Afghanistan Telecommunications Regulatory Authority (ATRA)

Quality of Service Regulatory Procedures for Telecommunication Services

Year 2021

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1. Introduction

1.1 QoS definition

ITU[1] defines QoS as the "totality of characteristics of a telecommunications service that bear on its ability to satisfy stated and implied needs of the user of the service".[2]

QoS experienced by end-users, QoS required or expected by end-users, QoS planned by Service Providers and QoS delivered by Service Providers do not necessarily converge. Despite great efforts from the Service Providers to attempt to provide high QoS levels, QoS experienced by end-users may still be low and much lower than QoS expected by end-users. Making these 4 levels of QoS match together can be very challenging (see Figure 1 below).

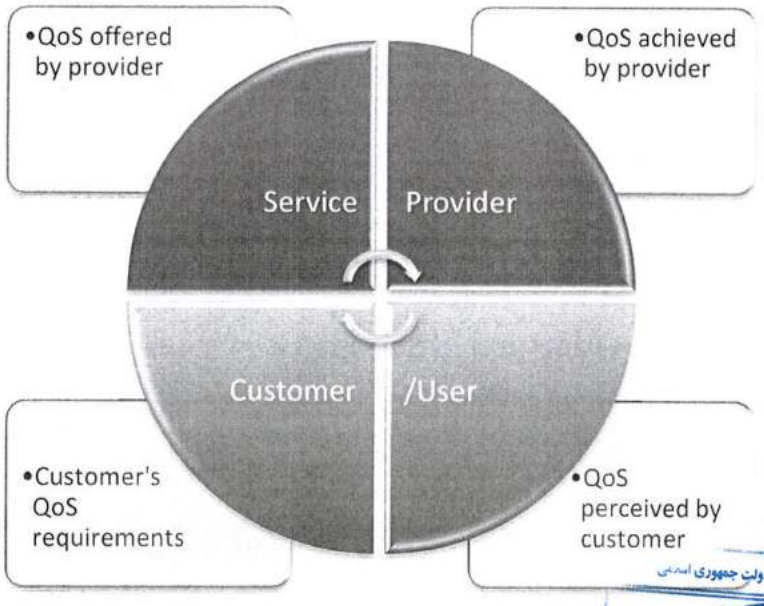

Figure 1: Four viewpoints of quality of service (from ITU)

[1] International Telecommunications Union
[2] Recommendation ITU-T E.800

While QoS experienced by end-users and QoS required or expected by end-users can be better assessed thanks to customer surveys, measuring QoS delivered by Service Providers can better inform end-users. QoS can be measured by objective means such as level meters, delay counters, etc.

QoS must not be confused with Network Performance. To avoid such confusion, QoS is sometimes called "end-to-end QoS" in order to remind that QoS depends on many components (see ITU diagram in Figure 2).

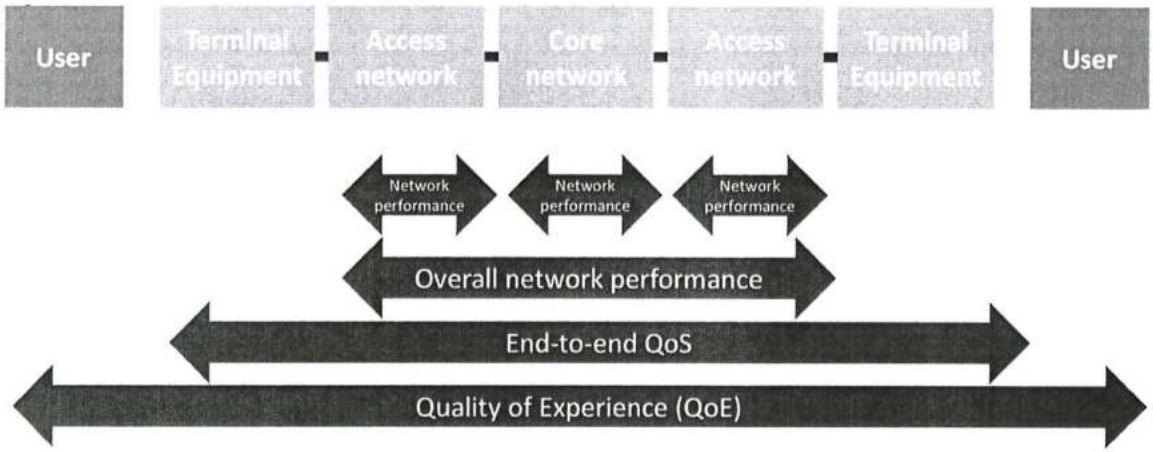

Figure 2: Schematic contributions to end-to-end QoS (from ITU)

Indeed, from the end-user point of view, achieved QoS is the combination of:

- Network performance;
- Terminal performance;
- Retail channels;
- Customer care.

Generally speaking, QoS regulation does not focus on terminal performance and retail channels:

- Markets for terminals tend to be international markets with significant competition and significant amount of information available for end-users to facilitate comparison;
- Sales can be made not only by Service Providers but also by resellers, which makes QoS regulation of such activities much more difficult and less effective.

In addition to the concept of QoS, it is important to note that the concept of Quality of Experience (QoE) is being more and more considered. However, this concept is difficult to regulate since it adds subjective parameters on top of QoS, such as: personal mood, environment, etc. QoE is not covered by these Regulatory Procedures.

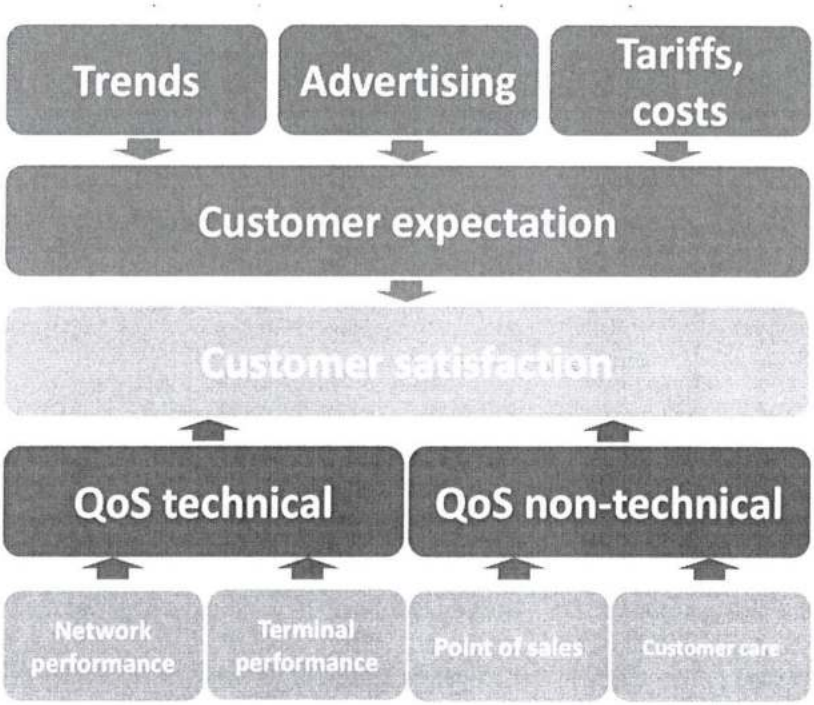

Figure 3: Schematic contributions to end-to-end QoS (from ITU, "Overview of Quality of Service)

1.2 Legal basis

The following legal provisions provide the basis for the QoS Regulatory Procedures documents, but not exhaustively.

Article 2 of the Telecommunications Services Regulation Act of 2005 ("the Law") establishes promotion of quality of telecom market services as one purpose of the Law. Article 6(5) empowers the Afghanistan Telecommunications Regulatory Authority (ATRA) to monitor and control compliance with the conditions included in licenses, and Article 6(8) gives ATRA the authority to intervene in disputes between operators, service providers, users and other parties regarding QoS. In addition, Articles 49 and 50 empower ATRA to prescribe terms of service via procedures in order to regulate the provision of services in order to support users and customers, including those related to QoS.

QoS for Mobile services in Afghanistan is regulated via a specific procedure enacted in 2015, the Procedure for Measuring the Quality of Mobile Telecommunication Services (PMQMTS). This procedure was drafted in 2013 and later updated by ATRA to account for QoS for 3G services. The QoS procedure for mobile services was formally approved by the Board and it is currently in force.

The QoS requirements for the mobile operators in their licenses to provide mobile services in Afghanistan are also part of the QoS regulatory framework and establish minimum performance and quality of service requirements for mobile networks, including reporting requirements related to QoS to ATRA and penalties and fees for non-compliance.

ATRA has signed national fiber-optic network licenses, investment and expansion agreements with three private companies. Fiber optic licensees have service level agreements (SLAs) and QoS requirements as part of their licenses. They basically outline the QoS levels that a service provider

is expected to deliver to its customers, which in the case of nationwide licenses will be other operators. No QoS requirements for metropolitan fiber networks have been developed so far.

The above-mentioned licenses authorize the Service Providers to provide the specified telecommunications networks and services in accordance with the terms and conditions of the licenses, relevant legislation, and any regulations, including instructions issued by ATRA before or after the effective date of the licenses. Accordingly, ATRA may from time to time issue additional requirements as part of the terms and conditions of the licenses which are binding on the Service Providers.

The considerations listed above justify without any doubt the need for ATRA to set regulatory procedures with respect to QoS for services other than mobile, which has already been developed in the Procedure for Measuring the Quality of Mobile Telecommunication Services. Hence, the QoS Regulatory Procedures will include the latter procedure via explicit reference to it. The regulatory framework will then be comprised by:

1. Procedure for Measuring the Quality of Mobile Telecommunication Services
2. QoS Regulatory Procedures
3. Licenses to Provide Mobile Services
4. National Fiber-Optic Network Licenses
5. Any other regulation or procedure issued by ATRA regarding QoS

The QoS Regulatory Procedures will complement the respective QoS annexes of Service Providers' Licenses and will be applicable to all Service Providers whenever relevant to the services they provide.

ATRA considers that the Telecom Law may evolve in the future. In this context, any future amendments to the Telecom Law shall apply to the QoS Regulatory Procedures.

1.3 Scope of the QoS Regulatory Procedures

These QoS Regulatory Procedures set how ATRA is going to regulate QoS offered by Service Providers. Their goal is to define KPIs, targets, measurements methods, reporting and publication procedures, validation and audit approaches and enforcement procedures. The development of comprehensive and effective QoS Regulatory Procedures will maximize the benefits to the public in the provision of telecommunications services (including Internet services) in Afghanistan.

The QoS Regulatory Procedures apply to:

1. Services Providers holding:
    a. Individual License for the provision of Public Fixed Telecommunications Networks and Services;
    b. Individual License for the provision of Public Mobile Telecommunications Networks and Services;
    c. Individual License for the provision of Passive Fixed Telecommunications Networks and Services; or
    d. Individual License for the provision of Public Satellite Telecommunications Networks and Services;
2. Any Class License (as applicable) by which telecommunications services are offered to the public;
3. All public telecommunications services (including Internet Service Provider (ISP) licenses); and
4. Support functions such as billing and customer care.

Therefore, the scope of these QoS Regulatory Procedures includes, but is not limited to:

1. Fixed wired networks (including fixed passive wired networks), fixed wireless networks, mobile networks and satellite;
2. Access services, voice services, video and multimedia services (including video streaming), SMS services, web browsing, leased lines services (national or international);
3. Wholesale services currently provided or which may be provided in the future. This includes leased lines, interconnection voice services such as call origination or call termination, bitstream services, local loop unbundling, infrastructure access services such duct access and their ancillary services;
4. Customer support;
5. Billing; and
6. Number portability.

For the avoidance of doubt, the following areas are outside the scope of this QoS Regulatory Procedures:

1. The performance of radio equipment and telecommunications terminal equipment; and
2. The quality of sales and retailing of Service Providers.

In parallel to these QoS Regulatory Procedures, ATRA has developed the National Telecommunications Quality of Service Regulations, which set out the basis upon which the QoS offered by Service Providers shall be measured and regulated by ATRA. Its goal is to set policies and objectives to regulate QoS in Afghanistan.

In preparing these draft QoS Regulatory Procedures, ATRA has taken into account:

1. International standards and best practices as a result of a benchmark on all aspects of QoS covering 13 countries across the world;
2. Specificities of Afghanistan;
3. An assessment of the potential impacts of the proposed new QoS regulations on all the parties involved (i.e., Service Providers, Customers and ATRA);
4. The evolution of the telecommunications market to build forward-looking QoS Regulatory Procedures; and
5. Experts' opinions.

1.4 Effective date

The provisions of these QoS Regulatory Procedures become effective upon its date of issue, except where otherwise indicated.

1.5 Future amendments of the QoS Regulatory Procedures

Technologies and customer needs are evolving fast. As QoS regulation aims to protect customers and make sure the services they use are provided at an adequate level of quality, the QoS Regulatory Procedures may need to evolve in the future.

ATRA will therefore amend the QoS Regulatory Procedures in the following cases:

1. In case a new service becomes increasingly used by customers and becomes of importance for them, ATRA may add relevant Key Performance Indicators (KPIs) to measure the QoS delivered by Service Providers for this service. ATRA may set corresponding targets;
2. In case an existing service becomes obsolete, ATRA may decide to remove the KPIs and targets associated with it;
3. In case a new technology develops and has features that the QoS Regulatory Procedures cannot handle (because for example, existing measurement methods or KPIs are not relevant), ATRA may adapt the QoS Regulatory Procedures accordingly;

4. In case competition develops and exerts adequate pressure on existing Service Providers to improve QoS levels, ATRA may decide to remove targets (and associated bonds, penalties or rebates);
5. ATRA may decide to add wholesale KPIs and associated targets when it imposes on a Service Provider the obligation to provide a new wholesale service to other Service Providers; or
6. In case the international QoS levels become more demanding than the targets set in Afghanistan, ATRA may decide to upgrade the QoS targets.

ATRA shall issue a consultation document describing and justifying any future amendments proposed to the QoS Regulatory Procedures. The consultation document should in particular list the new KPIs or targets or the amended KPIs or targets and provide a rationale for these proposed changes.

Requests for amendments may be submitted by Service Providers, customer associations or proposed by the ATRA itself.

ATRA intends in any case to re-assess the QoS Regulatory Procedures and the list of KPIs and associated targets every three (3) years, bearing in mind that changes shall be limited to the necessary in order to provide stability and transparency to the sector.

2. Approach

2.1 General overview

Competition in telecommunications markets enables end-users to choose their Service Providers. In the absence of competition in all or some telecommunications markets, Service Providers can be discouraged to improve QoS because improving QoS may increase their costs and decrease their profitability. Without effective competition, a Service Provider has market power and can be insensitive to subscribers' needs. Therefore, regulatory authorities need to regulate QoS by requiring the publication of KPIs and imposing obligations to improve QoS where minimum levels are not met.

However, where there is competition, QoS may need to be regulated because it can be difficult for end-users to access transparent, objective and comparable quality information and also because Service Providers may discriminate between categories of end-users or services. In these cases, measurements of KPIs and publication of these KPIs continue to be needed. For both these reasons QoS regulation provides important benefits.

Telecommunications markets in Afghanistan are characterized by a high level of competition with in the mobile and ISP markets and nascent competition in the fixed market. **ATRA therefore needs to impose direct and demanding QoS regulation and to be closely involved with the definition of all relevant KPIs, associated targets, measurement definitions, and processes.**

ATRA has to take into account the needs of both end-users and Service Providers. Therefore, this QoS regulation scheme should be developed with the involvement of:

- End users through customer satisfaction studies and widespread publication of QoS measurement results with easy to access web-based information; and
- All Service Providers.

2.2 Strategy implementation in the short to medium term

In the absence of many services provided at the wholesale level, QoS regulation should first focus on retail services. As a consequence, ATRA defines a set of KPIs and associated targets in the following domains of retail markets:

- Fixed access services. These services relate to the provision of a fixed line to end-users, whatever the service they use on this line (voice, Internet access, TV & video, etc.). QoS regulation in this domain should indeed not depend on specific services.
- Mobile access services. This is similar to fixed access services but this domain typically deals with coverage issues;
- Voice services (supported by any type of network operated by Service Providers, i.e. mobile network, fixed wired network, fixed wireless network or satellite) which cover both national and international calls;
- Broadband access services (supported by any type of network operated by Service Providers) which typically cover speed issues;
- Video and multimedia services (supported by any type of network operated by Service Providers);
- SMS (supported by any type of network operated by Service Providers);
- Video streaming (supported by any type of network operated by Service Providers);
- Web browsing (supported by any type of network operated by Service Providers);
- Leased Lines services (national or international);
- Number portability;
- Customer relation and billing.

ATRA is of the view that it is necessary to focus on services seen by end-users: this is why the domains "voice services", "broadband access services", "video and multimedia service", "SMS", "web browsing", "video streaming" for residential and business users and "leased lines services" for business users only have been identified and are monitored whatever the network operated by Service Providers is. In addition to this, number portability and customer relation and billing domains are also traditionally covered (as explained in section 1.1 customer relationship is one aspect of QoS). Finally, because fixed and mobile networks have some differences especially in the provision of lines/provision of coverage, specific fixed access and mobile access services domains are considered.

For many of those KPIs, ATRA defines the associated targets (see section 3), the deadline to achieve these targets (see section 4.1), and the enforcement procedure if these targets are not met (see section 4.3).

In parallel of this traditional approach to regulate QoS, ATRA may adopt complementary measures such as promoting the availability of applications enabling end-users to test their own QoS (see section 4.6).

2.3 Strategy implementation in the longer term

2.3.1 QoS regulation of retail services

The QoS context in Afghanistan will change with the introduction of new services, the adoption of new QoS standards from ITU-T or ETSI, the increase of competition in some retail segments, the entry of new Service Providers, etc. (see section 1.5). A forward-looking approach is therefore needed in order to cope with longer term requirements. ATRA will therefore update retail KPIs and associated targets regularly as explained in section 1.5 above.

2.3.2 QoS regulation of wholesale services

Few wholesale services are provided today in Afghanistan compared to other countries.

In the short to medium term however, Service Providers may be obliged to provide new wholesale services or such services may be obtained through bilateral negotiations.

Therefore, in order to prepare for the growth of wholesale services, ATRA has considered such services in the QoS Regulatory Procedures.

At the wholesale level, two different approaches can be envisaged:

1. Monitor wholesale QoS and impose targets, i.e. using the same strategy as for retail services. This approach is relevant when QoS regulation at the retail level is not sufficiently strong to force QoS at the wholesale level to be at adequate levels. Typically, this applies either when there is no regulation of retail service quality (no longer the case in Afghanistan - see section 2.2) or when Service Providers of wholesale services are not also Service Providers at the retail level;

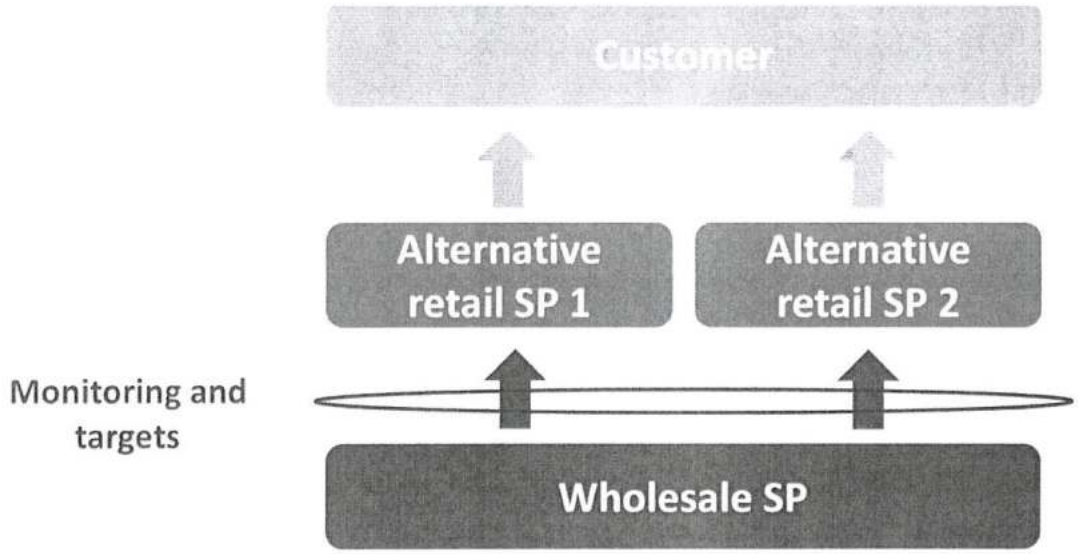

Figure 4: Wholesale QoS regulation when QoS is not regulated at the retail level (SP = Service Provider)

2. Impose a non-discrimination obligation and monitor and compare:
   - the provision of wholesale services to the Service Provider's retail arm (sometimes called "self-supply");
   - with the provision of wholesale services to other Service Providers.

   In this case, no targets are needed as targets at the retail level generate pressures at the wholesale level. The provider of wholesale services must supply an adequate level of QoS at the wholesale level if it wants to meet the targets imposed at the retail level. For example, if Service Provider A provides Bitstream services to Service Provider B and is also present at the retail level then:
   - Service Provider A should publish the value of the KPI for supply time for itself internally. The value of the KPI must be in line with the associated KPI at the retail level (e.g. supply time at the wholesale level must obviously be lower than at the retail level);
   - Service Provider A should publish the value of the KPI for supply time for Service Provider B;
   - The two values should be at a similar level.

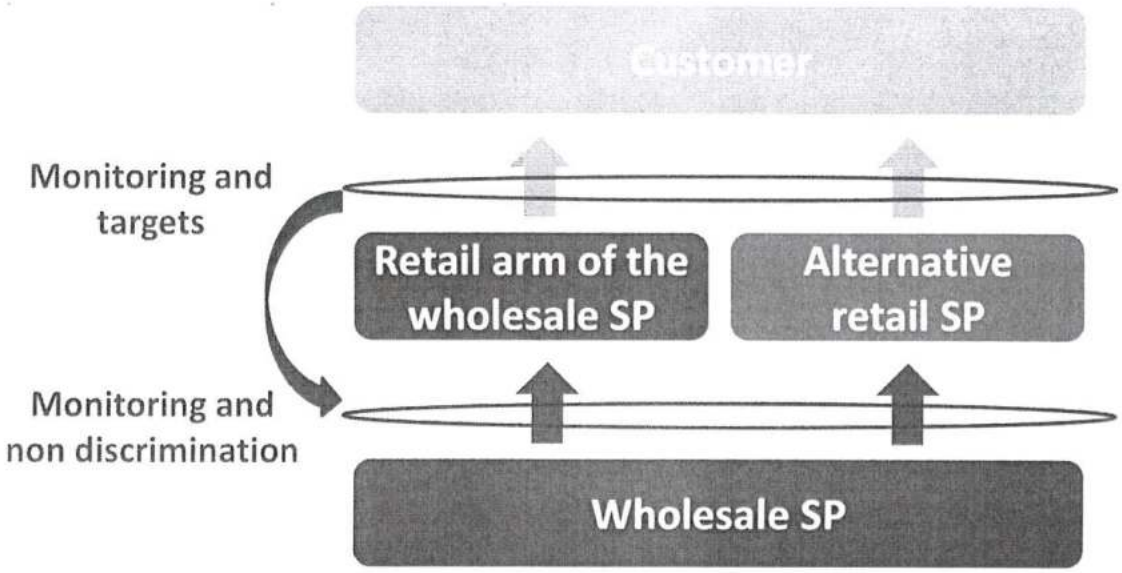

Figure 5: Wholesale QoS regulation when QoS is regulated at the retail level (SP = Service Provider)

The following areas for which QoS may be regulated at the wholesale level are:

1. Services supported by the Access Network such as:
   a. Bitstream services;
   b. Access to FTTH passive optical lines/dark fibers;
   c. Leased Lines services;
2. Interconnection services;
3. Duct access.

Today, only the following wholesale services are provided:

- wholesale FTTH passive services provided by Afghan Telecom and other Fiber Optic Network services providers; and
- few wholesale services provided by Afghan Telecom.

Regular updates of wholesale KPIs and associated targets are also needed as explained in section 1.5 above.

3. KPIs, targets and measurement methods

KPIs, targets and measurements methods are defined separately for retail and for wholesale services, in line with the QoS regulatory strategy defined in section 2.

3.1 KPIs, targets and measurement methods – general considerations

KPIs, targets and measurements methods are listed in tables in section 3.2 for retail services and in section 3.3 for wholesale services. To facilitate the understanding of the tables, ATRA comments first on:

- Services considered (see section 3.1.1);
- Use of standards (see section 3.1.2);
- Formulation of KPIs (see section 3.1.3);
- Targets (see section 3.1.4);
- Service descriptions versus quality (see section 3.1.5);
- Availability versus fault rate and fault repair time (see section 3.1.6);

- Confidence intervals for test data (see section 3.1.7);
- KPI reporting a probability (see section 3.1.8).

3.1.1 Services considered

The practice in the past has been to treat fixed and mobile services as distinct services. Hence fixed voice telephony was a separate service to mobile voice telephony, although only if viewed from the perspective of the calling party.

With the development of Next Generation Networks, there is a change in approach to regard fixed and mobile as different forms of access to a common core network. This is the objective behind the IP Multimedia System (IMS) standardization, which is being followed by many traditionally mobile and some traditionally fixed Service Providers. It is also the approach of some countries in moving to "unified licensing", where services provided by both fixed and mobile access can be provided under the same license. Also, in economic market analysis there is a focus on the possible substitution of mobile for fixed.

In view of these trends and in order to make the formulation of the QoS parameters as future proof as possible, these parameters have been grouped in accordance with domains described in section 2.2. This means that wherever possible the parameter definition applies to services over both forms of access (mobile or fixed).

In terms of measurement and targets, however, there may be differences because of the differences in the access.

For measurements, it is possible and common to make measurements of mobile access using drive tests from stationary or moving vehicles. These test set-ups are described in detail in the Procedure for Measuring the Quality of Mobile Telecommunication Services, which is complementary to these QoS Regulatory Procedures.

For fixed access such tests would require either connection to the local loops at the roadside cabinet or access to the subscriber's premises, which is less practicable. Consequently, for measurements over fixed access, techniques that can be run from distribution frames or exchange sites have been developed to make an assessment of the performance that is being delivered to the subscriber. As a result, in most cases different measurement methods have had to be specified for the same service provided over fixed and mobile access but they are wherever possible measurements of the same service parameter.

3.1.2 Use of standards

Whenever possible, the following KPIs are based on international standards. The following standards are used for this list:

- ETSI EG 202 057-1 (2013-01)
  "Speech Processing, Transmission and Quality Aspects (STQ); User related QoS parameter definitions and measurements; Part 1: General"
- ETSI TS 125 214 (2017-01)
  "Universal Mobile Telecommunications System (UMTS); Physical layer procedures (FDD) (3GPP TS 25.214 version 14.1.0 Release 14)"
- ETSI EG 202 057-2 (2009-02)
  "Speech Processing, Transmission and Quality Aspects (STQ); User related QoS parameter definitions and measurements; Part 2: Voice telephony, Group 3 fax, modem data services and SMS"
- Recommendation ITU-T E.804 (02/2014)
  "QoS Aspects for Popular Services in Mobile Networks"

- Recommendation ITU-T P.863 (03/2018)
  "Perceptual objective listening quality assessment"
  This standard needs to be considered in conjunction with its application guide P.863.1 (see: https://www.itu.int/rec/T-REC-P.863.1-201409-I/en)
- Recommendation ITU-T P.863.1 (09/2014)
  "Application Guide for Recommendation ITU-T P.863"
- Recommendation ITU-T P.563 (05/2004)
  "Single-ended method for objective speech quality assessment in narrow-band telephony applications" (see: https://www.itu.int/rec/T-REC-P.563/en)
- Recommendation ITU-T J.247 (08/2008)
  "Objective perceptual multimedia video quality measurement in the presence of a full reference" (see: https://www.itu.int/rec/T-REC-J.247-200808-I/en)

The following abbreviations are used in the "standards" column of the KPI table (see section 3.1.8):

Table 1: Standards abbreviations used in the report

E=ETSI • E1=EG202057-1 • E2=TS125214 • E3=EG202057-2	I=ITU-T • I1 = ITU-T E.804 • I2 = ITU-T P.863 • I2a = ITU-T P.863.1 • I4 = ITU-T P.563 • I6 = ITU-T J.247

The Procedure for Measuring the Quality of Mobile Telecommunication Services (PMQMTS) presently in use by ATRA will also be referred to whenever applicable in the "standards" column of the KPI table.

3.1.3 Formulation of KPIs

KPIs can be formulated with implied targets. An example is "the percentage of faults repaired within one day". This implies that one day is the target. This approach has been discussed in depth in ETSI STQ with the conclusion that it is better to formulate parameters without implied targets but separately to set a target level if appropriate. For example, a formulation without an implied target would be "the time within which the fastest 80% of faults are repaired". A target could then be "2 days". Generally, such parameters without implied targets are preferred. This is the approach followed by ATRA.

3.1.4 Targets

The situation for setting targets varies very much from parameter to parameter. The performance level achievable may be affected by the type of access and so it may be necessary to specify different target values for the same service over fixed access and over mobile access.

It should be noted that the level of performance that is considered the minimum acceptable may increase over time as technology develops and users demand more. This should be part of ATRA regular review as described in section 1.5.

3.1.5 Service descriptions versus quality

There is a grey area between service descriptions and quality where there is no established correct approach as to what an aspect of a service description is and what an aspect of quality is.

From a legal point of view, a service should be judged against what it is described to offer. As competition increases there may be more services that are basically similar but have different levels of quality in the service description.

If the performances of such services are measured in absolute terms different levels will be observed. The question is whether the different levels are quality issues or just reflect the different service descriptions. A Service Provider should not be criticized if its quality levels meet the claims in the service description.

The net result could be a situation where:

- Service Provider A offers a quality level of at least X units and is measured to achieve 0.9X;
- Service Provider B offers a quality level of at least 0.7X units and is measured to achieve 0.8X

Which Service Provider is better? In absolute terms A is better, but in terms of meeting their service description B is better. Therefore, ATRA will be careful in making comparisons where service descriptions include aspects of quality or performance.

Ultimately, one cannot say theoretically where the boundary is between service descriptions and quality. But ATRA's expectation is that competition and user choice will put pressure on Service Providers to offer and provide what customers need.

3.1.6 Availability versus fault rate and fault repair time

Fault rate, fault repair time and availability are typical KPIs considered by regulatory authorities. When a fault occurs, a service becomes unavailable until the fault is repaired. Thus, there is a relationship between availability and fault rates and fault repairs as follows:

$$Availability = 100\left[1 - Average\ number\ of\ faults\ per\ measurement\ period \frac{average\ fault\ repair\ time}{measurement\ period}\right]$$

For ATRA, it does seem that this relationship has been discussed in the standard world, in which:

- Fault rate and repair time KPIs tend to be used for customer retail parameters where the Service Providers rely on the customer to report faults, i.e. the service is not fully monitored by the network. Measurement is then performed through the administrative systems.
- Availability tends to be used where the service is fully monitored by the network and so measurement is performed through the network.

Both approaches look satisfactory, with a slight preference for availability. However, where the availability is not high it may be worthwhile having an additional requirement on the fault repair time to give an incentive to ensure that no customer suffers an unreasonably long outage. This has been considered by ATRA to build the table of KPIs.

3.1.7 Confidence intervals for test data

In statistics, confidence intervals describe an interval that covers the true parameter value with a certain probability. Usual probability measures are in the 90 percent range. For example, a confidence interval represents the interval in which the mean of the underlying distribution lies with a probability of 95 percent or with a probability of 99 percent.

As a rule of thumb the number of samples within a measurement campaign correlates with the reliability of results. In other words: the higher the number of collected samples, the more precise and trustworthy the results are.

The computation of confidence intervals depends heavily on the assumed kind of distribution. In telecommunications, typically, the computation of confidence intervals is using the binomial and the normal (Gaussian) distribution.

Further in-depth information on post processing and statistical methods is given in § 11 of Recommendation ITU-T E.804.

3.1.8 KPI reporting a probability

There has been a change in recent years in the formulation of targets and presentation of results for KPIs that assess a probability.

Both ETSI and ITU-T concluded that users tend to think of probabilities in terms of say 1 in 100 or 1 in 1000. Consequently, probabilities presented as close to 100% have to be converted first into the opposite value close to zero as this is easier to think about as a probability. Thus 99% success is better presented as 1% failure, and 99.9% success as 0.1% failure. Therefore, ATRA has formulated some of those targets that are probabilities in this way, when relevant.

3.2 Table of applicable KPIs, targets and measurements methods for retail services

To define KPIs, targets and measurements methods for retail services, ATRA has considered best international practices.

The following letters are used in the column for measurement (M):

- T = needs test calls/connections typically as part of a drive/walk test;
- A = data collected by the ordering system or other administrative system;
- N = uses data collected or measured within the network measurements.

Disclaimer

Whenever an ITU or ETSI recommendation/standard is referred to (in column "Standard"), this recommendation/standard fully applies and is incorporated to the QoS Regulatory Procedures. The texts provided in the table are extracts and/or summaries which shall not be interpreted as superseding the relevant ITU or ETSI recommendation/standard. References to ITU or ETSI recommendation/standard are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Table 2: List of KPIs applicable to Service Providers

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
Customer relation and billing (all services) The types of service considered here shall be: • Residential line and its services e.g. voice & broadband • Business line and its services e.g. voice & broadband • Pre-pay mobile including voice, Internet and SMS • Post pay mobile including voice, Internet and SMS • Calling cards						
R1	Customer complaints rate	Both	This parameter assesses the average number of complaints per year per customer for each type of service. Customer complaints rate = customer complaints per year related to the service ---------- x 100 number of customers of the service This parameter shall be reported separately for each type of service (see above in grey) and in each case separate figures shall be given for complaints relating to the service itself and complaints relating to its billing.	A	E1 § 5.9	< 0.5 %
R2	Time to resolve customer complaints	Both Mobile and Fixed here should be separated	This parameter assesses the period between the instant when a customer complaint is notified to the Service Provider and the instant the cause for the complaint has been resolved. time to resolve customers complaints = t (complaint resolved) - t (notification of complaint) where t (complaint resolved) is the instant when the complaint has been resolved t (notification of complaint) is the instant when notification of the complaint has been received. Complaints that are found to be invalid may be excluded. Complaints related to faults are included.	A	E1 § 5.10	95% in <5 working days

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
			The KPI calculation process shall be the following: 1) Record the complaint times 2) Make a list of the times and sort the list with the shortest time first 3) Count the number of entries in the list 4) Read off the response time for the entries closest to 95% of the number of entries. This parameter shall be reported separately for each type of service (see above in grey) and in each case separate figures shall be given for complaints relating to the service itself and complaints relating to its billing.			
R3	Response time by customer support center – phone call	Both	The response time by customer support center is the period of time between the end of dialing and the instant when the call actually reaches a human that is capable of discussing the customer's issue. For example, if the issue concerns billing and the call is initially handled by a general call center and then passed to the accounts department, the time from the end of dialing to the time when the call is answered by the accounts department should be measured. Where an issue is normally handled by the call center but requires specialist assistance then the time when the call center answers may be used. response time by customer support center = t (call reaches operator) - t (end of dialing) where t (end of dialing) is the instant when the user finishes dialing t (call reaches operator) is the instant when the call actually reaches an operator The KPI calculation process shall be the following: 1) Record the response times. 2) Make a list of the times and sort the list with the shortest time first. 3) Count the number of entries in the list. 4) Read off the response time for the entries closest to 75% and 95% of the number of entries.	A	E1 § 5.6	75% in < 15s 95% in <30s
R4	Response time by customer support center	Both	The response time by customer support center is the period of time between the instant when the electronic message is sent and the instant	A	E1 § 5.6	75% in <4h 95% in < 2 working days

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
	– emails and electronic complaints		when the first human response is received. Automatic acknowledgements shall be excluded. response time by customer support center = t (first response by operator) - t (electronic message is sent) where t (electronic message is sent) is the instant when the electronic message is sent t (first response by operator) is the instant when the first response by operator is received The KPI calculation process shall be the following: 1) Record the response times. 2) Make a list of the times and sort the list with the shortest time first. 3) Count the number of entries in the list. 4) Read off the time for the entries closest to 50% and 90% of the number of entries.			
R5	Refunds ratio	Both	This parameter is the ratio of complaints resulting in a refund, i.e. repayment of rental or call charges to reflect the failure to provide the service specified to the total number of complaints. All services should be considered together. Refunds ratio = complaints resulting in refund ---------- x 100 all valid complaints	A	n/a	no target possible, reporting only
R6	Compensation ratio	Both	This parameter is the ratio of complaints resulting in a compensation, i.e. payments to reflect the harm (consequential damages) caused to the customer by the failure to provide the service specified to the total number of complaints. All services should be considered together. Refunds ratio = complaints resulting in compensation ---------- x 100 all valid complaints	A	n/a	no target possible, reporting only

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
R7	Rate of complaints related to wording of contracts	Both	This parameter is deemed to the average number of complaints per year related to wording of contracts. Complaints related to wording of contracts = relevant complaints received per year ---------- x 100 all customers	A	n/a	<1%
R8	Rate of complaints related to wording of offer/Terms & Conditions	Both	This parameter is deemed to the average number of complaints per year related to conditions of the offer / Terms & Conditions. Complaints related to wording of the offer / Terms & Conditions = relevant complaints received per year ---------- x 100 all customers	A	n/a	<1%
R9	Rate of number portability related complaints	Both	This parameter is deemed to the average number of complaints per customer. Customer complaints related to number portability rate = customer complaints related to number portability ---------- x 100 all customers requesting porting	A	n/a	< 0.5%
R10	Time to Reconnection and activation of Service after resolution of cause of suspension	Both	This parameter is the period from the instant when a cause of suspension is removed to the time when the service is reactivated. Where the cause of the suspension is an unpaid bill the time counts from the start of the working day following the day on which the payment is received in the bank account of the Service Provider. reconnection time = t (service reactivated) - t (cause of suspension removed) where t (cause of suspension removed) is the instant when the cause of suspension is removed t (service reactivated) is the instant when the service is reactivated	A	n/a	95% in <4 h

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
			The KPI calculation process shall be the following: 1) Record the times for reconnection and activation of the service. 2) Make a list of the times and sort the list with the shortest time first. 3) Count the number of entries in the list. 4) Read off the response time for the entries closest to 95% of the number of entries.			
Fixed Access						
R11	Initial supply time	F	The initial supply time is the period of time between the instant when the supply event is ordered (i.e. the order has been accepted as valid and complete by the network provider) and the instant when the supply is completed. Supply time = t (supply completed) - t (supply ordered) where t (supply ordered) is the instant when the supply event is ordered t (supply completed) is the instant when the supply is completed The KPI calculation process shall be the following: 1) Record the initial supply times. 2) Make a list of the times and sort the list with the shortest time first. 3) Count the number of entries in the list. 4) Read off the response time for the entries closest to 99% of the number of entries. The supply time shall be measured in calendar days and reported separately for telephone lines and broadband connections with separate figures for business and residential and for FTTH lines.	A	n/a	99% in < 5 calendar days except for FTTH For FTTH 99% in < 15 calendar days when there is a cable with spare fiber available within a range of 100 meters
R12	Faults report rate Mean Time Between Failures (MTBF)	F	The Fault report rate assesses the rate of faults reported that are not found to be invalid. Fault report rate = faults reported per access line per year / Total number of access lines x 100	A	E1 § 5.4	<1% MTBF per access line >876,000 hours

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
			Where an access line (i.e. a customer account) serves several different telephone numbers it shall count as one line, i.e. the measure concerns lines not numbers. MTBF = (8,760 hours)/[(Fault report rate)/100] Separate figures shall be reported for business and residential and for FTTH lines.			
R13	Fault repair time	F	The fault repair time is the period of time between the instant when the request for repair occurs (i.e. the request has been accepted as valid and complete by the network provider) and the instant when the fault repair is completed fault repair time = t (fault repair completed) - t (request for repair) where t (fault repair requested) is the instant when the fault repair is requested t (fault repair completed) is the instant when the fault repair is completed Separate figures shall be reported for business and residential and FTTH lines. The KPI calculation process shall be the following: 1) Record the fault repair times. 2) Make a list of the times and sort the list with the shortest time first. 3) Count the number of entries in the list. 4) Read off the response time for the entries closest to 90% and 95% of the number of entries for residential and 90% and 99% in business.	A	E1 § 5.5	Residential: 90% in < 24h 95% in < 48h Business: 90% in <3h 99% in <18h
R14	Selection and Registration Failure Ratio	F	The network selection and registration failure ratio assess the probability that the user cannot perform a successful selection and registration. This parameter applies only to services directly provided by network operators (e.g. VoIP). network selection and registration failure =	N	n/a	< 0.2 %

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
			unsuccessful selection and registration attempts ---------- x 100 all selection and registration attempts			
Mobile ACCESS including coverage (radio parameters and voice parameters)						
R15	Service delivery time	M	The service delivery time for customers is the period between the instant when the registration with identification document and signature of the contract (if applicable) was completed successfully and the instant when the service is available, e.g., the customer can make a call or send an SMS. service delivery time = t (service available) - t (registration completed) where t (registration completed) is the instant when the registration with identification and signature of the contract (if applicable) is completed t (service available) is the instant when the service is available Results shall be reported separately for prepaid and postpaid customers. The KPI calculation process shall be the following: 1) Record the service delivery times. 2) Make a list of the times and sort the list with the shortest time first. 3) Count the number of entries in the list. 4) Read off the response time for the entries closest to 95% of the number of entries.	A	n/a	95 % in <2h
R16	Network outage repair time	M	The network outage time is the period of time between the instant when the fault/outage is detected and the instant when the fault repair is completed. 4 levels of network outage are defined: • Red network outages which affect 10% or more of the customers; • Orange network outages which affect between 5% and 10% of the customers; • Yellow network outages which affect between 5% and 1% of the customers; • Green network outages which affect 1% or less of the customers.	A	PMQMTS § 3.2	For red network outage 95% in <30 min 99% in <1h For orange network outage 75 % in <30 min 95 % in <1 h

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
			Network outage repair time = t (fault repair completed) - t (request for repair) where t (fault repair requested) is the instant when the fault repair is requested t (fault repair completed) is the instant when the fault repair is completed The KPI calculation process shall be the following: 1) Record the network outage repair times. 2) Make a list of the times and sort the list with the shortest time first. 3) Count the number of entries in the list. 4) Read off the response time for the entries closest to 75% and 95% of the number of entries.			For yellow network outage 75% in < 1 h 95% in < 2h
R17	Radio Network Unavailability	M	The radio network unavailability assesses the probability that the mobile services are not available to a user. radio network unavailability = probing attempts with mobile services not available / all probing attempts x 100 Measurements shall be performed within the declared coverage area. Results shall be reported separately for covered areas, defined drive / walk test routes and as average per building. See section 3.4.	T	I1 § 7.2.1 PMQMTS § 3.2	<1%
R18	Network Selection and Registration Failure Ratio	M	The network selection and registration failure ratio assess the probability that the user cannot perform a successful selection and registration on the desired mobile network (manual selection mode, automatic selection mode with a specified network) or on any network (automatic selection mode without a specified network). network selection and registration failure = unsuccessful selection and registration attempts / all selection and registration attempts x 100 Measurements shall be performed within the declared coverage area.	T	I1 § 7.2.2	< 0.2 %

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
			Results shall be reported separately for covered areas, defined drive / walk test routes and as average per building. See section 3.4. If after 5 minutes the terminal is not registered on the desired mobile network, this is considered as an unsuccessful attempt.			
R19	Coverage	M	Coverage is assessed in terms of the area where the radio field strength exceeds a specified level. There is a distinction between coverage in cities, towns and villages referred to "Coverage (CTV)" and coverage for all other areas referred to as "Coverage (other)". Coverage (CTV) = probing attempts with at least -75 dBm radio power ---------- x 100 all probing attempts Coverage (other) = probing attempts with at least -85 dBm radio power ---------- x 100 all probing attempts Measurements shall be made only in to declared coverage areas and figures shall be reported separately for each technology. Measurements shall be made as far as possible at regularly spaced points throughout the declared coverage area. This method is a revised method compared to existing licenses. The boundaries of cities, towns and villages are the ones published by the Afghan Geodesy and Cartography Head Office (HGCHO) (http://agcho.gov.af/en)	T	PMQMTS § 3.2	> 95 %
R20	Coverage quality	M	Coverage quality is assessed using feedback from the mobile terminal to the base station. It uses the Coverage Quality Indicator (CQI) which gives an estimate of the best possible quality under the given radio conditions. The CQI is expected to give superior results than measurements of signal strength alone.	T	E2 (clause 6A.2) PMQMTS § 3.2	Reporting only (targets shall apply in 2018)

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
			Measurements are restricted to declared coverage areas and figures need to be reported separately for each radio access technology. Measurements shall be made as far as possible at regularly spaced points throughout the declared coverage area.			
R21	Mobile throughput when coverage is available	M	Mobile broadband throughput when coverage is available is assessed by measuring the average data transmission rate for the downlink direction during a connection to the top ten websites which according to the Alexa website were visited most often in the month before the test. The average data transmission rate is the average of the data transfer rate measured during the entire connection to each of these websites, see http://www.alexa.com/topsites/countries/AF. The data transfer shall be completed without failure. The prerequisite for this parameter is network and service access. Measurement starts only, after a data link has been successfully established. Average Data Transmission Rate = user data transferred ---------- x 100 t (data transfer complete) - t (data transfer start) where t (data transfer complete) is the instant when the data transfer is successfully terminated t (data transfer start) is the instant when the data transfer starts Measurements are restricted to declared 3G and 4G coverage areas. Measurements shall be made as far as possible at regularly spaced points throughout the declared coverage area.	T	PMQMTS § 3.2	10 Mbps for 75%
SERVICES – Voice						
R22	Telephony Service Non-Accessibility	F	The telephony service non-accessibility assesses the probability that the end user cannot access the telephony service when requested. Probability of Telephony service non-accessibility =	N	n/a	< 0.2 %

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
			unsuccessful telephony service attempts by all users ---------- x 100 all telephony service attempts by all customers			
R23	Telephony Service Non-Accessibility	M	The telephony service non-accessibility assesses the probability that the end user cannot access the telephony service when requested despite the display on the handset indicating that the service is available. In mobile networks it may happen that the caller receives a busy signal despite the called party is not in a busy state; this may be caused by network problems. Because the signaling between caller and called party has not been established, this will be counted as an unsuccessful call attempt. Probability of Telephony service non-accessibility = unsuccessful telephony service attempts by all users when service shown as available ---------- x 100 all telephony service attempts by all users Measurements shall be performed within the declared coverage area. Results shall be reported separately for covered areas, defined drive / walk test routes and as average per building. See section 3.4.	T	I1 § 7.3.6.1	< 0.2 %
R24	Telephony Set-up Time	F	The telephony set-up time is the time period between sending of complete address information and receipt of call set up notification. Telephony set-up time = t (connect established) - t (user pressed button on terminal) where t (user pressed button on terminal) is the instant when the call button is pushed at the terminal on the A side (en bloc sending), or the last digit is dialed (overlap sending) t (connect established) is the instant when the connection is established on the signaling level (caller receives ringback tone and called party rings)	N	E3 § 5.2	For local calls only: • To fixed 95% in <2 s 99% in <5 s • To mobile 95% in <2 s 99% in <5 s For International calls. • To fixed

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
			The KPI calculation process shall be the following: 1) Record the set-up times. 2) Make a list of the times and sort the list with the shortest time first. 3) Count the number of entries in the list. 4) Read off the time for the entries closest to 95% and 99% of the number of entries.			95% <8s 99% in <10s • To mobile 95% in <8s 99% in <10s
R25	Telephony Set-up Time	M	The telephony set-up time is the time period between sending of complete address information and receipt of call set up notification. Telephony set-up time = t (connect established) - t (user pressed button on terminal) where t (user pressed button on terminal) is the instant when the call button is pushed at the terminal on the A side (en bloc sending), or the last digit is dialed (overlap sending) t (connect established) is the instant when the connection is established on the signaling level (caller receives ringback tone and called party rings) The KPI calculation process shall be the following: 1) Record the set-up times. 2) Make a list of the times and sort the list with the shortest time first. 3) Count the number of entries in the list. 4) Read off the time for the entries closest to 95% and 99% of the number of entries. Measurements shall be performed within the declared coverage area. Results shall be reported separately for covered areas, defined drive / walk test routes and as average per building. See section 3.4.	T	I1 § 7.3.6.2	For local calls only: • To mobile 95% in <2 s • To fixed 99% in <2 s International calls. • To mobile 95% in <8s 99% in <10s • To fixed 95% in <8s 99% in <10s
R26	Telephony Cut-off Call Ratio during first 60 s	F	The Telephony Cut-off Call Ratio (also called dropped call ratio) is the probability that a successful call is ended by a cause other than the intentional termination of either user (calling or called party) during the period of the first 60 s after the connection has been established. Telephony cut-off call ratio during first 60 s = unintentionally dropped telephony calls during first 60 s ---------- x 100 all successful telephony call attempts	N	n/a	< 0.2 %

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
R27	Telephony Cut-off Call Ratio	F	The Telephony Cut-off Call Ratio (also called dropped call ratio) is the probability that a successful call is ended by a cause other than the intentional termination of either user (calling or called party). Telephony cut-off call ratio = unintentionally dropped telephony calls ---------- x 100 all successful telephony call attempts	N	n/a	<1%
R28	Telephony Cut-off Call Ratio during first 60 s	M	The Telephony Cut-off Call Ratio (also called dropped call ratio) is the probability that a successful call is ended by a cause other than the intentional termination of either user (calling or called party) during the period of the first 60 s after the connection has been established. Telephony cut-off call ratio during first 60 s = unintentionally cut-off telephony calls during first 60 s ---------- x 100 all successful telephony call attempts Measurements shall be performed within the declared coverage area. Results shall be reported separately for covered areas, defined drive / walk test routes and as average per building. See section 3.4.	T	I1 § 7.3.6.5	< 0.1 %
R29	Telephony Cut-off Call Ratio	M	The Telephony Cut-off Call Ratio (also called dropped call ratio) is the probability that a successful call is ended by a cause other than the intentional termination of either user (calling or called party). Telephony cut-off call ratio = unintentionally cut-off telephony calls ---------- x 100 all successful telephony call attempts Measurements shall be performed within the declared coverage area. Results shall be reported separately for covered areas, defined drive / walk test routes and as average per building. See section 3.4.	T	I1 § 7.3.6.5 PMQMTS § 3.2	< 1.5 %

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
R30	Voice Quality	F	Voice quality in fixed networks should be measured using special network equipment based on the P.563 algorithm. The P.563 algorithm provides speech quality predictions without a separate reference signal. For this reason, this method is recommended for non- intrusive speech quality assessment, live network monitoring and assessment by using unknown speech sources at the far-end side of a telephone connection. Real systems may include background noise, filtering and variable delay, as well as distortions due to channel errors and speech codecs. The P.563 approach is the first recommended method for single-ended non- intrusive measurement applications that takes into account the full range of distortions occurring in public switched telephone networks and that is able to predict the speech quality on a perception-based scale MOS LQO. This Recommendation is not restricted to end-to-end measurements; it can be used at any arbitrary location in the transmission chain. The calculated score is then comparable to the quality perceived by a human listener, who is listening with a conventional shaped handset at this point. This method is based on the assessment of the received voice sequences only (non-reference model), i.e. the voice quality is assessed based on the received real-time traffic by using the standardized mathematical algorithm. Measurements should be made at a range of test points close to the network termination points and equally spaced around the network and the results averaged. This KPI is based on standardized and IPR protected algorithms. For conducting the tests, a licensed implementation of the mathematical algorithms which have been standardized by the ITU-T is required. The processing of the sequence requires in-depth understanding of the application. Typically, this should be handled by well-trained personnel or third parties.	N	I4	> 3.75 for 90%

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
R31	Voice Quality	M	Voice quality in mobile networks should be measured using special network equipment based on the P.863 algorithm. POLQA, ITU-T P.863 is the next-generation voice quality testing technology for fixed, mobile and IP-based networks. ITU-T P.863 has been selected to form the new ITU T voice quality-testing standard. The purpose of the objective ITU-T P.863 model is to predict overall listening speech quality from narrowband (300 to 3,400 Hz) to superwideband (50 to 14,000 Hz) telecommunication scenarios as perceived by the user. This includes all speech-processing components usually considered for telecommunications in clean and noisy conditions. The term 'listening speech quality' means the overall speech quality as perceived and scored by human subjects in an absolute category rating experiment. In superwideband mode, ITU-T P.863 scores are predicted on a MOS ACR superwideband scale. The model output is referred to as MOS-LQOsw (Mean opinion score - listening quality objective - superwideband scale). The approach of ITU-T P.863 is called 'full-reference' or 'double-ended', which means that the quality prediction is based on the comparison between an undistorted reference signal and the received signal to be scored. This method is based on sending reference speech sequences through the network and comparing the received speech sequences with the original speech sequences (full-reference model) by using the standardized mathematical algorithm. Measurements should be made at equally spaced locations within the coverage area and the results averaged. This KPI is based on standardized and IPR protected algorithms. For conducting the tests, a licensed implementation of the mathematical algorithms which have been standardized by the ITU-T is required. The processing of the sequence requires in-depth understanding of the	T	I2, I2a PMQMTS § 3.2	> 3.75 for 90%

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
			application. Typically, this should be handled by well-trained personnel or third parties.			
SERVICES – Broadband						
R32	Network latency	F	The latency (round trip time) is the time required for a packet to travel from the source to the destination and back. It is measured using PING. round trip time = t (packet received) - t (packet sent) where t (packet sent) is the instant when packet is sent t (packet received) is the instant when packet is received Measurements should be made at equally spaced locations in Afghanistan and the results averaged. They should also be made at the connection points to the Internet core. Automated PING tests should be made from: • Terminal equipment, or • Network equipment as close to the Network Termination Point as possible. Tests should be made every 30 minutes and the average round trip delay at each time point calculated As an alternative the measurement of the round-trip time can made by evaluating the TCP handshake: • Start: Point of time when the [SYN] is sent. • Stop: Point of time when the [SYN, ACK] is received. This applies to all services that are TCP based, e.g. file transfer (FTP), web browsing (HTTP) and E Mail (POP3, SMTP).	N	n/a	< 60 ms
R33	Network latency	M	The latency (round trip time) is the time required for a packet to travel from the source to the destination and back. It is measured using PING. round trip time = t (packet received) - t (packet sent)	T	I1 § 7.3.3	< 200 ms for 90% of tests

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
			where t (packet sent) is the instant when packet is sent t (packet received) is the instant when packet is received Measurements should be made at equally spaced locations in Afghanistan and the results averaged They should also be made at the connection points to the Internet core. Automated PING tests should be made from: • Terminal equipment, or • Network equipment as close to the Network Termination Point as possible. Tests should be made every 30 minutes and the average round trip delay at each time point calculated As an alternative the measurement of the round-trip time can made by evaluating the TCP handshake: • Start: Point of time when the [SYN] is sent. • Stop: Point of time when the [SYN, ACK] is received. This applies to all services that are TCP based, e.g. file transfer (FTP), web browsing (HTTP) and E Mail (POP3, SMTP).			
R34	HTTP Mean Data Rate Ratio	F	The HTTP Mean Data Rate is the average of the data transfer rate measured during the entire connection time to the service. The data transfer shall be completed without failure. The prerequisite for this parameter is network and service access. Measurement starts only, after a data link has been successfully established. HTTP Mean Data Rate = user data transferred ---------- x 100 t (data transfer complete) - t (data transfer start) where t (data transfer complete) is the instant when the data transfer is	N (can be read from mode ms)	I1 § 7.3.8.7	Initially > 75 % after 1 year from the issuance of the QoS Regulatory Procedures > 85 %

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
			successfully terminated t (data transfer start) is the instant when the data transfer starts The HTTP Mean Data Rate Ratio denotes the deviation between the rate offered / contracted to the customer and the actual rate: HTTP Mean Data Rate Ratio = HTTP Mean Data Rate measured ---------- x 100 HTTP Data Rate offered / contracted The HTTP Mean Data Rate Ratio is measured separately for download and upload for each different (speed) offer.			
R35	HTTP Mean Data Rate Ratio	M	The HTTP Mean Data Rate is the average of the data transfer rate measured during the entire connect time to the service. The data transfer shall be completed without failure. The prerequisite for this parameter is network and service access. Measurement starts only, after a data link has been successfully established. HTTP Mean Data Rate = user data transferred ---------- x 100 t (data transfer complete) - t (data transfer start) where t (data transfer complete) is the instant when the data transfer is successfully terminated t (data transfer start) is the instant when the data transfer starts The HTTP Mean Data Rate Ratio denotes the deviation between the rate offered / contracted to the customer and the actual rate: HTTP Mean Data Rate Ratio = HTTP Mean Data Rate measured ---------- x 100 HTTP Data Rate offered / contracted	N	I1 § 7.3.8.7	Initially > 75 % after 1 year from the issuance of the QoS Regulatory Procedures > 85 %

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
			The HTTP Mean Data Rate Ratio is measured separately for download and upload for each different (speed) offer.			
SERVICES – Leased Lines						
R36	Leased Line (LL) Supply time where there are no existing network facilities at one end	F	The LL supply time is the period of time between the instant when the supply event is ordered (i.e. the order has been accepted as valid and complete by the network provider) and the instant when the supply is completed and accepted by the customer. LL supply time = t (supply completed) - t (supply ordered) where t (supply ordered) is the instant when the supply event is ordered t (supply completed) is the instant when the supply is completed	A	n/a	Subject to survey, limited to 3 (three) months maximum
R37	Leased Line (LL) Supply time where there are sufficient network resources and existing network facilities along the transmission path	F	The LL supply time is the period of time between the instant when the supply event is ordered and the instant when the supply is completed and accepted by the customer. LL supply time = t (supply completed) - t (supply ordered) where t (supply ordered) is the instant when the supply event is ordered t (supply completed) is the instant when the supply is completed The KPI calculation process shall be the following: 1) Record the LL supply times. 2) Make a list of the times and sort the list with the shortest time first. 3) Count the number of entries in the list. 4) Read off the time for the entries closest to 99% of the number of entries.	A	n/a	99% in < 20 working days
R38	Leased Line (LL) Fault report rate Mean Time Between Failures (MTBF)	F	The LL Fault report rate assesses the faults reported which are not found to be invalid (i.e. the fault report has been accepted as valid and complete by the network provider). The rate is expressed as: LL Fault report rate = valid faults reported per year ---------- x 100 Number of LL	A	n/a	< 0.5 % MTBF per LL >1,752,000 hours

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
			LL MTBF = (8,760 hours)/[(LL Fault report rate)/100]			
R39	LL Fault repair time	F	The LL fault repair time is the period of time between the instant when the client request for repair occurs and the instant when the fault repair is completed and accepted by the affected party. LL fault repair time = t (fault repair completed) - t (request for repair) where t (fault repair requested) is the instant when the fault repair is requested t (fault repair completed) is the instant when the fault repair is completed The KPI calculation process shall be the following: 1) Record the LL fault repair times. 2) Make a list of the times and sort the list with the shortest time first. 3) Count the number of entries in the list. 4) Read off the time for the entries closest to 95% and 99% of the number of entries.	A	n/a	95% in <4h 99% in <24h
SERVICES – SMS						
R40	SMS Service Non-Accessibility	M	The SMS service non-accessibility assesses the probability that the end user cannot access the Short Message Service (SMS) when requested despite the display on the handset indicating that the service is available. SMS service non-accessibility = (unsuccessful SMS service attempts when service shown as available / all SMS service attempts) x 100 Measurements shall be performed within the declared coverage area. Results shall be reported separately for covered areas, defined drive / walk test routes and as average per building. See section 3.4. The tests should include 50% of on-net SMS and 50% of off-net national SMS.	T	I1 § 7.4.4.2 PMQMTS § 3.2	< 0.2 %

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
R41	SMS End to End Delivery Time	M	The SMS end-to-end delivery time is the period of time between sending a short message to the network and the message being received at the distant terminal (user device). SMS end-to-end delivery time = t (B, received) - t (A, send) where t (A, send) is the instant when the send button is pushed at the terminal (user device) on the A side t (B, received) is the instant when the SMS is received completely at the terminal (user device) on the B side The KPI calculation process shall be the following: 1) Record the SMS delivery time times. 2) Make a list of the times and sort the list with the shortest time first. 3) Count the number of entries in the list. 4) Read off the time for the entries closest to 95% and to 99% of the number of entries. Measurements shall be performed within the declared coverage area. Results shall be reported separately for covered areas, defined drive / walk test routes and as average per building. See section 3.4. For local to local, tests should include 50% of on-net SMS and 50% of off-net national SMS.	T	I1 § 7.4.4.5	Local to local: 95% in <5 s 99% in <10 s Local to International: 95% in <7 s 99% in <10 s
R42	SMS Completion Failure Ratio	M	The SMS Completion Failure Ratio assesses the ratio of SMS sent by the A side which are not received by the B side at all or not received in full without errors in the contents. SMS completion failure ratio = unsuccessfully received SMS ---------- x 100 all sent SMS Measurements shall be performed within the declared coverage area.	T	I1 § 7.4.4.4	< 0.2 %

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
			Results shall be reported separately for covered areas, defined drive / walk test routes and as average per building. See section 3.4. The tests should include 50% of on-net SMS and 50% of off-net national SMS.			
SERVICES - Video Streaming (TCP)						
R43	Video Streaming Service Non-Accessibility	F	The Streaming service non-accessibility is the probability that when the user requests a stream the first packet of the Transmission Control Protocol (TCP) is not received within 20 seconds. Receipt of the first packet is normally indicated by the appearance of the "buffering" message or icon on the player. Streaming service non-accessibility = unsuccessful stream request attempts ---------- x 100 all stream request attempts The video streaming server location for testing should be a local server (i.e. located in Afghanistan) to avoid factors outside Service Provider's control.	N	n/a	< 0.5% %
R44	Video Streaming Service Non-Accessibility	M	The Streaming service non-accessibility is the probability that when the user requests a stream the first packet of the Transmission Control Protocol (TCP)is not received within 20 seconds. Receipt of the first packet is normally indicated by the appearance of the "buffering" message or icon on the player. Streaming service non-accessibility = unsuccessful stream request attempts ---------- x 100 all stream request attempts Measurements shall be performed within the declared coverage area. Results shall be reported separately for covered areas, defined drive / walk test routes and as average per building. See section 3.4.	T	I1 § 7.3.5.4	<1%

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
			The video streaming server location for testing should be a local server (i.e. located in Afghanistan) to avoid factors outside Service Provider's control.			
R45	Video Streaming Service Access Time	F	The Streaming end-to-end delivery time is the time period between requesting the stream and receiving the first stream data packet of the Transmission Control Protocol (TCP)at the terminal. Streaming end-to-end delivery time = t (stream request) - t (reception first data packet) where t (stream request) is the instant when the stream was requested at a portal t (reception first data packet) is the instant when the first data packet is received The KPI calculation process shall be the following: 1) Record the access times. 2) Make a list of the times and sort the list with the shortest time first. 3) Count the number of entries in the list. 4) Read off the time for the entries closest to 95% and 99% of the number of entries. The video streaming server location for testing should be a local server (i.e. located in Afghanistan) to avoid factors outside Service Provider's control.	N	n/a	95% in <5 s 99% in <10 s
R46	Video Streaming Service Access Time	M	The Streaming end-to-end delivery time is the time period between requesting the stream at a portal and receiving the first stream data packet at the terminal. The first data packet refers to Transmission Control Protocol (TCP). Streaming end-to-end delivery time = t (stream request) - t (reception first data packet) where t (stream request) is the instant when the stream was requested at a portal t (reception first data packet) is the instant when the first data packet is received	T	I1 § 7.3.5.5	95% in <5 s 99% in <10 s

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
			The KPI calculation process shall be the following: 1) Record the access times. 2) Make a list of the times and sort the list with the shortest time first. 3) Count the number of entries in the list. 4) Read off the time for the entries closest to 95% and 99% of the number of entries. Measurements shall be performed within the declared coverage area. Results shall be reported separately for covered areas, defined drive / walk test routes and as average per building. See section 3.4. The video streaming server location for testing should be a local server (i.e. located in Afghanistan) to avoid factors outside Service Provider's control.			
R47	Video Streaming Reproduction Cut-off Ratio	F	The Streaming Reproduction Cut-Off Ratio is the probability that a successfully started stream reproduction is ended by a cause other than the intentional termination by the user. Streaming reproduction cut-off ratio = unintentionally terminated stream reproductions ---------- x 100 all successfully started stream reproductions The video streaming server location for testing should be a local server (i.e. located in Afghanistan) to avoid factors outside Service Provider's control.	N	n/a	< 0.2 %
R48	Video Streaming Reproduction Cut-off Ratio	M	The Streaming Reproduction Cut-Off Ratio is the probability that a successfully started stream reproduction is ended by a cause other than the intentional termination by the user. Streaming reproduction cut-off ratio = unintentionally terminated stream reproductions ---------- x 100 all successfully started stream reproductions Measurements shall be performed within the declared coverage area. Results shall be reported separately for covered areas, defined drive / walk test routes and as average per building. See section 3.4.	T	I1 § 7.3.5.6	< 0.2 %

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
			The video streaming server location for testing should be a local server (i.e. located in Afghanistan) to avoid factors outside Service Provider's control.			
R49	Video streaming quality	F	ITU recommendation ITU-T P.1203 (10/2017) recently developed in SG12 (see https://www.itu.int/rec/T-REC-P.1203/en) - should be considered at later stage			
R50	Video streaming quality	M	ITU recommendation ITU-T P.1203 (10/2017) recently developed in SG12 (see https://www.itu.int/rec/T-REC-P.1203/en) - should be considered at later stage			
SERVICES – Web browsing						
R51	HTTP Service Non-Accessibility	F	The HTTP service non-accessibility assesses the probability that a subscriber cannot establish a TCP-IP connection within 10 seconds and access the service successfully. HTTP service non-accessibility = unsuccessful attempts to establish TCP-IP connection to the location of the content ---------- x 100 all attempts to establish TCP-IP connection to the location of the content The HTTP server location for testing should be a local server (i.e. located in Afghanistan) to avoid factors outside Service Provider's control.	N	n/a	< 0.2 %
R52	HTTP Service Non-Accessibility	M	The HTTP service non-accessibility is the probability that that a subscriber cannot establish a Packet Data Protocol (PDP) context within 10 seconds and access the service successfully. HTTP service non-accessibility = unsuccessful attempts to establish PDP Context to the location of the content reach ---------- x 100 all attempts to establish PDP Context to the location of the content reach	T	I1 § 7.3.8.1 PMQMTS § 3.2	< 0.2 %

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
			Measurements shall be performed within the declared coverage area. Results shall be reported separately for covered areas, defined drive / walk test routes and as average per building. See section 3.4. The HTTP server location for testing should be a local server (i.e. located in Afghanistan) to avoid factors outside Service Provider's control.			
R53	HTTP Set-up Time	F	The HTTP set-up time is the period of time between starting the connection to the instant when the content is sent or received. HTTP set-up time = t (http access successful) - t (http access start) where t (http access successful) is the instant when the http connection is started t (http access start) is the instant when the content is sent or received The KPI calculation process shall be the following: 1) Record the access times. 2) Make a list of the times and sort the list with the shortest time first. 3) Count the number of entries in the list. 4) Read off the time for the entries closest to 95% and 99% of the number of entries. The HTTP server location for testing should be a local server (i.e. located in Afghanistan) to avoid factors outside Service Provider's control.	N	n/a	99% in <5 s
R54	HTTP Set-up Time	M	The HTTP set-up time is the period of time between starting the connection to the instant when the content is sent or received. HTTP set-up time = t (http access successful) - t (http access start) where t (http access successful) is the instant when the http connection is started t (http access start) is the instant when the content is sent or received The KPI calculation process shall be the following: 1) Record the access times. 2) Make a list of the times and sort the list with the shortest time first. 3) Count the number of entries in the list. 4) Read off the time for the entries closest to 95% and 99% of the number of entries.	T	I1 § 7.3.8.2 PMQMTS § 3.2	99% in <5 s

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
			Measurements shall be performed within the declared coverage area. Results shall be reported separately for covered areas, defined drive / walk test routes and as average per building. See section 3.4. The HTTP server location for testing should be a local server (i.e. located in Afghanistan) to avoid factors outside Service Provider's control.			
R55	HTTP Session Failure Ratio	F	The HTTP Session Failure Ratio is the ratio of uncompleted sessions to sessions that were started successfully. An uncompleted session is a session that terminates or freezes without being terminated by the user. HTTP session failure ratio = uncompleted http sessions ---------- x 100 sessions started successfully Tests should use sessions of 10 minutes duration. The HTTP server location for testing should be a local server (i.e. located in Afghanistan) to avoid factors outside Service Provider's control.	N	n/a	< 0.5 %
R56	HTTP Session Failure Ratio	M	The HTTP Session Failure Ratio is the ratio of uncompleted sessions to sessions that were started successfully. An uncompleted session is a session that terminates or freezes without being terminated by the user. HTTP session failure ratio = uncompleted http sessions ---------- x 100 sessions started successfully Tests should use sessions of 10 minutes duration. Measurements shall be performed within the declared coverage area. Results shall be reported separately for covered areas, defined drive / walk test routes and as average per building. See section 3.4. The HTTP server location for testing should be a local server (i.e. located in Afghanistan) to avoid factors outside Service Provider's control.	T	I1 § 7.3.8.5 PMQMTS § 3.2	< 0.5 %

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
R57	Video Quality	F	Video quality in fixed networks should be measured using special test equipment based on the PEVQ algorithm. Perceptual evaluation of video quality (PEVQ) is a model which is designed to predict the effects of transmission impairments on the video quality as perceived by a human subject. Its main targets are mobile applications and multimedia applications. PEVQ is built on PVQM, a TV quality measure developed by KPN and Swisscom. The key features of PEVQ are: • (fast and reliable) temporal alignment of the input sequences based on multi-dimensional feature correlation analysis with limits that reach far beyond those tested by VQEG, especially with regard to the amount of time clipping, frame freezing and frame skipping which can be handled. • Full frame spatial alignment. • Color alignment algorithm based on cumulative histograms. • Detection and perceptually correct weighting of frame freezes and frame skips. • Perceptual estimation of degradations. This method is based on sending reference video sequences through the network and compare the received video sequences with the original video sequences (full-reference model) by using the standardized mathematical algorithm. This KPI is based on standardized and IPR protected algorithms. For conducting the tests, a licensed implementation of the mathematical algorithms which have been standardized by the ITU-T is required. The processing of the sequence requires in-depth understanding of the application. Typically, this should be handled by well-trained personnel or third parties. The video streaming server location for testing should be a local server (i.e. located in Afghanistan) to avoid factors outside Service Provider's control.	T	I6 Annex B	PEVQ > 3.5

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
R58	Video Quality (download)	M	Video quality in mobile networks should be measured using special test equipment based on the PEVQ algorithm. Perceptual evaluation of video quality (PEVQ) is a model which is designed to predict the effects of transmission impairments on the video quality as perceived by a human subject. Its main targets are mobile applications and multimedia applications. PEVQ is built on PVQM, a TV quality measure developed by KPN and Swisscom. The key features of PEVQ are: • (fast and reliable) temporal alignment of the input sequences based on multi-dimensional feature correlation analysis with limits that reach far beyond those tested by VQEG, especially with regard to the amount of time clipping, frame freezing and frame skipping which can be handled. • Full frame spatial alignment. • Color alignment algorithm based on cumulative histograms. • Detection and perceptually correct weighting of frame freezes and frame skips. • Perceptual estimation of degradations. This method is based on sending reference video sequences through the network and compare the received video sequences with the original video sequences (full-reference model) by using the standardized mathematical algorithm. This KPI is based on standardized and IPR protected algorithms. For conducting the tests, a licensed implementation of the mathematical algorithms which have been standardized by the ITU-T is required. The processing of the sequence requires in-depth understanding of the application. Typically, this should be handled by well-trained personnel or third parties. The video streaming server location for testing should be a local server (i.e. located in Afghanistan) to avoid factors outside Service Provider's control.	T	I6 Annex B	PEVQ > 3.5

#	Name	Fixed/ Mobile	Description/ Definition	T/A/N	Standard	Target
Number portability – fixed and mobile						
R62	Percentage of portability orders that are rejected or incomplete on due date	Both	The percentage of customer requests for number porting input to the NPAS that are rejected or incomplete within the agreed time. The agreed time is one working day unless the customer order specifies an alternative period Number of port requests rejected or incomplete by the due time ---------- *100 Total number of port requests input to the NPAS by the recipient	A	n/a	<5%
R63	Non-completion ratio of number porting attempts within specified time limit	Both	The Non-completion ratio of number porting attempts is the ratio of number of validated porting attempts requested by the recipient operator on behalf of the customers, which remain incomplete after time set in the policy and all number porting attempts. Cases where the customer requests delays are shall be excluded. Non-completion ratio of number porting attempts = number porting attempts which remain incomplete within specified time limit ---------- x 100 all validated number porting attempts	A	n/a	Initially < 15 % after 1 year <5%
R64	Unavailability ratio of number porting service	Both	The Unavailability ratio of the number porting service is the ratio between the sum of the times when the service is unavailable during the working hours of the service divided by the total working time Unavailability ratio of number porting service = sum of unavailability periods during working hours ---------- x 100 sum of working hours This parameter is calculated separately for each of the service providers involved and for the central number database.	A	n/a	<2%

3.3 Table of applicable KPIs, targets and measurements methods for wholesale services

There is no wholesale offer in Afghanistan except for those offered by Afghan Telecom and other Fiber Optic Network services providers and for few wholesale services provided by Afghan Telecom. The table below includes parameters for wholesale services that are likely to be offered in the future but are not necessarily offered at present.

Generally speaking, for new wholesale services, some principles should be followed:

- KPIs related to supply time and faults (fault rate, fault repair time) should apply;
- KPIs should be consistent with similar KPI are retail level when relevant.

The following letters are used in the column for measurement (M):

- T=needs test calls/connections typically as part of a drive/walk test;
- A= data collected by the ordering system or other administrative system;
- N= uses data collected or measured within the network measurements.

Table 3: List of KPIs applicable to Service Providers

#	Name	Description/ Definition	T/A/N	Standard	Target
Bitstream Services					
W1	Supply time of the interconnection to the ISP	Time from placing of order to satisfactory completion of testing of the interconnection. There will be few such interconnections and so each one should be reported individually.	A	No	< 2 months
W2	Unavailability of interconnection to ISP	% time interconnection to ISP is not available. interconnection unavailability = sum of durations of periods when interconnection is not available / total length of reporting period x 100 There will be few such interconnections and so each one should be reported individually.	N	No	< 0.1%
W3	Time to confirm or refuse provision of service request relating to an	Time within which 50% and 90% of requests are responded to The KPI calculation process shall be the following: 1) Record the time for responding to each request. 2) Make a list of the times and sort the list with the shortest time first. 3) Count the number of entries in the list. 4) Read off the	N	No	50% in < 6 hours 90% in < one day The target should also be

#	Name	Description/ Definition	T/A/N	Standard	Target
	individual subscriber	response time for the middle entry and the entry closest to 50% and to 90% of the number of entries.			stated in the inter-operator process specification
W4	Supply time of each subscriber order from initial request by ISP to working service	Time within which 50% and 90% or requests are responded to. The KPI calculation process shall be the following: 1) Record the time for responding to each request. 2) Make a list of the times and sort the list with the shortest time first. 3) Count the number of entries in the list. 4) Read off the response time for the middle entry and the entry closest to 50% and 90% of the number of entries.	A	No	50% in < 2 days 90% in < 3 days The target should also be stated in the inter-operator process specification
W5	Fault report rate on each subscriber service Mean Time Between Failures (MTBF)	The Fault report rate denotes the faults reported which are not found to be invalid; the rate is expressed as: Fault report rate faults reported per access line ---------- x 100 calendar year MTBF = (8,760 hours)/[(Fault report rate)/100]	A	No	<5% MTBF per access line >175,200 hours
W6	Fault repair time	The fault repair time is the time between the instant when the request for repair occurs and the instant when the fault repair is completed fault repair time = t (fault repair completed) - t (request for repair) where t (fault repair requested) is the point in time when the fault repair is requested t (fault repair completed) is the point in time when the fault repair is completed The KPI calculation process shall be the following: 1) Record the time for responding to each request. 2) Make a list of the times and sort the list with the shortest time first. 3) Count the number of entries in the list. 4) Read off the	A	No	Residential: 90% in < 24h 95% in < 72h Business: 90% in <4h 99% in <24h

#	Name	Description/ Definition	T/A/N	Standard	Target
		response time for the middle entry and the entry closest to 90%, 95% and 99% of the number of entries.			
Interconnection links					
W7	Supply time of point of interconnection	Time from placing of order to satisfactory completion of testing of the interconnection There will be few such interconnections and so each one should be reported individually	A	No	Subject to survey – limited to 3 (three) months maximum
W8	New Interconnection Link to a new Point of Interconnection (POI) where there are insufficient network resources along the Interconnection Path and existing network facilities.	Time from placing of order to satisfactory completion of testing of the interconnection There will be few such interconnections and so each one should be reported individually	A	No	< 8 weeks
W9	New Interconnection Link to an existing Point of Interconnection (POI) where there are sufficient network resources and existing network facilities along the Interconnection Path.	Time from placing of order to satisfactory completion of testing of the interconnection There will be few such interconnections and so each one should be reported individually	A	No	< 4 weeks

#	Name	Description/ Definition	T/A/N	Standard	Target
W1 0	Non-availability of interconnection link	% time interconnection link is not available. This should be reported separately for each interconnection link. Average link unavailability = sum of durations of periods when circuits of the same type are not available ---------- x 100 number of circuits * total length of reporting period	N	No	<0.03%
Number Portability					
W11	Time to respond to Authorization requests	Time within which 50% and 90% of authorization requests are responded to. The KPI calculation process shall be the following: 1) Record the time for responding to each request. 2) Make a list of the times and sort the list with the shortest time first. 3) Count the number of entries in the list. 4) Read off the time for the middle entry and the entry closest to 50% and 90% of the number of entries.	N	No	50% in < 2 hours 90% in < 4 hours The target should also be stated in the inter-operator process specification
W12	Most common two reasons for refusing an authorization request	Each time an authorization request is rejected the reason should be recorded and a list of the refusals compiled. The number of refusals for the same reasons should be counted and the two reasons with the highest count should be reported. The purpose is to provide information on how well the porting procedure is working and whether it needs to be changed to make it more effective or whether additional user education is needed.	A	No	Not applicable
Leased Lines such as E1 / E3 / STM-1 / STM-4 / STM-16 / STM-64 / Ethernet 100 Mbps / GigEth					
W13	Leased Line (LL) supply time (where there are no existing network facilities at one end)	The (wholesale) Leased Lines (LL) supply time is the period of time between the instant when the supply event is ordered and the instant when the supply is completed. LL supply time = t (supply completed) - t (supply ordered) Where	A	No	Subject to survey, limited to 3 (three) months maximum

#	Name	Description/ Definition	T/A/N	Standard	Target
		t (supply ordered) is the point in time when the supply event is ordered t (supply completed) is the point in time when the supply is completed The Supply time is measured in working days and should be reported separately for each leased line type (in blue above). The KPI calculation process shall be the following: 1) Record the time for responding to each request. 2) Make a list of the times and sort the list with the shortest time first. 3) Count the number of entries in the list. 4) Read off the time for the middle entry and the entry closest to 99% of the number of entries.			
W14	Leased Line (LL) supply time (where there are sufficient network resources and existing network facilities along the transmission path)	The (wholesale) Leased Lines (LL) supply time is the period of time between the instant when the supply event is ordered and the instant when the supply is completed. LL supply time = t (supply completed) - t (supply ordered) where t (supply ordered) is the point in time when the supply event is ordered t (supply completed) is the point in time when the supply is completed The Supply time is measured in working days and should be reported separately for each leased line type. The KPI calculation process shall be the following: 1) Record the time for responding to each request. 2) Make a list of the times and sort the list with the shortest time first. 3) Count the number of entries in the list. 4) Read off the time for the middle entry and the entry closest to 99% of the number of entries.	A	No	99% in < 20 working days
W15	Unavailability	% time leased lines are not available at the same time. Leased line unavailability = sum of durations of periods when leased lines are not available ---------- x 100 number of leased lines * total length of reporting period The unavailability is measured in seconds and should be reported separately for each leased line type (in grey above).	N	No	< 0.1%

#	Name	Description/ Definition	T/A/N	Standard	Target
W16	Leased Line (LL) Fault report rate Mean Time Between Failures (MTBF)	The LL Fault report rate assesses the faults reported which are not found to be invalid (i.e. the fault report has been accepted as valid and complete by the wholesale network provider). The rate is expressed as: LL Fault report rate = valid faults reported per year ---------- x 100 Number of LL LL MTBF = (8,760 hours)/[(LL Fault report rate)/100] LL Fault report rate and MTBF should be reported separately for each leased line type (in grey above).	A	n/a	< 0.5 % MTBF per LL >1,752,000 hours
W17	Fault repair time	The LL fault repair time is the period of time between the instant when the request for repair occurs and the instant when the fault repair is completed. LL fault repair time = t (fault repair completed) - t (request for repair) where t (fault repair requested) is the point in time when the fault repair is requested t (fault repair completed) is the point in time when the fault repair is completed The KPI calculation process shall be the following: 1) Record the time for responding to each request. 2) Make a list of the times and sort the list with the shortest time first. 3) Count the number of entries in the list. 4) Read off the time for the middle entry and the entry closest to 90 and 99% of the number of entries.	A	No	90% in <4h 99% in <24h
Fixed services – Specific passive services (dark fiber)					
W18	Supply time	The dark fiber supply time is the period of time between the instant when the fiber is ordered and the instant when the supply is completed. Supply time = t (supply completed) - t (supply ordered) where t (supply ordered) is the point in time when the supply event is ordered t (supply completed) is the point in time when the supply is completed	A	based on E1 § 5.1.1	Note: All KPIs will be in accordance to the results of the ongoing consultation on the Reference

#	Name	Description/ Definition	T/A/N	Standard	Target
		The Supply time is measured in working days.			Interconnection Offer (RIO)
W19	Fault repair time	The dark fiber fault repair time is the period of time between the instant when the request for repair occurs and the instant when the fault repair is completed. The repair may be effected by replacing one fiber with another. Fault repair time = t (fault repair completed) - t (request for repair) where t (fault repair requested) is the point in time when the fault repair is requested t (fault repair completed) is the point in time when the fault repair is completed	A	n/a	Note: All KPIs will be in accordance to the results of the ongoing consultation on the Reference Interconnection Offer (RIO)
Duct access					
W20	Duct access information supply time	The duct access information (typically, information on duct access availability at a given location) supply time is the period of time between the instant when the information on duct access is ordered and the instant when the supply is completed. Supply time = t (supply completed) - t (supply ordered) where t (supply ordered) is the point in time when the supply event is ordered t (supply completed) is the point in time when the supply is completed The Supply time is measured in working days.	F	No	Note: All KPIs will be in accordance to the results of the ongoing consultation on the Reference Interconnection Offer (RIO)
W21	Duct access supply time	For ducts for which access is possible, the duct access supply time is the period of time between the instant when the duct access is ordered and the instant when the supply is completed. Supply time = t (supply completed) - t (supply ordered) where t (supply ordered) is the point in time when the supply event is ordered t (supply completed) is the point in time when the supply is completed The Supply time is measured in working days.			Note: All KPIs will be in accordance to the results of the ongoing consultation on on the Reference Interconnection Offer (RIO)

دافغانستان اسلامي جمهوري دولت دولت جمهوری اسلامی افغانستان

(۱۳۸۵) اداره تنظیم خدمات مخابراتی افغانستان

دافغانستان مخابراتي خدمتونو دتنظیم اداره

اترا ATRA

د اسنادو او اړیکو ریاست

Afghanistan Telecommunication Regulatory Authority

3.4 Further specifications of measurement methods

Where Administrative (A) and Network (N) data sources are used, all events should be reported and used in the compilation of the QoS statistics. This applies for the majority of KPIs.

Where Tests (T) are used they should normally be made:

- From a representative sample of network termination points equally spaced around the network (fixed). This applies only for one fixed KPI (R59, video quality);
- From a representative sample of locations equally spaced around the coverage area (mobile).

In this latter case (mobile KPI requiring tests "T"), drive/walk around tests are necessary. For drive and walk around testing mobile networks, it is essential to observe the requirements for test equipment as outlined in detail in section 9 of ITU-T E.804. All tests are based on emulation of a typical user using services provided in a public mobile network. All of the services to be tested can be emulated by the Mobile QoS Test-equipment which can be installed in a vehicle, can be carried around by a pedestrian or is installed for semi-stationary use (e.g. office environment). Measurement profiles need to be defined as outlined in section 10 of ITU-T E.804.

Measurement profiles are required to enable benchmarking of different networks both within and outside national boundaries. It is necessary to have these profiles so that when a specific set of tests is carried out then customers are comparing "like for like" performance. For interpretation and comparability of test results it is important to know in which measurement environment the tests were performed.

The environment classifications described below shall be used. Since the type of the measurement locations may be interpreted differently, the particular understanding of the location type determining a category shall be described in the results report.

Table 4: Stationary tests

Category	Location Type	Additional information
S1O:	airports/railway stations/shopping centers and malls business districts and exhibition areas	outdoor measurement
S11:	airports/railway stations/shopping centers and malls business districts and exhibition areas	indoor measurements

Table 5: Drive tests/Walk tests

Category	Location Type	Additional information
D1:	Train Measurements	
D2:	Urban Areas (medium cities)	
D3:	Highways	
D4:	Rural Areas (country roads)	
D5:	Large cities	
W1:	Walk Tests (indoor measurements)	
W2:	Walk Tests (outdoor measurements)	
NOTE: Drive tests may be performed by in car using external antenna with an appropriate attenuation.		

In the present case (mobile KPIs requiring tests - "T"), the target levels apply throughout the networks and do not take into account any averaging between performance in one location type and performance in another location type. Consequently, if there are indications of poor quality in specific areas, measurements and tests can and should be focused on that location type with the targets applying in full.

It is important to note that the 9 locations types described above can be modified by ATRA if it is observed that less or more categories are needed. Changing the location types does not involve different measurements but only impacts the way QoS measurement results are aggregated together to produce reported KPIs.

Service Providers should mutually agree to select and pay a supplier to conduct tests for mobile services within two (2) months of the date of these QoS Regulatory Procedures. Tests shall then be conducted at the same time for all Service Providers. Details of the test campaign (frequency, locations) should be submitted by Service Providers to ATRA by e-mail one (1) month before campaigns are run and ATRA may require by e-mail within ten (10) calendar days to modify some of the details.

3.5 Specific requirements for satellite Service Providers

Originally telecommunications via satellite made symmetrical use of earth station (huge parabolic antennas) terminals on both ends. Voice communications via such satellite hops were based on digital circuit multiplication equipment between earth stations, thus adding 260 ms one-way delay and a transcoding. There the picture was rather clear: extra delay and extra distortions were compensated by the fact of enabling the communication at all.

Today, telecommunications via satellite is asymmetrical:

- On the one end is a VSAT (Very Small Aperture Terminal), which can be a very small satellite dish, like the ones used to receive TV via satellite, but with both send and receive capabilities or it can be "satellite phone" which connects directly to the satellite telephony service, e.g. Inmarsat. In any case the VSAT terminal is the one close to the user.
- On the other end of the satellite link there is still the large earth station terminal, which connects users either to the Internet or to the global telephony network.

There might be variations of the terminal types on the user side, e.g. the handheld device might not only connect to telephony services but also to the Internet. However most of these access types via VSAT have to be seen as best effort services on shared media. In addition, the segment between the VSAT terminal and the satellite is subject to distortion by strong weather (e.g. rain, or hail), which is not the case for the segment between the large earth station terminal and the satellite.

Therefore, one could set similar KPIs for access via satellite as for access via fixed, with the indication that this applies for "good weather conditions" only, which is difficult to define.

Customer relation and billing KPIs apply to satellite and service specific KPIs apply except all that refer to time (set-up time, etc.). In other words, the following KPI apply: R1 to R10, R22, R26, R27, R34, R39, R43, R47, R49, R51, R55 and R57.

The following KPI is added:

Table 6: Additional KPI for satellite Service Providers

#	Name	Fixed/ Mobile	T/A/ N	Standard	Description/ Definition	Target
R32b	Network latency	VSAT	T	I1 § 7.3.3	The latency (round trip time) is the time required for a packet to travel from the source to the destination and back. It is measured using PING. round trip time = t (packet received) - t (packet sent) where t (packet sent) is the instant when packet is sent t (packet received) is the instant when packet is received Measurements should be made at equally spaced locations in Afghanistan and the results averaged They should also be made at the connection points to the Internet core. Automated PING tests should be made from: • Terminal equipment, or • Network equipment as close to the Network Termination Point as possible. Tests should be made every 30 minutes and the average round trip delay at each time point calculated As an alternative the measurement of the round-trip time can made by evaluating the TCP handshake: • Start: Point of time when the [SYN] is sent. • Stop: Point of time when the [SYN, ACK] is received. This applies to all services that are TCP based, e.g. file transfer (FTP), web browsing (HTTP) and E Mail (POP3, SMTP).	< 600 ms

4. Process and organization

4.1 Reporting and publication procedures

4.1.1 KPI reporting results

The reporting and publication procedures have to take account of the way in which different parameters are measured:

- Where measurements are based on data provided by information systems (data collected by the ordering systems or other administrative systems, marked "A" in the KPI tables in section 3) or data automatically provided by network equipment (data collected or measured within the network measurements, marked "N" in the KPI tables above), KPI measurement results are generally easily (and almost automatically) available to Service Providers. As a consequence, in this case, the QoS measurements result shall be submitted by Service Providers to ATRA every 3 months (see below for the description of the submission process).
- Where measurements require specific test campaigns (marked "T" in the tables), such test campaigns shall be run twice a year. Therefore, the QoS measurements results shall be submitted by Service Providers to ATRA every 6 months (see below for the description of the submission process).

On or before the last day of the month following the end of each quarter (with results averaged over the quarter), Service Providers shall submit to ATRA by e-mail the results of QoS measurements (see 4.1.2 for details on the content and format of this submission).

Table 7: Timelines for QoS reporting

Reporting period	QoS report submission date
1st January to 31st March	By 31st May of the same year at the latest
1st April to 30th June	By 31st August of the same year at the latest
1st July to 30th September	By 30th November of the same year at the latest
1st October to 31st December	By 28th February of the next year at the latest

ATRA shall review the KPI measurement results and the associated potential comments from the Service Providers. Indeed, Service Providers are allowed to mention any relevant comments that can help in understanding the values of the QoS measurements results published by Service Providers and by ATRA. These comments shall be sent with the results to ATRA.

In the absence of comments from ATRA within ten (10) calendar days after results of QoS measurements have been submitted by e-mail to ATRA, Service Providers shall publish the results of KPI measurement results on their website within ten (10) calendar days from the time limit of applying for ATRA to comment (i.e. 10 calendar days after results of QoS measurements have been submitted by e-mail to ATRA). The address of this website should remain stable and information should be accessible from the Service Providers' website front-page. If ATRA raises comments by e- mail, these comments should be taken into account by Service Providers before publication by Service Providers, ten (10) calendar days after ATRA's comments being sent.

Each Service Provider shall be responsible for the QoS measurements submitted to ATRA.

ATRA shall also publish the QoS measurements results on its website, in a manner that enables remote access to the public, free of charge, including a comparison between Service Providers. ATRA may also include international benchmarks. ATRA may include comments sent along with

KPI measurement results in the publication as these comments may allow a better understanding of results.

Before the 30th of April of each year, ATRA shall publish a report on QoS, which should summarize QoS measurement of the year (QoS measurements from Service Providers and if applicable, QoS measurements from ATRA), showing comparison between Service Providers and being relatively easy to understand by end-users.

4.1.2 QoS results reporting content and format

QoS measurement results shall be reported to ATRA by e-mail in a written QoS Compliance Report (QCR). The format of the QCR (Excel sheet) will be specified by ATRA and will include:

1. Detailed documentation describing the measurement system which has been used, including its certificates obtained from independent bodies against measurement standards (e.g. ITU-T Recommendation P.863 Mean Opinion Score for Voice quality);
2. Detailed QoS results including comparison with targets and potential comments from Service Providers (as explained in section 4.1.1); and
3. Explanations of the observed results and details of the actions that the Service Provider plans to undertake to improve quality where it has failed to meet the target. The Service Provider has to explain the reasons for the failure to meet targets and the steps it has taken or will take to improve the quality to the level required.

It is not expected that the first element of the QCR (detailed documentation) will change significantly from a quarter to another. As a consequence, Service Providers shall outline to ATRA changes in this element from a quarter to another.

4.1.3 Network Outages

ATRA defines 4 types of network outages, in accordance with the KPI "Network Outage Repair Time" (R16):

1. Red network outages which affect 10% of more of the customers;
2. Orange network outages which affect between 5% and 10% of the customers;
3. Yellow network outages which affect between 5% and 1% of the customers;
4. Green network outages which affect 1% or less of the customers.

Also, a network outage can be planned or unplanned. A planned network outage is a network outage that the Service Provider knows will happen sixty (60) hours before the outage occurs (for example, as a result of a planned maintenance process). An unplanned network outage is a network outage which is not planned, i.e. a network outage for which the Service Providers does know it will happen or knows it less than sixty (60) hours before the outage occurs. ATRA reserves the right to verify any Service Provider internal document or equipment proving whether the network outage is planned or unplanned.

Service Providers shall inform ATRA about red network outages in a report. This report shall contain:

- A qualitative description of the network outage in terms of initial causes, affected network elements and nodes, affected transmission links, consequences on voice, data, video, Internet traffic;
- A quantitative evaluation of the number affected subscribers for each service or retail product sold by the Service Provider and the duration of the problem;
- A description of the long-term action plan defined by the Service Provider to improve the network resilience against such internal or external outage causes.

The report shall be sent by email to ATRA within five (5) calendar days after the start of the network outage.

For planned network outages, Service Providers should notify their customers, by all necessary means, and ATRA, by e-mail, at least forty-eight (48) hours in advance. This notification should specify the expected duration of the network outage as well as a list of services affected by the network outage and, if relevant, geographic locations affected.

For unplanned network outages, Service Providers should notify their customers and ATRA about service disruptions or outages which impact customer services from the moment the start of the service disruption/outage (within maximum 2 hours from the service disruption/outage). This notification should specify the expected duration of the network outage as well as a list of services affected by the network outage and, if relevant, geographic locations affected. Notifications should be broadcast over social networking sites such as Twitter and Facebook and over the Service Provider website front-page and except in case the network outage affect SMS services also, customers should be notified by SMS.

4.2 Measurement validation and audit

From time to time and as deemed necessary, ATRA may audit the QCR by a variety of methods, including:

- Validity controls such as:
  1. Checking the consistency of reported data;
  2. Reviewing the internal procedures used by the Service Provider to collect data from its own systems, including checks with its administrative or technical staff to verify that the internal procedure has been correctly followed;
  3. Launching queries on the Service Provider systems;
- Performance Controls by ATRA or by independent field tests conducted by third party companies contracted by ATRA, specialized in QoS testing and certified in fixed and/or mobile QoS domains. Performance Controls consist in measuring some or all of the KPIs listed in section 3, in parallel of Service Providers' own measurements (as required by these QoS Regulatory Procedures), from time to time to verify that QoS measured through these Performance Controls is equivalent from QoS measured by Service Providers for the purpose of meeting their QoS obligations.

These audit methods will allow ATRA to:

- Identify KPIs that are appropriately measured and KPIs that are not measured in accordance with the requirements of QoS Regulatory Procedures. In the latter case, enforcement actions will be taken by ATRA (see section 4.3). Such a case is equivalent to a failed target.
- Measure KPIs and verify whether Service Providers meet the targets associated with the KPIs:
  - For KPIs listed in section 3 which must be measured by Service Providers using test campaigns (labelled as "T"), ATRA's Performance control measurements will show whether Service Providers meet the requested targets. If not, enforcement actions will be taken by ATRA (see section 4.3). Such a case is equivalent to a failed target.
  - For KPIs listed in section 3 and which must be measured by Service Providers using data collected by the ordering system or other administrative system (labelled as "A") or using data collected or measured within the network measurements (labelled as "N"), ATRA's Performance Control measurements will enable to verify that the results of the measurements are similar to Service Providers' measurements. If the comparison shows significant differences (+/-10%), then ATRA will launch an investigation which

will aim at understanding the reasons for differences. If at the end of the investigation, it appears that the KPI at stake was not measured in accordance with the requirements of the QoS Regulatory Procedures, the associated target will be considered as not met (and enforcement actions will be taken by ATRA, see section 4.1.3). The Service Provider will be obliged to adapt the measurement methodology for this KPI for the next quarter.

4.3 Enforcement

The QCR as well as Performance Controls described in section 4.2 will enable ATRA to identify those KPIs for which the targets set in section 3 are not achieved.

When a target is not achieved, the Service Provider must rectify the failures within forty-five (45) calendar days of the date of submission of the QCR by e-mail to ATRA. If the failure leading to the target not being met requires more than forty-five (45) calendar days to be remedied, the Service Provider must provide justifications to ATRA in the QCR in writing. Only if the justifications are accepted by ATRA, will the Service Provider be given three (3) months from the date of submission of the QCR by email to ATRA to achieve the level of quality required.

ATRA will advise the Service Provider within fifteen (10) calendar days of receipt of a QCR that includes an explanation regarding non-compliance whether it accepts the reasons provided by the Service Provider for not meeting the required targets. If a reply is not provided within the above-mentioned period, or if a specific delay to answer is not set by ATRA, the QCR including the explanation shall be deemed accepted by ATRA.

If the Service Provider delivers, within the forty-five (45) calendar day or the three (3) month period, a report demonstrating by measurements that the breach has been remedied, the matter is closed. If not, the Service Provider will have to pay same amounts as for failed target.

If the KPI does not meet the requested target in the next quarter or if the Service Provider does not provide in time a report which demonstrates by measurements that the breach has been remedied or in the "failed target" cases mentioned in section 4.2, ATRA shall proceed with enforcement action and shall call in the relevant Performance Bonds (see section 4.4) per established non-compliance as set out below:

a. 600 000 Afghanis per failed target on a quarterly basis;
b. 100 000 Afghanis per day delay for late QCR submission;
c. 3 000 000 Afghanis per inconsistent QCR (above 10 inconsistencies). An inconsistency is a wrong target value in the QCR, i.e. not in line with what has been really measured by the Service Provider;
d. 3 000 000 Afghanis for each network outage obligation not fulfilled.

ATRA will issue penalties for breaches to the QoS Regulatory Framework in cases where performance bonds are not available.

If the Service Provider applies compensation scheme of same amount to its end-users, then Performance Bonds will not be called in by ATRA. In this respect, when a Service Provider is not compliant with its QoS obligations (failed target, delay for late QCR submission, inconsistent QCR, network outage obligation not fulfilled), it will have two (2) months to compensate end-users through a reduction on their invoice. The compensation should be fair between all end-users or affected end-users. When a Service Provider decides to compensate end-users, it shall inform ATRA about this by email so that ATRA can stop the enforcement process. Once end-users are compensated, the Service Provider shall send to ATRA by e-mail a report detailing the list of customers being compensated and the amount of compensation and the methodology to allocate this compensation between end-users. If the compensation is equal or above the level of the

accrued Performance Bonds which should have been called by ATRA, then no additional performance Bond will be required by ATRA. If the compensation is below the level of Performance Bond imposed by ATRA, an amount equal to the difference between the initial Performance Bonds and the compensation granted to end-users will be called in by ATRA.

4.4 Performance bonds

Consistent with the terms above and in accordance with Schedule A of the Mobile Services licenses and Clause 19 of the Fiber Optic Network licenses, Service providers must execute and provide to ATRA a Performance Bond, payable to ATRA for an amount calculated on the basis of six hundred thousand Afghanis (600,000) per applicable KPI per month, three million Afghanis (3,000,000) per QCR per quarter and three million Afghanis (3,000,000) per network outage guaranteeing the fulfillment of each Service Provider Secured Obligations regarding the QoS Regulatory Procedures for each financial year.

The Performance Bonds shall be in the form of a bank guarantee issued by a bank operating in the Islamic Republic of Afghanistan and shall provide for an unconditional and irrevocable undertaking on the part of the issuing financial institution to pay the amount stipulated by this Instruction, or any subsequent amendment, for the Secured Obligation in question.

Within twenty-one (21) days of the date of these QoS Regulatory Procedures, each Service Provider must submit to ATRA for approval the name of the financial institution it has selected to issue the bond. The Performance Bond must be executed and provided to ATRA within two (2) weeks of ATRA's approval of the issuing financial institution. The Completion Deadline for this Performance Bond will be January 1st, and the Performance Bond for a given financial year shall remain in force for a period of nine (9) months following the Completion Deadline. In the case of a dispute with respect to the Service Provider's compliance with the Secured Obligation, the term of the bond shall be extended automatically in accordance with the provisions of Schedule A of the Mobile Services licenses and Clause 19 of the Fiber Optic Network licenses.

Each Service Provider shall procure that the issuing financial institution shall undertake, irrevocably and unconditionally, to pay to ATRA the full value of the Performance Bond pertaining to a specific Secured Obligation on demand if and when ATRA provides such institution with written notice confirming that the conditions for payment have been met. Such notice shall be delivered by ATRA to the issuing financial institution prior to the expiry of the relevant component of the Performance Bond, including any extensions thereto that may be notified by ATRA in accordance with the provisions of Schedule A of the Mobile Services licenses and Clause 19 of the Fiber Optic Network licenses of each Service Provider license.

The terms of the Performance Bond shall make clear that the issuing financial institution's obligation to pay shall not be excused for any reason, including but not limited to: any dispute regarding the Service Provider's performance under the QoS Regulatory Procedures; external factors allegedly affecting performance under the QoS Regulatory Procedures; or any alleged act or omission by ATRA or any third party.

Any dispute concerning the Performance Bonds shall be resolved exclusively in accordance with the procedures set forth in Clause 42 of the Mobile Services licenses and Clause 18 of the Fiber Optic Network licenses.

4.5 Exemption

No Performance Bond will be applied for failure to comply with targets within a period of 6 months after the introduction of a new service (i.e., the commercial launch date of the new service)

or after the introduction of a new KPI, including after the publication of the QoS Regulatory Procedures.

When a KPI is replaced by a new KPI or if targets are modified for a given KPI (see section 1.5), the first year period will be a period for adjustment and upgrading. Thus, the Service Providers will have one year to comply with the targets of the new KPI or the new targets, and in such a case, the targets of the previous KPI definition will continue to apply for a period of one year.

4.6 QoS measured by customers

As explained in section 2.1, in parallel of the traditional approach to regulate QoS which is based on KPIs, targets and enforcement processes, ATRA intends to promote the use by customers of applications enabling them to test their own QoS.

QoS testing initiated by end-users has the advantage of offering a large number of test samples with little effort on the side of operators and regulatory authorities. It can also give users an immediate insight into their telecommunication situation. In comparison to traditional measurement methodologies (drive testing, etc.), the data achieved should be more realistic.

Such solutions are more and more used by regulatory authorities. The following examples can be cited:

- The German regulatory authority (BNA) describes in the report "The Quality of Service of Broadband Accesses" (April 2013) how it conducted end-user measurements. (see https://www.bundesnetzagentur.de/SharedDocs/Downloads/EN/Areas/Telecommunications/Companies/TelecomRegulation/QualityStudy/QualityStudy_2013.pdf?__blob=publicationFile&v=2)
- In January 2016, the European Commission launched a 3-year project for Mapping of Broadband Services in Europe. It aims to develop an interactive online mapping application that enables visualization of Quality of Service (QoS) for all EU and EEA Member States. (January 2016). (see https://ec.europa.eu/digital-single-market/en/broadband-and-infrastructure-mapping-project)
- Such an initiative is continuously conducted by the FCC in the USA in the project "Measuring Broadband America" Project. (see https://www.fcc.gov/general/measuring-broadband-america)
- The French regulatory authority ARCEP explains in its 2013-0004 decision how it intends to conduct QoS tests initiated by end-users to complement and verify results of measures conducted by operators (July 2015). (see https://www.arcep.fr/uploads/tx_gsavis/13-0004.pdf)
- In Colombia the regulatory authority has established a system where an application on the mobile phone rates radio QoS parameters and these data are automatically accumulated to calculate fines to operators. (see https://www.crcom.gov.co/es/pagina/medicion-calidad)

However, there is a risk of abuse with such solutions. Crowd testing is controversial in the international QoS community since it is difficult to make sure measures are representative ("unhappy" customers may be over represented, results may highly depend on the types of mobile phones used by customers, etc.). These types of solutions are therefore complementary to the list of KPIs and targets provided in these QoS Regulatory Procedures.

Several solutions are available or in development for mobile networks and for fixed broadband networks. ATRA intends therefore to promote such solutions.

4.7 ATRA organization

ATRA intends to take a proactive role in implementing the QoS Regulatory Procedures in Afghanistan. In doing so, ATRA will aim to represent the interests of end-users.

In addition to the work that ATRA has already undertaken in developing the QoS Policy and Regulatory Framework, ATRA will:

1. Collect data on QoS provided by Service Providers;
2. Verify/audit the results of measurements performed by Service Providers;
3. Make its own independent measurements of some critical parameters;
4. Audit and review processes and measurements conducted by Service Providers in relation to QoS;
5. Provide relevant useful information to end-users;
6. Encourage QoS improvements in line with international standards and best practices;
7. Adapt and reduce the requirements imposed on Service Providers as competition becomes effective;
8. Engage in consultation with Service Providers on a regular and periodic assessment of the implementation of these QoS Regulatory Procedures and the need to amend them, taking into account new services and technologies and changes in customer expectations;
9. Conduct specific studies on key QoS issues such as:
   - dedicated measurement campaigns;
   - customer satisfaction studies;
   - on anticipated future QoS issues for "looking forward" purposes;
   - on critical QoS issues (e.g. ones that attract many complaints), or critical network outages.
10. Promote applications enabling customers to test their own QoS;
11. Publish annual reports on QoS; and
12. Identify non-compliance cases (e.g., targets not being met) and apply the appropriate enforcement actions (see section 4.3);

5. List of acronyms and definitions

3GPP	3rd Generation Partnership Project
Access network	An access network is a telecommunication network which connects directly end-users. This is sometimes referred as the local loop or as the last mile
Ancillary services	Services that are ancillary to the sale or provision of basic services, which may include co-location services, patching services, duct space, cabling services and in-house-wiring
ATRA	Afghanistan Telecommunications Regulatory Authority
Bitstream services	Service where a fixe wired network operator installs a high-speed access link to the customer's premises (e.g., by installing ADSL equipment in the local access network) and then makes this access link available to third parties, to enable them to provide high speed services to customers
Core network	A core network is a telecommunication network's core part, which offers numerous services to the customers who are interconnected by the access network
CQI	Channel Quality Indicator
CTV	Coverage in cities, towns and villages
Customer relationship	Service Provider activity aiming at managing the relationship with customer (i.e. managing complaints, providing support, etc.)
dBm	Power ratio in decibels (dB) of the measured power referenced to one milliwatt (mW)
E1	E1 is a European digital transmission format that offers dedicated 2.048 Mbps
E3	E3 carries 16 E1 signals with a data rate of 34.368 Mbps
ETSI	European Telecommunications Standards Institute
FDD	Frequency Division Duplexing
Fixed passive network	Fixed wired network (see below) which only provide passive services, i.e. services which provide access to a physical medium
Fixed wired network	A telecommunications network that facilitates the conveyance of signals by means of wireline facilities between points at fixed locations on the network
Fixed wireless network	A telecommunications network that facilitates the conveyance of signals by means of wireless facilities between points at fixed locations on the network
FTTH	Fiber To The Home
FTP	File Transfer Protocol
GE	Gigabit Ethernet (GigEth)
HTTP	Hypertext Transfer Protocol
IMS	IP Multimedia Subsystem
ISP	Internet Service Provider
ITU	International Telecommunications Union
Kbps	Kilobits per seconds

KPI	Key Performance Indicator
LL	Leased Lines, Service contract between a Service Provider and a customer, whereby the Service Provider agrees to deliver a symmetric telecommunications line connecting two or more locations in exchange for a monthly rent
Mbps	Megabits per second
MMS	Multimedia Messaging Service
Mobile networks or Public Mobile telecommunications network	Any network over which Mobile Services are provided by a holder of a Public Mobile Telecommunications Networks and Services Authorization to the general public on a commercial basis
MOS	Mean Opinion Score
NPAS	Number Portability Access Seeker
Number portability	Any service by which a customer can retain any existing number without any difficulty or impairment of the quality of the service or its availability, when changing his location or switching from one Service Provider to another
PING	Packet Internet Groper
PMQMTS	Procedure for Measuring the Quality of Mobile Telecommunication Services
QCR	Quality of Service Compliance Report
QoE	Quality of Experience
QoS	Quality of Service
Service Provider	Person that is licensed to provide one or more telecommunications services to the public or licensed to own, establish or operate a telecommunications network to provide telecommunications services to the public. This includes providers of information or content provided using a telecommunications network
SMS	Short Message Service
STM-1	Synchronous Transport Mode 1 (155.520 Mbps)
STM-16	Synchronous Transport Mode 16 (2,488.320 Mbps)
STM-4	Synchronous Transport Mode 4 (622.080 Mbps)
STM-64	Synchronous Transport Mode 4 (9,953.280 Mbps)
STQ	Speech and multimedia Transmission Quality
TV	Television
UMTS	Universal Mobile Telephone System
VoIP	Voice over IP
VSAT	Very Small Aperture Terminal
Wholesale services	Services provided by one Service Provider to another Service Provider (as opposed to retail services provided by one Service Provider to an end-user)