Ka8 Balaji Estate, Guru Ravidass Marg, Kalkaji, New Delhi - 110019
Phone: (91)-11-4269-7800, Fax: (91)-11-42697802
Website: www.imrbint.com

Objective Assessment of Quality of Services for (QoS) for Basic Wireline, Cellular Mobile (Wireless) and Broadband Service Providers - North East Circle

Final Report: March - 2009

-

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

By: **eTechnology Group@IMRB**

A specialist unit of IMRB International

IMRB international

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 Half Yearly periods. IMRB International Auditors carried out Audits across North East, Himachal Pradesh, Jammu and Kashmir, Orissa, UP (W), Assam, Andhra Pradesh and Kerala circles in the second Half Yearly period 2008. **This report details the performance of various service providers in North East circle against Quality of Services benchmarks for various parameters laid down by TRAI in respective regulations for Basic (Wireline), Cellular (Mobile) and Broadband services**

Table of contents

Page no.

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

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:

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

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 North East circle for Basic (Wireline), Cellular Mobile services, and Broadband services

The present report highlights the findings for the Audit module for North East circle that was covered in the Quarter 4 (October – December 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 October 2008 – January 2009.

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 of 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

- BSNL is the only operator offering Basic (Wireline services) in NE circle
- For BSNL the sample of exchanges was selected was spread across 10% of SDCA's in the entire service. 12 exchanges (4 Urban and 8 Rural) exchanges were audited each in NE1*(Meghalaya, Tripura and Mizoram)* and NE2 *(Arunachal Pradesh, Manipur and Nagaland)*

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 NORTH EAST circle

- Bharti Airtel Ltd.
- BSNL
- Reliance Telecom (RTL)
- Aircel

3.3 Sampling for Broadband service providers

- BSNL and Sify are the two operators providing Broadband services in North East circle
- For BSNL, Audit was conducted at the central node in NE1 and NE2 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
- For Sify the audit was carried out at the central node in Chennai. Live calling and download speed test were carried out at the regional office in Assam circle
- For BSNL, the data pertaining to network related parameters was obtained by IMRB Auditors at the 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 April to June 2008 was carried out for all 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 centres 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 October 2008 to January 2009 in North East 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-NE I	BSNL-NE II
1	**Provision of telephone after registration of demand**			
1.1	Connections completed within 7 days	100%	55%	42%
2	**Fault incidence/clearance statistics**			
3	Fault incidences(No. of faults/100 subscribers/month)	<3		
3.1	Faults repaired within 24 hours	>90%	39%	83%
3.2	Faults repaired within three working days	100%	67%	100%
4	Mean time to Repair (MTTR)	<8 hours		
5	Call Completion Rate (CCR)	>55%	62%	61%
6	**Metering and billing credibility**			
6.1	Billing complaints per 100 bills issued	<0.1%	0.23%	0.03%
6.2	%age of billing complaints resolved within 4 weeks	100%	92%	100%
7	**Customer care/helpline promptness**			
7.1	Shift requests attended			
	Shift requests attended within 3 days	95%	70%	84%
7.2	Closure request attended			
	Closure within 24 hours	95%	37%	58%
7.3	Supplementary (additional) service requests attended			
	Additional facility provided within 24 hours	95%	100%	100%
8	**Response time to customer for assistance**			
8.1	% age call answered through IVR in 20 seconds	80%	100%	99%
	% age call answered through IVR in 40 seconds	100%	100%	99%
8.2	% age calls answered by operator in 60 seconds	80%	90%	DNA
	% age calls answered by operator in 90 seconds	95%	100%	DNA
9	**Time taken for refund of deposits after closure**			
9.1	%age cases where refund received within 60 days	100%	92%	97%

{*Note: For BSNL data pertains to the sample 5% of exchanges audited during the period of to September to November 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'mar**k = TRAI Benchmark, **DNA** = Details not available, **NA:** Not Applicable

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

North East circle for the purpose of reporting performance for Wireline services to TRAI is divided into two regions i.e. NE 1 constituting of Meghalaya, Tripura and Mizoram and NE 2 constituting of Arunachal Pradesh, Manipur and Nagaland . BSNL is the only operator providing Basic (Wireline) services in North East circle. The audit results reveal that the service provider could not meet benchmarks for most of the parameters specified by TRAI for the month in which audit was carried out.

The live calling results were found to be different from the 1 month audit data collection in certain places. To some extent the difference can be attributed to the smaller sample size undertaken for the live calling. For live measurements conducted to assess Call Completion Rate (CCR) it was found that the operator meets the benchmark in both the circles

The parameter wise key takeouts for the wireline service providers for the North East circle are as under:-

Provision of telephone after registration of demand

- The operator i.e. BSNL falls short of the TRAI specified benchmark in both NE1 and NE2 with scores for the month of audit being 55% and 42% respectively.
- One of the reasons for achieving low scores was observed to be the fact that the service provider provides connection at all the locations and SDCA's in the circle whereas private service providers normally provide connections in areas which are technically feasible for the operator, especially for retail customers.
- As far as live calling scores are concerned the service providers score in NE1 and NE2 is observed to be 50% and 52% respectively.

Fault incidence / clearance statistics

- Fault repair emerges out to be the key area of concern for BSNL with its score in NE1 and NE2 being 39% and 83% for faults repair within 24 hrs. However when it comes to fault repair within 3 working days BSNL meets the benchmark in NE2 but falls short of the same in NE 1 with a score of 67%
- The live calling scores (for fault repair within 24 hrs) were observed to be 29% and 56% in NE1 and NE2 respectively.
- One of the low reasons for low scores on fault repair is the fact that in remote areas of North East prompt action on faults becomes difficult due to accessibility issues.

Traffic statistics (CCR)

- The service provider meets the TRAI specified benchmark for CCR both during live measurements and month in which audit was carried out in NE 1 and NE 2 circle

Metering and billing credibility

- The operator falls short of the TRAI specified benchmark of %age billing complaints and resolution of billing complaints in NE1

Customer care/helpline promptness

- For "shift requests attended within 3 days" audit data, operator falls short of TRAI specified benchmark of 95% in both NE1 and NE2 with scores being 70% and 84% respectively
- For closure requests within 24 hours only BSNL again falls short with score in NE1 and NE2 being 37% and 58% respectively.
- For supplementary service requests, all the operators (except BSNL) were found to be meeting the TRAI specified benchmark for the month in which audit was carried out.

Response time to customer for assistance

- For customer care number through electronic IVR menu parameter the operator comfortably meets the benchmark for calls answered within 20 and 40 seconds for one month data in both NE 1 and NE2 circle
- The data for calls answered and received by the operator was not available at the exchanges in NE2 circle. Also the operator meets the benchmark in NE1 circle on the same.
- Live calling results carried out to check the efficiency of calls answered by the operator reveal that the operator falls short of the TRAI specified benchmark for calls answered by the operator in 60 seconds by 4%.

Time taken for refund of deposits after closure

- BSNL marginally falls short of the TRAI specified benchmark with a score of 92% and 97% in NE1 and NE2 respectively.

Level 1 service

To test the efficiency of level 1 services (Trunk booking, Child helpline, Women helpline, Airline booking, Fire, Police, Railways) offered by various service providers. More than 400 calls were made for service provider to different numbers and time taken to answer the call was noticed. 100% of calls made were answered in 60 seconds.

Summary of Live Measurement Results – Basic Wireline Services

Traffic statistics - Call Completion Rate	Benchmark	BSNL NE1	BSNL NE2
Call Completion Rate (CCR) in the local network	>55%	62%	61%

- For basic wireline services there was only one parameter (Call Completion Rate – Benchmark > 55%) for which live measurement was applicable.
- The service provider is comfortably meeting the TRAI specified benchmark with scores in NE1 and NE2 being 62% and 61% respectively.

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

Parameters	Benchmark	Bharti Airtel	Aircel	BSNL GSM	Reliance - GSM
Accumulated downtime for community isolation	< 24 hrs.	0.00	0.00	0.00	17.98
Call Set Up Success Rate (CSSR)	> 95%	95.12%	80.74%	98.01%	98.00%
Service Access Delay*	9 to 20 seconds (< = 15 seconds for 100 calls)	9.00	8.00	14.70	7.60
Blocked Call Rate					
SDCCH /Paging Channel Congestion	<1%	5.01%	8.38%	0.94%	0.88%
TCH Congestion	< 2%	4.88%	8.65%	1.30%	1.59%
Call drop rate	< 3%	3.00%	0.91%	2.38%	2.37%
Percentage connections with good voice quality*	> 95%	81%	93%	66%	93%
Service coverage*					
In door	>-75dbm	Complied	Complied	Complied	Complied
In vehicle	>-85dbm				
Out door - in city	>-95dbm				
POI congestion	< 0.5%	Complied	Complied	Complied	Complied
Calls answered electronically					
Percentage calls answered within 20 seconds	80%	100%	100%	93%	88.48%
Percentage calls answered within 40 seconds	95%	100%	100%	95%	Details Not Provided
Calls Answered by the operator					
Percentage calls answered within 60 seconds	80%	95%	Details Not Provided	82%	Details Not Provided
Percentage calls answered within 90 seconds	95%	95%	Details Not Provided	93%	Details Not Provided
Billing Complaints					
Billing complaints per 100 bills issued	<0.1%	0.11%	0.00%	0.07%	0.01%
Percentage billing complaints resolved within 4 weeks	100%	95%	Not Applicable	100%	100%
Period of refunds/payments due to customers from the date of resolution of complaints	<4 weeks	50%	100%	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 North East circle.

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 Airtel	2000 – 2100	2000 – 2100
Aircel (Dishnet)	1700 – 1800	1700 – 1800
BSNL	1900 – 2000	1900 – 2000
Reliance GSM - RTL	1900 – 2000	1900 – 2000

The TCBH reported by all the service providers matched the network busy hour calculated by IMRB auditors for the North East circle.

Accumulated Downtime:
In the North East circle, there were outages that led to a community being isolated at a particular point in time for Reliance GSM with an outage of close 18 hours observed. All other operators did not experience any downtime during the month of audit.

Call Set-up Success Rate (CSSR):
Aircel with a call set up success rate of 80.74% does not meet the TRAI benchmark of 95%. BSNL leads on this aspect with a CSSR of 98.01%. CSSR 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 North East 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 BSNL at 14.7 seconds followed by Bharti Airtel at 9.00 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 Airtel and Aircel 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 5.01% and a Traffic Channel congestion of 4.88% which was found during the one month data collected for the month of audit. Aircel does not meet the TRAI specified benchmark with a SDCCH congestion of 8.38% and a Traffic Channel congestion of 8.65% which was found during the one month data collected for the month of audit. 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.

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, except for Bharti all other service providers were found to be meeting the TRAI specified benchmark. The lowest call drop rate was of Aircel at 0.91%.

% connections with good voice quality:

All the operators are measuring these parameters via their periodic drive tests. 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 none of the operators met the TRAI benchmark. BSNL scores the lowest at 66% while Aircel and Reliance GSM score the highest with percentage connections with good voice quality at 93%.

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 GSM no data of customer care calls by circle is present in case of calls answered by IVR in 40 seconds and calls answered by operator both for 60 and 90 seconds. In case of calls answered by operators, all the service providers except BSNL (for percentage calls answered by operator within 90 seconds) meet the benchmark for the month of audit. Also, for Aircel no data of percentage calls answered by the operator was provided by the operator.

Billing performance

Airtel was found not to be meeting the benchmark of < 0.1% complaints registered per 100 bills issued. Also, it did not meet the benchmark both on percentage complaints resolved within 4 weeks and also the period of refunds. However, all other the operators met the benchmark of 100% billing complaints being resolved within 4 weeks. In all cases where customers were due for refund, all the service providers except Bharti meet the TRAI benchmark of 100% with 4 weeks. Aircel claimed in all bills issued by it in the month of audit, none of them was disputed.

Inter operator calls assessment

Inter operator call Assessment (To ↓ / From→)	Airtel	Aircel	BSNL - NE	RTL
Airtel	92%	98%	92%	94%
Aircel	95%	93%	90%	91%
BSNL - NE	90%	91%	93%	91%
RTL	91%	83%	89%	88%

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. Bharti and Aircel found connecting to a BSNL number the toughest with only 90 and 91 out of their 100 calls getting established. It was also observed that in only 89% of the cases a call from BSNL got connected to a Reliance GSM number. Calls from a Reliance GSM number got connected only 88% of times to a Reliance GSM number.

Results of Operator assisted Drive test

The drive test was conducted simultaneously for all the operators present in the North East circle. There was in total of three drive tests conducted in the circle. These tests were conducted in the cities of Dimapur, Shillong and Itanagar. 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 North East 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 North East circle were conducted in the cities of Dimapur, Shillong and Itanagar was conducted along the following route:

	Type of Location	Dimapur	Shillong	Itanagar
Outdoor	Periphery of the city	Burma Complex Road, NH-39, Khermahal, Circular Road, ADC Court Junction, Lotha Colony, Army supply road	Bishnupur, Madan Labon, Lumparing, Barek Point, Dhankheti, Fire Brigade, Nongthymmai, Pohkseh, Rynjah, MS Road, Laichand, Pynthormukh, Club, Golflink, Nehu Road, Mawlai, Garikhana, Mawprem, Jhalupara, GS Road	C Sector Chariali, Bank Tiniali, VIP Road, Mub-2, Nitimarg, Lower niti Bihar, E Sector, Doordarshan Sector, MLA Cottage road, ESS Sector, State circuit House
	Congested Area	Midland, GS Road, Kalibari Road, Army supply road, West yard colony, Gulaghat Road, MP Road, NL Road	Ramakrishna Mission Road, Beeat House, Bethery Hospital, Nongrim Hills, Pohkeseh Point, Dum Dum, Nongthymai main Road	Jully Road, SP office, E Sector, Abotany colony, Lower niti Bihar, TT Marg, VIP Road, Ganga Market
	Across the City	Bank colony, Kohima Road, Railway Gate Flyover, Station Road, Khermahal, Circular Road, Dhobinala, Midland, PWD Road, Duncan Basti, DC Court Junction, Fellowship colony, Natunbasti, LRC colony, Lake view colony, River belt colony	Police bazar, Anthony college, Shillong College, Laitumukhrah, Youthpoint, Taxi stand	RK Mission Road, H Sector, Vivek Bihar, Main Road Chandra Nagar, Gohpur Tiniali Dera Natung, Govt. College, F Sector, 131 Battelion Head Quarter, Mithun Gate, O point Tiniali, Rajya Mission
Indoor	Office Complex	DC Court	Lachumere area, Medical Health office	AP Secretariat
	Shopping Complex	Supermarket	Vishal Megamart	Ganga Market

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

Drive Test – Dimapur

	Airtel		Aircel		BSNL NE		RTL GSM	
	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	80.63%	23.41%	92.72%	85.38%	83.75%	57.23%	99.00%	95.57%
CSSR	98.68%	96.30%	91.11%	87.12%	90.00%	57.23%	97.62%	97.40%
Blocked Call Rate	1.32%	3.70%	8.89%	12.88%	10.00%	42.77%	2.38%	2.60%
Call drop rate	0.00%	0.00%	0.00%	2.82%	1.16%	53.54%	0.00%	2.00%
Hands off success rate	Complied		Complied		Complied		Complied	

Drive Test – Shillong

	Airtel		Aircel		RTL GSM	
	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	87.71%	83.01%	96.30%	88.39%	98.36%	91.32%
CSSR	93.18%	97.95%	89.22%	92.78%	98.08%	100.00%
Blocked Call Rate	6.82%	2.05%	10.78%	7.22%	1.92%	0.00%
Call drop rate	0.00%	0.00%	1.10%	2.40%	0.00%	2.38%
Hands off success rate	Complied		Complied		Complied	

Drive Test – Itanagar

	Airtel		Aircel		RTL GSM	
	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	79.40%	82.52%	99.25%	92.29%	98.47%	91.28%
CSSR	98.90%	96.99%	98.78%	97.12%	97.20%	94.78%
Blocked Call Rate	1.10%	3.01%	1.22%	2.88%	2.80%	5.22%
Call drop rate	0.00%	0.78%	0.72%	1.23%	0.00%	3.15%
Hands off success rate	Complied		Complied		Complied	

Not meeting the benchmark

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

ALL SERVICE PROVIDERS

Dimapur: There was interference and low signal strength recorded for all operators in the outdoor areas of Signal angami area, Natun basti, station road, circular road, Dhobinala, DC Court, Supermarket while in the indoor areas inadequate coverage was not found in any of the areas.
Shillong: There was interference and low signal strength recorded for all the operators in the outdoor areas of MS Road, rynjah, MS Road, Police Bazar, garikhana, mawpremwhile in the indoor areas there was no inadequate coverage or interference recorded.
Itanagar: There was interference and low signal strength recorded for all operators in the outdoor areas of Ganga Market, near state circuit house, lower niti bihar while in the indoor areas there was no inadequate coverage or interference recorded.

Conclusions:

1. BSNL did not participate in the drive test at Shillong and Itanagar. It does not meet the benchmark on any of the parameters (except call drop rate for indoor areas) in Dimapur
2. Airtel does not meet the percentage connections with good voice quality benchmark for both indoor and outdoor areas in all the three cities. It also does not meet the CSSR benchmark in the indoor areas of Shillong. Also, apart from Dimapur and Itanagar (indoor areas), Airtel does not meet the benchmark on blocked call rate
3. Aircel does not meet the percentage connections with good voice quality benchmark for outdoor areas in all the three cities while for indoor areas it does not meet the benchmark in Dimapur. It also does not meet the CSSR benchmark in the both Dimapur and Shillong. It also does not meet the benchmark on blocked call rate in both these cities and in the outdoor areas of Itanagar
4. Reliance GSM does not meet any of the TRAI benchmark in the outdoor areas of Itanagar. Also, it experiences high blocked call rate in Dimapur and Itanagar.

Summary of Live Measurement Results – Cellular Mobile Services

Parameter	Benchmark	AIRTEL	Aircel	BSNL	RTL GSM
CSSR	> 95%	95.67%	67.16%	93.51%	98%
SDCCH / Paging Channel Congestion	< 1%	6.29%	19.74%	1.77%	1.06%
TCH Congestion	< 2%	4.33%	11.77%	2.16%	2.65%
Call drop rate	< 3%	3.20%	4.37%	2.80%	1%
POI congestion	< 0.5%	Complied	Complied	Complied	Complied

* DNP: Details Not Provided

Not meeting the benchmark

During the three day live measurement all the operators were found not be meeting the TRAI benchmark on SDCCH and TCH Congestion. Aircel and BSNL do not meet the benchmark on CSSR while Airtel and Aircel do not meet the benchmark on call drop rate. RTL figures are basis sample calls done. The operator claims that it does not have the facility to generate three day data.

Summary of TCH drop during Audit period

Parameter	Airtel	Aircel	BSNL	RTL
Total number of cells	2015	1523	442	DNP
No. of cells exceeding 3% TCH drop	507	529	140	DNP
% of cells exceeding 3% TCH Drop	25%	35%	32%	DNP

35% of Aircel and 32% BSNL cells exceed 3% TCH drop. The same is as high as 25% for Airtel while the details of Reliance GSM were not provided by the operator.

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

S.No	Parameters	B'mark	BSNL (NE-I)	BSNL (NE-II)	Sify
1	**Service provisioning uptime**				
1.1	Total connections registered		300	434	66
1.2	Percentage connections provided within 15 days	100%	100%	100%	100%
2	**Fault repair restoration time**				
2.1	Total number of faults registered/calls made		778	160	5
2.2	Percentage faults repaired by next working days	> 90%	96%	93%	100%
2.3	Percentage faults repaired within three working days	99%	100%	100%	100%
3	**Billing performance**				
3.1	Total bills generated		6929	4356	Prepaid
3.2	Billing complaints per 100 bills issued	<2%	0.35%	No such cases	
3.3	%age of billing complaints resolved within 4 weeks	100%	100%		
3.4	Time taken for refund of deposits after closure	100%	100%		
4	**Customer care/helpline assessment**				
4.1	Percentage calls answered within 60 seconds	> 60%	86%	90%	100%
4.2	Percentage calls answered within 90 seconds	>80%	100%	95%	100%
5	**Bandwidth utilization/Throughput**				
5.1	Total number of intra network links tested		23 BRAS, TI 24, T2624,DSLAM 5960		412
5.2	Total number if intra network links crossing 90%		0		0
	Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)				
5.3	Total number of upstream links		141		27
5.4	Number of links > 90%		8		0
5.5	Percentage bandwidth utilised on upstream links	<80%	70%		79%
6	**Broadband download speed**	>80%	Complied		Complied
7	**Service availability/uptime**	>98%	100.00%		100.00%
8	**Packet loss**	<1%	0%		0%
9	**Network Latency**				
9.1	POP/ISP Node to NIXI to IGSP	<120msec	<120		<30
9.2	ISP node to NAP port	<350msec	Complied		<300

** 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

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 in North East circle. BSNL and Sify are the only two Broadband operators present in the circle. Both of them being category "A" service providers provide report at an all India level to TRAI especially for Network related parameters. In fact the findings reported herewith for some of the parameters for these operators are on an all India basis.

The key conclusions (Parameter wise) emerging out from the Audit exercise of Broadband service providers are highlighted below

Service provisioning/Activation time

- Both Sify and BSNL meet the TRAI benchmark of 100% connections to be provided within 15 days. However it should be noted that number of new connections registered in the month of audit for both the operators is relatively low as compared to other circles
- Also Broadband penetration is limited only to few big cities in the circle and is taken care by some of the bigger exchanges in case of BSNL
- Live calling scores for Sify , BSNL NE1 and BSNL NE 2 are observed to be 100%, 40% and 20% respectively

Fault Repair/Restoration time

- Both the operators meet the TRAI specified benchmark for fault repair within 24 hrs and 3 days for the month of Audit
- It should be noted that for Sify only those complaints are recorded which are reported through the call centre. Reports booked at the cable operators end is not taken into consideration while reporting the same to TRAI
- TRAI can consider including Mean Time to Repair (MTTR) for faults as one of the parameters for measuring Quality of Services (QoS) in future for Broadband services as well.
- Live calling scores (for fault repair in 24 hrs) are observed to be poor for BSNL in NE1 at 10% whereas the score in NE2 is 83%.

Billing performance

- Sify claims that all its retail broadband customers are prepaid and hence there are no billing complaints for Sify.
- BSNL comfortably meets the benchmark for %age billing complaints and resolution of billing complaints in NE1 circle. Also, no cases of billing complaints were observed in NE 2

Customer Care/Helpline Assessment

- Both the operators meet the benchmark for calls answered by the operator in 60 and 90 seconds both for the month in which audit was carried out and for live calling carried out by IMRB auditors
- Live calling could not be carried out for Sify in NE as call centre number was not functioning during the period in which audit was conducted by IMRB

Bandwidth Utilisation:

- Both the service providers were found to be using Multiple Router Traffic Grapher (MRTG) to measure the bandwidth utilisation at intra network links.
- For Intra network link, data for was obtained on all India basis. None of the links tested for these operators was found to be having above 90% bandwidth utilization for the month in which audit was carried out
- Also It was observed that all the links (tested during three day live measurement) in the access segment for both the service providers were found be below 80%.
- For Bandwidth utilisation on upstream links (From ISP Node to IGSP/NIXI), both the operators meet the TRAI specified benchmark.

Download speed

- Also, during live measurements carried out at Pop's/ISP Node it was observed that all the operators are 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 April to June 2008 with the service providers. Most of them claimed that they are reporting to TRAI basis live tests conducted at customer premises during field visits and tests conducted at POPs/ISP Node.

Service Availability/Uptime:

- Both the service providers are meeting the benchmark on service availability/uptime for the month in which audit was carried out.
- There was no occasion observed when Broadband access network was in state of failure for both the operators for the month in which audit was carried out.

Packet Loss and Network Latency

- Due to non availability of the records of old ping tests, verification process could not conducted for Sify
- However, ping tests conducted/smoked ping results during live measurements revealed that both the service providers are meeting the benchmark prescribed by TRAI.

Summary of Live Measurement Results – Broadband Services

Parameters	Benchmark	BSNL	Sify
Service Availability Uptime	**>98%**	100.00%	100.00%
No of **Intra network links** found to be above 90% (Out of sample links tested)		0	0
Total Bandwidth utilization at all upstream links	**< 80%**	83%	68%
Data Download Speed	**> 80%**	Complied	Complied
Packet Loss (Percentage)	**< 1%**	<1%	<1%
From user reference point at POP/ISP Node to IGSP NIXI (msec)	**<120msec**	Complied	Complied
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	**<350msec**	Complied	Complied

** Methodology not in line with QoS

Figures provided on All India basis

Not meeting the benchmark

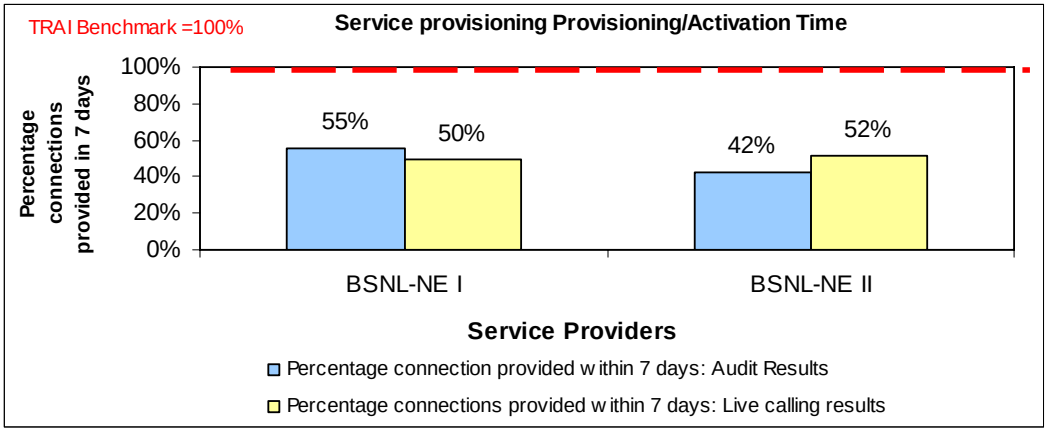
B'mark = TRAI Benchmark, **DNA** = Details not available, **NA:** Not Applicable

- Both Sify and BSNL are meeting the benchmark on service availability/uptime for three day live measurements. As explained earlier, it was observed that type of sites being taken into consideration for calculating network uptime varies from operator to operator.
- The testing for Bandwidth utilization during live measurement was carried out on sample basis by IMRB auditors for intra network links. There were no intra network links that were found to have a utilization of more than 90% for both the operators
- For Bandwidth utilization on upstream links, both the service providers are meeting the benchmark during the three day live measurement and have excess capacities available on their upstream links.
- However, it should be noted that for BSNL out of the total 141 gateway links present at different places in India 19 were found to be > 90 %.
- For network latency and packet loss both the service providers comfortably meet the TRAI specified benchmark for ping tests carried out during live measurements.

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

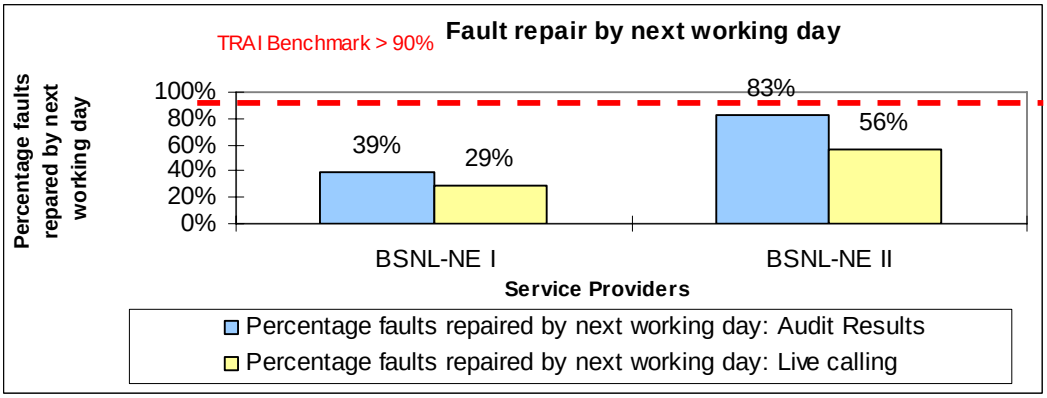
6.1 Graphical/Tabular Representations for Basic (Wireline) services

Service provisioning / Activation time (Comparison between one month audit results and live calling results)

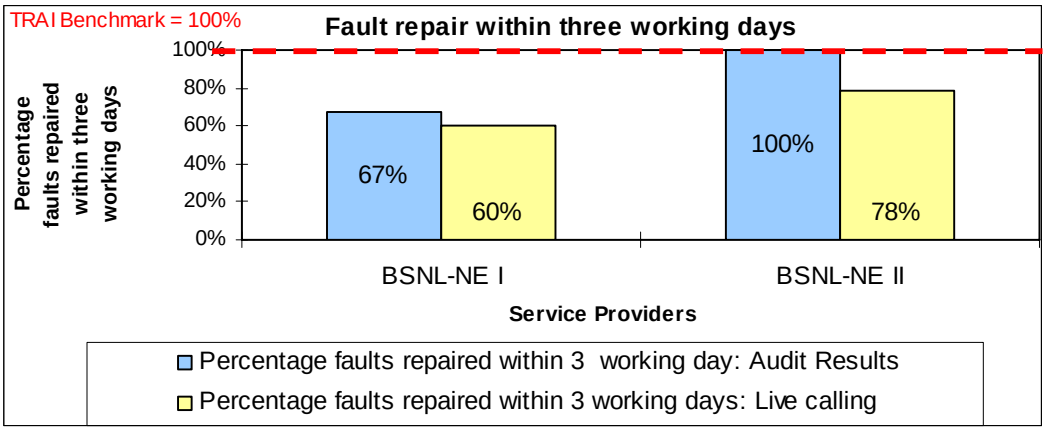


The operator falls short of TRAI specified benchmark in both NE1 and NE2 for the month in which audit was carried out

Fault repair/Restoration time (Comparison between one month audit results and live calling results)

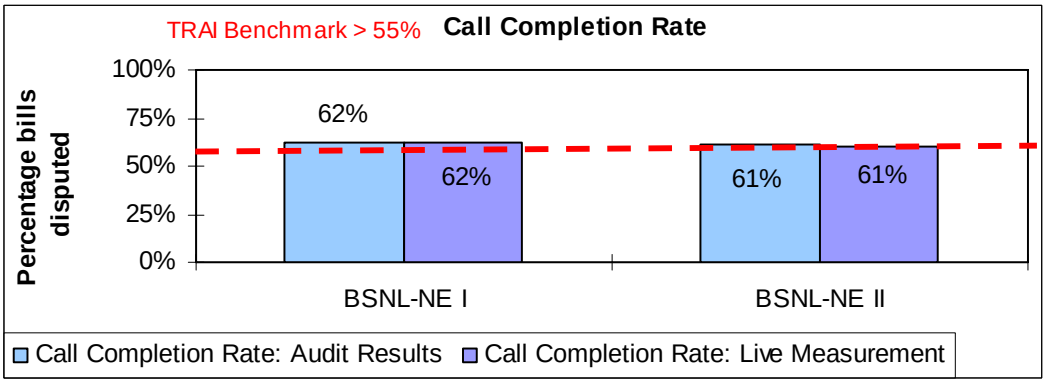


For fault repair by next working day scores in NE 1 are observed to poor when compared to scores observed in NE2 both for live calling and the month in which audit was carried out



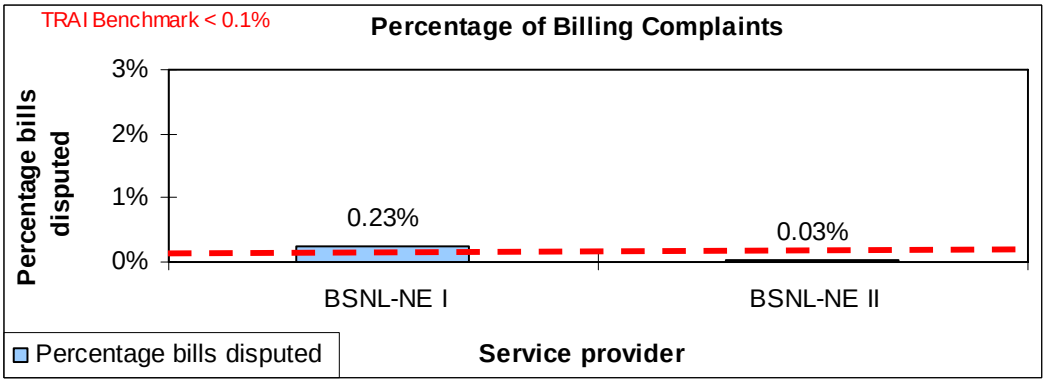
The operator fails to meet the benchmark again in NE1 circle for faults repaired within 3 working days.

Call completion rate (Comparison between one month audit results and three day live measurement)



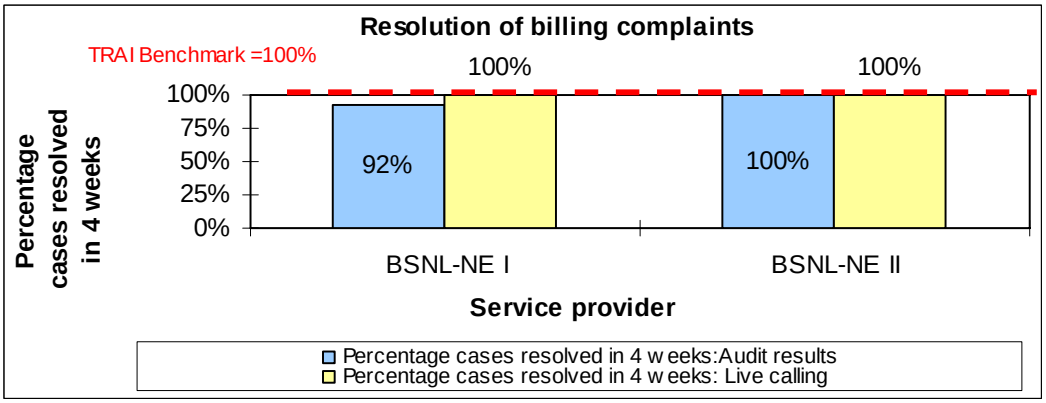
The operator meets the benchmark for CCR both during one month audit and live measurements carried out by IMRB

Percentage bills disputed



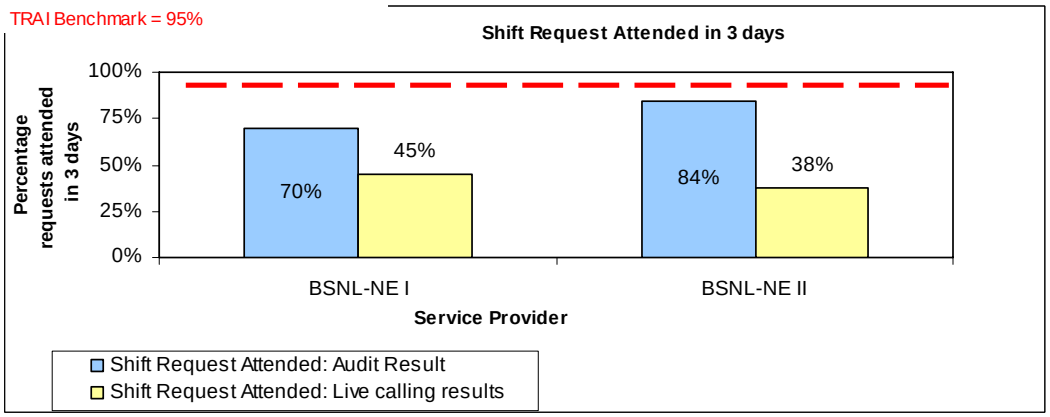
The operator falls short of TRAI specified benchmark in NE1 circle

Resolution of billing complaints (Comparison between one month audit results and live calling results)



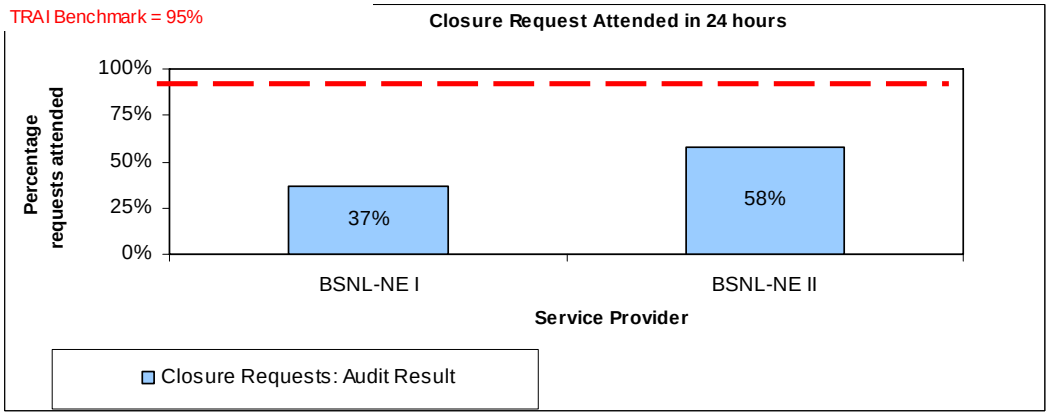
The operator falls short of TRAI specified benchmark in NE1 circle. Live calling samples remained low both in NE1 and NE2 owing to low sample of billing complaints

Shift requests attended (Comparison between one month audit results and live calling results)



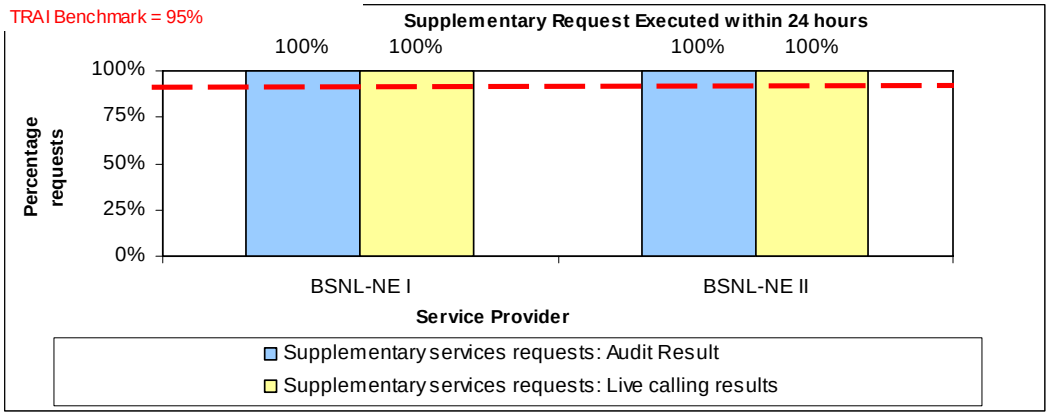
For shift requests attended within 3 days the operator fall short of TRAI specified benchmark in both NE1 and NE2

Closure requests attended within 24 hours



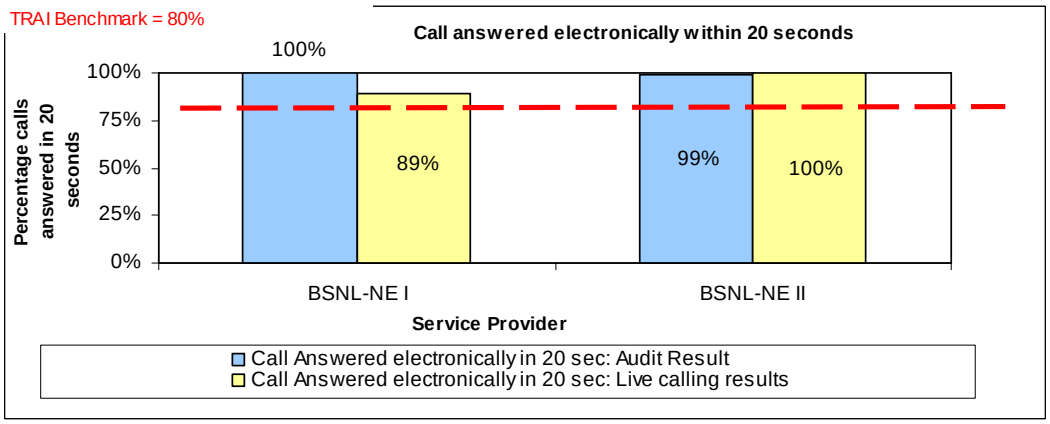
Operator falls short of the TRAI specified benchmark both in NE1 and NE2

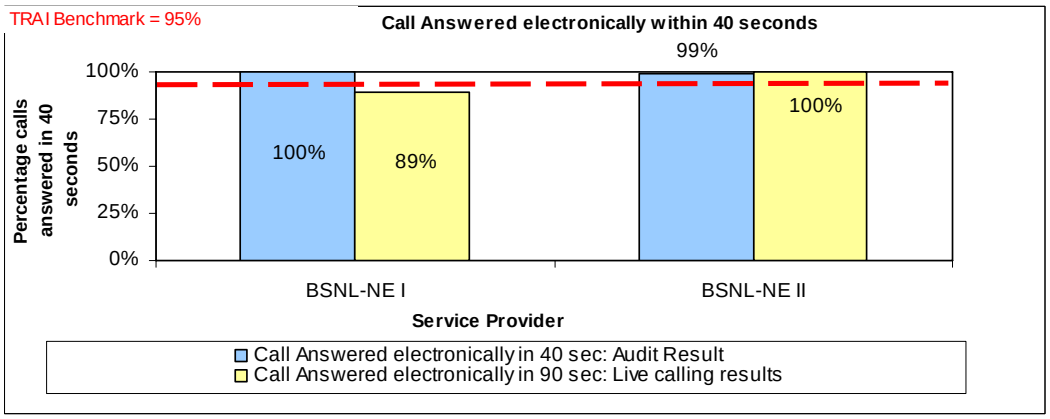
Supplementary requests (Additional services) attended within 24 hours (Comparison between one month audit results and live calling results)



Operator comfortably meets the benchmark in both NE1 and NE2

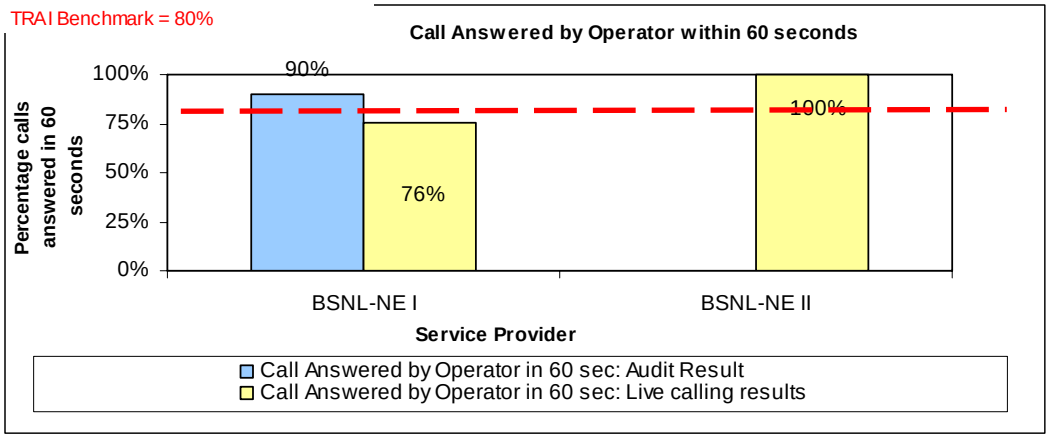
Response time to customer for assistance - Calls answered electronically within 20 and 40 seconds (Comparison between one month audit live calling results)





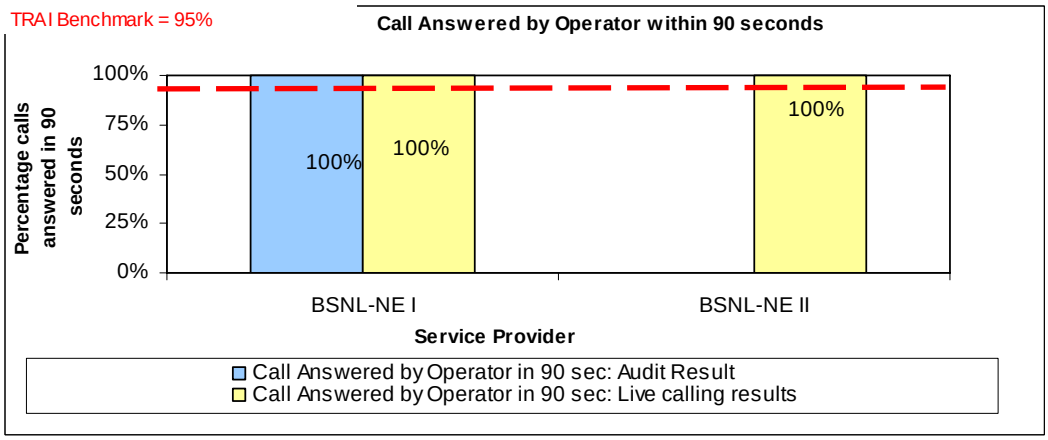
BSNL falls short of TRAI specified benchmark for live calling scores for calls answered electronically by the operator in 40 seconds in NE1 circle

Response time to customer for assistance - Calls answered by the operator within 60 seconds (Comparison between one month audit results and live calling results)



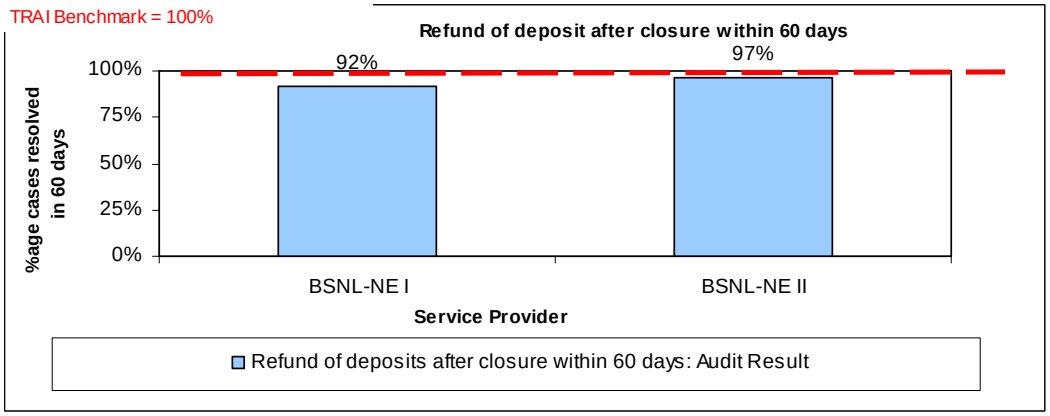
Operator falls short of TRAI specified benchmark in NE1 for live calling carried out by IMRB. Data for calls answered by the operator was not available in exchanges audited in NE2 circle hence one month audit data could not be verified

Response time to customer for assistance - Calls answered by the operator within 90 seconds (Comparison between one month audit results and live calling results)



BSNL meets the benchmark in both NE I and NE II circles.

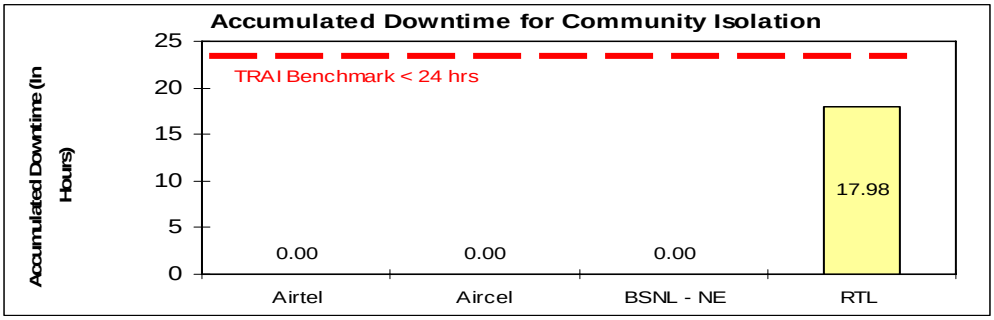
Time taken to refund of deposits after closure



Operator falls short of the benchmark in both NE1 and NE2

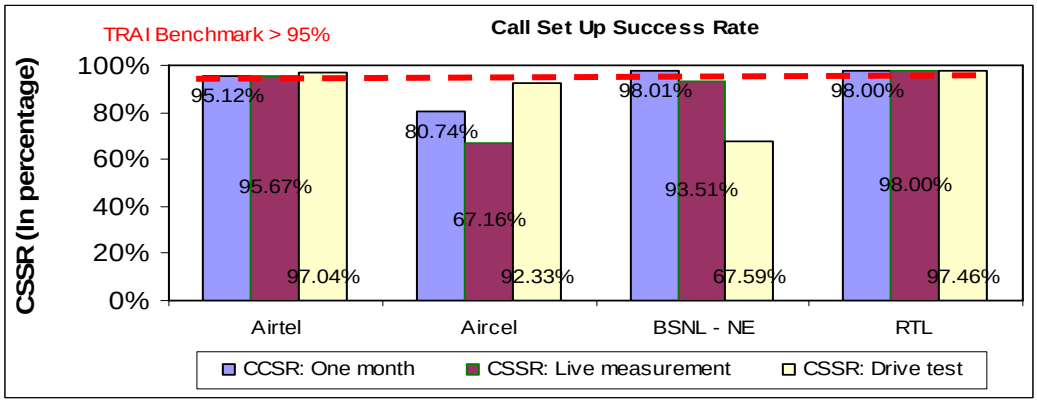
6.2 Graphical/Tabular Representations for Cellular Mobile Services

Accumulated Downtime



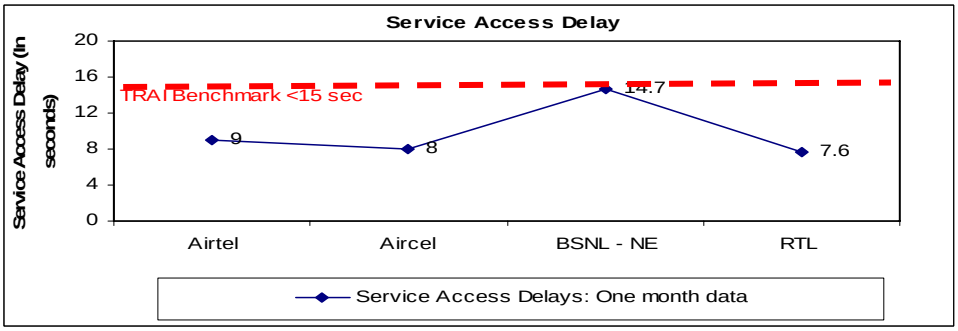
In the North East circle, there were outages that led to a community being isolated at a particular point in time for Reliance GSM with an outage of close 18 hours observed. All other operators did not experience any downtime during the month of audit.

Call Set-up Success Rate (CSSR)



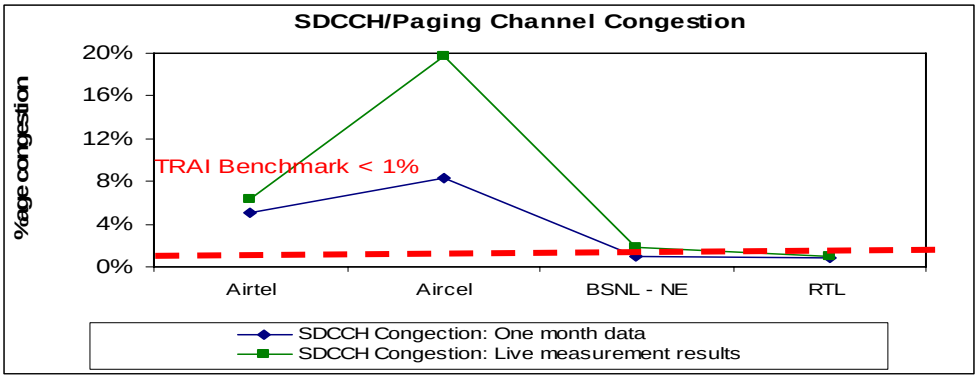
Aircel does not meet the voice quality benchmark for one month data collection and verification, 3 day live measurement as well as drive test. BSNL does not meet the benchmark on live measurement and drive test. Airtel meets the TRAI benchmark on all the three measurement criteria.

Service Access Delay



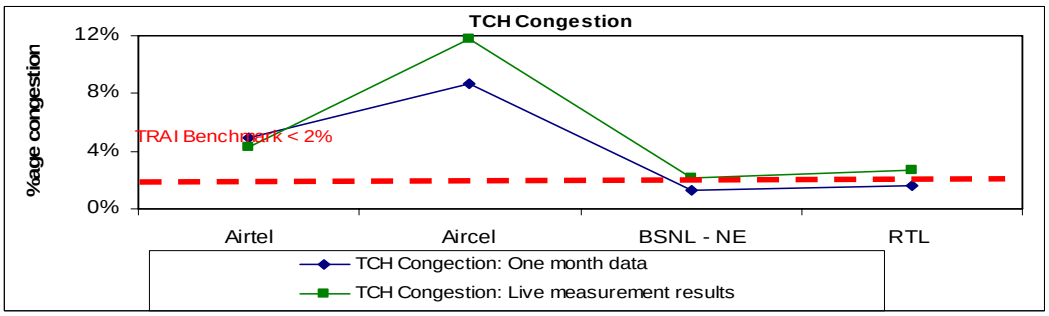
All the operators are meeting the benchmark on this parameter. The auditors measured this parameter using a standard drive test tool kit. The highest service access delay was measured for BSNL at 14.7 seconds and the lowest was for Reliance GSM at 7.6 seconds.

SDCCH / Paging Channel Congestion



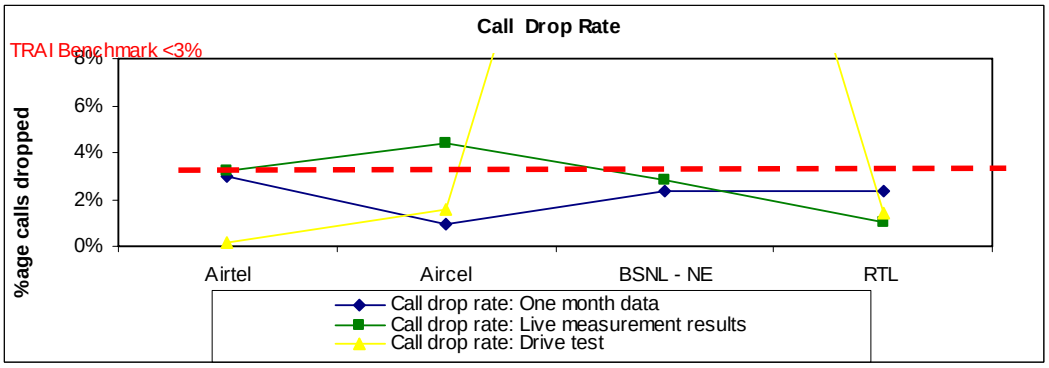
All the operators do not meet the benchmark on SDCCH congestion for three day live measurement. Bharti Airtel and Aircel also do not meet the benchmark on one month data collection and verification.

TCH Congestion



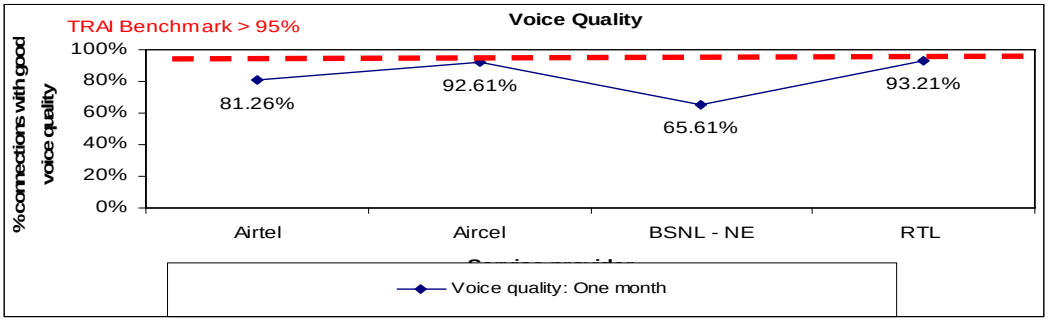
Airtel and Aircel for both one month data collection and verification and BSNL and RTL for three day live measurement do not meet the benchmark on this parameter.

Call Drop Rate



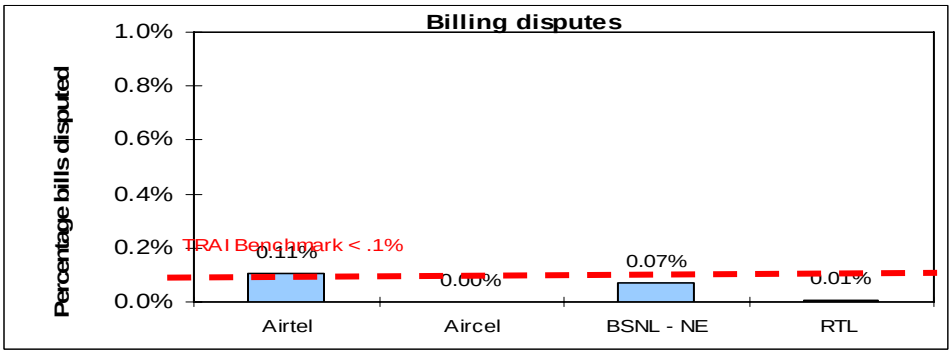
Airtel does not meet the TRAI benchmark on call drop rate both for one month data collection and verification as well as for three day live measurement. Aircel for 3 day live measurement and BSNL for drive test do not meet the benchmark.

Voice quality

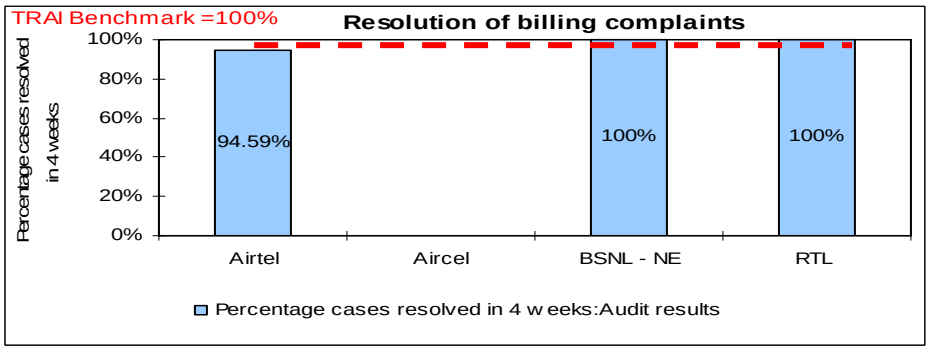


None of the operators meet the TRAI benchmark on percentage connections with good voice quality as found out during the drive test. The lowest percentage of connections with good voice quality was observed across BSNL at a level of 65.61% and the highest score is observed for RTL at 93.21%.

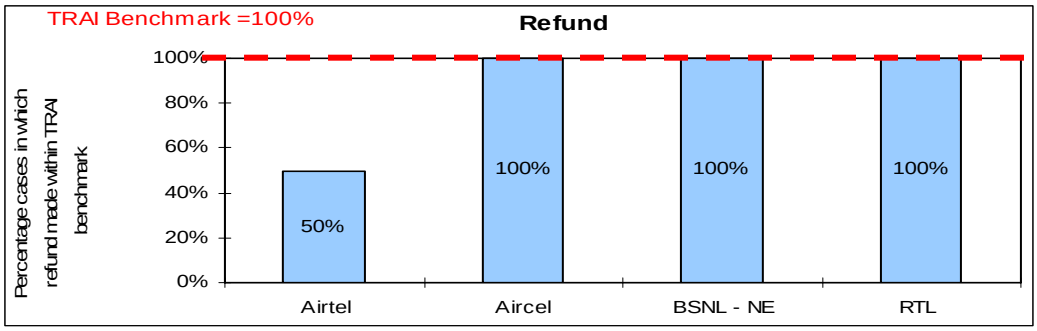
Billing Disputes



Airtel does not meet the TRAI benchmark on percentage billing disputes per 100 bills with a billing complaint percentage of 0.11%. Aircel with 0 billing complaints received is the best performing operator in the North East circle.



All the operators except Airtel with 95% billing complaints resolved within 4 weeks 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. Aircel did not receive any billing complaint in the month of audit.



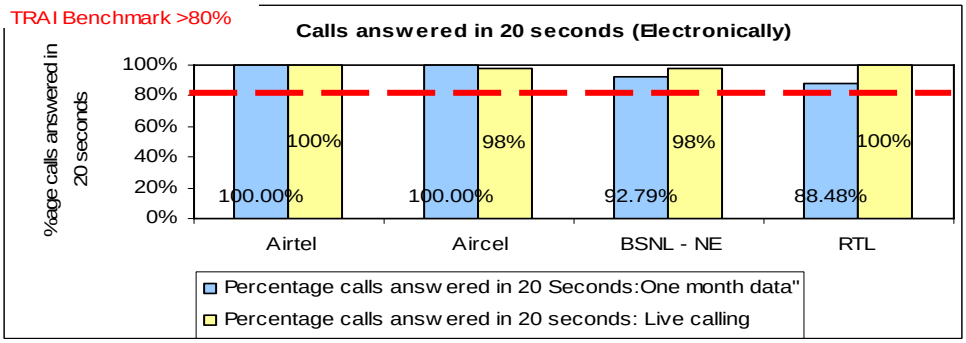
All the operators except Airtel with a score of 50% were found to be giving refunds to their subscribers within the stipulated time period set by TRAI.

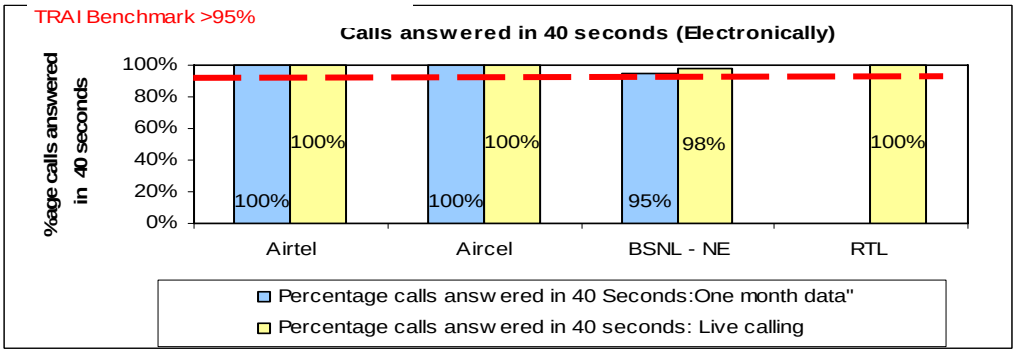
Live calling for billing Complaints

Resolution of billing complaints	Airtel	Aircel	BSNL - NE	RTL
Total Number of calls made	40	Not Applicable	DNP	3
Number of cases resolved in 4 weeks	40	Not Applicable	DNP	3
Percentage cases resolved in four weeks	100%	Not Applicable	DNP	100.0%

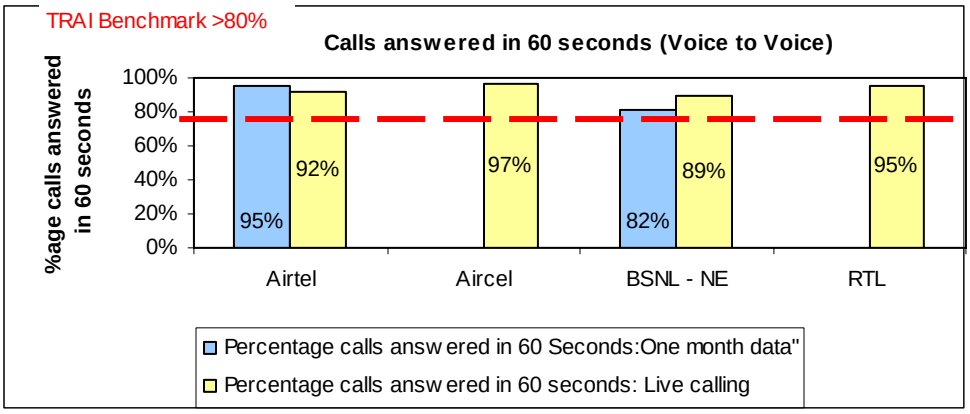
Airtel and Reliance GSM were able to meet the benchmark on percentage billing complaints resolved with 4 weeks. The same was not applicable for Aircel as the operator claimed that it received no billing complaints in the month of audit. For BSNL, the details were not provided by the operator.

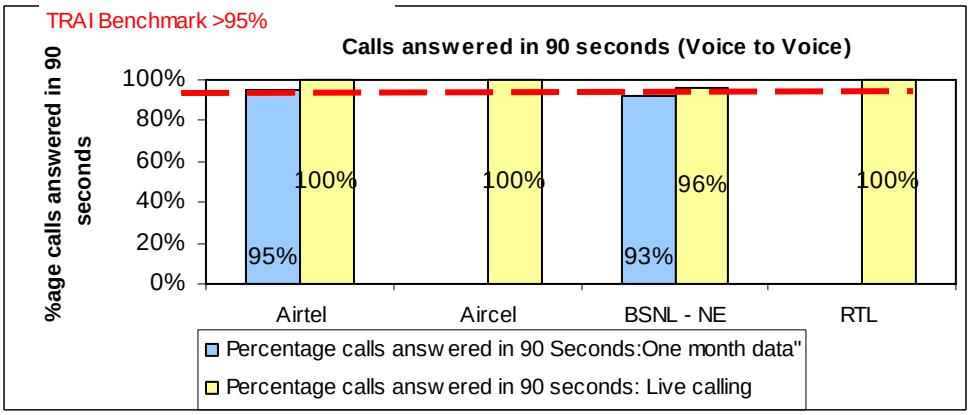
Customer Care / Helpline:





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. The IVR details were not provided by reliance GSM for calls answered within 40 seconds.





Except BSNL for percentage calls answered by the operator within 90 seconds for one moth data collection and verification, all other operators meet the TRAI benchmark for both the one month audit period as well as the live calling for voice to voice calls. The monthly details of voice to voice calls answered were not provided by Aircel and Reliance GSM.

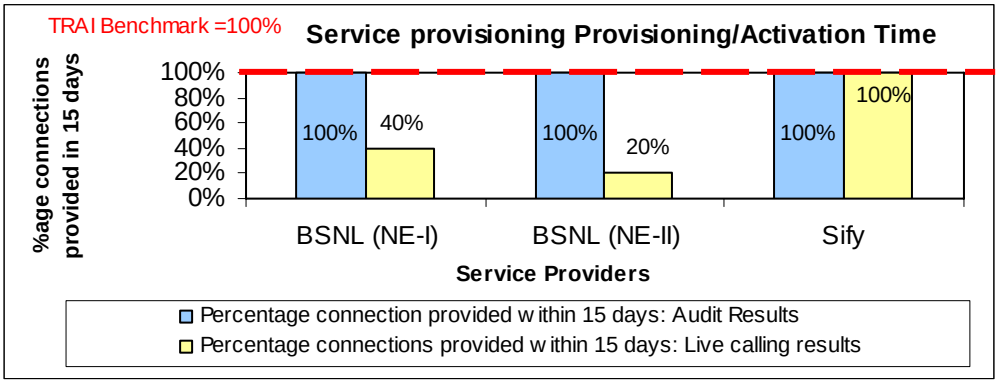
Inter operator calls assessment

Inter operator call Assessment (To ↓ / From→)	Airtel	Aircel	BSNL - NE	Reliance GSM (RTL)
Airtel	92%	98%	92%	94%
Aircel	95%	93%	90%	91%
BSNL - NE	90%	91%	93%	91%
Reliance GSM (RTL)	91%	83%	89%	88%

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. Bharti and Aircel found connecting to a BSNL number the toughest with only 90 and 91 out of their 100 calls getting established. It was also observed that in only 89% of the cases a call from BSNL got connected to a Reliance GSM number. Calls from a Reliance GSM number got connected only 88% of times to a Reliance GSM number.

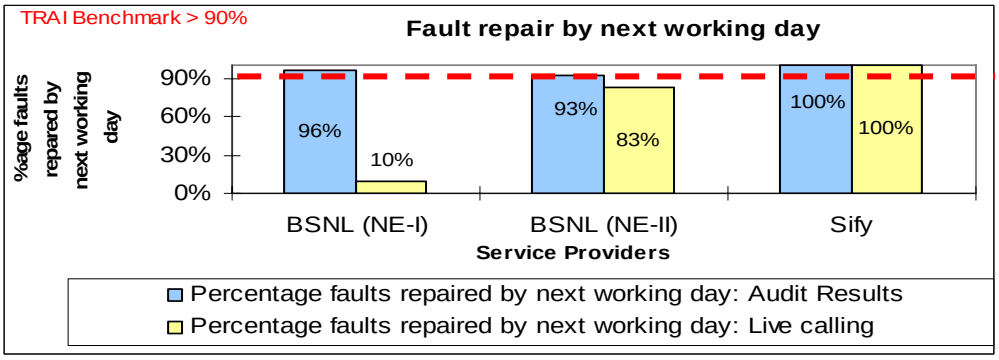
6.3 Graphical/Tabular Representations for Broadband services

Service provisioning/Activation time (Comparison between one month audit results and live calling results)



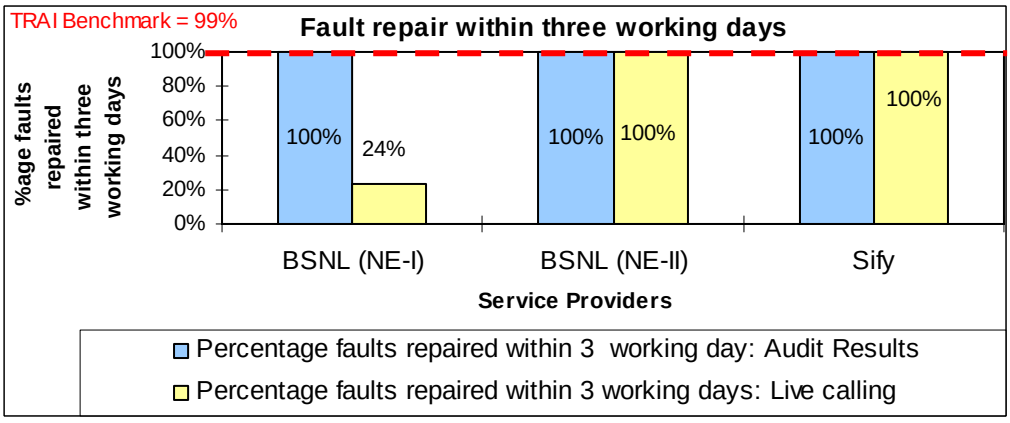
Live calling scores are observed to be poor for BSNL in NE1 and NE2 circles at 40% and 20% respectively

Fault repair/Restoration time (By next working day)- Comparison between one month audit results and live calling results



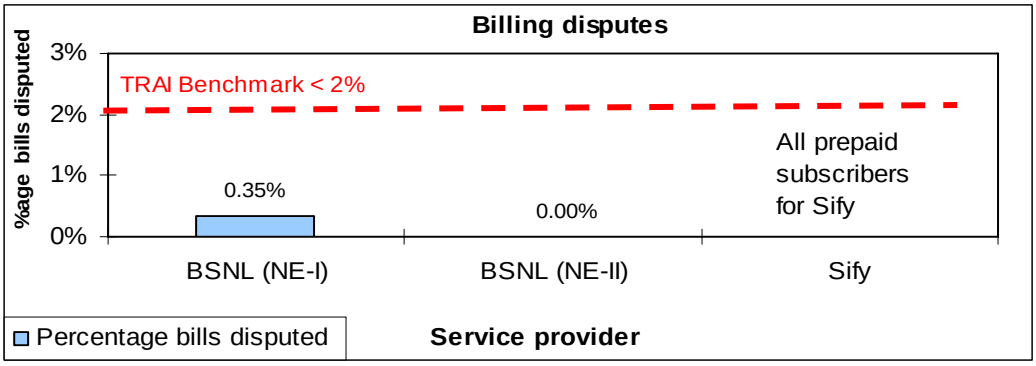
Live calling score for BSNL in NE2 is observed to be poor at 10%. For Sify live calling sample was only 2 owing to low sample of billing complaints in the circle

Fault repair/Restoration time within three working days (Comparison between one month audit results and live calling results



Live calling score for BSNL in NE2 is observed to be poor at 24%

Percentage bills disputed

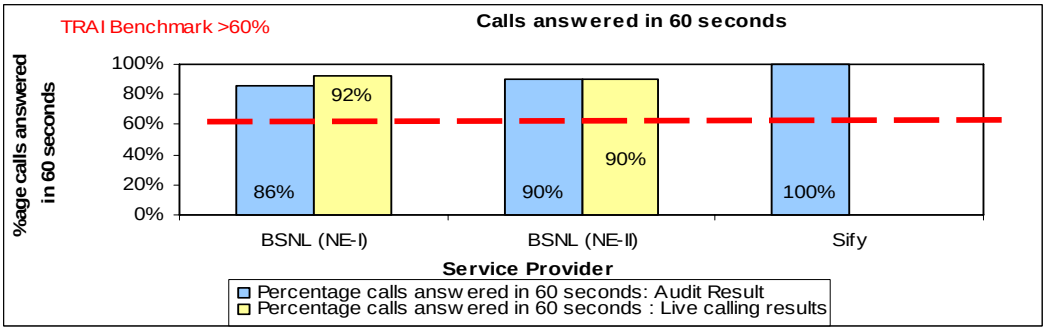


BSNL meets the benchmark on percentage bills disputed

Resolution of billing complaints (Comparison between one month audit results and live calling results)

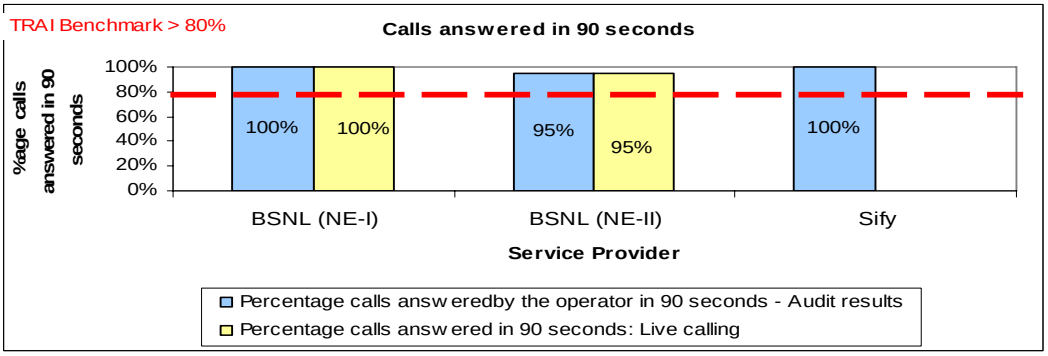
- Sify claims that all its retail broadband customers are prepaid in North East.
- BSNL meets the benchmark for resolution of billing complaints in NE1 circle, whereas there are no complaints observed for the operator in NE2 circle

Response time to customer for assistance - Calls answered by the operator within 60 seconds (Comparison between one month audit results and live calling results)



All operators meet the benchmark for live calling and one month audit. Live calling could not be carried out for Sify owing to non functionality of call centre number during the period of audit

Response time to customer for assistance - Calls answered by the operator within 90 seconds (Comparison between one month audit results and live calling results)



All operators meet the benchmark for live calling and one month audit.

Bandwidth utilization at Intra network links (Comparison between one month audit results and live measurement results)

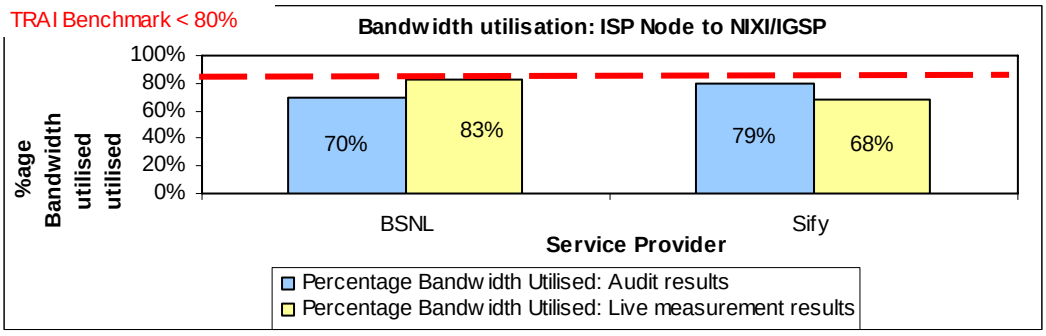
Bandwidth Utilization	B'mark	BSNL	Sify
One month Audit Results			
Total number of intra network links		23 BRAS, TI 24, T2624,DSLAM 5960	412
No of Intra network found to be above 90%	**<80%**	0	0
Live measurement Results			
No of Intra network Links tested		23 BRAS	412
No of Intra network found to be above 90%	**<80%**	0	0

**Reported on All India Basis ,^BRAS: Broadband Remote Access Server*

As far as bandwidth utilization on the intra network links is concerned all the operators seem to performing well as all the sample intra network links (Access segment) tested during live measurement were found to be below 90%.

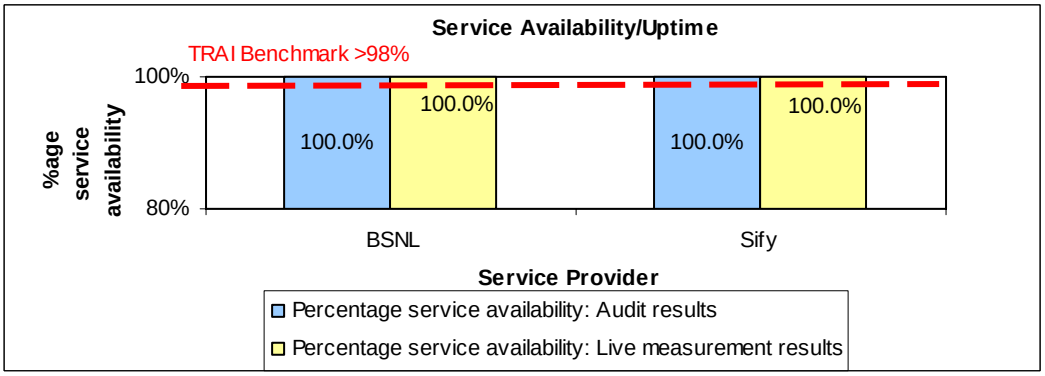
For Sify bandwidth utilisation at the end customer level (from POP to cable operator) remains unreported which may be a concern as some cable operators may be distributing more connections then their equipped capacity.

Bandwidth utilization at Upstream links (Comparison between one month audit results and live measurement results)



BSNL, Sify) meet the TRAI specified benchmark cumulatively for all gateways in India.

Service availability/Uptime (Comparison between one month audit results and live measurement results)



Both the service providers meet the benchmark with uptime of more than 98% for the month of Audit.

Compliance reports: Results of Verification of Records for April to June 2008

7.1 Basic (Wireline) services

S. No	Parameters	B'mark	BSNL NE 1		BSNL NE 2	
			PMR	IMRB	PMR	IMRB*
1	**Provision of telephone after registration of demand**					
1.1	Percentage connections completed within 7 days	100%	80.70	80%	100%	48%
2	**Fault incidence/clearance statistics**					
2.1	Fault incidence	<5	4.4	23	4.9	34
2.2	Faults repaired within 24 hours	>90%	90.30%	30%	91.47	82%
2.3	Mean time to repair	<8 hrs	16.6	4.8	10.6	4.6
3	Call Completion Rate (CCR)	>55%	56.86	60%	69.48	58%
4	**Metering and billing credibility**					
4.1	Billing complaints per 100 bills issued	<0.1%	0.04%	0.00%	0.01%	5.30%
4.2	%age of billing complaints resolved within 4 weeks	100%	93.68%	65%	100%	100%
5	**Customer care/helpline promptness**					
5.1	Shift requests (Total number received)		214	149	56	67
	Percentage shift requests attended within 3 days	95%	87.38	68%	100%	81%
5.2	Closure request attended (Total number received)		1563	727	1180	171
	Closure within 24 hours	95%	96.35%	35%	100%	69%
5.3	Supplementary (additional) service requests attended (Total number received)		229	286	512	124
	Additional facility provided within 24 hours	95%	96.94%	100%	100%	100%
6	**Response time to customer**					
6.1	% age call answered through IVR in 20 seconds	80%	100%	100%	84.79%	100%
	% age call answered through IVR in 40 seconds	100%	100%	100%	91.61%	100%
6.2	% age calls answered by operator in 60 seconds	80%	98.33%	88%	98.00%	DNA
	% age calls answered by operator in 90 seconds	95%	99.33%	88%	100%	DNA
7	%age cases where refund received within 60 days	100%	100%	69%	100%	100%

* These have been calculated cumulatively on the basis of figures reported by various exchanges

Figures do not match with those reported in PMR

Figures verified on all India basis

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

7.2 Cellular Mobile services

Parameter	SERVICE PROVIDER							
	Airtel		Aircel		BSNL		Reliance GSM	
	PMR	IMRB	PMR	IMRB	PMR	IMRB	PMR	IMRB
Network Performance								
Accumulated Downtime	9.46	9.46	0	0	0	0	15.19	16.87
Call set up success rate	94.18%	97.50%	98.71%	98.71%	98.00%	98.00%	Raw Data NA	
Service Access delay	9.00	9.00	8.00	8.00	14.67	14.67	7.58	7.58
Blocked call rate								
SDCCH Congestion	1.98%	2.00%	0.85%	0.85%	0.92%	0.92%	0.95%	0.80%
TCH Congestion	2.50%	2.50%	0.72%	0.72%	1.26%	1.26%	2.23%	1.84%
Call drop rate	1.98%	3.13%	0.67%	0.66%	2.26%	2.26%	Raw Data NA	
%age connections with good voice quality	95.00%	95.00%	93.15%	93.15%	96.33%	96.33%	96.32%	96.32%
Service coverage	Complied		Complied		Complied		Complied	
POI congestion	Complied		Complied		Complied		Complied	
Customer Care								
Calls answered electronically								
Within 20 seconds	100%	100%	100%	100%	93.00%	94.06%	Raw Data NA	
Within 40 seconds	100%	100%	100%	100%	96.00%	97.93%		
Calls answered by the operator								
Within 60 seconds	71.30%	66.94%	Raw Data NA		90.67%	94.06%	Data Not Provided in the PMR	
Within 90 seconds	76.80%	70.72%			94.33%	97.93%		
Billing complaints								
Billing complaints/100 bills	0.10%	0.10%	0.00%	0.00%	0.05%	0.05%	0.00%	0.00%
%age complaints resolved within 4 weeks	100%	53%	Not Applicable		100%	100%	100%	100%
Period of refunds due to customers	100%	82%			100%	100%	Not Applicable	

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	SERVICE PROVIDER					
			BSNL NE1		BSNL NE 2		Sify	
			PMR	IMRB	PMR	IMRB	PMR	IMRB
1	**Service provisioning uptime**							
1.1	Percentage connections provided within 15 days	100%	82%	79%	100%	100%	100%	100%
2	**Fault repair restoration time**							
2.1	Percentage faults repaired by next working days	> 90%	90%	89%	92%	92%	87%	87%
2.2	Percentage faults repaired within three working days	99%	100%	100%	100%	100%	94%	94%
3	**Billing performance**							
3.1	Billing complaints per 100 bills issued	<2%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
3.2	%age of billing complaints resolved in 4 weeks	100%	NA	NA	NA	NA	0.00	0.00
3.3	%age cases in which refund of deposits after closure was made in 60 days	100%	NA	NA	NA	NA	0.00	0.00
4	**Customer care/helpline assessment (Voice to Voice)**							
4.1	Percentage calls answered within 60 seconds	> 60%	98%	92%	87%	89%	86%	86%
4.2	Percentage calls answered within 90 seconds	> 80%	98%	100%	96%	96%	94%	94%
5	**Bandwidth utilization/Throughput**							
			BSNL (All India)				Sify	
			PMR		IMRB		PMR	IMRB
5.1	*Intra network links (POP to ISP Node)*							
5.1.1	Total number of intra network links > 90%		NR		<80%		13	13
5.2	*Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)*							
5.2.1	Percentage bandwidth utilised on upstream links	< 80%	NR		<80%		85%	85%
6	Broadband download speed		Details not available for verification					
7	**Service availability/uptime**	> 98%	NR		99.00%		100%	100%
8	**Packet loss**	<2%	Details verified at the central node in Bangalore.				No details available for verification	
9	**Network Latency**							
9.1	POP/ISP Node to NIXI	< 120 msec						
9.2	ISP node to NAP port (Terresrtrial)	< 350 msec						

^^ Methodology not in Line with QoS regulation, Data verified on All India basis, NR – Not reported DNA- Details Not Available for verification, B'mark = TRAI Benchmark Figures do not match those in PMR

7.4 Conclusions

7.4.1 Basic Wireline Services

1. Variation observed in figures for BSNL is owing to the fact that only 5% of the total exchanges were audited for the operator whereas the data provided in the PMR is basis all the exchanges in the circle
2. Data on percentage calls answered by the operator in 60 and 90 seconds was not available in any of the exchanges of NE – II circle

7.4.2 Cellular Mobile services

1. The figures for customer care found out during verification did not match with the figures reported by BSNL for both IVR and Voice to Voice aspects. Also, for voice to voice aspect, Airtel's figures also did not match
2. The figures for call set up success rate and call drop rate also did not match for Airtel
3. The figures for Reliance GSM for accumulated downtime and TCH congestion did not match

7.4.3 Broadband services

1. Complete data for Sify was verified on an all India level
2. For BSNL there is slight variation observed in for some parameters when compared to the figures reported in PMR. But the reason is largely the fact that data was obtained for sample 5% of exchanges whereas reporting is done for 100% of exchanges.
3. Historic data for Broadband download speed and Ping test conducted to check the latency and packet loss was not available for verification with Sify. Results of old ping tests were available for verification at the central node in Bangalore for BSNL

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-NE I	BSNL-NE II
Number of connections registered during the period		56	276
Total number of connections provided within 7 days		31	117
Percentage of connections provided within 7 days	100%	55%	42%

Live calling results for Service provisioning

Service Provisioning/Activation Time	Benchmark	BSNL-NE I	BSNL-NE II
Total Number of service registration calls made		42	114
Number of cases in which connection was provided in 7 Days		21	59
Percentage cases in which connection was provided in 7 days	100%	50%	52%

One month data verification results for Fault repair/Restoration time

Fault Repair/Restoration time	Benchmark	BSNL-NE I	BSNL-NE II
Total number of faults registered during the period		4612	8046
Total number of faults repaired by next working day		1800	6675
Percentage of faults repaired by next working day	>90%	39%	83%
Total number of fault repaired within three working days		3104	8046
Percentage faults repaired within three working days	100%	67%	100%

Live calling results for Fault repair/Restoration time

Fault Repair	Benchmark	BSNL-NE I	BSNL-NE II
Total Number of calls made		216	120
Number of cases where faults were repaired by next working day		63	67
Percentage cases where faults were repaired by next working day	>90%	29%	56%
Number of cases where faults were repaired within 3 days		129	94
Percentage cases where faults were repaired within 3 days	100%	60%	78%

One month data verification results for CCR

Traffic statistics - Call Completion Rate	Benchmark	BSNL-NE I	BSNL-NE II
Total local call attempts		13265	846924
Total number of successful local calls		8205	515059
Call Completion Rate (CCR) in the local network	>55%	62%	61%

Live measurement results for CCR

Traffic statistics - Call Completion Rate	Benchmark	BSNL-NE I	BSNL-NE II
Total local call attempts		37797	10915
Total number of successful local calls		23566	6617
Call Completion Rate (CCR) in the local network	>55%	62%	61%

One month data verification results for billing performance

Billing Performance	Benchmark	BSNL-NE I	BSNL-NE II
Billing disputes			
Total bills generated during the period		27727	23969
Total number of bills disputed		65	7
Percentage bills disputed	0.10%	0.23%	0.03%
Resolution of billing complaints			
Total complaints resolved in 4 weeks from date of receipt		60	7
Percentage complaints resolved within 4 weeks of date of receipt	100%	92%	100%

Live calling results for billing performance

Resolution of billing complaints	Benchmark	BSNL-NE I	BSNL-NE II
Total Number of calls made		10	3
Number of cases resolved in 4 weeks		10	3
Percentage cases resolved in four weeks	100%	100%	100%

One month data verification for Customer Care – Shift

Customer Care - Shift Requests	Benchmark	BSNL-NE I	BSNL-NE II
Total Number of shift requests received		56	45
Total number requests attended in 3 days		39	38
Total number requests attended beyond 3 days		15	7
Shifts not attended		2	0
Percentage of requests attended in 3 days	95%	70%	84%
Percentage of requests attended beyond 3 days		27%	16%
Percentage of shifts not attended		4%	0%

Live calling results for Customer Care – Shifts

Customer Care - Shift Requests	Benchmark	BSNL-NE I	BSNL-NE II
Total number of call to shift requests		31	8
Total number of requests attended in 3 days	95%	14	3
Total number of requests attended beyond 3 days		17	5
Shifts not attended		0	0
Percentage of requests attended in 3 days		45%	38%
Percentage of requests attended beyond 3 days		55%	63%
Percentage of shifts not attended		0%	0%

One month data verification Audit results for Customer Care – Closures

Customer Care - Closure Requests	Benchmark	BSNL-NE I	BSNL-NE II
Total Number of closure requests received		128	86
Total closure attended within 24 hours	95%	47	50
Total number of requests attended beyond 24 hours		73	36
Closure requests not attended		8	0
Percentage of closure attended within 24 hours		37%	58%
Percentage of closure attended beyond 24 hours		57%	42%
Percentage of closures not attended		6%	0%

Live calling results for Customer Care – Supplementary requests

Customer Care - Supplementary Requests	Benchmark	BSNL-NE I	BSNL-NE II
Total Number of supplementary requests received		10	178
Total number requests attended within 24 hours	95%	10	178
Total number requests attended beyond 24 hours		0	0
Supplementary requests not attended		0	0
Percentage of requests attended within 24 hours		100%	100%
Percentage of requests attended beyond 24 hours		0%	0%
Percentage of supplementary requests not attended		0%	0%

Live calling results for calls answered electronically

Customer Care Assessment	Benchmark	BSNL-NE I	BSNL-NE II
Total Number of calls dialed on toll free number		100	100
Calls answered within 20 seconds			
Total Number of calls answered by IVR in 20 seconds	80%	89	100
Percentage calls answered in 20 seconds		89%	100%
Calls answered within 40 seconds			
Total Number of calls answered by IVR in 40 seconds	95%	89	100
Percentage calls answered in 40 seconds		89%	100%

Live calling results for calls answered by the operator

Customer Care Assessment	Benchmark	BSNL-NE I	BSNL-NE II
Total Number of calls dialed on toll free number		100	100
Calls answered within 60 seconds			
Total Number of calls answered by operator in 60 seconds	80%	76	100
Percentage calls answered in 60 seconds		76%	100%
Calls answered within 90 seconds			
Total Number of calls answered by operator in 90 seconds	95%	100	100
Percentage calls answered in 90 seconds		100%	100%

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

Resolution of billing complaints	Benchmark	BSNL-NE I	BSNL-NE II
Total Number of cases requiring refund		2817	178
Number of cases where refund was made in < 60 days		2582	172
Percentage cases where refund was made in < 60 days	100%	92%	97%

Level 1 Services

Level 1 services	BSNL
TOTAL Calls Made	450
Answered in 60 seconds	450
Percentage calls answered in 60 seconds	100%

8.2 Parameter wise performance reports for Cellular Mobile services

Audit Results for Accumulated Downtime for community Isolation

Accumulated Downtime	Airtel	Aircel	BSNL - NE	RTL
Total Downtime (In hours)	0.00	0.00	0.00	17.98

Audit Results for CSSR

CSSR	Airtel	Aircel	BSNL - NE	RTL
Total number of call attempts	20129304	1623936	1482593	21591058
Total number of successful calls	19146994	1311145	1453075	21248273
CSSR	95.12%	80.74%	98.01%	98.00%

Live measurement results for CSSR

CSSR	Airtel	Aircel	BSNL - NE	RTL
Total number of call attempts	61068021	5278839	1145534	100
Total number of successful calls	58423777	3545135	1071199	98
CSSR	95.67%	67.16%	93.51%	98.00%

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

CSSR	Airtel	Aircel	BSNL - NE	RTL
Total number of call attempts	642	756	253	709
Total number of successful calls	623	698	171	691
CSSR	97.04%	92.33%	67.59%	97.46%

* DNP: Details Not Provided

Service Access Delay

Service Access Delay	Airtel	Aircel	BSNL - NE	RTL
One month data collection	9	8	14.7	7.6

Audit results for SDCCH and TCH Congestion

Traffic Statistics	Airtel	Aircel	BSNL - NE	RTL
SDCCH Congestion				
Total number of SDCCH Attempts	47878361	3643269	1742774	1573156
Total Number of SDCCH Congestions	DNP	305306	16382	13844
Percentage SDCCH Congestion	5.01%	8.38%	0.94%	0.88%
TCH Congestion				
Total number of TCH Attempts	20129304	1623936	1482593	696486
Total Number of TCH Congestions	DNP	140470	19242	11074
Percentage TCH Congestion	4.88%	8.65%	1.30%	1.59%

Live measurement results for SDCCH and TCH Congestion

Traffic Statistics	Airtel	Aircel	BSNL - NE	RTL
SDCCH Congestion				
Total number of SDCCH Attempts	153349099	13721206	2592758	4328022
Total Number of SDCCH Congestions	DNP	2708121	45816	45698
Percentage SDCCH Congestion	6.29%	19.74%	1.77%	1.06%
TCH Congestion				

Total number of TCH Attempts	61068021	5278839	1140656	2124447
Total Number of TCH Congestions	DNP	621530	24590	56402
Percentage TCH Congestion	4.33%	11.77%	2.16%	2.65%

* DNP: Details Not Provided

Audit Results for Call drop rate

Call drop rate	Airtel	Aircel	BSNL - NE	RTL
Total number of calls established	42390154	1311145	1453075	21248273
Total number of calls dropped	1271704	11869	34583	503788
Call drop rate	3.00%	0.91%	2.38%	2.37%

Live measurement results for Call drop rate

Call drop rate	Airtel	Aircel	BSNL - NE	RTL
Total number of calls established	42390023	3545135	1071199	100
Total number of calls dropped	1356798	154938	29979	1
Call drop rate	3.20%	4.37%	2.80%	1.00%

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

Call drop rate	Airtel	Aircel	BSNL - NE	RTL
Total number of calls established	623	702	171	691
Total number of calls dropped	1	11	55	10
Call drop rate	0.16%	1.57%	32.16%	1.45%

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

Voice quality	Airtel	Aircel	BSNL - NE	RTL
Total number of sample calls	848741	707692	253	603812
Total number of calls with good voice quality	689648	655380	166	562803
%age calls with good voice quality	81.26%	92.61%	65.61%	93.21%

Audit Results for POI Congestion

POI congestion	Airtel	Aircel	BSNL - NE	RTL
POI traffic offered on all individual POI's	DNP	29250.89	N.A	96832.44
Served traffic for all individual POI's	DNP	21792.48	N.A	95642.72
Traffic failed on all individual POI's	Complied	Complied	Complied	Complied

Live measurement results for POI congestion

POI congestion	Airtel	Aircel	BSNL - NE	RTL
POI traffic offered on all individual POI's	DNP	N.A	N.A	11055.69
Served traffic for all individual POI's	DNP	N.A	N.A	10279.34
Traffic failed on all individual POI's	Complied	Complied	Complied	Complied

* DNP: Details Not Provided

Inter operator call Assessment (To/From)	Airtel	Aircel	BSNL - NE	RTL
Bharti	92%	98%	92%	94%
BSNL	95%	93%	90%	91%
Aircel	90%	91%	93%	91%
RTL	91%	83%	89%	88%

Audit results for customer care (Electronically)

Customer Care Assessment	Airtel	Aircel	BSNL - NE	RTL
Total Number of calls received by	207935	569555	447009	DNP
Calls answered within 20 seconds				
Total Number of calls answered in 20 seconds	207935	569555	414780	DNP
Percentage calls answered in 20 seconds	100.00%	100.00%	92.79%	88.48%
Calls answered within 40 seconds				
Total Number of calls answered in 40 seconds	207935	569555	424980	DNP
Percentage calls answered in 40 seconds	100.00%	100%	95.07%	DNP

Live calling results for customer care (Electronically)

Customer Care Assessment	Airtel	Aircel	BSNL - NE	RTL
Total Number of calls received by the operator	100	100	100	100
Calls answered within 20 seconds				
Total Number of calls answered in 20 seconds	100	98	98	100
Percentage calls answered in 20 seconds	100%	98%	98%	100%
Calls answered within 40 seconds				
Total Number of calls answered in 40 seconds	100	100	98	100
Percentage calls answered in 40 seconds	100%	100%	98%	100%

Audit results for customer care (Voice to Voice)

Customer Care Assessment	Airtel	Aircel	BSNL - NE	RTL
Total Number of calls received by the operator	207935	DNP	12836	DNP
Calls answered within 60 seconds				
Total Number of calls answered in 60 seconds	198158	DNP	10488	DNP
Percentage calls answered in 60 seconds	95.30%	DNP	81.71%	DNP
Calls answered within 90 seconds				
Total Number of calls answered in 90 seconds	198349	DNP	11885	DNP
Percentage calls answered in 90 seconds	95.39%	DNP	92.59%	DNP

Live calling results for customer care (Voice to Voice)

Customer Care Assessment	Airtel	Aircel	BSNL - NE	RTL
Total Number of calls made	100	100	100	100
Calls answered within 60 seconds				
Number calls answered within 60 seconds	92	97	89	95
Percentage calls answered in 60 seconds	92%	97%	89%	95%
Calls answered within 90 seconds				
Number calls answered within 90 seconds	100	100	96	100
Percentage calls answered in 90 seconds	100%	100%	96%	100%

* DNP: Details Not Provided

Audit Results for Billing performance

Billing Performance	Airtel	Aircel	BSNL - NE	RTL
Billing disputes				
Total bills generated during the period	**34978**	16028	5714	30820
Total number of bills disputed	37	0	4	2
Percentage bills disputed	0.11%	0.00%	0.07%	0.01%

Resolution of billing complaints				
Total complaints resolved in 4 weeks from date of receipt	35	Not Applicable	4	2
Percentage complaints resolved within 4 weeks of date of receipt	94.59%	Not Applicable	100%	100%
Refund				
Total number of cases requiring refund of deposits	4	59	4	8
Total number of cases where refund was made within 60 days	2	59	4	8
Percentage cases in which refund was receive within 60 days	50%	100%	100%	100%

Live calling results for resolution of billing complaints

Resolution of billing complaints	Airtel	Aircel	BSNL - NE	RTL
Total Number of calls made	40	Not Applicable	DNP	3
Number of cases resolved in 4 weeks	40	Not Applicable	DNP	3
Percentage cases resolved in four weeks	100%	Not Applicable	DNP	100.0%

8.3 Parameter wise performance reports for Broadband services

One month data verification results for Service provisioning

Service provisioning/Activation time	B'mark	BSNL (NE-I)	BSNL (NE-II)	Sify
No of connections registered during the period		300	434	66
Total number registered during 15 days		300	434	66
Percentage of connections provided within 15 days	100%	100.0%	100.0%	100%

Live calling results for Service provisioning

Service Provisioning/Activation Time	B'mark	BSNL (NE-I)	BSNL (NE-II)	Sify
Total Number of calls made		100	40	20
Number of cases in which connection was provided in 15 Days		40	8	20
Percentage cases in which connection was provided in 15 days	**100%**	40%	20%	100%

One month data verification results for Fault repair

Fault Repair/Restoration time	B'mark	BSNL (NE-I)	BSNL (NE-II)	Sify
Total number of faults registered during the period		778	160	5
Total number of faults repaired by next working day		744	148	5
Percentage of faults repaired by next working day	**>90%**	96%	93%	100%
Total number of faults repaired within three working days		778	160	5
Percentage of faults repaired within three working days	**>99%**	100%	100%	100%

Live calling results for fault repair

Fault Repair	B'mark	BSNL (NE-I)	BSNL (NE-II)	Sify
Total Number of calls made		21	18	2
Number of cases in which faults were repaired by next working day		2	15	2
Percentage cases in which faults were repaired by next working day	**>90%**	10%	83%	100%
Number of cases in which faults were repaired within three working days		5	18	2
Percentage cases in which faults were repaired within three working days	**>99%**	24%	100%	100%

One month data verification results for billing performance

Billing Performance	B'mark	BSNL (NE-I)	BSNL (NE-II)	Sify
Billing disputes				
Total bills generated during the period		6929	4356	Prepaid
Total number of bills disputed		24	0	Prepaid
Percentage bills disputed	**<2%**	0.35%	0.00%	Prepaid
Resolution of billing complaints				
Total complaints resolved in 4 weeks from date of receipt		24	NA	Prepaid
Percentage complaints resolved within 4 weeks of date of receipt	**100%**	100%	NA	Prepaid
Refund of deposits after closure				
Total number of cases requiring refund of deposits		653	NA	Prepaid
Total number of cases where refund was made within 60 days		653	NA	Prepaid
Percentage cases in which refund was receive within 60 days	**100%**	100%	NA	Prepaid

Live calling results for billing complaints

Resolution of billing complaints	B'mark	BSNL (NE-I)	BSNL (NE-II)	Sify
Total Number of calls made		100	NA	Prepaid
Number of cases resolved in 4 weeks		46	NA	
Percentage cases resolved in four weeks	**100%**	46%	NA	

Live calling results for call centre

Customer Care Assessment	B'mark	BSNL (NE-I)	BSNL (NE-II)	Sify
Total Number of calls made		50	175	NA
Calls answered within 60 seconds				
Number calls answered within 60 seconds		46	158	NA
Percentage calls answered in 60 seconds	**>60%**	92%	90%	NA
Calls answered within 90 seconds				
Number calls answered within 90 seconds		50	167	NA
Percentage calls answered in 90 seconds	**>80%**	100%	95%	NA

One month data verification results for Service Availability/Uptime

Service Availability Uptime	B'mark	BSNL	Sify
Total Operational Hours		53568	744
Total Downtime		2	0
Total time when the service was available		53566	744
Service Availability Uptime in Percentage	**>98%**	100.0%	100.0%

Three day live measurement results for Service Availability/Uptime

Service Availability Uptime	B'mark	BSNL	Sify
Total Operational Hours		5184	72
Total Downtime		0	0
Total time when the service was available		5184	72
Service Availability Uptime in Percentage	**>98%**	100.00%	100.00%

One month data verification results for Bandwidth utilization

Bandwidth Utilization	B'mark	BSNL	Sify
Total number of intra network links		23 BRAS, TI 24, T2624,DSLAM 5960	412
No of Intra network found to be above 90%		0	0
Total number of upstream links		141	27
No of Intra network found to be above 90%		8	0
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In mpbs)		27048	2830
Total International Bandwidth utilised during peak hours		18934	2238
Percentage Bandwidth utilisation during peak hours (In mpbs)	**>90%**	70%	79%

Live measurement results for Bandwidth utilisation

Bandwidth Utilization	B'mark	BSNL	Sify
Total number of intra network links		23 BRAS	412
No of Intra network Links tested		0	0
No of Intra network found to be above 90%		0	0
Total number of upstream links		141	27
No of Intra network found to be above 90%		19	0
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In mpbs)		22010	2830
Total International Bandwidth utilised during peak hours		18326	1934
Percentage Bandwidth utilisation during peak hours (In mpbs)	**>90%**	83%	68%

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. **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.

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* ** *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	< 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

*****