Quality of Service Regulation
Decision on Measurements and Targets

Public Consultation

20 April 2014

Ref: TOD/0414/002

Purpose: to seek stakeholder's views on the proposed revise Quality of Service Regulation and the proposed Decision setting the Measurements and associated binding Targets.
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Instructions for submitting a response

1. The Telecommunications Regulatory Authority (the ‘Authority’) invites comments on this consultation document and annexes from all interested parties. Comments should be submitted to the Authority by no later than 4pm, 20 May 2014.

2. Responses should be sent to the Authority preferably by email (or by post or hand in electronic format, word or Excel) to the attention of:

   **Post:**
   Director, Technical & Operations Department
   Telecommunications Regulatory Authority
   P.O. Box 10353
   Manama, Kingdom of Bahrain

   **Hand:**
   Director, Technical & Operations Department
   Telecommunications Regulatory Authority
   5th Floor, building 852, road 3618, Seef 436

   **Email:**
   consultancy@tra.org.bh

3. Responses should include:
   a) Title should indicate “Answer to Public Consultation on Quality of Service Regulation”
   b) the name of the company/institution/association etc.;
   c) the name of the principal contact person; and
   d) full contact details (physical address, telephone number, fax number, and email address); or
   e) name and contact details for responses submitted by individual consumers

4. The Authority expects the responses to follow the same structure as set out by the list of questions in this consultation document. The Authority also invites respondents to substantiate their responses to the questions raised, wherever possible by providing factual evidence to support their responses.

5. In the interest of transparency, the Authority may make all submissions received available to the public, subject to the confidentiality of the information received.

6. The Authority will evaluate requests for confidentiality in line with relevant legal provisions and the Authority’s published guidance on the treatment of confidential and non-confidential information.¹

7. Respondents are required to clearly mark any specific information included in their submission which they consider to be confidential. Where such confidential information is included respondents are required to provide both a confidential and non-confidential version of their

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submission. If a submission is marked confidential in its entirety, reasons for this should be provided. The Authority may publish or refrain from publishing any document or submission at its sole discretion.

8. For enquiries:

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Introduction

9. On 11 September 2008, the Telecommunications Regulatory Authority (the “Authority”) issued the Quality of Service Regulation (the “2008 Regulation”) following a consultation process with stakeholders. The 2008 Regulation was published in the Official Gazette on 22 January 2009.

10. Qualities of Service ("QoS") reports have since been submitted by licensed operators on quarterly basis and the Authority believes that the 2008 Regulation and associated Measurements are now due for review.

11. In addition, the Authority contemplates the introduction of a number of QoS performance Targets that should be met by operators licensed to provide telecommunications services in the Kingdom of Bahrain ("Bahrain").

12. The purpose of this document is to seek comments from the industry and interested parties regarding the following:
   a. The draft QoS Regulation; and
   b. The draft Decision related to:
      i. The set of revised Measurements; and
      ii. The set of binding Targets associated with specific Measurements.

13. The Authority’s views as expressed in this consultation document are intended to provide an explanation and background to the proposed draft Regulation and draft Decision.

14. Capitalized terms defined in this consultation document shall have the same meaning as set by the Telecommunications Law and the draft QoS Regulation in Annex 1.
1 Review of the Regulation

1.1 Description of main changes

15. The draft QoS Regulation is available in Annexe 1.

16. The main proposed modification is to separate
   a. the general provisions that defines the QoS framework and the obligation of Licensed Operators to submit a set of Measurements, on one side; and
   b. the technical provisions that set a list of Measurements and Targets which should be met by Licensed Operators, on the other side.

17. The proposed scope of the draft QoS Regulation would apply to Targets associated with specific Measurements. The review of individual Targets is discussed in section 3 of this document.

18. The Authority is of the view that quarterly submissions remain appropriate for the size and the maturity of the market in Bahrain.

19. It is of paramount importance that operators submit accurate Measurements. While reserving the right to appoint external auditors to verify the submitted measurements, the Authority also proposes to request that officers of the company validate the submitted measurements in a “self-certification” process.

20. The Authority also proposes to introduce a new set of obligations related to Major Incidents, Major Planned Work and Major Emergency Maintenance.
1.2 Reasoning for the changes made to the Regulation

The need for a review of the QoS Regulation

21. A study on best practices for regulatory implementation\(^2\) showed that, in most advanced markets, national regulatory authorities have mandated licensed operators to submit QoS measurements. The Authority is satisfied to keep the reporting obligation that was initially set by the 2008 Regulation.

22. However, it is now time to revisit the 2008 Regulation which was promulgated more than 5 years ago in a context that has since undergone considerable changes. Such changes include, among others:

   a. **the market structure**: in the last 5 years, the telecommunications market in Bahrain has witnessed the consolidation of the two fixed wireless operators that were licensed in 2006; the emergence of an additional licenced mobile operator in 2010; and the continued development of other licensed operators competing in retail markets based on wholesale inputs provided by Batelco.

   b. **the mix and penetration of telecommunications services**: as seen in Figure 1 below, the period 2008-2013 is characterised by a strong increase in the penetration of broadband services, mostly driven by fixed wireless broadband and mobile broadband adoption.\(^3\)

   c. **the technologies deployed by operators**: for instance, Next Generation Network (‘NGN’) technology has been deployed by several operators, which in turn has introduced separation between service and network layers, thereby creating a new technological environment.

23. The Authority considers that all the above market and technology evolutions call for a review of the QoS regulatory framework.


Figure 1: Number of broadband subscribers by access type

Note: no data available on add-on mobile broadband and pay-per-use mobile broadband for the years 2010 and 2011. Source: The Authority’s analysis based on data submitted by operators

24. The objective of the draft QoS Regulation remains the same as the 2008 Regulation i.e. to set well defined and appropriate approach to monitor QoS, with the End User as the ultimate beneficiary.

The QoS cycle and the End User point of view

25. The proposed modifications are in line with the 2001 ITU-T Recommendation G.1000\(^5\) which establishes a uniform QoS cycle, which combines the four viewpoints of QoS, as summarized in the figure below.

Figure 2: The four viewpoints of QoS

Source: ITU G.1000

26. The main elements of the QoS cycle described by the ITU Recommendation can also be found in more details in a technical report prepared by the European Telecommunications Standards

\(^5\) ITU-T Rec G.1000 TRANSMISSION SYSTEMS AND MEDIA, DIGITAL SYSTEMS AND NETWORKS - Quality of service and performance - Framework and Definitions
Institute\textsuperscript{6} (ETSI). As seen in Figure 3 below, ETSI’s description includes the underlying relationships between service and network layers in the QoS cycle. It is pertinent to note the QoS cycle applies equally if the service provider and the network provider are the same entity, or separate entities.

\textbf{Figure 3: Various viewpoints of QoS}

27. The Authority, following the QoS cycle approach, is of the view that QoS observed from the point of view of the End User is appropriate and therefore puts emphasis on Measurements that are related to the level of QoS achieved by operators for end-to-end services.

28. The Authority further notes that the reliability of QoS level is underpinned by the combined performance of a number of elements, network or non-network related. However, it is the operator’s responsibility to implement the network performance objectives and network performance measurements, necessary to fulfil the QoS requirements of the service.

29. The Authority will not, at this stage, impose on operators an obligation to report on Measurements related to network performance. Accordingly, all network-related measurements have been removed from the list of Measurements.

30. However, in the event of an effective failure to meet QoS Targets set for specific services, the Authority may request the operator to submit additional network-related QoS measurements.

\textbf{Review of Measurements and Targets}

31. Apart from being customer-oriented, the QoS cycle approach is also characterised by the iterative review process under which the appropriate setting of Measurements and Targets are re-valuated on a regular basis.

32. Under the existing 2008 Regulation, it is currently not practical to have such regular reviews as any changes made to Measurements and Targets would have to be acted by introducing specific amendments to the Regulation, de facto requiring a lengthy legal process.

\textsuperscript{6} Source: ETSI ETR 003 Network Aspects (NA); General aspects of Quality of Service (QoS) and Network Performance (NP)
33. To facilitate reviews on a regular basis and to improve the overall QoS Regulation efficiency, the Authority proposes to remove the Measurements and Targets from the Regulation and to include them in a Decision. The Decision process is a more amenable process which would ensure a more dynamic QoS framework, allowing for interaction with Licensed Operators and consumers.

34. While the process for amending the Regulation would remain the same, any changes to the Measurements and Targets would be consulted with Licensed Operators and consumers and implemented by way of a Decision. A similar process has been adopted by the Regulator in Lebanon.\(^7\)

35. The Authority intends to assess the opportunity to review some or all Measurements and Targets on a regular basis, and if this is deemed appropriate, to consult stakeholders on the proposed changes.

36. The proposed review process is similar in its approach to the ITU chart reproduced below (illustrative example).

37. If the Authority issues a Decision to introduce a new Measurement and/or Target, the Authority considers that the default period of three calendars month is a sufficient time for implementation. The Authority will however be minded to take into account Operators’ feedback during the consultation period, and when necessary on a case by case basis, set a different time window for implementation.

Reporting period

38. The Authority intends to maintain the current reporting period to a calendar quarter, as it is the case in many other jurisdictions. The Authority is of the view that reducing the reporting period to a calendar month would not be an efficient use of operators’ and the Authority’s resources, and that extending the period to a calendar year would not provide consumers with sufficient granular data to meet the Regulations’ objective of informing consumers, nor will the Authority be in a position to monitor QoS in a timely manner and react to any significant degradation. This is in line with the recommendation from the European Telecommunications Standards Institute (ETSI). 8

Binding Targets

39. The Authority’s intention to set specific binding Targets is a natural evolution of the work started in 2008 and this intention had been communicated to Operators in the past. The Authority has been minded to gather Measurements over a time period that is significant enough9 to provide a reasonable view of the performance of the industry in Bahrain, based on inputs provided by Operators themselves.

40. The setting of QoS Targets follows a similar evolution as seen in Europe. In defining a common regulatory framework for network and communications services, 10 the European Parliament and Council have included the provision for national Regulatory bodies to set minimum QoS performance obligations.

41. Further, the Authority has conducted an internal study to gather publically available QoS indicators published by regulatory bodies in other countries in order to benchmark the Measurements and Targets set elsewhere. As part of this exercise, the Authority has also benchmarked the performance achieved by operators in such countries. A summary table of such benchmark is available in Annex 3.

Accuracy and integrity of reported QoS information

42. To guarantee a faithful representation of the QoS achieved in Bahrain, the integrity of Measurements provided by Operators is of primary importance. While it would not be practical for the Authority to audit every Measurement submitted by Operators in each quarter, the Authority however reserves its rights to audit such Measurements and to exercise its powers where it deems necessary.

43. Ultimately, it is the responsibility of each Licensed Operator to provide accurate Measurements, in accordance with the Regulation requirements in terms of time and format, and in line with the definition specified for each individual Measurement. In case a specific measurement is falling outside the range of expected values, it is also the responsibility of each Licensed Operator to provide detailed explanations and justifications.

44. The Authority’s proposal is therefore to mandate a self-certification process whereby a senior officer of the Licensed Operator validates all Measurements that are submitted to the Authority. While it may not have yet been formalised, the Authority would expect such validation process to be already taking place in a form or another within Operators’ organisation.

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8 ETSI EG 202 057 4.7 Data collection period
9 Quarterly QoS submissions have been received since Q2 2009
45. Keeping in mind that the objective of the Authority is to publish the measurements provided; it appears coherent for the Authority to impose to Operators such internal validation process. The alternate solution would be to impose the use of an independent party to review and certify Measurements submitted. However in consideration with the costs associated with such obligation, this option is not mandated at this time.

Q1. **Do you agree with the Authority’s proposed amendments of the QoS Regulation, to separate the Regulation itself from the Measurements and Targets? Please elaborate**
1.3 Reasoning for the new requirements

46. The Authority is proposing the introduction of new requirements with consideration to the importance of Telecommunications services to Mass market and Business in the case of severe degradation or total disruption of one or several services. This is in line with similar approach taken by other regulatory bodies such as Lebanon.

47. The proposed new obligations are as follow:
   a. Operators shall notify the Authority in case of Major Incident
   b. Operators shall seek the Authority’s prior approval in case of Major Planned Work and,
   c. Operators shall notify the Authority in case of Major Emergency Maintenance.

48. The common characteristic of the 3 situations listed above is that they each impact on a large proportion of consumers resulting in a totally disrupted or severely degraded service or services, or has the potential to do so in the case of planned maintenance.

49. The Authority requires that, in the case of a Major Incident, it should be informed by Licensed Operators in writing upon the occurrence of such event, and be provided a post-mortem analysis of the incident, including lessons learned as appropriate.

50. The Authority advises that no licensed operator should intentionally interrupt the operations of its network (or any part thereof) in the normal course of business, nor may in the normal course of business suspend the provision of any type of Licensed Telecommunications Service without having first obtained the approval of the Authority in writing and providing reasonable advance notice to consumers to be affected by such interruption.

51. The Authority is of the view that a minimum 2-week advance notice is reasonable.

52. The Authority understands that Emergency Maintenance would not fall in the same category as Major Planned Work, the significant characteristic of an Emergency Maintenance being the absence of planning due to the reactive nature of the action in front of an unplanned event. However, the Authority considers that it should still be notified promptly by Operators under such circumstances.

53. The Authority has annexed a Form to the draft QoS Regulation that should be used by Licensed Operators to communicate in the occurrence of such Major event.

Q2. Do you agree with the Authority’s intention to introduce new obligations related to Major Incidents, Major Planned Work and Major Emergency Maintenance? Please elaborate.
1.4 Reasoning for the setting of fines

54. In line with other jurisdictions, the Authority believes that, by way of deterrent, it should impose a fine for each failure to comply with the Quality of Service Regulation and Decision.

55. The Authority considers that, on the basis of the foregoing, an operator which fails to submit information or which submit false information should be subject to an appropriate fine.

56. Similarly, a single failure to perform a Measurement or to meet a Target should attract a level of penalty set by a mechanism that makes a distinction between those contraventions that have marginally failed to satisfy the Targets and those that have failed to do by a wider margin.

57. The Authority is proposing the following fines

<table>
<thead>
<tr>
<th>Offences</th>
<th>Maximum fine per Contravention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure by a Licensee to perform measurement, reporting and record keeping tasks set out in this QoS Regulation</td>
<td>BHD 500 for each act of contravention and BHD 50 for each day that the contravention continues to occur.</td>
</tr>
<tr>
<td>Failure by a Licensee to meet and maintain a Target for the Parameter and the Service.</td>
<td>BHD 1,000 per unit of deviation below the Target for the Parameter and the Service for each act of contravention</td>
</tr>
<tr>
<td>Failure by a Licensee to submit, during a time period specified by the Authority, information requested by the Authority pursuant this Regulation.</td>
<td>BHD 500 for each act of contravention and BHD 50 for each day that the contravention continues to occur.</td>
</tr>
<tr>
<td>Submission and/ or publication of false or misleading information about quality of service by Licensee</td>
<td>BHD 5,000 for each act of contravention.</td>
</tr>
</tbody>
</table>

58. In the case of repetitive offences, the Authority may treat such failure as a severe breach of the Licensed Operator's licenses and the provisions of the Telecommunications Law and may take any enforcement step according to Article 35 of the Telecommunications Law.

59. In the following paragraphs, the Authority provides illustrative examples on how such fines would be calculated.

Submission of incomplete QoS report

60. When a licensed operator subject to reporting obligations fails to provide a Measurement; the applicable fine will be set based on the following:

   a. BHD 500 for not submitting the Measurement at the due date for submission
   b. BHD 50 for each additional day up to the end of the quarter (i.e. a maximum of 92 days in Q3)
   c. Total maximum fine for the contravention 500 + 92 x 50 = BHD 5,100
**Failure to meet a Target**

61. When a licensed operator fails to meet a Target for a particular Measurement; the applicable fine will be set based on the following principles.

**Maximum percentage**

62. Case 1: the target is a maximum percentage which should not be exceeded:
   a. Target: \( \leq 3\% \);
   b. Increment deviation from the target: 1%; and
   c. Fine per increment deviation from the target: BHD 1,000

63. In this scenario, when the operator’s measurement exceeds the target, the total applicable fine is calculated as follows:

\[
\text{Total Fine} = \left\lceil \frac{\text{Operator's Measurement} - \text{Target}}{\text{Increment Deviation}} \right\rceil \times \text{Fine per Increment Deviation}
\]

where the function \( \left\lceil x \right\rceil \) returns the nearest positive integer

\[
\text{Total Fine} = \left\lceil \frac{\text{Operator's Measurement} - 3\%}{1\%} \right\rceil \times \text{BHD 1,000}
\]

64. The total applicable fine for different levels of performance is presented in the below table.

<table>
<thead>
<tr>
<th>Operator’s measurement (reported result)</th>
<th>Total applicable fine</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.85%</td>
<td>No fine</td>
</tr>
<tr>
<td>3.00%</td>
<td>No fine</td>
</tr>
<tr>
<td>3.01%</td>
<td>BHD 1,000 = 1 \times 1,000 BHD</td>
</tr>
<tr>
<td>3.99%</td>
<td>BHD 1,000 = 1 \times 1,000 BHD</td>
</tr>
<tr>
<td>4.00%</td>
<td>BHD 1,000 = 1 \times 1,000 BHD</td>
</tr>
<tr>
<td>4.75%</td>
<td>BHD 2,000 = 2 \times 1,000 BHD</td>
</tr>
<tr>
<td>5.00%</td>
<td>BHD 2,000 = 2 \times 1,000 BHD</td>
</tr>
<tr>
<td>6.42%</td>
<td>BHD 4,000 = 4 \times 1,000 BHD</td>
</tr>
<tr>
<td>10.01%</td>
<td>BHD 8,000 = 8 \times 1,000 BHD</td>
</tr>
</tbody>
</table>
**Maximum time**

65. Case 2: the target is a maximum time which should not be exceeded:
   a. Target: ≤ 4 hours;
   b. Increment deviation from the target: 2 hours; and
   c. Fine per increment deviation from the target: BHD 1,000

66. The total applicable fine is calculated in the same manner as the above scenario (see below table)

<table>
<thead>
<tr>
<th>Operator's measurement (reported result)</th>
<th>Total applicable fine</th>
</tr>
</thead>
<tbody>
<tr>
<td>03:43</td>
<td>No fine</td>
</tr>
<tr>
<td>04:00</td>
<td>No fine</td>
</tr>
<tr>
<td>04:01</td>
<td>BHD 1,000 = 1 × 1,000 BHD</td>
</tr>
<tr>
<td>06:00</td>
<td>BHD 1,000 = 1 × 1,000 BHD</td>
</tr>
<tr>
<td>06:01</td>
<td>BHD 2,000 = 2 × 1,000 BHD</td>
</tr>
<tr>
<td>06:17</td>
<td>BHD 2,000 = 2 × 1,000 BHD</td>
</tr>
<tr>
<td>10:20</td>
<td>BHD 4,000 = 4 × 1,000 BHD</td>
</tr>
<tr>
<td>15:30</td>
<td>BHD 6,000 = 6 × 1,000 BHD</td>
</tr>
<tr>
<td>23:00</td>
<td>BHD 10,000 = 10 × 1,000 BHD</td>
</tr>
</tbody>
</table>

**Q3. Do you agree with the Authority’s proposed fine regime? Please elaborate.**
2  Review of the Decision on Measurements and Targets

67. The draft Decision is available in Annexe 2.

68. The proposed amendments aim at improving the following number of points identified by the Authority:
   
   **Issue 1**  Simplify the number of Measurements in removing when appropriate a number of sub-measurements or a measurement itself.
   
   **Issue 2**  Setting thresholds for a minimum subscriber’s number for a service that triggers the requirement to submit measurements for the service.
   
   **Issue 3**  Segregate between Business and Mass market services since those are very often characterised with different performance levels.
   
   **Issue 4**  Segregate between Fixed and Mobile services, in particular in the case of broadband.
   
   **Issue 5**  Address separately wholesales services for Operators subject to SMP/Dominance obligations.

2.1  Reasoning for the changes made to the list of Measurements

69. The proposed list of Measurements is included in the draft Decision.

70. Some Measurements (or part thereof) have either only partially been implemented or have not been implemented at all. This situation resulted mainly due to practical issues such as:
   
   a.  a number of sub-criteria difficult to capture and compare;
   
   b.  the inability of tools or business process to capture the required data;
   
   c.  very specific technical aspects requiring particular implementation; and
   
   d.  lack of clarity on what could be achieved from the results analysis.

71. The Authority has therefore revisited those Measurements which it considers as candidates for simplification or removal. Following the approach described in the following paragraphs, the Authority has either simplified or removed the obligation to report those Measurements.

72. As indicated in the rationale for amending the Regulation, the Authority has taken the view that network-related Measurements, while being monitored internally by Licensed Operators should no longer be provided to the Authority as part the QoS reports.

73. This general rule, however does support exceptions such as when those requirements are imposed in License conditions, or deemed necessary for any other reason (e.g. interconnection gateways which are considered as bottlenecks or control points).

74. The simplification of sub-parameters has resulted in the removal of a number of sub-parameters and concerns the following Measurements:
   
   a.  Account complaint rate
   
   b.  Account resolution time
   
   c.  Call statistics for national manual directory queries
   
   d.  Fault report number
   
   e.  Fault report rate
f. Fault report time (mean)
g. Service supply number
h. Service supply time (mean)
i. Unsuccessful call setup
j. Dropped call ratio

75. The removal of the obligation to report certain Measurements includes the following parameters. While some Measurements are simply removed altogether, others such as “Disconnections complaints” remain captured as part of the more generic “Complaints” Measurement:

   a. Disconnection complaints rate
   b. Disconnection complaints received
   c. Disconnection complaints resolution time
   d. Disconnection complaints standard deviation
   e. Disconnection complaints 95th percentile
   f. Fault repair time standard deviation
   g. Fault repair time 95th percentile
   h. Service supply time standard deviation
   i. Service supply time 95th percentile
   j. Unsuccessful MMS transmission ratio
   k. Unsuccessful Internet session login ratio
   l. Dropped Internet session ratio
   m. Unsuccessful Internet data transmission ratio
   n. Internet data transmission time
   o. Network – ITU-T Rec E.422

76. Other modifications concern aspects that were not captured in the existing list of Measurements and that the Authority is considering to implement, includes the following new Measurements:

   a. Call to customer service, waiting time to reach an Operator.
   b. Number of Major Network Incident
   c. Number of Major Planned Work
   d. Number of Major Emergency Maintenance

77. Those new obligations are in line with the EU position that recommends notifying the relevant regulatory body in the event that conditions of sustainability, quality, availability, integrity and security of network and services are in jeopardy.

78. On 27 March 2014, the Authority has issued a Determination of Significant Market Power and Determination of Dominant Position in the Markets for Provision of Broadband Internet Access from Fixed Location. In such Determination, the Authority distinguishes two different retail broadband markets:

   a. the mass-market; and
b. the business market.

79. The Authority is of the view that, for the purpose of the QoS Regulation, the same distinction between mass-market and business market shall be made and extended to all services, as far as an offer exists in each market segment.

80. For that purpose, the reporting template has now been clearly separated inputs for the specific measurements of the mass-market and business market services.

81. The Authority intends to set a threshold on the obligation to report on a particular measurement when the number of services delivered by the Licensed Operator is equal to or above the following number of services (excluding wholesales):
   
   a. Mass market 500 services
   b. Business 25 services

82. When the number of subscribers for a particular service is below the threshold, the Licensed Operator would be only obliged to continue to inform the Authority on the evolution of the number of subscriber but not be subject to other QoS Regulation requirements. Measurements can however still be provided on a voluntary basis.

83. To note that based on the proposed threshold implementation it is possible that a Licensed Operator is subject to the QoS Regulation for a particular market segment, either mass-market or business market, but not for the other, if the minimum number of subscribers in the second case is not met.

84. The Authority has prepared a specific input spreadsheet for Mobile services in the reporting template; with the objective to further clarify the inputs and facilitate the analysis in case an operator provides both Fixed and Mobile services. The current spreadsheet that mixes both inputs is somewhat confusing. The Mobile services spreadsheet is associated with individual Measurement definitions.

85. In the same manner, Mobile Measurements are separated for mass-markets and business markets, as far as an offer exists in each market segment.

86. The Authority is considering to separate in the Mobile spreadsheet two type of Broadband services that are provided via:
   
   a. Dedicated mobile broadband that refers to internet accessed via dongles, tablets, modems, USBs, etc.
   b. Confined connectivity that includes data allowance in mobile packages, add-ons to mobile voice packages, smart phones, Blackberries, etc.

87. The Authority is further considering segregating data gathering between post-paid and pre-paid for the purpose of measuring account complaints.

88. In order to further simplify reporting, the Authority is considering removing from the main reporting document any specific Measurements related to retail and wholesale services provided by Operators which have been determined by the Authority to hold Significant Market Power (‘SMP’) or determined to be Dominant in specific markets. Since the obligation only applies to those particular operators, they will report QoS Measurements in a specific spreadsheet.

89. The operators which have been determined by the Authority to hold SMP or Dominance in specific markets are the following:
   
   a. the 3 Mobile Operators (mobile termination services); and
   b. Batelco
90. The Authority’s proposal is to combine all QoS related SMP and DD submissions as follows:
   a. For Batelco’s wholesale services, the Measurements include:
      i. CPS,
      ii. ISI/CSI (interconnection links)
      iii. Business-grade WDSL,
      iv. Business-grade Bitstream,
      v. Legacy and SDH-based domestic leased line services (e.g. CAT/LLCO);
      vi. Ethernet-based domestic leased line services (e.g. WLA)
      vii. Duct sharing,
   b. For Batelco’s retail services the Measurements include:
      i. Business-grade internet broadband accesses (i.e. Broadband Business)
      ii. Legacy and SDH-based domestic leased line and connectivity services (i.e. Legacy Local Leased Circuits, LAN Connect);
      iii. Ethernet-based domestic leased line and connectivity services (i.e. NGN-based Local Leased Circuits, Local MPLS; IP-VPN);
      iv. Ethernet-based international leased line and connectivity services (i.e. Global Ethernet, Global IP-VPN)
   c. For the 3 Mobile operators
      i. Measurements on Interconnection link services. Since those Measurements only apply to the Mobile Operators those would be captured in the Mobile spreadsheet.
      ii. Average peak capacity during busy hours
      iii. Percentage interconnection capacity used during busy hours
      iv. Average/Maximum Latency, Jitter and bit error rate
      v. Number of faults related to interconnection

91. The Authority is considering the possibility to separate faults Measurements between faults that occur within one month from the installation of the service and faults that occur after the service has been in operation for a period of one month. This has for example been implemented by ARCEP\(^\text{11}\) for the monitoring of broadband services. It allows a closer monitoring of specific issues which are likely related to service activation.

92. Similarly the Authority is considering the possibility to change the reporting information regarding the average time to restore a service with the time taken to restore 95% of the services for a particular product and the percentage of services restored within a certain period of time for the same product (i.e. percentage of services restored within 48 hours for a fixed Broadband service).

Q4. Do you agree with the Authority’s proposed amendments to the list of Measurements, to separate Measurements between Business & Mass market, between Mobile & Fixed services and separate Regulated Services?

Q5. Do you agree with the proposed simplified and discontinued Measurements and the proposed additional or modified Measurements? Please elaborate.
2.2 Reasoning for the setting of Targets

93. The draft list of Targets is included in Annexe 2.

94. In setting those Targets, the Authority used the following inputs:

   a. Data mining based on Operators QoS submission since the implementation of the QoS Regulation, and its evolution. Historical graphs in following pages are presenting monthly averages in Blue with trend line in Black.

   b. Benchmark from publicly available regulatory data in the Middle-East Region, Africa and the EU. The benchmark can be found in Annex 3.

   c. Work performed by the Quality of Service Development Group (QSDG) ITU-T Study Group\textsuperscript{12}.

   d. Mobile and Broadband audit reports performed by the Authority or its contractors and available on the Authority’s web site\textsuperscript{13}.

95. The Targets were reviewed and set in accordance with ITU-T Rec. G.1000 QoS Cycle iterative approach, the ITU background paper on setting QoS Measurements and Targets\textsuperscript{14} and the ETSI report on general aspects of QoS and Network Performance\textsuperscript{15}.

96. Since Measurements are proposed to be performed separately, when appropriate, for Business and Mass market services, it is proposed to set specific Targets adapted to each case.

97. Similarly wholesale services might have specific Targets associated, unless already imposed by other regulatory procedures.

\textsuperscript{12} http://www.itu.int/en/ITU-T/studygroups/2013-2016/12/Pages/QSDG.aspx

\textsuperscript{13} http://www.tra.org.bh/EN/marketQuality.aspx

\textsuperscript{14} ITU Global Seminar on Quality of Service and Consumer Protection - ICT Quality of Service Regulation - BACKGROUND PAPER - Geneva, Switzerland, 31 August-1 September 2006

\textsuperscript{15} ETSI ETR 003 Network Aspects (NA); General aspects of Quality of Service (QoS) and Network Performance (NP)
2.2.1 Account complaint rate

Figure 5: Statistics on account complaint rate

Source: the Authority’s analysis based on QoS information submitted by operators

98. The Authority proposes to set the Target for account complaint rate as follow:
   
a. Telephone Line <= 1%

b. Mobile services <= 1%

c. Fixed Internet services <= 2%
2.2.2 Account complaint resolution time

Figure 6: Statistics on account resolution rate

The Authority propose to set the Target for account complaint resolution time as follow:

a. Telephone line <= 8 days (mean)

b. Other services <= 4 days (mean)
2.2.3 General complaint rate

Figure 7: Statistics on general complaint rate

Source: the Authority’s analysis based on QoS information submitted by operators

100. The Authority proposes to set the Target for general complaint as follow:

a. Rate $\leq 4\%$

b. Resolution time $\leq 3$ days (mean)
2.2.4 Fault report rate:

Figure 8: Statistics on fault report rate

Source: the Authority’s analysis based on QoS information submitted by operators

101. The Authority proposes to set the Target for fault rate as follow:
   a. Telephone line residential \( \leq 2\% \) Telephone line Business \( \leq 5\% \)
   b. Mobile services \( \leq 3\% \)
   c. Broadband \( \leq 5\% \) (with interim objective towards 10\%)
2.2.5 Fault repair time

Figure 9: Statistics on fault repair time

Source: the Authority’s analysis based on QoS information submitted by operators

102. The Authority proposes to set the Target for fault repair time as follow:
   a. Telephone line residential <= 48h (mean)
   b. Telephone line Business <= 48h (mean)
   c. Mobile service <= 8h (mean)
   d. Broadband <= 48h (mean)
2.2.6 Service supply time

Source: the Authority’s analysis based on QoS information submitted by operators

103. The Authority proposes to set the Target for supply time as follow:
   a. Telephone line residential $\leq 5$ days  Telephone line Business $\leq 10$ days
   b. Mobile service residential $\leq 4$h  Business $\leq 8$h
   c. Broadband $\leq 5$ days (mean)
2.2.7 Unsuccessful call setup

Figure 11: Statistics on unsuccessful call setup

Unsuccessful call set-up Mobile - Fixed

Unsuccessful call set-up Mobile - Mobile (own network)

Unsuccessful call set-up Mobile - Mobile (other network)

Source: the Authority’s analysis based on QoS information submitted by operators

104. The Authority proposes to set the Target for successful call setup as follow:

a. All services <= 1.5%
2.2.8 Dropped calls

Source: the Authority’s analysis based on QoS information submitted by operators

105. The Authority proposes to set the Target for dropped calls ratio as follow:

   a. All services <= 1%
2.2.9 SMS transmission

106. Mobile operators have been submitting quarterly measurements that show a consistent SMS successful delivery over 99%.


Figure 13: Statistics on SMS transmission

<table>
<thead>
<tr>
<th>SMS service</th>
<th>2012</th>
<th>2011</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of received SMS (in 2 min)</td>
<td>99.6%</td>
<td>99.7%</td>
<td>99.2%</td>
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<tr>
<td>Statistical accuracy</td>
<td>0.2%</td>
<td>0.2%</td>
<td>0.4%</td>
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<tr>
<td>% of received SMS (in 30 sec)</td>
<td>99.3%</td>
<td>99.3%</td>
<td>96.9%</td>
</tr>
<tr>
<td>Statistical accuracy</td>
<td>0.3%</td>
<td>0.3%</td>
<td>0.9%</td>
</tr>
<tr>
<td>% of received SMS (in 15 sec)</td>
<td>96.5%</td>
<td>97.5%</td>
<td></td>
</tr>
<tr>
<td>Statistical accuracy</td>
<td>0.7%</td>
<td>0.5%</td>
<td></td>
</tr>
<tr>
<td>Average reception delay (sec)</td>
<td>8</td>
<td>10</td>
<td>13</td>
</tr>
</tbody>
</table>

All networks offered fair SMS service within two minutes with less than 1% defects.
The average observed SMS reception delay was 8 seconds.

Source: The Authority 2012 mobile audit report

108. The Authority propose to set the Target for SMS transmission as follow:
   a. Success rate >= 99 % in 2 minutes
   b. Transmission time <= 12 seconds (mean)


2.2.10 Calls to customer service

109. Since this is a new Measurement, the Authority had to set Targets without supporting historical data on the performance of operators in Bahrain. The Authority is proposing to set what it considers reasonable and achievable Targets, detailed as follow:

   a. Average waiting time to customer service Mass market 95% <= 1 minutes
   b. Average waiting time to customer service Business 95% <= 1 minute

110. The waiting time is the time taken to be answered by a human person; calls that are either dropped before reaching a human person or that are directly handled by the operator’s interactive voice server should not be taken into account.

Q6. Do you agree with the Authority’s proposed list of Targets and do you agree with the proposed threshold value set for each individual Target?

Q7. Would you consider the implementation of alternate Targets or recommend additional Targets? If yes, please justify and provide your proposed threshold value for such Targets.
Annexe 1 – Draft Regulation
## International benchmark of QoS Targets

<table>
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<tr>
<th></th>
<th>Spain</th>
<th>Brazil</th>
<th>STHL</th>
<th>France</th>
<th>India</th>
<th>KSA</th>
<th>Lebanon</th>
<th>Malawi</th>
<th>Maldives</th>
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<td>General customer complaint rate</td>
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<td>4%</td>
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<td>2%</td>
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<td>4d mean</td>
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<td>28d 90%</td>
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<td>20 d 95%</td>
<td>15d mean</td>
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<td>4d mean</td>
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<td>2% after</td>
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<td>15% – 5%</td>
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<td>48h mean</td>
<td>72h 36%</td>
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<td>8h mean</td>
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<td>3d 93%</td>
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<td>Service supply time</td>
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<td>8h – 4h</td>
<td>7d 90%</td>
<td>25d 95%</td>
<td>3h</td>
<td>43h 90%</td>
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<td>Call center access time</td>
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<td>38%</td>
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<td>55% 35sec</td>
<td>95%</td>
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<td>Messaging success ratio</td>
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<td>99% 2min</td>
<td>99%</td>
<td>95% 24h</td>
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<td>Messaging delivery time</td>
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<td>12s mean</td>
<td>99%</td>
<td>30min</td>
<td>12 sec</td>
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</tbody>
</table>

Annexe 3 - International benchmark of QoS Targets
Primary data sources:

CITC, Saudi Arabia:

ictQatar, Qatar:

TRA, UAE:
http://www.tra.gov.ae/TRA%20Regulations.php

TRA, Oman:

Kuwait:
http://www.marcopolis.net/top-telecoms-in-kuwait.htm

TRC, Jordan:
http://www.trc.gov.jo/images/stories/pdf/Instructions%20for%20Implementing%20the%20Quality%20of%20Service%20Frame
work%20in%20Jordan%20[1].pdf?lang=english

TRA, Lebanon:
http://www.tra.gov.lb/QoS-Regulation

IDA, Singapore:

ECTEL, Eastern Caribbean countries (Dominica, Grenada, Saint Christopher and Nevis, Saint Lucia, Saint Vincent
and The Grenadines):
http://www.ectel.int/Archive%20Consultations/QOS%20REV%202%20_28.2.pdf

NTA, Nepal:

TRR, Vanuatu

ITU

ARCEP
http://www.arcep.fr/index.php?id=1&L=1

Ofcom
http://www.ofcom.org.uk/

ICASA
https://www.icasa.org.za/

AT Kearney
http://www.atkearney.com/paper/-/asset_publisher/dVvx4Hz2h8bS/content/telecommunication-measuring-quality-of-service/10192
Draft Quality of Service Regulation

A Regulation issued by the Telecommunications Regulatory Authority

Date Month 2014

Regulation 1 of 2014
Preamble

Pursuant to its duties under article 3 (b) 1 of the Telecommunications Law, the Authority must protect the interests of Subscribers and Users in respect of availability, provision and quality of services. The provision of quality of service (“QoS”) information by Licensed Operators to the Authority is therefore necessary for the Authority to carry such duties. The Authority also considers that the availability of comparable QoS information is beneficial to consumers in so far as it allows them to make better informed decision when selecting a Licensed Operator for the provision of a Telecommunication Service. The Authority is therefore committed to ensuring that it is supplied by Licensed Operator.

On the [Date of public Consultation], the Authority published a public consultation document proposing a new Quality of Service Regulation replacing Regulation number 5 of 2008 (“the Replaced QoS Regulation”). Following the completion of the public consultation process, the Replacing Quality of Service Regulation, (“the QoS Regulation”) and its associated Decisions have been issued on <enter date>.

This QoS Regulation has been promulgated pursuant to the Authority’s powers under the Telecommunications Law of the Kingdom of Bahrain included Article 3(c)(1) and Article 53. This QoS Regulation shall come into force on the <enter date> and is subject to review and amendment from time to time as deemed necessary by the Authority.

The QoS Regulation supersedes and replaces the Replaced QoS Regulation.

This QoS Regulation sets out the rationale and legal basis for the requirements on Licensed Operators to supply certain QoS information using defined testing Parameters. The Authority believes that it is necessary to specify a base set of reporting parameters. The process of how to meet these Parameters and the identification of any further testing options is determined by virtue of a Decision.
Definitions

Any capitalised term that is not defined in this QoS Regulation shall have the same meaning as that attributed to it under the Telecommunications Law. For the purpose of interpreting this Regulation, the following definitions shall apply:

“Authority” means the Telecommunications Regulatory Authority of the Kingdom of Bahrain;

“Commercial Launch Date” means the date on which a Licensed Operator begins commercial provision of Telecommunication Service;

“Decision” means a Decision issued by the Authority pursuant to the provisions of the Telecommunications Law;

“End User” means any person using or requesting a Telecommunication Service;

“Fixed Telecommunication Service” means any Telecommunication Service that is not a Mobile Telecommunication Service;

“Internet Service” means any Telecommunication Service that is provided substantially for data communications directly to or from network termination points that are associated with End Users and that have IP addresses assigned through delegation from the Internet Assigned Numbers Authority (IANA);

“IP Transit Service” means any IP service that is provided for communications between networks of Licensed Operators that provide Internet Services, or international routes to or from the Kingdom of Bahrain, not for communications directly to or from network termination points that are associated with End Users.

“IP” means the Inter-network Protocol standardised by the Internet Engineering Task Force (IETF);

“Major Emergency Maintenance” means a maintenance that is required in response to a sudden event in order to protect or restore any equipment or platform required to support the delivery of network and/or services, and which will cause a total disruption or a severe degradation of one or several services;

“Major Network Incident” means an incident or a series of incidents which causes a total disruption or a severe degradation of one or several services and may result in a sudden increase of End User fault reports to the hotline of a Licensed Operator;

“Major Planned Work” means a planned activity which is programmed in advance and despite mitigating arrangements has the potential to cause a total disruption or a severe degradation of one or several services;

“Mobile” means any Telecommunication Service which may be used
| **Telecommunication Service** | while in motion that uses mobile radiocommunications to provide communications to or from network termination points that are associated with End Users; |
| **“Measurement”** | means a numerical value obtained by measuring using a Measurement Method; |
| **“Measurement Method”** | means a method of measuring a Parameter in a way prescribed by a Decision of the Authority; |
| **“Monitored Service”** | means a service for which Measurements of a Parameter must be made as prescribed by a Decision issued by the Authority; |
| **“Parameter”** | means a characteristic of the Quality of Service derived from measurements; |
| **“Published Measurement”** | means a Measurement intended for publication with the content and format prescribed by a Decision issued by the Authority; |
| **“Quality of Service”** | means the collective effect of service performance which determines the degree of satisfaction of an End User; |
| **“Reporting Period”** | means a period of time that is defined in a Decision of the Authority; |
| **“Target”** | means a numerical value that represents a minimum satisfactory level for the quality of an aspect of a Monitored Service as prescribed by a Decision issued by the Authority; |
| **“Telecommunications Law”** | means Legislative Decree No. 48 of 2002 promulgating the Telecommunications Law. |
| **“Telecommunication Service”** | Telecommunications service provided by a Licensed Operator to Subscribers, who may be End Users or Licensed Operators. |
Article 1 – Scope

1.1 The purpose of this QoS Regulation is to set out obligations on Licensed Operators to measure and submit to the Authority a set of Quality of Service Measurements of the Telecommunication Services that they provide and ensure compliance with the Targets associated with specific Measurements. Pursuant to this QoS Regulation, the Authority has the right to publish all or part of the Quality of Service Measurement report provided by Licensed Operators.

1.2 This Regulation applies to all Licensed Operators in the Kingdom of Bahrain. The Licensed Operators should undertake the necessary changes to their operation systems and processes, if needed, to allow the application of this QoS Regulation and associated Decisions.

1.3 The list of Measurements and Targets are set out by the Authority by way of a Decision (which may be amended by the Authority from time to time). These Measurements and Targets specified in the Decision are mandatory minimum requirements that Licensed Operators shall comply with.

Article 2 – Objectives

2.1 A Decision will be issued by the Authority from time to time to define a minimum set of Measurements and Targets that Licensed Operators shall meet. The Authority will ensure that these Measurements and Targets are regularly published to assist End Users to make informed choice as to their Licensed Operators and services;

2.2 Specifically, this QoS Regulation addresses the following objectives:

(a) to provide information to assist:

(i) End Users with their selection of services;

(ii) Licensed Operators with the design and operation of their Services

(iii) the sustained development of the telecommunications industry in the Kingdom of Bahrain; and

(b) to, at a minimum, assist in the maintenance and the improvement of the Services provided by Licensed Operators.

2.3 The Measurements specified in the Decision will facilitate the Authority's monitoring of the telecommunications industry's performance in the Kingdom of Bahrain as well as provide data to support the evolution of an optimised regulatory framework.

2.4 The Authority, in reaching its decision on the provision of QoS information to End Users, has sought to fulfil its principal duties set out in Article 3 of the Telecommunications Law. Article 3 (b) states that in carrying out its duties, the Authority shall, inter alia, protect the interests of Subscribers and Users in respect of the tariffs charged for services, the availability and provision of services, and the quality of service. In addition, the Authority is tasked with promoting efficient and fair competition among new and existing Licensed Operators.
2.5 The Authority aims to further the interests of consumers by having regard, in particular, to the interest of End Users in respect of choice, price, QoS, and value for money.

2.6 The Authority has considered amongst other things the requirement to promote competition and the interests of End Users by promoting choice and competition and by ensuring that End Users can make informed choice.

2.7 To this end, it is important that the Authority encourages the provision of timely, relevant, accessible and accurate information to citizen-consumers and enable them to make informed purchasing decisions.

2.8 Reliable consumer information facilitates the exercise of choice by End-Users and helps them to receive the benefits of increased competition. The Authority believes that, if End-Users are to rely upon such information, it needs to be accurate, accessible, and truly comparable.

2.9 All consumers should be able to take advantage of the benefits of transparent and comparable information and the competitive benefits that this should bring.

**Article 3 – Principles of Quality of Service**

3.1 Quality of Service Measurements in the Kingdom of Bahrain shall:

(a) apply to all Monitored Services;

(b) enable End Users to compare the performance achieved by Licensed Operators;

(c) be described in such terms that provide flexibility in the provision of future services; and

(d) enable the Authority to establish appropriate Targets as required to maintain levels of quality which are satisfactory to the needs of End Users in the Kingdom of Bahrain.

3.2 Such Targets, as established by the Authority following the process defined in Article 7 of this Regulation, shall be reviewed on a regular basis.

**Article 4 – Review and amendment**

4.1 The Authority may periodically amend this QoS Regulation in accordance with provisions of the Telecommunications Law;

4.2 The Authority may periodically amend the list of Measurements and Targets by virtue of a Decision. Provided, that the Authority will publish any such Decision on its website, at least three months before its coming into effect.

4.3 In the event of any conflict between this QoS Regulation and a Decision, this QoS Regulation shall prevail.
Article 5 – Measurement and Reporting of Quality of Service

5.1 The Licensed Operator shall, in accordance with any Decision, submit and/or publish comparable, adequate and up to date information for End Users on the quality of its services.

5.2 Where a Decision, contains a Monitored Service for the Parameter that describes part or all of the Service then that Parameter shall be reportable for that Monitored Service of a Licensed Operator and the Licensed Operator shall have Quality of Service obligations related to the Parameter as per this QoS Regulation.

5.3 Licensed Operators shall, in respect of each Reporting Period, perform the relevant Measurement, report and/or publish results for each reportable Parameter for a Service of a Licensed Operator as specified in accordance with the Decision applicable for the Reporting Period:

(a) make the Measurements by using the prescribed Measurement Method for the Parameter;

(b) no later than 30 days after the end of the Reporting Period, submit the Measurements to the Authority in electronic format using the form contained in the Decision or as amended and provided by the Authority from time to time pursuant to article 5.3 of this Regulation;

(c) no later than 60 days after the end of the Reporting Period or as otherwise directed by the Authority, submit any information that is used in making the Measurements and any other information that is requested by the Authority from time to time, including but not limited to details of the observations and calculations made for the Measurements; and

(d) keep the Measurements and any information that is used in making the Measurements for at least 18 months after the end of the Reporting Period or as otherwise directed by the Authority.

Article 6 – QoS Publication and Investigation

6.1 The Authority may publish on its web site or in any other manner or format as considered appropriate a Quality of Service report, by using all or part of the Measurements submitted by Licensed Operators. For the avoidance of doubt such information shall not be considered as confidential information.

6.2 For each reportable Parameter and for each Reporting Period, a Quality of Service report, as published by the Authority under Article 6.1, shall contain:

(a) the definition of each Measurement in a manner that is simple and easy to understand by End Users;

(b) the achieved Measurement for the Parameter that is submitted by each Licensed Operator;

(c) the manner of publication of the information;

(d) the timing of publication of the information

(e) an indication of any Target for the Parameter that Licensed Operators should achieve;
Draft Quality of Service Regulation

(f) any explanatory remarks from any Licensed Operator that are previously accepted and approved by the Authority; and

(g) any other remarks that are regarded as appropriate by the Authority.

6.3 In approving explanatory remarks by a Licensed Operator under Article 6.2, the Authority may take into account a number of factors, including but not limited to:

(a) any service deficiencies that arise partly or wholly from the Telecommunications Services of another Licensed Operator, or another operator licenced to provide services in other countries that may contribute to the Telecommunications Service which is subject to the Quality of Service Measurement;

(b) any changes in environmental or operating conditions that could not have been reasonably foreseen by the Licensed Operator; and

(c) any expectations about Quality of Service that are appropriate to the tariffs for the Telecommunication Services of the Licensed Operator.

6.4 The Authority may use numbers of End Users submitted by Licensed Operators and Published Measurements that are reported and/or published by Licensed Operators under article 5.3 of this Regulation, for publication of information pursuant to Article 54 of the Telecommunications Law.

6.5 Quality of Service Measurements that are submitted by Licensed Operators shall be, as a minimum, certified by relevant senior employees in a "Self Certification" process. While Licensed Operators may use external auditors, the Authority, being cognisant of the associated costs, does not mandate such external certification.

Article 7 – Target Setting

7.1 The Authority reserve the possibility to review, amend, revise or modify such Targets, either to relax or tighten them, remove existing Measurement or impose new Measurement and Targets based on the performances of the industry in the Kingdom and the evolution of the performances and best practices in other jurisdictions.

7.2 Any such review, amendment, revision or modification of Measurements and Targets will follow the process described in Article 4 of this Regulation.

7.3 Any Licensed Operator who is found to be in non-compliance with the Regulation, will be subject to investigation and action by the Authority using the powers set out in the Telecommunications Law. This includes power for the Authority to issue a penalty for any contravention.
Article 8 – Contravention and Enforcement

8.1 In the event that a Licensed Operator is found to have failed to comply with the provisions of this Regulation, or does not meet the requirements set by way of a Decision, the Authority will apply a financial fine as set out in Annex 2 having into account the factors set out in Clause 8.2

8.2 The Authority will, in setting out the level of the fine in Annex 2, take into account the following factors:

(a) the extent of impact of breach;
(b) the cause of breach;
(c) the efforts taken by the Licensed Operator to meet the requirements of this Regulation;
(d) the challenges faced by the Licensed Operators in meeting such requirements;
(e) the factors set out in article 6.3
(f) the number and nature of the Services, Parameters, Reporting Periods and Targets for which the Licensed Operator has committed quality of service contraventions;
(g) the effects of the quality of service contraventions on the Services of other Licensed Operators;
(h) any service credits, rebates or other remedial measures that have been provided by the Licensed Operator to End Users including other Licensed Operators, that may have been inconvenienced by the quality of service contraventions;
(i) the number and nature of the measures that were applied on earlier occasions when the Licensed Operator or another Licensed Operator had committed quality of service contraventions; and
(j) the financial circumstances of the Licensed Operator.

8.3 In the event that a Licensed Operators does not meet the provisions of this Regulation, or does not meet the requirements set by way of Decision for a period of any two (2) quarters within four (4) consecutive quarters, the Authority may treat such failure as a severe breach of the Licensed Operator’s licenses and the provisions of the Telecommunications Law and may take any enforcement step according to Article 35 of the Telecommunications Law
Article 9 – Major Network Incident, Major Planned Work and Major Emergency Maintenance

9.1 A Licensed Operator shall promptly inform the Authority in writing upon the occurrence of a Major Network Incident affecting its Telecommunication Services. Such incidents are defined by the impact on a large portion of the Services provided by Licensed Operators resulting from a totally disrupted or severely degraded service.

9.2 Examples of Major Network Incidents include but are not limited to:
(a) total disruption of a Telecommunications Service (voice, broadband, data etc.); or
(b) severe degradation of a Telecommunications Service; or
(c) disruption or severe degradation of Telecommunications Service over a specific geographical area of the Kingdom; or
(d) disruption of an international cable terminated with the licensed Operator.

9.3 In the context of a Major Planned Work, a Licensed Operator shall not intentionally interrupt the operations of its network (or any part thereof) in the normal course of business, nor may in the normal course of business suspend the provision of any type of Licensed Telecommunications Service without having first obtained the approval of the Authority in writing and provided reasonable advance notice to End Users to be affected by such interruption.

9.4 For that effect and no later than 2 calendar weeks prior to the Major Planned Work, the Licensed Operator shall provide to the Authority the following information:
(a) a high level explanation of the nature of the operation;
(b) the date, time and exact planned duration of the maintenance window;
(c) the risk assessment associated with the intended maintenance or upgrade (between low, medium or high);
(d) the availability of a fall back plan, a time estimate for the implementation of such fall back plan, and the events that may trigger such plan;
(e) the confirmation that subscribers would or would not be able to access emergency services during the network operation; and
(f) the nature and advance notice mechanism to the affected or potentially affected consumers of the service(s)

9.5 A Licensed Operator shall promptly inform the Authority in writing upon the occurrence of a Major Emergency Maintenance affecting its own services or the service provided to third parties. For the avoidance of doubts emergency maintenance would not fall in the same category as Major Planned Work, the characteristic of a Major Emergency Maintenance being the absence of notice due to the reactive nature of the action in front of an unplanned event.

Notification to the Authority of Major Network Incident, Major Planned Work and Major Emergency Maintenance shall be made by Licensed Operators using the form available in Annexe 1.
## Annexe 1

**Major Activity Notification**

### OPERATOR DETAILS
- Operator name: [ ]
- Contact person: [ ]
- Phone number: [ ]
- Email: [ ]

### ACTIVITY INFORMATION
- **Major activity type:**
  - Network Incident [ ]
  - Planned Work [ ]
  - Emergency Maintenance [ ]
- **Description:**
- **Date (DD/MM/YYYY):** [ ]
- **Duration:** [ ]
- **Start time:** [ ]
- **End time:** [ ]
- **Service(s) affected:**
- **Area(s) affected:**
- **Number of subscribers concerned:**
- **Risk associated with the activity:**
  - Low [ ]
  - Medium [ ]
  - High [ ]
- **Availability and details of a fall back plan:**
- **Ability for subscribers to access emergency services during the activity:** YES [ ] NO [ ]
- **Nature of the advance notice mechanism to the affected consumers of the service(s):**

### DECLARATION
I am authorized by the Service Provider to legally bind the provider to the truth, completeness, and accuracy of the information contained in this report. I on oath depose and state that the information contained therein is true, correct, and accurate to the best of my knowledge and belief, and that the Service Provider on oath deposes and states that this information is true, complete, and accurate.
- **Date:** [ ]
- **Name:** [ ]
- **Signature:**

### AUTHORITY USE
- **Recipient name:** [ ]
- **Manager name:** [ ]
- **Date:** [ ]
- **Date:** [ ]
- **Signature:** [ ]
- **Signature:** [ ]
- **Approved** [ ]
- **Rejected** [ ]
## Major Activity Follow-Up Report

### OPERATOR DETAILS

<table>
<thead>
<tr>
<th>Operator name:</th>
<th>Contact person:</th>
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<tr>
<th>Phone number:</th>
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### FOLLOW UP DETAILS

<table>
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<th>Major Activity description:</th>
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<tr>
<th>Date (DD/MM/YYYY):</th>
<th>Duration:</th>
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</table>

Follow-up details:

### DECLARATION

I am authorized by the Service Provider to legally bind the provider to the truth, completeness, and accuracy of the information contained in this report. I, on oath, depose and state that the information contained therein is true, correct, and accurate to the best of my knowledge and belief, and that the Service Provider on oath deposes and states that this information is true, complete, and accurate.

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### AUTHORITY USE

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Annex 2

Fines for contravention made by Licensed Operators

<table>
<thead>
<tr>
<th>Offences</th>
<th>Maximum fine per Contravention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure by a Licensee to perform measurement, reporting and record keeping tasks set out in this QoS Regulation</td>
<td>BHD 500 for each act of contravention (per individual measurement) and BHD 50 for each day that the contravention continues to occur.</td>
</tr>
<tr>
<td>Failure by a Licensee to meet and maintain a Target for the Parameter and the Service.</td>
<td>BHD 1,000 per unit of deviation below the Target for the Parameter and the Service for each act of contravention.</td>
</tr>
<tr>
<td>Failure by a Licensee to submit, during a time period specified by the Authority, information requested by the Authority pursuant this Regulation.</td>
<td>BHD 500 for each act of contravention and BHD 50 for each day that the contravention continues to occur.</td>
</tr>
<tr>
<td>Submission and/ or publication of false or misleading information about quality of service by Licensee</td>
<td>BHD 5,000 for each act of contravention.</td>
</tr>
</tbody>
</table>
## Part A – Measurement Methods and Published Measurements

<table>
<thead>
<tr>
<th>Parameter Name</th>
<th>Measurement Method</th>
<th>Published Measurement</th>
</tr>
</thead>
</table>
| Mean number of subscribers     | For each Reporting Period Licensed Operator shall provide the mean number of Subscribers to each main type of service.  
The mean subscribers shall be calculated as the arithmetic average for the period calculated as follows:  
The average of the number of active subscribers at the time of 23:59:59 in the Kingdom of Bahrain on the last calendar day of each month during the Reporting period. For example, the sum of active subscribers as at 31st January and active subscribers as at 28th February and active subscribers as at 31st March) divided by 3. | Mean number of subscribers                                                                                   |
| Account complaint rate         | An account is a statement of money owed or paid that is read or otherwise accessed by a Subscriber; the services provided to the Subscriber may be prepaid or postpaid.  
An account complaint is an expression of dissatisfaction with a bill received from a customer.  
An account complaint should not be confused with a billing query (a request for information) or with a fault report.  
The number of account complaints received during the Reporting Period should be divided by the average number of Subscriptions for the Licensed Operator during the same period. The result should be provided as a Measurement.  
The Measurements should include all account complaints received during the Reporting Period, regardless of the validity of the complaint, the extent to which the complaint repeats an earlier one, and the dates of calls or any other occurrences that are the subject of the complaint. | Percentage of service Subscribers making account complaints in the Reporting Period, rounded up to the nearest percentage point ETSI EG 207 769 &5.9 |
| Account complaint              | The time to resolve an account complaint is the elapsed time (not the working time) from when the complaint is received by a Licensed Operator to when the cause for the complaint has been corrected. | Mean time in days taken to correct inaccurate accounts for the service in the Reporting Period               |
### Quality of Service Decision

<table>
<thead>
<tr>
<th>Parameter Name</th>
<th>Measurement Method</th>
<th>Published Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>resolution time</td>
<td>The mean to resolve account complaints, and the number of account complaints resolved, should be provided as Measurements. The Measurements should include all account complaints resolved during the Reporting Period, regardless of the validity of the complaint the extent to which the complaint repeats an earlier one, and the dates of calls or any other occurrences that are the subject of the complaint.</td>
<td>Reporting Period, rounded up to two numerically significant figures ETSI EG 207 769 &amp;5.9</td>
</tr>
<tr>
<td>General complaint rate</td>
<td>A general complaint is is an expression of dissatisfaction raised by a Subscriber that is different from a billing complaint treated previously, and that is not a fault. Service providers may have different strategies for handling customer complaints (e.g. call centres, ACD, trouble ticket systems etc.). Independantly of the collection method, the number of complaints logged per customer per data collection period should be provided and including all customer complaint notified to the published point of contact of the service provider and is not found to be invalid to the instant the cause for the complaint has been resolved. Where more than one complaint is made by the same costumer on the same subject, each instance of the complaint should be counted separately in the statistics. If a customer complaints again before an existing complaint has been closed, then this should not be treated as a separate complaint but as a continuation of the first unclosed complaint. The number of general complaints received during the Reporting Period should be divided by the average number of Subscriptions for the Licensed Operator during the same period. The result should be provided as a Measurement. The Measurements should include all disconnection complaints received during the Reporting Period, regardless of the validity of the complaint, the extent to which the complaint repeats an earlier one, and the dates of disconnections or any other occurrences that are the subject of the complaint.</td>
<td>Percentage of service Subscribers making general complaints in the Reporting Period, rounded up to the nearest percentage point</td>
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Telecommunications Regulatory Authority

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Date: XX/XX/2014
## Quality of Service Decision

<table>
<thead>
<tr>
<th>Parameter Name</th>
<th>Measurement Method</th>
<th>Published Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>resolution time</td>
<td>The mean, and the number of general complaints resolved, should be provided as Measurements. When calculating the complaint resolution time service providers may subtract from the measured time any delay introduced by the customer, such as when collaboration of the customer is needed but cannot be obtained in a reasonable term, on the basis evidence of such delay is available for audit purpose. The Measurements should include all disconnection complaints resolved during the Reporting Period, regardless of the validity of the complaint, the extent to which the complaint repeats an earlier one, and any other occurrences that are the subject of the complaint.</td>
<td>the Reporting Period, rounded up to two numerically significant figures</td>
</tr>
<tr>
<td>Fault report rate</td>
<td>A Fault is a report of disrupted or degraded service that is made by a customer and is attributable to the network of the service provider or any interconnected public network, and that is not found to be invalid. Fault in any equipment on the consumer side of the network termination point are excluded. Fault Report Rate should be calculated as follow: 100 * ( A / B ), where, ( A ) = Total number of faults reported, ( B ) = Average number of subscriptions.</td>
<td>Percentage of service subscribers making a fault report in the reporting period rounded up to the nearest percentage point ETSI EG 201 769 &amp;5.2</td>
</tr>
<tr>
<td>Fault report number</td>
<td>Total number of faults reported as per Fault definition</td>
<td>Number of faults reported by subscribers during the reporting period ETSI EG 201 769 &amp;5.2.2</td>
</tr>
<tr>
<td>Fault repair time</td>
<td>The duration from the instant a fault has been notified by the customer to the published point of contact of the service provider to the instant when the service element or service has been restored to normal working order.</td>
<td>Mean time in hours taken to repair a service during the Reporting Period rounded up to two numerical</td>
</tr>
</tbody>
</table>
## Quality of Service Decision

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<tr>
<th>Parameter Name</th>
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<th>Published Measurement</th>
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</table>
| **Service supply number** | The number of Service Supplied over the Reporting Period defined as a commitment made to an End User to provide a product or service or to effect a change to an existing product or service. Order completion is defined as the time / date when all items of an order are available for use by the End User. | Number of Services Supplied over the Reporting Period  
ETSI EG 201 769 &5.1.1                                                                                           |
| **Service supply time** | The time to Supply a Service is the elapsed time (not the working time) from when a complete order is received from an End User to when the order is completed by the License Operator and Service, including all items, is available for use by the End User. | Mean time in day taken to Supply a Service in the Reporting Period rounded up to two numerical significant figures
ETSI EG 201 769 &5.1                                                                                     |
| **Average call center waiting time** | The call center waiting time is the duration from the instant when the address information required for setting up a call is received by the network (e.g. recognized on the calling user's access line) to the instant the human operator answers the calling user to provide the service requested. Services provided wholly automatically, e.g. by voice response systems, are excluded. The services covered are the services for operator controlled and assisted calls that are accessed with special access codes. Access to emergency services is excluded. The period in this definition includes waiting times because operators are busy, and times for going through voice response systems to reach the operator. However it excludes the handling of the enquiry itself, e.g. conversation with the attendant and the response of any database used by the attendant. | Mean time in seconds taken to answer 95% of the call  
ETSI EG 201 769 &5.6                                                                                  |
| **Unsuccessful call setup ratio** | An unsuccessful call is a call attempt to a valid number, properly dialled following dial tone, where neither called party busy tone, nor ringing tone, nor answer signal, is recognized on the | Percentage rounded up to two numerical significant                                                                                                     |
## Quality of Service Decision

<table>
<thead>
<tr>
<th>Parameter Name</th>
<th>Measurement Method</th>
<th>Published Measurement</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>access line of the calling user within 30 seconds from the instant when the address information required for setting up a call is received by the network. Unsuccessful call ratio should be calculated as follow: Unsuccessful call ratio = Number of unsuccessful calls x 100 Total number of call For further details see also 202 057-2 Annex C Decision about success of call attempt</td>
<td>ETSI EG 201 769 &amp;5.4</td>
</tr>
<tr>
<td>Dropped call ratio</td>
<td>A dropped-call is a telephone call successfully established between two parties which, due to technical reasons, was cut off before the speaking parties had finished their conversation and before one of them had hung up. The dropped call ratio should be calculated as follow: Dropped calls ratio = Number of dropped calls x 100 Total calls established</td>
<td>Percentage rounded up to two numerical significant figures ETSI EG 202 057-3 &amp;6.4.2</td>
</tr>
<tr>
<td>Answer Seizure Ratio (ASR)</td>
<td>ASR gives the relationship between the number of seizures that result in an answer signal and the total number of seizures. This is usually expressed as a percentage as follows: ASR = Seizures resulting in answer signal x 100 Total seizures Measurement of ASR may be made on a route or on a destination code basis.</td>
<td>Percentage per destination. ITU-T Rec.E.425</td>
</tr>
</tbody>
</table>

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Date: XX/XX/2014
<table>
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<tr>
<th>Parameter Name</th>
<th>Measurement Method</th>
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<tbody>
<tr>
<td></td>
<td>The destination ASR is calculated on the total amount of traffic to the destination whichever the outgoing route used. Separate Measurement shall be provided for: All international routes and Top 5 international destinations</td>
<td></td>
</tr>
<tr>
<td>Successful SMS ratio</td>
<td>The ratio of correctly sent and received SMS between two terminal equipments.</td>
<td>Percentage rounded up to two numerical significant figures</td>
</tr>
<tr>
<td></td>
<td>The successful SMS ratio shall be calculated as follow:</td>
<td>ETSI EG 202 057-2 &amp; 5.6</td>
</tr>
</tbody>
</table>
|                                | \[
|                                | \text{Successful SMS ratio} = \frac{\text{Number of SMS received}}{\text{Total number of SMS send}} \times 100 \]
<p>| | | |
|                                |                                                                                       |                                                                                         |
| Average time to resolve an interconnection fault | An interconnection is a service jointly established between two parties to exchange and agreed traffic type between the two parties' networks. An interconnection fault is when one or both parties reports to the other the inability to perform a required function resulting in lost or degraded interconnection traffic. The average time to resolve an interconnection fault is the elapse time (not the working time) from when the fault is raised by a party to when the traffic has been restored for the successful satisfaction of both parties. | Mean time in hours taken to repair an interconnection fault during the Reporting Period rounded up to two numerical significant figures |
| Average interconnection capacity during | The average interconnection capacity during busy hours is the average traffic observed during the sliding 60 minutes period during which occurs the maximum total traffic load in every 24 hours period of the reporting period. |                                                                                         |</p>
<table>
<thead>
<tr>
<th>Parameter Name</th>
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<tbody>
<tr>
<td>busy hours</td>
<td></td>
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</tr>
<tr>
<td>Major Network Incident</td>
<td>A Major Network Incident is an incident affecting the network of an operator, and resulting in the impact on a significant portion of the consumers due to a totally disrupted or severely degraded service or services as a result of this incident. For the avoidance of doubts, this includes core and access network failures, telecom technical rooms and exchange outages, interconnection incidents as well as incidents resulted from disruption of international cables.</td>
<td>Number of Major Incident Notification</td>
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| Major Planned Work | A Major Planned Work is a work planned in advance that either:  
1/ requires the license operator to temporarily suspend the provision of any type of licensed service, resulting in the impact on a significant portion of the consumers during the maintenance window; or  
2/ is a work that should be transparent to customer service however due to its nature a/ may carry a risk to disrupt or severely degrade licensed service or services to a significant portion of the consumers, or  
b/ the fall back plan is difficult to implement or would requires an amount of time exceeding the allocated maintenance window. | Number of Major Planned Work Notification |
| Major Emergency Maintenance | A Major Emergency Maintenance exhibit the same attributes as a Major Planned Work with the particularity that, due to the sudden and reactive nature, the situation could not be planned in advance. The maintenance work is required to be performed without delay to rectify an unexpected fault on a network element or core system to enable it to resume normal operation and mitigate any further loss or damage. | Number of Major Emergency Maintenance |
## Quality of Service Decision

<table>
<thead>
<tr>
<th>Parameter Name</th>
<th>Measurement Method</th>
<th>Published Measurement</th>
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<td>Call to customer service waiting time</td>
<td>The waiting time is the time taken to be answered by a human person on a properly dialled number following dial tone; calls that are either dropped before reaching a human person or that are directly handled by the operator’s interactive voice server should not be taken into account.</td>
<td>Average waiting time, in seconds</td>
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## Part B: Targets

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<th>Unit</th>
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**SCHEDULE 1**

**Quality of Service Regulation**

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