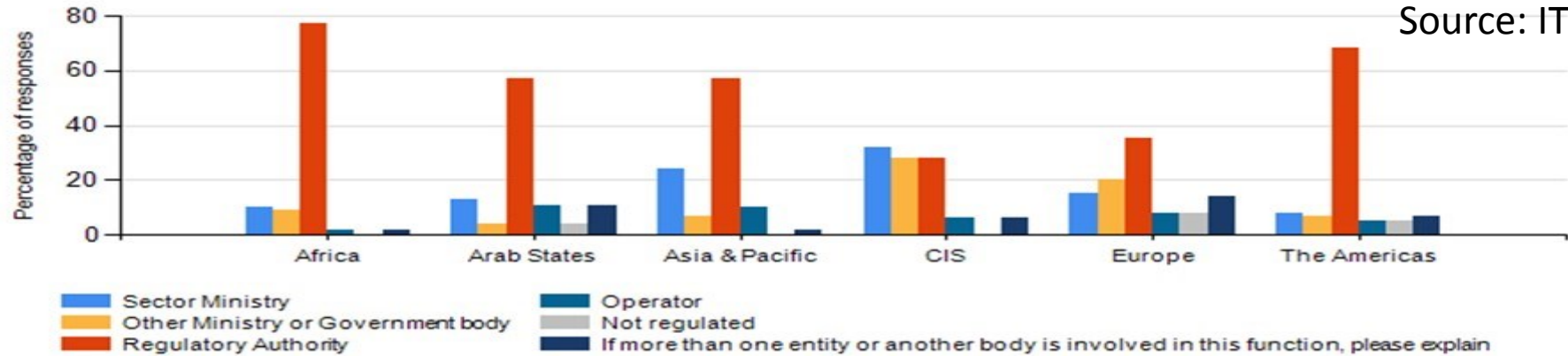


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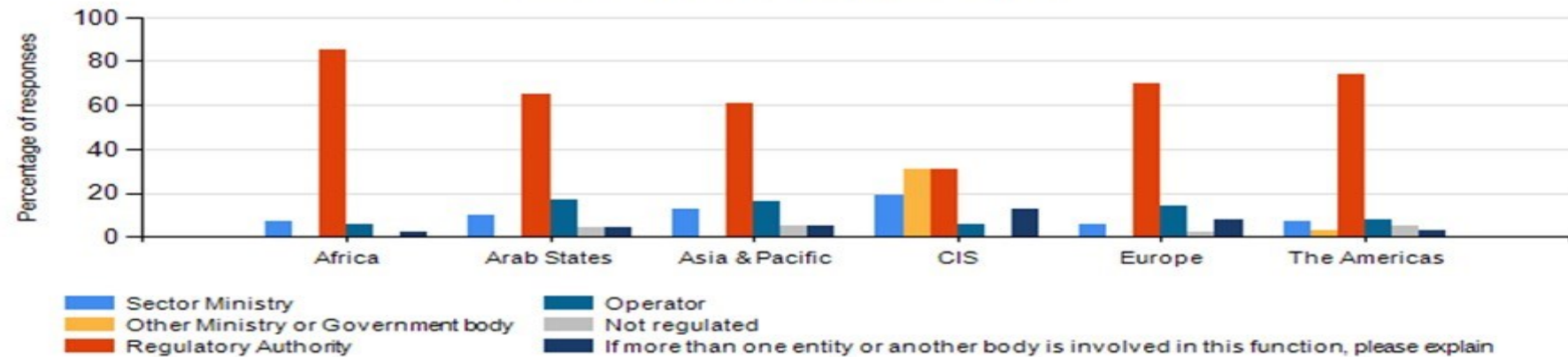


Who's in Charge of QoS Standards setting and monitoring?

Entity in charge of technical standards setting, 2015



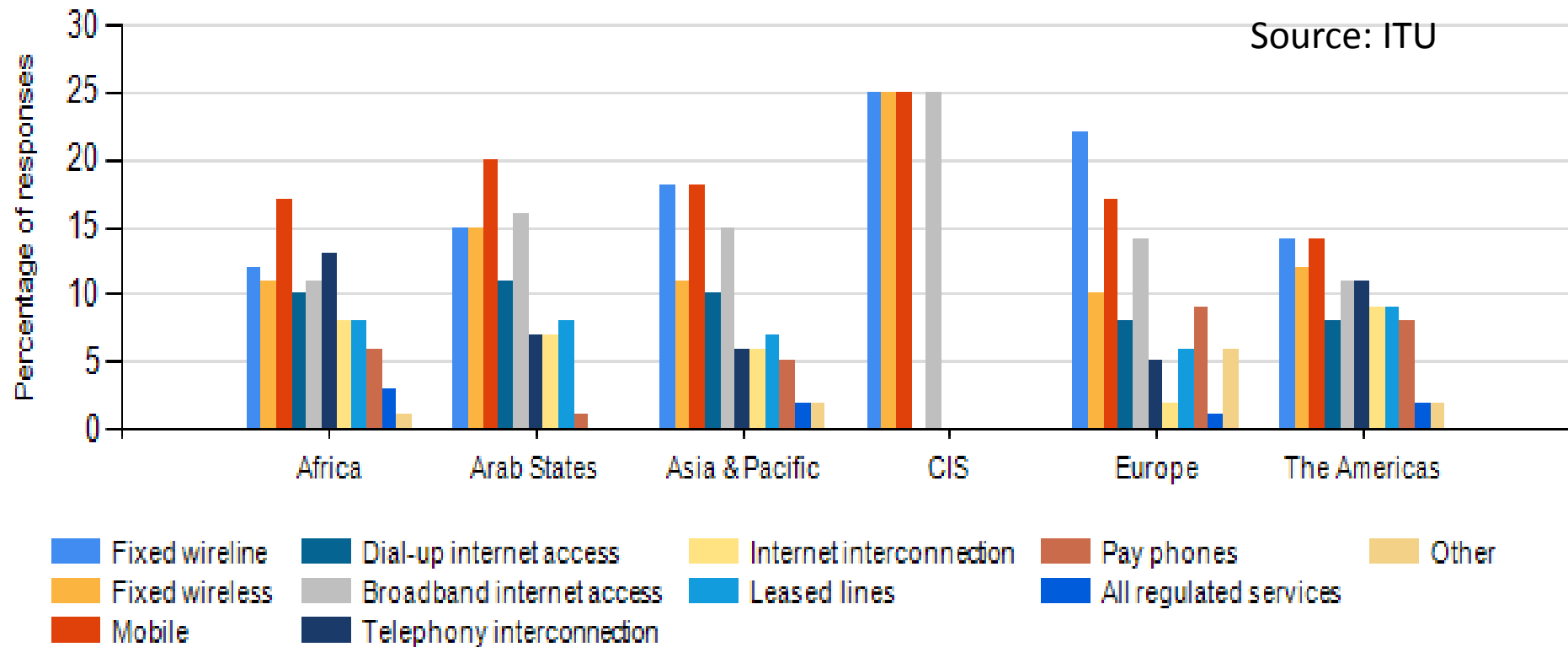
Entity in charge of service quality monitoring, 2015





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

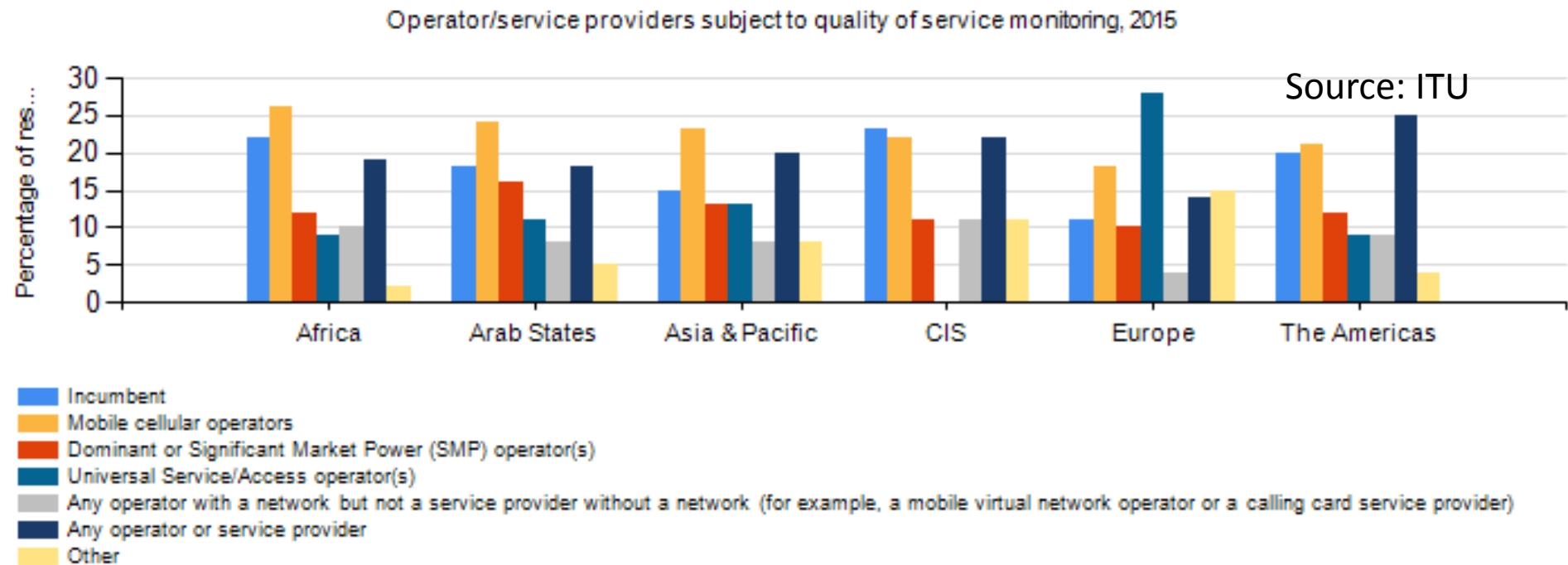
Services subject to quality of service monitoring, 2015





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

QoS monitoring required in 92% of the countries worldwide





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



Veri kullanım hesaplayıcı

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Sam Knows Canadian Radio-television and Telecommunications Commission Canada

SIGN UP ABOUT FAQ CONTACT US

MEASURE YOUR BROADBAND ACCURATELY.

Join our Canadian campaign...

Sign up with us today to accurately measure your broadband performance.

Sign up for a free Whitebox to accurately measure your broadband performance.

JOIN TODAY

The Canadian Radio-television and Telecommunications Commission (CRTC) and SamKnows have established the "Measuring Broadband Canada" program in order to provide Canadian citizens with reliable and accurate data concerning broadband provision across the country. Anyone who would like to be part of this project just needs to sign up. It might be worth reading the requirements before doing so just to make sure you're eligible to join!

On signing up, volunteers will receive a purpose-built broadband measurement unit, also known as a SamKnows Whitebox. The Whitebox is also IP-enabled, since it has been plugged into the existing modem/router then it is good to go. Volunteers will also be able to see their own data from their broadband connection using a purpose-built SamKnows dashboard.

Please note, not everyone who registers will necessarily receive a SamKnows Whitebox. We do want to thank everyone for signing up and for working together to make Canadian broadband better!

RTR-NetTest

The RTR-NetTest informs users about the current service quality (including upload, download, ping, signal strength) of their internet connection. In addition, a map view and statistics of previous tests can be accessed.

Privacy Policy and Terms of Use

Start RTR-NetTest

App and Browser Test

Download iOS or Android App or conduct the browser test.

Statistics

Statistics on the test results.

Map view

Map with test results.

Help

Detailed background information.

Mobile - Download Automatic Heatmap Points Communities

Median All networks 6 months 2G/3G/4G

Search for an address or city Search

Map key

0.4 1.4 5.7 22.6 Mbps

Sources: RTR, basemap.at, ArcData, Statistik Austria, BEV 2012





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:

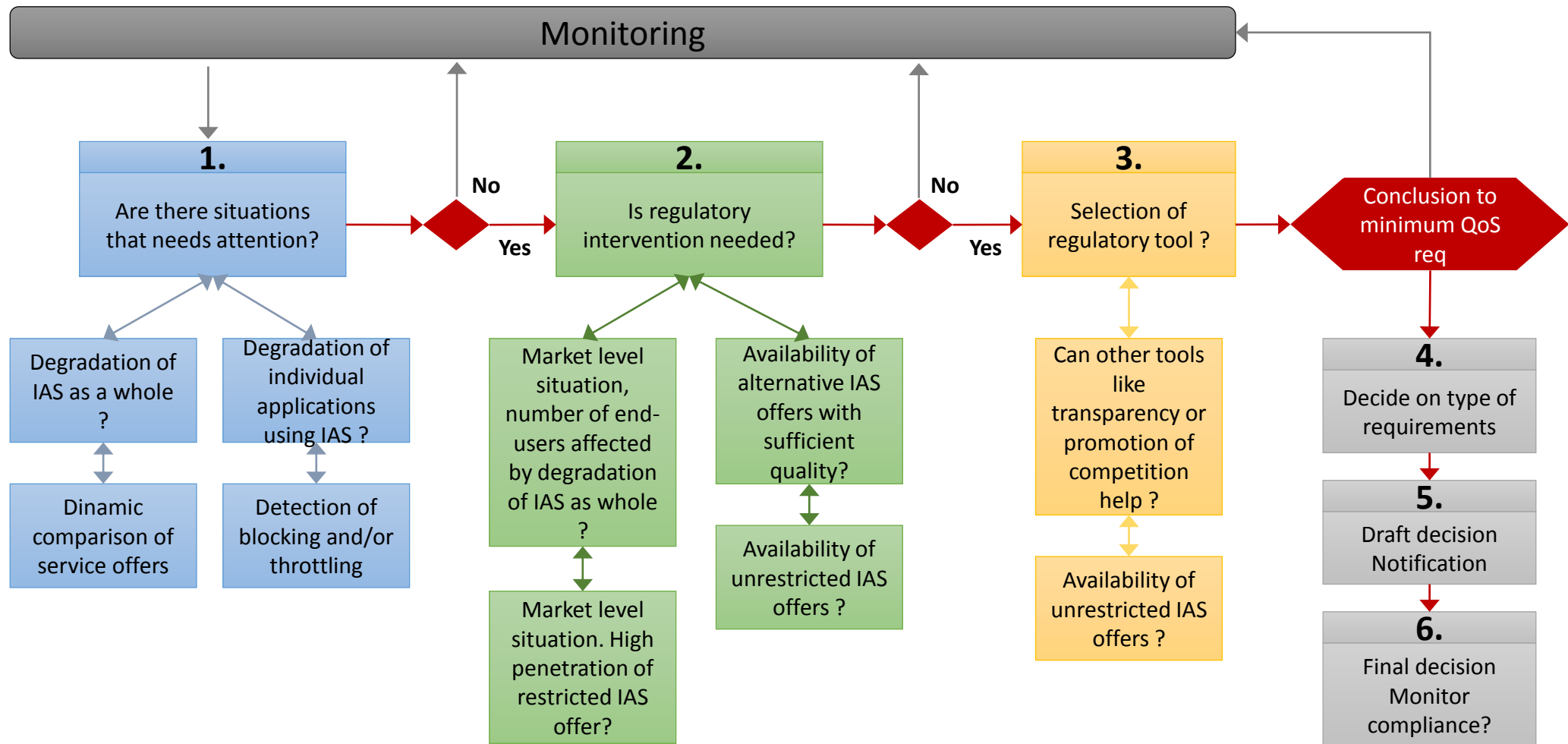
Internet access services are a publicly available electronic communications services that provides connectivity to the Internet.

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





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.