

Consultation Paper No. 03/2009



**Bangladesh Telecommunication Regulatory Commission**

**Standardization of Quality of Service (QoS) Parameters for  
Broadband Internet Services**

**Dated August 3, 2009  
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## 1. Introduction

Considering the extensive use of Broadband Internet services and its contribution in growth of GDP as well as enhancement in quality of life through social applications including tele-education, telemedicine, e-governance, entertainment as well as employment generation, it is now imperative that along with accelerating the growth of services, QoS standards are set and monitored to protect the interest of the customers at large as well as to achieve the above mentioned social objectives. The Broadband service is defined as: “

**An ‘always-on’ (24X7) data connection that is able to support interactive services including Internet access and has the capability of the minimum download speed of 128 kilobits per second (kbps) to an individual subscriber from the Point Of Presence (POP) of the service provider intending to provide Broadband service where multiple such individual Broadband connections are aggregated and the subscriber is able to access these interactive services including the Internet through this POP.**

## 2. QoS Parameters

In broadband access network the service providers could use different technologies for providing the services but regardless of the medium of the access network, QoS expected by the consumer or mandated by the regulator has to be delivered by the operator. Considering the international practices as well as QoS parameters and their benchmarks fixed by the Regulators of the countries of this region, the following QoS parameters have been defined as under. Also an Operator’s Reporting format has been framed and can be found in Table 1.

### 2.1 Service Provisioning / Activation

The service provisioning/ activation time means the time taken from the date of receipt of valid application to the date when the service is activated. The issues

that could arise in this regard are as to whether the following situations should be excluded from the service activation time benchmark or not:

- a) Wrong address/incomplete information.
- b) Damage to network facility due to force majeure.
- c) Damage to network facility by third party.
- d) Customer premises inaccessible.
- e) Customer canceling or deferring agreed appointment.

The above factors do impact the service activation time and on these factors the service provider has not much control. Considering these aspects, the following benchmarks are proposed:

- (a) 80% of all installation orders shall be fulfilled by next days of receipt of the order;**
- (b) 90% of all installation orders shall be fulfilled within 2 days of receipt of the order; and**
- (c) 100% of all installation orders shall be fulfilled within 7 days.**

## **2.2 Fault Repair Time**

The benchmark for fault repair should be as under:

- (a) 80% of all service restoration requests should be attended to and restored by next day of report of fault.**
- (b) 90% of all service restoration requests should be attended to and restored within 2 days of report of fault.**
- (c) 100% of all service restoration requests should be attended to and restored within 3 days of report of fault.**

The following events may be excluded in the above calculation:

- (i) Damage to network facility due to third parties.
- (ii) Damage to network facility due to force majeure.
- (iii) Deferment of service restoration request by customers.
- (iv) Faulty customer equipment.

### **2.3 Response Time to the Customer for operator assisted calls**

This parameter reflects the speed with which a call is answered by the operator at the Call Center/ Customer Care/ Helpdesk provided by the service provider. It is proposed to keep the following benchmarks for this service:

- i) % of calls answered by the operator within 60 sec  $\geq$  80%**
- ii) % of calls answered by the operator within 90 sec  $\geq$  95%**

### **2.4 Bandwidth Utilization/Throughput**

**The bandwidth utilization between the user and the nearest serving ISP node during download shall be more than 70% of the subscribed level for 95% of the time.** To ensure this, the broadband service provider has to make adequate provision of bandwidth for the upstream connectivity for which purpose he should enter into Service Level Agreements (SLA) with the domestic long distance service providers and IGSPs/ ILDOs for the IPLC.

### **2.5 Annual Network Service Availability**

**Annual network service availability should be  $\geq$ 99%** for all users and the measurement of this parameter is described by the ratio:

$$\frac{\{(Total\ operational\ hours\ over\ a\ 12\ months\ period\ -\ Total\ downtime\ over\ the\ 12\ month\ period)\}}{Total\ Operational\ hours\ over\ the\ 12\ months\ period} \times 100$$

This will exclude the events beyond the control of operator such as under Force Majeure.

## **2.6 Packet Loss**

Packet loss is the percentage of packets lost to the total packets transmitted between two designated points (routers). It is measured by averaging sample measurements for a month. This parameter indicates the quality of leased line resources used as well as the equipment at the ISP Node.

**The benchmark proposed is that the packet loss between the two designated points should be  $\leq 1\%$  over a period of 1 month.**

## **2.7 Network Latency**

The transmission of broadband traffic involves the handing over of data packets over different operators' network (also known as hops). Latency is the measure of duration of a round trip for a data packet between specific source and destination CPE's. There could be round trip delay for traffic within the local broadband network and also in international broadband network. The local broadband network includes connection from the end user to the ISP node and from there to the International Gateway. The international broadband network is from the International Gateway to First Point of Presence (NAP) abroad.

The benchmark proposed for network latency is as under:

- a) Within the Local network i.e. from the broadband customer to the International Gateway  $\leq 90$  msec.**
- b) For the international segment  $\leq 300$ msec for OFC based networks and  $\leq 800$ msec for satellite based connection.**

## **2.8 Billing Performance**

Billing complaints should not be more than **0.5%** of the bills issued during the billing cycle.

Billing complaints should be resolved within the following time-frame:

- (i) **95% within 15 working days** of the receipt of the complaint.
- (ii) **100% within 30 working days** of the receipt of the complaint.

### **3. Customers Perception of Service**

The Customer's perception of Quality of Service is the most important factor for provisioning 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, billing and charging credibility could be physically measured, the satisfaction level of the customer can only be assessed by talking to them and obtaining their feedback on properly designed questionnaires. This job may be assigned to an independent expert agency. A format for Customer survey is given in Table 2.

#### **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 Broadband connection.
- Satisfaction with the time taken for shifting a broadband connection to another location.
- Satisfaction with the re-activation of service in case of disconnection due to non-payment.
- Satisfaction with the ease of understanding the offer or tariff plan.

**The benchmark proposed in regard to provision of service  $\geq 95\%$**

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

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

**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 centre/ 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 with the Bandwidth availability.
- Satisfaction with Internet Access.

**The benchmark proposed is % satisfied with Network Performance, reliability and availability  $\geq$  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  $\geq$  95%**

### **3.1.6 Overall Customer Satisfaction:**

- Satisfaction with the quality of total service offering

**The benchmark proposed for Overall Customer Satisfaction is  $\geq$  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,

$$A = (\text{No. of customers who have given rating of very satisfied} \times 4) + (\text{No. of customers given rating of satisfied} \times 3) + (\text{No. of customers who have given rating of dissatisfied} \times 2) + (\text{No. of customers who have given rating of very dissatisfied} \times 1)$$

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

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

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).

### 3.2.3 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 the following table:

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

These are based on the following:

Confidence level -	95%
Confidence interval -	3

## 4. Issue of Consultation Paper

Broadband Internet Service is forecast to be the major growth area in the ICT industry in Bangladesh. Consumers, being the driving force behind the expansion of this service, need to be ensured a certain level of Quality of Service. In order to achieve this, BTRC has formulated a Regulation. In order that the Regulation takes into consideration the views held by the industry stakeholders, this consultation paper containing all the QoS parameters for broadband Internet Service is put in the public domain to elicit views of the industry and other stakeholders.

**Table 1****OPERATOR REPORTING FORMAT FOR BROADBAND INTERNET SERVICES****Quality of Service Report For The Quarter Ending -----****Name of the Service Provider: -----****Name of the Service Area: -----**

<b>Sr.No.</b>	<b>QoS Parameters</b>	<b>Benchmarks</b>	<b>Month 1</b>	<b>Month 2</b>	<b>Month 3</b>	<b>Quarter</b>
1	Service Provisioning/Activation Time	a) 80% by next days b) 90% in 2 days c) 100% in 7 days				
1.1	No. of connections registered.					
1.2	Total no. of connections during the period					
1.3	Total no. of working connections at the end of the period					
2	Fault Repair					
2.1	Total no. of faults registered					
2.2	% of faults repaired by next day	>=80				
2.3	% of faults repaired within 2 days	>=90				
2.4	% of faults repaired within 3 days	100%				
3	Billing Performance					
3.1	Total no. of bills issued					
3.2	No. of bills disputed					

3.3	No. of bills disputed/no. of bills issued in %	=<0.5%				
3.4	% of billing complaints resolved: within 15 days within 30 days	95% 100%				
4	Response Time to a Customer for Assistance					
4.1	Total no. of calls received by Customer care Centre / Helpline operator(voice to voice)					
4.2	% of calls answered by operator (voice to voice) within 60 sec.	>=80				
4.3	% of calls answered by operator (voice to voice) within 90 sec	>=95				
5	Bandwidth Utilization					
5.1	No. of intra network links (Point of Presence to ISP Gateway Exchange)					
5.2	No. of intra network links having Bandwidth utilization >= 90% during peak hours i.e. TCBH					
5.3	No. of upstream links for International connectivity(ISP Gateway Exchanges to IGSP)					
5.4	No. of upstream links for International connectivity having Bandwidth utilization >= 90% during TCBH					
5.5	Total International Bandwidth available from ISP node to IGSP in Mbps					

5.6	Total International Bandwidth utilization during TCBH in Mbps					
5.7	% of International Bandwidth utilization during TCBH					
5.8	Percent of the time Broadband connection speed $\geq$ 70% of the subscribed level available (download) from ISP node to user	95%				
6	Annual network Service Availability	$\geq$ 99%				
6.1	Total operational Hours					
6.2	Total down time in Hours					
7	Packet Loss	$\leq$ 1%				
8	Network Latency					
8.1	Within the local network i.e. from the customer to IGSP	$\leq$ 90 msec.				
8.2	For the International segment	$\leq$ 300 msec. for OFC based network, $\leq$ 800 msec. for satellite based connection.				

**TABLE 2**

**SURVEY OF BROADBAND SERVICES**

**Questionnaire for Customer Satisfaction Survey**

**Name of the operator: -----**

**Name of the service area: -----**

<b>1. Service Provisioning</b>	
1.1 How much time was taken to get the broadband connection installed and activated after you applied for it?	1. =< 3 days 2. 3-5 days 3. 6-7 days 4. >= 7 days
1.2 How satisfied are you with time taken to provide broadband connection?	1. Very satisfied 2. Satisfied 3. Dissatisfied 4. Very dissatisfied
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?	1. Very satisfied 2. Satisfied 3. Dissatisfied 4. Very dissatisfied
<b>2. Billing Related</b>	
2.1 How satisfied you are with the accuracy of the bills?	1. Very satisfied 2. Satisfied 3. Dissatisfied 4. Very dissatisfied
2.2 How satisfied are you with the timely delivery of bills?	1. Very satisfied 2. Satisfied 3. Dissatisfied 4. Very dissatisfied
2.3 Please specify the reasons for your dissatisfaction over the accuracy of the bills.	1. Charges not as per tariff plan subscribed 2. Tariff plan changed without information 3. Download charge not as per usage 4. Others (please specify)----- -----

2.4 Have you made any billing related complaints in last 12 months?	1. Yes 2. No
2.5 How satisfied are you with the process of resolution of billing complaints?	1. Very satisfied 2. Satisfied 3. Dissatisfied 4. Very dissatisfied
2.6 How satisfied are you with the clarity of the bills sent by your service provider in terms of transparency and understandability?	1. Very satisfied 2. Satisfied 3. Dissatisfied 4. Very dissatisfied
2.7 Please specify the reasons for your dissatisfaction in regard to question 2.6	1. Difficult to read the bills 2. Difficult to understand the language 3. Charges not as per offered tariff 4. Others(please specify)----- --
<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?	1. Yes 2. No
3.2 How satisfied are you with ease of access of call centre/ customer care or help line?	1. Very satisfied 2. Satisfied 3. Dissatisfied 4. Very dissatisfied
3.3 How satisfied are you with response time taken to answer your call by a customer care executive?	1. Very satisfied 2. Satisfied 3. Dissatisfied 4. Very dissatisfied
3.4 How satisfied are you with the problem solving ability of the customer care executives?	1. Very satisfied 2. Satisfied 3. Dissatisfied 4. Very dissatisfied
3.5 How satisfied are you with the time taken by call centre/customer care/help line to resolve your complaint?	1. Very satisfied 2. Satisfied 3. Dissatisfied 4. Very dissatisfied
<b>4. Network Performance, Reliability and Availability</b>	
4.1 How satisfied are you with availability of broadband connection?	1. Very satisfied 2. Satisfied 3. Dissatisfied 4. Very dissatisfied
4.2 How satisfied are you with the	1. Very satisfied

bandwidth available to you on continuous basis while using it?	2. Satisfied 3. Dissatisfied 4. Very dissatisfied
4.3 How satisfied are you with the accuracy of the downloaded data?	1. Very satisfied 2. Satisfied 3. Dissatisfied 4. Very dissatisfied
<b>5. Maintainability (Fault Repair)</b>	
5.1 Have you experienced fault in your broadband connection in the last 12 months?	1. Yes 2. No
5.2 How many times your broadband became faulty in the last 1 month.	1. Nil 2. 1 time 3. 2-3 times 4. More than 3 times
5.3. How long did it take generally for repairing to fault after lodging complaint?	1. 1 day 2. 2-3 days 3. 4-7 days 4. >= 7 days
5.4 How satisfied are you with the fault repair service?	1. Very satisfied 2. Satisfied 3. Dissatisfied 4. Very dissatisfied
<b>6. Overall Customer Satisfaction</b>	
6.1 How satisfied are you with the overall quality of your broadband service?	1. Very satisfied 2. Satisfied 3. Dissatisfied 4. Very dissatisfied
6.2 If dissatisfied, specify the reasons	1. ----- 2.-----
<b>7. General Information</b>	
7.1 Have you been informed in writing about the complete details of your tariff plan within a week of activation of service?	1. Yes 2. No
7.2 If yes, please name your previous service provider.	
7.3 How many days were taken for termination of your broadband connection from the date of your such request?	1. 1 day 2. 2-3 days 3. 4-7 days 4. >= 7 days
7.4 Did your service provider adjust your security deposit in the bill raised after you requested for termination?	1. Yes 2. No