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Objective Assessment of Quality of Services for (QoS) for Basic Wireline, Cellular Mobile (Wireless) and Broadband Service Providers – West Bengal (Including Andaman) Circle

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Prepared for: **Telecom Regulatory Authority of India**

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Preface

TRAI, the regulatory watch dog for the Quality of Service for the telecom services – Basic (Wireline), Cellular Mobile (Wireless) and Broadband has commissioned this study with the objective of measuring Quality of Services under the parameters as per the published notifications. The study, from the execution perspective, has been divided into two modules – Survey module and Audit module.

The Survey module has been commissioned with the objective of gauging the subscriber feedback on Quality of Services by way of primary survey and comparing them with quality of service benchmarks stipulated by TRAI. In addition, Survey module would also measure the compliance of 'Telecom Consumer Protection and Redressal of Grievances Regulations, 2007'.

The Audit module would assess the Quality of Service of telecom operators (Basic (Wireline), Cellular Mobile (Wireless) and Broadband services) by auditing the service level records maintained by the operators, conducting drive tests as well as live measurements and comparing them with quality of service benchmarks stipulated by TRAI.

For the ease of execution both the modules have been commissioned as two separate exercises. However, the findings of each module would feed into the justification of the other module.

The Survey and Audit modules for various circles within the Zones, due the sheer scale of data collection, have been distributed across various quarterly periods. IMRB International Auditors carried out Audits across Tamil Nadu, Karnataka, West Bengal, Bihar & Jharkhand, Haryana, Punjab and Uttar Pradesh (East) circles in the period of May – August 2008. This report details the performance of various service providers in West Bengal circle against Quality of Services benchmarks for various parameters laid down by TRAI in respective regulations for Basic (Wireline), Cellular (Mobile) and Broadband services

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1.0 **Background**

The Telecom Regulatory Authority of India (TRAI) has a critical mandate to protect the interest of telecom consumers in addition to various other functions bestowed upon it. As part of the license conditions to telecom operators, it has the power and authority to measure the Quality of Service provided by various govt. (BSNL & MTNL) and private telecom operators. The parameters that need to be measured for Basic (Wireline) and Cellular Mobile (Wireless) services have been specified in the TRAI notification on Quality of Services of Basic (Wireline) and Cellular Mobile (Wireless) services dated 1st July, 2005. The parameters for Broadband Service have been specified in the TRAI notification for Quality of Services of Broadband Service Regulation, 2006

The study is being conducted broadly in two modules:
(i) Survey module and
(ii) Audit module

IMRB has been engaged by TRAI for a period of 12 months starting January 2008 to assess the quality of services being provided by Basic (Wireline), Cellular Mobile (Wireless) and Broadband service providers.

The study is being conducted broadly in two modules. They are:

Survey module: To obtain subscriber feedback on quality of services by way of primary survey and to check the 'Implementation and effectiveness of Telecom Consumer Protection and Redressal of Grievances Regulations, 2007'

Audit module: To assess the quality of service of telecom operators (Basic (Wireline), Cellular Mobile (Wireless) and broadband services) by auditing the service level records maintained by the operators, conducting drive tests as well as live measurements and comparing them with quality of service benchmarks stipulated by TRAI

This report highlights the Audit Module findings for Chennai circle for Basic (Wireline), Cellular Mobile services, and Broadband services

The present report highlights the findings for the Audit module for West Bengal circle that was covered in the Quarter 2 (April – June 2008). The primary data collection and verification of records maintained by various operators of Basic (Wireline), Cellular Mobile (Wireless) and broadband services was undertaken by IMRB International during the period of May 2008 – August 2008.

2.0 Objectives and Methodology

The primary objective of the Audit module is to Audit and Assess the Quality of Services being rendered by Basic (Wireline), Cellular Mobile (Wireless), and Broadband service against the parameters notified by TRAI. (The parameters of Quality of Services (QoS) have been specified by in the respective regulations published by TRAI). Following are the key activities undertaken by Auditors during the Audit process conducted at the operator's premises

All Network related and Non network related parameters notified by TRAI in various regulations were Audited

1. Verification of the data submitted by service providers: This involved verification of the quarterly Performance Monitoring Reports (PMR's) and monthly Point if Interconnect (POI) Congestion reports being submitted by various service providers. The raw data in the records maintained by service providers was audited to assess the book keeping methodology.

2. Live measurement for three days: Network performance of service providers was assessed for three days in the month in which the Audit was carried out. Live figures from the server/ NMS software were recorded for various network related parameters.

3. Data verification for the month in which Audits were carried out: Subsequent to the visits for Audit during the live measurement at various Exchanges/ISP Nodes/Exchanges, data for all the network and Non network related parameters was collected from various service providers for the complete month in which the Audit was carried out. Raw data/records pertaining to these were also verified on sample basis to check the veracity of data provided by the operators.

4. Drive tests: Operator assisted and Independent drive test were conducted in three city as per the norms stated in the tender.

5. Live calling: Live testing was done on a sample basis to check efficiency of the customer care, inter operator call assessment, Back check calls for service provisioning and fault repair

- Any changes or discrepancies found in the methodology were reported to the service providers and changes were suggested by IMRB Auditors.
- Separate formats were designed each for Basic (Wireline), Cellular mobile (Wireless) and Broadband services to collect the information on various parameters (Please refer to Annexure)

3.0 Sampling methodology

3.1 Sampling for Basic (Wireline) services

- For BSNL the sample of exchanges was selected was spread across 10% of SDCA's in the entire service. Overall 60 exchanges (12 Urban and 48 Rural) exchanges were audited in West Bengal. In Andaman total 6 (2 Urban and 4 Rural) exchanges were audited

- Also, Reliance communications was found to be having very limited presence in West Bengal circle and caters only to its internal customer i.e. Reliance Telecommunications Ltd. (RTL). The same was discovered during the verification of records submitted by service provider. Hence the audit process was not carried out for the service provider as service provider does not cater to external customers in the circle

3.2 Sampling for Cellular Mobile (Wireless) service providers

Data pertaining to 100% of the Gateway MSC's (GMSC's) and Mobile Switching Centres (MSC's) of all the Cellular Mobile Service Providers or Unified Access Service Providers (UASP) was collected and verified in specified circles/service areas. Following are the various operators covered in West Bengal circle

- Bharti Airtel Ltd. – 3 MSCs
- Tata teleservices ltd – 2 MSCs
- Reliance communications – 2 MSCs
- Dishnet Wireless (Aircel) – 2 MSC's
- BSNL – 4 MSCs
- Vodafone Essar Ltd. – 4 MSCs
- Reliance Telecommunications Ltd. – 2 MSC's

3.3 Sampling for Broadband service providers

- BSNL was the only operator providing Broadband services in West Bengal circle

- For BSNL, Audit was conducted at the central node in West Bengal and Andaman and data submitted by various exchanges/POPs providing Broadband service was verified and collected. This was done in such a way that atleast 5% of POPs spread across 10% of SDCA's were covered

- The data pertaining to network related parameters was obtained by IMRB Auditors at BSNL's central node in Bangalore.

4 Audit methodology

4.1 Basic (Wireline) Services

Following table explains the audit methodology for Basic (Wireline) services:-

Sl. No.	Parameters	One month data verification	Live measurement	Live calling
1	Provision of telephone after registration of demand	YES	----	YES
2	Fault incidence/clearance related statistic	YES		
2.1	*- Total number of faults registered per month*	YES		YES
2.2	*- Fault repair by next working day*	YES		YES
3	Mean Time to Repair (MTTR)	YES		
4	Call Completion Rate (CCR)	YES	YES	
5	Metering and billing credibility – billing complaints	YES		YES
6	Customer care promptness	YES		
6.1	*- Shifting of telephone line*	YES		YES
6.2	*- Processing closure request*	YES		YES
6.3	*- Processing of additional supplementary services*	YES		YES
7	Response time to customer	YES		
7.1	- While call is electronically answered	YES		YES
7.2	- While call is answered by operator (voice to voice)	YES		YES
8	Time taken to refund of deposits after closure	YES		YES

* In addition to above verification of records for PMR submitted during October to December 2007 was carried out for all the network and non network related parameters.

{Note: - A more detailed explanation of parameter wise audit methodology for Basic (wireline) services is explained in Annexure II}

4.2 Cellular Mobile Services

In a nutshell the following activities were done while auditing for various parameters for Cellular Mobile Services:

S.no	Parameter	AS REPORTED IN PMR	AS FOUND IN ACTUAL RECORDS AFTER VERIFICATION	AS FOUND IN VERIFICATION FOR THE MONTH OF AUDIT	AS FOUND IN 3 DAY LIVE MEASUREMENT DATA	LIVE CALLING	OPERATOR ASSISSTED DRIVE TESTS	INDEPENDENT DRIVE TESTS
A	**Network Performance**							
A (i)	Accumulated down time of community isolation	Yes	Yes	Yes				
A (ii)	Call setup success rate (within licensee own network)	Yes	Yes	Yes	Yes		Yes	Yes
A (iii)	Service Access Delay	Yes	Yes	Yes				
A (iv)	Blocked Call Rate	Yes	Yes	Yes	Yes		Yes	Yes
A (v)	Call Drop rate	Yes	Yes	Yes	Yes		Yes	Yes
A (vi)	% Connections with good voice quality	Yes	Yes	Yes			Yes	Yes
A (vii)	Service Coverage	Yes	Yes	Yes			Yes	Yes
A (viii)	PoI Congestion	Yes	Yes	Yes				
B	**Customer Helpline**							
B (i)	Response time to the customer for assistance	Yes	Yes	Yes		Yes		
C	**Billing Complaints**							
C (i)	Billing complaints per 100 bills issued	Yes	Yes	Yes				
C (ii)	%age of billing complaints resolved within 4 weeks	Yes	Yes	Yes		Yes		
C (iii)	Period of all refunds/payments due to customers from date of resolution as in (ii) above	Yes	Yes	Yes		Yes		

{Note: A more detailed explanation of parameter wise audit methodology for Broadband services is explained in Annexure II}

4.3 Broadband Services

In a nutshell, the audit methodology was as follows:

	Parameters	Verification of PMR	Three day live measurement	Data Verification for one month	Live calling
(i)	Service Provisioning/ Activation time	YES	YES	YES	YES
(ii)	Fault Repair/ Restoration Time	YES	YES	YES	YES
(iii)	Billing Performance				
-	Billing Complaints per 100 Bills issued	YES	YES	YES	
-	%age of billing complaints resolved in four weeks	YES	YES	YES	YES
-	Time taken for refund of deposits after closure	YES	YES	YES	YES
(iv)	Response time to the customer for assistance(Voice to Voice)				
-	*Within 60 seconds > 60%*	YES	YES	YES	YES
-	*Within 90 seconds > 90%*	YES	YES	YES	YES
(V)	Bandwidth Utilization/ Throughput:				
▪	*A)Bandwidth Utilization*				
-	POP to ISP gateway Node [Intra – network] Links	YES	YES	YES	
-	ISP Gateway Node to IGSP / NIXI Node upstream Link(s) for international connectivity	YES	YES	YES	
▪	*B) Broadband Connection Speed (Download)*	YES	YES	YES	YES
(vi)	Service availability / Uptime	YES	YES	YES	
vii)	Packet Loss	YES	YES	YES	
(viii)	Network Latency for wired broadband access)				
-	*User reference point at POP / ISP Gateway Note to International Gateway (IGSP/NIXI)*	YES	YES	YES	
-	*User reference point at ISP Gateway Node to International nearest NAP port abroad (Satellite)*	YES	YES	YES	
-	*User reference point at ISP Gateway Node to International nearest NAP port abroad (Satellite)*	YES	YES	YES	

{Note: A more detailed explanation of parameter wise audit methodology for Broadband services is explained in Annexure II}

4.4 Audit Limitations

Despite having a wide scope of work, we have found following problems that may impair the comparison across operators. As mentioned earlier we have suggested changes to operators, which will allow comparison in future. TRAI has already suggested a book keeping methodology and practical ways to the operators (within the spirit of QoS definition), also there has been previous rounds of Audit being conducted by different independent audit agencies (including IMRB) which had enabled comparison of the findings but still some variations were observed in methodologies and understanding of parameters among service providers (especially for Broadband services where Audit was carried out for the first time). Hence, the data reported in here has to be used carefully in the light of variation in testing.

1. Complete data not being maintained: In certain cases lack of availability of the data with the service providers rendered verification of raw data unfeasible and verification was done to the extent possible. For e.g. for network related parameters for Broadband services service providers could not produce old raw data files for ping tests, download speed etc

2. Difference in measurement methodology: For some cases, calculation methodology for some of the parameters was found to be different across various service providers.

3. Technical unfeasibility: There were cases observed where service providers expressed technical unfeasibility to provide the data required as according them their current system does not support the data being maintained/ recorded in the desired form. For e.g. Service providers were unable to provide data on service access delay and signal coverage from OMC for cellular mobile services. Hence, data was collected from the results of recent drive tests being conducted by various service providers

4. Decentralized system for book keeping: In certain cases, book keeping of records was found to be decentralized. This was largely observed for call centre performance for BSNL, where required data was not available with the exchanges and hence data could not be collected for the same. Also for some service providers who have call centralized call centers located at places away from ISP Nodes/Exchanges detailed raw data i.e. call by call detail was not available for verification. Hence verification of records was done to the extent possible in such cases.

5. Difference in level of reporting to TRAI: Some of the large Broadband service providers were observed to be reporting their performance on various parameters to TRAI at an all India level. They claimed that since they are providing gateway service to other small service providers, they are “Category A” service providers and consider entire India as one circle. Data for some of the parameters was provided by these operators on All India basis.

5 Executive Summary

The objective assessment of Quality of Services (QoS) was carried out by IMRB International for all the Basic(Wireline), Cellular mobile and Broadband service providers during the period starting from May 2008 to August 2008 in West Bengal and Andaman circle. The executive summary encapsulates the key findings of the Audit by providing: -

- *"Service provider performance report"* for Basic (Wireline), Cellular mobile and Broadband service , which gives a glimpse of the performance of various operators against the benchmark specified by TRAI, during the month in which the Audit was carried out by IMRB Auditors
- *"Parameter wise critical findings"* for Basic (Wireline), Cellular mobile and Broadband services: This indicates key observations and findings from different activities carried out during the Audit process

5.1 Service provider performance report based on one month data verification – Basic (Wireline) Services

S.No.	Parameters	B'mark	BSNL- West Bengal	BSNL – Andaman and Nicobar
1	Provision of telephone after registration of demand			
1.1	Connections completed within 7 days	100%	35%	94%
2	Fault incidence/clearance statistics			
3	Fault incidences(No. of faults/100 subscribers/month)	<3	7.2	5.7
3.1	Faults repaired within 24 hours	>90%	47%	87%
3.2	Faults repaired within three working days	100%	75%	99%
4	Mean time to Repair (MTTR)	<8 hours	> 8 for exchanges where logs were maintained	
5	Call Completion Rate (CCR)	>55%	91%	84%
6	Metering and billing credibility			
6.1	Billing complaints per 100 bills issued	<0.1%	0.01%	0.01%
6.2	%age of billing complaints resolved within 4 weeks	100%	67%	Only one billing complaint reported. Not attended in stipulated time
7	Customer care/helpline promptness			
7.1	Shift requests attended			
	Shift requests attended within 3 days	95%	24%	89%
7.2	Closure request attended			
	Closure within 24 hours	95%	79%	98%
7.3	Supplementary (additional) service requests attended			
	Additional facility provided within 24 hours	95%	78%	92%
8	Response time to customer for assistance			
8.1	% age call answered through IVR in 20 seconds	80%	Details not available at the exchanges	No separate call centre available in the circle with IVRS facility. Only numbers dialed on 1500 are answered from the exchange
	% age call answered through IVR in 40 seconds	100%		
8.2	% age calls answered by operator in 60 seconds	80%		
	% age calls answered by operator in 90 seconds	95%		
9	Time taken for refund of deposits after closure			
9.1	%age cases where refund received within 60 days	100%	92%	91%

{*Note: For BSNL data pertains to the sample 5% of exchanges audited during the period of April to July 2008, whereas for rest of the operators figures pertain to all the exchanges present in the circle}

** Methodology not in line with QoS Figures provided on All India basis Not meeting the benchmark B'mark = TRAI Benchmark, DNA = Details not available, NA: Not Applicable

Critical findings and Key take outs: Basic (Wireline) services

The Basic (Wireline) services audit for West Bengal (including Andaman and Nicobar) circle was carried out for BSNL across various exchanges spread in West Bengal and Andaman circle.

Making a relative comparison with other circles which were covered during the same quarterly period BSNL's performance was observed to be little below the mark especially on service provisioning and fault repair in West Bengal. Some reason for the same can be attributed to the fact that there is no competition for the service provider as there are no private operators providing Wireline services to retail customers in West Bengal.

The live calling results were found to be low when compared with one month audit data. To some extent the difference can be attributed to the smaller sample size undertaken for the live calling.

During exchange audit in Andaman it was discovered that there is no dedicated call centre with IVRS facility for BSNL in the circle. Service provider's representative at the exchanges said that customers dial 1500 and queries/complaints are recorded manually at the exchanges. The reason could be low subscriber base in the circle.

For live measurements conducted to assess Call Completion Rate (CCR), BSNL meets the benchmark comfortably. Infact the scores on this parameter were observed to be relatively better in West Bengal and Andaman when compared to other circles.

Also, results of verification of the records for the period of October to December 2008 show that there was variation in the figures reported in the PMR and those found in actual records for the service provider but the reason can largely be attributed to the fact that BSNL has a decentralized system for Book keeping, and data was verified only for sample 5% of exchanges spread over 10% of Short Distance Charging Area (SDCA's) in West Bengal and Andaman and Nicobar.

The parameter wise key takeouts for the audit process carried out are provided herewith

Provision of telephone after registration of demand

- For the sample exchanges covered in West Bengal only 35% of the new connections registered during the month of Audit were provided in 7 days which is way below the benchmark specified by TRAI. Also it was observed during Audit that only 185 new connections were registered during the month of Audit which is quiet low as compared to other circles.
- Compared to its performance in West Bengal the service provider's performance in Andaman was found to be far better as 94% of connections were provided in 7 days. However, it should be noted that Andaman is small area as compared to West Bengal and there were only 18 new connections registered in the month of Audit.
- Live calling score for the service provider in West Bengal was observed to be 43%. In Andaman live calling was carried out for 6 customers out of which 2 claimed that connection was provided in 7 days

Fault incidence / clearance statistics

- Although BSNL was not complying with the benchmark for fault incidences both in West Bengal and Andaman but as compared to service provider's performance in other circles fault incidences were observed to be low.
- During verification of records it was observed that the registers were not maintained properly at some of the exchanges as entries were found to be made without opening and closing hours which rendered calculating Mean Time to Repair (MTTR) difficult for the Auditors.
- As per the 1-month audit data findings, BSNL falls short of TRAI specified benchmark of > 90% of faults to be repaired within 24 hours in both Andaman and West Bengal. One of the reasons for the same could be the fact that the service provider provides connections in rural areas where fault repair may become difficult due to operational reasons.
- For fault repair within 3 working days BSNL does quite well in Andaman with 99% of the faults reported being repaired in 3 days. For West Bengal the score on the parameter was observed to be 75%.
- The live calling scores (for fault repair within 24 hrs) in West Bengal were found to be low with only 12% of subscribers in West Bengal claiming that the fault was repaired in 24 hours.
- The live calling results for fault repair within three working days were found to be slightly better as 43% of subscribers in West Bengal and 33% in Andaman claimed that the faults reported by them were cleared in stipulated time period.

Traffic statistics (CCR)

- BSNL has comfortably met the benchmark for CCR both in Andaman and West Bengal. In fact scores were found to be relatively better when compared to service provider's performance in other circles.
- For one month data score was observed to be as high as 91% of calls attempts being successful in West Bengal and 84% calls being successfully established in Andaman.

Metering and billing credibility

- BSNL comfortably meets the benchmark both in Andaman and West Bengal. However it should be noted that there were very few complaints that were being reported in the sample exchanges where audit was carried out by IMRB International

Customer care/helpline promptness

- For "shift requests attended within 3 days" audit data the service provider was falling short of the benchmark with scores observed to be 24% in West Bengal and 89% in Andaman. The samples for live calling remained low owing to few cases. Out of 16 calls made in West Bengal 38% customers said that the request made by them was attended in 3 days whereas in Andaman out of 6 calls made only 3 customers claimed the same.
- For closure requests within 24 hours BSNL (79%) in West Bengal fall short of the benchmark of 95%.
- For supplementary service requests, BSNL falls short of the benchmark for the month of Audit with a score of 78% (West Bengal) and 92% (Andaman & Nicobar) respectively. For live calling 87% of subscribers (15 calls made) in West Bengal and 33% subscribers (21 calls made) claimed that the request made by them was attended in 24 hours.

Response time to customer for assistance

- As mentioned earlier that during the Audit process it was discovered that there is no dedicated call centre in Andaman. For West Bengal call centre data was not available at the exchanges.
- Live calling results carried out in West Bengal circle for BSNL 100% of the calls made were answered electronically in 20 seconds. For calls answered by the operator (voice to voice), service provider falls short of the benchmark for calls answered by the operator in 60 seconds at 70 % score.
- For calls answered by the operator within 90 seconds service provider (BSNL West Bengal) comfortably met the benchmark with 100% calls answered in the stipulated time period.

Time taken for refund of deposits after closure

- Although the service providers is falling short of the benchmark, more than 90% cases of refunds after closure were addressed by BSNL in stipulated period of time both in West Bengal and Andaman.

Level 1 Services

To test the efficiency of level 1 services (Trunk booking, Child helpline, Women helpline, Airline booking) offered by BSNL approximately 300 calls were made to different numbers and time taken to answer the call was noticed. 100% of the total calls made were answered in 60 seconds.

Summary of Live Measurement Results – Basic Wireline Services

- For basic Wireline services there was only one parameter (Call Completion Rate – Benchmark > 55%) for which live measurement was applicable.
- BSNL comfortably met the benchmark for live measurements carried out at various exchanges both in West Bengal and Andaman with scores of 83% and 86% respectively

5.2 Service provider performance report based on one month data verification: Cellular Mobile Services

Parameters	Benchmark	Bharti	BSNL	Vfone	TATA	Dishnet	RTL	RCOM
Accumulated downtime for community isolation	< 24 hrs.	0.00	0.00	0.00	0.95	0.00	8.00	0.95
Call Set Up Success Rate (CSSR)	> 95%	86.00%	97.92%	99.98%	97.56%	29.35%	99.81%	97.85%
Service Access Delay*	9 to 20 seconds (< = 15 seconds for 100 calls)	8.60	10.69	5.00	5.97	7.20	11.96	4.10
Blocked Call Rate								
SDCCH /Paging Channel Congestion	<1%	4.60%	0.61%	0.11%	0.00%	0.08%	0.44%	0.00%
TCH Congestion	< 2%	4.08%	1.46%	0.39%	0.90%	1.33%	1.83%	0.46%
Call drop rate	< 3%	1.94%	2.27%	0.00%	1.09%	2.57%	1.69%	1.40%
Percentage connections with good voice quality*	> 95%	81%	98%	91%	97%	72%	95%	94%
Service coverage*								
In door	>-75dbm	Complied	Complied	Complied	Complied	Complied	Complied	Complied
In vehicle	>-85dbm							
Out door - in city	>-95dbm							
POI congestion	< 0.5%	0.23%	0.00%	0.00%	0.00%	0.00%	0.20%	0.00%
Calls answered electronically								
Percentage calls answered within 20 seconds	80%	100.0%	92.0%	100.0%	100.0%	86.1%	100.0%	97.9%
Percentage calls answered within 40 seconds	95%	100.0%	98.4%	100.0%	100.0%	96.2%	100.0%	97.9%
Calls Answered by the operator								
Percentage calls answered within 60 seconds	80%	91.2%	85.5%	83.0%	73.2%	86.1%	43.9%	80.5%
Percentage calls answered within 90 seconds	95%	92.9%	94.2%	89.9%	92.0%	96.2%	58.7%	85.8%
Billing Complaints								
Billing complaints per 100 bills issued	<0.1%	0.00%	0.03%	0.05%	0.08%	No Postpaid subscribers	No Billing Complaints received	0.05%
Percentage billing complaints resolved within 4 weeks	100%	NA	100%	91%	100%			100%
Period of refunds/payments due to customers from the date of resolution of complaints	<4 weeks	NA	NA	75%	100%			100%

*Details pertaining to these are obtained through operator assisted drive tests. Results of the drive tests are explained in greater detail in critical findings

** Methodology not in line with QoS

Figures provided on All India basis

Not meeting the benchmark

B'mark = TRAI Benchmark, DNA = Details not available, NA: Not Applicable

Critical findings: Cellular Mobile Services

The audit for cellular mobile service providers were conducted at their respective MSCs in the West Bengal circle apart from Reliance Communication whose audit was conducted at their central NOC at Mumbai.

It should be noted that most of the service providers claimed that they were submitting the PMR basis their inference of the QoS parameters. However, we need to take a larger view of the picture and ignore some differences in measurement methodologies. We believe that book keeping is bound to get better as more such Audits will be carried out in subsequent quarters as mandated by TRAI.

The audit involved a three stage verification process which consisted of auditing the records of the service providers and verifying the data submitted to TRAI. The second step involved a three day live measurement of all the network parameters. Finally basis the three day live measurement the auditors needed to find out the busy hour for the service provider and collect the hourly data for this busy hour for the month in which the audit was conducted.

Busy Hour of Various Service Providers

Service Provider	Reported Time Consistent Busy Hour	Network Busy Hour found in 3 day live measurement
Bharti	1900 – 2000	1900 – 2000
BSNL	1900 – 2000	1900 – 2000
RCOM	1100 – 1200	1900 – 2000
Dishnet	1900 – 2000	1900 – 2000
RTL	2000 – 2100	2000 – 2100
TATA	1900 – 2000	1900 – 2000
Vodafone	1900 – 2000	1900 – 2000

The TCBH reported by all the service providers except Reliance matched the network busy hour calculated by IMRB auditors for the West Bengal circle. During the three day live measurement the busy hour of Reliance was found to be between 1900 – 2000 hours. The auditors came to this conclusion by studying the traffic reports that were generated from the switch during the audit.

Accumulated Downtime:

In the West Bengal circle, there were outages that led to a community being isolated at a particular point in time for TATA, RTL & RCOM. RTL had the maximum outage in the month of audit with an outage of 8 hours observed. RCOM's and TATA's outage was found to be 0.95 hours for the month of audit.

Call Set-up Success Rate (CSSR):

All the operators except Bharti and Dishnet were comfortably meeting the benchmark on this parameter. During the audits the maximum CSSR was observed for TATA with 99.98% of their calls getting completed. Dishnet had an abysmal level of CSSR with only just more than 29% of its calls getting set up. All the operators were found to be calculating the parameter as per the norm specified by TRAI. CCSR was established as the ratio of total number of successful call attempts (establishment) to the total number of call attempts made.

Service Access Delay:

This parameter is reported to TRAI basis the period drive tests that are conducted by the service providers during that quarter. It is measured using a drive test tool kit and a protocol analyzer. All the operators in the West Bengal comfortably meet the TRAI specified benchmark. Also, all the operators follow the TRAI specified mechanism for measuring the parameter. During the drive test, none of the operators were found to be using engineering hand sets. The highest service access delay was observed for RTL at 11.96 seconds followed closely by BSNL at 10.69 seconds, all of which comfortably met the TRAI benchmark of < = 15 seconds for a sample of 100 calls.

Network Congestion parameters:

SDCCH / Paging Channel Congestion, TCH and POI are part of the network congestion parameters. All the operators except Bharti for SDCCH and Traffic channel congestion are meeting the TRAI specified on the congestion parameters. Bharti does not meet the TRAI specified benchmark with a SDCCH congestion of 4.60% and a Traffic Channel congestion of 4.08% which was found during the one month data collected for the month of audit. RCOM leads the way in network congestion parameters with almost negligible paging and very minimal traffic channel congestion. The calculation methodology of these parameters was found to be in complete accordance with what has been specified by TRAI. There was almost 0 POI congestion on almost all individual POI links between a service provider vis-à-vis other service providers except for RTL & Bharti which had a POI congestion of 0.20 % and 0.23% respectively and was found to be meeting the benchmark.

Call Drop Rate:

During the audit it was found that all the service providers were measuring this parameter as per the TRAI guidelines. The call drop rate was measured as the ratio of total calls dropped (unexpected seizure) to the total number of call attempts for all operators. Also, all of service providers were found to be meeting the TRAI specified benchmark. The lowest call drop rate was of Vodafone with almost negligible calls getting dropped while the relative highest (although it easily met the benchmark) was for Dishnet with 2.57%.

% connections with good voice quality:

Almost all of the operators are measuring these parameters via their periodic drive tests. However, for Vodafone these parameters can be obtained at their switch as well. During the audit it was found that all the service providers were measuring this parameter as per the TRAI guidelines. Drive test was conducted by IMRB with the help of service providers to measure this parameter. In the drive test it was found that Bharti 81%, with Vodafone with 91%, Dishnet with 72% and RCOM with 94% did not meet the TRAI benchmark.

Service coverage:

This parameter is reported by the service provider basis the periodic drive tests in a particular circle. The service coverage for all the operators was found to be within the TRAI specified limits for 100% of the drive test route (for which the audit was conducted). However, there were places were interference and inadequate coverage was recorded (explained in greater detail along with drive test findings).

Customer Care / Helpline Assessment

For the IVR aspect all the service providers meet the TRAI benchmark. However, in case of Reliance no breakup of IVR calls by circle is present. The figure reported is for all India level. Also, RCOM claimed that whatever calls cannot be routed to the IVR is directly routed to the voice to voice operator. In case of calls answered by operators, all the service providers except Dishnet (percentage calls answered within 90 seconds) did not meet the benchmark for the month of audit. Also, for percentage calls within 60 seconds by the operator, TATA and RTL did not meet the benchmark.

Billing performance

All the operators were found to be meeting the benchmark of < 0.1% complaints registered per 100 bills issued. However, Vodafone does not meet the TRAI benchmark of 100% billing complaints being resolved within 4 weeks. In all cases where customers were due for refund, all the service providers except Vodafone meet the TRAI benchmark of 100% with 4 weeks. RTL claimed that in more 2500 bills issued by it in the month of audit, it did not receive any complaint.

Inter operator calls assessment

Inter operator call Assessment (To/From)	Bharti	BSNL	Vfone	TATA	Dishnet	RTL	RCOM
Bharti	NA	92%	No test Number provided	98%	100%	100%	96%
BSNL	94%	NA	96%	95%	100%	97%	93%
Vodafone	74%	88%	NA	100%	100%	100%	95%
TATA	96%	93%	No test Number provided	NA	100%	96%	97%
Dishnet	95%	80%	100%	100%	NA	No test Number provided	93%
RCOM	94%	80%	98%	78%	100%	96%	NA
RTL	96%	79%	79%	No test Number provided	No test Number provided	NA	93%

In the inter-operator call assessment, calls were made from the test sims of service provider whose audit was being conducted to all the other service providers. The calls from Bharti to all other service providers were established in the range of 74% (Vodafone) to 96% (TATA and RTL). Similarly BSNL's connectivity with all the operators was found to be not that good where only 79% (RTL) to 93% (TATA) of its calls to numbers of other operators got connected. However, Vodafone has maximum difficulty in connecting to a RTL number with only 79% of its calls getting connected. TATA had problems in connecting to RCOM with only 78 out of 100 of its calls getting established. Also, RCOM's connectivity to BSNL, Dishnet and RTL was not good with only 93 out of 100 calls getting connected. RTL had the most problem in connecting to a RCOM & TATA number with 96 out of 100 calls getting established. Also, Dishnet's connectivity with all the operators was found to be very good.

Results of Operator assisted Drive test

The drive test was conducted simultaneously for all the operators present in the West Bengal circle. There was in total of three drive tests conducted in the circle. These tests were conducted in the cities of Durgapore, Haldia and Port Blair. IMRB auditors were present in vehicles of every operator. A sample of 15 – 30 test calls were made along each of the routes. The holding period for all test calls was between 120 seconds to 180 seconds. The drive test vehicle across all routes plied at a speed of less than 20 km per hour. Taking into consideration the route that was taken for the drive test; most of the major areas of West Bengal telecom circle were covered.

For measuring voice quality RxQual samples for GSM operators and Frame Error Rate (FERs) for CDMA service providers were measured. RxQual greater than 5 meant that the sample was not of appropriate voice quality and for CDMA operators FERs of more than 4 were considered bad. Call drops were measured by the number of calls that were dropped to the total number of calls established during the drive test. Similarly CSSR was measured as the ratio of total calls established to the total call attempts made. Signal strength was measured in Dbm with strength > -75dbm for indoor, -85 dms for in-vehile and > -95 dbm outdoor routes.

The drive tests in the West Bengal circle were conducted in the cities of Durgapore, Haldia and Port Blair was conducted along the following route:

Mysore	Type of Location	Durgapore	Haldia	Port Blair
Outdoor	Periphery of the city	Munchipara to Durgapur to Banuara to Durgapur A Zone to main gate	Bandar Railway Station to Durga chowk	Bazar, Head Post office, Carbin, Cave, Patrapur, Calicutt, Chthiratapor, Hadba
	Congested Area	Bidhan Nagar Benachity	Link Road to City Center	Light House, Junglihat, Abedin Bazar
	Across the City	GT Road	Link Road	Water Sports Complex, Bazar, Golghar, Airport, Dairy Firm
Indoor	Office Complex	Bengal Sristri city center	Municipality Office	APWD OFFICE
	Shopping Complex	89 Cinema, Big Bazar	Big Bazar	Surya Shopping Complex

The tables given below gives a glimpse of the results of the operator assisted drive test:

Drive Test – Durgapore

	Bharti		BSNL		Vfone		TATA		Dishnet		RTL		RCOM	
	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	94.98%	93.93%	98.25%	97.40%	96.95%	87.80%	100.00%	97.07%	77.29%	72.61%	98.71%	96.60%	87.03%	86.90%
Call set up Success Rate	100.00%	99.33%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	96.43%	95.08%
Call drop rate	0.00%	0.67%	0.00%	0.00%	0.00%	1.12%	0.00%	0.54%	0.00%	0.00%	0.00%	0.00%	0.00%	1.64%
Hands off success rate	99.4%	100.0%	100.0%	99.2%	100.0%	99.3%	100.0%	100.0%	100.0%	99.7%	100.0%	100.0%	100.0%	100.0%

Drive Test – Haldia

	Bharti		BSNL		Vfone		TATA		Dishnet		RTL		RCOM	
	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door
Voice quality	94.73%	74.11%	97.65%	97.99%	88.67%	90.10%	95.83%	96.26%	74.78%	71.98%	96.95%	93.31%	99.25%	99.51%
Call set up Success Rate	100.00%	99.33%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Call drop rate	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate	99.4%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Drive Test – Port Blair

Call drop rate	Bharti		BSNL		Vfone	
	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	95.27%	92.40%	94.44%	91.23%	97.53%	91.86%
Call set up Success Rate	100.00%	100.00%	94.44%	91.23%	100.00%	100.00%
Call drop rate	0.00%	0.00%	2.94%	2.88%	0.00%	0.00%
Hands off success rate	100.00%	100.00%	100.00%	98.57%	100.0%	100.0%

Not meeting the benchmark

Following were the areas where the signal strength was found to be inadequate for the operators:

ALL SERVICE PROVIDERS

Durgapore: There was interference and low signal strength recorded for all operators in the outdoor areas PCBL More, Indo American More, Old Court More, Piala Kali Badi, Alstom, Jubilee Dhaba, muchipara road, J.P. Avenue, B.C. Roy avenue, Durgapore station, DVC road, SSB block-d, DSMS open market road, nehru road, benachity, Bhiringee, Bidhan Nagar while in the indoor areas inadequate coverage was found in Big Bazaar, Bengal Shrishti.

Haldia: There was interference and low signal strength recorded for all the operators in the outdoor areas near Exide Industry, Durgachowk, Manjushree, Rani Chawk, Hati Bazar, Icare, CIPET Play Grond, Haldia Development office, Hotel Classic In, Bio Care, Indian Oil, Emergengy Contact, Indian Oil, Utsav Bhawan, ISPAT, Harra More, Link Road and in the indoor areas of Municipality office Complex and Big Bazaar.

Port Blair: There was interference and low signal strength recorded for all operators in the outdoor areas near Corbin Road, PWD Guest House, Austinbad, Water Sports Complex, Hotel Sinclarias, Science Museum, Chiratappu, Indian Airlines Office, UCO Bank, Sagarika, Phonix Jetty, Haddo, Chattam Show Mill and in the indoor areas interference and inadequate coverage was recorded in APWD office and Surya Mahal shopping complex.

Conclusions:

1. Dishnet (both cities), Vodafone & Bharti do not meet the TRAI benchmark on percentage connections with good voice quality during the drive tests for all the three cities.
2. BSNL does not meet the benchmark for call set up success rate for the city of Haldia.
3. Dishnet experienced high number of connections (almost 28% to 30%) which did not have good have good voice quality.
4. Also, there is a problem of handoff seen especially for BSNL in Durgapore and Port Blair. Bharti also experiences handoff problems in Durgapore and Haldia.

Summary of Live Measurement Results – Cellular Mobile Services

Parameter	Benchmark	Bharti	BSNL	Vfone	TATA	Dishnet	RTL	RCOM
CSSR	> 95%	87.66%	97.92%	99.87%	97.15%	31.18%	99.73%	98.85%
SDCCH / Paging Channel Congestion	< 1%	3.28%	0.60%	0.10%	0.00%	0.05%	0.39%	0.00%
TCH Congestion	< 2%	4.09%	1.40%	0.38%	0.06%	0.15%	1.85%	0.38%
POI congestion	< 0.5%	0.06%	0.00%	0.00%	0.00%	0.00%	0.03%	0.00%
Call drop rate	< 3%	2.15%	2.22%	0.00%	0.15%	2.36%	1.57%	1.35%

Not meeting the benchmark

During the three day live measurement, all the operators except Bharti and Dishnet were found to be meeting the TRAI benchmark on CSSR. Vodafone leads the way with a CSSR of 99.87% while Dishnet has the lowest CSSR in the West Bengal circle for the three day live measurement with a call success rate of only 31.18%.

Except for Bharti, all the operators met the TRAI benchmark on the SDCCH / paging channel congestion parameter. During the live measurements the maximum SDCCH congestion was observed for Bharti at 3.28% followed by BSNL at only 0.60%. RCOM and TATA experienced no Paging Channel Congestion. Bharti did not meet the benchmark on traffic channel congestion with a congestion of 4.09%. Also, there was POI congestion observed for individual POI links for Bharti and RTL.

Also, during the three days live measurement, all the operators met the benchmark on call drop rates. The maximum call drop rate was observed for Dishnet with 2.36% calls getting dropped after establishment followed closely by BSNL at 2.22% and Bharti at 2.15%. The lowest call drop rate was observed for Vodafone with the operator claiming that only a negligible number of its total calls getting dropped after establishment.

5.3 Service provider performance report based on one month data Verification – Broadband Services

S.No	Parameters	B'mark	BSNL- West Bengal	BSNL – Andaman and Nicobar
1	Service provisioning uptime			
1.1	Total connections registered		274	4
1.2	Percentage connections provided within 15 days	100%	92%	75%
2	Fault repair restoration time			
2.1	Total number of faults registered/calls made		411	25
2.2	Percentage faults repaired by next working days	> 90%	92%	100%
2.3	Percentage faults repaired within three working days	99%	100%	100%
3	Billing performance			
3.1	Total bills generated		4979	1183
3.2	Billing complaints per 100 bills issued	<2%	0.00%	0.00%
3.3	%age of billing complaints resolved within 4 weeks	100%	NA	NA
3.4	Time taken for refund of deposits after closure	100%	NA	NA
4	Customer care/helpline assessment		Details pertaining to call centre are not available at the exchanges	No dedicated call centre in Andaman
4.1	Percentage calls answered within 60 seconds	> 60%		
4.2	Percentage calls answered within 90 seconds	>80%		
5	Bandwidth utilisation/Throughput			
5.1	Total number of intra network links		BRAS-23,T1-24,T2-610, DSLAM-5456	
5.2	Total number if intra network links crossing 90%		Uplink Traffic in Chennai BRAS is > 90%	
	Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)			
5.3	Total number of upstream links		97 Links physically located in Bangalore, Chennai, Noida, Kolkata and Mumbai	
5.4	Number of links > 90%		1	
5.5	Percentage bandwidth utilized on upstream links	<80%	75%	
6	Broadband download speed	>80%	Complied	
7	Service availability/uptime	>98%	100%	
8	Packet loss	<1%	<1%	
9	Network Latency			
9.1	POP/ISP Node to NIXI to IGSP	<120msec	Complied	
9.2	ISP node to NAP port	<350msec	Complied	

** Methodology not in line with QoS

Figures provided on All India basis

Not meeting the benchmark

B'mark = TRAI Benchmark, DNA = Details not available, NA: Not Applicable

Critical findings and Key take outs: Broadband services

Before concluding the Audit findings for Broadband services we would like to accentuate the fact that the Broadband audit process was being carried out for the first time by an independent audit agency. Also BSNL is the only subscriber offering Broadband services in West Bengal and Andaman circle.

The data for non network parameters for the service provider was obtained from 13 PoPs in West Bengal circle. In Andaman the service provider is offering Broadband services only from one PoP location in Port Blair, where the data was verified.

For measuring service provider's performance on network related parameters data was verified at the service provider's central node located in Bangalore.

It should also be noted that West Bengal being category "C" circle penetration of Broadband was observed to be low as compared to other circles. This was indicated by the fact that there were very few new connections registered during the period of Audit and Broadband service is primarily provided in key cities.

The key conclusions (Parameter wise) emerging out from the Audit exercise for BSNL in Andaman and West Bengal are provided herewith. For network related parameters analysis is provided at an all India level as the service provider reports the same to TRAI cumulatively.

Service provisioning/Activation time

- Although BSNL falls short of the benchmark score of 100%, service provider scores well with a score of 92% in West Bengal.
- In Andaman there were only 4 new connections registered during the month of Audit out of which 3 were provided in time.
- One of the reason for better performance of the service provider was observed to be the fact that broadband service is mainly offered from bigger PoP's/ Exchanges as compared to Wireline services which is being offered in rural areas as well.
- For live calling scores 57% of subscribers in West Bengal claimed that connection was provided in 15 days.

Fault Repair/Restoration time

- For fault repair within 24 hours service provider meets the TRAI specified benchmark both in West Bengal and Andaman.
- For live calling scores only 19% of West Bengal subscribers claimed that the fault reported by them was cleared in 24 hours. However 55% of subscribers called in West Bengal claimed that fault was repaired in 3 days.
- Only 11 calls were made in Andaman owing to low incidence of faults out of which 4 customers claimed that fault reported by them was repaired in 24 hours.

Billing performance

- No billing complaints were reported both in West Bengal and Andaman during the month of Audit. The reason for the same could be low penetration of Broadband in West Bengal and Andaman

Customer Care/Helpline Assessment

- As for Wireline services, it was observed that there is no dedicated call centre for Broadband services in Andaman and West Bengal circle due to low penetration of Broadband
- In the exchanges/PoP visited it was observed that fault complaints are booked by customer's directly over cell phone or through SMS to SDE or JTO.

Bandwidth Utilisation:

- For measuring the Bandwidth utilization for various intra network links IMRB Auditors checked the Bandwidth available at various links in the access segment for the service provider. For testing Bandwidth availability from PoP to ISP Node sample links were tested at all the levels (DSLAM, Tier I, Tier 11 and BRAS) during live measurements.
- All the links tested on sample basis across India were found to be below 90%
- For upstream links (ISP Node to NIXI/NAP/IGSP) there was only 1 link which was found to be over 90% for the month of Audit
- Service provider comfortably meets the benchmark of <80% bandwidth utilisation cumulatively at all the upstream links both for live measurement and one month
- However, it should be noted that out of the total 97 gateway links present at different places in India 10 to 20 were found to be > 90 % during live measurement.

Download speed

- Also, during live measurements carried out at Pop's/ISP Node it was observed that the operator is meeting the TRAI prescribed benchmark of greater than 80% speed available to the customer.
- However, no historic data was available for verification of records for month of Audit as well as quarter ending October to December 2007 with the service providers.
- Hence, IMRB Auditors also carried out live calling to understand the download speed available to the customer. At a score of 60% speed available (cumulatively for sample customers in Andaman) the service provider falls short of the benchmark in Andaman. However, the service provider comfortably meets the benchmark for calls made in West Bengal with a score of more than 80% speed available to customers (cumulatively for sample customers in west Bengal)

Service Availability/Uptime:

Service provider comfortably meets the benchmark at none of its Broadband Remote Access Servers (BRAS) located all across India was found to be in a state of failure during live measurements. For one month data service providers score was observed to be very close to 100% service availability.

Packet Loss and Network Latency

- For live measurements carried out at the ISP node, the service provider meets the benchmark for packet loss and latency. The same was tested for different links all across India by generating ping tests as per TRAI specifications.
- BSNL was one of the two operators which were found to be maintaining records for ping tests and following a systematic process of book keeping for this parameter. Also, it was the only service provider fund to be aware of the TRI specified norms for conducting ping tests i.e. one test constitute of 1000 ping packets of 64 bytes each

Live Measurement Results – Broadband Services

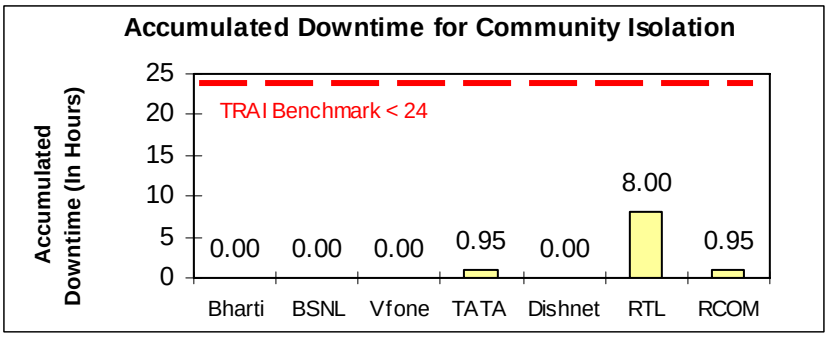
Parameters	Benchmark	BSNL
Service Availability Uptime	>98%	100.00%
No of Intra network links found to be above 90% (Out of sample links tested)		0
Total Bandwidth utilization at all upstream links	< 80%	71%
Data Download Speed	> 80%	Complied
Packet Loss (Percentage)	< 1%	<1%
From user reference point at POP/ISP Node to IGSP NIXI (msec)	<120msec	Complied
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	Complied

Note: All figures obtained on all India basis from the central node in Bangalore

Live measurement results reveal that BSNL comfortably meets the TRAI specified benchmark for all the parameters specified by TRAI at an all India level. Please refer to the executive summary for a more detailed explanation of the parameters.

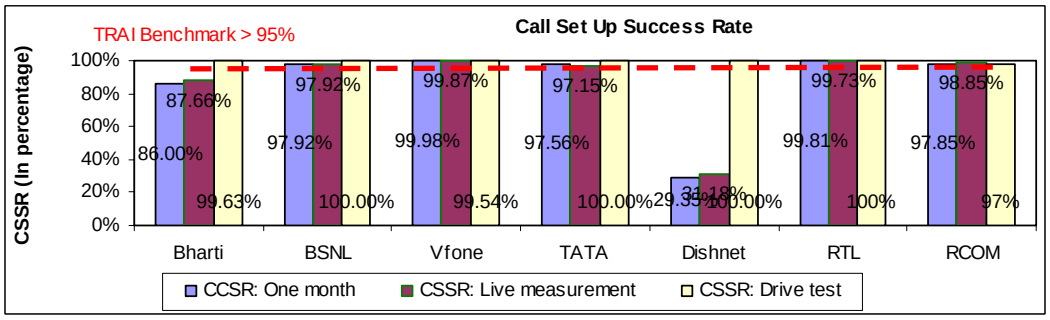
6. Detailed findings – Includes comparison between Live calling/Live measurements and One month data collection for Cellular Mobile Services

Accumulated Downtime



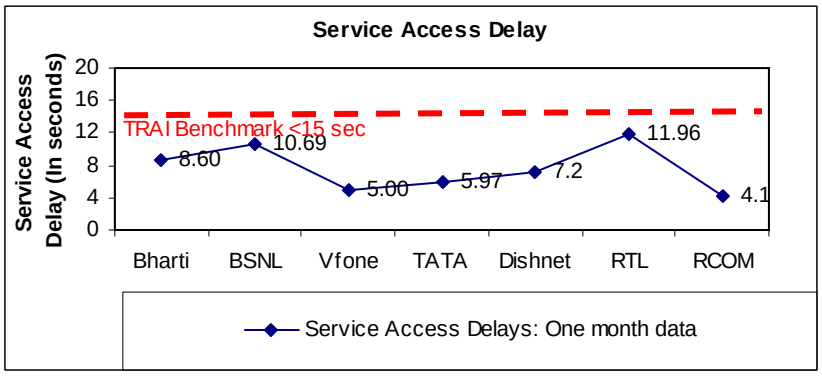
Only TATA, RTL & RCOM experienced a downtime in the West Bengal circle in the month of audit. All of these operators experienced a downtime in their network ranging from 0.95 hours for TATA and RCOM to 8.00 hours for Dishnet.

Call Set-up Success Rate (CSSR)



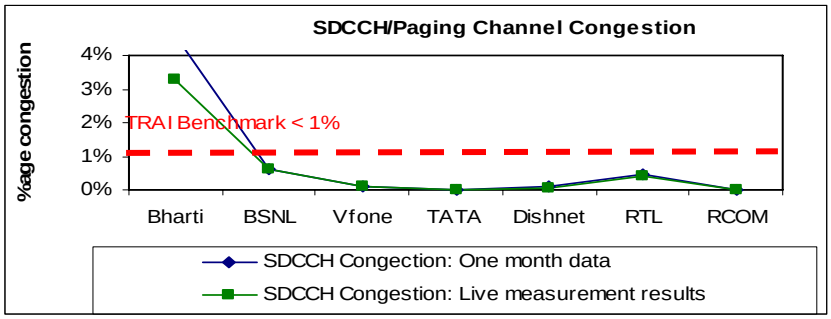
All the operators except, Bharti & Dishnet for the month of Audit and live measurement, are meeting the benchmark for the audit month, live measurement as well as the drive test. The CSSR figures are extremely low for Dishnet with calls ranging from 29% to 31% getting established. However, when the drive test was conducted, all 100% of its calls got established in both the cities of Durgapore and Haldia.

Service Access Delay



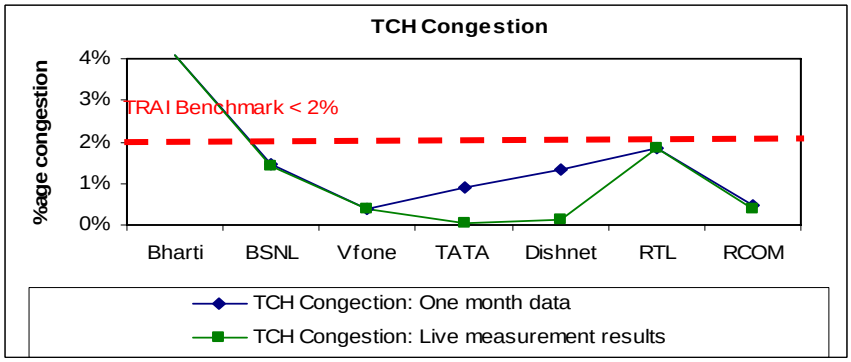
All the operators are meeting the benchmark. The auditors measured this parameter using a standard drive test tool kit. The highest service access delay was measured for RTL at 11.96 seconds and the lowest was for RCOM at 4.10 seconds.

SDCCH / Paging Channel Congestion



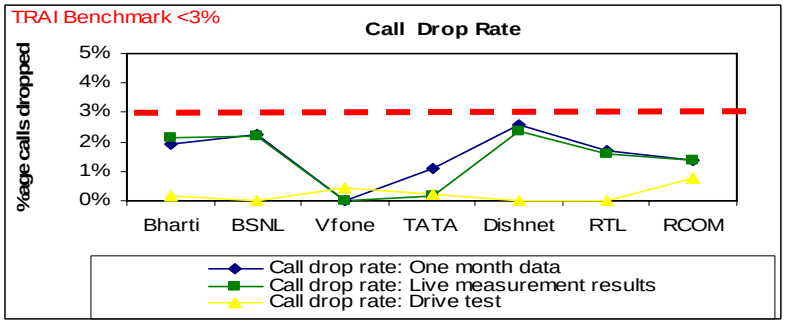
All the operators except Bharti meet the benchmark for the month and the three day live measurement period. During the monthly measurements and verification both TATA and RCOM do not record any paging channel congestion.

TCH Congestion



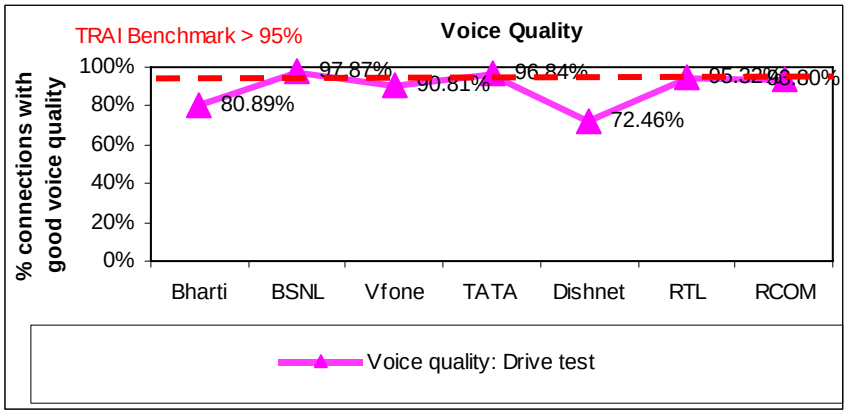
All the operators expect Bharti meet the TRAI benchmark for both the monthly audit as well as the three day live measurement period. On an overall basis, the relatively lower congestion is observed for Vodafone, TATA and RCOM

Call Drop Rate



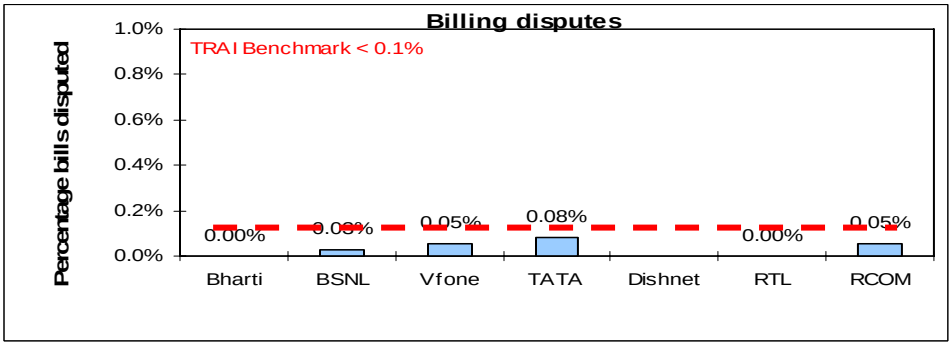
All the operators meet the TRAI benchmark. The operators with the least call drop rates taking into consideration the figures for drive tests, live measurement and the month of audit are Vodafone and TATA.

Voice quality

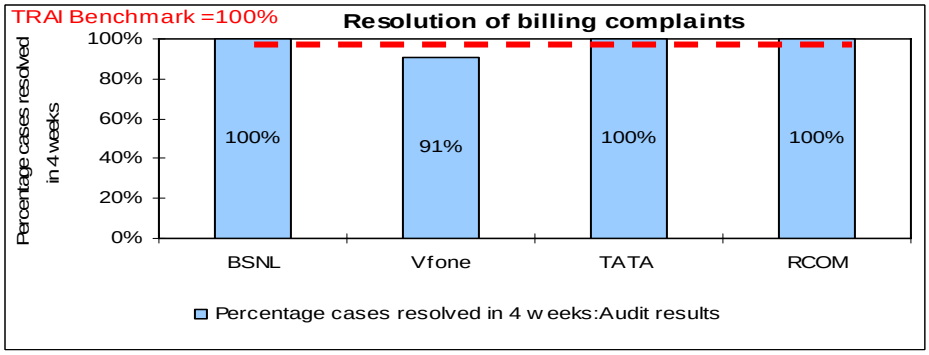


Bharti, Vodafone & Dishnet do not meet the TRAI benchmark as found out during the drive test. The lowest percentage of connections with good voice quality was observed across Dishnet at a paltry level of 72.46% followed Bharti at 80.89% and Vodafone at close to 91%.

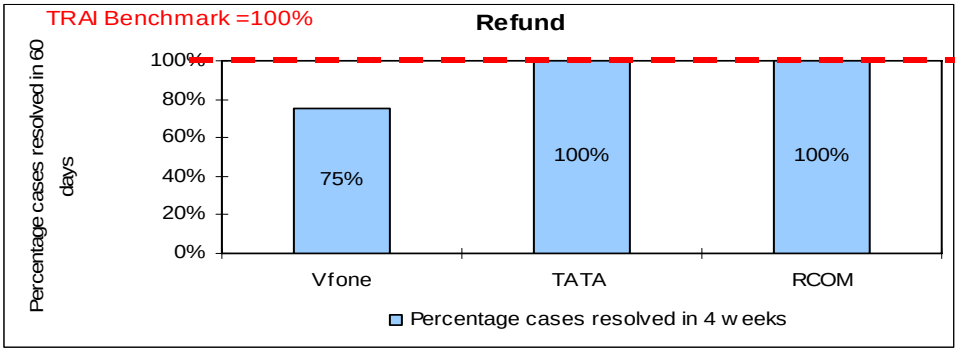
Billing Disputes



All the operators meet the TRAI benchmark on percentage billing disputes per 100 bills. Dishnet claims that it does not have a postpaid subscriber active in the West Bengal while RTL did not receive any billing complaint from its more than 2500 postpaid subscribers.



All the operators meet the TRAI benchmark of resolving 100% of the cases related to resolution of billing complaints for the month in which data was collected. However, the operators consider only those as billing complaints where they have issued an internal ticket which essentially means that a refund is due to the customer.



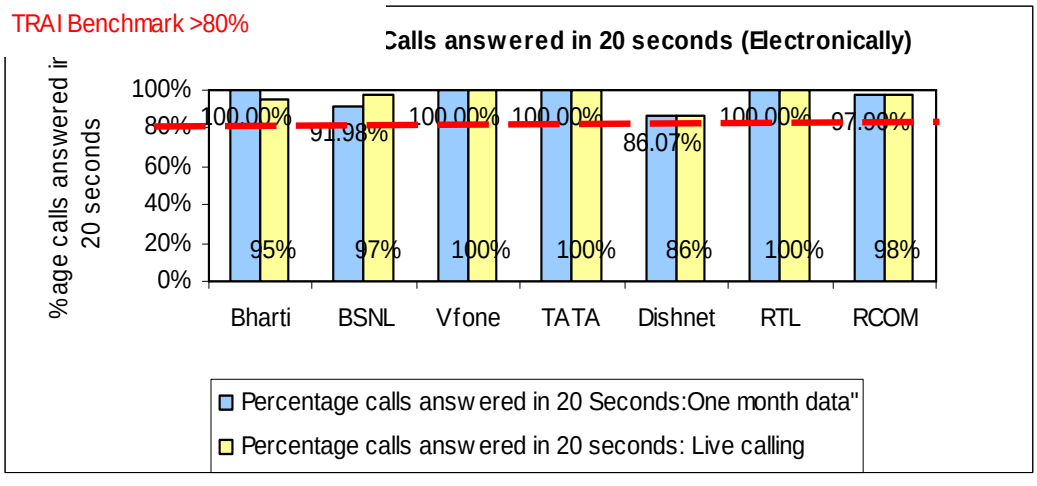
All the operators were found to giving the refunds to their subscribers within the stipulated time period except Vodafone. Only 75% of Vodafone subscribers who were due a refund claim to have been given the refund within the time stipulated by TRAI. Bharti and BSNL claimed that none of their subscribers were due a refund in the month for which the records were verified.

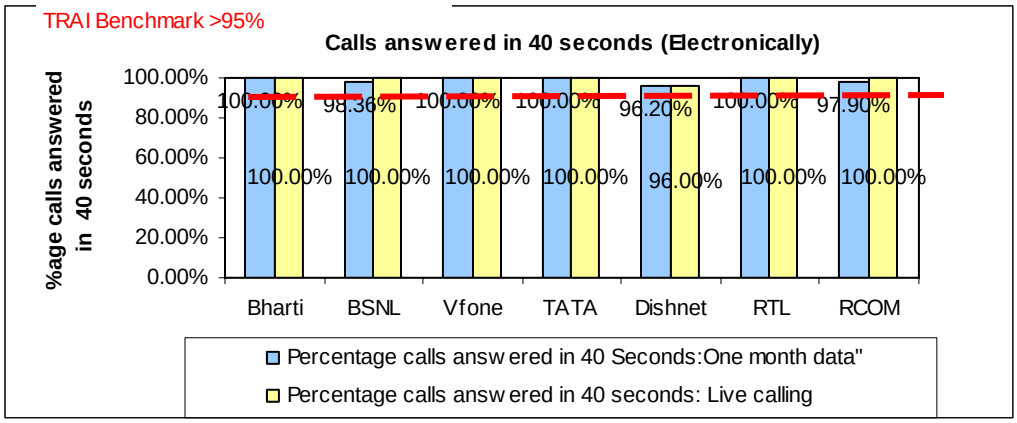
Live calling for billing Complaints

Resolution of billing complaints	Bharti	BSNL	Vfone	TATA	Dishnet	RTL	RCOM
Total Number of calls made	5	13	8	46	No Postpaid subscribers	NA	None of the subscribers responded
Number of cases resolved in 4 weeks	5	11	6	18		NA	
Percentage cases resolved in four weeks	100.00%	84.62%	75.00%	39.13%		NA	

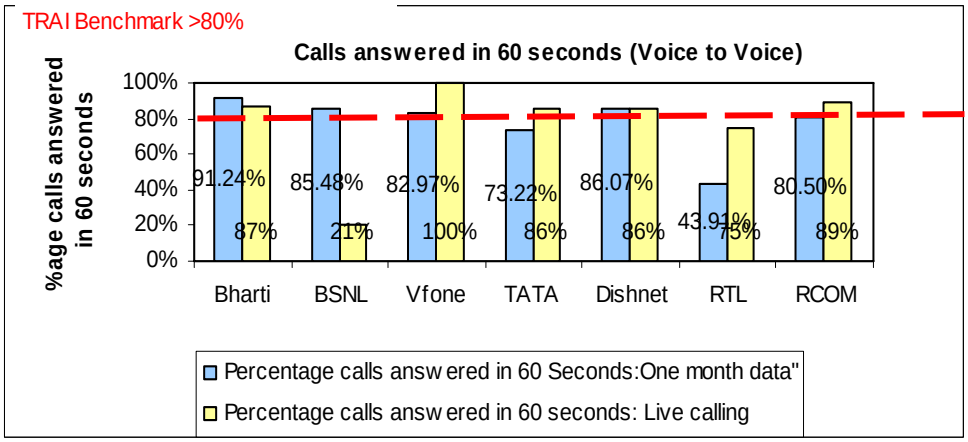
Except for Bharti (and that too only on a very low base), none of the operators were able to meet the TRAI benchmark for the live calling aspect. Only 39.13%% of TATA subscribers say that their complaints were resolved within 4 weeks.

Customer Care / Helpline:

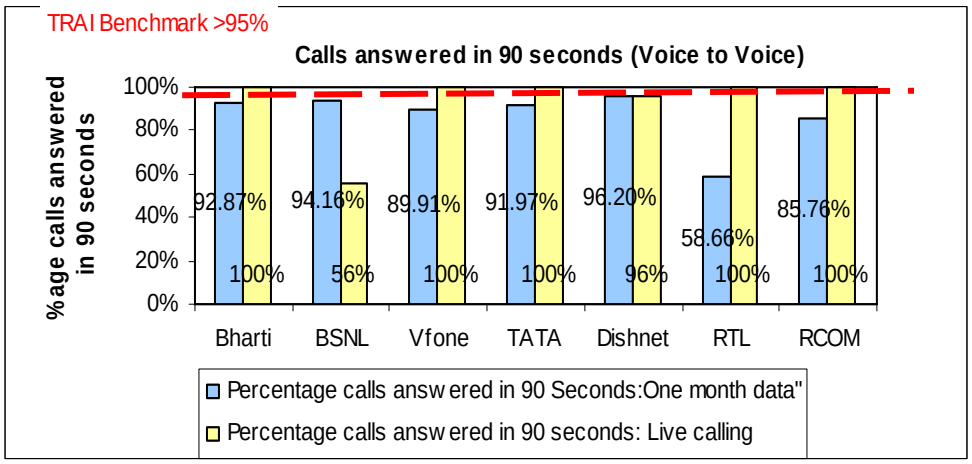




All the operators meet the TRAI benchmark for IVR (Electronic) answering of customers' calls for the one month data as well as the live calling that was carried out during the audit.



However, except for TATA and RTL for the month of audit and BSNL and RTL for live calling aspect, all other operators meet the TRAI benchmark for both the one month data as well as the live calling for voice to voice calls answered within 60 seconds.



Except for Dishnet for the month of audit aspect all the other operators fail to meet the TRAI benchmark. Also BSNL at a level of only 56% calls answered by the operator within 60 seconds fails to meet the TRAI benchmark for the live calling aspect for voice to voice calls answered within 90 seconds.

Inter operator calls assessment

Inter operator call Assessment (To/From)	Bharti	BSNL	Vfone	TATA	Dishnet	RTL	RCOM
Bharti	NA	92%	No test Number provided	98%	100%	100%	96%
BSNL	94%	NA	96%	95%	100%	97%	93%
Vodafone	74%	88%	NA	100%	100%	100%	95%
TATA	96%	93%	No test Number provided	NA	100%	96%	97%
Dishnet	95%	80%	100%	100%	NA	No test Number provided	93%
RCOM	94%	80%	98%	78%	100%	96%	NA
RTL	96%	79%	79%	No test Number provided	No test Number provided	NA	93%

In the inter-operator call assessment, calls were made from the test sims of service provider whose audit was being conducted to all the other service providers. The calls from Bharti to all other service providers were established in the range of 74% (Vodafone) to 96% (TATA and RTL). Similarly BSNL's connectivity with all the operators was found to be not that good where only 79% (RTL) to 93% (TATA) of its calls to numbers of other operators got connected. However, Vodafone has maximum difficulty in connecting to a RTL number with only 79% of its calls getting connected. TATA had problems in connecting to RCOM with only 78 out of 100 of its calls getting established. Also, RCOM's connectivity to BSNL, Dishnet and RTL was not good with only 93 out of 100 calls getting connected. RTL had the most problem in connecting to a RCOM & TATA number with 96 out of 100 calls getting established. Also, Dishnet's connectivity with all the operators was found to be very good.

Compliance reports: Results of Verification of Records for October to December 2007

7.1 Basic (Wireline) services

Parameter	B'mark		BSNL-WB		BSNL-A&N
		PMR	IMRB	PMR	IMRB
Provision of telephone after registration of demand					
Percentage connections completed within 7 days	100%	100%	39%	93%	90%
Fault incidence/clearance statistics					
Fault incidence	<5	5.76	5.6	4.7	<5
Faults repaired within 24 hours	>90%	84%	46%	86%	91%
Mean time to repair	<8 hrs	10.2	Fault repair registers not being maintained properly which made verification tough	5.3	Fault repair registers not being maintained properly which made verification tough
Call Completion Rate (CCR)	>55%	73%	68%	45%	80%
Metering and billing credibility					
Billing complaints per 100 bills issued	<0.1%	0.0%	0.001%	0.00%	0.00%
%age of billing complaints resolved within 4 weeks	100%	97%	83%	NA	NA
Customer care/helpline promptness					
Shift requests (Total number received)					
Percentage shift requests attended within 3 days	95%	100%	47%	100%	32%
Closure request attended (Total number received)					
Closure within 24 hours	95%	100%	76%	100%	94%
Supplementary (additional) service requests attended (Total number received)					
Additional facility provided within 24 hours	95%	100%	88%	100%	100%
Response time to customer					
% age call answered through IVR in 20 seconds	80%	95%	Data not available at the exchanges	80%	No dedicated call centre
% age call answered through IVR in 40 seconds	100%	98%		95%	
% age calls answered by operator in 60 seconds	80%	93%		80%	
% age calls answered by operator in 90 seconds	95%	96%		95%	
%age cases where refund received within 60 days	100%	100%	80%	100%	100%

Note: - For BSNL, verification process was carried out at 5% of the total exchanges spread across 10% of SDCA's. This may be one of the reasons for variation in figures reported in PMR as figures reported are basis sample and not complete universe. Also key takeouts from verification of records has already been explained in Critical findings}

Figures do not match with those reported in PMR NA = Not Applicable

7.2 Cellular Mobile services

Parameter	SERVICE PROVIDER													
	Bharti		BSNL		Vodafone		TATA		Dishnet (Aircel)		RTL		RCOM	
	PMR	IMRB	PMR	IMRB	PMR	IMRB	PMR	IMRB	PMR	IMRB	PMR	IMRB	PMR	IMRB
Network Performance														
Accumulated Downtime	0.00	0.00	0.00	0.00	0.00	0.00	0.75hr	2.17 hr	0.00	0.00	42.25 hr	42.25 hr	0.7hr	0.7hr
Call set up success rate	93.67%	86.73%	97.00%	98.07%	99.97%	99.97%	97.94%	97.93%	98.93%	97.93%	99.00%	99.00%	99.30%	99.30%
Service Access delay	8 sec	7 sec	9.5 sec	11.58 sec	14.3 sec	14.3 sec	5.15 sec	5.15 sec	8 sec	7 sec	8.36 sec	8.36 sec	4.1 sec	4.1 sec
Blocked call rate														
SDCCH Congestion	0.81%	0.81%	0.51%	0.52%	0.14%	0.13%	0.00%	0.00%	0.97%	0.77%	0.36%	0.36%	0.00%	0.00%
TCH Congestion	1.57%	1.57%	1.48%	1.49%	0.36%	0.33%	0.04%	0.04%	0.97%	0.86%	1.43%	1.43%	0.00%	0.00%
Call drop rate	2.50%	3.22%	2.10%	2.34%	1.50%	1.50%	1.21%	1.24%	0.84%	0.84%	1.61%	1.61%	1.10%	1.10%
%age connections with good voice quality	92.54%	92.54%	98.00%	98.00%	97.70%	97.70%	97.44%	98.62%	99.23%	99.95%	97.47%	97.47%	97.10%	97.10%
Service coverage	Complied		Complied		Complied		Complied		Complied		Complied		Complied	
POI congestion	Complied		0.20%	0.20%	Complied		0.24%	0.24%	0.82%	0.82%	0.00%	0.00%	1.50%	1.50%
Customer Care														
Calls answered electronically														
Within 20 seconds	100.00%	100.00%	89.00%	90.24%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	97.30%	97.30%
Within 40 seconds	100.00%	100.00%	97.00%	97.75%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	97.30%	97.30%
Calls answered by the operator														
Within 60 seconds	67.60%	76.54%	89.00%	90.04%	87.60%	87.72%	64.30%	90.63%	89.00%	42.40%	100.00%	100.00%	97.50%	97.50%
Within 90 seconds	72.10%	78.81%	98.10%	98.40%	96.20%	93.61%	68.00%	94.99%	89.00%	57.59%	100.00%	100.00%	98.40%	98.40%
Billing complaints														
Billing complaints/100 bills	0.00%	0.06%	0.03%	0.02%	0.09%	0.25%	0.03%	0.06%	No postpaid subscriber active during Oct – Dec. Period		0.00%	0.00%	0.03%	0.03%
%age complaints resolved within 4 weeks	100%	100%	100%	100%	100.00%	100%	100.00%	100%			NA	NA	100%	100%
Period of refunds due to customers	< 4 weeks	100%	100%	100%	15 days	100%	< 4 weeks	100%			NA	NA	100%	100%

Figures do not match with those reported in PMR

Figures verified on all India basis

Not meeting benchmark

B'mark = TRAI Benchmark, DNA = Details not available

7.3 Broadband services

S.no	Parameter	B'mark	BSNL (Combined for West Bengal and Andaman)	
			PMR	IMRB
1	Service provisioning uptime			
1.1	Percentage connections provided within 15 days	100%	44%	57%
2	Fault repair restoration time			
2.1	Percentage faults repaired by next working days	> 90%	60%	33%
2.2	Percentage faults repaired within three working days	99%	100%	63%
3	Billing performance			
3.1	Billing complaints per 100 bills issued	<2%	0.00%	0.00%
3.2	%age of billing complaints resolved in 4 weeks	100%	Not Applicable	
3.3	%age cases in which refund of deposits after closure was made in 60 days	100%		
4	Customer care/helpline assessment (Voice to Voice)			
4.1	Percentage calls answered within 60 seconds	> 60%	90.00%	Data not available at PoP's
4.2	Percentage calls answered within 90 seconds	> 80%	100.00%	
5	Bandwidth repaired on/Throughput			
5.1	*Intra network links (POP to ISP Node)*			
5.1.1	Total number of intra network links > 90%		All parameters reported by Bangalore NOC	Details not available
5.2	*Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)*			
5.2.1	Percentage bandwidth repaired on upstream links	< 80%		Complied
6	Broadband download speed			No raw data available
7	Service availability/uptime	> 98%		Complied
8	Packet loss	<2%		Complied
9	Network Latency			Complied
9.1	POP/ISP Node to NIXI	< 120 msec		Complied
9.2	ISP node to NAP port (Terrestrial)	< 350 msec		Complied

, Data verified on All India basis

7.4 Conclusions

7.4.1 Basic Wireline Services

1. The figures for BSNL vary because the audit was conducted only in sample exchanges (5% spread across 10% of SDCA's) and the PMR figure is reported by the operator on the overall circle level.
2. During verification process carried out at BSNL exchanges it was observed that customer care data is not maintained at the exchanges as service provider has a centralized call centre.
3. During verification of records it was observed that the registers were not maintained properly at some of the exchanges as entries were found to be made without opening and closing hours which rendered calculating Mean Time to Repair difficult for the Auditors.
4. Also audit process revealed that rent rebates are being provided only when the same is claimed by the customers.

7.4.2 Cellular Mobile services

1. The figures for Bharti do not match for call set up success rate, call drop rate, customer care (voice to voice) and billing complaints parameters.
2. Also, figures for Vodafone and TATA on billing complaints did not match during the verification process.
3. TATA and Dishnet figures do not match for customer care (voice to voice) parameter
4. Also, TATA's figures for accumulated downtime in the network do not match
5. RCOM and Dishnet on POI congestion and RTL accumulated downtime in the network does not meet the TRAI benchmark

7.4.3 Broadband services

1. The figures for BSNL vary because the audit was conducted only in sample PoPs (5% spread across 10% of SDCA's) and the PMR figure is reported by the operator on the overall circle level.
2. Compliance report is provided cumulatively for Andaman and West Bengal as there is no separate PMR being reported for Andaman by the operator.
3. Interestingly it was observed that some of the smaller PoP's do not maintain fault registers as the same is being taken care by bigger exchanges. Due to low subscriber base for such exchanges most of the faults/complaints/queries were solved verbally. Infact for in some cases it was observed that fault complaints are booked by customer's directly over cell phone or through SMS to SDE or JTO.

8. Annexure – I

8.1 Parameter wise performance reports for Basic Wireline services

One month data verification results for Service provisioning

Service provisioning/Activation time	Benchmark	BSNL-WB	BSNL-A&N
Number of connections registered during the period		185	18
Total number of connections provided within 7 days		65	17
Percentage of connections provided within 7 days	100%	35%	94%

Live calling results for Service provisioning

Service Provisioning/Activation Time	Benchmark	BSNL-WB	BSNL-A&N
Total Number of service registration calls made		63	6
Number of cases in which connection was provided in 7 Days		27	2
Percentage cases in which connection was provided in 7 days	100%	43%	33%

One month data verification results for Fault repair/Restoration time

Fault Repair/Restoration time	Benchmark	BSNL-WB	BSNL-A&N
Total number of faults registered during the period		18105	684
Total number of faults repaired by next working day		8481	598
Percentage of faults repaired by next working day	>90%	47%	87%
Total number of fault repaired within three working days		13503	680
Percentage faults repaired within three working days	100%	75%	99%

Live calling results for Fault repair/Restoration time

Fault Repair	Benchmark	BSNL-WB	BSNL-A&N
Total Number of calls made		1028	145
Number of cases where faults were repaired by next working day		128	0
Percentage cases where faults were repaired by next working day	>90%	12%	0%
Number of cases where faults were repaired within 3 days		447	46
Percentage cases where faults were repaired within 3 days	100%	43%	32%

One month data verification results for CCR

Traffic statistics – Call Completion Rate	Benchmark	BSNL-WB	BSNL-A&N
Total local call attempts		5637523	18841
Total number of successful local calls		5146640	15852
Call Completion Rate (CCR) in the local network	>55%	91%	84%

Live measurement results for CCR

Traffic statistics – Call Completion Rate	Benchmark	BSNL-WB	BSNL-A&N
Total local call attempts		1703634	40808
Total number of successful local calls		1416610	35132
Call Completion Rate (CCR) in the local network	>55%	83%	86%

One month data verification results for Billing performance

Billing Performance	Benchmark	BSNL-WB	BSNL-A&N
Billing disputes			
Total bills generated during the period		419533	9879
Total number of bills disputed		21	1
Percentage bills disputed	0.10%	0.01%	0.01%
Resolution of billing complaints			
Total complaints resolved in 4 weeks from date of receipt		14	0
Percentage complaints resolved within 4 weeks of date of receipt	100%	67%	0%

One month data verification for Customer Care – Shifts

Customer Care – Shift Requests	Benchmark	BSNL-WB	BSNL-A&N
Total Number of shift requests received		58	9
Total number requests attended in 3 days		14	8
Total number requests attended beyond 3 days		38	0
Shifts not attended		0	1
Percentage of requests attended in 3 days	95%	24%	89%
Percentage of requests attended beyond 3 days		66%	0%
Percentage of shifts not attended		0%	11%

Live calling results for Customer Care – Shifts

Customer Care – Shift Requests	Benchmark	BSNL-WB	BSNL-A&N
Total number of call to shift requests		16	6
Total number of requests attended in 3 days	95%	6	3
Total number of requests attended beyond 3 days		9	3
Shifts not attended		0	0
Percentage of requests attended in 3 days		38%	50%
Percentage of requests attended beyond 3 days		56%	50%
Percentage of shifts not attended		0%	0%

One month data verification Audit results for Customer Care – Closures

Customer Care – Closure Requests	Benchmark	BSNL-WB	BSNL-A&N
Total Number of closure requests received		924	57
Total closure attended within 24 hours	95%	726	56
Total number of requests attended beyond 24 hours		140	1
Closure requests not attended		0	0
Percentage of closure attended within 24 hours		79%	98%
Percentage of closure attended beyond 24 hours		15%	2%
Percentage of closures not attended		0%	0%

One month data verification for Customer Care – Supplementary requests

Customer Care – Supplementary Requests	Benchmark	BSNL-WB	BSNL-A&N
Total Number of supplementary requests received		160	12
Total number of requests attended within 24 hours	95%	125	11
Total number of requests attended beyond 24 hours		28	1
Supplementary requests not attended		0	0
Percentage of requests attended within 24 hours		78%	92%
Percentage of requests attended beyond 24 hours		18%	8%
Percentage of supplementary requests not attended		0%	0%

Live calling results for Customer Care – Supplementary requests

Customer Care – Supplementary Requests	Benchmark	BSNL-WB	BSNL-A&N
Total Number of supplementary requests received		15	21
Total number requests attended within 24 hours	95%	13	7
Total number requests attended beyond 24 hours		2	14
Supplementary requests not attended		0	0
Percentage of requests attended within 24 hours		87%	33%
Percentage of requests attended beyond 24 hours		13%	67%
Percentage of supplementary requests not attended		0%	0%

Live calling results for calls answered electronically

Customer Care Assessment	Benchmark	BSNL-WB	BSNL-A&N
Total Number of calls dialed on toll free number		100	No dedicated call centre
Calls answered within 20 seconds			
Total Number of calls answered by IVR in 20 seconds	80%	100	No dedicated call centre
Percentage calls answered in 20 seconds		100%	
Calls answered within 40 seconds			
Total Number of calls answered by IVR in 40 seconds	95%	100	No Call centre
Percentage calls answered in 40 seconds		100%	

Live calling results for calls answered by the operator

Customer Care Assessment	Benchmark	BSNL-WB	BSNL-A&N
Total Number of calls dialed on toll free number		100	
Calls answered within 60 seconds			
Total Number of calls answered by operator in 60 seconds	80%	70	No dedicated call centre
Percentage calls answered in 60 seconds		70%	
Calls answered within 90 seconds			
Total Number of calls answered by operator in 90 seconds	95%	100	No dedicated call centre
Percentage calls answered in 90 seconds		100%	

One month data verification Audit results for Refund of deposits after closure

Resolution of billing complaints	Benchmark	BSNL-WB	BSNL-A&N
Total Number of cases requiring refund		1377	89
Number of cases where refund was made in < 60 days		1273	81
Percentage cases where refund was made in < 60 days	100%	92%	91%

8.2 Parameter wise performance reports for Cellular Mobile services

Accumulated Downtime	Bharti	BSNL	Vfone	TATA	Dishnet	RTL	RCOM
Total Downtime (In hours)	0.00	0.00	0.00	0.95	0.00	8.00	0.95

Audit Results for CSSR

CSSR	Bharti	BSNL	Vfone	TATA	Dishnet	RTL	RCOM
Total number of call attempts	441039194	77046644	462794222	37911690	34699539	44492762	DNP
Total number of successful calls	379314582	75447892	462679715	36986130	10183697	44406519	DNP
CSSR	86.00%	97.92%	99.98%	97.56%	29.35%	99.81%	97.85%

DNP – the figure was obtained directly from the system.

Live measurement results for CSSR

CSSR	Bharti	BSNL	Vfone	TATA	Dishnet	RTL	RCOM
Total number of call attempts	103124914	9151691	53262008	42433472	2985663	4596798	DNP
Total number of successful calls	90400502	8960912	53190943	41225831	930870	4584344	DNP
CSSR	87.66%	97.92%	99.87%	97.15%	31.18%	99.73%	98.85%

DNP – the figure was obtained directly from the system.

Drive test results for CSSR (Average of three drive tests)

CSSR	Bharti	BSNL	Vfone	TATA	Dishnet	RTL	RCOM
Total number of call attempts	540	587	655	425	430	424	391
Total number of successful calls	538	587	652	425	430	424	381
CSSR	99.63%	100.00%	99.54%	100.00%	100.00%	100.00%	97.44%

Service Access Delay	Bharti	BSNL	Vfone	TATA	Dishnet	RTL	RCOM
One month data collection	8.60	10.69	5.00	5.97	7.2	11.96	4.1

Audit results for SDCCH and TCH Congestion

Traffic Statistics	Bharti	BSNL	Vfone	TATA	Dishnet	RTL	RCOM
SDCCH Congestion							
Total number of SDCCH Attempts	11305532	95823478	10674720	5634275	50367597	4975254	DNP
Total Number of SDCCH Congestions	DNP	584704	11297	DNP	DNP	DNP	DNP
Percentage SDCCH Congestion	4.60%	0.61%	0.11%	0.00%	0.08%	0.44%	0.00%
TCH Congestion							
Total number of TCH Attempts	5047170	73263555	5783133	3791169	31845378	1448349	DNP
Total Number of TCH Congestions	DNP	1068802	22654	34120	DNP	DNP	DNP
Percentage TCH Congestion	4.08%	1.46%	0.39%	0.90%	1.33%	1.83%	0.46%

DNP – the figure was obtained directly from the system.

Live measurement results for SDCCH and TCH Congestion

Traffic Statistics	Bharti	BSNL	Vfone	TATA	Dishnet	RTL	RCOM
SDCCH Congestion							
Total number of SDCCH Attempts	31692110	8495053	10557010	16643314	4006261	5323073	DNP
Total Number of SDCCH Congestions	DNP	50884	10747	DNP	DNP	DNP	DNP
Percentage SDCCH Congestion	3.28%	0.60%	0.10%	0.00%	0.05%	0.39%	0.00%
TCH Congestion							
Total number of TCH Attempts	14637890	7103248	5744340	42433472	2060748	1471099	DNP
Total Number of TCH Congestions	DNP	99473	21742	25460	DNP	DNP	DNP
Percentage TCH Congestion	4.09%	1.40%	0.38%	0.06%	0.15%	1.85%	0.38%

DNP – the figure was obtained directly from the system.

Audit Results for Call drop rate

Call drop rate	Bharti	BSNL	Vfone	TATA	Dishnet	RTL	RCOM
Total number of calls established	4861575	73234877	227682500	36986130	31845378	41653060	DNP
Total number of calls dropped	94474	1659515	0	401400	818503	705037	DNP
Call drop rate	1.94%	2.27%	0.00%	1.09%	2.57%	1.69%	1.40%

DNP – the figure was obtained directly from the system.

Live measurement results for Call drop rate

Call drop rate	Bharti	BSNL	Vfone	TATA	Dishnet	RTL	RCOM
Total number of calls established	4680196	7103248	23267270	41225831	2060748	3934417	DNP
Total number of calls dropped	100797	157729	0	60144	48613	61748	DNP
Call drop rate	2.15%	2.22%	0.00%	0.15%	2.36%	1.57%	1.35%

DNP – the figure was obtained directly from the system.

Drive test results for Call drop rate (Average of three drive tests)

Call drop rate	Bharti	BSNL	Vfone	TATA	Dishnet	RTL	RCOM
Total number of calls established	538	587	652	425	430	414	391
Total number of calls dropped	1	0	3	1	0	0	3
Call drop rate	0.19%	0.00%	0.46%	0.24%	0.00%	0.00%	0.77%

DNP – the figure was obtained directly from the system.

Drive test results for Voice quality (Average of three drive tests)

Voice quality	Bharti	BSNL	Vfone	TATA	Dishnet	RTL	RCOM
Total number of sample calls	295859	333096	938723	97469	752482	633596	6516
Total number of calls with good voice quality	239322	325991	852472	94388	545258	603915	6112
%age calls with good voice quality	80.89%	97.87%	90.81%	96.84%	72.46%	95.32%	93.80%

Audit Results for POI Congestion

POI congestion	Bharti	BSNL	Vfone	TATA	Dishnet	RTL	RCOM
POI traffic offered on all individual POI's	DNP	3561196.9	38319	15685	DNP	DNP	DNP
Served traffic for all individual POI's	DNP	3554118.9	24734	5365	DNP	DNP	DNP
Traffic failed on all individual POI's	0.23%	0.00%	0.00%	0.00%	0.00%	0.20%	0.00%

DNP – the figure was obtained directly from the system.

Live measurement results for POI congestion

POI congestion	Bharti	BSNL	Vfone	TATA	Dishnet	RTL	RCOM
POI traffic offered on all individual POI's	41636	347509.05	38319	15685	DNP	4788.45	DNP
Served traffic for all individual POI's	21318	346814.36	24793	20730	DNP	4788.42	DNP
Traffic failed on all individual POI's	0.06%	0.00%	0.00%	0.00%	0.00%	0.03%	0.00%

DNP – the figure was obtained directly from the system.

Inter operator call Assessment (To/From)	Bharti	BSNL	Vfone	TATA	Dishnet	RTL	RCOM
Bharti	NA	92%	No test Number provided	98%	100%	100%	96%
BSNL	94%	NA	96%	95%	100%	97%	93%
Vodafone	74%	88%	NA	100%	100%	100%	95%
TATA Indiacom	96%	93%	No test Number provided	NA	100%	96%	97%
Dishnet	95%	80%	100%	100%	NA	No test Number provided	93%
RCOM	94%	80%	98%	78%	100%	96%	NA
RTL	96%	79%	79%	No test Number provided	No test Number provided	NA	93%

Audit results for customer care (Electronically)

Customer Care Assessment	Bharti	BSNL	Vfone	TATA	Dishnet	RTL	RCOM
Total Number of calls received by	13517125	15870	11037093	798981	1111924	1650150	40324997
Total Number of calls answered in 20 seconds	13517125	14597	11037093	798981	957021	1650150	39476257
Percentage calls answered in 20 seconds	100.00%	91.98%	100.00%	100.00%	86.07%	100.00%	97.90%
Total Number of calls answered in 40 seconds	13517125	15610	11037093	798981	1069640	1650150	39476257
Percentage calls answered in 40 seconds	100.00%	98.36%	100.00%	100.00%	96.20%	100.00%	97.90%

Live calling results for customer care (Electronically)

Customer Care Assessment	Bharti	BSNL	Vfone	TATA	Dishnet	RTL	RCOM
Total Number of calls received by the operator	100	100	100	100	100	100	100
Total Number of calls answered in 20 seconds	95	97	100	100	86	100	98
Percentage calls answered in 20 seconds	95.00%	97.00%	100.00%	100.00%	86%	100.00%	98.00%
Total Number of calls answered in 40 seconds	100	100	100	100	96	100	100
Percentage calls answered in 40 seconds	100.00%	100.00%	100.00%	100.00%	96%	100.00%	100.00%

Audit results for customer care (Voice to Voice)

Customer Care Assessment	Bharti	BSNL	Vfone	TATA	Dishnet	RTL	RCOM
Total Number of calls received by the operator	2640466	7225	2847934	102358	1111924	852346	**683419**
Total Number of calls answered in 60 seconds	2409111	6176	2362863	74945	957021	374270	**550121**
Percentage calls answered in 60 seconds	91.24%	85.48%	82.97%	73.22%	86.07%	43.91%	80.50%
Total Number of calls answered in 90 seconds	2452148	6803	2560507	94141	1069640	499997	**586079**
Percentage calls answered in 90 seconds	92.87%	94.16%	89.91%	91.97%	96.20%	58.66%	85.76%

Live calling results for customer care (Voice to Voice)

Customer Care Assessment	Bharti	BSNL	Vfone	TATA	Dishnet	RTL	RCOM
Total Number of calls made	100	100	100	100	100	100	100
Number calls answered within 60 seconds	87	21	100	86	86	75	89
Percentage calls answered in 60 seconds	87%	21%	100%	86%	86%	75%	89%
Number calls answered within 90 seconds	100	56	100	100	96	100	100
Percentage calls answered in 90 seconds	100%	56%	100%	100%	96%	100%	100%

Audit Results for Billing performance

Billing Performance	Bharti	BSNL	Vfone	TATA	Dishnet	RTL	RCOM
Billing disputes							
Total bills generated during the period	192411	76800	20143	29885	No Postpaid subscribers	2510	32264
Total number of bills disputed	0	22	11	24		0	17
Percentage bills disputed	0.00%	0.03%	0.05%	0.08%		0.00%	0.05%
Resolution of billing complaints							
Total complaints resolved in 4 weeks from date of receipt	0	22	10	24	No Postpaid subscribers	NA	17
Percentage complaints resolved within 4 weeks of date of receipt	NA	100%	91%	100%		NA	100%
Refund							
Total number of cases requiring refund of deposits	NA	0	4	24	No Postpaid subscribers	NA	17
Total number of cases where refund was made within 60 days	NA	0	3	24		NA	17
Percentage cases in which refund was receive within 60 days	NA	NA	75%	100%		NA	100%

Live calling results for resolution of billing complaints

Resolution of billing complaints	Bharti	BSNL	Vfone	TATA	Dishnet	RTL	RCOM
Total Number of calls made	5	13	8	46	No Postpaid subscribers	NA	None of the subscribers responded
Number of cases resolved in 4 weeks	5	11	6	18		NA	
Percentage cases resolved in four weeks	100.00%	84.62%	75.00%	39.13%		NA	

8.3 Parameter wise performance reports for Broadband services

One month data verification results for Service provisioning

Service provisioning/Activation time	B'mark	BSNL-WB	BSNL-A&N
No of connections registered during the period		274	4
Total number registered during 15 days		252	3
Percentage of connections provided within 15 days	100%	92.0%	75.0%

Live calling results for Service provisioning

Service Provisioning/Activation Time	B'mark	BSNL-WB	BSNL-A&N
Total Number of calls made		100	1
Number of cases in which connection was provided in 15 Days		57	1
Percentage cases in which connection was provided in 15 days	100%	57%	100%

One month data verification results for Fault repair

Fault Repair/Restoration time	B'mark	BSNL-WB	BSNL-A&N
Total number of faults registered during the period		411	25
Total number of faults repaired by next working day		379	25
Percentage of faults repaired by next working day	>90%	92%	100%
Total number of faults repaired within three working days		411	25
Percentage of faults repaired within three working days	99%	100%	100%

Live calling results for fault repair

Fault Repair	B'mark	BSNL-WB	BSNL-A&N
Total Number of calls made		58	11
Number of cases in which faults were repaired by next working day		11	4
Percentage cases in which faults were repaired by next working day	>90%	19%	36%
Number of cases in which faults were repaired within three working days		32	4
Percentage cases in which faults were repaired within three working days	99%	55%	36%

One month data verification results for billing performance

Billing Performance	B'mark	BSNL-WB	BSNL-A&N
Billing disputes			
Total bills generated during the period		4979	1183
Total number of bills disputed		0	0
Percentage bills disputed	<2%	0.00%	0.00%
Resolution of billing complaints			
Total complaints resolved in 4 weeks from date of receipt		0	0
Percentage complaints resolved within 4 weeks of date of receipt	100%	NA	NA
Refund of deposits after closure			
Total number of cases requiring refund of deposits		0	0
Total number of cases where refund was made within 60 days		0	0
Percentage cases in which refund was receive within 60 days	100%	NA	NA

One month data verification results for Service Availability/Uptime

Service Availability Uptime	B'mark	BSNL
Total Operational Hours		53568
Total Downtime		2
Total time when the service was available		53566
Service Availability Uptime in Percentage	>98%	100.0%

Three day live measurement results for Service Availability/Uptime

Service Availability Uptime	B'mark	BSNL
Total Operational Hours		1728
Total Downtime		0
Total time when the service was available		1728
Service Availability Uptime in Percentage	>98%	100.00%

One month data verification results for Bandwidth utilisation

Bandwidth Utilization	B'mark	BSNL
Total number of intra network links		BRAS-23,T1-24,T2-610, DSLAM-5456
No of Intra network found to be above 90%		Uplink Traffic in Chennai BRAS is > 90%
Total number of upstream links		97
No of upstream links found to be above 90%		1
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In mpbs)		17233
Total International Bandwidth utilised during peak hours		12877
Percentage Bandwidth utilisation during peak hours (In mpbs)	>80%	75%

Live measurement results for Bandwidth utilisation

Bandwidth Utilisation	B'mark	BSNL
Total number of intra network links		BRAS-23,T1-24,T2-610, DSLAMS-5456
No of Intra network Links tested		20
No of Intra network found to be above 90%		0
Total number of upstream links		97
No of Intra network found to be above 90%		10 t0 20
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In mpbs)		18157
Total International Bandwidth utilised during peak hours		12909
Percentage Bandwidth utilisation during peak hours (In mpbs)	<80%	71%

9 Annexure – II Detailed Explanation of Audit methodology (Parameter wise)

9.1 For Basic wireline services

1. Provision of telephone after registration of demand	
Computational Methodology as per QoS definition	Percentage connections provided within 7 working days = (No. of connections provided within seven working days/ Total number of connections registered during the period of 3 months) * 100 Technically Non Feasible (TNF) cases such as unavailability of telephone infrastructure/ equipment in the Area or Spare Capacity for activating telephone connection shall be excluded from the calculation of this parameter.
Benchmark	100% cases in <7 days, subject to technical feasibility
Audit Procedure	IMRB Auditors verified and collected data pertaining to number of applications received at the service provider's level in the following time frames:- - Number of connections provided within 7 days - Number of connections provided after 7 days - Number of connections were request is still pending Live calling : - - Interviewers ensured that operator should provide list of all new numbers added in one month prior to IMRB staff visit. - Live calling team called up at least 10% of the customers who applied for new connections during the month prior to Audit - Checked and Recorded whether the connection was provided within 7 days of registration on demand

2. Fault incidence/clearance related statistic	
Computational Methodology	Fault incidence = (No. of faults reported by the customer per month/ Total Number of Subscribers for that particular month)*100
Benchmark	Total number of faults registered per month: By 31st March 2007: <5 and By 31st March 2008: <3, averaged over the quarter Fault repair by next working day: By next working day: >90% and within 3 days: 100%, averaged over a month.
Audit Procedure	IMRB Auditors to verify and collect data pertaining to number of fault received at the service provider's level in the following time frames:- Number of faults cleared within 24 hours Number of cleared in more than 1 day but less than 3 days Number of cleared in more than 3 days but less than 7 days Number of cleared in more than 7 days but less than 15 days Number of cleared in more than 15 days Live calling : - -Live calling to be done to verify 'Fault repair by next working day' parameter -Interviewers ensured that operator provided a list of all the subscribers who reported faults in one month prior to IMRB staff visit. -Calls were made to up to 10% or 30 complainants for the concerned exchange, whichever is less - Auditors checked and recorded whether the fault was corrected within the timeframes as mentioned in the benchmark.

4. Metering and billing credibility – billing complaints	
Computational Methodology	Percentage incidence of billing complaints = (No. of billing complaints reported by the customer per month/ Total Number of Subscribers for that particular month)*100 Percentage resolution of billing complaints = (No. of billing complaints resolved over a particular period of time/Total No. of billing complaints of that period of time)*100
Benchmark	Percentage incidence of billing complaints: Not more than 0.1% of the bills issued Percentage resolution of billing complaints: 100% within a period of 4 weeks
Audit Procedure	IMRB Auditors to verify and collect data pertaining to - Number of Billing complaints received at the service provider's level - Last billing cycle stated should be such that due date for payment of bills must be beyond the date when this form is filled. - Include all types of bills generated for customers. This could include online as well as other forms of bills presentation including printed bills - Billing complaint is any of written complaint/ personal visit/ telephonic complaint related to: Excess metering/ wrong tariff scheme charged, Late receipt of bills/ Not received at all, Wrong name and address, Payment made in time but charged penalty/ not reflected in next bill, Last payment not reflected in bill, Adjustment/ waiver not done, Anything else related to bills, Toll free numbers charged etc. Live calling : - - IMRB Auditors collected the list of all the subscribers who have made billing complaints in the month prior to the Audit. -100 such subscribers per service provider were called to check the time taken to resolve t he billing complaint. However, in some cases where number of billing complaints were less the sample size could not be achieved

5. Customer care promptness (Shifts, Closures and Additional facility)	
Computational Methodology	Supplementary (Additional) services requests: A few of the supplementary services that are considered for the audit purpose: Clip (caller line identification presentation) facility , STD, ISD, Call forwarding, Voice Mail etc.
Benchmark	Shifting of telephone line : Less than 3 days Processing of closure request: Less than 24 hours Supplementary (Additional) services requests: Less than 24 hours
Audit procedure	IMRB Auditors collected and verified data pertaining to Shifting Request: (Following key points were taken care of while verifying the data) - Date of filing form should be at least 3 working days after the date of month appraised. - All the holidays are excluded and only working days are considered - The number of shift requests per month does not include the pending connections of the previous months. Processing of closure request (Following key points were taken care of while verifying the data) - The operator includes all Requests for volunteer Permanent Closure and External (shifts to other exchanges) Shift requests received at their exchange. - DNP (due to Non – payment) cases are excluded - All holidays are excluded for calculating 24 hours. - Closure requests attended in the previous months are excluded - The period for closure starts from the time of submission of application by the subscriber. Supplementary (Additional) services requests - All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services. - Do not include holidays. - Collect the list of all cases of all subscribers requested for additional facility in past 48 hours prior to IMRB staff visit. - The period starts from the time of submission of application by the subscriber. Live calling was done in 10% of such cases to check the time taken to attend all such requests

6. Response time to customer (Electronically and Voice to Voice)	
Computational Methodology	Percentage of calls answered in a specified time = (Total no. of calls answered within that specified time / Total no. of calls dialed for a particular service)*100
Benchmark	(i) % age of calls answered (electronically): within 20 seconds = 80% of the calls over a period within 40 seconds = 95% of the calls over a period (ii) % age of calls answered by operator / voice to voice): within 60 seconds = 80% of the calls over a period within 90 seconds = 95% of the calls over a period
Audit Procedure	-IMRB auditors made test calls from the exchanges to the operator's customer care / helpline / toll free numbers. They will record the time taken to connect a customer's call both to the IVR as well as to a customer care executive. - All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services. - Time to answer the call by the operator should be taken from the time auditor has pressed the requisite button for being assisted by the operator. Live calling: - - Overall sample size is 2*50 calls per service provider per circle at different points of time, evenly distributed across the selected exchanges – 50 calls between 1000 HRS to 1300 HRS and 50 calls between 1500 HRS to 1700 HRS - Time to answer the call by the operator was assessed from the time interviewer pressed the requisite button for being assisted by the operator. - All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.

7. Time taken to refund of deposits after closure	
Computational Methodology	Percentage of cases needing refund in a specified time = (Total no. of cases where refund was made within a particular time / Total no. of cases requiring refunds)*100
Benchmark	Time taken to refund = 100% within 60 days
Audit Procedure	IMRB Auditors verified and collected data pertaining to - Cases requiring refund of deposits after closure are to be included - Time taken starts from the date on which the closure is made by the service provider and ends at the date on which refund is received by the customer Live calling : - - Collect the details of all the cases for which the refund was provided by the operator prior to the month of Audit - Overall 100 number of live calls are to be made in a licensed service area/circle for each service provider (Distributed across number of exchanges selected)

8. Call completion rate	
Computational Methodology	Call Completion Rate: Call Completion Rate (CCR) is defined as the percentage of total calls that are connected out of the total calls presented to exchange. This could be due to:- Other exchange not working / lines blocked Calling exchange is blocked CCR = [(Call attempts – Calls blocked)/Call attempts] X 100
Benchmark	Call Completion Rate (CCR) within local network: More than 55%
Audit Procedure	IMRB Auditors verified and collected data pertaining to Sample Traffic Data during Time Consistent Busy Hour (TCBH). These details were collected separately for -Three days in which live measurement was carried out - For the complete month in which audit was carried out

9.2 For Cellular Mobile services

1. Accumulated Downtime of the Network	
Computational Methodology as per QoS definition	The total time for which the network is down for a particular service provider resulting in a community isolation Computational Methodology: Accumulated downtime = Summation of Significant Downtime* * Significant Downtime to be defined as duration of network outages that result in groups of customers in PLMN being isolated for more than an hour at a stretch. Planned outages during low/ no traffic hours for maintenance/ modernisation/ network enhancement work etc. should be ignored
Benchmark	< 24 hrs
Audit Procedure	IMRB auditors collected and verified data pertaining to: • The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) used for arriving at the benchmark reported to TRAI were audited • Outages could be in MSC, BSC, BTS or in trunk. In case of BTS failure we have included only those that resulted in community isolation

2. Call Set-Up Success Rate (CSSR)	
Computational Methodology as per QoS definition	The ratio of calls established to total calls is known CSSR. Call Established means the following events have happened in call setup:- ↳ call attempt is made ↳ the TCH is allocated ↳ the call is routed to the outward path of the concerned MSC Computational Methodology: Calls Established / Total Call Attempts * 100
Benchmark	> 95%
Audit Procedure	IMRB auditors collected and verified data pertaining to ↳ The cell-wise data generated through counters/ MMC available in the switch for traffic measurements was verified by the auditors ↳ CSSR calculation was measured using OMC generated data only ↳ Measurement was done only in Time Consistent Busy Hour (TCBH) period for all days of the week

3. Service Access Delay	
Computational Methodology as per QoS definition	Service Access delay is a summation of following parts in the call flow: ↳ Time to connect calls ↳ Time to confirm instruction to connect ↳ Time to release calls ↳ Time to alert mobile set Computational Methodology: Time to connect calls = Time between "Origination" and "Service Connect" message from BTS to Mobile Time to confirm instruction to connect* = Time between "Origination" and "Base Station Acknowledgment" Note: Time measured here is a sub-part of first measurement Time to release call = Time between "Release on Reverse Link" and "Release on Forward Link" Time to alert a mobile = This is measured as a mean of two measurements (i+ii/2): ● First paging attempt = Time between receiving a call request at PLMN and alerting the mobile ● Final paging attempt = Time between receiving a call request at PLMN and hearing start of "Not reachable" announcement
Benchmark	Between 9 to 20 seconds depending on number of paging attempts (Average of 100 calls < = 15 sec.)
Audit Procedure	IMRB Auditors collected and verified records pertaining to: ↳ Audit of the details of Layer 3 Message diagnostics generated from periodic Drive tests conducted at different parts of the network used to arrive at the benchmarks reported to TRAI was conducted ↳ Validating that at least 100 sample calls should have been by the service provider made during Time consistent busy hour (TCBH) for the quarter using standard drive test equipment. (Note: measurement using engineering handsets was not deemed acceptable) ↳ The component 'first paging attempt' was checked whether it was measured by the operator using a protocol analyser.

4. Network Congestion Parameters	
Computational Methodology as per QoS definition	It means a call is not connected because there is no free channel to serve the call attempt. This parameter represents congestion in the network. It happens at three levels: ➢ SDCCH Level: Stand-alone dedicated control channel ➢ TCH Level: Traffic Channel ➢ POI Level: Point of Interconnect Computational Methodology: ➢ SDCCH / TCH Congestion% = [(A1 x C1) + (A2 x C2) +…….+ (An x Cn)] / (A1 + A2 +…+ An) ● Where:-A1 = Number of attempts to establish SDCCH / TCH made on day 1 ● C1 = Average SDCCH / TCH Congestion % on day 1 ● A2 = Number of attempts to establish SDCCH / TCH made on day 2 ● C2 = Average SDCCH / TCH Congestion % on day 2 ● An = Number of attempts to establish SDCCH / TCH made on day n ● Cn = Average SDCCH / TCH Congestion % on day n ➢ POI Congestion% = [(A1 x C1) + (A2 x C2) +…….+ (An x Cn)] / (A1 + A2 +…+ An) ● Where:-A1 = POI traffic offered on all POIs (no. of calls) on day 1 ● C1 = Average POI Congestion % on day 1 ● A2 = POI traffic offered on all POIs (no. of calls) on day 2 ● C2 = Average POI Congestion % on day 2 ● An = POI traffic offered on all POIs (no. of calls) on day n ● Cn = Average POI Congestion % on day n
Benchmark	SDCCH Congestion: < 1% TCH Congestion: < 2% POI Congestion: < 0.5%
Audit Procedure	IMRB Auditors collected and verified records pertaining to: ➢ Audit of the details of SDCCH and TCH congestion percentages computed by the operator (using OMC–Switch data only) was conducted ➢ The operator should be measuring this parameter during Time consistent busy hour (TCBH) only SDCCH ➢ The POI details were verified from the switch for all the links of the operators

5. Call Drop Rate	
Computational Methodology as per QoS definition	The dropped call rate is the ratio of successfully originated calls that were found to drop to the total number of successfully originated calls that were correctly released ➢ Total calls dropped = All calls ceasing unnaturally i.e. due to handover or due to radio loss ➢ Total calls established = All calls that have TCH allocation during busy hour Computational Methodology: Total Calls Dropped / Total Calls Established x 100
Benchmark	< 3%
Audit Procedure	IMRB Auditors collected and verified records pertaining to: ➢ Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR was conducted. ➢ The operator should only be considering those calls which are dropped during Time consistent busy hour (TCBH) for all days of the relevant quarter

6. Percentage Connections with Good Voice Quality	
Computational Methodology as per QoS definition	Definition: ↳ for GSM service providers the calls having a value of 0 – 4 are considered to be of good quality (on a seven point scale) ↳ For CDMA the measure of voice quality is Frame Error Rate (FER). FER is the probability that a transmitted frame will be received incorrectly. Good voice quality of a call is considered when it FER value lies between 0 – 4 % Computational Methodology: ↳ % Connections with good voice quality = (No. of voice samples with good voice quality / Total number of samples) x 100
Benchmark	> 95%
Audit Procedure	IMRB Auditors collected and verified records pertaining to: Audit would be conducted based on the details of periodic drive tests conducted at different part of the network during Time consistent busy hour (TCBH) and used to arrive at the benchmarks reported to TRAI. Procedures that were to be followed by operator for obtaining relevant details for computing this parameter were audited ↳ Operator to conduct at least one drive test using standard drive test equipment every week during TCBH ↳ Each drive test should evenly cover the following 5 types of locations: ↳ 3 Outdoor (Periphery of the city, Congested Area, Across the City), and 2 Indoor (Office Complex and Shopping Complex) ↳ 2 minute long calls to be initiated and held throughout the drive test ↳ The speed of the vehicle should be kept at around 50km/hr. (around 30 km/hr in case of geographically small cities) – This was ensured during the drive tests conducted by IMRB Auditors ↳ RxQual / FER samples generated during the drive test collected by the operator were verified ↳ *Measurements using Engineering handsets were not acceptable* ↳ All the operators were not maintaining this data at the switch level

7. Service Coverage	
Computational Methodology as per QoS definition	Definition: ➢ The level of signal available in a particular part of a city is known as signal strength. Computational Methodology: ➢ Service Coverage for route type x = [(N1 x CSS1) + (N2 x CSS2) + …..+ (Nn x CSSn)] / (N1 + N2 +……..+Nn) ➢ Where:-N1 = Number of calls on type of route x made in drive test 1 ➢ CSS1 = Average coverage signal strength on type of route x in drive test 1 (in dBm) ➢ N2 = Number of calls on type of route x made in drive test 2 ➢ CSS2 = Average coverage signal strength on type of route x in drive test 2 (in dBm) ➢ Nn = Number of calls on type of route x made in drive test n ➢ CSSn = Average coverage signal strength on type of route x in drive test n (in dBm)
Benchmark	Indoor >= -75 dBm In-vehicle >= -85 dBm Outdoor – in city >= -95 dBm
Audit Procedure	IMRB Auditors collected and verified call centre records pertaining to: ➢ Audit was conducted based on the details of periodic drive tests conducted at different part of the network during Time consistent busy hour (TCBH) which were used to arrive at the benchmarks reported to TRAI. ➢ Procedures were verified that were to be followed by operator for obtaining relevant details for computing this parameter:- ➢ Operator to conduct at least one drive test using standard drive test equipment* every week during Time consistent busy hour (TCBH). ➢ Each drive test should evenly cover the following 5 types of locations: – ➢ 3 Outdoor (Periphery of the city, Congested Area, Across the City), and ➢ 2 Indoor (Office Complex and Shopping Complex) ➢ *Measurements using Engineering handsets were not acceptable*

8. Response time to customer (Electronically and Voice to Voice)	
Computational Methodology	To connect to IVR: The time taken to connect a person (as soon as he presses call) to the IVR of the service provider To connect to operator: The time taken to connect a person (as soon as he presses 9) to the customer care executive Computational Methodology: Percentage of calls answered in a specified time = (Total no. of calls answered within that specified time / Total no. of calls dialed for a particular service)*100
Benchmark	(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%

Audit Procedure	-IMRB auditors made test calls from the exchanges to the operator's customer care / helpline / toll free numbers. They will record the time taken to connect a customer's call both to the IVR as well as to a customer care executive. - All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services. - Time to answer the call by the operator should be taken from the time auditor has pressed the requisite button for being assisted by the operator. <u>Live calling: -</u> - Overall sample size is 2*50 calls per service provider per circle at different points of time, evenly distributed across the selected exchanges – 50 calls between 1000 HRS to 1300 HRS and 50 calls between 1500 HRS to 1700 HRS - Time to answer the call by the operator was assessed from the time interviewer pressed the requisite button for being assisted by the operator. - All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.

9.1 Billing complaints per 100 bills issued	
Computational Methodology as per QoS definition	Billing complaints includes any of the following complaints related to billing from the point of view of customer: • Local call charges billed as STD/ISD or vice-versa • Toll free numbers charged • Wrong roaming charges • Call made/received disputed • Wrongly charged extra for some service (SIM replacement charged twice, service not used but charged etc.) • Cheque submitted on time but charged penalty for paying beyond due date (in case customer is not at fault i.e. all those that operator cannot prove that he/she is not lying) • Payment made but not reflected (may be wrongly adjusted to another customer etc.) Billing complaints per 100 bills issued = Total billing complaints** received during the relevant quarter / Total bills generated* during the relevant quarter * *All types of bills generated for customers i.e. printed bills, online bills and any other forms of bills generated are to be included* ** *<u>Only</u> dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end) are to be included. It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.*
Benchmark	< 0.1% billing complaints per 100 bills
Audit Procedure	IMRB auditors collected and verified data pertaining to - Number of bills generated - Number of billing complaints received - %age complaints per 100 bills

9.2 Resolution of billing complaints	
Computational Methodology as per QoS definition	%age of billing complaints resolved within 4 weeks=(Complaints resolved in 4 weeks from date of receipt / Total billing complaints received during the relevant period) x 100 *Only dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end) are to be included. It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.* *Date of resolution in this case would refer to the date when a communication has taken place from the operator's end to inform the complainant about the final resolution of the issue / dispute.*
Benchmark	100% cases to be resolved within 4 weeks
Audit Procedure	IMRB Auditors collected and verified data pertaining to - Total number of billing complaints/bills disputed - Number of complaints resolved in 4 weeks Live calling : - Overall 100 number of live calls made in a licensed service area/circle for each service provider. However in certain cases the sample could not be achieved as bills disputed (prior to the month of Audit) were found to be less than100

9.3 Period of refunds / payments due to customers	
Computational Methodology as per QoS definition	Period of all refunds = Maximum value of 'Time taken to refund' where:-Time taken to refund = Date of refund – date of lodging complaint
Benchmark	100% cases in less than 4 weeks
Audit Procedure	Audit of refund details and complaints (only those resulting in refunds) resolution details used for arriving at the figures reported to TRAI to be conducted. Operator to provide details of:- • Dates of lodging of all billing complaints resolved in favour of customer and resulting in requirement of a refund by the operator • Dates of refund pertaining to all billing complaints received during the relevant quarter Also random live checks of all subscribers entitled for refund were conducted

9.3 For Broadband services

1. Service provisioning/Activation time	
Computational Methodology as per QoS definition	Service provisioning time refers to the time taken from the date of receipt of an application to the date when the service is activated Percentage connections provided within X working days = No of connections provided within X working days/ Total number of connections registered during the period * 100 Technically Non Feasible (TNF) cases such as unavailability of Broadband infrastructure/ equipment in the Area or Spare Capacity i.e. Broadband Ports including equipment to be installed at the customer premises for activating Broadband connection shall be excluded from the calculation of this parameter. Also, problems relating to customer owned equipment such as PC, LAN Card/ USB Port and internal wiring or non-availability of such equipment shall be excluded from the calculation of this parameter.
Benchmark	100 % cases in =<15 working days.
Audit Procedure	IMRB auditors collected and verified data pertaining to -Number of applications received at the service provider's level -Number of connections provided within 15 days -Number of connections provided after 15 days Live calling : Atleast 10% of the subscribers who had requested for new connections in month prior to Audit were called to check whether connection was provided in 15 days

2. Fault repair/Restoration time	
Computational Methodology as per QoS definition	This refers to the time taken to restore the existing customer service to operational level from the time that a problem or fault is reported Percentage faults repaired in X working days = (Total no of faults repaired in X working days /Total number of faults reported during the period)*100 The time period for fault repair starts from the time when the fault is reported to the service provider either through customer care help line or in person by the subscriber Only the complaints registered till the close of the business hours of the day are to be taken into account. All the complaints registered after the business hours are to be considered as being registered in the next day business hours
Benchmark	By next working day: > 90% and within 3 working days: 99%
Audit Procedure	IMRB auditors collected and verified data pertaining to -Number of applications received at the service provider's level -Number of connections provided within 15 days -Number of connections provided after 15 days Live calling : Atleast 10% of the subscribers who had requested for new connections in month prior to Audit were called to check whether connection was provided in 15 days

3. Billing complaints per 100 bills issued	
Computational Methodology as per QoS definition	Billing complaints includes any of the following complaints related to billing from the point of view of customer: • Wrongly charged extra for some service • Cheque submitted on time but charged penalty for paying beyond due date • Payment made but not reflected (may be wrongly adjusted to another customer etc.) Billing complaints per 100 bills issued = Total billing complaints** received during the relevant quarter / Total bills generated* during the relevant quarter * *All types of bills generated for customers i.e. printed bills, online bills and any other forms of bills generated are to be included* ** *Only dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end) are to be included. It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.*
Benchmark	< 2% billing complaints per 100 bills
Audit Procedure	IMRB auditors collected and verified data pertaining to - Number of bills generated - Number of billing complaints received - %age complaints per 100 bills

3.1. Resolution of billing complaints	
Computational Methodology as per QoS definition	%age of billing complaints resolved within 4 weeks=(Complaints resolved*** in 4 weeks from date of receipt / Total billing complaints** received during the period 2008) x 100 *Only dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end) are to be included. It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.* *Date of resolution in this case would refer to the date when a communication has taken place from the operator's end to inform the complainant about the final resolution of the issue / dispute.*
Benchmark	100% cases to be resolved within 4 weeks
Audit Procedure	IMRB Auditors collected and verified data pertaining to - Total number of billing complaints/bills disputed - Number of complaints resolved in 4 weeks Live calling : - -Overall 100 number of live calls are to be made in a licensed service area/circle for each service provider. However in certain cases the sample could not be achieved as bills disputed (prior to the month of Audit) were found to be less than100

3.2 Time taken to refund after closure	
Computational Methodology as per QoS definition	Time taken to refund = Date of refund – Date of closure Date of closure is considered to be the date on which the connection is discontinued in the service provider database of active customers
Benchmark	100% cases in less than 60 days
Audit Procedure	IMRB Auditors collected and verified data pertaining to -Number of cases requiring refund of deposits -Number of cases where refund was made within 60 days -%age cases where refund was made within 60 days

4. Response time to customer for assistance	
Computational Methodology as per QoS definition	%age of calls answered by operator (voice to voice) within n seconds = (Number of calls where time taken for operator to respond* >= n sec / Total number of calls where an attempt to route to the operator was made) x 100 Time taken for operator to respond = Time when an operator responds to a call – Time when the relevant code to reach the operator is dialled
Benchmark	Calls answered within 60 seconds > 60 % Calls answered within > 80%
Audit Procedure	IMRB Auditors collected and verified call centre records pertaining to -Number of calls received by the operator -Number and %age calls answered within 60 seconds -Number and percentage calls answered within 90 seconds Live calling : - Overall 100 number of live calls at different points of time were made in a licensed service area/circle for each service provider to assess the efficiency of the call centre

5. Bandwidth Utilization	
Computational Methodology as per QoS definition	Percentage Bandwidth available on the link = Total Bandwidth* utilised in TCBH for the period/ Total Bandwidth Available during the period*100 Multi Router Traffic Grapher (MRTG) is to be used to measure the details of Bandwidth utilisation by service providers
Benchmark	-- < 80% link(s)/route bandwidth utilization during peak hours (TCBH). -- If on any link(s)/route bandwidth utilization exceeds 90%, then network is considered to have congestion. For this additional provisioning of bandwidth on immediate basis, but not later than one month is mandated.
Audit Procedure	IMRB Auditors collected and verified call centre records pertaining to (I)POP to ISP gateway Node [Intra – network] Links -Auditors to verify and collect data pertaining to Total Bandwidth available and Total Bandwidth utilised during TCBH at some of the sample intra network links (POP to ISP Node) on each of the three days of live measurement separately - Total Bandwidth available and Total bandwidth utilised during at the sample links TCBH for the complete month of audit - Total number of intra network links having >90% bandwidth utilisation during the month of Audit (ii) ISP Gateway Node to IGSP / NIXI Node upstream Link's) for international connectivity -Total number of upstream links for International connectivity -Total number of links having Bandwidth > 90%Total Bandwidth available and Total Bandwidth utilised on all the upstream links during TCBH (POP to ISP Node) on each of the three days of live measurement separately -Total Bandwidth available and Total bandwidth utilised at all the international links during TCBH for the complete month of audit (Also obtain details separately for the days)

Broadband download speed	
Computational Methodology as per QoS definition	This refers to the ratio of size of the file to be downloaded and total time required for error free transmission of the file
Benchmark	Subscribed broadband connection speed to be met >80% from ISP Node to user
Audit Procedure	Live calling : - -Details of live customers were obtained from the service providers -Overall 50 number of live calls at were made during peak hours in a licensed service area/circle for each service provider to assess the download speed available to subscribers. Tool provided by the on the service providers website was used for the same -Details of total committed download speed and speed available to the users were recorded for each of the subscriber - Percentage download speed available was calculated as = Sum of total speed available for 50 customers/Total committed download speed for 50 customers*100

Service availability/Uptime	
Computational Methodology as per QoS definition	Service availability/uptime is the measure of the degree to which the broadband access network including ISP Node is operable and not in a state of failure or outage at any point of time for all users Service availability/Uptime = (Total operational hours – Total Downtime hrs)*100 / Total operational hours Total downtime for all users, including the LAN switches, Routers, Servers, Etc at ISP Node and connectivity to upstream service provider are to be included Planned outages for routine maintenance of the system are excluded from the calculation of service availability/uptime
Benchmark	- 90% for quarter ending June 2007 - 98% with effect from quarter ending September 2007 and onwards
Audit Procedure	IMRB Auditors collected and verified call centre records pertaining to -Total operational hrs -Total downtime hrs The above mentioned data was obtained and verified separately for three days in which the live measurement was carried out, Month in which audit was carried out Also, verification of old records(July to September 2007) was verified

Packet loss	
Computational Methodology as per QoS definition	Packet loss is the percentage of packets lost to total packets transmitted between two designated Customer Premises Equipments/Router ports. It is the measurement of packet lost from the broadband customer (User) configuration/User reference point at POP/ISP Node to IGSP/NIXI Gateway and to the nearest NAP port abroad The packet loss is measured by computing the percent packet loss of 1000 pings of 64 byte packet each. Service provider needs to carry out such tests daily during Time Consistent Busy Hour(TCBH) and report the average results for the month in the performance monitoring report to TRAI Minimum sample reference points for each service area shall be three in number or multiple reference points if required Hence Packet loss is computed by the formula - (Total number of ping packets lost during the period/Total number of ping packets transmitted)* 100
Benchmark	<1 %
Audit Procedure	IMRB Auditors collected and verified call centre records pertaining to - Records maintained for ping tests conducted during the period of July to September 2007 - Smoked ping test (wherever available) results for the period of July to September 2007 - Results of live ping tests conducted during three day live measurement and month of Audit (During peak hours) - Live ping tests were conducting by selecting a minimum of three user reference test points at POP/ISP Node in each circle

Network Latency	
Computational Methodology as per QoS definition	Latency is the measure of duration of a round trip for a data packet between specific source and destination Router Port/Customer Premises Equipment (CPE). The round trip delay for the ping packets from ISP premises to the IGSP premises to the IGSP/NIXI gateway and to the nearest NAP port abroad are measured by computing delay for 1000 pings of 64 bytes each (Pings are to be sent subsequent to acknowledgement received for the same for previous ping) Service provider needs to carry out such tests daily during Time Consistent Busy Hour(TCBH) and report the average results for the month in the performance monitoring report to TRAI Minimum sample reference points for each service area shall be three in number or multiple reference points if required Hence the formula for network latency would be Network latency for X days= Total round trip time for all the ping packets transmitted in X days /No of days during the period
Benchmark	< 120 msec from user reference point at POP/ISP Node to International Gateway < 350 msec from User reference point at ISP Gateway Node to International nearest NAP port (Terrestrial) < 800 msec from User reference point at ISP Gateway Node to International nearest Nap port (Sattelite)
Audit Procedure	IMRB Auditors collected and verified call centre records pertaining to - Records maintained for ping tests conducted during the period of July to September 2007 - Smoked ping test (wherever available) results for the period of July to September 2007 - Results of live ping tests conducted during three day live measurement and month of Audit (During peak hours) - Live ping tests were conducting by selecting a minimum of three user reference test points at POP/ISP Node in each circle

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