TELECOM REGULATORY AUTHORITY OF INDIA

NOTIFICATION

New Delhi, the 1st July, 2005

[File No. 305-2/ 2005 (QoS) Vol.-II]. In exercise of the powers conferred upon it under section 36 read with paras (i) & (v) of clause (b) of sub section (1) of section 11 of TRAI Act 1997, the Telecom Regulatory Authority of India hereby makes the following Regulation, namely:

Short title, extent and commencement

1. i) This regulation shall be called ***'Regulation on Quality of Service of Basic and Cellular Mobile Telephone Services , 2005' (11 of 2005)(hereinafter the 'Regulation') .***

ii) This regulation shall be applicable to all the Basic Service Providers, Unified Access Service Providers and Cellular Mobile Telephone Service Providers, including Mahanagar Telephone Nigam Limited / Bharat Sanchar Nigam Limited.

iii) This regulation shall come into effect from the date of its publication in the Official Gazette.

Definitions

2. In this Regulation, unless the context otherwise requires:

i) '**Act**' means the Telecom Regulatory Authority of India Act, 1997.

ii) **'Authority"** means the Telecom Regulatory Authority of India.

iii) **'Basic Telecommunication Services'** means services derived from a Public Switched Telephone Network (PSTN) & as specified in the license.

iv) **'Cellular Mobile Telephone Services**' means services derived from a Public Land Mobile Network (PLMN) & as specified in the License. This includes both Cellular Mobile Telephone Service provided through GSM and CDMA Technology.

(v) '**CDMA '** means Code Division Multiple Access.

vi) **'GSM'** means Global System for Mobile Communications.

vii) **'Licence'** means a licence granted or having effect as if granted under section 4 of the Indian Telegraph Act 1885 and Indian Wireless Act 1933.

viii) **'Licensee'** means any person licensed under sub-section (1) of section 4 of the Indian Telegraph Act 1885 (13 of 1885) for providing specified public telecommunication services.

ix) **'Message**' means anything falling within paragraph 3 section 3 of the Indian Telegraph Act.

x**)** **'Operator** means any person who is authorized by the Licensor to run a relevant connectable system.

xi) **'Public Land Mobile Network'** means a network set up and operated by the licensed operator(s) including Mahanagar Telephone Nigam Limited and Bharat Sanchar Nigam Limited, for the specified purpose of providing land based mobile communication services to the public. It provides communication facilities to subscribers using mobile set.

xii) **'Public Switched Telephone Network'** means a network set up and operated by Mahanagar Telephone Nigam Limited / Bharat Sanchar Nigam Limited, or other licensed Basic Service Providers for the specified purpose of providing fixed communication between subscribers using telephone sets/accessories.

xiii**)** **'Quality of Service'** is the main indicator of the performance of a telephone network and of the degree to which the network conforms to the stipulated norms. The subscriber's perception of the Quality of Service (QoS) is determined by a number of performance factors. The most important of these have been specified in this regulation.

xiv) **'Service Provider'** means a licensee of Basic, Cellular Mobile Telephone and Unified Access Services and also includes the Bharat Sanchar Nigam Limited & Mahanagar Telephone Nigam Limited.

xv) **'TRAI'** means Telecom Regulatory Authority of India constituted under TRAI Act, 1997.

xvi) '**Telecommunication Services**' means service of any description (including electronic mail, voice mail data services, audio tex services, video tex services, radio paging and cellular mobile

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telephone services) which is made available to users by means of any transmission or reception of signs, signals, writing images, and sounds or intelligence of any nature, by wire, radio, visual or other electro- magnetic means but shall not include broadcasting services.

xvii) **'Time Consistent Busy Hour (TCBH)':** The one hour period starting at the same time each day for which the average traffic of the resource group concerned is greatest over the days under consideration. ITU recommends analysis of 90 days to establish TCBH.

Purpose of laying down Quality of Service Parameters:

3. The purpose of laying down Quality of Service Parameters is to:

i) Create conditions for consumer 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.

iii) Generally protect the interests of consumers of telecommunication services.

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4. Quality of Service (QoS) Parameters:

The service provider is required to meet the quality of service parameters as laid down below: -

(i) For Basic Service (wire line):

S.N.	Parameters	Benchmarks	Averaged over a period of
1	Provision of a telephone after registration of demand	100% cases in <7 days, subject to technical feasibility	One quarter
2	Fault incidences (No. of faults/100 subscribers /month)	By 31st March 2007: <5 and By 31st March 2008: <3	One quarter
3	Fault repair by next working day	By next working day: >90% and within 3 days: 100%. **Rent Rebate** Faults pending for >3 days and <7 days: Rent rebate for 7 days. Faults pending for >7 days and <15 days: Rent rebate for 15 days Faults pending for >15 days: rent rebate for 1 month	One month
4	Mean Time To Repair (MTTR)	<8 Hrs	One month
5	Grade of Service	a) Junction between local exchanges – 0.002 b) Outgoing junctions from TAX to local exchange –0.005 c) Incoming junctions from local exchange to TAX –0.005 d) Incoming or out going junctions between TAX's 0.005 e) Switching network should be non-blocking or should have extremely low blocking	One quarter

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		probability	
6	Call Completion Rate within a local network Should be better than	>55%	
7	Metering and billing credibility	Not more than 0.1% of bills issued should be disputed over a billing cycle	One Billing Cycle
8	Customer Care (Promptness in attending to customers requests) 95% of requests - Shifts - Closures - Additional Facility	 < 3 days <24 Hrs. <24 Hrs.	 One month One month One month
9	Response Time to the customer for assistance	(i) % age of calls answered (electronically: within 20 seconds = 80% within 40 seconds = 95% (ii) % age of calls answered by operator(voice to voice): within 60 seconds = 80% within 90 seconds = 95%	One month
10	Time taken for refund of deposits after closures	100% within 60 days.	One Quarter
11	**Customer perception of services**		
(i)	% satisfied with the provision of service	>95	
(ii)	% satisfied with the billing performance	>90	
(iii)	% satisfied with help services	>90	
(iv)	% satisfied with network performance, reliability and availability	>95	
(v)	% satisfied with maintainability	>95	
(vi)	Overall customer satisfaction	>95	
(vii)	Customer satisfaction with offered supplementary services % satisfied	>95	

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(ii) For Basic Service (Wireless) and Cellular Mobile Telephone Service:

S. No.	Parameters	Benchmarks	Averaged over a period of
A	**Network Performance**		
(i)	Accumulated down time of Community Isolation	<24 hours	One quarter
(ii)	Call set-up Success Rate (within licensees own network)	>95%	One quarter
(iii	Service Access Delay	Between 9 to 20 seconds depending upon number of paging attempts (Average of 100 calls =< 15 sec)	One quarter
(iv)	Blocked Call Rate	(i) SDCCH Congestion < 1 % (ii)TCH Congestion < 2 %	One Month
(v)	Call Drop Rate	<3%	One quarter
(vi)	Percentage of connections with good voice quality	>95%	One quarter
(vii)	Service Coverage	In door >= -75 dBm In-vehicle >= -85 dBm Out door- in city >= -95 dBm	
(viii)	POI Congestion	<0.5%	One Quarter
B	**Customer Help Lines:**		
(i)	Response time to the customer for assistance	(i) % age of calls answered (electronically) : within 20 seconds = 80% within 40 seconds = 95% (ii) % age of calls answered by operator (voice to voice): Within 60 seconds = 80% Within 90 seconds = 95%	One month
C	**Billing Complaints**		
(i)	Billing complaints per 100 bills issued	<0.1%	One quarter
(ii)	% of billing complaints resolved within 4 weeks	100%	One quarter
(iii)	Period of all refunds / payments due to customers from the date of resolution of complaints as in (ii) above	< 4 weeks	One quarter

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(D)	**Customer perception of service**		
(i)	% satisfied with the provision of service	>95	
(ii)	% satisfied with the billing performance	>90	
(iii)	% satisfied with help services	>90	
(iv)	% satisfied with network performance, reliability and availability	>95	
(v)	% satisfied with maintainability	>95	
(vi)	Overall customer satisfaction	>95	
(vii)	Customer satisfaction with offered supplementary services % satisfied	>95	

5. Review:

i) The Quality of Service parameters given in regulation 4 may be reviewed by the Authority from time to time.

ii) The Authority, on reference from any affected party, and for good and sufficient reasons, may review and modify this regulation.

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6. Explanatory Memorandum:

This regulation contains at Annex, an explanatory memorandum, which explains the background and reasons for its issuance.

7. Over-riding Effect:

Wherever higher quality parameter has been stipulated as a condition of licence, the Quality of Service as required by the licence shall override the parameters given herein.

8. Repeal and Saving: -

i) Regulation on Quality of Service of Basic and Cellular Mobile Telephone Services, 2000 (2 of 2000) is hereby repealed.

ii) Notwithstanding such repeal, anything done or any action taken under the said Regulation shall be deemed to have been done or taken under this Regulation.

9. Interpretation:

In case of any doubt regarding interpretation of any of the provisions of this Regulation, the clarification of the Authority shall be final and binding.

(Rajendra Singh)

Secretary- in-Charge

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EXPLANATORY MEMORANDUM

BACKGROUND

1. In July 2000, a Regulation was issued by TRAI, which defined the quality of service parameters and their benchmarks for Basic and Cellular Mobile services. This "Regulation on Quality of Service of Basic and Cellular Mobile Telephone Services, 2000" was issued on 5th July 2000 under the provisions of Section 11 1(b)(v) of TRAI Act, 1997. The benchmarks were defined to be achieved in the short term, medium term and long term corresponding to periods 12, 24 and 48 months for Basic Services and 12, 24 and 36 months for Cellular Mobile Services from the date of issue of Regulation. Thus, even the long-term period expired in July 2003 for cellular services and July 2004 for basic services. TRAI has been carrying out regular reviews of the status of quality of service of the networks of all operators. The performance was found to be very poor for basic service networks, especially the ones that were predominantly wire line networks. In the case of cellular operators, while about 75 percent of operators were meeting most of the parameters, there was still the problem of several other parameters not being met. Several rounds of discussions were held with the various operators. It became quite evident that in the case of wire line basic operators, the network conditions were very poor and the possibility of meeting these targets within the stipulated time frame for the huge networks of the incumbent was not feasible since extensive rehabilitation work was required. Though the rehabilitation work was being carried out by the incumbents in particular, but the rate at which this was being carried out was far from satisfactory. In particular, difficulty was being experienced for the provisioning of new connections, fault incidences and call completion rate within the network. In the case of cellular networks, it was found that while an extensive attempt had been made to cover all relevant parameters and lay down benchmarks for them in the present Regulation, however, certain important parameters were inadvertently left out and some other parameters, which had become unimportant as the result of technological developments had remained. Feedback had also been obtained from the agency hired by TRAI, which was carrying out the actual field measurements. Feedback was also being received regarding the need to monitor some new parameters in particular, those that reflect the call completion rates between networks, etc.

2. From the discussions with the operators it emerged that two approaches are possible, one in which the old Regulation had been retained as it is with its limitations in regard to reflecting the true picture of the network and imposing fines through the intervention of the competent authority to ensure achieving of these benchmarks. The other alternative was to allow the operators additional time to carry out the completion of network up gradation to achieve the benchmarks.

3. The Authority after extensive deliberations some of which are reflected in the following paragraphs, has come to the conclusion that in the first instance better results can be obtained by all parties co-operating together, considering

that some of these parameters had already been accepted by all the operators in the "Common Charter of Telecom Services, 2005". With this approach in view, **and also in accordance with the clause (i) and (ii) of section V of the "Regulation on Quality of Service** of Basic and Cellular Mobile Telephone Services, 2000", the Authority decided to review the existing parameters and also to introduce some new parameters. The Authority had issued a Consultation Paper on the various issues relating to quality of service on 22nd February 2005 and held an Open House Session on 6.5.2005. The Authority considered the comments received from stakeholders while finalizing the Regulation.

BASIC SERVICES:

1. In respect of QOS parameters for Basic Services, this regulation covers all key parameters. However, in view of changed telecom scenario, availability of state of the art digital exchanges and gradual phasing out of operator assisted service, parameters like Dial Tone Delay, Percentage of repeat faults, Response time to other operator assisted services, Operator Assisted Trunk Calls which were present in the Regulation dated 5th July, 2000 have been deleted. The Parameters 'Response Time to the Customer for Assistance' reflects the speed in which a call is answered either by the operator or by the IVR system provided by the service provider and this parameter has been added to address the problems of the customers who often try again and again for connecting to operator assistance number. Time taken for refund of deposit after closures' has been added in this regulation to ensure that the operator makes the refund of deposit within the prescribed period after closure.

2 During consultation process all the stakeholders have suggested that the parameters for basic service using wireless should be same as that of cellular mobile service as parameters like fault incidences, fault repair etc. are not applicable to a fixed wireless phone. At the same time all the network related parameters of mobile service would be applicable for fixed wireless terminal. The Authority has, therefore, accepted the suggestion that the parameters for basic service using wireless should be same as that of cellular mobile service.

3. There is no change in the provision for customer survey through opinion polls to assess their perception of the quality of service. The same Parameters of subjective assessment have been retained to make the survey more customer centric.

4. All the measurements of engineering standards such as Grade of Service (GOS) are to be carried out in the Time Consistent Busy Hour (TCBH) as specified by ITU-T.

5. In respect of the parameter "provision of a telephone after registration of demand (Sl. No. 1, Section IV of the Regulation)' only those exchange areas where telephone is available on demand will be taken in to account. The operators should specify such areas and the same should be widely publicised. In order to ensure that applications for telephone connections are, registered without any discrimination, it is mandatory for the service provider to register all demands for telephones and give registration number to the prospective

customer. If the telephone can be provided on demand, the same should be provided within the time frames indicated in the Regulation. In all other cases, waiting list should be maintained and connections released in a non-discriminatory manner as per the waiting list, objectively predetermined for various categories.

6. The prevailing benchmark for number of faults per 100 subscribers per month is <3. Considering the views of the Basic Service Operators and their present network conditions, time period up to March, 2008 has been allowed to achieve the present benchmark of <3 and the benchmark has been relaxed to <5 to be achieved by March, 2007.

7. In the parameter "fault repair by next working day", only those complaints, which have been registered till the close of the business hours of that day, will be taken into account. Complaints registered after the business hours will be taken as being registered in the next day business hours. This Regulation stipulates refund of rental for compensating the customer for faults not attended for a long period.

8. Network performance parameters like grade of service and call completion rate (CCR) shall be measured on sample basis by the Authority from time to time, directly or if it so chooses, through an independent agency. These measurements shall be taken in the Time Consistent Busy Hour (TCBH).

9. The Authority shall also audit / inspect, either directly or through an independent agency, the records relating to the reporting of compliance to the QOS parameters. The Authority shall also, if it so chooses, require the service provider to get the reports submitted to the Authority audited, at its own cost, through independent and qualified agencies.

10. Customer perception regarding telecom service shall be measured through customer survey conducted by the Authority through an independent agency. The results of this survey may be made public for the information of the customers to generate healthy competition amongst service providers to improve service.

11. The metering and billing credibility parameters have been specified for online charging systems as well as for offline Billing Software system. It includes charging errors in preparation of telephone bills by the operator.

12. Call Completion Rate: (CCR) Call completion rate is defined as the ratio of the number of completed calls to the number of call attempts. Not all call attempts result in effective calls i.e. called party answers. A variety of reasons such as called line busy, no answer and congestion in the network as well as subscriber behaviour like premature release wrong dialing etc. are responsible for the failure. Congestion or blocking occurs due to either node or link congestion in the network due to paucity of resources both hardware and software to handle the call.

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13. Grade of Service: This is defined as ratio of lost calls to total call attempts offered to a group of junctions. The smaller the value of grade of service, the better is the service. 0.002 grade of service means that two calls in one thousand calls or one call in every five hundred calls may be lost.

14. During the consultation process, it had been proposed to seek more powers for TRAI through amendment in the TRAI act, 1997 in order to enable it to more effectively enforce the quality of service norms. The issue was further examined during consultation process and it appears possible to impose fines on defaulters by making appropriate recommendations to the licensor. The TRAI would henceforth, pursue this route to check defaulters.

BASIC WIRELESS & CELLULAR SERVICES:

1. The basic wireless and cellular QOS parameters have been divided into four categories viz. (i) Network performance (ii) Customer Help Lines (iii) Billing complaints and (iv) Customer Perception regarding Services.

The network performance deals with technical parameters and includes parameters viz. “Call set up success rate, service access delay, blocked call rate, call drop rate, measurement of voice quality, service coverage and congestion in the network”. These shall be measured during the Time Consistent Busy Hour (TCBH). The fault incidence and repair parameters have been deleted, as these parameters are not relevant to mobile services.

The customer help line includes parameters, which reflects the speed with which a call to the customer care center is answered by either an IVR system or by an operator.

Billing complaints deals with the percentage of complaints received related to billing, time taken for the resolution of the complaints and also time for making the refund to the customer.

The customer perception regarding the service has seven parameters, which lays down the benchmarks for the customer satisfaction about different aspects of the service being provided.

2. New Parameters introduced in the Regulation:

i) Call Set up Success Rate (CSSR).

The parameter Call Set Up Success Rate has been introduced in this Regulation in place of the prevailing parameter “Call Success Rate” as it was seen that there is no standard measurement possible for this parameter and different operators had been measuring it differently. Call Setup Success Rate is defined as the ratio of Established calls to Call attempts. Established Calls means the following events have happened in call setup:

i) Attempt is made
ii) The TCH is allocated &
iii) The call is routed to the outwards path of the concern MSC.

Thus this includes complete signaling in the call setup process and does not aim to measure the performance of the called exchange or that of the Point of Interconnection (PoI).

- CSSR calculation should be measured using OMC generated data only.
- Measurement should be only in Time Consistent Busy Hour for all days of week.

ii) Blocked Call Rate:

Blocked call means a call that is not connected because there is no free channel to serve a call attempt. Numbers of blocked calls are those times where there is no free channel to serve a call attempt. Hence this parameter represents congestion in the network. The congestion may be at SDCCH level or TCH level. This objective parameter is an accepted engineering level for determining the hardware and software requirements in any network. Hence, this parameter has been included in the regulation. This parameter should be measured using OMC generated data only in Time Consistent Busy Hour (TCBH). In case of the CDMA networks, in place of SDCCH congestion, it is proposed to measure Paging channel congestion with the same benchmark.

(iii) Service Coverage:

This parameter will be measured through drive test on a sample basis for assessing the network coverage in cities where the service of the operator is available. This parameter is not to be reported to TRAI by the service providers. However, the assessment of the network converge will be done by TRAI during the drive test of the mobile network. The coverage strength shown as benchmarks is a measurement at street level.

(iv) POI Congestion:

During consultation process the service providers had suggested that there should be a parameter on POI congestion. The Authority has considered this suggestion and has decided to include this parameter in this Regulation for out going traffic.

3. Voice quality:

The quality of voice in cellular mobile telecom services (GSM), is measured on a scale from 0 to 7. As the quality deteriorates, this value increases. The quality of the 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 measure for voice quality is the *Frame Error Rate* (FER). It is the probability that a transmitted frame will be received incorrectly. The frame includes signaling information and error detection bits as well as user voice/data. This metric includes the error detection/correction coding inherent in the system.

Good voice quality is 0-4 % FER value

For FER of 4% for CDMA EVRC System, the Speech Quality Rating is MOS score of 3.6. Further, for Bit Error Rate of Rx Qual 0 to 4 for GSM EFR system, the Speech Quality Rating is MOS score of 3.4.

(4) Group Access Delay

It comprises of the following:

(a) Time to connect Call: Telecom engineering Centre (TEC) test schedule has specified this time as the time between " Pressing the send button " and " getting ring back tone". This should not exceed four seconds.

b Time to confirm instruction to connect: This will be defined as the maximum time from initiating the call set up command to when this is acknowledged to the user.

c Time to release call: The maximum time from initiating the disconnect command to when this command is passed on to the called network. This should not exceed 2 seconds.

d. Time to alert Mobile Set: The maximum time from when the PLMN receives a call for a Mobile Set (assumed to be within the coverage area) to when the alert is energized. This time period is 4-15 seconds depending upon the number of paging attempts.

The value of Group Access Delay should be between 9-20 seconds

5. **Call Drop Rate**:

It is defined as ratio of calls lost after establishment to all established calls. This shall include calls dropped due to failure of handover, radio loss and network congestion.

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6. **Accumulated downtime of community isolation:**

This shall be defined as the accumulated downtime due to community isolation lasting for more than one hour i.e. failure of entire exchange area resulting from trunk failure, switch failure, Base Station failure.

7. Handover means the action of switching the call in progress from one radio channel to another radio channel and is used to allow established calls to continue by switching them to another radio source, e.g. when mobile station moves from one base station area to another.

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