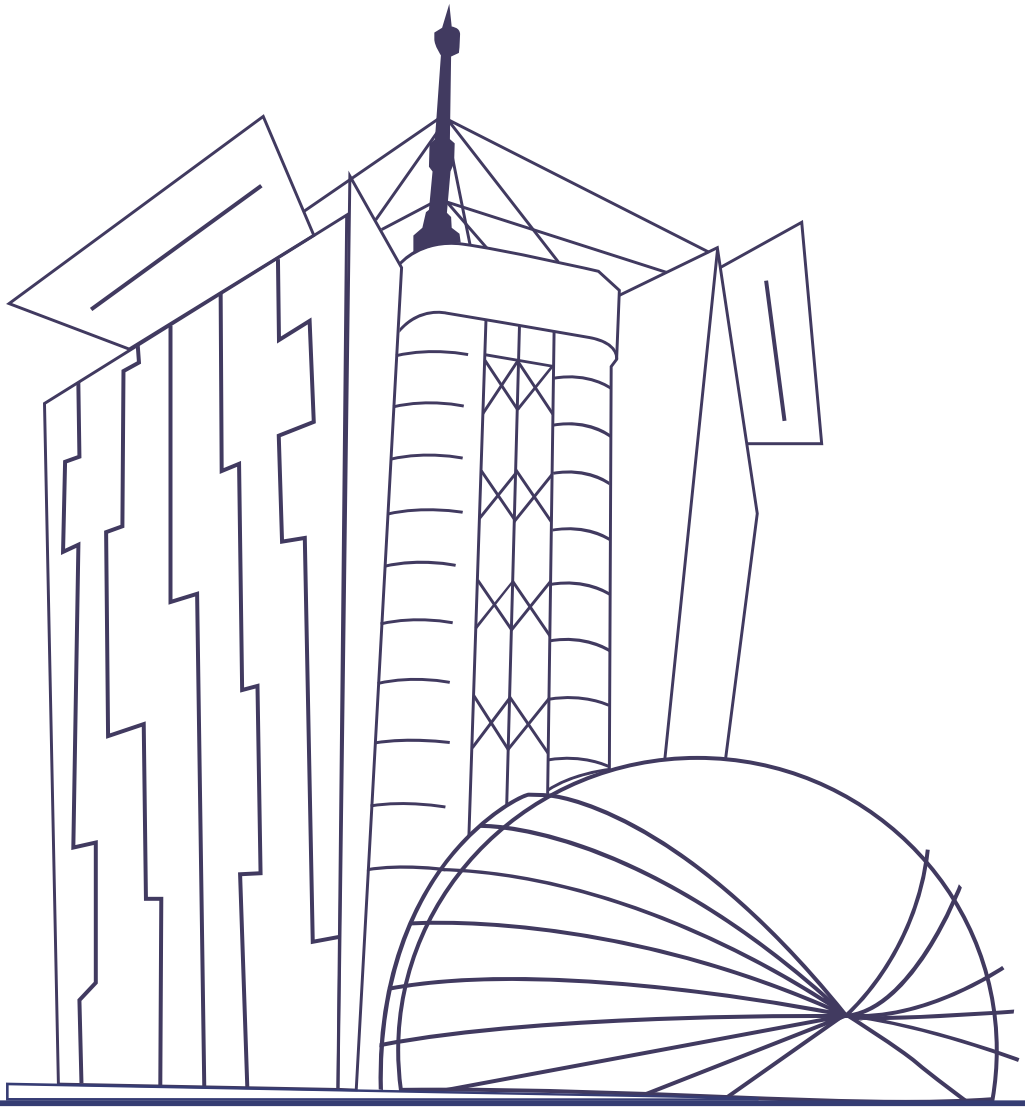
هيئة الإتصالات وتقنية المعلومات
Communications and Information Technology Commission

A Public Consultation Document on the proposed QoS Framework

April 2017



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1 Introduction

1.1 Pursuant to the Telecommunications Act, the Telecommunications Bylaw and the Ordinance, the Communications and Information Technology Commission ("CITC") is authorized to regulate the Information and Communications Technology (ICT) sector in the Kingdom of Saudi Arabia ("the KSA").

1.2 Pursuing its goal of constantly improving the quality of telecommunication infrastructure and associated services to the public of KSA, CITC is in the process of reviewing its "Quality of Service Scheme for the Kingdom of Saudi Arabia" (dated April 2009).

1.3 This public consultation concerns the way in which CITC will:

a) Define key performance indicators [1] based on which the quality and performance of telecommunication services, offered by licensed service providers to the public, will be measured, reported and enforced against possible minimum targets.

b) Obligate telecommunication service providers to cover the population and businesses of KSA with a minimum set of basic services.

c) Handle complaints from the public related to the quality of services rendered by the service providers to their consumers.

1.4 CITC invites all individuals and members of the public, including private individuals, public organizations and commercial entities to participate in this Public Consultation.

2 Scope of the public consultation

2.1 This public consultation is for the purpose of seeking comments from all stakeholders and members of the public who are interested to respond on the need, principles and the draft versions of the documents (contained in the appendices) that together form the updated QoS / QoE Framework.

2.2 The motivation to draft an updated QoS framework is contained in chapter 4. An overview of the methodology used to draft the updated framework is given in chapter 5. The approach of the updated framework is described in chapter 6. The objective of these chapters is to illustrate the background, methodology and approach only, the actual proposed framework is documented in the appendices as follows:

a) Appendix A: Proposed QoS / QoE KPIs

b) Appendix B: Proposed QoS / QoE Implementation and Enforcement

c) Appendix C: Proposed Complaints Handling Process

d) Appendix D: Draft Quality of Service framework for the Kingdom of Saudi-Arabia

2.3 After successful conclusion of this consultation process, the submissions will be reviewed and the framework will be adapted where CITC deems it necessary. The final framework will then be published by CITC.

[1] For Quality of Service (QoS) and Quality of Experience (QoE)

3 Comments on the consultation documents

3.1 This Public Consultation Document including its Appendices are available on the CITC's website at: http://www.citc.gov.sa

3.2 Respondents who wish to express opinions on the Public Consultation Documents are invited to submit their comments in writing to CITC. All comments must be received by CITC no later than 09/09/1438 H, corresponding to (04/06/2017 G).

3.3 Comments filed in relation to the Public Consultation Documents must be submitted to one or more of the following addresses:

E-Mail: QoS@citc.gov.sa

Delivery (hard and soft copies) by hand or by courier to:

Communications and Information Technology Commission (CITC)

Corner Prince Turki Ibn Abdulaziz Al Awwal Road and Al Imam Saud Ibn Abdulaziz Road

P.O. Box 75606

Riyadh 11588

Kingdom of Saudi Arabia

3.4 CITC welcomes comments on the content of the updated QoS framework as contained in chapter 6 and the appendices. CITC particularly invites comments and responses to the specific "Questions" set out in this Public Consultation Document and at the end of each of the appendices (the "Consultation Questions").

3.5 CITC encourages Respondents to support all comments with relevant justification and analysis, data and information based on the current situation or on relevant experience from other countries to support their comments. CITC may give greater weight to comments supported by appropriate evidence. In providing their comments, Respondents are requested to indicate the number of the Consultation Question(s) to which each comment relates. Respondents are not required to comment on all Consultation Questions. CITC is under no obligation to adopt the comments of any Respondent.

3.6 Comments submitted by Respondents in relation to the Public Consultation Documents may be published on the CITC's website at http://www.citc.gov.sa. Claims of confidentiality will be determined by CITC in accordance with the Commission Statutes. Generally speaking, statements of opinion will not be regarded as confidential by CITC.

4 Motivation to update the current QoS scheme

4.1 CITC intends to update its "Quality of Service Scheme for the Kingdom of Saudi Arabia" issued by CITC in April 2009. CITC is of the opinion that this step is necessary as the technology and markets in Saudi-Arabia have been developing at a rapid pace and the regulatory framework needs to advance further over time in order to keep pace with that evolution.

4.2 CITC registered a significant increase in user complaints over the last year (particularly in 2015) and many of those complaints were QoS/Coverage related. For example, a CITC internal statistical analysis has revealed that the proportion of QoS / Coverage related complaints on the overall complaints increased from 25% in 2014 to 32% in 2015.

4.3 Therefore, it is necessary to assess the current situation in Saudi-Arabia specifically with regards to: QoS, Complaint Handling, and Coverage. Consequently, CITC has analyzed the current status of the Quality of Service scheme as implemented in Saudi-Arabia and has identified the gaps in the current QoS scheme.

Question 4.1: Can Respondents share other reasons why the scheme should now be updated?

5 Methodology to develop the QoS Framework

5.1 The objective of the updated QoS framework is the improvement of overall quality of telecommunication and ICT services in the Kingdom of Saudi Arabia for the benefit of consumers. The main aim in this context is the promotion and protection of consumer interests by means of focused investment into network quality, network performance and coverage for the benefit of the population and economy in KSA.

5.2 CITC has undertaken a comprehensive analysis of QoS / QoE assessing the current state of regulation in Quality of Service, complaint handling and coverage in the Kingdom of Saudi Arabia. These as-is assessments were complemented with an extensive benchmark study on QoS / QoE frameworks implemented in other countries which have been taken into account in the development of the proposed framework. These learnings were adapted to the KSA specific situation and as a result, specific solutions tailored to KSA. The overview of this methodology is depicted in Figure 1 below.

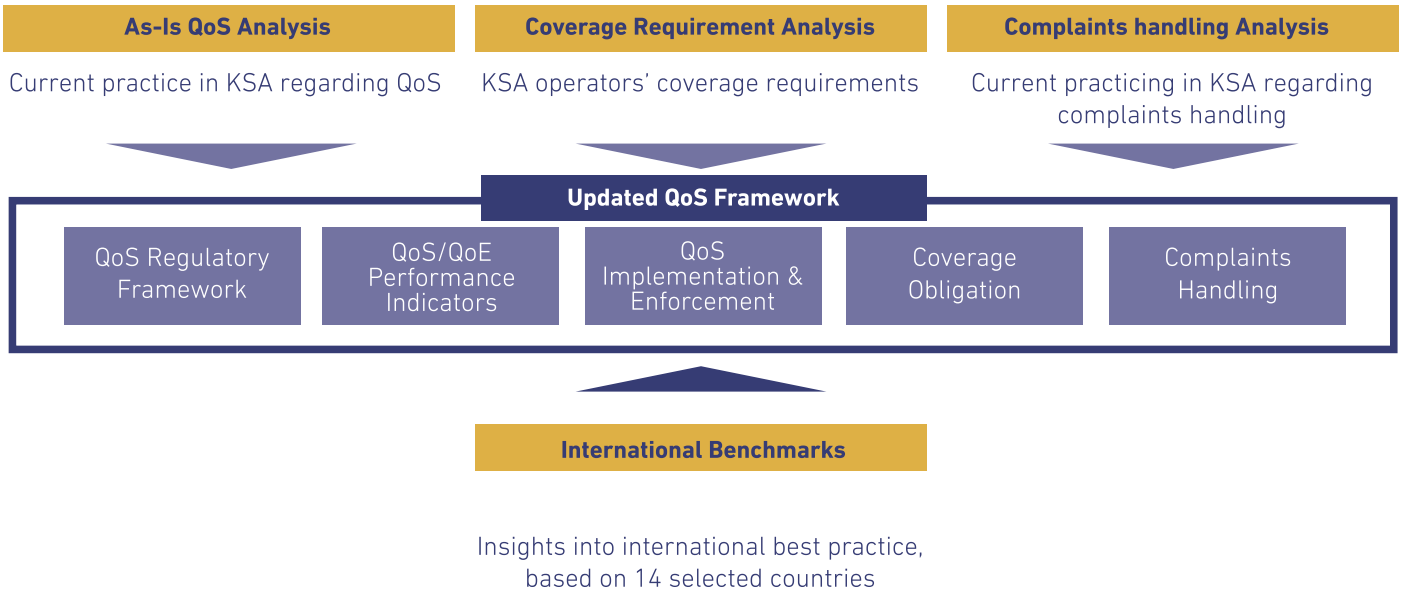

Figure 1: Methodology of the QoS framework update

5.3 The content of the QoS Framework is structured along the following five main topics:

- QoS / QoE regulatory framework
- Applied Key Performance Indicators (KPIs) for QoS / QoE
- KPI implementation and enforcement
- Consumer complaints handling
- Coverage obligations and measurement

6 Proposed framework approach

Key Findings on the current QoS scheme

6.1 Benchmarks show that strict and comprehensive regulation does not automatically lead to high quality; European experience with no/very limited QoS/QoE KPIs have led to a better service quality than e.g. countries in Middle East that have specified a high number of KPIs. Typically, in those countries actual enforcement is limited due to lack of enforcement power or the fact that it is simply impractical to enforce the specified KPIs due to high numbers and the nature of the selected KPIs.

6.2 In terms of international best practice, there are mainly two regulatory approaches to QoS that can be summarized as follows:

a) Some countries – particularly those that are members of the European Union (EU) or

designed their regulation close to EU framework – follow a lean approach and leave QoS regulation to the competitive forces on the markets. Those countries focus on creating and maintaining the competitiveness and enhancing transparency and availability of information to consumers.

b) Other countries tend to apply a stricter control and regulation of telecommunication business. These countries typically have an elaborated QoS framework in place but enforcement may be at different levels. Such environments may require higher regulation levels in order to protect the interest of consumers (especially in less populated areas) and economic development. The common practice here is driven by various factors, such as:

- less competitive markets
- generally low urbanization rates which is a restricting factor for the roll-out of telecommunication infrastructure (e.g. Middle East countries, South Africa)
- a legacy of diverse licensing resulting in a multitude of licensees, creating a non-homogeneous market with high level of competition and very low service fees (India).

6.3 Starting point for the proposed updated QoS / QoE regulation, which is the subject of this consultation, is the current framework (see reference in paragraph 1.2). It applies to specific services and specific service providers.

6.4 The specific services covered under the current framework are:

- End-user services: Fixed voice and internet access services, mobile voice services and business data services
- Wholesale services: Bit-stream access, Line sharing, Bit-stream access link service, Backhaul service, Internet service, Transmission link service, Data local access service
- Interconnect services

6.5 QoS Key Performance Indicators (KPIs) reporting and compliance obligations apply to specific service providers:

- With regards to end-user services, reporting obligations for QoS Key Performance Indicators (KPIs) apply to all service providers, but only dominant service providers, universal service providers and mobile voice service providers have to actually meet the set target values.
- With regards to wholesale services as well as interconnect services, only dominant service providers must report and comply with QoS KPIs.

6.6 QoS KPIs for fixed data or mobile data services are covered only under the KPI IP data transmission throughput for internet access.

6.7 Coverage obligations for mobile network service providers and roll-out obligations for fixed network service providers are contained in the respective licenses. The results of the analysis of these license conditions can be summarized as follows:

- One fixed-line service provider is lagging behind on its roll-out obligations.
- All mobile network service providers have fulfilled their coverage obligations for 2G and 3G services. They all publish coverage maps on their web pages.
- Mobile licenses have been issued under the technology-specific framework that has been replaced by the service-specific approach to licensing. However, the existing licenses have not been converted to the new approach. Recently, CITC has begun to issue unified licenses to some existing facility based providers.
- CITC has recently published a beta version of a coverage map on their web page and Smartphone App.

6.8 There is room to enhance the enforcement and sanctioning in the current QoS framework.

General Principles regarding QoS Framework

6.9 The proposed QoS framework is characterized by focused regulations enabling market forces via transparency. This lean approach is depicted in the following key messages:

6.10 Few KPIs aimed at strengthening and protecting consumers.

The QoS Regulatory Framework directs its focus on a set of few KPIs and on measures to enable competition to enhance service quality. The specific KPIs are chosen from a perspective of practicability of approach. In order to derive measurement results, the focus in our approach lies in choosing those that are measurable with reasonable effort. This approach is then combined with CITC's role to protect end consumers and, thus, safeguarding the basis for the steady growth of the telecommunications markets in the Kingdom.

6.11 QoS / QoE specific framework to focus on end-consumer services

The updated approach focuses on end-consumer services: CITC sets some core QoS / QoE KPIs for end-consumer services and reporting obligations. These are properly published in a comparable way creating the transparency required to enhance competitive market forces.

For wholesale and interconnection services CITC plans to shift detailed QoS / QoE KPIs and description into Reference Offers as it is recommended by international best practice. Wholesale and interconnection KPIs fall within the specific wholesale access and interconnection framework that are specific to the relationships between wholesale and interconnection providers and seekers. They only indirectly concern the relationship between the service provider and its end- (retail) consumers and are therefore not elaborated in this end-user framework. Thus, specific QoS KPIs will be described in detail in the specific framework documents, e.g. in Reference Offers that aim at creating a level playing field be-

tween service providers. What is left for the general framework is mainly to set a rule that specific QoS / QoE KPIs are to be dealt with in the relevant Reference Offers and approval depends on the Service Providers to comply with that rule (see Appendix D).

6.12 Reporting and publishing

The Service Providers are to report these specific KPIs to CITC. CITC may propose specific formats for the reporting and publishing of the results by the service providers in order to enhance transparency for consumers. Such publishing may include a centralized publishing tool such as including those on the central CITC webpage.

6.13 Monitoring and enforcement in future framework

CITC then, however, monitors these KPIs and publishes these results in a fair, transparent and comparable way. This will enhance competitive forces and quality of service.

The publication interval is proposed to be quarterly.

For verification of the reported KPIs, CITC reserve the right to benefit from new measurement tools. For instance CITC may acquire crowd-based tool services that allow a highly objectified view on whether or not the reported KPIs are correct. This may be complemented with spot check campaigns, commissioned by CITC for verification purposes, and were CITC deems it necessary. The results of these verification measurements, together with the KPIs reported by the Service Provider may be combined and depicted in a transparent, easy to navigate tool e.g. on a central webpage of the CITC.

Question 6.1: Do Respondents regard the summary of general objectives exhaustive? If applicable, please substantiate your responses with facts and examples, as appropriate.

Question 6.2: Do Respondents share CITC's views that improving QoS by updating relevant KPIs will lead to tangible consumer benefits? If you disagree, please support your answer with evidence.

Question 6.3: Do Respondents share CITC's interest in moving from intrusive intervention to greater self-regulation in the context of the update of the QoS Framework?

Appendix A Proposed QoS / QoE KPIs

A.1 The proposed approach to KPI regulation focuses on those parameters that are relevant for end-consumer. CITC intends to focus on those KPIs that are relevant for the consumer experience and some minimum "hard-coded" KPIs for service providers. As the guiding principle, the future QoS / QoE regime proposed by CITC defines KPIs:

- From the perspective of the end-consumer.
- QoS in all non-consumer related services (e.g. Wholesale / Interconnection) should be covered by other regulatory instruments, e.g. Reference Offers (ROs).

A.2 KPIs are generally set to facilitate the test and / or measurement of the level of QoS provided to the public. As a key principle, they are to be measured by the service providers and verified by CITC for compliance.

A.3 The KPIs proposed herein are a mixture of so called Quality of Service- and Quality of Experience KPIs. Defined as "QoS KPIs" for technical (network-related) parameters and "QoE KPIs" for support services. Another aspect of KPI definition is whether - or not - target values support the enforcement of the specific KPI. Although there is no direct link between the KPI type (i.e. QoS, QoE) and the target definition, it is common practice to:

a) Report QoE KPIs and publish them transparently and in a directly comparable way to stimulate competition forces (leading to improved service quality). These will be reported and published, but no target values or thresholds are set.

b) Measure QoS KPIs (or collect measurement reports from Service Providers) and validate them against target values. If the target value is not achieved, the Regulator exercises corrective measures (e.g. warnings, sanctions, fee rebates etc.).

A.4 In order to apply recognized and generally accepted standards as much as possible, a mix of parameters taken from respective ITU-T and ETSI documents are proposed. Both ITU and ETSI rank as the biggest and mostly regarded institutions for telecommunication standardization and therefore provide good reference for the definition of local or national specifications. Accordingly, CITC proposes to use selected KPIs from these two international bodies as their standards and KPIs are clearly described and the technical systems (OSS) of service providers can easily generate those measurements.

A.5 The key concepts as described by the International Telecommunication Union (ITU) are depicted in Figure 2 below. Although the ITU is primarily focused on technical details, it provides parameter descriptions [2] for some service domains used in the regulatory context and from an end-user view, namely for Support Services.

[2] Note: The term "parameter" in ITU terminology is synonymous with "KPI"

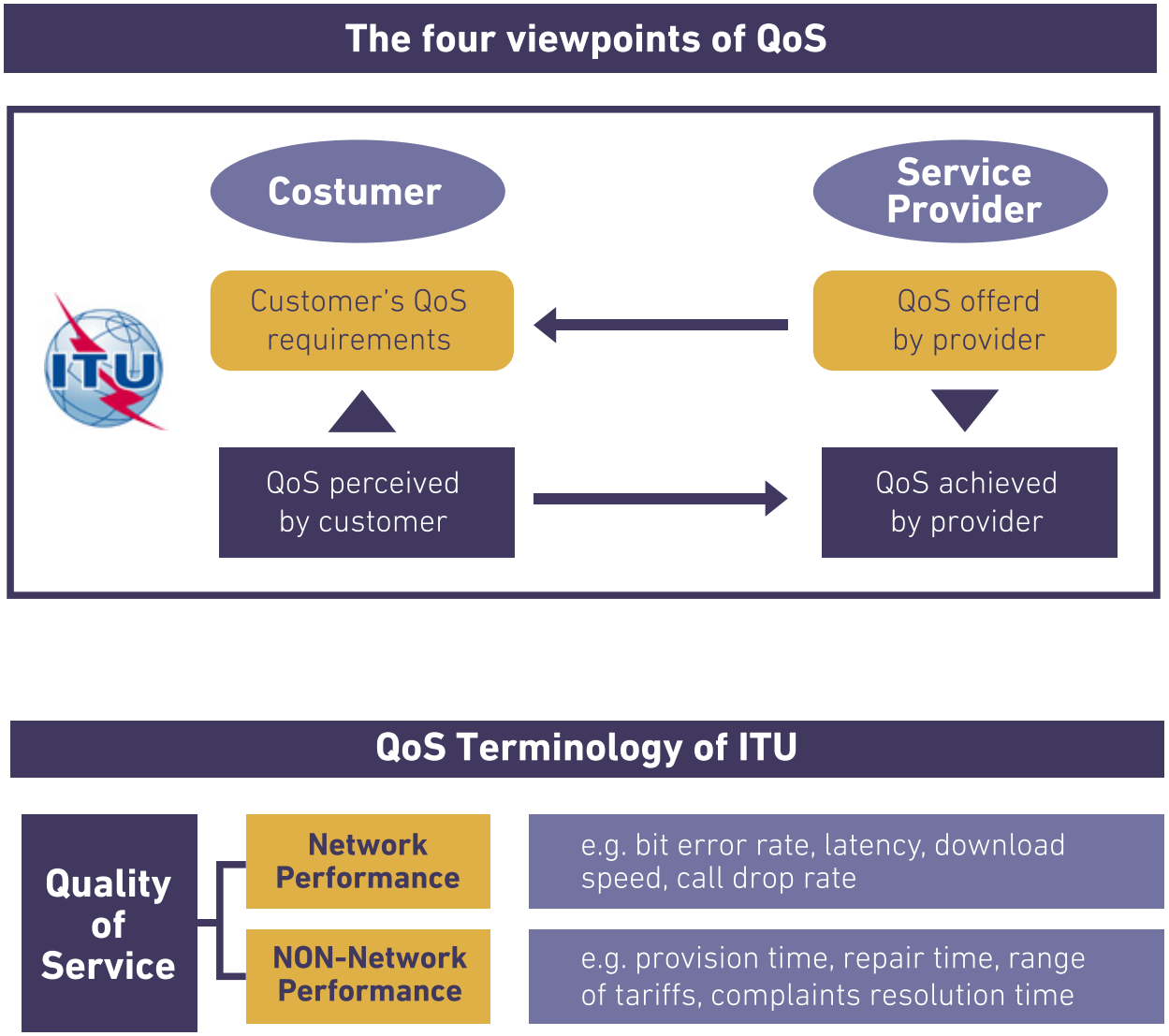

Figure 2: QoS reference model of ITU-T as described in E.800 and G.1000

A.6 The key documents from the comprehensive set of ITU recommendations in the context of QoS are: E.800, E.803, E.804, E.807, G.1000 and the "ITU Handbook of Quality of Service and Network Performance". Especially E.800 contains some basic definition on QoS.

A.7 The European Telecommunications Standards Institute (ETSI) provides more tangible and ready-to-use KPIs in its standards documents. It can be broadly concluded that the ETSI "translates" the principles and basics as described by ITU into practical and directly usable KPIs suitable for service providers and regulators alike.

A.8 When selecting the KPIs, CITC was guided by the objective to have easy-to-implement, easy-to-monitor and easy-to-enforce parameters that quickly affect the markets and focus on those KPIs that are directly relevant for the consumer.

A.9 The proposed KPIs are categorized into four subsets of parameters, as depicted in Figure 3.

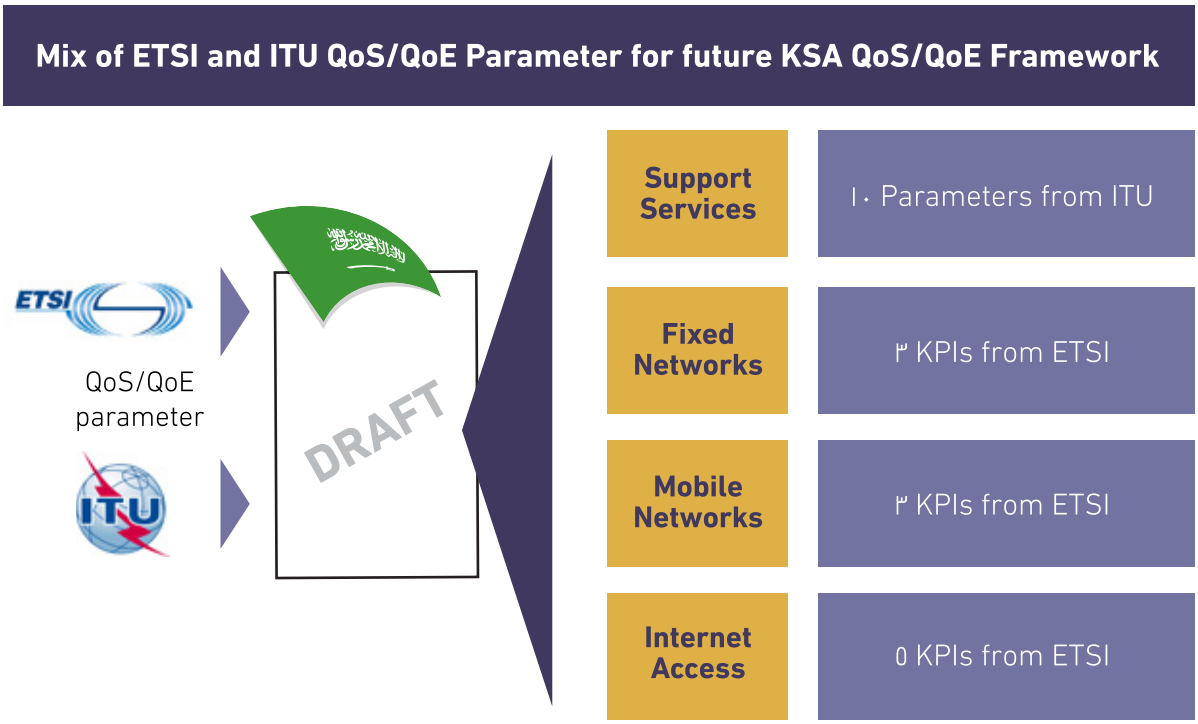

Figure 3: Four sub-sets of KPIs related to QoS and QoE

A.10 Figure 4 below provides an overview on the references used to define the KPIs in the four subsets.

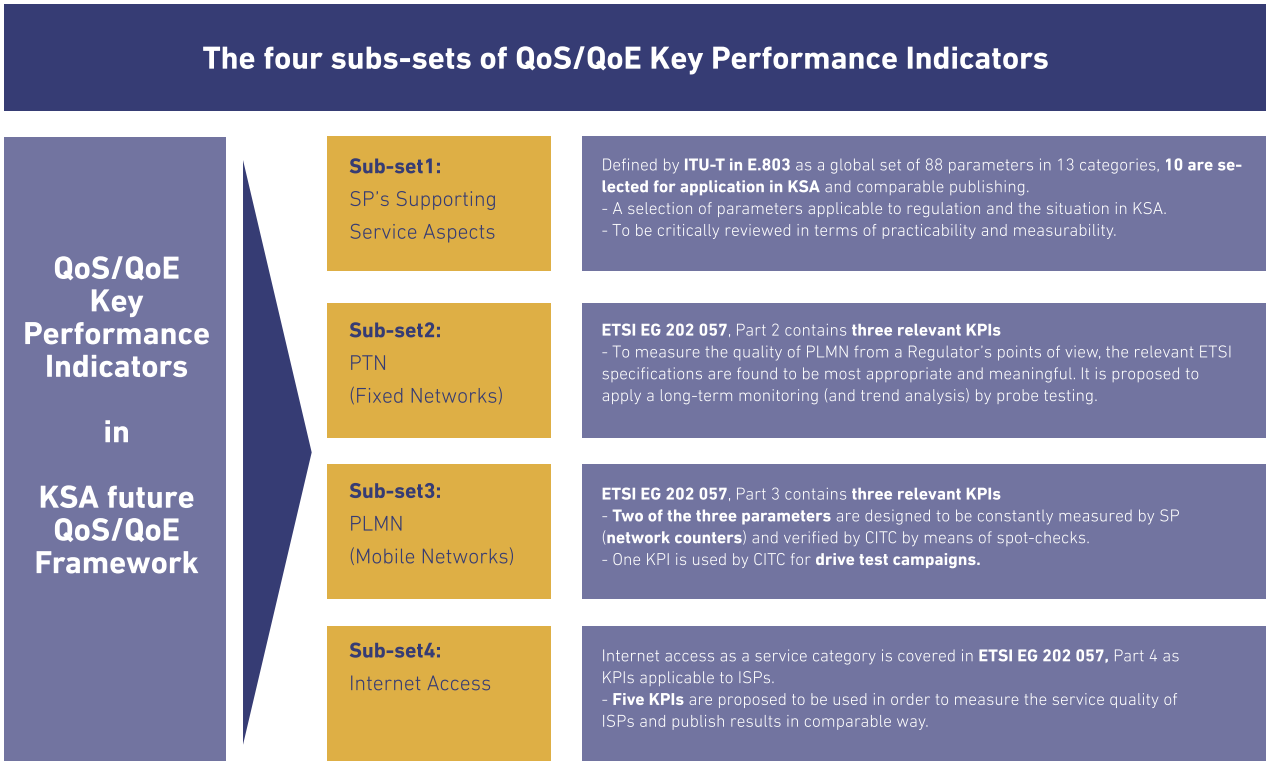

Figure 4: Reference and description of the four subsets proposed as KPI framework

A.11 KPIs applied to support services

ITU E.803 provides 88 parameters in 13 categories for "Quality of service parameters for supporting service aspects". Many of the 13 categories either are of little relevance to regulation or in some cases are impractical for the ongoing monitoring of end-user service levels. However, CITC has selected 10 parameters (KPIs) out of the 88 provided by the ITU document that are most applicable, contained in the following categories [3] :

- Preliminary information on ICT services
- Contractual matters between ICT service providers and consumers
- Provision of services
- Service alteration
- Technical upgrade of ICT services
- Documentation of services (operational instructions)
- Technical support provided by service provider
- Commercial support provided by service provider
- Complaint management
- Repair services
- Charging and billing
- Network/Service management by consumer
- Cessation of service

The proposed KPIs are described in the following:

Provision of Services KPIs:

Parameter 14: Punctuality of service provisioning	Applicable SPs: - Fixed, ISPs Time difference between the actual service provisioning and that contractually specified. - Measured as: Time
Parameter 16: Provisioning not complete and correct first time	- Applicable SPs: Fixed, ISPs - Ratio of service provisioning that is either not completely arrived out or not correctly carried out in the first attempt, to the total number of contracts where the provisioning is deemed completed. * - Measured as: Ratio as Percentage.

[3] Note: The list contains all 13 categories. Those selected by CITC and applicable to the pro posed framework are highlighted in **bold**.

Service alteration KPIs:

Parameter 30: Outage time due to technical upgrade	- Applicable SPs: Fixed, ISPs - Duration when the service in part or in full is unavailable to the customer for use due to the technical upgrade process. - Measured as: Time.
Parameter 31: Technical upgrade not complete and correct first time	- Applicable SPs: Fixed, ISPs. - Ratio (percentage) of the number of contracts not completely carried out or not correctly carried out in the first attempt to the total number of contracts. * - Measured as: Ratio or Percentage.

Technical support provided by service provider KPIs:

Parameter 45: Integrity of technical solutions	- Applicable SPs: Fixed, Mobile, ISPs. - Proportion of successful solutions with respect to the total number of technical support requests within a specified period of time. - Measured as: Opinion Rating (survey by CITC).

Commercial support provided by service provider KPIs:

Parameter 51: Integrity of commercial solutions	- Applicable SPs: Fixed, Mobile, ISPs. - Proportion of successful solutions with respect to the total number of commercial support requests within a specified period of time. - Measured as: Opinion Rating (survey by CITC).

Complaint management KPIs:

Parameter 59: Overall quality of the complaint management process	- Applicable SPs: Fixed, Mobile, ISPs. - The combined effect of accessibility of the complaint management service: correct solutions at the first attempt, speed of resolution and the organizational capability to carry out these services. - Measured as: Opinion Rating (survey by CITC).

Repair services KPIs:

Parameter 65: Efficiency of repair service	- Applicable SPs: Fixed, ISPs. - "Efficiency of the repair service" (mainly technical) of a SP is characterized by the combined performances of: - Accessibility, the number of repairs in a specified period of time, repairs carried out successfully the first time, punctuality. - Measured as: Opinion Rating (survey by CITC).

Network/Service management by consumer KPIs:

Parameter 80: Response time for reply to requests	- Applicable SPs: Fixed, Mobile, ISP. - The time elapsed from the instant customer requests access to the network/service management facility to the instant such a request was carried out. - Measured as: Time.
Parameter 82: Overall reliability of network/service management service	- Applicable SPs: Fixed, Mobile, ISPs. - The consistent combined performance of availability, response times, response rates, correctness and completeness in the processing and fulfillment of customer requests for network/service management facilitie. - Measured as: Opinion Rating (survey by CITC).

A.12 KPIs applied to fixed networks

The proposed three parameters for fixed line services are a selection out of the ETSI specifications (namely ETSI EG 202 057-2), applicable to the user situation of KSA.

CITC intends to use a combination of two test methods:

- Recommended for regular reporting by Service Providers is the compulsory application of "In-service Non-intrusive Measurement Devices" (INMD) as probes in strategically relevant network interfaces or demarcation points (see also ITU-T Recommendation P.561 [i.28]).
- Recommended for verification test campaigns by CITC is the use of intrusive measurement with artificially generated traffic (i.e. test calls) and evaluation by psycho-acoustic models (use of dedicated test equipment). See also ITU-T Recommendations P.862 [i.27], P.862.1 [i.18] and P.862.2 [i.19] for reference.

The proposed three QoS KPIs for fixed networks are:

Unsuccessful Call Ratio Target: 99.999% or 0.99999	- Unsuccessful call ratio is defined as the ratio of unsuccessful calls to the total number of call attempts in a specified time period. An unsuccessful call is a call attempt to a valid number, properly dialled following dial tone, where neither called party busy tone, nor ringing tone, nor answer signal, is recognized at the access of the calling user within 30 seconds. - Measured as: Ratio or Percentage.

Note: The unsuccessful call ratio is comparable to the Network Effectiveness Ratio (NER) as defined in ITU-T Recommendation E.425 [i.12].

Call Setup Time **Target: 95% in <7 sec** **99% in <10 sec**	- The call set up time is the period starting when the address information required for setting up a call is received by the network and finishing when the called party busy tone or ringing tone or answer signal is received by the calling party. Where overlap signaling is used the measurement starts when sufficient address information has been received to allow the network to begin routing the call. - Measured as: Time.

Speech Connection Quality **Target: >3.75**	Three types of vocal quality evaluation methods are identified and used: • Intrusive methods. • Non-intrusive methods. • Parametrical methods (especially ITU-T G.107 [i.17]) For details on measurement, refer to ETSI EG 202 057-2. • Measured as: MOS.

For details on measurement methods, statistics and result presentation please refer to ETSI EG 202 057-2.

A.13 KPIs applied to mobile networks

The proposed three parameters for mobile network services are derived from the ETSI specifications (see ETSI EG 202 057-3), applicable to the user situation of KSA. When selecting the mobile network QoS KPIs, CITC used the following methodologies as guidance:

End-to-end measurements – Measurements reflect all aspects that impact the quality of a service.

Impartiality – Measurements are carried out under equal terms for service providers using drive test equipment. Simultaneous measurements of different networks are performed, providing an accurate picture of how the networks perform under the same conditions, same time, at the same locations and with the same parameters, thus making it possible to perform comparative analysis of the observed performances. Measurements are done generically and do not require channel-locking or network-locking.

Objectivity – Tests are carried out in a totally automatic way, thus eliminating the subjectivity inherent to human intervention or decision.

Note: It is widely used practice, especially in technical mobile network management and owed to the tremendous number of measurement counters in modern OSS, to measure a multitude of technical network counters (e.g. SDCCH Drop Rate, Handover Success Rate etc.). However, these counters were developed for use by internal network optimization efforts. In the context of regulatory QoS management, we recommend to use simple, user-experience oriented KPIs only.

Service accessibility

Unsuccessful Call Ratio **Target: <2%**	- Measured by network element counters of the SP, this KPI is synonymous with Call Setup Success Rate (CSSR, for voice and data Radio Access Bearers (RAB). - Measured as: Percentage.

Service Retainability

Dropped Call Ratio **Target: <3%**	- Measured by network element counters of the SP, this KPI is synonymous with Call Drop Rate and should include dropped calls by failed hand-overs (measured by Hand Over Success Rate). - Measured as: Percentage

Service performance

Voice Quality **(MOS > 3.5),** **Data Throughput**	- To be used for CITC initiated drive-test campaigns (using appropriate tool such as Qvoice or similar). - Measured as: Opinion Rating (survey by CITC) for voice, Mbps for data.

Note: Measurement of voice quality and data throughput must be done from the user perspective, i.e. by application of a test probe for the simulation of subscriber behavior or by subscribers directly (principle of crowd sourcing measurement). Consequently, it should not be done by the service provider but by CITC in the form of test campaigns.

For details on measurement methods, statistics and result presentation (of all three KPIs) please refer to ETSI EG 202 057-3.

A.14 KPIs applied to Internet Access

The proposed five parameters are a selection out of the ETSI EG 202 057-4 specification, applicable to the user situation of KSA.

The KPIs listed in this chapter are for comparative publishing e.g. on CITC website or any other form CITC deems appropriate (e.g. CITC smart phone applications or newspaper) to improve QoS by competition through transparency. Measurement data is to be collected by means of test calls/measurement campaigns and/or probes at user premises.

Login Time*	- The login time is the period starting when the data connection between the Test-PC and the Test-Server has been established and finishing when the login process is successfully completed. An attempt to login is unsuccessful if the login process fails for any reason. If more than 5 consecutive attempts to login fail, an ISP outage is assumed. - Measured as: time in seconds within the fastest 80 % and 95 % of logins are achieved.
Successful Login Ratio*	- The successful log-in ratio is defined as the ratio of successful log-ins to access the Internet when both the access network and the IAP network are available in full working order. - Measured as: Ratio or Percentage.

* Meaningful application depends on type of access provided by the ISP (or in ETSI terms IAP (Internet Access Provider)). NOT applicable to “always-on“ access services.

Data Transmission Speed	- The data transmission speed is defined as the data transmission rate that is achieved separately for downloading and uploading specified test files between a remote web site and a user's computer. Measured as: - The highest 95 % of the data transmission rate in kbit/s achieved. - The lowest 5 % of the data transmission rate in kbit/s achieved. - The mean value and standard deviation of the data transmission rate in kbit/s.

Note: Reference is made to the appendices B, C, D, G of the document ETSI EG 202 057-4. An explanation of the highest 95 % and the lowest 5 % of the data transmission rate is given in annex G.

The statistics should be calculated from test calls made according to the measurement set-up given in annex B and taking into account the representativeness requirements given in annex C. The data transmission rate is measured by downloading/uploading a test file specified in annex D.

The data transmission rate is calculated by dividing the size of the test file by the transmission time required for a complete and error-free transmission.

The transmission time is the time period starting when the access network has received the necessary information to start the transmission and ending when the last bit of the test file has been received.

Unsuccessful Data Transmissions Ratio	- The unsuccessful data transmission ratio is defined as the ratio of unsuccessful data transmissions to the total number of data transmission attempts in a specified time period. A data transmission is successful if a test file is transmitted completely and with no errors. - Measured as: Ratio or Percentage.

Note: The unsuccessful data transmission is measured by downloading/uploading a test file specified in annex D of document ETSI EG 202 057-4 when the connection to the IAP is available. An attempt to transmit the test file should be considered unsuccessful if it takes longer than 60 seconds.

The threshold of 60 seconds refers to the limit for acceptable performance for bulk data transmission/retrieval of ITU-T Recommendation G.1010 [4].

Delay (one-way transmission time)	- The delay is half the time in milliseconds, that is needed for an ICMP Echo Request/Reply (Ping) to a valid IP address. - Measured as: The mean values and standard deviation of the delay in milliseconds.

Note: The delay is assessed by measuring half the time for an Echo Reply Message according to RFC 792 [8].

The standard deviation of the delay is a measure for the jitter.

Question A.1: Do Respondents have views on the proposed sub-sets of KPIs? Please provide evidence supporting your view.

Question A.2: Do Respondents agree with the balance between more general KPIs enforced by consumers and detailed KPIs subject to traditional regulatory intervention?

Question A.3: Do Respondents share CITC's view that these particular recommended KPIs, if properly implemented, will help achieve higher QoS for the benefit of consumer in KSA? Please provide evidence supporting your view.

Question A.4: Do Respondents agree with the categories of services? If not, please elaborate the reasons and propose categories of services that CITC should implement. In your response, please provide evidence supporting your view.

Question A.5: Do Respondents agree with the recommendations for monitoring compliance with the KPIs? If not, please elaborate the reasons and propose your view in how CITC should monitor compliance. In your response, please provide evidence supporting your view.

Question A.6: Do Respondents share CITC's view that the KPIs should be published quarterly? If not, what frequency would the respondents prefer to see, bearing in mind the need for KPIs to be reported effectively?

Question A.7: In your view, is the proposed set of KPIs adequately future proofed? If not, what further steps could be taken to future proof these KPIs? In your response, please provide evidence supporting your view.

Appendix B Proposed QoS / QoE Implementation and Enforcement

B.1 Implementation of a QoS framework requires a clear specification of evaluation criteria, test concepts and associated responsibilities. For this purpose, CITC will employ different strategies for the evaluation of coverage obligations and KPI targets. As a principle, both (coverage and KPI measurements) will have to be reported by the service provider to CITC, and then verified by CITC using appropriate instruments.

B.2 Generally, the principles and measurement method for each KPI is detailed and explained in the ETSI document to which the KPI is referenced. It is for this reason that CITC has opted to select ETSI as the primary reference for QoS KPIs. The ETSI standards place a lot of emphasis on thought-out engineering of test- and measurement standards. Because of this detailed standardization, the obtained measurement results are expected to be comparable between the service providers in the context of the respective KPI. These results will be analyzed by CITC experts with the objective to verify.

B.3 Apart from the general principles of measurement as specified in the ETSI standards, the following verification activities as depicted in Figure 5 are recommended:

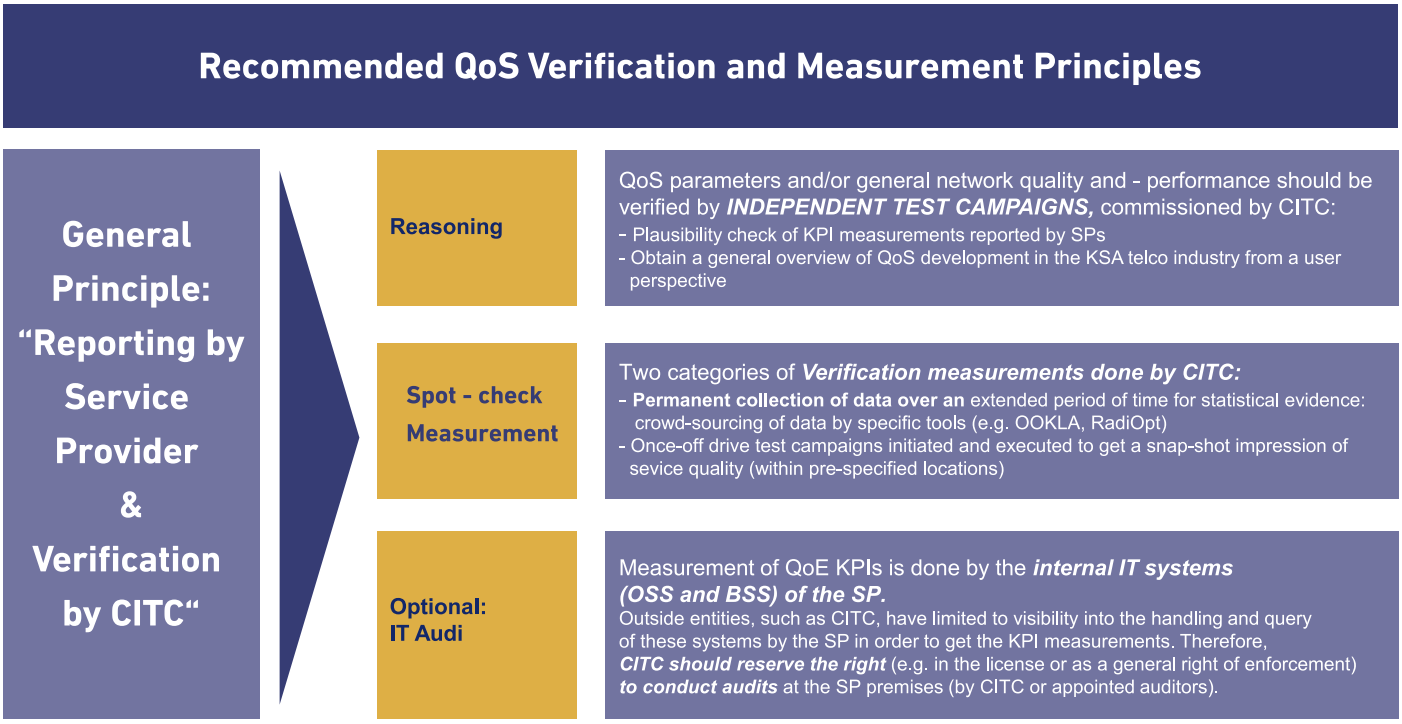

Figure 5: Proposed measurement methods for verification of QoS KPIs

B.4 Service providers will be required to report their measurement results to CITC in the intervals as specified and by means of standardized forms in MS Excel format. CITC reserves the right to provide templates for such forms and amend the format from time to time as

required in order to ensure compatibility with the post-processing and publishing tools and formats as employed by CITC for the purpose.

B.5 The KPIs as set out in this consultation document are of such types that they can be measured with minimal additional effort by existing systems. It is for this reason that CITC has opted to select KPIs specified in mature frameworks by internationally recognized organizations (ITU and ETSI) and as a result, widely implemented in commercially available systems deployed by service providers.

B.6 The entire practice of KPI specification, measurement and enforcement will be critically reviewed by CITC in periods of:

- Annually in the first 3 years after implementation
- Thereafter every 3 years

The objective of these reviews is the validation of the practicability of the measurement and reporting practice for the purpose of maximum efficiency and transparency.

B.7 CITC considers for the further evolution of the QoS / QoE implementation and enforcement the following learnings based on the international benchmark:

- Saudi Arabia has a high degree of urbanization, fast developments of new settlements or business districts (which in turn require adequate telecommunication coverage) and relatively low competition in fixed but increasing competition in mobile services.
- Oblige all licensed service providers to measure and report on KPIs in regular intervals and in a standardized format (in order to create direct comparability between report intervals and service providers of same type).
- Set reasonable thresholds for each KPI.
- Assess which KPIs service providers should report and publish.
- Focus on a few relevant KPIs that should be carefully monitored and enforced by CITC itself or with the support of third parties.
- Clearly define the set of auditing measures.
- Devise a process to be followed in case of noncompliance to thresholds. This may include a sensible escalation procedure, e.g.

1. Issue of warning with rectification period;
2. Penalty according to the schedule scheme [4];
3. Repeated breach of same parameter: Severe fine on a case-by-case basis;
4. Revocation of license.

[4] CITC has draft a penalty schedule (see Appendix D documents for details).

B.8 The principles above have been successfully deployed in international practice following the principle of "observation and information" and therefore promoting development of service quality by competition forces. If the public is well informed and has easy-to-use tools at hand to be able to directly and fairly compare Service Providers and their service offerings, the Service Providers will compete on quality, without too much intervention by the Regulator.

Question B.1: Does proposed solution give the appropriate balance between regulatory intervention and self-regulation?

Question B.2: Are 3-year-review intervals appropriate with regards to the development of the communications markets? If not, please propose what review intervals would be appropriate in your view and provide evidence for your view.

Question B.3: Do Respondents have views on the process set out in B.7?

Question B.4: How can consumers be best informed to achieve transparency and comparability between service providers? Please provide evidence supporting your view.

Appendix C Proposed Complaints Handling Process

C.1 Internal CITC statistical analysis shows an increase of total number of complaints by 62% in 2015 compared to 2014 – from 31,502 [5] (2014) to 50,709 (2015) complaints. The reason for the significant increase in complaints is mainly related to CITC starting an active awareness program for user protection, making user aware of their rights and the opportunity to complain. In addition, the number of internet users increased giving more people access to the complaint tools of CITC.

C.2 In the international context, most countries handle consumer complaints within the relevant regulatory authority as a last resource once the complaint is not satisfactorily solved by the service providers themselves. Obviously, other countries handle complaints better as more complaints are "filtered" out via the complaint handling process of the service providers. Therefore, it is the intention of CITC to trigger an improvement of the complaint handling process.

C.3 A reduction of consumer complaints can be achieved by applying a combination of measures, improving user experience and complaints processing efficiency. In general, the proposed measures can be classified in two categories – measures related to the source of the complaints and measures related to complaint handling.

C.4 Measures related to the source of the complaints

The main responsibility to enhance service quality and coverage rests with the service providers offering high quality service to all of their consumers and according to their

contractual commitments towards their consumers. Here we encourage the network service providers to invest in their networks continuously.

CITC's mandate also endows it with the right to issue further regulatory measures where this is required to cure market failure or achieve other social and political objectives, such as protecting the consumers. An available option to bring down the number of QoS / Coverage related complaints is the introduction of regulatory measures to enhance the quality of service and coverage of the services providers. However, it will not bring immediate effects on the number of complaints as implementation of those measures will take time. Therefore those measures need to be accompanied with a bundle of supporting measures to create a level playing field between the service providers and their consumers. Those measures are considered in the following paragraphs.

C.5 Measures related to the complaint handling itself

Here the measure can be categorized into those that affect the CITC complaint handling process and those that are directed towards the internal complaint handling of the service providers.

[5] Note: Figures provided by CITC; in the Annual Report 2014, a total number of complaints of 31,656 was reported: See CITC, Annual Report 2014, p. 34: "In 2014, CITC received 31,656 complaints. Most of those complaints were related to billing, nuisance calls, quality of service, disconnection of service, and service interruptions."

C.5.1 Measures regarding CITC's complaint handling process

CITC sees its role as a regulatory authority in the process of complaint handling as an arbitrator and last resort for consumers. Primarily, the complaint should be dealt with by the service providers that are best suited to address the subject matters of complaints.

CITC intends to introduce the following measures to reduce the number of complaints regarding QoS / Coverage related issues, but also on other categories of complaints:

(1) Measures-Group 1: Introduction of crowd-sourced tools

The introduction of crowd-sourced tools to monitor the performance of the service provider will enable CITC to gain a better information base on QoS and coverage related performance of the service providers that in itself can be used when handling the consumer complaints at CITC internally and during the mediation towards service providers.

(2) Measures-Group 2: Empower consumers by enhancing the publication of information on CITC webpage

CITC intends to create more transparency and comparability by publishing on its webpage and other media sources information in a comparable way – meaning that the performance related to QoS and Coverage parameters will be available to the general public in a way that the performance of service providers is directly comparable. CITC intends to use a combination of service providers' reported information, measurement events of CITC (e.g. periodic drive tests) and – potentially – information generated out of crowd-sourced tools. This will – over time – create transparency and public awareness on quality of service and allow consumers to base their choices on what is best for them.

Publication of clear advertising guidelines

CITC intends to develop and publish clear advertising guidelines for service providers, that clearly explains accepted practices and those that will be considered illegal. Consumers can then revert back to those when exercising their right to complain and prove their case to the service providers and ultimately to CITC.

(3) Measures-Group 3: Public awareness media campaigns enhancing information base of consumers

Measures in this group consist of a bundle of activities that ultimately aim at enhancing the availability of information to the consumers on the quality of service and consumer satisfaction performance of the service providers. CITC sees its role primarily in fostering the competition in the market and providing a level playing field. One way of doing this is to put the correct information into the hands of consumers so they can take an informed decision when choosing a service provider for their service requirements. By acting as an advocate of consumers, CITC chooses the least intrusive means of intervention that at the same time will have its sustainable effects on the markets. By creating transparency, consumers will be better educated on their individual rights and service provider choice. Besides publishing KPI measurement results and test campaign data, CITC plans to actively push this information into the media channels that consumers in KSA are actively and frequently using as information source.

Those publications shall then also include educating the user of the technological limitations of e.g. mobile technologies and align the messages that service providers are allowed to use in their advertising campaigns accordingly.

C.5.2 Measures regarding enhancement of service providers' complaint handling

CITC will consult with the service providers separately on their contribution to improve consumer satisfaction by enhancing their internal complaint handling process. Depending on the outcome of this initiative, CITC may consider the establishment of an industry-financed independent complaint review body ("Ombudsman") that takes away the load of complaints handling from CITC, as service providers current complaint handling process is obviously not achieving this. Details of this initiative will be presented at a later stage, depending on the results of the planned stakeholders' discussions.

Question C.1: Do Respondents share the analysis and conclusions about the complaint handling process? If not, please provide evidence for your view.

Question C.2: Do Respondents agree with proposed actions to enhance public awareness? If not, please provide evidence for your view.

Question C.3: What is Respondents view on a possible role for an Ombudsman to achieve a more effective and efficient complaint process that helps to address the needs of consumers?

Appendix D Draft Quality of Service framework for the Kingdom of Saudi-Arabia

Please refer to the separate document entitled "Quality of Service framework for the Kingdom of Saudi Arabia, April 2017".

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