

Consultation Paper No. 01/2009



**Bangladesh Telecommunication Regulatory Commission**

**Standardization of Quality of Service (QoS) Parameters for  
Cellular Mobile Telecommunication Services**

**Dated June 23, 2009  
IEB Bhaban (5<sup>th</sup> to 7<sup>th</sup> Floor), Ramna, Dhaka - 1000**

## FOREWORD

The objective of laying down the Quality of Service (QoS) parameters and benchmarks is to create conditions for customer satisfaction by making known, on the one hand the quality of service to which a customer is entitled, and on the other hand what an Operator must provide in a competitive market environment. While setting QoS standards for basic, value-added and supplementary telecommunication services, main factors considered are the existing levels of QoS of respective telecommunication services obtaining in Bangladesh, practicable timeframes to match international/ regional or at the least sub-regional benchmarks for the Key Performance Indicators, customer satisfaction, and costs. Monitoring of QoS performance indicators from time to time against the specified benchmark standards provides a means to assess and compare the respective QoS levels of different Licensees.

2. In a competitive scenario, the two most important factors considered by a customer for choosing to subscribe for service from one or the other operator are the quality of service and the price to be paid for that service. Every Service provider would normally endeavour to provide quality of service better than the other in competition to attract and retain the customers and this by the very nature of things should serve as an incentive for them to maintain high quality of service standards. Benchmarking the QoS serves to provide a yardstick for comparison of different service providers and by publishing such information, a discerning customer can make informed choice of Operator based on the quality of service. This would also induce the service providers to take measures for improving QoS conducive to creating conditions for effective competition.

3. Competition amongst the service providers in a mature market is manifested by industry co-regulation that takes care of the Quality of Service to a great extent. However, in a fast developing market, the Quality of Service has other linkages, such as accessibility, robustness of network-infrastructure, and affordability considerations. The Consultation Paper addresses comprehensively the issues relating to the Quality of Service. This evidently calls for consultation with service

providers for obtaining their inputs in regard to practical, measurable and meaningful QoS standards.

4. The objective is to bring out the QoS Regulations on conclusion of the consultation process that would clearly define the QoS standards in terms of Key Performance Indicators, Benchmark standards, Performance monitoring and enforcement, in unambiguous, simple and practical terms.

5. This consultation paper consists of 5 chapters. Chapter 2 relates to QoS standards and benchmarks in respect mobile wireless services. Chapter 3 pertains to customer perception of service, i.e., subjective perception of QoS and their benchmarks. Chapter 4 deals with record keeping, reporting of QoS parameters by the operators and Customer Survey to be conducted by BTRC or through an independent national agency engaged by BTRC. Chapter 5 relates to Proposals on QoS Benchmarks and associated Issues for Consultation.

6. All stakeholders are requested to send their written comments on the issues raised in this paper on or before 7<sup>th</sup> July 2009 to Ms. Anamika Bhakta, Senior Assistant Director. Clarifications, if any, may be sought within 30<sup>th</sup> June 2009. Submissions of comments in electronic form would be preferred.

7. After in-depth consideration of all comments received within the timeframe as indicated above, the Consultation paper would be revised, if required, which may be followed by stakeholder meeting/open house as considered necessary, before finalization with a view to issuing a Regulation on the subject.

## CHAPTER 1

### 1. Background

1.1 Bangladesh National Telecommunication Policy, 1998 stipulates maintenance of Quality of Service to prescribed standards set by the commission. Further, Article 30 (2)(j)&(k) of the Bangladesh Telecommunication Act, 2001 empowers Bangladesh Telecom Regulatory Commission (BTRC) to set the technical standards of telecommunication services provided by operators and to ensure that such services conform to such standards set by the Commission. Also in accordance with this Article, the Commission is mandated to “make arrangements for monitoring the QoS standards set by the Commission and their compliances”. The licenses issued to operators by the BTRC as well as the licenses previously issued by the Ministry of Post & Telecom on revalidation require the Operators to comply to standards and QoS benchmarks and reporting of performance at the specified periodic intervals, primarily to achieve the following objectives:

- i) Create conditions for customer satisfaction by making known the Quality of Service which the service provider is required to provide and the user has a right to expect;
- (ii) measure the Quality of Service provided by the Service Providers from time to time and to compare them with the norms so as to assess the level of performance; and
- (iii) To generally protect the interests of consumers of telecommunication services and at the same time act in a manner conducive to rapid growth of the industry, not making it more burdensome for it than necessary.

1.2 In the present scenario, the licenses for Cellular mobile telephone service (on revalidation of those issued before 2002), contain QoS requirements, but at present no reporting system is in place. In order to enforce the licensing requirement as well as the need to provide the quality service to the customers, a reporting mechanism for QoS parameters is to be finalized in consultation with stake holders.

- 1.3 In the telecom sector, particularly in cellular mobile telephone service, there has been phenomenal growth in the recent years and the technological innovations have made it possible for the operators to provide variety of new services as well as services that overlap from one to the other license. Considering these developments as well as future changes in the technologies, it is logical that the Quality of Service parameters are updated periodically. Since Customer aspiration is the major determining factor in the evolutions of new services, setting standards for QoS and designing the network to achieve these standards are of paramount importance, especially in a competitive environment.
- 1.4 QoS regulations should clearly define the QoS parameters, Performance monitoring and method of measurement and should aim at reducing or eliminating ambiguity. This evidently calls for consultation with service providers for obtaining their inputs in regard to practical, measurable and meaningful QoS standards. Maintenance of QoS is important to achieve customer satisfaction and to protect consumer interest as well as to enable the customer to make informed choice of an operator. In a competitive scenario, the need for service providers to provide good service to attract and retain the customer should serve as an incentive for operators to maintain high quality of service.

## CHAPTER 2

### Cellular Mobile Telecom Service QoS Parameters and their Benchmarks

#### 2. Cellular Mobile Telecom Service (CMTS)

There has been a phenomenal growth in cellular mobile telecom services in Bangladesh in the recent past and this service has overtaken PSTN services in terms of number of connections. This trend of extremely rapid growth witnessed in mobile telecommunication services is likely to continue. Thus ensuring the QoS standards by the service provider is very critical for smooth and orderly growth in the services as well as satisfaction of customers at large. In this context, QoS benchmarks for CMTS adopted by some of the countries of this region are given in Annex. 1. The QoS parameters for cellular mobile telecom service can be categorized in 6 categories, namely provision time, complaints/fault incidence and repair, network performance, Customer care/ assistance, billing complaints, network management and security and customer perception of service. While first five are put under **Objective Parameters** and will be covered in this chapter, the sixth is covered under **Subjective Parameters** in chapter 5.

##### 2.1. Complaints/ fault incidence and repair

There are distinct provisions in the license to set up a mechanism for receipt and disposal of complaints. Since the cellular network is based on state-of-the-art digital standards, the QoS parameters for complaint/fault incidence and repair have been laid down mostly based on GSM-MOU. Complaints/ fault incidence will include the problems relating to network performance only viz, non availability of service, delay in call setup, no ring back, call blocking, call drop, poor voice quality, service coverage, SMS delayed / not delivered etc. The benchmark proposed for this KPI is as under:

**No of complaints per 100 subscribers per month:**

**Short term benchmark:  $\leq 2.5\%$ ; long term (after 2 years) benchmark:  $\leq 1\%$ .**

## 2.2. Network Performance

### 2.2.1. a) Accumulated Down Time of BTSs

This parameter is defined as the ratio of sum of down time in hours of all the BTSs in a quarter to No. of clock hours in that quarter multiplied by no. of working BTSs in the network. For this purpose the down time of a BTS exceeding more than 1 hour on each occasion is to be taken into account for calculation. The benchmark and the method of measurement of this parameter are as under:

**The benchmark for BTSs accumulated down time (not available for service) is proposed as < 1%**

#### Measurements:

BTSs accumulated down time (not available for service) in percent =

$$\frac{\{\text{Sum of downtime of BTSs (exceeding more than an hour on each occasion)} \\ \text{in a Quarter in hours} \times 100\}}{\text{-----} \\ 24 \times \text{number of days in that Quarter} \times \text{number of BTSs in the network}}$$

The parameter is computed from the data generated by BTS failure alarm display in OMC/NMS.

### 2.2.1 b) Worst Affected BTSs Due to Downtime

Worst affected BTSs due to down time are those BTSs which remain out of service for more than 96 hours in a Quarter (each time for more than 1 hour). Such BTSs shall be taken as worst affected BTSs for the computation of this parameter.

**The benchmarks for worst affected BTSs due to downtime are proposed as:**

- i) **Short term < 2%.**

**ii) Long term (After 2 years) < 1%****Measurement:**

The performance against the benchmark shall be measured as under:

Percentage of worst affected BTS based on down time =

No. of BTSs having accumulated down time of >96 hours in a quarter x 100

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Total no. of BTSs in the network

The parameter is computed from the data generated by BTS failure alarm display in OMC/NMS.

**2.2.2. Network Downtime over Rolling Year Period**

This parameter denotes the total downtime of the network observed over a period of previous 12 months i.e. 1 year prior to the month in which this parameter is computed. For computing this parameter, all the outages in the network elements viz: Switching System, IN and BSC as well as the Trunks are to be taken into account in terms of total no of hours. The benchmarks for this **parameter are:**

**i) Short term <3%**

**ii) Long term (after 2 years) <1%**

This parameter is not to be a part of Regulation and is for reporting only.

**Measurement:**

Network downtime over 1 rolling year period = (Total no of network outages in hours in a year X 100) / (24 X No of days in previous one year).

Computed from OMC/NMS data.

### 2.2.3. Call Set-up Success Rate

Call Setup Success Rate is a ratio of Established Calls to Call Attempts. The established calls are those calls where Traffic Channel (TCH) is allocated. In accordance with ITU-T E600 (03/93), the call attempt is defined as “an attempt to achieve a connection to one or more devices attached to a telecommunication network.” Established calls means the following events have happened in call set up.

- i. Attempt is made
- ii. The TCH is allocated, and
- iii. The call is routed to the outward path of the concerned MSC.

Thus established calls is a process which includes complete signaling in the call set up and does not measure the performance of the called exchange or that of the Point of Interconnection. This is defined as under:

Call set up success rate (TCH success rate = Total no. of all successful TCH Assignments x 100 / Total no. all TCH Assignment Attempts.

**It is proposed to keep the benchmark for this parameter as:**

- i) **Short term < 92%**
- ii) **Long term < 95%**

#### **Measurement:**

This parameter is measured using OMC generated data in Time Consistent Busy Hour (TCBH) for all days of the week.

### 2.2.4. Service Access Delay

This parameter defines the time taken from pressing the send button of Mobile Set (MS) to getting the ring back tone. It consists of the following components:

- a) Time to connect call: This means that call setup command has been passed to the called network after authentication. This normally should happen within 4 seconds.
- b) Time to confirm instructions to connect: This is the maximum time from initiating the call setup command to when this is acknowledged to the user. This is concurrent to the time to connect call.
- c) Time to alert mobile set: The maximum time from when the mobile network receives a call for a mobile set to when the alert is energized. This time period is generally 4 to 15 seconds.

**Based on above, the benchmark for Service Access Delay should be <15 seconds.**

**Measurement:**

The measurement of this parameter is done offline by using TEMS tool.

**2.2.5. Block Call Rate**

This parameter denotes congestion in the network either due to non-availability of signaling channel known as Standalone Dedicated Control Channel (SDCCH) in respect of GSM network or paging channel in respect of CDMA network, or due to non-availability of Traffic Channel (TCH) itself. In other words, blocked call means a call that is not connected because there is no free channel to serve a call attempt. The benchmarks for these parameters are proposed as below:

**a. Short Term:**

- i) Congestion due to SDCCH < 3%**
- ii) Congestion due to Paging channel < 3%**
- iii) Congestion in TCH < 3%**

**b. Long Term (After 2 Years):**

- i) Congestion due to SDCCH < 1%**

**ii) Congestion due to Paging channel < 1%**

**iii) Congestion in TCH < 2%**

**Measurement:**

These parameters are taken from the OMC report during TCBH.

**2.2.6. Call Drop Rate**

This parameter is a measure of uninterrupted quality of call during the entire length of conversation i.e. once the Traffic Channel has been assigned, the call should not drop. This parameter measures failure in coverage, problem with the quality of signal, network congestion and network failure. As per ETSI EG 202 057-3 v 1.1.1 (2005-04), Dropped Call Ratio is “the percentage of calls which, once they have been correctly established and therefore have an assigned TCH, are interrupted prior to their normal completion by the user, the cause of the early termination being within the operator’s network.”

The call drops in the network could be mainly due to following reasons:

- a. Equipment: GSM radios/Combiners could be the cause for call drop. A mobile station (handset) could also cause call drop.
- b. VSWR (Voltage Wave Standing Ratio): VSWR caused by poor connections on feeders, water penetration, fault on antenna, etc.
- c. Transmission problem: If transmission is not perfect, high B.E.R (Bit Error Rate) or other factors causing inaccuracy of transmission.
- d. Interference: Frequency Interference caused by either co-channel or adjacent channels.
- e. Handover: If handover between two sectors is not well defined.
- f. Antenna down-tilts are wrong.
- g. Antenna on one sector pointing in different directions.
- h. Antenna is obstructed.

**The benchmark for this parameter is proposed as < 3%**

### **Measurement**

This parameter is computed directly from the output of OMC or NMC during the Time Consistent Busy Hour (TCBH). However the Counters should include all the events leading to call drops.

### **2.2.7. Connections with Good Voice Quality**

The quality of voice in cellular mobile telecom service is measured on a scale from 0 to 7. As the quality deteriorates, this value increases. The quality of voice is considered to be good, if this value remains between 0 and 4. However, this value may be between 0 to 5 for the network, where Frequency Hopping phenomenon is used. In case of CDMA, the fundamental performance measured for voice quality is a Frame Erasure Rate (FER). It is the probability that a transmitted frame is received incorrectly. The frame includes signaling information and error detection bits as well as user voice voice/data. Similarly for GSM system<sup>1</sup> Bit Error Rate (BER) decides the voice quality.

In GSM the 0 - 7 scale is defined in terms of BER as under:

Scale	BER percent
0	<0.18
1	<0.28
2	<0.5
3	<1.3
4	<2.26

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<sup>1</sup> the relationship table between RXQUAL and BER for GSM radio networks are defined in 3GPP specifications 45.008. The table is available at page no.32-33. The BER is for raw data and does not consider channel coding. 3GPP specifications are freely downloadable from [www.3gpp.org](http://www.3gpp.org)

5	<4.53
6	<9.08
7	<18.1

In CDMA system a good channel should have FER value < 4%.

**The proposed benchmark for connections of good voice quality > 95%.**

### **Measurement**

The measurement of voice quality parameter can either be done from data derived from the system or from 'drive test' on sample basis. The data derived from the system is, however, more objective and preferred.

#### **2.2.8. Service Coverage**

This parameter is intended for measuring the coverage in terms of the received signal strength in a give service area. However this parameter is used by the operator primarily to improve the radio coverage in the service area. The benchmarks for the service coverage are proposed as under:

- a) Indoor > - 75 dBm.**
- b) In-Vehicle > - 85 dBm.**
- c) Outdoor > - 95 dBm.**

**Note:** a) above would imply that the signal strength outside the building should not be less than – 75 dBm, presuming 20 db loss in signal strength will occur from outside to inside of the building. Similarly in regard to b) above, 10 db loss is expected in case of a vehicle.

### **Measurement:**

These parameters are measured through Drive Test. and shall be audited.

#### **2.2.9 Completion Rate for Short Message Service (SMS)**

SMS has become a popular service in the mobile communication system and is extensively used by customers. This service is provided by the system through SMSC on a store and forward basis. Normally adequate capacity is provided in the SMSC to ensure that no congestion takes place even during the busy hour. Considering the importance and extensive use of this service, it is proposed to fix a benchmark so that the messages are not lost and delivered without appreciable delay. This parameter is defined as the ratio of No. of successfully delivered SMS from SMSC to No. of successfully submitted SMS to SMSC. The benchmarks proposed are as under:

**a. Short Term: > 80% SMS Completion Rate.**

**b. Long Term (After 2 years): > 85% SMS Completion Rate.**

**Measurement:**

It is computed from input output data of SMSC.

**2.2.10 Point of Interconnection (POI) congestion**

This parameter indicates as to how effective is the interconnection between two networks. Very often the congestion at many points of interconnection occurs due to non-provisioning or insufficient provisioning of telecom circuit resource as per traffic requirements. These lead to:

- Inter-network congestion at the POI,
- loss of calls ,
- repeated call attempts by customers,
- deterioration in QoS; and
- Customers' dissatisfaction

**The benchmark proposed for POI Congestion < 1%.**

## **Measurement**

This parameter is measured using OMC generated data during Time Consistent Busy Hour (TCBH) once in a month.

### **2.2.11 Grade of Service**

This parameter is defined as probability of loss of a call between originating switch and terminating switch.

**The proposed benchmark for this parameter  $\leq 4\%$  i.e. upto 4% calls should be lost between the originating switch, their interconnections and terminating switch during TCBH.**

**Grade of service is a planning parameter to ensure adequate provision of links, junctions and equipment. Operators should furnish a certificate regarding provisioning of links, junctions and equipment as per  $GOS \leq 4\%$ .**

## **2.3 Customer Care/Assistance**

### **2.3.1 Response Time to the customer for assistance:**

This parameter reflects the speed with which a call is answered either by the operator or by the IVR system at the Call Centre/Customer Care/Help Desk or fault repair service provided by the service provider. It is proposed to set QoS standards for IVRS and for the voice to voice response separately. Accordingly, the following benchmarks are proposed:

(i) % age of calls answered (electronically)

**within 20 seconds =80%**

**within 40 seconds = 90%**

(ii) % age of calls answered by operators (voice to voice)

**within 60 seconds = 80%**

**within 90 seconds= 90%**

In addition to above, there is need to provide a benchmark for accessibility of call centre number which means that the customer should be able to access the call centre without much difficulty. The benchmark for this is proposed as under:

**Minimum 95% calls to be connected to call center successfully.**

**Measurement:**

**In case of calls handled by IVRS and operator, the call center data will be used to compute the response time. In case of calls to be connected to the call centers successfully, the parameter has to be computed on sampling basis.**

### **2.3.2 Customer's Request Compliance**

Customer can demand provision of supplementary value added services as well as termination of the service and it is expected that prompt attention will be given in compliance to customers' requests. It is therefore, necessary that QoS benchmarks are fixed for complying with the requests of the customers in respect of the following services:

- Provision of supplementary/ Value added services.
- Termination of Services.

It is proposed that 100% requests for providing supplementary services or for terminating the service should be complied within 24 hours. Thus the **benchmark for this parameter is proposed as <24 hours.**

### **2.4 Billing/ Charging Complaints**

There are three parameters relating to bills issued by the operator. These are as under:

- i) a. Complaints for 100 bills issued in case of post paid customers.  
b. Complaints about charging, credit and validity in respect of pre paid customers.
- ii) Resolution of billing complaints

- iii) Period of refunds/ adjustments to customers from the date of resolution of complaints.

#### **2.4.1 Billing & Charging Credibility**

The present trend in the mobile service shows that vast majority of the customers are prepaid customers wherein the charging is made on line through the IN platform and no bills are issued to the customer. In order that customer complaints relating to charging not as per tariff plan, credit and validity etc. are addressed effectively, it is necessary that benchmarks for both post paid billing and pre- paid charging are fixed separately as under:

- a) Post paid billing- it should be < 0.1% i.e. not more than 1 bill in 1000 bills issued should be disputed over a billing cycle.**
- b) Post paid billing- International Roaming - it should be < 1%. i.e. not more than 1 bill in 100 bills issued should be disputed over a billing cycle.**
- c) Pre-paid charging- it should be < 0.05% i.e. not more than 1 complaint in a month from 2000 prepaid customer.**

#### **2.4.2 Resolution (Time-bound) of billing/charging complaints**

In order to have customers' confidence in the matters of billing and charging, it is important that the complaints in this regards are minimal and disposed off quickly. Accordingly, it is proposed to set the benchmark as under:

**100% complaints should be resolved within 4 weeks.**

**100% complaints in regards to International Roaming bills should be resolved within 12 weeks.**

#### **2.4.3 Refunds / payments due to customers from the date of resolution of complaints**

The benchmark for this parameter is proposed as under:

All refunds in the form of deposits/ credit / waiver / adjustment should be made within 4 weeks after the resolution of the billing/charging

## 2.5 General Packet Radio Service

GPRS network enables access to internet and other IP (Internet Protocol) based services by mobile telephone in a GSM network. Data services are becoming dominant mode of communication in telecommunication operations by rapid progress in computer networking and the related field of Internet. The following QoS parameters and their benchmarks are relevant to ensure the quality offered by service providers.

### 2.5.1 Service Availability (equipment up time)

This parameter defines the availability of service from Data Node and Links to customers using GPRS in GSM network. Its benchmark proposed are as under:

- a) **Short Term- > 96% of time.**
- b) **Long Term (more than 2 years ) > 99% of time**

#### **Measurement**

This parameter is computed from NMS/OMC data.

### 2.5.2. PDP Context Activation Success Rate

It is defined as ratio of successful PDP context activation x100/ PDP context activation attempts made by MS. The benchmark proposed is **>98%.**

#### **Measurement**

This parameter is computed from NMS/OMC Data

### 2.5.3. Data Retainability

This parameter measures TBF( Temporary Block Flow) drops in busy hour and % of cells having TBF drops beyond tolerable limits.

a) No. of TBF drops in busy hour x 100 / Total no. TBF in busy hour.  
The benchmark proposed is < 2%.

b) No. of cells having TBF drops within tolerable limits.

No. of cells having TBF drops  $\leq$  3% x 100 / Total no. of cells.

#### **Measurement**

This parameter is computed from NMS/OMC Data

#### **2.5.4 Through Put**

It is defined as data speed of Up Link ( UL) and Down Link (DL) in busy hour. The benchmarks proposed are as under:

**U L > 10 kbps**

**DL > 30 kbps.**

#### **Measurement**

This is done by TEMS tool for drive test.

## CHAPTER 3

### Customers Perception of Service

#### Subjective Parameters and their Benchmarks

### 3. Customers Perception of Service

The Customer's perception of Quality of Service is the most important factor about providing a service in a competitive environment. This parameter is a subjective one as it indicates the level of satisfaction of a customer about the quality of service that he receives. While the network performance parameters such as fault rate, voice quality, and call set up success rate response time in operator services and billing and charging credibility could be physically measured, the satisfaction level of a customer can only be assessed by talking to them and obtaining their feedback on properly designed questionnaires. This job can be by an independent expert agency.

#### 3.1 Subjective Parameters and their benchmarks

##### 3.1.1 Service Provisioning

This activity will include the customer satisfaction in respect of the followings:

- Satisfaction in regard to providing/activating a fixed line phone/mobile telephone/Broadband connection.
- Satisfaction about time taken for shifting a telephone.
- Satisfaction with re-activation of service in case of disconnection due to non-payment.
- Satisfaction with ease of understanding the offer or tariff plan.

**The benchmark proposed in regard to provision of service > 95%**

### **3.1.2 Billing/ Charging Performance:**

#### **Post Paid:**

- Satisfaction with timely receipt of the bill.
- Satisfaction with the accuracy and completeness of the bill
- Satisfaction with the clarity in bills/ presentation of the billing information in terms of transparency and understandability.
- Satisfaction with the process of resolution of billing complaints

#### **Pre-paid:**

- Satisfaction with the accuracy of charges i.e. correctness of the amount deducted on every usage.
- Satisfaction with the credit and validity correctness.
- Satisfaction with the ease and transparency of recharge.

**The benchmark proposed is % satisfied with the billing performance > 90%**

### **3.1.3 Help Services/ Customer Care**

- Satisfaction with ease of access of call center/ customer care or help line.
- Satisfaction with the response time taken to answer (waiting time) the call by the customer care executive.
- Satisfaction with the time taken by call center/ customer care or help line to resolve the complaints.
- Satisfaction with the problem solving ability of the customer care executive.

- Satisfaction with the achievement of a satisfactory solution or resolution of old complaints.
- Satisfaction with the overall grievance redressed mechanism.

**The benchmark proposed is % satisfied with help service > 90%**

#### **3.1.4 Network Performance, reliability and availability:**

- Satisfaction with the network coverage (signal strength or availability of telephone connections).
- Satisfaction with the ability to make or receive calls easily.
- Number of call drops experienced during conversation.
- Satisfaction with the voice quality.
- Satisfaction on Bandwidth availability.
- Satisfaction with Internet Access.

**The benchmark proposed is % satisfied with Network Performance, reliability and availability > 95%**

#### **3.1.5 Maintainability**

- Average duration and frequency of network/ exchange outages (no signal or no dial tone or no Internet Access).
- Satisfaction with availability of network.
- Satisfaction with restoration of network (signal/ exchange/broadband connection) problems.
- Number and frequency of faults/ problems experienced.

**The benchmark proposed is % satisfied with maintainability > 90%**

### 3.1.6 Supplementary Services/Value Added Services

- Satisfaction with process of activation of supplementary/ value added services.
- Satisfaction with ease of messaging (SMS/MMS).
- Satisfaction with the voice mail.
- Satisfaction with the quality of the supplementary/ value added services.

**The benchmark proposed is % satisfied with Supplementary Services/Value Added Services > 95%**

### 3.1.7 Overall Customer Satisfaction:

- Satisfaction with the quality of total service offering

**The benchmark proposed for Overall Customer Satisfaction is > 95%**

## 3.2 Assessment of Customer's Perception of QoS:

The assessment could be made either by getting the response of the customers to questionnaire or through personal/telephonic interviews. For computing the percentage satisfaction level of the customers, one of the following two methods may be adopted:

### 3.2.1 Weighted Satisfaction Scores

The overall weighted satisfaction score is ascertained using the following formula:

$$\text{Mean Score} = A/N$$

Where,

A= No of customers who have given rating of very satisfied X 4 + No of customers given rating of satisfied X 3 + No of customers who have given rating of dissatisfied X 2+ No of customers who have given rating of very dissatisfied X 1

N= Total sample size i.e. No of customers covered in survey

**Overall weighted satisfaction score =  $\{(\text{Mean score} - 1) / 3\} \times 100$**

Thus, if all customers are very satisfied, the operator can get a score of 100%. On the other hand, if all the customers are very dissatisfied, the operator gets a score of 0%. Accordingly, the scale has been calibrated to range between 0% to 100%.

### 3.2.2 Alternate Approach - Mean Opinion Score (MOS)

In this process the customer perception is recorded on a five point scale as under:

Customer Perception	Excellent	Good	Fair/Average	Poor	Bad
Mean opinion Score(MOS)	5	4	3	2	1

Minimum acceptable Mean Opinion Score can be specified as a benchmark of customer's perception of QoS. It is proposed that "(4-Good)" could be an acceptable indicator of customers satisfaction.

#### Measurement

The MOS can be computed by using the following formula:

$$\text{MOS} = (5A + 4B + 3C + 2D + 1E) / N$$

Where,

A=No. of customers having perceptions about the service as "Excellent"

B= No. of customers having perceptions about the service as "Good"

C= No. of customers having perceptions about the service as "Fair/Average"

D= No. of customers having perceptions about the service as "Poor"

E= No. of customers having perceptions about the service as “Bad”

N=Total sample size, i.e. No of customers surveyed (A+B+C+D+E).

### 3.3 Sample Size

In order to fix the sample size for conducting the survey for assessing customer satisfaction, the target population should be fixed as per following table:

Population Size	Sample Size
100000	1056
200000	1061
500000	1065
1000000 and above	1066

These are determined on the following basis:

Confidence level - 95%

Confidence interval - 3

## **CHAPTER - 4**

### **Record Keeping, Reporting of Quality of Service Performance by operators and Customer Survey**

#### **4. Record Keeping, Reporting of QoS Parameters and Customer Survey**

##### **4.1 Need for Record Keeping**

For the purposes of verification and audit of QoS parameters by the Regulator, it is important that the data regarding performance and benchmarks are kept and maintained properly. While some of the data related to network performance is generated by OMC/NMC and stored in electronic form, the others are to be recorded and kept in a manner that these could be retrieved/ obtained whenever required. This calls for adopting uniform record keeping procedure by all the service providers so that the verification and auditing could be done either by the staff of the BTRC or by an independent agency engaged by BTRC. For this purpose the Reporting format is given in Tables 1, may be utilized.

##### **4.2 Reporting of Performance against the QoS Benchmarks**

The operators are under obligations to report the Network Performance Parameters against the benchmarks prescribed by the BTRC every quarter for the following three areas separately:

- 1) Dhaka
- 2) Chittagong
- 3) Rest of the license areas

For this purpose, the Reporting Format for the operators in respect of Cellular Mobile Telephone Service has been framed and is annexed as Table 1.

### **4.3 Auditing the QoS Parameters and Customer Survey**

In accordance with the Bangladesh Telecommunication Act 2001, one of the major functions of the BTRC is to lay down the standards of QoS to be provided by the service providers and to ensure the Quality of service and also to audit the performance parameters reported by the operators. Additionally, to ascertain the level of customer satisfaction, BTRC may conduct periodical surveys by Expert Agency. Therefore, monitoring the network performance against the prescribed benchmarks as well as assessing the satisfaction level of the customers by conducting customer survey is the major functions of BTRC. For this purpose the operators are required to furnish performance report on quarterly basis. These reports are analyzed by QoS Group of BTRC and also sample auditing shall be carried out to verify the authenticity of these reports. The BTRC may also put in place a system of Direct Monitoring for which it is proposed to secure access to the concerned Operator's Facilities and necessary tools. It shall be provided by the Operator.

As far as customer survey is concerned, this has to be carried out by an expert agency to assess the perception of a customer about the service he/she is getting. To carry out the customer survey a set of questionnaires for Cellular Mobile Telephone Services has been designed and is annexed as Table 2.

## CHAPTER 5

### Proposals on QoS Benchmarks and Issues for Consultation

## 5. Summary of Proposals for Consultation

### 5.1 Benchmarks for Cellular Mobile Telecom Service

The QoS parameters and their benchmarks have been detailed out in chapter 2. This primarily includes **complaints/fault incidence and repair, network performance in regard to accumulated down time for community isolation, network downtime over rolling year period, call set-up success rate , service access delay, block call rate, call drop rate, connections with good voice quality, service coverage, completion rate of SMS and grade of service.** In addition, **customer care and billing complaints** have also been discussed and benchmarks fixed. The consultation paper also contains QoS parameters and their benchmarks for GPRS. The comments are invited about the relevance of these parameters, the benchmarks proposed as well as the method of measurement in respect of each parameter of cellular mobile telecom service.

### 5.2 Customer Perception of service

Customer satisfaction is the basic parameter to judge the QoS provided by an operator. However, the methodology to measure this parameter is highly subjective and requires due care to assess the level at which services is being rendered. In order to ascertain the customer perception about the service, a set of questionnaires for cellular mobile telecom service has been provided in **Table 2.** Further, in regard to assessment of customer perception of QoS, two approaches have been suggested namely the first one as the Weighted Satisfaction Scores and second one as Mean Opinion Score (MOS). The comments of the stakeholders are invited regarding the method of assessing the customer's perception by using either Weighted Satisfaction Scores or Mean Opinion Score (MOS).

Table 1

**CELLULAR MOBILE TELEPHONN SERVICES  
QUALITY OF SERVICE REPORT FOR THE QUARTER ENDING**

**NAME OF SERVICE PROVIDER:.....**

**NAME OF SERVICE AREA:.....**

Sr. No.	QoS Parameters	Benchmarks		Remarks
		Short Term	Long Term (>2 years)	
1	<b>Complaints/ Fault Incidence and Repair</b>			
1.1	No of complaints per 100 customers per month	$\leq 2.5$	$< 1$	
2	<b>Network Performance</b>			
2.1	BTSs accumulated down time of community isolation	$< 1 \%$	$< 1\%$	
2.2	% of worst affected BTS due to down time	$< 2 \%$	$< 1\%$	
2.3	Network down time over 1 rolling year period	$< 3 \%$	$< 1\%$	
2.4	Call set-up success rate within licensee's own network	$> 92 \%$	$> 95\%$	
2.5	Service Access delay	$< 15 \text{ sec}$	$< 15 \text{ sec}$	
2.6	Block call rate			
	a. Congestion due to SDCCH	$< 3\%$	$< 1\%$	
	b. Congestion due to Paging Channel	$< 1\%$	$< 1\%$	
	b. Congestion due to TCH	$< 3\%$	$< 2\%$	
2.7	Call drop rate	$< 3\%$	$< 3\%$	
2.8	Connections with good voice quality	$> 95\%$	$> 95\%$	
2.9	Service coverage			

	a. Indoors (assuming 20 dB loss of signal)	> -75 dBm	> -75 dBm	
	b. In vehicle (assuming 10 dB loss of signal)	> -85 dBm	> -85 dBm	
	c. outdoors	> -95 dBm	> -95 dBm	
2.10	Completion Rate of SMS	>80%	>85%	
2.11	Point of Interconnection Congestion (POI)	< 1 %	< 1 %	
2.12	Grade of Service	Better than 4 %	Better than 4 %	
3	<b>Customer Care/Assistance</b>			
3.1	Response Time to the customer for assistance			
	a. Electronically	80 % within 20 sec 90% within 40 sec	80 % within 20 sec 90% within 40 sec	
	b. Voice to voice	i. .80 % within 60 sec  ii. 90% within 90 sec	4) .80 % within 60 sec  4) 90% within 90 sec	
	c. Call center accessibility	> 95 %	> 95 %	
3.2	Compliance to customer's request	< 24 hours	< 24 hours	
4	<b>Billing/ Charging Complaints</b>			
4.1	Metering, billing and charging credibility			
	a. postpaid bills	< 0.1%	< 0.1%	
	b. post paid International Roaming bills	<1%	<1%	
	c. prepaid charging	< 0.05%	< 0.05%	
4.2	Resolution of billing complaint i)post paid bills ii) International roaming bills	< 4 weeks <12 weeks	< 4 weeks <12 weeks	
4.3	Refunds/payments/credi	< 4 weeks	< 4 weeks	

	t/waiver/adjustment due to customers from the date of resolution of complaints or date of termination of service			
5	<b>GPRS</b>			
5.1	Service Availability (equipment up time)	>96%	>99%	
5.2	PDP context activation success rate.	>98%	> 98%	
5.3	Data Retainability a) TBF drops in busy hour b) Cells having TBF drops <= 3%	< 2% >95%	< 2% >95%	
5.4	Through put	UL >10kbps DL >30 kbps	UL >10 kbps DL >30 kbps.	

**TABLE 2**  
**SURVEY OF CELLULAR MOBILE TELECOM SERVICE**  
**Questionnaire for Customer Satisfaction Survey**

1. Service Provisioning	
11.1 How much time was taken to get the working connection (activation) after you applied for it and completed all formalities?	<ol style="list-style-type: none"> <li>1. 1 days</li> <li>2. 2-3 days</li> <li>3. 4-7 days</li> <li>4. &gt; 7 days</li> </ol>
1.2 How satisfied are you with time taken to activate the mobile connection?	<ol style="list-style-type: none"> <li>1. Very satisfied</li> <li>2. Satisfied</li> <li>3. Dissatisfied</li> <li>4. Very dissatisfied</li> </ol>
1.3 In case your connection was temporarily suspended due to non-payment of bills, are you satisfied with the time taken to reactivate the service after you made the payment?	<ol style="list-style-type: none"> <li>1. Very satisfied</li> <li>2. Satisfied</li> <li>3. Dissatisfied</li> <li>4. Very dissatisfied</li> </ol>
2 A. Billing Related – Prepaid Connection	
2.1 How satisfied you are with the accuracy of charges i.e. amount deducted on every usage?	<ol style="list-style-type: none"> <li>1. Very satisfied</li> <li>2. Satisfied</li> <li>3. Dissatisfied</li> <li>4. Very dissatisfied</li> </ol>
2.2 Please specify the reasons for your dissatisfaction.	<ol style="list-style-type: none"> <li>1. Charges not as per tariff plan subscribed</li> <li>2. Tariff plan changed without information</li> <li>3. Charge for value added services not subscribed</li> <li>4. Charge for calls/ services not made/used</li> <li>5. Others (please specify)-----</li> </ol>
2 B. Billing Related—Postpaid Connection	
2.3 How satisfied are you with the timely delivery of bills?	<ol style="list-style-type: none"> <li>1. Very satisfied</li> <li>2. Satisfied</li> <li>3. Dissatisfied</li> <li>4. Very dissatisfied</li> </ol>
2.4 How satisfied you are with the accuracy of the bills?	<ol style="list-style-type: none"> <li>1. Very satisfied</li> <li>2. Satisfied</li> <li>3. Dissatisfied</li> </ol>

	4. Very dissatisfied
2.5 Please specify the reasons for your dissatisfaction over the accuracy of the bills.	<ol style="list-style-type: none"> <li>1. Charges not as per tariff plan subscribed</li> <li>2. Tariff plan changed without information</li> <li>3. Charge for value added services not subscribed</li> <li>4. Charge for calls/ services not made/used</li> <li>5. Others (please specify)-----</li> </ol>
2.6 Have you made any billing related complaints in last 12 months?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>
2.7 How satisfied are you with the process of resolution of billing complaints?	<ol style="list-style-type: none"> <li>1. Very satisfied</li> <li>2. Satisfied</li> <li>3. Dissatisfied</li> <li>4. Very dissatisfied</li> </ol>
2.8 How satisfied are you with the clarity of the bills sent by your service provider in terms of transparency and understandability?	<ol style="list-style-type: none"> <li>1. Very satisfied</li> <li>2. Satisfied</li> <li>3. Dissatisfied</li> <li>4. Very dissatisfied</li> </ol>
2.9 Please specify the reasons for your dissatisfaction in regard to question 2.8	<ol style="list-style-type: none"> <li>1. Difficult to read the bills</li> <li>2. Difficult to understand the language</li> <li>3. Calculations not clear</li> <li>4. Item-wise charges not given</li> <li>5. Others(please specify)-----</li> </ol>
<b>3. Help Services/ Customer Care</b>	
3.1 Did you complain or make a query in the last 12 months to the customer care/call centre of your service provider?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>
3.2 How satisfied are you with ease of access of call centre/ customer care or help line?	<ol style="list-style-type: none"> <li>1. Very satisfied</li> <li>2. Satisfied</li> <li>3. Dissatisfied</li> <li>4. Very dissatisfied</li> </ol>
3.3 How satisfied are you with response time taken to answer your call by a customer care executive?	<ol style="list-style-type: none"> <li>1. Very satisfied</li> <li>2. Satisfied</li> <li>3. Dissatisfied</li> <li>4. Very dissatisfied</li> </ol>
3.4 How satisfied are you with the problem solving ability of the customer care executives?	<ol style="list-style-type: none"> <li>1. Very satisfied</li> <li>2. Satisfied</li> <li>3. Dissatisfied</li> <li>4. Very dissatisfied</li> </ol>
3.5 How satisfied are you with the time taken by call centre/customer care/help	<ol style="list-style-type: none"> <li>1. Very satisfied</li> </ol>

line to resolve your complaint?	2. Satisfied 3. Dissatisfied 4. Very dissatisfied
4. Network Performance, Reliability and Availability	
4.1 How satisfied are you with the availability of signal of your service provider?	1. Very satisfied 2. Satisfied 3. Dissatisfied 4. Very dissatisfied
4.2 How satisfied are you with ability to make or receive calls easily?	1. Very satisfied 2. Satisfied 3. Dissatisfied 4. Very dissatisfied
4.3 How satisfied are you with the voice quality?	1. Very satisfied 2. Satisfied 3. Dissatisfied 4. Very dissatisfied
4.4 How often does your call drop during conversation?	1. Never 2. Occasionally 3. Frequently 4. Very frequently
5. Maintainability (Fault Repair)	
5.1 How often your mobile hand set faces problem of signal?	1. Never 2. Occasionally 3. Frequently 4. Very frequently
5.2 How satisfied are you with the availability of network(signal)?	1. Very satisfied 2. Satisfied 3. Dissatisfied 4. Very dissatisfied
5.3. How satisfied are you with the restoration of network (signal) problems?	1. Very satisfied 2. Satisfied 3. Dissatisfied 4. Very dissatisfied
6. Supplementary Services/Value Added Services	
6.1 Do you use value added services like roaming, ring tone, GPRS, E-mail, voice mail or any other such services?	1. Yes 2. No
6.2 Did the service provider have your explicit consent before providing the chargeable value added services?	1. Yes 2. No

6.3 How satisfied are you with the quality of the supplementary/value added services provided?	<ol style="list-style-type: none"> <li>1. Very satisfied</li> <li>2. Satisfied</li> <li>3. Dissatisfied</li> <li>4. Very dissatisfied</li> </ol>
7. Overall Customer Satisfaction	
7.1 How satisfied are you with the overall quality of your mobile service?	<ol style="list-style-type: none"> <li>1. Very satisfied</li> <li>2. Satisfied</li> <li>3. Dissatisfied</li> <li>4. Very dissatisfied</li> </ol>
7.2 If dissatisfied, specify the reasons	<ol style="list-style-type: none"> <li>1. -----</li> <li>2. -----</li> </ol>
8. General Information	
8.1 Have you been informed in writing about the complete details of your tariff plan within a week of activation of service?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>
8.2 Have you terminated your mobile phone connection during last 12 months?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>
8.3 If yes, please name your previous service provider.	
8.4 How many days were taken for termination of your mobile phone connection?	<ol style="list-style-type: none"> <li>1. 1 day</li> <li>2. 2-3 days</li> <li>3. 4-7 days</li> <li>4. &gt; 7 days</li> </ol>
8.5 Did your service provider adjust your security deposit in the bill raised after you requested for termination?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>
8.6 Have you registered your mobile number for "Do Not Call"(DNC) facility with your service provider so that you do not receive unsolicited commercial calls / SMSs?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>

## Annexure-1

International QoS Parameters and Benchmark for Cellular Mobile Telecom Services

Sr. No.	QoS Parameters/KPI	Benchmarks				
		Australia	India	Malaysia	Pakistan	Singapore
1	Complaints/faults incidence and repair	-	< 1%	< 0.4%	-	-
2	Network Performance					
2.1	(a) Accumulated down time for community isolation	-	< 1%	-	< 1%	-
	(b) worst affected BTS due to down time	-	< 1%	-	-	-

2.2	Network down time over rolling 1 year period	-	< 1%	-	<1%	-
2.3	Call Set-up success rate	-	98%	-	98%	-
2.4	Service access delay	-	<20 sec	-	< 5 sec	-
2.5	Block call rate ( during TCBH)	-	SDCCH <1% TCH <2%	-	<2%	<5%
2.6	Call drop rate	-	< 2%	< 5%	< 2%	<5%
2.7	Connections with good voice quality	-	> 95%	-	MOS score >3	-
2.8	Service coverage	-	Indoor >- 75dbm  In-vehicle >- 85 dBm  Out-door > - 95 dBm	-	-	In-building >85%  Street level >95%
2.9	Short message service ( SMS )	-	-	-	-	-

2.10	Point of inter-connection (POI) congestion	-	< 0.5%	-	-	-
2.11	Grade of service	-	-	-	< 2%	-
3	Customer care / assistance					
3.1	Response time to customer for assistance	-	Electronically 80% in 20 sec. 95% in 40 sec. Voice to voice Voice to voice 80% in 60 sec 95% in 90 sec	Voice to voice 90% in 10 sec. 100% in 20 sec.	Voice to voice 80% in 20 sec. 90% in 30 sec 99% in 90 sec.	-
3.2	Customer's request compliance	-	< 24 hrs	-	-	-

4	Billing/ charging complaints					
4.1	Metering and billing/ charging credibility	-	< 0.1%	< 2%	< 0.2%	-
	a) Post paid	-	< 0.05%	-	-	-
	b) Pre-paid					
4.2	Resolution of Billing complaints	-	100% within 4 weeks	90% within 15 days  95% within 30 days	-	-
4.3	Refunds/ payments due to customers	-	Within 4 weeks from date of resolution	-	-	-