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 Service Providers - Bihar & Jharkhand Circle

Report: April – May – June, 2010

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

By: **eTech 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. The auditor - IMRB International carried out the audits across Jammu & Kashmir, Himachal Pradesh, Bihar & Jharkhand and Kerala circles in the April – May – June period 2010. **This report details the performance of various service providers in Bihar & Jharkhand circle against Quality of Services benchmarks for various parameters laid down by TRAI in respective regulations for Basic (Wireline), Cellular mobile (Wireless) and broadband services.**

Table of contents

Page no.

1.0 Background 5

2.0 Objectives And Methodology 6

Section A: WIRELINE 6

3.0 Sampling Methodology 7

3.1 Sampling for Basic (Wireline) services 7

4.0 Audit methodology 8

4.1 Basic (Wireline) Services 8

5.0 Executive Summary 9

5.1 Service provider performance report based on one month data verification – Basic (Wireline) Services 9

6.0 Detailed findings – Includes comparison between Live calling/Live measurements and One month data collection for Basic Wireline Services 12

6.1 Graphical/Tabular Representations for Basic (Wireline) services 12

7.0 Compliance reports: Results of Verification of Records 18

7.1 Basic (Wireline) services 18

7.2 Conclusions 19

Section B WIRELESS 20

8.0 Sampling methodology 21

9.0 Audit methodology 22

9.1 Cellular Mobile Services 22

10.0 Executive Summary 23

10.1 Service provider performance report based on one month data verification: Cellular Mobile Services 24

11.0 Detailed findings – Includes comparison between Live calling/Live measurements and One month data collection 32

11.1 Graphical/Tabular Representations for Cellular Mobile Services 32

12.0 Compliance reports: Results of Verification of PMR 41

12.1 Cellular Mobile services 41

13.0 Conclusions 42

Section C BROADBAND 43

14.0 Sampling Methodology 44

15.0 Audit methodology 45

15.1 Broadband Services 45

16.0 Executive Summary 46

16.1 Service provider performance report based on one month data Verification – Broadband Services 46

17.0 Detailed findings – Includes comparison between Live calling/Live measurements and One month data collection for Broadband Services 50

17.1 Graphical/Tabular Representations for Broadband services 50

18.0 Compliance reports: Results of Verification of Records 55

18.1 Broadband services 55
18.2 Conclusions 55

19.0 Annexure - I (Wireline) 56

19.1 Parameter wise performance reports for Basic Wireline services 56

20.0 Annexure - I (Wireless) 61

20.1 Service provider performance report based on one month data 61
20.2 Monthly Point of Interconnection (POI) Congestion Report 62
20.3 Parameter wise performance reports for Cellular Mobile services 64

21.0 Annexure - I (Broadband) 71

21.1 Parameter wise performance reports for Broadband services 71

22.0 Annexure – II Detailed Explanation of Audit methodology (Parameter wise) 76

22.1 For Basic (Wireline) services 76
22.2 Cellular Mobile services 79
22.3 For Broadband services 84

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 20th March, 2009. The parameters for Broadband Service have been specified in the TRAI notification for Quality of Services of Broadband Service Regulation, 2006

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

IMRB has been carrying out this exercise for TRAI since December 2007 to assess the quality of services being provided by Basic (Wireline), Cellular Mobile (Wireless) and Broadband service providers.

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

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

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

This report highlights the findings for the Audit module for Bihar & Jharkhand circle that was covered in the period of April – June 2010. 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 April – June 2010.

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. **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.
- PMR verification was done as per the new parameters being reported to TRAI by all operators.
- Live measurement and 1 month data collection was done as per the new regulations published by TRAI on 20th March, 2009.
- Separate formats were designed each for Basic (Wireline), Cellular mobile (Wireless) and Broadband services to collect the information on various parameters

3.0 Sampling Methodology

3.1 Sampling for Basic (Wireline) services

- For BSNL the sample of exchanges was selected was spread across 10% of SDCA's in the entire service.
- For TATA data was collected pertaining to all the exchanges present in the circle/service area
- Following service providers are providing Basic (Wireline) service in Bihar & Jharkhand circle –

	Name of Operator
Operator 1	BSNL - Bihar
Operator 2	BSNL - Jharkhand
Operator 3	TTSL

4.0 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 getting connected and answered	YES		YES
7.2	- While call is answered by operator (voice to voice)	YES		YES
8	Time taken to refund of deposits after closure	YES		YES

* In addition to above verification of records for PMR submitted during October to December 2009 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}

5.0 Executive Summary

The objective assessment of Quality of Services (QoS) was carried out by IMRB International for all the Basic (Wireline) and Broadband service providers during the period starting from April to June 2010 in Bihar & Jharkhand circle. The executive summary encapsulates the key findings of the Audit by providing: -

- *"Service provider performance report"* for Basic (Wireline) 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) service: 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

Parameters	Benchmarks	BSNL* - Bihar	BSNL* - Jharkhand	TTSL
Faults incidences (No. of faults/100 Subs./month)	≤5	2.94	4.99	2.42
% of faults repaired by next working day	≥ 90%	78.44%	62.21%	100.00%
% of faults repaired within 3 days	100%	90.53%	60.79%	100.00%
Faults pending for> 3days and ≤7 days	Rent rebate of 7 days	100.00%	NA	NA
Faults pending for > 7 days and ≤15 days	Rent rebate of 15 days	100.00%	100.00%	NA
Faults pending for > 15 days	Rent rebate of 1 month	100.00%	64.71%	NA
Mean Time to Repair (MTTR)	≤ 8 Hrs	14.56	8	3.44
Call Completion Rate (CCR)	≥ 55%	41.48%	50.58%	76.31%
Answer to Seizure ratio (ASR)	≥ 75%	59.28%	41.82%	75.60%
No. of POIs with congestion > 0.5%	≤ 0.5%	0.00	0.00	0.00
Metering and billing credibility - Number of bills disputed during over a billing cycle	≤ 0.1%	0.02%	0.04%	0.00%
Resolution of billing complaints within 4 weeks	100%	100.00%	100.00%	NA
Period of applying credit / waiver	≤ 1 week	100.00%	100.00%	NA
Closure within 7 days	100%	99.35%	100.00%	100.00%
Response time to customer for assistance				
% age calls getting connected and answered	≥ 95%	100.00%	100.00%	NA
% age call answered by operator in 60 seconds	≥ 90%	94.34%	100.00%	NA
Time taken for refund of deposits after closures within 60 days	100%	100.00%	96.23%	NA

{*Note: For BSNL data pertains to the sample 5% of exchanges audited during the audit period, 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

Summary of Live Measurement Results – Wireline Services

Parameters	Benchmarks	BSNL - Bihar	BSNL - Jharkhand	TTSL
% of faults repaired by next working day	≥ 90%	27.55%	4.68%	NA
% of faults repaired within 3 days	100%	49.43%	38.85%	NA
Call Completion Rate (CCR)	≥ 55%	40.82%	54.22%	79.66%
Answer to Seizure ratio (ASR)	≥ 75%	46.27%	46.66%	75.39%
Resolution of billing complaints within 4 weeks	100%	66.67%	100.00%	NA
Response time to customer for assistance				
% age calls getting connected and answered	≥ 95%	82.13%	72.67%	NA
% age call answered by operator in 60 seconds	≥ 90%	60.39%	43.30%	NA

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

BSNL and Tata are the only operators providing Basic (Wireline) Services in Bihar & Jharkhand circle to retail customers. During the audit process it was observed that the service provider BSNL could not meet TRAI specified benchmark on most of the parameters specified by TRAI.

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 service provider meets the TRAI specified benchmark with CCR during three days observed to be 72%.

The parameter wise key takeouts for the Wireline service providers for the Bihar & Jharkhand circle are as under:-

Fault incidence / clearance statistics

- Fault repair remains pain point with less than 80% of the total complaints registered in the sample exchanges were repaired within 24 hrs which is significantly short of TRAI specified benchmark of >90%.
- For live calling carried out by IMRB auditors only 5% of BSNL Jharkhand subscribers claimed that fault was repaired within 24 hrs.
- Even for fault repair within 3 days BSNL falls short of the TRAI specified benchmark in both Bihar & Jharkhand.

Traffic statistics (CCR)

- BSNL does not meet the benchmark on this parameter both during month in which audit was carried out and three days when live measurement was carried out in auditor's presence at various exchanges

Metering and billing credibility

- The service provider (BSNL) comfortably meets TRAI specified benchmark with percentage billing complaints being equal to 0.1% of the total bills generated.
- Also all the complaints registered were resolved within the time period stipulated by TRAI
- No billing complaint for Tata was observed

Response time to customer for assistance

- Data on number of calls received and calls answered by IVR was not available at the Tata exchange
- However BSNL comfortably meets TRAI specified benchmark for calls answered by the operator in 60 seconds.
- However for the live calling carried out by IMRB auditors service provider fails to meet the TRAI specified benchmark

Time taken for refund of deposits after closure

- BSNL fails to meet benchmark for refund of deposits within 60 days in Jharkhand circle
- There were no cases of refunds observed for Tata

Level 1 service

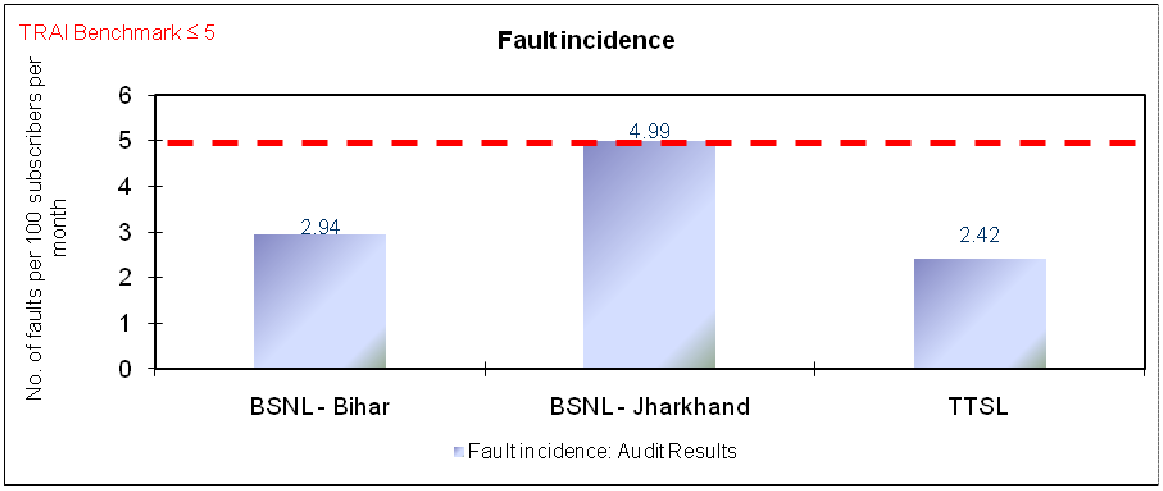
Level 1 services	Benchmark	BSNL - Bihar	BSNL - Jharkhand	TTSL
Total no. of calls made		570	729	NA
Calls answered in 60 sec		419	322	NA
Calls answered after 60 sec		151	407	NA

To test the efficiency of level 1 services (Trunk booking, Child helpline, Women helpline, Airline booking, Fire, Police, Railways) offered by various service providers.

6.0 Detailed findings – Includes comparison between Live calling/Live measurements and One month data collection for Basic Wireline Services

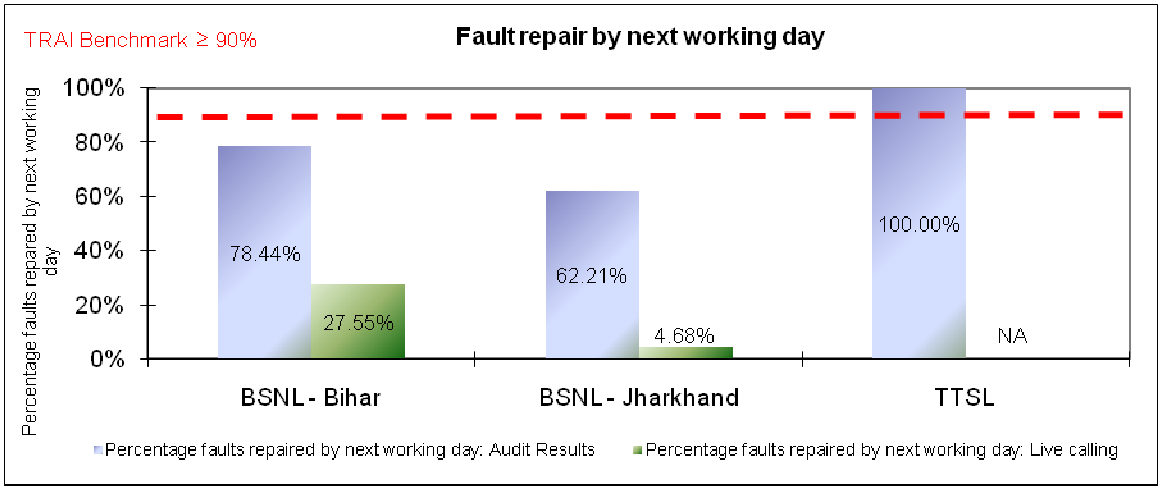
6.1 Graphical/Tabular Representations for Basic (Wireline) services

Fault incidence



All operators are meeting the benchmark

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



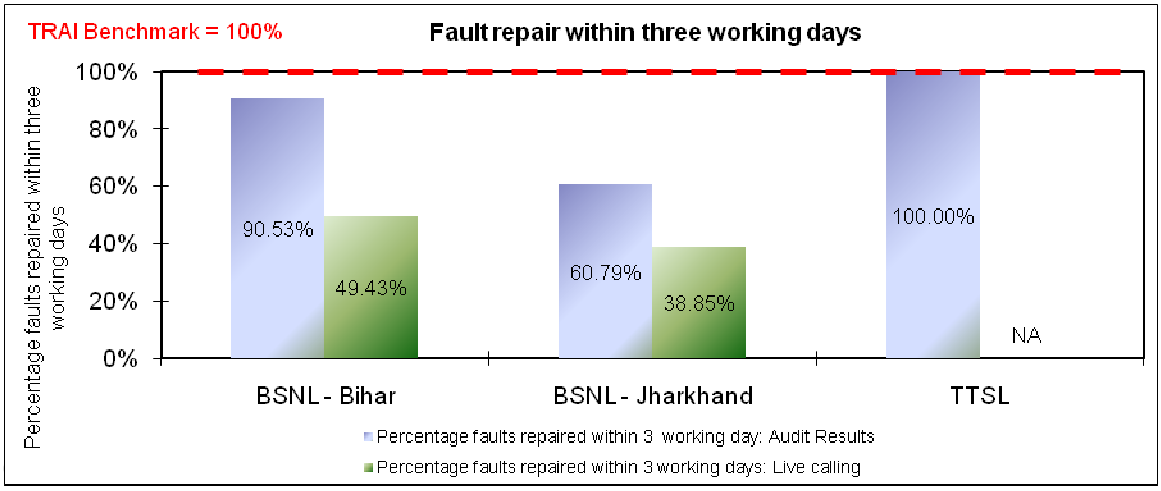
One month

Operator meeting benchmark: TTSL

Operator not meeting benchmark: BSNL - Bihar, BSNL - Jharkhand

Live calling

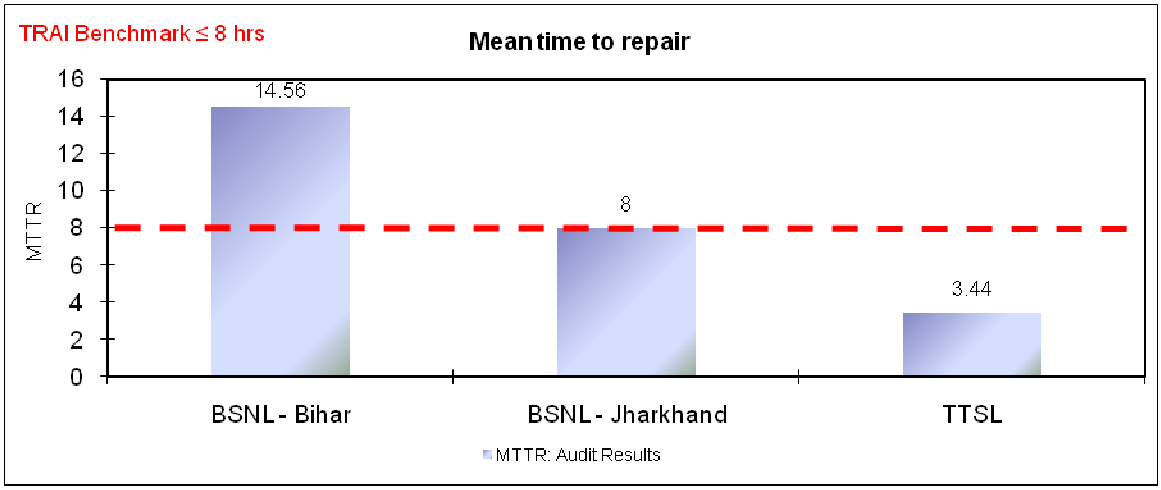
No operator is meeting the benchmark



Operator meeting benchmark: TTSL
Operator not meeting benchmark: BSNL - Bihar, BSNL - Jharkhand

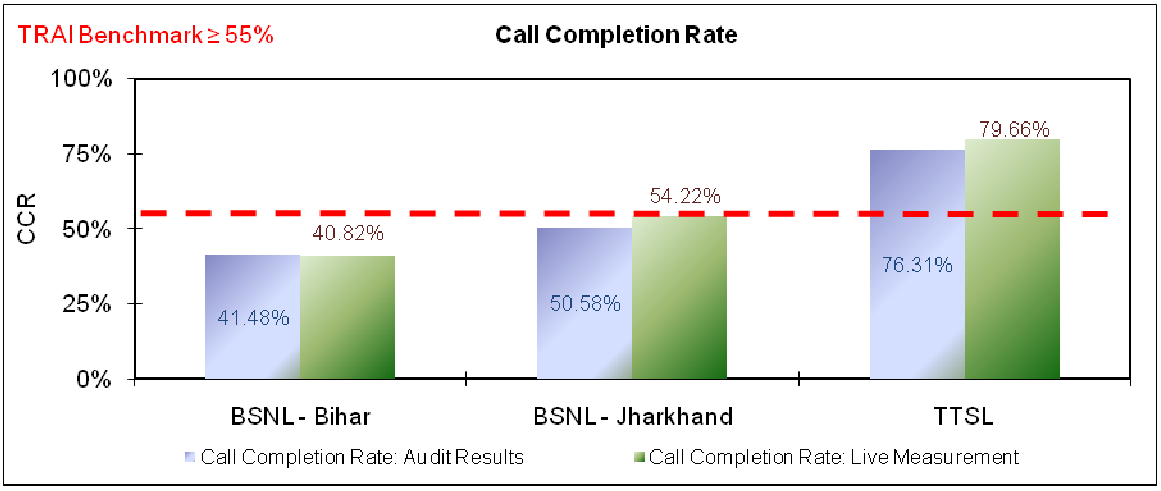
Live calling
No operator is meeting the benchmark

Mean time to repair



Operator meeting benchmark: BSNL - Jharkhand, TTSL
Operator not meeting benchmark: BSNL - Bihar

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



One month

Operator meeting benchmark: TTSL

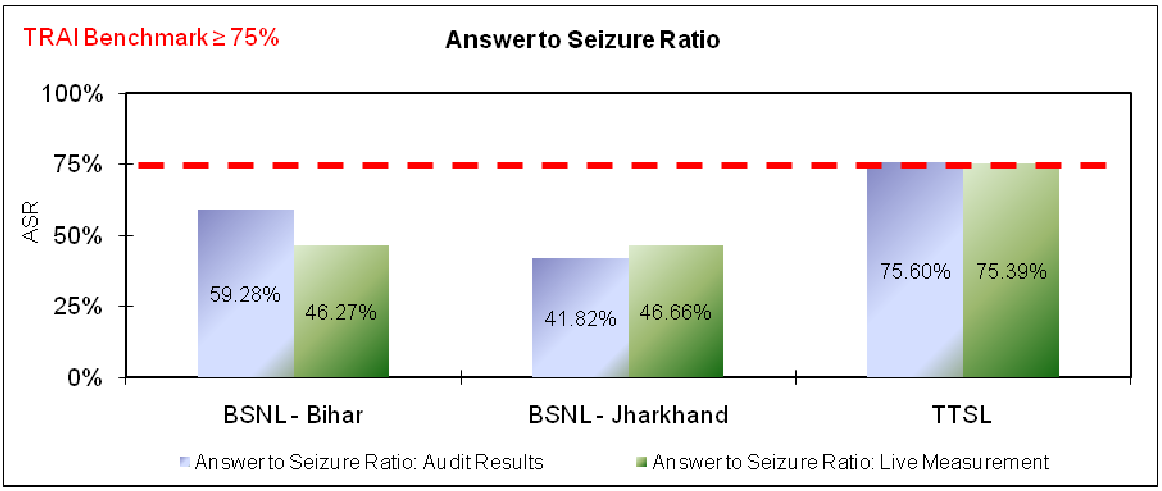
Operator not meeting benchmark: BSNL - Bihar, BSNL - Jharkhand

Live measurement

Operator meeting benchmark: TTSL

Operator not meeting benchmark: BSNL - Bihar, BSNL - Jharkhand

Answer to Seizure Ratio (Comparison between one month audit results and three day live measurement)



One month

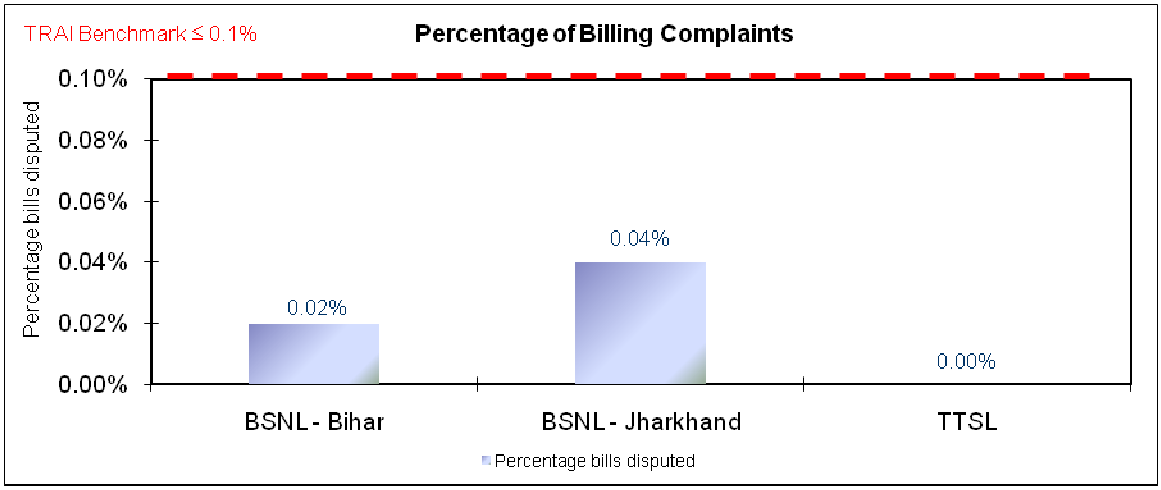
Operator meeting benchmark: TTSL

Operator not meeting benchmark: BSNL - Bihar, BSNL - Jharkhand

Live measurement

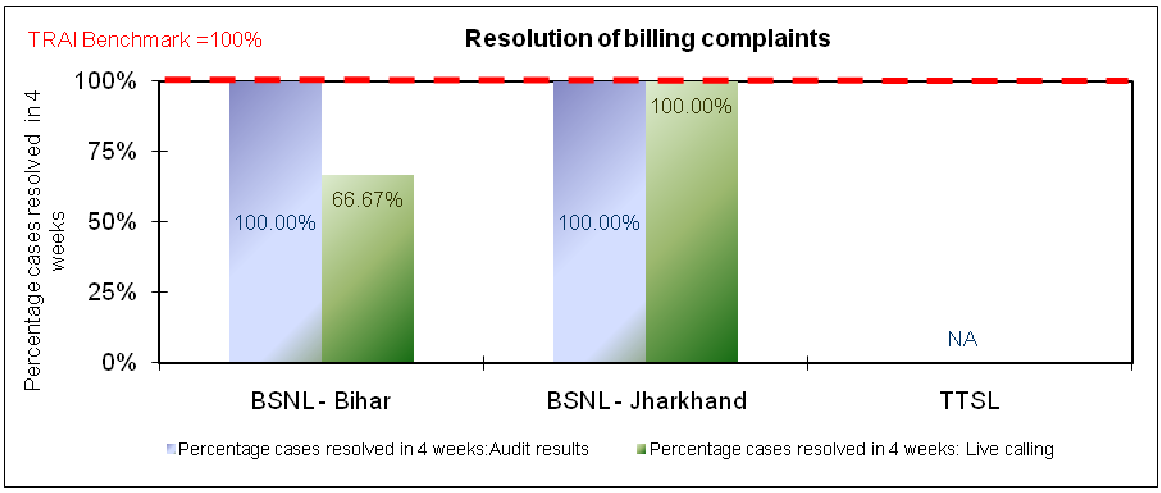
Operator meeting benchmark: TTSL
Operator not meeting benchmark: BSNL - Bihar, BSNL - Jharkhand

Percentage bills disputed



All operators are meeting the benchmark

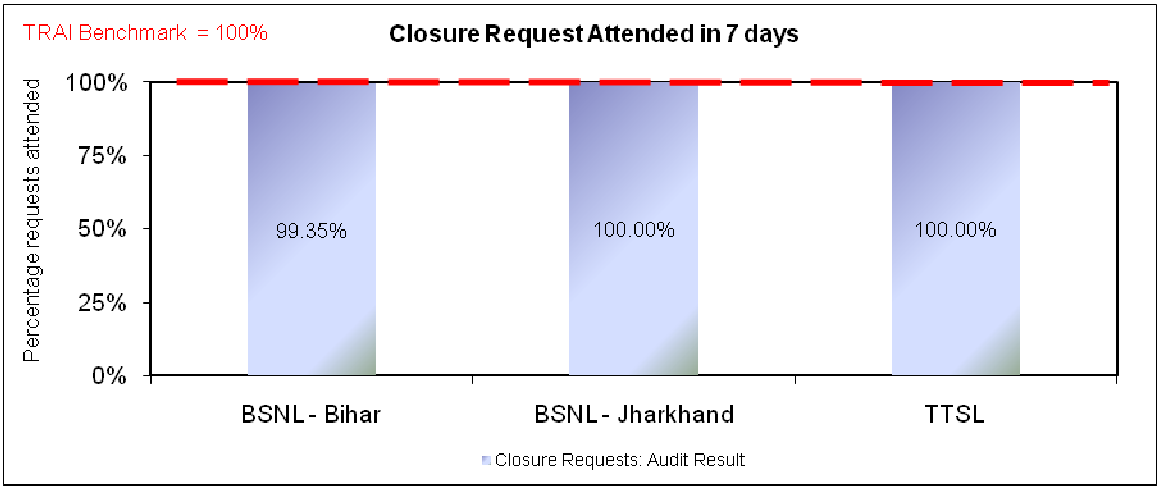
Resolution of billing complaints - postpaid (Comparison between one month audit results and live calling results)



One month
All operators are meeting the benchmark

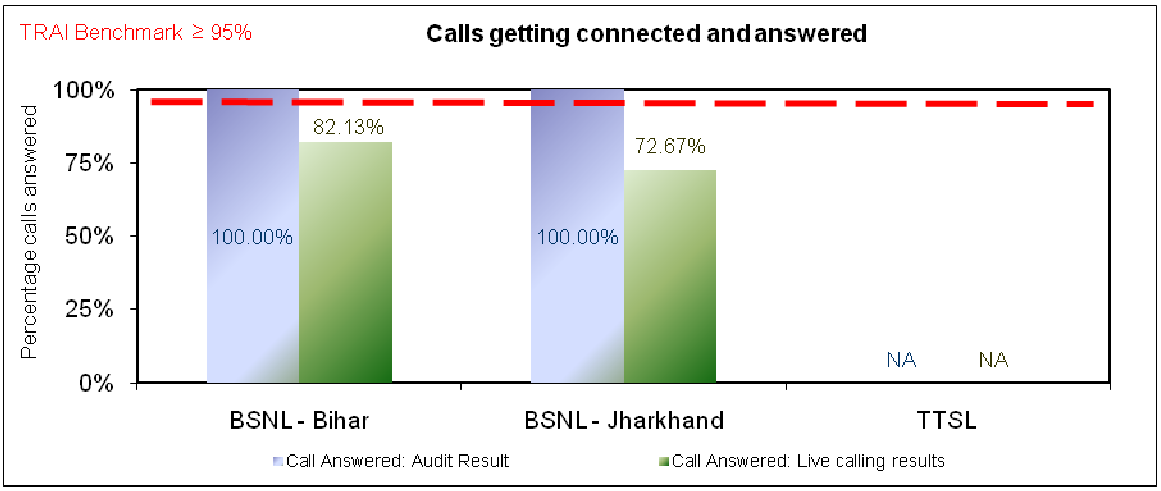
Live calling
Operator meeting benchmark: BSNL - Jharkhand
Operator not meeting benchmark: BSNL - Bihar

Closure requests attended within 7 days



Operator meeting benchmark: BSNL - Jharkhand, TTSL
Operator not meeting benchmark: BSNL - Bihar

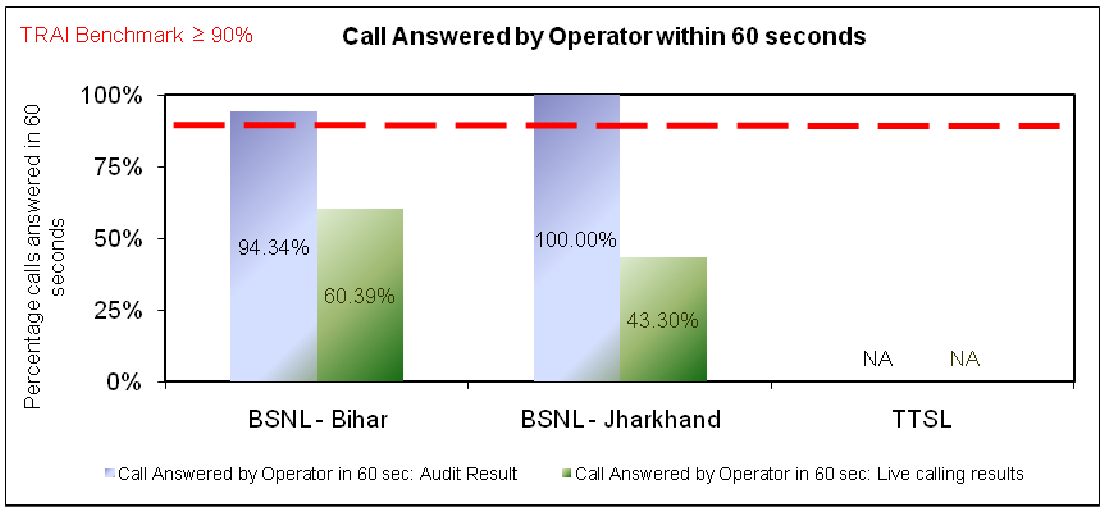
Response time to customer for assistance - Calls answered and getting connected (Comparison between one month audit and live calling results)



One month
All operators are meeting the benchmark

Live calling
No operator is meeting the benchmark

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



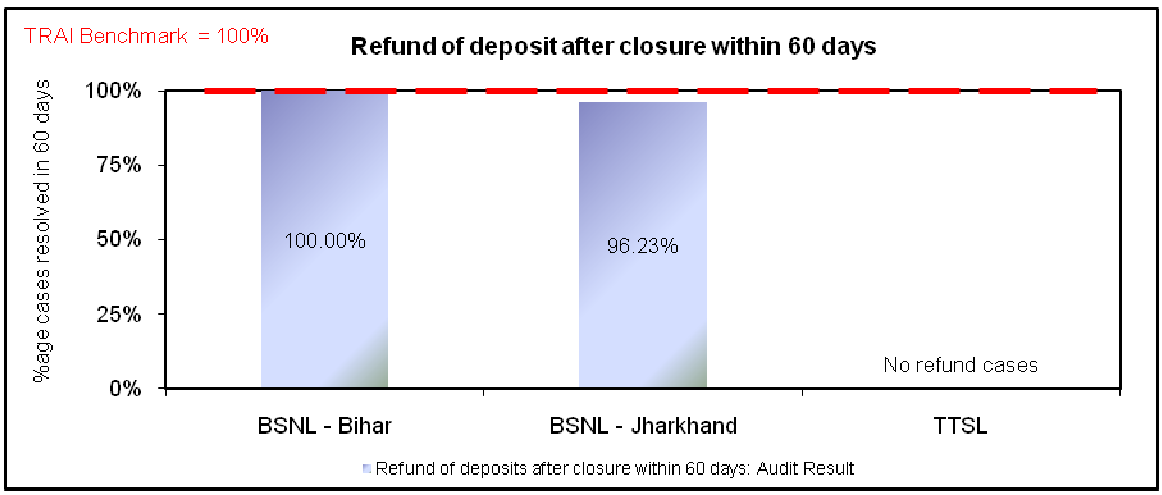
One month

All operators are meeting the benchmark

Live calling

No operator is meeting the benchmark

Time taken to refund of deposits after closure



Operator meeting benchmark: BSNL - Bihar

Operator not meeting benchmark: BSNL - Jharkhand

7.0 Compliance reports: Results of Verification of Records

7.1 Basic (Wireline) services

Parameters	Benchmarks	BSNL* - Bihar		BSNL* - Jharkhand		TTSL	
		PMR	IMRB	PMR	IMRB	PMR	IMRB
Faults incidences (No. of faults/100 Subs./month)	≤5	4.23	4.40	4.03	4.76	1.30	1.30
% of faults repaired by next working day	By next working day: ≥ 90%	93.61%	74.60%	95.61%	58.71%	90.60%	90.60%
Total No. of faults registered during the quarter		91092	10940	48807	39800	127	127
No. of faults repaired by next working day during the quarter		85268	8161	16099	23365	115	115
No. of faults repaired within 3 days during the quarter	For urban areas	62526	6803	38589	20112	119	119
% of faults repaired within 3 days	For urban areas: ≥ 100%	68.64%	87.18%	99.57%	51.51%	93.70%	93.70%
No. of faults repaired within 5 days during the quarter	For rural and hilly areas	36847	3103	10031	754	122	122
% of faults repaired within 5 days	For rural and hilly areas:	77.49%	98.92%	100.00%	100.00%	96.10%	96.10%
Rent Rebate :	≥ 100%						
Faults pending for> 3days and ≤7 days	Rent Rebate for 7 days	113	155	0	9	4	4
Faults pending for > 7 days and ≤15 days	Rent Rebate for 15 days	284	135	0	9	5	5
Faults pending for > 15 days	Rent Rebate for 30 days	199	102	0	15	0	0
Mean Time to Repair (MTTR)	≤ 8 Hrs	11.37	41.29	13.13	13.10	9.00	9.00
Call Completion Rate (CCR)	≥ 55%	57.63%	40.82%	59.34%	52.41%	98.61%	98.61%
Total Number of successful local calls		DNA	704856	DNA	944677	27963	27963
Total local call attempts		DNA	1726762	DNA	1802611	28356	28356
Answer to Seizure Ratio (ASR)	≥ 75 %	NA	46.76%	NA	43.21%	NA	NA
Total I/C seizures		DNA	1901917	DNA	9544490	NA	NA
No. of answered calls		DNA	889401	DNA	4124079	NA	NA
Point of Interconnection (POI) Congestion (No. of PoIs not meeting benchmark)	≤ 0.5%	DNA	0	DNA	0	0	0
Total number of working POI Service Area wise		DNA	DNA	DNA	DNA	0	0
Metering and billing credibility - post paid	Not more than 0.1%	0.01%	0.03%	0.03%	0.08%	2.00%	2.00%
No. of bills issued during the period		1162960	90644	804914	189417	9860	9860
No. of bills disputed including billing complaints during the period		156	24	273	143	2	2
Metering and billing credibility - pre paid	Not more than 0.1%	NA	NA	NA	NA	NA	NA
No. of charging / credit / validity complaints during the quarter		DNA	NA	DNA	NA	NA	NA
Total no. of pre-paid customers at the end of the quarter		DNA	NA	DNA	NA	NA	NA

Resolution of billing/ charging/ validity complaints	100% within 4 weeks	DNA	100.00%	DNA	100.00%	50.00%	50.00%
No. of billing/(post paid) and charging, credit / validity (pre paid) complaints resolved within 4 weeks during the quarter		DNA	54	DNA	151	1	1
Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		DNA	54	DNA	151	2	2
No. of billing complaints (post paid) and charging, credit/validity complaints (pre paid) resolved in favour of the customer during the quarter		163	24	243	143	0	0
No. of complaints disposed on account of not considered as valid complaints during the quarter		DNA	30	DNA	8	2	2
Period of applying credit/ waiver/ adjustment to customer's account from the date of resolution of complaints	within 1 week of resolution of complaint	DNA	100%	DNA	100%	100%	100%
Response time to the customer for assistance	≥ 95%	85.23%	100.00%	DNA	100.00%	95.40%	95.40%
Total no. of call attempts to call centre / customer care nos. during TCBH		1276	1276	DNA	25226	99730	99730
Accessibility of call centre/ customer care		933	1276	DNA	25226	95192	95192
Percentage of calls answered by the operators (voice to voice) within 60 seconds	≥ 90%	100.00%	93.96%	DNA	DNA	83.50%	83.50%
Termination / closure of service	≤ 7 days						
%age requests for Termination / Closure of service complied within 7 days	100.00%	98.25%	94.31%	99.71%	99.05%	100.00%	100.00%
Total No. of requests for Termination / Closure of service received during the quarter		3530	1089	3066	321	38	38
No.of requests for Termination / Closure of service complied within 7 days during the quarter		3474	1027	3057	271	38	38
Time taken for refund of deposits after closures	100% within 60 days.	100.00%	100.00%	100.00%	84.42%	NA	NA

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

Figures do not match with those reported in PMR Not meeting the benchmark Figures verified on all India bases

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

7.2 Conclusions

Basic Wireline Services

For verification of raw data for the period of October to December 2009, there was significant variation observed when compared to the figures reported in the PMR for BSNL

1. For 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. Both service providers were found not to meeting benchmark for fault repair within 3 working days and MTTR

Section B
WIRELESS

8.0 Sampling methodology

8.1 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 Bihar circle

	Name of Operator
Operator 1	Airtel
Operator 2	Aircel
Operator 3	Vodafone
Operator 4	BSNL
Operator 5	Idea
Operator 6	Tata Docomo
Operator 7	S-Tel
Operator 8	Uninor
Operator 9	RTL
Operator 10	RCOM
Operator 11	MTS
Operator 12	Tata Indicom

9.0 Audit methodology

9.1 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)	BTS accumulated down time	Yes	Yes	Yes				
A (ii)	Call setup success rate (within licensee own network)	Yes	Yes	Yes	Yes		Yes	Yes
A (iii)	Blocked Call Rate	Yes	Yes	Yes	Yes		Yes	Yes
A (iv)	Call Drop rate	Yes	Yes	Yes	Yes		Yes	Yes
A (v)	% Connections with good voice quality	Yes	Yes	Yes			Yes	Yes
A (vi)	Service Coverage	Yes	Yes	Yes			Yes	Yes
A (vii)	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 Cellular Mobile services is explained in Annexure II}

10.0 Executive Summary

The objective assessment of Quality of Services (QoS) was carried out by IMRB International for all the Cellular mobile service providers during the period starting from April 2010 to June 2010 in Bihar circle. The executive summary encapsulates the key findings of the Audit by providing: -

- *"Service provider performance report"* for Cellular mobile 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 Cellular mobile services: This indicates key observations and findings from different activities carried out during the Audit process

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

Name of Service Provider	Time Consistent Busy Hour (TCBH)	Network Availability					Connection Establishment (Accessibility)			Connection Maintenance (Retainability)					POI		Network Traffic Capacity and Utilization		
		Total no. of BTSs in the licensed service area	Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month	BTSs Accumulated downtime (not available for service) (%age)	No. of BTSs having accumulated downtime of >24 hours in a month	Worst affected BTSs due to downtime (%age)	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Total No. of cells exceeding 3% TCH drop (call drop)	Total no. of cells in the network	Worst affected cells having more than 3% TCH drop (call drop) rate (%age)	%age of connection with good voice quality	POI Congestion (No. of POIs not meeting the benchmark)	Total number of working POI Service Area wise	Equipped Capacity of Network in respect of Traffic in erlang	Total traffic handled in TCBH in erlang	Total no. of customers served (as per VLR) on last day of the month
Benchmark →				≤ 2%		≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%			≤ 5%	≥ 95%	≤ 0.5%				
Airtel	1900-2000	5994	10789.44	0.24%	93	1.55%	97.50%	0.65%	1.58%	1.47%	391	17926	2.18%	99.01%	0	47	475600	3712567	10744866
Aircel	1900-2000	3156	82553	3.52%	218	6.91%	97.09%	0.55%	2.17%	1.92%	1527	9391	16.26%	93.98%	2	35	107613	49764	2116319
Vodafone	1900-2000	4250	4284	0.14%	53	1.25%	96.97%	0.99%	1.71%	0.84%	589	12739	4.62%	96.28%	4	41	118183	82946	2628260
BSNL	1900-2000	3055	66550	2.93%	184	6.02%	96.94%	0.40%	1.02%	1.64%	372	7347	5.06%	96.91%	0	225	84000	32188	806097
Idea	20.00-21.00	3800	49156	1.74%	2	0.05%	97.41%	1.00%	1.53%	1.33%	10758	337758	3.19%	96.19%	0	75	93522	75422	2387643
Tata Docomo	20.00-21.00	1885	2538	0.18%	0	0.00%	98.18%	0.17%	0.15%	0.82%	66	5277	1.25%	98.13%	0	10	65398	10309	452820
S-Tel	1900-2000	1205	17165	1.91%	21	1.74%	98.51%	0.09%	1.49%	0.90%	65	3615	1.80%	97.89%	3	41	25563	3887	112081
Uninor	1900-2000	1732	51129	3.97%	108	6.24%	99.04%	0.20%	0.32%	1.06%	103	5178	1.99%	100.00%	30	46	43286	3853	696917
RTL	1900-2000	2987	5362	0.24%	43	1.44%	98.88%	0.58%	1.17%	0.96%	342	8961	3.82%	96.95%	0	10	84828	262000	2211340
RCOM	1900-2000	2416	11553	0.64%	22	0.91%	98.88%	DNP	1.02%	0.81%	13	2416	0.54%	96.44%	0	12	84828	262000	2211340
MTS	1900-2000	1256	18620	1.99%	25	1.99%	99.30%	DNP	0.02%	1.96%	4495	113040	3.98%	99.31%	0	35	18900	2671	80219
Tata Indicom	1900-2000	1032	1263	0.16%	5	0.48%	98.07%	DNP	0.04%	0.84%	2	1032	0.19%	DNP	0	187	156950	44814	1146363

*Details pertaining to these are obtained through operator done drive tests. Results of the operator assisted drive tests are explained in 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 Bihar circle apart from Reliance Communication whose audit was conducted at their central NOC at Mumbai.

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
Airtel	19.00-20.00	19.00-20.00
Aircel	19.00-20.00	19.00-20.00
Vodafone	19.00-20.00	19.00-20.00
BSNL	19.00-20.00	19.00-20.00
Idea	20.00-21.00	20.00-21.00
Tata Docomo	20.00-21.00	20.00-21.00
S-Tel	19.00-20.00	19.00-20.00
Uninor	19.00-20.00	19.00-20.00
RTL	19.00-20.00	19.00-20.00
RCOM	19.00-20.00	19.00-20.00
MTS	19.00-20.00	19.00-20.00
Tata Indicom	19.00-20.00	19.00-20.00

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

BTSs Accumulated Downtime:
In the Bihar circle, Aircel had the highest number of BTSs with a downtime of more than 24 hours per month.Aircel, BSNL and Uninor do not meet the TRAI benchmark for worst affected BTSs due to downtime in percentage as well as the TRAI benchmark for BTS accumulated downtime.

Call Set-up Success Rate (CSSR):
All the operators were comfortably meeting the benchmark on this parameter. During the audits the maximum CSSR was observed for MTS with 99.30% of their calls getting completed. All the operators were found to be calculating the parameter as per the norm specified by TRAI. CSSR was established as the ratio of total number of successful call attempts (establishment) to the total number of call attempts made.

Network Congestion parameters:
SDCCH / Paging Channel Congestion, TCH and POI are part of the network congestion parameters. All the operators except Aircel for Traffic channel congestion are meeting the TRAI specified benchmarks on the congestion parameters. Aircel does not meet the TRAI specified benchmark with a Traffic Channel congestion of 2.17% which was found during the one month data collected for the month of audit. TATA leads the way in network congestion parameters with almost negligible paging as well as traffic channel congestion. The calculation methodology of these parameters was found to be in complete accordance with what has been specified by TRAI. Both RCOM CDMA and MTS do not measure paging channel utilization. There were almost no POIs with congestion more than the benchmark (≤0.5%) except for 4 POIs for Vodafone, 3 for S-Tel, 30 for Uninor and 2 for Aircel.

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 to the total number of call attempts for all operators. Also, all of service providers were found to be meeting the TRAI specified benchmark. The lowest call drop rate was of RCOM at 0.81% while the highest was for Aircel at 1.92%.

Connections with good voice quality:

All the operators are measuring this parameter via their periodic drive tests. However, for some operators these parameters can be obtained at their switch as well. During the audit it was found that all the service providers were measuring this parameter as per the TRAI guidelines. All the service providers were meeting the TRAI benchmark except for Aircel, which had a voice quality of 93.98%. Tata Indicom did not provide IMRB with their voice quality figures.

Customer Care / Helpline Assessment

For the accessibility of customer care aspect all the service providers meet the TRAI benchmark with the exception of Docomo. Most operators like Airtel, Aircel, BSNL, Docomo, Indicom and Reliance CDMA fail to meet the benchmark for calls answered within 60 seconds (V2V).

Billing performance

All the operators except Aircel and BSNL were found to be meeting the benchmark of ≤ 0.1% complaints registered per 100 bills issued whereas the benchmark of 100% billing complaints being resolved within 4 weeks was met by all operators. In all cases where customers were due for refund, all the service providers meet the TRAI benchmark of 100% with 1 week.

Inter operator calls assessment

Inter operator call Assessment To↓ From→	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom
Airtel	NA	99%	100%	100%	98%	100%	70%	99%	100%	99%	100%	100%
Aircel	99%	NA	100%	100%	100%	100%	99%	100%	93%	96%	100%	100%
Vodafone	99%	100%	NA	99%	99%	100%	98%	100%	96%	100%	100%	99%
BSNL	100%	99%	100%	NA	99%	97%	100%	100%	98%	99%	100%	100%
Idea	100%	100%	100%	99%	NA	100%	100%	100%	99%	100%	100%	100%
Tata Docomo	98%	100%	100%	96%	98%	NA	100%	99%	90%	98%	100%	97%
S-Tel	100%	99%	93%	100%	100%	100%	NA	99%	99%	100%	99%	100%
Uninor	100%	100%	72%	83%	100%	99%	100%	NA	99%	94%	98%	100%
RTL	100%	100%	100%	43%	100%	100%	99%	100%	NA	100%	100%	100%
RCOM	99%	97%	99%	46%	100%	100%	97%	99%	100%	NA	87%	81%
MTS	100%	100%	100%	93%	100%	100%	100%	99%	99%	98%	NA	100%
Tata Indicom	100%	97%	98%	99%	100%	100%	100%	100%	95%	100%	100%	NA

The maximum problem faced by the calling operator to other operators

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. BSNL, MTS & Tata Indicom found it tough connecting to a Reliance CDMA number. BSNL had difficulty in connecting to Reliance (GSM & CDMA) and a Uninor number with less than half of their calls getting completed. From STel, only 70 out of 100 calls to a bharti number got connected. Reliance GSM had difficulty in connecting to an Aircel number. Vodafone users found it difficult to connect to an S-Tel and a Uninor number.

Results of Operator assisted Drive test

The drive test was conducted simultaneously for all the operators present in the Bihar circle. There was in total of three drive tests conducted in the circle. These tests were conducted in the cities of Patna, Ranchi and Hajipur. 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 Bihar telecom circles 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 Bihar circle were conducted in the cities of Patna, Ranchi and Hajipur was conducted along the following route:

	Type of location									
Outdoor	Peiphery of the city	NA	STATION MORE TO BUTI MORE	Paswan chowk to mujaffarpur road	Paswan Chowk to Jail Chowk	Paswan Chowk to Jail	Paswan Chauk to Jail More	Paswan Chauk to Jail More	PASWAN CHOWK TO JAIL CHOWK.	Paswan Chowk to Muzaffarpur Road
	Congested area	NA	SHAHJAHANAND CHOWK TO PISCA MORE	Paswn Chowk to Sonpur bridge	Paswan Chowk Rajendera, Gandhi Chowk	Paswan Chawk to Main market Area	Paswan chawk to Ghandhi Chawk	Paswan chawk to Ghandhi Chawk	PASWAN CHOWK TO GANDHI CHOWK.	Paswan Chowk to Sonepur Bridge
	Across the city	NA	FIRAYALAL TO BIRSA MORE	Ramashish Chowk to Sonpur Road	Ramashis Chowk to RAI Chowk	Ramashish Chawk to Doctor's Colony	Ramashish chawk to Ghandhichawk	Ramashish chawk to Ghandhichawk	RAMASHISH CHOWK TO NAKASH CHOWK	Ramasis Chowk to Sone Pur Road
Indoor	Office complex	NA	Hari om tower	Railway Zonal office	Railway Zonal office	DRM Office	Lilliput	Lilliput	HAJIPUR DRM OFFICE(RAILWAY)	Railway Office
	Shopping complex	NA	Big Bazar	Lilliput	Lilliput	Lilliput Shop	Railway DRM office, Hazipur	Railway DRM office, Hazipur	LILLIPUT	LILLIPUT

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

Drive Test – City 1

	Benchmark	Airtel		Aircel		Vodafone		BSNL		Idea		Tata Docomo		S-Tel		Uninor		RTL		RCOM		MTS		Tata Indicom	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	≥ 95%	99.18%	97.39%	89.03%	92.63%	96.70%	94.70%	94.40%	95.70%	94.03%	96.08%	NA	NA	98.15%	95.76%	96.50%	94.53%	96.23%	92.65%	94.17%	88.76%	99.92%	99.63%	99.48%	97.62%
CSSR	≥ 95%	97.92%	94.35%	100.00%	99.01%	100.00%	100.00%	100.00%	100.00%	94.44%	99.39%	NA	NA	100.00%	100.00%	100.00%	99.13%	100.00%	98.15%	93.33%	99.08%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls		2.08%	5.65%	0.00%	0.99%	0.00%	0.00%	0.00%	0.00%	5.56%	0.61%	NA	NA	0.00%	0.00%	0.00%	0.87%	0.00%	1.85%	6.67%	0.92%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	2.13%	0.85%	0.00%	0.00%	0.00%	0.00%	0.00%	0.93%	0.00%	0.00%	NA	NA	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.92%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	0.00%	NA	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Drive Test – City 2

	Benchmark	Airtel		Aircel		Vodafone		BSNL		Idea		Tata Docomo		S-Tel		Uninor		RTL		RCOM		MTS		Tata Indicom	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	≥ 95%	96.39%	96.52%	95.42%	94.26%	93.39%	95.78%	93.33%	92.03%	97.05%	96.67%	96.52%	91.68%	99.56%	97.33%	99.80%	96.89%	95.90%	87.37%	96.10%	91.57%	99.92%	99.65%	99.64%	96.19%
CSSR	≥ 95%	100.00%	93.94%	100.00%	97.78%	100.00%	98.96%	100.00%	98.89%	100.00%	99.12%	95.24%	94.62%	100.00%	100.00%	100.00%	66.67%	97.67%	97.92%	95.35%	97.78%	100.00%	99.06%	100.00%	100.00%
%age Blocked calls		0.00%	6.06%	0.00%	2.22%	0.00%	1.04%	0.00%	1.11%	0.00%	0.88%	4.76%	5.38%	0.00%	0.00%	0.00%	33.33%	2.33%	2.08%	4.65%	2.22%	0.00%	0.94%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	3.23%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.06%	0.00%	2.22%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	0.00%	100.00%	99.30%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Drive Test – City 3

	Benchmark	Airtel		Aircel		Vodafone		BSNL		Idea		Tata Docomo		S-Tel		Uninor		RTL		RCOM		MTS		Tata Indicom	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	≥ 95%	98.31%	97.56%	96.59%	94.03%	98.55%	97.05%	98.10%	95.80%	99.02%	98.69%	95.15%	91.35%	99.23%	98.43%	90.12%	93.81%	97.46%	95.39%	22.14%	65.33%	100.00%	99.96%	99.53%	98.96%
CSSR	≥ 95%	97.96%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.20%	100.00%	98.81%	100.00%	95.71%	100.00%	100.00%	100.00%	100.00%	100.00%	98.61%	100.00%	98.70%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls		2.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.80%	0.00%	1.19%	0.00%	4.29%	0.00%	0.00%	0.00%	0.00%	0.00%	1.39%	0.00%	1.30%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	1.11%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.49%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.25%	0.00%	5.26%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	10.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Not meeting the benchmark

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

ALL SERVICE PROVIDERS

Patna: There was interference recorded for all operators in the outdoor areas near Reza Bazaar, Patna bypass, Sabji Bag area, near Prakasam barrage, near Zoo, near Sultanganj while in the indoor areas inadequate coverage and interference was recorded for MTS.

Ranchi: There was interference and low signal strength recorded for MTS and BSNL in the outdoor areas of Hesel, Kanta Tola, Patel Nagar, Near Airport and Sukala Colony. In the indoor areas there was inadequate coverage and interference recorded for MTS and BSNL in Big Bazaar and Hariom Tower.

Hajipur: There was interference and low signal strength recorded for MTS in the outdoor areas of Hajipur Market Area (Center Area) and near Railway Station while in the indoor areas interference and inadequate coverage was recorded for MTS.

Conclusions:

Drive test was conducted by IMRB with the help of service providers to measure this parameter. In the drive test it was found that with the exception of S-Tel, MTS, Tata Indicom and Airtel, all the operators are failing meet the TRAI benchmark on voice quality in at least 1 city.

1. Airtel does not meet the TRAI benchmark for CSSR in Patna and Ranchi. Also Idea and Uninor do not meet the TRAI benchmark for CSSR in Patna whereas Tata Docomo and Uninor do not meet the benchmark in Ranchi.
2. Airtel does not meet the benchmark for call drop rate in Patna and Ranchi.
3. RCOM-CDMA does not meet the TRAI benchmark on call drop rate in Ranchi

Summary of Live Measurement Results – Cellular Mobile Services

Name of Service Provider	Connection Establishment (Accessibility)			Connection Maintenance (Retainability)			Metering and Billing	Response time to customer for assistance	
	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality	%age complaints resolved within 4 weeks	Accessibility of call centre/ customer care	Percentage of calls answered by the operators (voice to voice) within 60 seconds
Benchmark	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 5%	≥ 95%	100%	≥ 95%	≥ 90%
Airtel	97.10%	0.86%	1.66%	1.87%	3.43%	97.34%	42.86%	100.00%	92.00%
Aircel	98.80%	0.31%	0.72%	1.77%	18.13%	93.40%	NA	36.00%	100.00%
Vodafone	96.85%	0.95%	1.62%	0.89%	4.77%	95.80%	100.00%	100.00%	100.00%
BSNL	95.12%	0.37%	0.96%	1.83%	6.02%	94.79%	100.00%	56.00%	51.00%
Idea	96.88%	1.00%	1.70%	1.31%	3.25%	96.57%	100.00%	88.00%	88.00%
Tata Docomo	97.96%	0.13%	0.20%	1.05%	5.75%	93.11%	100.00%	100.00%	100.00%
S-Tel	98.73%	0.05%	1.27%	0.78%	3.41%	97.89%	NA	100.00%	100.00%
Uninor	98.64%	0.99%	0.59%	1.74%	2.85%	95.18%	NA	100.00%	100.00%
RTL	98.44%	0.56%	0.76%	0.99%	3.49%	94.68%	66.00%	100.00%	86.00%
RCOM	98.55%	DNP	0.86%	0.85%	1.12%	85.13%	62.00%	100.00%	98.00%
MTS	99.28%	NA	0.00%	0.37%	1.96%	99.78%	NA	94.00%	90.00%
Tata Indicom	98.37%	0.00%	0.03%	0.52%	0.00%	98.52%	25.00%	100.00%	98.00%

* Based on operator assisted drive tests conducted by IMRB

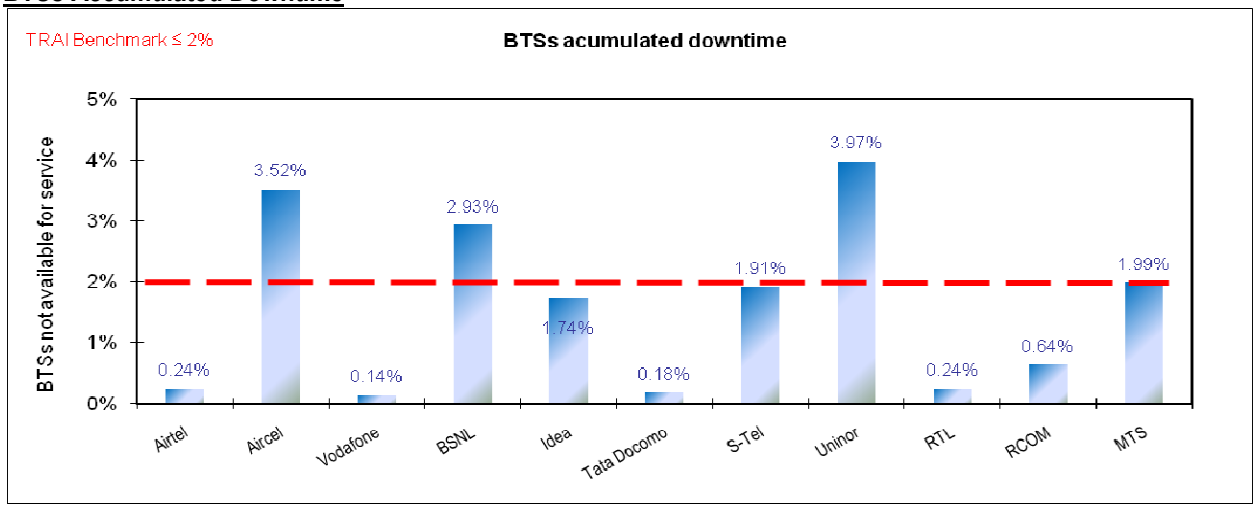
Not meeting the benchmark

During the three day live measurement, all operators were found to be meeting the TRAI benchmark on all the parameters related to connection established. Aircel, BSNL, Docomo and Reliance do not meet the TRAI benchmark for voice quality and Reliance, Tata Indicom and Airtel fail to meet TRAI benchmark for % complaints resolved in 4 weeks. BSNL, MTS, Idea and Aircel do not meet the TRAI benchmark for customer care accessability.

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

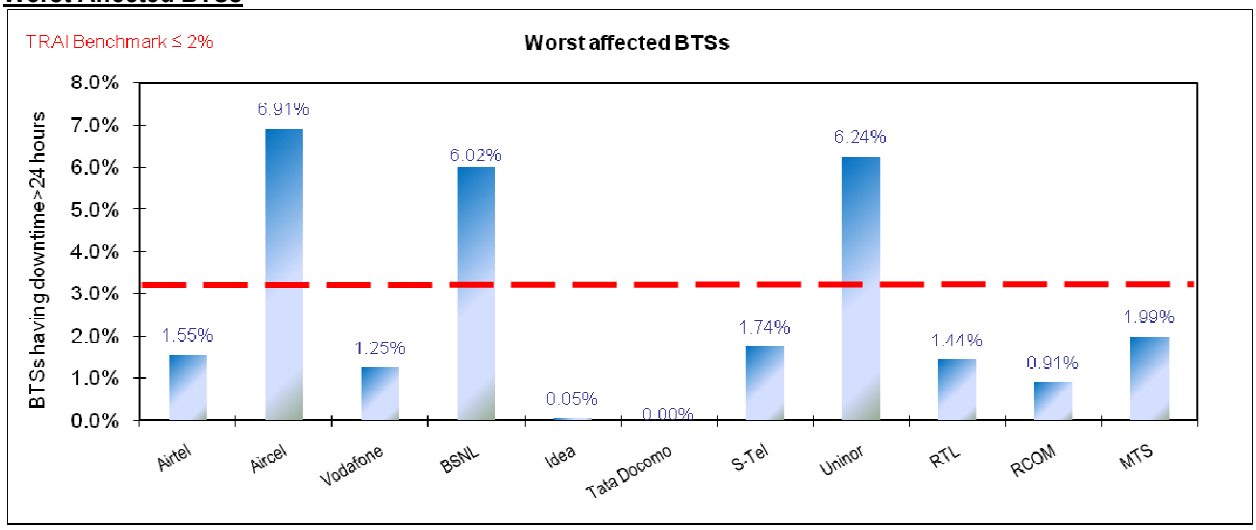
11.1 Graphical/Tabular Representations for Cellular Mobile Services

BTSs Accumulated Downtime



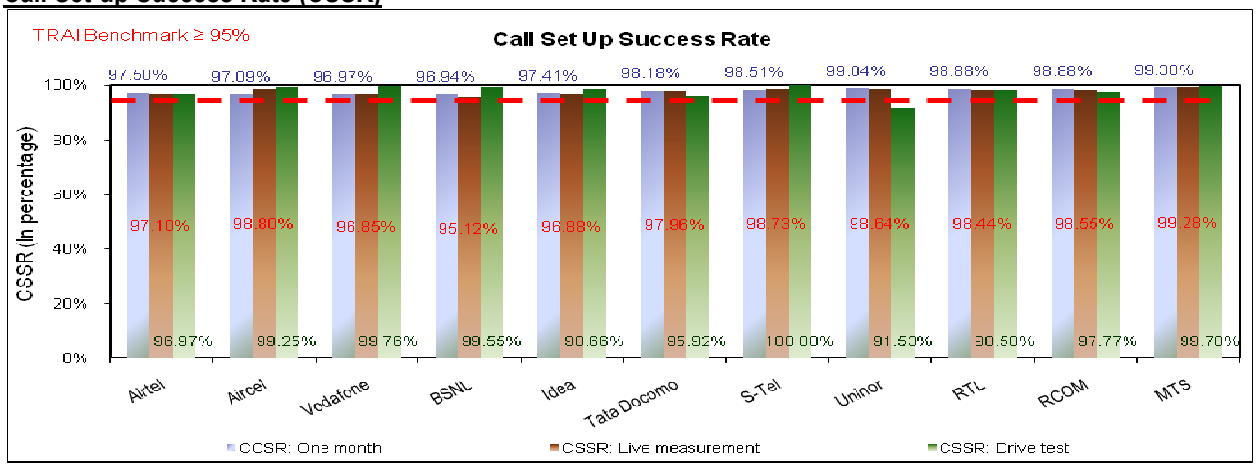
Operator(s) meeting benchmark: Airtel, Vodafone, Idea, Tata Docomo, S-Tel, RTL, RCOM, MTS, Tata Indicom
Operator(s) not meeting the benchmark: Aircel, BSNL, Uninor

Worst Affected BTSs



Operator(s) meeting benchmark: Airtel, Vodafone, Idea, Tata Docomo, S-Tel, RTL, RCOM, MTS, Tata Indicom
Operator(s) not meeting the benchmark: Aircel, BSNL, Uninor

Call Set-up Success Rate (CSSR)



One month

All the operators meet the benchmark

Live measurement

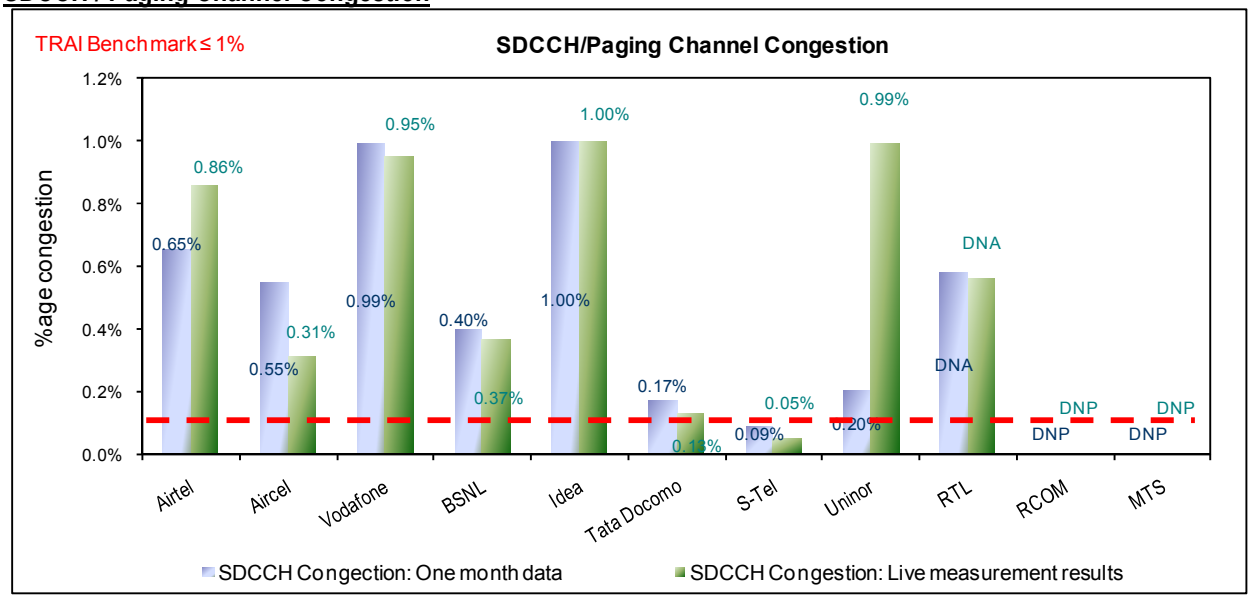
All the operators meet the benchmark

Drive test

Operator(s) meeting benchmark: Airtel, Aircel, Vodafone, BSNL, Idea, Tata Docomo, S-Tel, RTL, RCOM, MTS, Tata Indicom

Operator(s) not meeting the benchmark: Uninor

SDCCH / Paging Channel Congestion



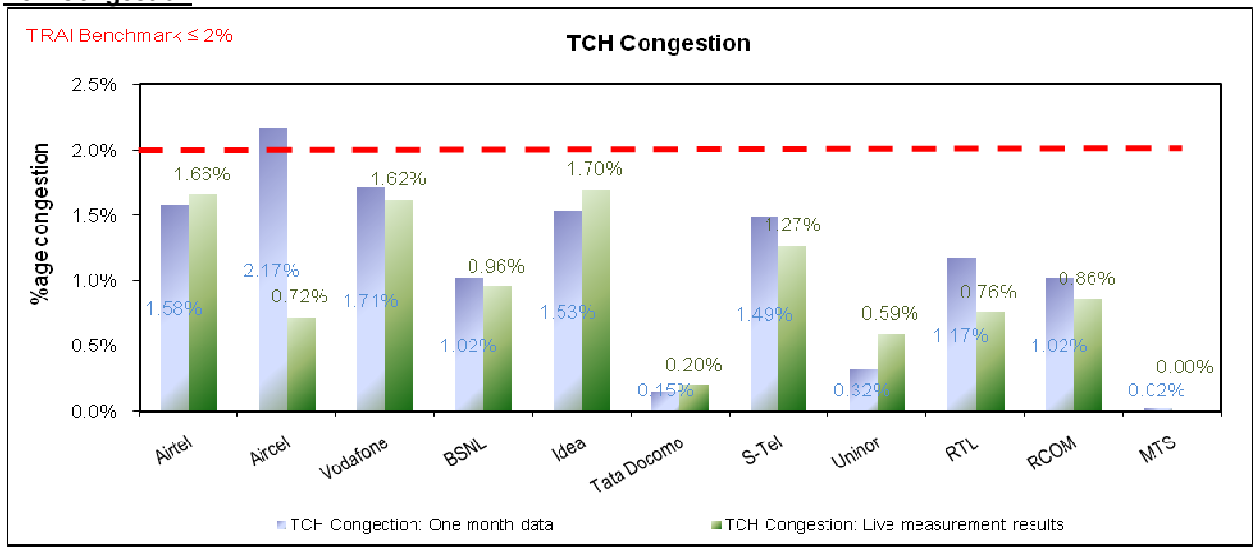
One month

All the operators meet the benchmark

Live measurement

All the operators meet the benchmark

TCH Congestion



One month

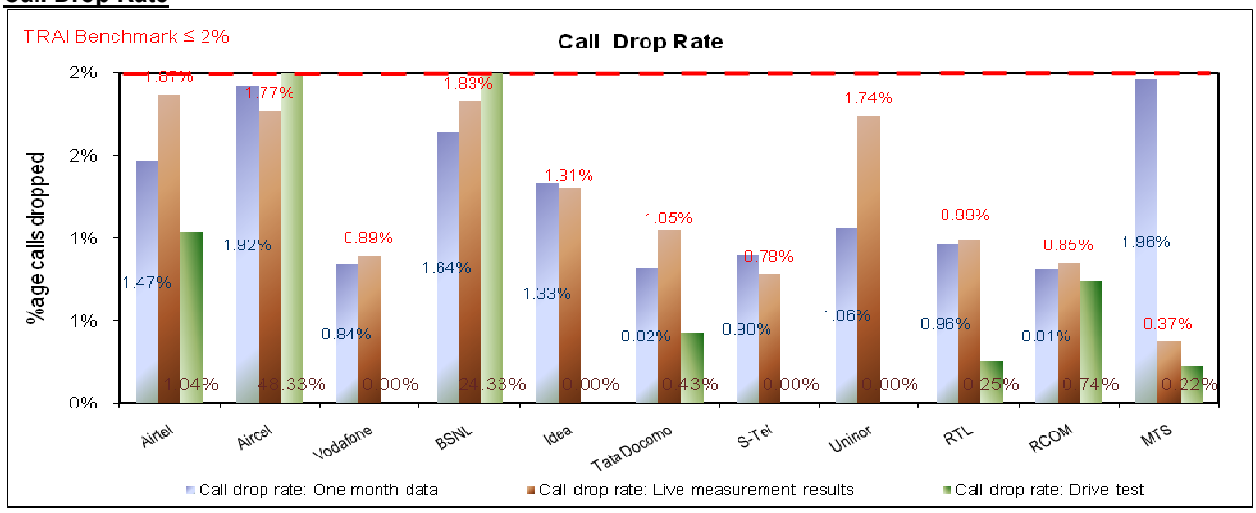
Operator(s) meeting benchmark: Airtel, Vodafone, BSNL, Idea, Tata Docomo, S-Tel, Uninor, RTL, RCOM, MTS, Tata Indicom

Operator(s) not meeting the benchmark: Aircel

Live measurement

All the operators meet the benchmark

Call Drop Rate



One month

All the operators meet the benchmark

Live measurement

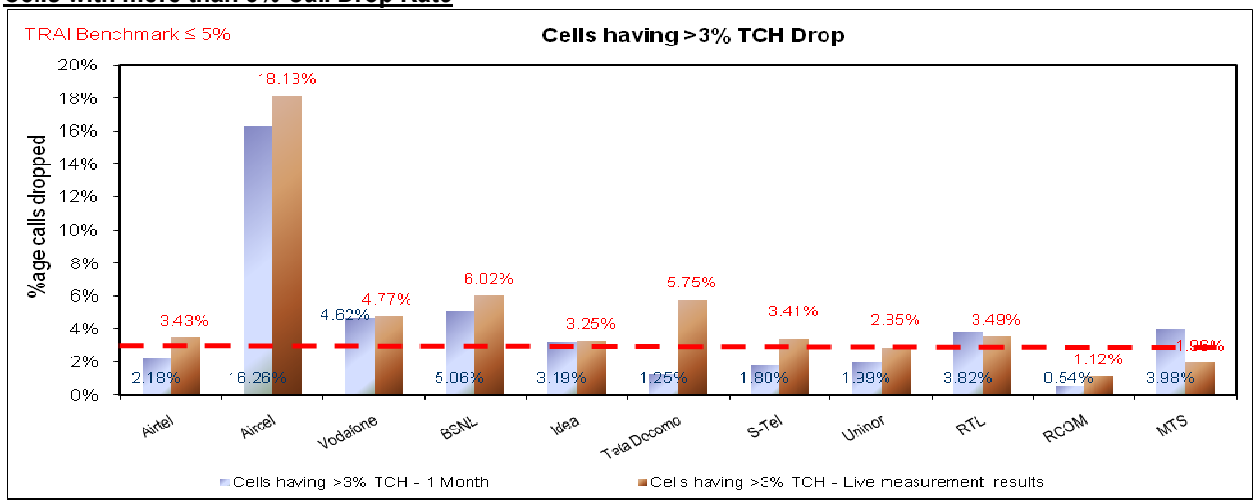
All the operators meet the benchmark

Drive test

Operator(s) meeting benchmark: Airtel, Vodafone, Idea, Tata Docomo, S-Tel, Uninor, RTL, RCOM, MTS, Tata Indicom

Operator(s) not meeting the benchmark: Aircel, BSNL

Cells with more than 3% Call Drop Rate



One month

Operator(s) meeting benchmark: Airtel, Vodafone, Idea, Tata Docomo, S-Tel, Uninor, RTL, RCOM, MTS, Tata Indicom

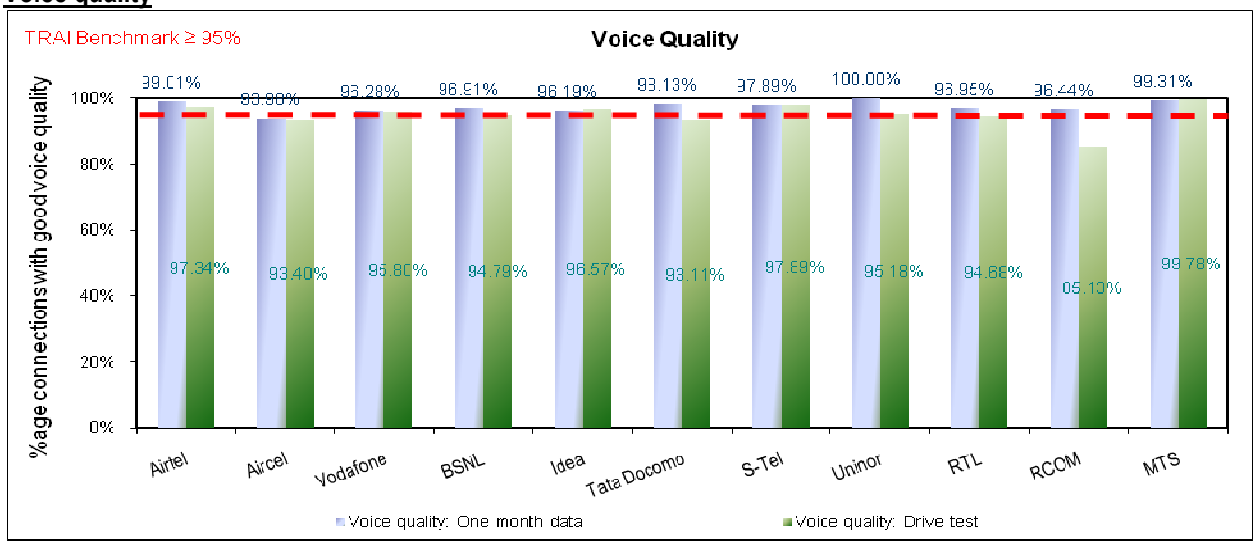
Operator(s) not meeting the benchmark: Aircel, BSNL

Live measurement

Operator(s) meeting benchmark: Airtel, Vodafone, Idea, S-Tel, Uninor, RTL, RCOM, MTS, Tata Indicom

Operator(s) not meeting the benchmark: Aircel, BSNL, Tata Docomo

Voice quality



One month

Operator(s) meeting benchmark: Airtel, Vodafone, BSNL, Idea, Tata Docomo, S-Tel, Uninor, RTL, RCOM, MTS

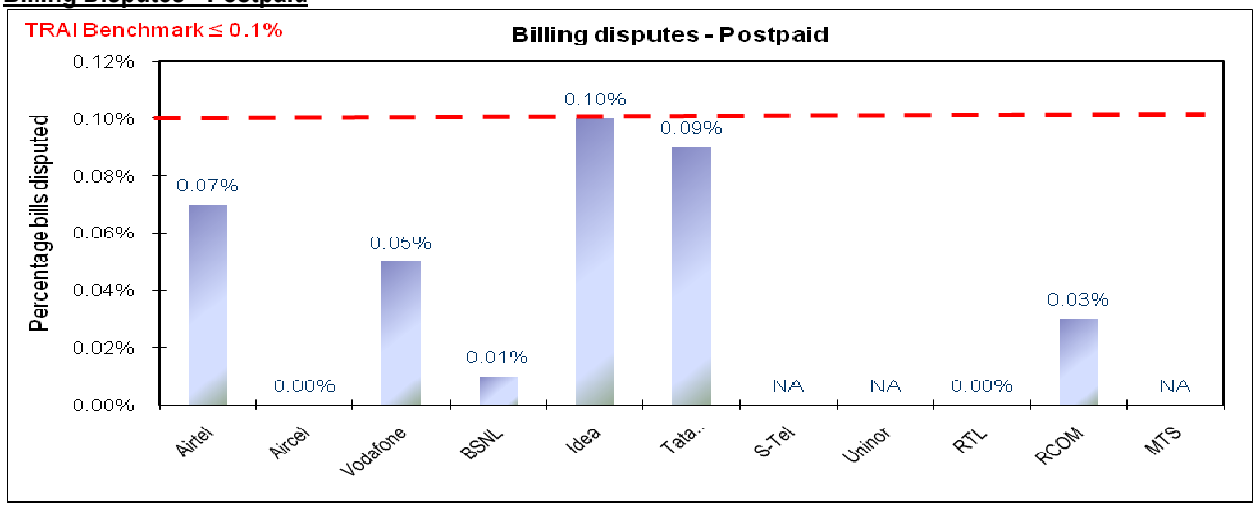
Operator(s) not meeting the benchmark: Aircel

Live measurement (Drive test)

Operator(s) meeting benchmark: Airtel, Vodafone, Idea, S-Tel, Uninor, MTS, Tata Indicom

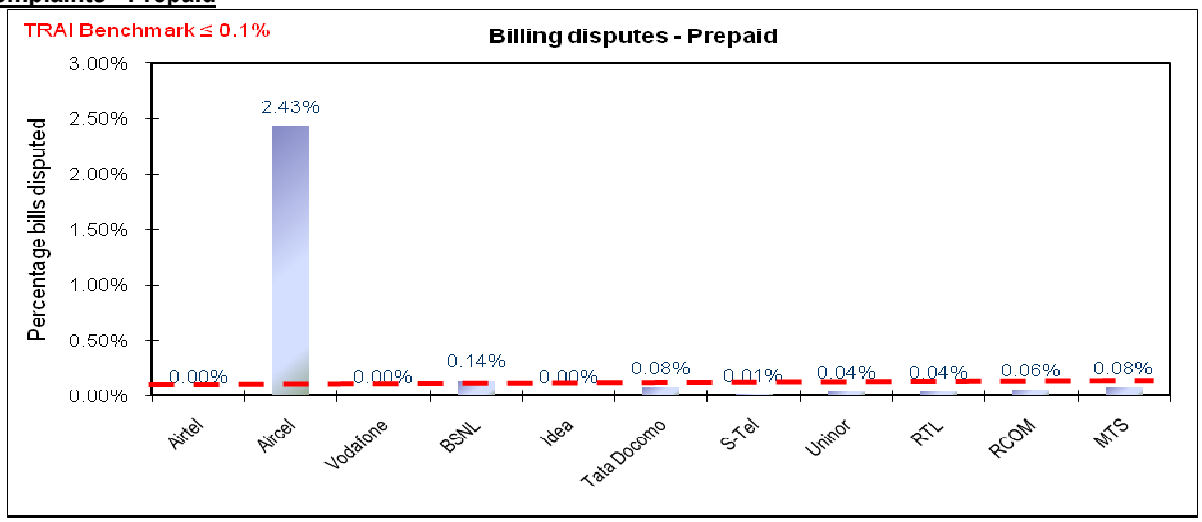
Operator(s) not meeting the benchmark: Aircel, BSNL, Tata Docomo, RTL, RCOM

Billing Disputes - Postpaid



All the operators meet the benchmark

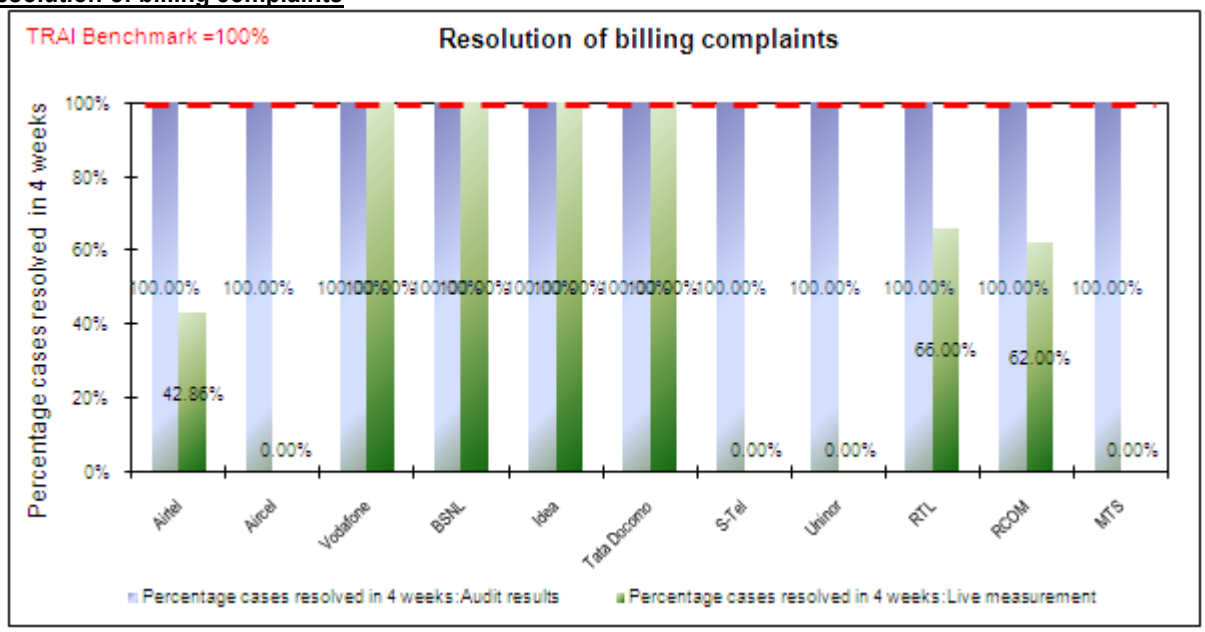
Complaints - Prepaid



Operator(s) meeting benchmark: Airtel, Vodafone, Idea, Tata Docomo, S-Tel, Uninor, RTL, RCOM, MTS, Tata Indicom

Operator(s) not meeting the benchmark: Aircel, BSNL

Resolution of billing complaints



One month

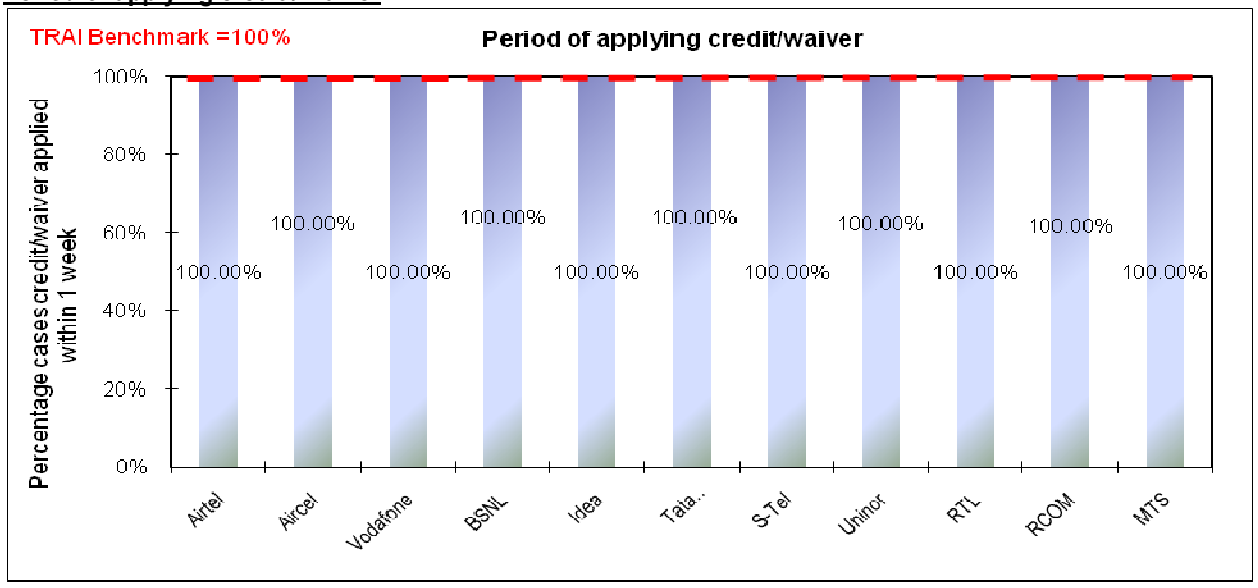
All the operators meet the benchmark

Live measurement

Operator(s) meeting benchmark: Vodafone, BSNL, Idea, Tata Docomo

Operator(s) not meeting the benchmark: Airtel, RTL, RCOM, Tata Indicom

Period of applying credit / waiver

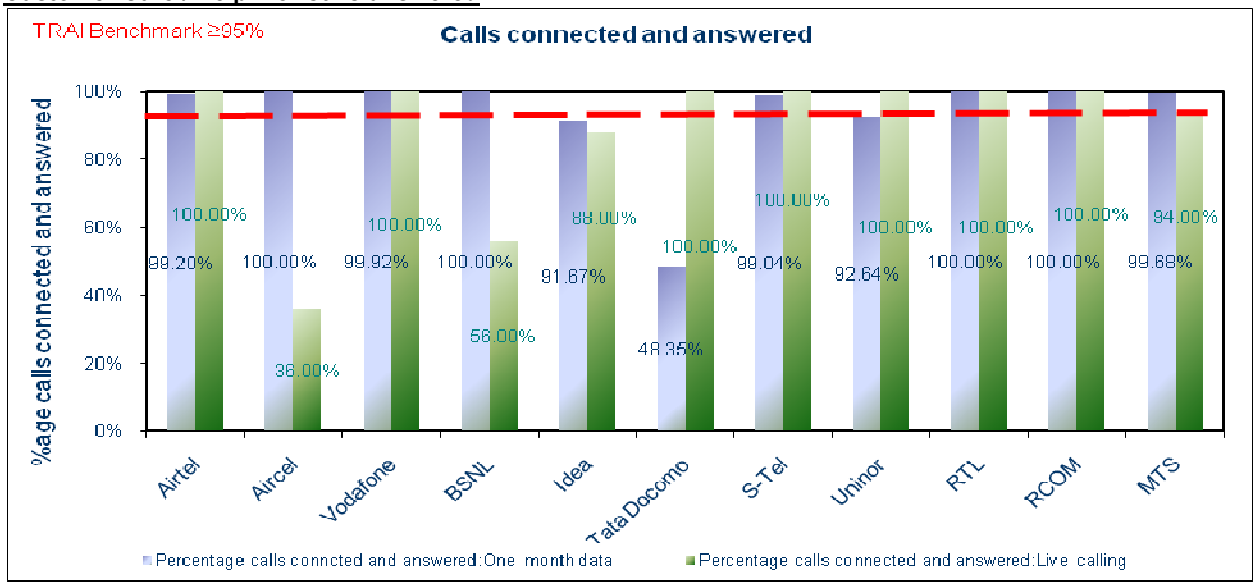


All the operators meet the benchmark

Live calling for billing Complaints

Resolution of billing complaints	B'mark	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom
Total Number of calls made		7	0	1	1	2	1	NA	NA	50	50	NA	4
Number of cases resolved in 4 weeks		3	0	1	1	2	1	NA	NA	33	31	NA	1
Percentage cases resolved in four weeks	100%	42.86%	NA	100.00%	100.00%	100.00%	100.00%	NA	NA	66.00%	62.00%	NA	25.00%

Customer Care / Helpline: Calls answered



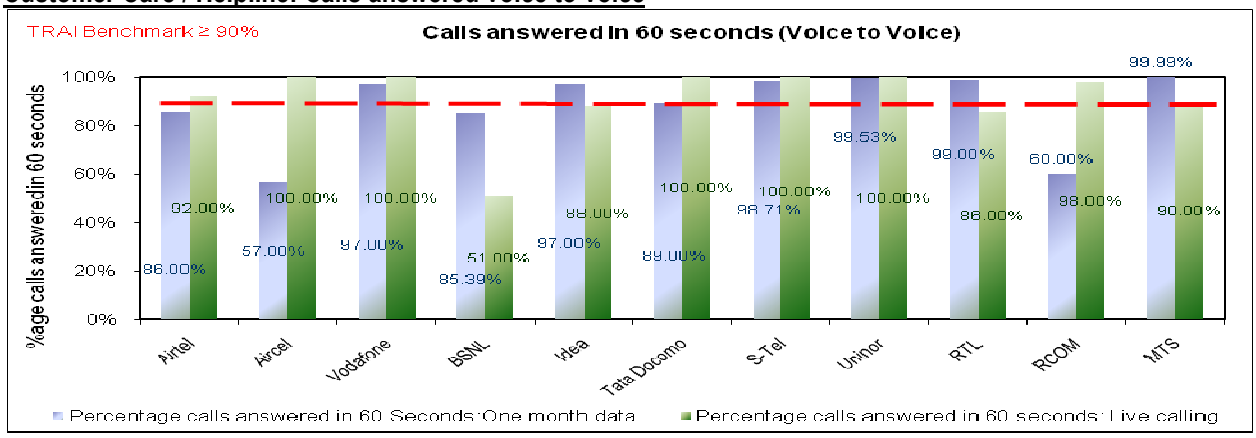
One month

Operator(s) meeting benchmark: Airtel, Aircel, Vodafone, BSNL, S-Tel, RTL, RCOM, MTS, Tata Indicom
Operator(s) not meeting the benchmark: Idea, Tata Docomo, Uninor

Live measurement

Operator(s) meeting benchmark: Airtel, Vodafone, Tata Docomo, S-Tel, Uninor, RTL, RCOM, Tata Indicom
Operator(s) not meeting the benchmark: Aircel, BSNL, Idea, MTS

Customer Care / Helpline: Calls answered voice to voice



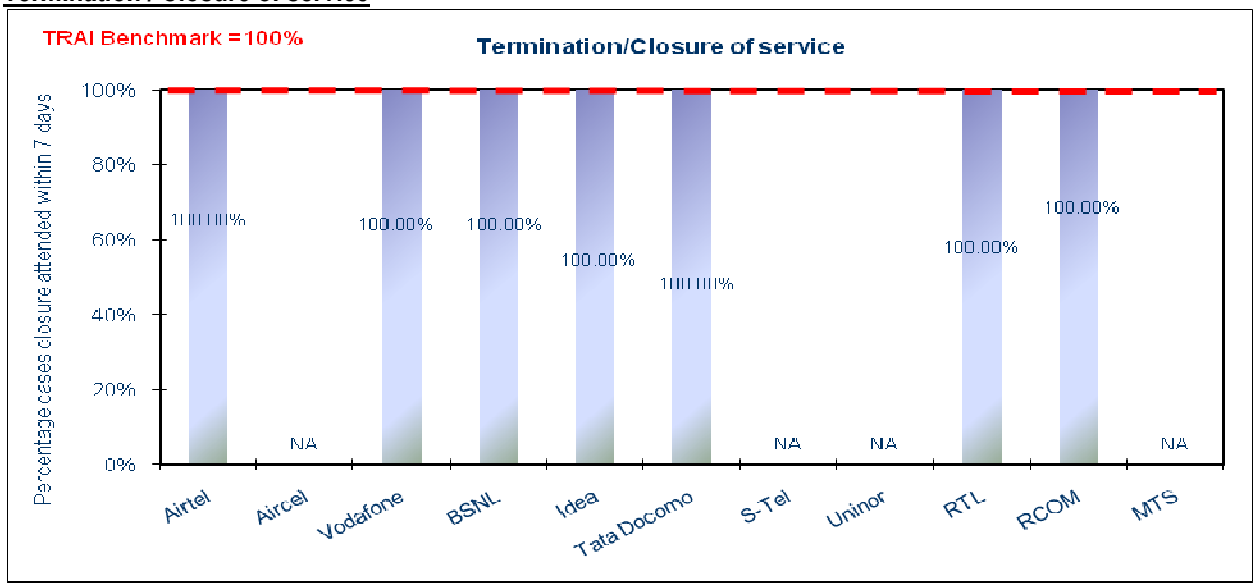
One month

Operator(s) meeting benchmark: Vodafone, Idea, S-Tel, Uninor, RTL, MTS, Tata Indicom
Operator(s) not meeting the benchmark: Airtel, Aircel, BSNL, Tata Docomo, RCOM

Live measurement

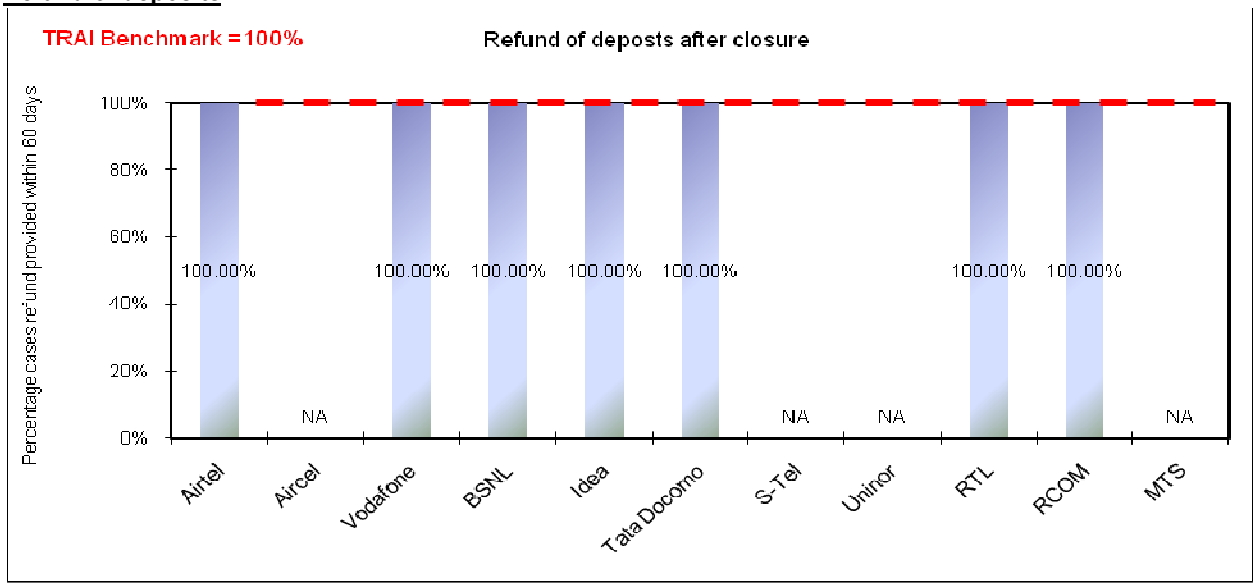
Operator(s) meeting benchmark: Airtel, Aircel, Vodafone, Tata Docomo, S-Tel, Uninor, RCOM, MTS, Tata Indicom
Operator(s) not meeting the benchmark: BSNL, Idea, RTL

Termination / Closure of service



All the operators meet the benchmark

Refund of deposits



Operator(s) meeting benchmark: Airtel, Vodafone, BSNL, Idea, Tata Docomo, RTL, RCOM
Operator(s) not meeting the benchmark: Tata Indicom

Inter operator calls assessment

Inter operator call Assessment To↓ From→	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom
Airtel	NA	99%	100%	100%	98%	100%	70%	99%	100%	99%	100%	100%
Aircel	99%	NA	100%	100%	100%	100%	99%	100%	93%	96%	100%	100%
Vodafone	99%	100%	NA	99%	99%	100%	98%	100%	96%	100%	100%	99%
BSNL	100%	99%	100%	NA	99%	97%	100%	100%	98%	99%	100%	100%
Idea	100%	100%	100%	99%	NA	100%	100%	100%	99%	100%	100%	100%
Tata Docomo	98%	100%	100%	96%	98%	NA	100%	99%	90%	98%	100%	97%
S-Tel	100%	99%	93%	100%	100%	100%	NA	99%	99%	100%	99%	100%
Uninor	100%	100%	72%	83%	100%	99%	100%	NA	99%	94%	98%	100%
RTL	100%	100%	100%	43%	100%	100%	99%	100%	NA	100%	100%	100%
RCOM	99%	97%	99%	46%	100%	100%	97%	99%	100%	NA	87%	81%
MTS	100%	100%	100%	93%	100%	100%	100%	99%	99%	98%	NA	100%
Tata Indicom	100%	97%	98%	99%	100%	100%	100%	100%	95%	100%	100%	NA

The maximum problem faced by the calling operator to other operators

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. BSNL, MTS & Tata Indicom found it tough connecting to a Reliance CDMA number. BSNL had difficulty in connecting to Reliance (GSM & CDMA) and a Uninor number with less than half of their calls getting completed. From STel, only 70 out of 100 calls to a bharti number got connected. Reliance GSM had difficulty in connecting to an Aircel number. Vodafone users found it difficult to connect to an S-Tel and a Uninor number.

12.0 Compliance reports: Results of Verification of PMR

12.1 Cellular Mobile services

Name of Service Provider		Network availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)			POI	Metering and Billing				Response time to customer for assistance		Termination of service	
		BTSs Accumulated downtime	Worst affected BTSs due to downtime	Call Set-up Success Rate	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality	Point of Interconnection (POI) Congestion	Metering and billing credibility - Postpaid	Metering and billing credibility - Prepaid	%age complaints resolved within 4 weeks	Period of applying credit/waiver less than 1 week	Accessibility of call centre/ customer care	%age of calls answered by the operators within 60 sec	%age requests for Termination within 7 days	Refund of deposits after closure within 60 days
Benchmark		≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 5%	≥ 95%	≤ 0.5%	≤ 0.1%	≤ 0.1%	100%	100%	≥ 95%	≥ 90%	100%	100%
Airtel	PMR	0.96%	8.62%	96.35%	1.46%	1.24%	1.53%	6.33%	98.09%	5	0.00%	0.00%	100.00%	100.00%	88.62%	85.00%	100.00%	100.00%
	IMRB	0.98%	8.55%	96.35%	1.49%	1.26%	1.53%	6.28%	98.41%	5	0.02%	0.00%	100.00%	100.00%	89.00%	85.00%	100.00%	100.00%
Aircel	PMR	1.00%	7.89%	94.93%	2.20%	3.54%	2.03%	20.51%	93.60%	4.00%	0.00%	0.08%	100.00%	100.00%	100.00%	96.00%	100.00%	100.00%
	IMRB	1.02%	8.02%	94.88%	2.64%	3.93%	2.18%	20.34%	93.60%	0.34%	0.00%	0.08%	100.00%	100.00%	100.00%	99.00%	100.00%	25.00%
Vodafone	PMR	0.19%	1.24%	96.73%	0.72%	1.39%	1.38%	4.86%	95.58%	0.00%	0.02%	0.02%	100.00%	100.00%	99.00%	95.00%	100.00%	100.00%
	IMRB	0.19%	1.24%	96.73%	0.72%	1.39%	1.38%	4.87%	95.58%	0.27%	0.02%	0.04%	100.00%	100.00%	98.34%	87.46%	100.00%	100.00%
BSNL	PMR	0.00%	1.00%	98.43%	0.50%	1.27%	1.73%	3.93%	98.47%	0.00%	0.07%	0.06%	100.00%	100.00%	100.00%	92.70%	100.00%	100.00%
	IMRB	2.23%	6.17%	97.70%	0.35%	0.95%	1.45%	4.35%	98.00%	2.00%	0.03%	0.04%	100.00%	100.00%	91.25%	85.07%	100.00%	100.00%
Idea	PMR	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	0.09%	0.01%	100.00%	100.00%	64.00%	94.00%	80.00%	100.00%
	IMRB	1.70%	0.73%	99.67%	0.61%	0.78%	1.16%	4.39%	95.80%	0.00%	0.09%	0.01%	100.00%	100.00%	64.00%	94.00%	80.34%	100.00%
RTL	PMR	0.11%	0.43%	98.47%	0.42%	0.77%	0.89%	1.10%	96.74%	0.00%	0.00%	0.05%	100.00%	100.00%	0.00%	99.00%	100.00%	100.00%
	IMRB	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	0.00%	0.00%	0.05%	100.00%	100.00%	NA	99.00%	100.00%	100.00%
RCOM	PMR	0.44%	0.45%	99.12%	0.00%	0.48%	0.92%	0.49%	97.64%	0.00%	0.10%	0.05%	100.00%	100.00%	0.00%	73.00%	100.00%	100.00%
	IMRB	NA	NA	99.12%	NA	0.48%	0.92%	0.92%	NA	0.00%	0.10%	0.05%	100.00%	100.00%	NA	90.00%	100.00%	100.00%
MTS	PMR	1.76%	0.93%	99.36%	0.00%	0.19%	1.26%	6.77%	98.20%	0.67%	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA
	IMRB	1.75%	0.82%	99.36%	NA	0.27%	1.52%	7.67%	99.24%	0.33%	DNA	0.00%	100.00%	100.00%	99.57%	99.20%	DNA	DNA
Tata Indicom	PMR	2.81%	0.47%	92.17%	0.00%	0.15%	0.82%	0.00%	98.33%	0.00%	0.04%	0.01%	92.35%	100.00%	100.00%	98.00%	99.00%	47.22%
	IMRB	0.15%	0.48%	98.80%	0.00%	0.15%	0.82%	0.00%	98.56%	0.00%	0.01%	0.01%	99.00%	99.00%	96.00%	91.00%	100.00%	78.00%

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

13.0 Conclusions

13.1 Cellular Mobile services

1. The figures reported by all the operators on all parameters do not match the figures obtained on verification for at least one operator.
2. Aircel does not meet the TRAI benchmark for 7 parameters which include connection establishment parameters such as SDCCH, TCH and mainteanance parameters such as voice quality and call drop rate.
3. Airtel, BSNL and Idea do not meet the TRAI parameters for call centre accessability. Airtel, BSNL and Vodafone do not meet the TRAI benchmarks for the parameter calls answered within 60 seconds.
4. Tata Indicom falls short of the TRAI benchmarks for the metering and billing parameters such as the percentage of billing complaints solved within 4 weeks. Tata Indicom also falls short of the TRAI benchmark set for number of refunds given within 60 days.
5. BSNL also does not meet the TRAI benchmarks for the Network availability parameters such as BTS accumulated downtime and worst affected BTSs due to downtime.

Section C
BROADBAND

14.0 Sampling Methodology

14.1 Sampling for Broadband service providers

- For BSNL, Audit was conducted at the 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 BSNL, the data pertaining to network related parameters was obtained by IMRB Auditors at the central node in Bangalore.

- For Sify, the data pertaining to network related parameters was obtained by IMRB Auditors at the central node in Chennai.

- Following Broadband service providers were Audited in Bihar & Jharkhand circle:

	Name of Operator
Operator 1	BSNL – Bihar
Operator 2	BSNL - Jharkhand
Operator 3	Sify

15.0 Audit methodology

15.1 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}

16.0 Executive Summary

The objective assessment of Quality of Services (QoS) was carried out by IMRB International for all the Broadband service providers during the period starting from April 2010 to June 2010 in Bihar & Jharkhand circle.

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

Parameters	Benchmarks	BSNL* - Bihar	BSNL* - Jharkhand	Sify
Service provisioning uptime				
Percentage connections provided within 15 days	100%	99.72%	99.92%	100.00%
Fault repair restoration time				
Percentage faults repaired by next working days	> 90%	92.35%	91.72%	94.87%
Percentage faults repaired within three working days	> 99%	97.89%	100.00%	100.00%
Billing performance				
Billing complaints per 100 bills issued	< 2%	0.00%	0.12%	NA
%age of billing complaints resolved in 4 weeks	100%	NA	100.00%	NA
%age cases in which refund of deposits after closure was made in 60 days	100%	NA	100.00%	NA
Customer care/helpline assessment (Voice to Voice)				
Percentage calls answered within 60 seconds	> 60%	100.00%		100.00%
Percentage calls answered within 90 seconds	> 80%	94.34%		100.00%
Bandwidth utilization/Throughput				
Intra network links (POP to ISP Node)		297		422
Total number of intra network links > 90%		4		0
Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)		345		23
Percentage bandwidth utilized on upstream links	< 80%	72.20%		86.16%
Broadband download speed	> 80%	90.00%		95.00%
Service availability/uptime	> 98%	99.48%		100.00%
Packet loss	< 1%	0.00%		<1%
Network Latency				
POP/ISP Node to NIXI	< 120 msec	15		< 45
ISP node to NAP port (Terrestrial)	< 350 msec	219		< 300

{*Note: For BSNL data pertains to the sample 5% of exchanges audited during the period of to April to June 2010, whereas for rest of the operators figures pertain to all the exchanges present in the circle}

** Methodology not in line with QoS

Figures provided on All India basis

Not meeting the benchmark

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

Critical findings and Key take outs: Broadband services

Before concluding the Audit findings for Broadband services we would like to accentuate the fact that some service providers claimed that they were submitting the PMR basis their inference of the QoS parameters. Also, there were differences observed in level of reporting for e.g. Sify, and BSNL (for network related parameters) consider all India as one circle. 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 five broadband service providers in Bihar & Jharkhand circle are highlighted below

Service provisioning/Activation time

- BSNL marginally falls short of TRAI benchmark of 100% connections to be provided within 15 days in both Bihar and Jharkhand circle.
- For Live calling carried out by IMRB auditors BSNL Bihar scores the lowest with only 36% subscribers claiming that connection was provided within 15 days. For rest of the service providers scores are observed to be >85%.

Fault Repair/Restoration time

- All service providers are meeting TRAI benchmark for fault repair within next working day for month of audit.
- All service providers except BSNL in Bihar are meeting the TRAI specified benchmark of 99% for fault repair within three working days
- 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.

Billing performance

- All the service providers were found to be meeting the benchmark of percentage billings complaints received.
- Sify claimed to have no billing complaints as it has got only prepaid connections
- BSNL - Jharkhand did not meet the benchmark for 100% resolution of billing complaints within 4 weeks during live calling.

Customer Care/Helpline Assessment

- All the operators meet the TRAI specified benchmark for calls answered by the operator in 60 and 90 seconds for the month in which audit was carried out and also during live calling
- TRAI can look into making benchmark of Customer care/Helpline assessment for Broadband services more stringent in line with Basic and Cellular services

Bandwidth Utilization:

- All the service providers were found to be using Multiple Router Traffic Grapher (MRTG) to measure the bandwidth utilization at intra network links.
- All the service providers were found to be reporting combined bandwidth utilization for corporate and household customers as there is no mechanism available to provide it separately for different users.
- For Intra network link, data for Sify and BSNL was obtained on all India bases. 4 of the 297 links tested for BSNL was found to be having above 90% bandwidth utilization for the month in which audit was carried out.

- For Bandwidth utilization on upstream links (From ISP Node to IGSP/NIXI), all operators are meeting TRAI specified benchmark for month of audit

Download speed

- 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. These measurements were carried out by IMRB auditors on a sample basis during visits at PoPs and ISP Node
- However, no historic data was available for verification of records for month of Audit as well as quarter ending October to December 2009 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:

- All the service providers are meeting the benchmark on service availability/uptime for the month of audit and 3 day live measurement carried out.

Packet Loss and Network Latency

- It was observed that almost all the service providers are measuring packet loss and latency by conducting random ping tests for their internal performance measurement.
- The verification of the records of old ping tests was done through latency graphs (available from smoke ping tool) for some of the operators.
- However, ping tests conducted/smoked ping results during live measurements revealed that all the service providers are meeting the benchmark prescribed by TRAI.

Summary of Live Measurement Results – Broadband Services

Parameters	Benchmarks	BSNL - Bihar	BSNL - Jharkhand	Sify
Service provisioning uptime				
Percentage connections provided within 15 days	100%	36.03%	85.09%	98.00%
Fault repair restoration time				
Percentage faults repaired by next working days	> 90%	23.03%	14.46%	16.67%
Percentage faults repaired within three working days	> 99%	60.11%	59.04%	56.67%
Billing performance				
%age of billing complaints resolved in 4 weeks	100%	NA	72.73%	NA
Customer care/helpline assessment (Voice to Voice)				
Percentage calls answered within 60 seconds	> 60%	94.00%	93.81%	98.00%
Percentage calls answered within 90 seconds	> 80%	100.00%	100.00%	100.00%
Bandwidth utilization/Throughput				
Intra network links (POP to ISP Node)		297		422
Total number of intra network links > 90%		5		0
Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)		377		23
Percentage bandwidth utilized on upstream links	< 80%	84.11%		86.16%
Broadband download speed	> 80%	90.00%		95.00%
Service availability/uptime	> 98%	99.96%		98.61%
Packet loss	< 1%	0.05%		0.00%
Network Latency				
POP/ISP Node to NIXI	< 120 msec	73		40
ISP node to NAP port (Terrestrial)	< 350 msec	279		226

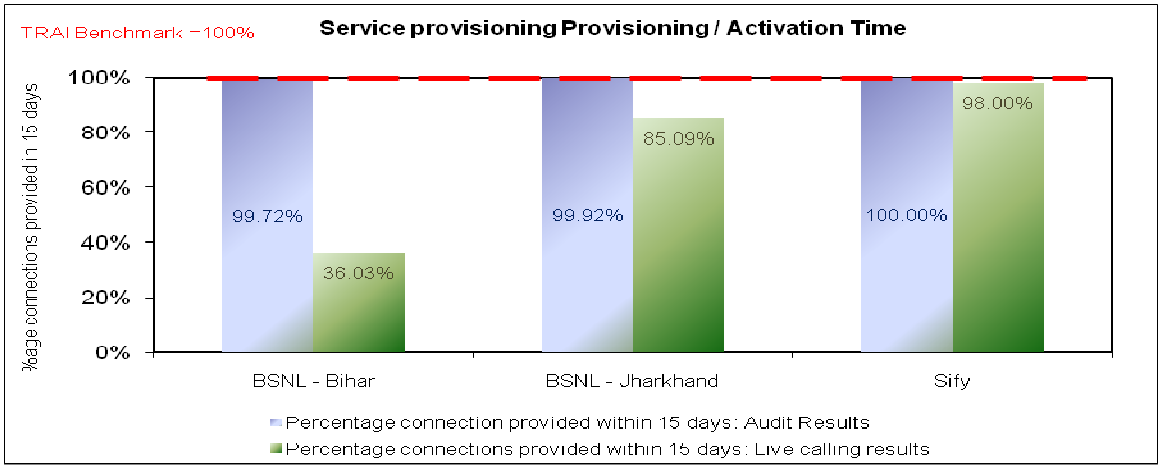
** Methodology not in line with QoS Figures provided on All India basis Not meeting the benchmark **B'mark** = TRAI Benchmark, **DNA** = Details not available, **NA:** Not Applicable

- All the service providers are meeting the benchmark on service availability/uptime for three day live measurements
- The testing for Bandwidth utilization during live measurement was carried out on sample basis by IMRB auditors for intra network links. 5 of the links tested for BSNL were found to be having above 90% bandwidth utilization during 3 day live measurement
- For Bandwidth utilization on upstream links, both the service providers are not meeting the benchmark during the three day live measurement.
- For network latency all the service providers comfortably meet the TRAI specified benchmark for ping tests carried out during live measurements.

17.0 Detailed findings – Includes comparison between Live calling/Live measurements and One month data collection for Broadband Services

17.1 Graphical/Tabular Representations for Broadband services

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



One month

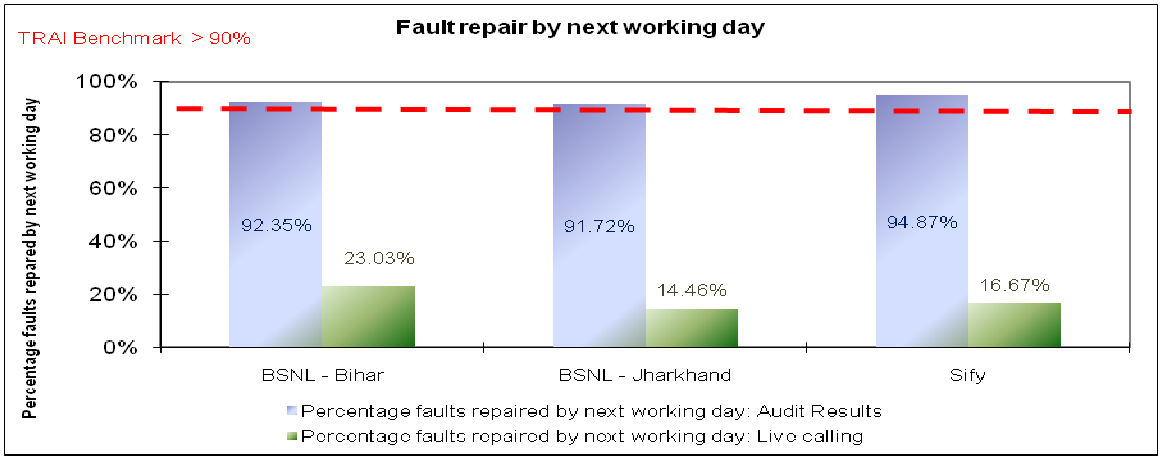
Operator meeting benchmark: Sify

Operator not meeting benchmark: BSNL - Bihar, BSNL - Jharkhand

Live calling

No operator is meeting the benchmark

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



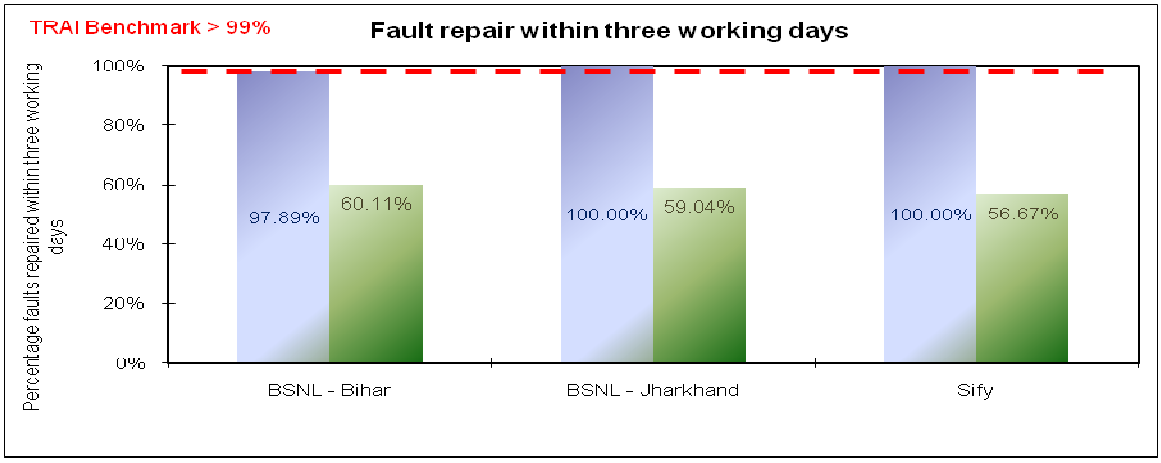
One month

All operators are meeting the benchmark

Live calling

No operator is meeting the benchmark

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



One month

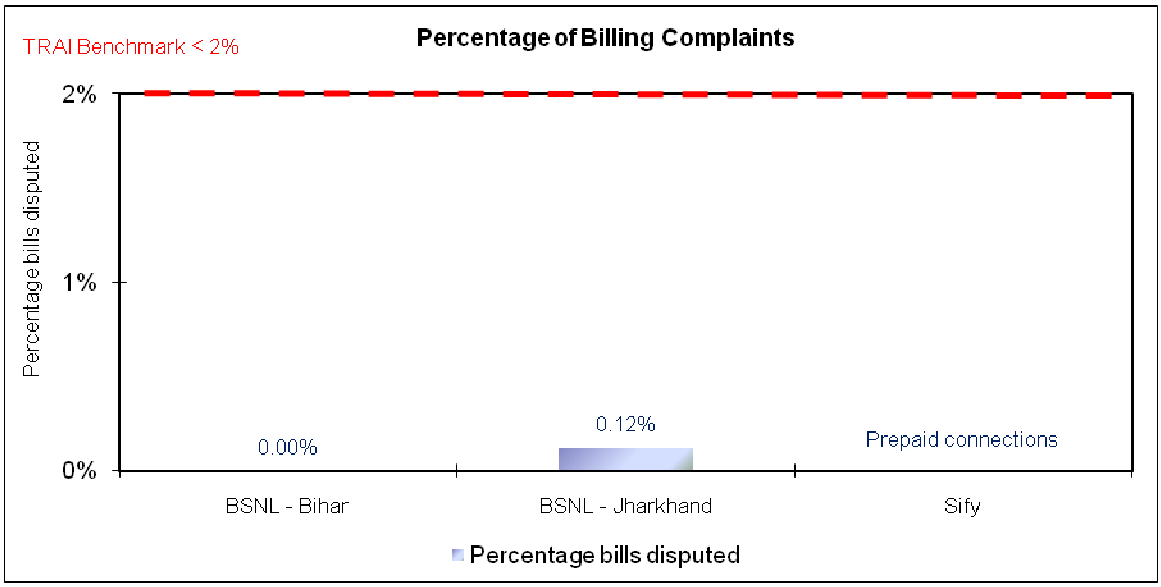
Operator meeting benchmark: BSNL - Jharkhand, Sify

Operator not meeting benchmark: BSNL - Bihar

Live calling

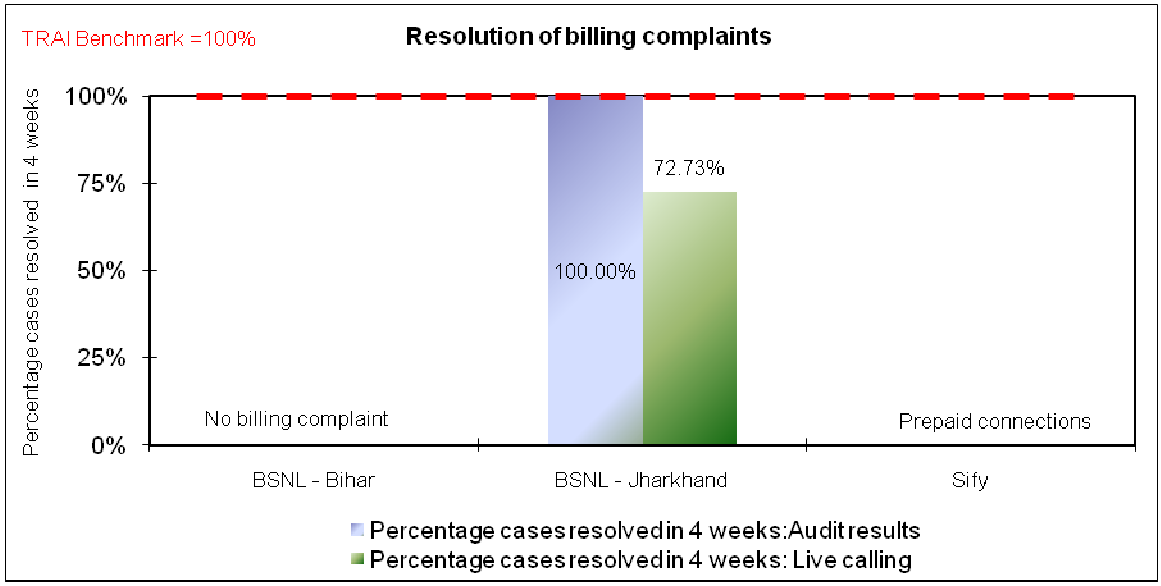
No operator is meeting the benchmark

Percentage bills disputed



All operators are meeting the benchmark

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



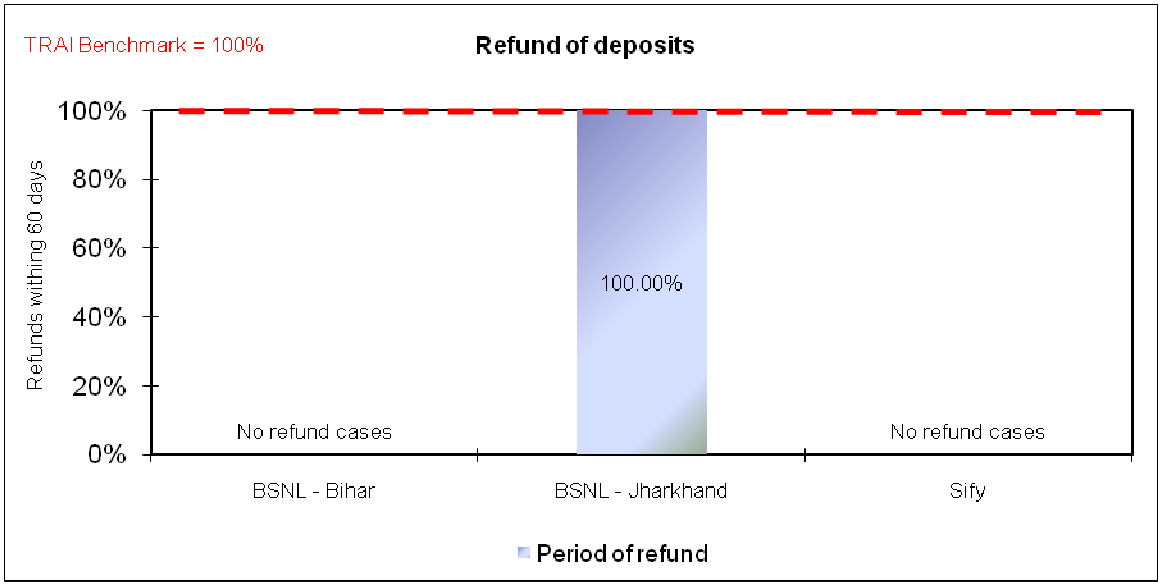
One month

All operators are meeting the benchmark

Live calling

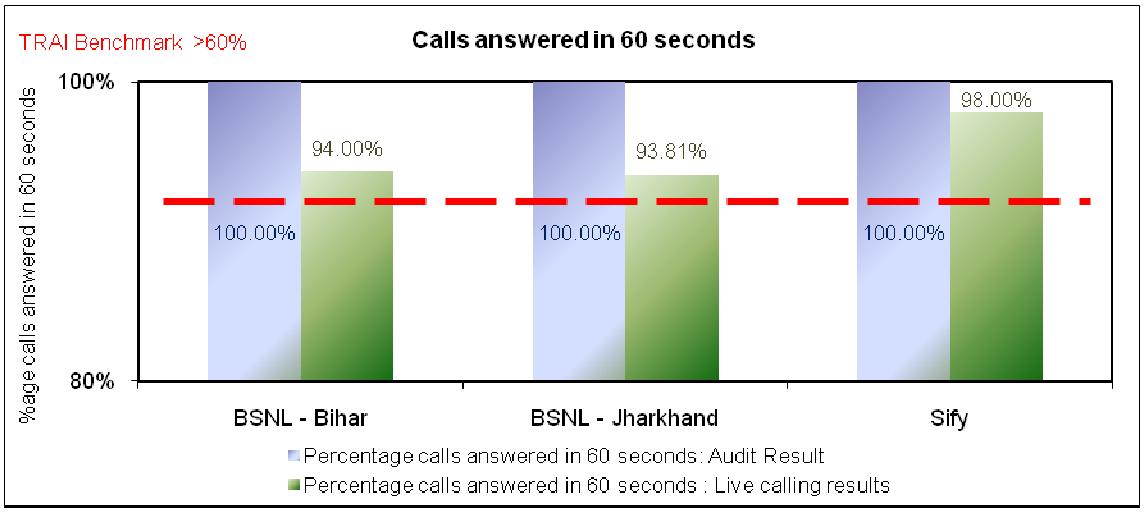
No operator is meeting the benchmark

Refund of deposits after closure



All operators are meeting the benchmark

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



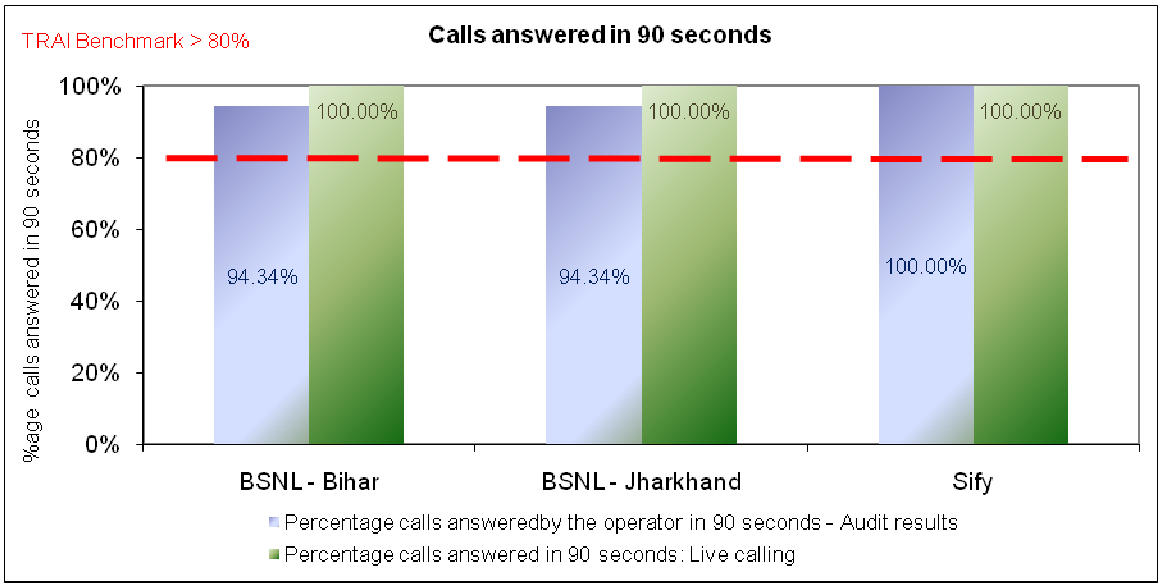
One month

All operators are meeting the benchmark

Live calling

All operators are meeting the benchmark

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



One month

All operators are meeting the benchmark

Live calling

All operators are meeting the benchmark

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

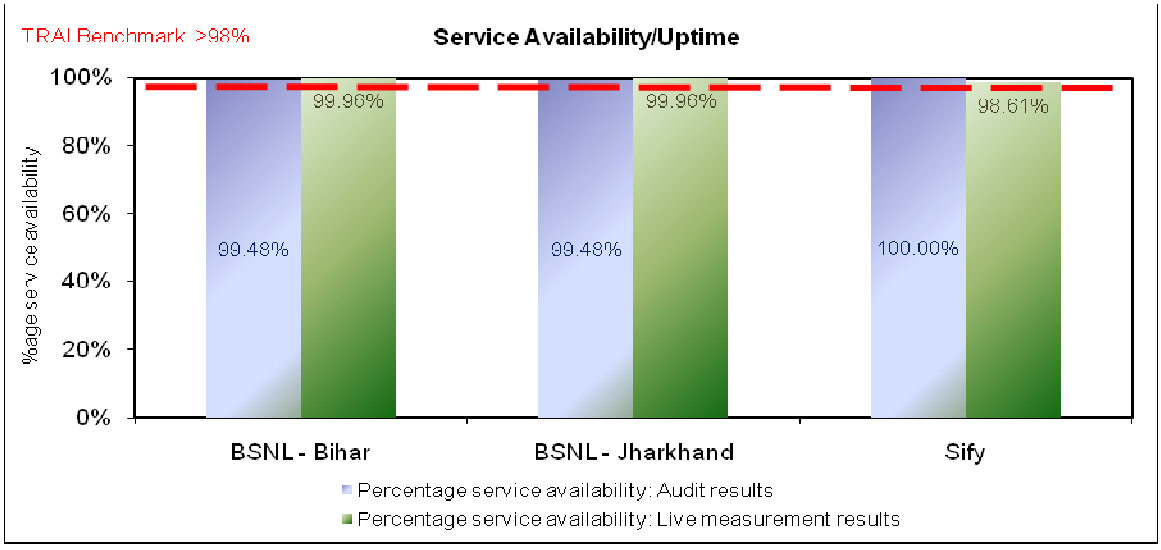
Bandwidth Utilisation (One month)	B'mark	BSNL - Bihar	BSNL - Jharkhand	Sify
Total number of intra network links		297		422
No of Intra network found to be above 90%		4		0

Bandwidth Utilisation (Live measurement)	B'mark	BSNL - Bihar	BSNL - Jharkhand	Sify
Total number of intra network links		297		422
No of Intra network found to be above 90%		5		0

Broadband download speed	Benchmark	BSNL - Bihar	BSNL - Jharkhand	Sify
Total committed download speed to the sample subscribers (In mpbs) (A)		2		1
Total average download speed observed during TCBH (In Mpbs) (B)		1.8		0.95
%age subscribed speed available to the subscriber during TCBH (B/A)*100	>80%	90.00%		95.00%

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

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



One month

All operators are meeting the benchmark

Live calling

All operators are meeting the benchmark

18.0 Compliance reports: Results of Verification of Records

18.1 Broadband services

Parameters	Benchmarks	BSNL* - Bihar		BSNL* - Jharkhand		Sify	
		PMR	IMRB	PMR	IMRB	PMR	IMRB
Service provisioning uptime							
Percentage connections provided within 15 days	100%	100.00%	97.89%	100.00%	100.00%	100.00%	100.00%
Fault repair restoration time							
Percentage faults repaired by next working days	> 90%	94.10%	94.53%	83.80%	91.15%	90.00%	90.00%
Percentage faults repaired within three working days	> 99%	98.50%	98.11%	94.10%	100.00%	100.00%	100.00%
Billing performance							
Billing complaints per 100 bills issued	< 2%	0.10%	0.00%	2.70%	0.23%	0.00%	0.00%
%age of billing complaints resolved in 4 weeks	100%	100.00%	100.00%	100.00%	100.00%	NA	NA
%age cases in which refund of deposits after closure was made in 60 days	100%	100.00%	100.00%	100.00%	100.00%	NA	NA
Customer care/helpline assessment (Voice to Voice)							
Percentage calls answered within 60 seconds	> 60%	100.00%	100.00%	82.40%	82.40%	100.00%	100.00%
Percentage calls answered within 90 seconds	> 80%	100.00%	100.00%	92.80%	92.80%	100.00%	100.00%
Bandwidth utilization/Throughput							
Intra network links (POP to ISP Node)		Project 2.2:- BRAS-23, T1-24, T2-624, DSLAM-5960, Multiplay Phase 1&2:- BNG-18, RPR-1181, OCLAN-2906, DSLAM-37036		173		408	408
Total number of intra network links > 90%		0		5		0	0
Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)		32316.4		32316.4		2763	2763
Percentage bandwidth utilized on upstream links	< 80%	73.10%		73.07%		85.00%	85.00%
Broadband download speed	> 80%	85.70%		85.70%		95.00%	95.00%
Service availability/uptime	> 98%	99.80%		99.80%		100.00%	100.00%
Packet loss	< 1%	0.00%		0.00%		< 1%	< 1%
Network Latency							
POP/ISP Node to NIXI (in msec)	< 120 msec	13.7		13.7		< 45	< 45
ISP node to NAP port (Terrestrial) (in msec)	< 350 msec	229		229		< 300	< 300

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

Figures do not match with those reported in PMR Not meeting the benchmark **B'mark** = TRAI Benchmark, **DNA** = Details not available, **NA:** Not Applicable

18.2 Conclusions

Broadband services

1. Complete data for Sify and network data for BSNL 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 for most of the service providers

19.0 Annexure - I (Wireline)

Name of the Service Provider	Name of POI not meeting the benchmark	Total No. of circuits on POI	Total No. of call attempts on POI	Total traffic served on POI (Erlang)	% of Congestion POI	Action already taken/ action plan for meeting the benchmark
BSNL	All POIs meeting benchmark					
Airtel	All POIs meeting benchmark					
TTSL	All POIs meeting benchmark					

19.1 Parameter wise performance reports for Basic Wireline services

2.1 Audit Results for Fault repair

Fault incidences	Benchmark	BSNL - Bihar	BSNL - Jharkhand	TTSL
Faults incidences (No. of faults/100 Subs./month)	≤ 5	2.94	4.99	2.42

Fault repair (Urban areas)	Benchmark	BSNL - Bihar	BSNL - Jharkhand	TTSL
Total No. of faults registered during the month		3696	11974	87
No. of faults repaired by next working day during the month		2899	7449	87
Percentage of faults repaired by next working day during the month	≥ 90%	78.44%	62.21%	100.00%
No. of faults repaired within 3 days during the month		2380	7151	87
Percentage of faults repaired within 3 days during the month	100%	90.53%	60.79%	100.00%

Fault repair (Rural & Hilly areas)	Benchmark	BSNL - Bihar	BSNL - Jharkhand	TTSL
Total No. of faults registered during the month		3696	11974	NA
No. of faults repaired by next working day during the month		2899	7449	NA
Percentage of faults repaired by next working day during the month	≥ 90%	78.44%	62.21%	NA
No. of faults repaired within 5 days during the month		1066	211	NA
Percentage of faults repaired within 5 days during the month	100%	99.90%	100.00%	NA

Rent rebate	Benchmark	BSNL - Bihar	BSNL - Jharkhand	TTSL
No. of cases with faults pending for >3 days and ≤7 days		170	0	0
Out of these number of cases where rent rebate for 7 days was given		170	0	0
Percentage of cases where rent rebate for 7 days was given	100%	100.00%	NA	NA
No. of cases with faults pending for >7 days and ≤15 days		75	6	0
Out of these number of cases where rent rebate for 15 days was given		75	6	0
Percentage of cases where rent rebate for 15 days was given	100%	100.00%	100.00%	NA
No. of cases with faults pending for ≥15 days		143	17	0

Out of these number of cases where rent rebate for 30 days was given		143	11	0
Percentage of cases where rent rebate for 30 days was given	100%	100.00%	64.71%	NA

MTTR	Benchmark	BSNL - Bihar	BSNL - Jharkhand	TTSL
Mean time taken to repair the fault in hours	≤ 8	14.56	8	3.44

2.2 Live calling for fault repair

Urban area	Benchmark	BSNL - Bihar	BSNL - Jharkhand	TTSL
Total Number of calls made		265	278	0
Number of cases where faults were repaired by next working day		73	13	0
Percentage cases where faults were repaired by next working day	≥ 90%	27.55%	4.68%	NA
Number of cases where faults were repaired within 3 days		131	108	0
Percentage cases where faults were repaired within 3 days	100%	49.43%	38.85%	NA

3.1 Audit Results for Call Completion Rate (CCR)

Traffic statistics - Call Completion Rate	Benchmark	BSNL - Bihar	BSNL - Jharkhand	TTSL
Total local call attempts		1265516	566966	1203
Total number of successful local calls		524947	286795	918
Call Completion Rate (CCR) in the local network	≥ 55%	41.48%	50.58%	76.31%

Traffic statistics - Answer to Seizure Ratio	Benchmark	BSNL - Bihar	BSNL - Jharkhand	TTSL
Total number of calls processed by the switch		4869926	2706730	918
Total number of calls answered		2886825	1132009	694
Answer to Seizure Ratio (ASR)	≥ 75%	59.28%	41.82%	75.60%

3.2 Live measurement results for Call Completion Rate (CCR)

Traffic statistics - Call Completion Rate	Benchmark	BSNL - Bihar	BSNL - Jharkhand	TTSL
Total local call attempts		217125	375534	1367
Total number of successful local calls		88626	203617	1089
Call Completion Rate (CCR) in the local network	≥ 55%	40.82%	54.22%	79.66%

Traffic statistics - Answer to Seizure Ratio	Benchmark	BSNL - Bihar	BSNL - Jharkhand	TTSL
Total number of calls processed by the switch		279421	378480	1089
Total number of calls answered		129297	176606	821
Answer to Seizure Ratio (ASR)	≥ 75%	46.27%	46.66%	75.39%

Traffic statistics - Answer to Seizure Ratio	Benchmark	BSNL - Bihar	BSNL - Jharkhand	TTSL
Total number of calls processed by the switch		279421	378480	1089
Total number of calls answered		129297	176606	821
Answer to Seizure Ratio (ASR)	≥ 75%	46.27%	46.66%	75.39%

4.1 Audit Results for POI Congestion

POI congestion	Benchmark	BSNL - Bihar	BSNL - Jharkhand	TTSL
POI traffic offered on all individual POI's		155882	30950.6	NA
Served traffic for all POI's		43375	13521.3	NA
Traffic failed on all POI's	≤ 0.5%	0.72	0.56	NA

4.2 Live measurement results for POI congestion

POI congestion	Benchmark	BSNL - Bihar	BSNL - Jharkhand	TTSL
POI traffic offered on all individual POI's		17822	58094.67	NA
Served traffic for all POI's		5093	26190.84	NA
Traffic failed on all POI's	≤ 0.5%	0.71	0.55	NA

POI congestion	Benchmark	BSNL - Bihar	BSNL - Jharkhand	TTSL
No. of POIs not meeting benchmark		0	0	0
Total number of working POIs		NA	NA	NA

5.1 Audit Results for Billing performance

Billing Performance	Benchmark	BSNL - Bihar	BSNL - Jharkhand	TTSL
Billing disputes - Postpaid				
Total bills generated during the period		28625	60735	54
Total number of bills disputed		5	22	0
Percentage bills disputed	≤ 0.1%	0.02%	0.04%	0.00%
Billing disputes - Prepaid				
No. of charging / credit / validity complaints during the month		NA	NA	NA
Total no. of pre-paid customers at the end of the month		NA	NA	NA
Number of complaints per 100 customers	≤ 0.1%	NA	NA	NA
Resolution of billing complaints				
Total number of billing/charging complaints		18	29	0
Total complaints resolved in 4 weeks from date of receipt		18	29	NA
Percentage complaints resolved within 4 weeks of date of receipt	100%	100.00%	100.00%	NA
Period of applying credit / waiver				
No. of complaints resolved in favor of the customer during the month		5	29	NA

No. of complaints disposed on account of not considered as valid complaints		13	0	NA
Percentage cases in which credit/waiver was received within 1 week	100%	100.00%	100.00%	NA

5.2 Live calling results for resolution of billing complaints

Resolution of billing complaints	Benchmark	BSNL - Bihar	BSNL - Jharkhand	TTSL
Total Number of calls made		3	2	0
Number of cases resolved in 4 weeks		2	2	0
Percentage cases resolved in 4 weeks	100%	66.67%	100.00%	NA

6.1 Audit Results for Requests

Closure Requests	Benchmark	BSNL - Bihar	BSNL - Jharkhand	TTSL
Total no. of requests received for Closures		461	1594	6
Total no. of requests for closures attended within 7 days		458	1594	6
Percentage of requests for closures attended within 7 days	100%	99.35%	100.00%	100.00%
Total no. of requests for closures not attended or attended beyond 7 days		9	0	0

7.1 Audit results for customer care

Customer Care Assessment	Benchmark	BSNL - Bihar	BSNL - Jharkhand	TTSL
Total no. of call attempts to call centre / customer care nos. during TCBH		1679	7101	NA
No. of calls connected and answered successfully to call centre / customer care nos. during TCBH		1679	7101	NA
Percentage of calls getting connected and answered electronically	≥ 95%	100.00%	100.00%	NA
Percentage of calls answered by the operators (voice to voice) within 60 seconds	≥ 90%	94.34%	100.00%	NA

7.2 Live calling results for customer care

Customer Care Assessment	Benchmark	BSNL - Bihar	BSNL - Jharkhand	TTSL
Total Number of calls received		750	750	0
Total Number of calls getting connected and answered		616	545	0
Percentage calls getting connected and answered	≥ 95%	82.13%	72.67%	NA

7.3 Live calling results for customer care (Voice to Voice)

Customer Care Assessment	Benchmark	BSNL - Bihar	BSNL - Jharkhand	TTSL
Total Number of calls received		616	545	0
Total Number of calls answered within 60 seconds		372	236	0
Percentage calls answered within 60 seconds	≥ 90%	60.39%	43.30%	NA

8.1 Audit results for refund of deposits

Refund	Benchmark	BSNL - Bihar	BSNL - Jharkhand	TTSL
Total number of cases requiring refund of deposits		221	53	0

Total number of cases where refund was made within 60 days		221	51	0
Percentage cases in which refund was receive within 60 days	100%	100.00%	96.23%	NA

9.1 Live calling for level 1 services

Level 1 services	Benchmark	BSNL - Bihar	BSNL - Jharkhand	TTSL
Total no. of calls made		570	729	NA
Calls answered in 60 sec		419	322	NA
Calls answered after 60 sec		151	407	NA

10.1 Exchange capacity and Subscribers

	Benchmark	BSNL - Bihar	BSNL - Jharkhand	TTSL
Equipped Capacity of the exchange (number of subscribers)		140804	170495	2000 (erlang)
Total number of customers served		74360	91574	4200

20.0 Annexure - I (Wireless)

20.1 Service provider performance report based on one month data

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)			Metering and Billing				Response time to customer for assistance		Termination / closure of service	
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality	Metering and billing credibility (Postpaid)	Metering and billing credibility (Prepaid)	%age complaints resolved within 4 weeks	Period of applying credit/waiver less than 1 week	Accessibility of call centre/ customer care	Percentage of calls answered by operators within 60 sec	%age requests for Termination complied within 7 days	Refund of deposits after closure within 60 days
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 5%	≥ 95%	≤ 0.1%	≤ 0.1%	100%	100%	≥ 95%	≥ 90%	100%	100%
Airtel	0.24%	1.55%	97.50%	0.65%	1.58%	1.47%	2.18%	99.01%	0.07%	0.00%	100.00%	100.00%	99.20%	86.00%	100.00%	100.00%
Aircel	3.52%	6.91%	97.09%	0.55%	2.17%	1.92%	16.26%	93.98%	0.00%	2.43%	100.00%	100.00%	100.00%	57.00%	NA	NA
Vodafone	0.14%	1.25%	96.97%	0.99%	1.71%	0.84%	4.62%	96.28%	0.05%	0.00%	100.00%	100.00%	99.92%	97.00%	100.00%	100.00%
BSNL	2.93%	6.02%	96.94%	0.40%	1.02%	1.64%	5.06%	96.91%	0.01%	0.14%	100.00%	100.00%	100.00%	85.39%	100.00%	100.00%
Idea	1.74%	0.05%	97.41%	1.00%	1.5%	1.33%	3.19%	96.19%	0.10%	0.00%	100.00%	100.00%	91.67%	97.00%	100.00%	100.00%
Tata Docomo	0.18%	0.00%	98.18%	0.17%	0.15%	0.82%	1.25%	98.13%	0.09%	0.08%	100.00%	100.00%	48.35%	89.00%	100.00%	100.00%
S-Tel	1.91%	1.74%	98.51%	0.09%	1.49%	0.90%	1.80%	97.89%	NA	0.01%	100.00%	100.00%	99.04%	98.71%	NA	NA
Uninor	3.97%	6.24%	99.04%	0.20%	0.32%	1.06%	1.99%	100.00%	NA	0.04%	100.00%	100.00%	92.64%	99.53%	NA	NA
RTL	0.24%	1.44%	98.88%	0.58%	1.17%	0.96%	3.82%	96.95%	0.00%	0.04%	100.00%	100.00%	100.00%	99.00%	100.00%	100.00%
RCOM	0.64%	0.91%	98.88%	DNA	1.02%	0.81%	0.54%	96.44%	0.03%	0.06%	100.00%	100.00%	100.00%	60.00%	100.00%	100.00%
MTS	1.99%	1.99%	99.30%	DNA	0.02%	1.96%	3.98%	99.31%	NA	0.08%	100.00%	100.00%	99.68%	99.99%	NA	NA

20.2 Monthly Point of Interconnection (POI) Congestion Report

Name of the Service Provider	Name of POI not meeting the benchmark	Total No. of circuits on POI	Total No. of call attempts on POI	Total traffic served on POI (Erlang)	% of Congestion POI	Action already taken/ action plan for meeting the benchmark
Airtel	All POIs meeting benchmark					
Aircel	AIRTEL	13355	1536043	11566.58	7.99	Pot feasibility is pending from Airtel end
	MTS	123	8145	102.73	1	Pending from Systema End
Vodafone	CELLONE	2841	24848	2442.65	89.12	63 e1 Augmentation in progress
	STEL	337	20939	229	81	6 e1 augmentation in progress
	MTS	245	12349	169	81	6 e1 augmentation in progress
	TATA NGN NLD	1143	17426	859	79	5 e1 Augmentaion in progress
S-Tel	Airtel Patna Outgoing	124	3682	122.79	2	10 E1's requested
	Local Airtel Bhagalpur Outgoing	51	1857	55.96	2	10 E1's requested
	Airtel Muzzaffarpur Outgoing	61	1682	60.62	2	10 E1's requested
Uninor	RP01B1,RP01NP,RP01SM,RP01VM,RP02BM,RR02TN	694	204343	508	1	Augmentation request sent to Airtel, Vodafone and BSNL L1
	RP01B1,RP01NP,RP01VM,RP02BM,RP21BM	604	176053	434.03	1	Augmentation request sent to Airtel, Vodafone and BSNL L1
	RP01B1,RP01NP,RP01TN,RP01VM,RP02BM,RP21BM	787	84906	634.53	50	6 E1s augmented with Airtel. Additional request raised
	RP01B1,RP01NP,RP01VM,RP02BM,RP21BM	603	83608	493.2	66	Augmentation request sent to Airtel, Vodafone and BSNL L1
	RP01B1,RP01NP,RP01VM,RP02BM,RP21BM	603	79938	534.64	68	Augmentation request sent to Airtel, Vodafone and BSNL L1
	RP01B1,RP01NP,RP02ID,RP01VM,RP02BM,RP21BM	880	119015	546.2	72	4 E1s augmented in Vodafone Access POI. Request raised for 3 E1s more
	RP01B1,RP01NP,RP02BM,RP02ID,RP11VM,RP21BM,RR02VI	910	122703	563.6	75	Idea no congestion only POI down at Busy hr.
	RP01B1,RP01NP,RP02BM,RP11VM,RP21BM,RR02VI	631	81185	534.5	67	Augmentation request sent to Airtel, Vodafone and BSNL L1
	RP01B1,RP01NP,RP02BM,RP11VM,RP21BM	603	85978	598.44	79	Augmentation request sent to Airtel, and BSNL L1
	RP01B1,RP01NP,RP02BM,RP11VM,RP21BM	603	93023	596.53	77	Augmentation request sent to Airtel, and BSNL L1, TTSL NLD
	RP01B1,RP01NP,RP01TN,RP02BM,RP11VM,RP21BM	787	108873	761.08	63	Augmentation request sent to Airtel, and BSNL L1, TTSL NLD
	RP01B1,RP01NP,RP01VM,RP02BM,RP11VM,RP21BM	695	113545	548.01	81	Augmentation request sent to Airtel, and BSNL L1, TTSL NLD
	RP01B1,P01NP,RP02BM,RP11VM,RP21BM	603	113601	566.86	68	Augmentation request sent to Airtel, and BSNL L1, TTSL NLD
	RP01B1,P01NP,RP02BM,RP11VM,RP21BM	603	116068	535.91	79	Augmentation request sent to Airtel, and BSNL L1, TTSL NLD
	RP01AM,RP01B1,RP01NP,RP01TC,RP02BM,RP11VM,RP21BM	756	121024	666.64	68	2 E1s augmented in TTSL NLD POI. No congestion
	RP01AM,RP01B1,RP01NP,RP01TC,RP01VM,RP02BM,RP11VM,RP21BM	848	144750	733.75	57	No congestion on Vodafone POI. Traffic overflow to other Vodafone POI
	RP01B1,P01NP,RP02BM,RP11VM,RP21BM	603	141094	488.27	82	No congestion on Vodafone POI. Traffic overflow to other Vodafone POI. Augmentation request sent to Airtel, and BSNL L1
	RP01B1,RP01NP,RP01TN,RP02BM,RP11VM,RP21BM	849	147843	661.94	69	No congestion on Vodafone POI. Traffic overflow to other Vodafone POI. Augmentation request sent to Airtel, and BSNL L1

	RP01B1,RP01NP,RP01TC,RP02BM,RP11VM,RP21BM	726	145984	672.41	68	No congestion on Vodafone POI. Traffic overflow to other Vodafone POI. Augmentation request sent to Airtel, and BSNL L1
	RP01AM,RP01B1,RP01NP,RP01VI,RP01VM,RP02BM,RP11VM,RP21BM,RR02VI	785	151618	682.03	69	No congestion on Vodafone POI. Traffic overflow to other Vodafone POI. Augmentation request sent to Airtel, and BSNL L1
	RP01B1,RP01NP,RP01VM,RP02BM,RP11VM,RP21BM	725	158504	664	68	No congestion on Vodafone POI. Traffic overflow to other Vodafone POI. Augmentation request sent to Airtel, and BSNL L1
	RP01B1,RP01NP,RP02BM,RP11VM,RP21BM	603	161230	570.83	81	No congestion on Vodafone POI. Traffic overflow to other Vodafone POI. Augmentation request sent to Airtel, and BSNL L1
	RP01B1,RP01NP,RP02BM,RP11VM,RP21BM,RP41BM	757	81690	751.89	80	10 E1s augmented in Airtel POI. Still congestion. Requested for augmentation of STM1. Feasibility yet to receive.
	RP01B1,RP01NP,RP01VM,RP02BM,RP11VM,RP21BM,RP41BM,RR02TN,RR02VN	1123	132633	828.61	71	No congestion on Vodafone POI. Traffic overflow to other Vodafone POI. Augmentation request sent to Airtel, and BSNL L1
	RP01B1,RP01NP,RP02BM,RP11VM,RP21BM,RP41BM	756	88376	745.8	78	No congestion on Vodafone POI. Traffic overflow to other Vodafone POI. Augmentation request sent to Airtel, and BSNL L1
	RP01B1,RP01NP,RP01TC,RP01TN,RP01VI,RP01VN,RP02BM,RP11VM,RP21BM,RP41BM,RR02TN	1926	121954	1128	49	No congestion on Vodafone POI. Traffic overflow to other Vodafone POI. Augmentation request sent to Airtel, and BSNL L1
	RP01B1,RP01NP,RP02BM,RP11VM,RP21BM,RP41BM,RR02VI	786	87123	731.92	63	3 E1s augmented in Vodafone Access POI. No congestion. Augmentation request sent to Airtel, and BSNL L1
	RP01B1,RP01NP,RP02BM,RP21BM,RP41BM	633	134343	597.44	86	Augmentation request sent to Airtel, and BSNL L1
	RP01B1,RP01NP,RP02BM,RP21BM,RP41BM	633	102290	631.33	84	Augmentation request sent to Airtel, and BSNL L1
	RP01B1,RP01NP,RP02BM,RP21BM,RP41BM	633	107608	630.78	84	Augmentation request sent to Airtel, and BSNL L1
RTL	All POIs meeting benchmark					
RCOM	All POIs meeting benchmark					
MTS	All POIs meeting benchmark					
Tata Indicom	All POIs meeting benchmark					

20.3 Parameter wise performance reports for Cellular Mobile services

1. Network Availability

Audit Results for Network Availability

	Benchmark	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom
Number of BTSs in the licensed service area		5994	3156	4250	3055	3800	1885	1205	1732	2987	2416	1256	1032
Sum of downtime of BTSs in a month (in hours)		10789.44	82553	4284	66550	49156	2538	17165	51129	5362	11553	18620	1263
BTSs accumulated downtime (not available for service)	≤ 2%	0.24%	3.52%	0.14%	2.93%	1.74%	0.18%	1.91%	3.97%	0.24%	0.64%	1.99%	0.16%
Number of BTSs having accumulated downtime >24 hours		93	218	53	184	2	0	21	108	43	22	25	5
Worst affected BTSs due to downtime	≤ 2%	1.55%	6.91%	1.25%	6.02%	0.05%	0.00%	1.74%	6.24%	1.44%	0.91%	1.99%	0.48%

2. Connection Establishment (Accessibility)

Audit Results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom
CSSR	≥ 95%	97.50%	97.09%	96.97%	96.94%	97.41%	98.18%	98.51%	99.04%	98.88%	98.88%	99.30%	98.07%

SDCCH congestion	Benchmark	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom
SDCCH/Paging channel congestion	≤ 1%	0.65%	0.55%	0.99%	0.40%	1.00%	0.17%	0.09%	0.20%	0.58%	DNP	DNP	0.00%

TCH congestion	Benchmark	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom
TCH congestion	≤ 2%	1.58%	2.17%	1.71%	1.02%	1.53%	0.15%	1.49%	0.32%	1.17%	1.02%	0.02%	0.04%

Live measurement results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom
CSSR	≥ 95%	97.10%	98.80%	96.85%	95.12%	96.88%	97.96%	98.73%	98.64%	98.44%	98.55%	99.28%	98.37%

SDCCH congestion	Benchmark	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom
SDCCH/Paging channel congestion	≤ 1%	0.86%	0.31%	0.95%	0.37%	1.00%	0.13%	0.05%	0.99%	0.56%	NA	NA	0.00%

TCH congestion	Benchmark	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom
TCH congestion	≤ 2%	1.66%	0.72%	1.62%	0.96%	1.70%	0.20%	1.27%	0.59%	0.76%	0.86%	0.00%	0.03%

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

CSSR	Benchmark	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom
Total number of call attempts		495	400	419	449	523	245	391	413	400	404	463	422
Total number of successful calls established		480	397	418	447	516	235	391	378	394	395	462	417
CSSR	≥ 95%	96.97%	99.25%	99.76%	99.55%	98.66%	95.92%	100.00%	91.53%	98.50%	97.77%	99.78%	98.82%

Blocked calls	Benchmark	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom
%age blocked calls		3.03%	0.75%	0.24%	0.45%	1.34%	4.08%	0.00%	8.47%	1.50%	2.23%	0.22%	1.18%

3. Connection Maintenance (Retainability)

Audit Results for Call drop rate and for number of cells having more than 3% TCH

Call drop rate	Benchmark	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom
Total number of calls established		682322237	107644745	NA	2134281	129165688	649486	5913886	7763728	NA	NA	4879080	3734569
Total number of calls dropped		10050148	2070118	NA	34959	1717332	5324	53428	82192	NA	NA	95630	31389
Call drop rate	≤ 2%	1.47%	1.92%	0.84%	1.64%	1.33%	0.82%	0.90%	1.06%	0.96%	0.81%	1.96%	0.84%

Cells having more than 3% TCH	Benchmark	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom
Total number of cells in the network		17926	9391	12739	7347	337758	5277	3615	5178	8961	2416	113040	1032
Total number of cells having more than 3% TCH		391	1527	589	372	10758	66	65	103	342	13	4495	2
Worst affected cells having more than 3% TCH	≤ 5%	2.18%	16.26%	4.62%	5.06%	3.19%	1.25%	1.80%	1.99%	3.82%	0.54%	3.98%	0.19%

Live measurement results for Call drop rate and for number of cells having more than 3% TCH

Call drop rate	Benchmark	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom
Total number of calls established		72134826	114614325	NA	4372075	13533494	790824	1012953	10531353	NA	NA	149076	34455252
Total number of calls dropped		1352517	2031530	NA	79946	177153	8303	7858	183192	NA	NA	552	178568

Call drop rate	≤ 2%	1.87%	1.77%	0.89%	1.83%	1.31%	1.05%	0.78%	1.74%	0.99%	0.85%	0.37%	0.52%

Cells having more than 3% TCH	Benchmark	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom
Total number of cells in the network		17906	9502	NA	7490	33420	5778	3633	5236	13914	2316	3768	1032
Total number of cells having more than 3% TCH		615	1723	NA	451	1085	332	124	149	486	26	74	0
Worst affected cells having more than 3% TCH	≤ 5%	3.43%	18.13%	4.77%	6.02%	3.25%	5.75%	3.41%	2.85%	3.49%	1.12%	1.96%	0.00%

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

Call drop rate	Benchmark	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom
Total number of calls established		480	269	419	448	520	235	392	422	393	404	463	422
Total number of calls dropped		5	130	0	109	0	1	0	0	1	3	1	5
Call drop rate	≤ 2%	1.04%	48.33%	0.00%	24.33%	0.00%	0.43%	0.00%	0.00%	0.25%	0.74%	0.22%	1.18%

4. Voice quality

Audit Results for Voice quality

Voice quality	B'mark	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom
Total number of sample calls		165603	310985047	NA	NA	13066023410	22231694	163153723	59	NA	NA	4879080	DNP
Total number of calls with good voice quality		163969	292263033	NA	NA	12568266307	21815028	159716667	59	NA	NA	4845486	DNP
%age calls with good voice quality	≥ 95%	99.01%	93.98%	96.28%	96.91%	96.19%	98.13%	97.89%	100.00%	96.95%	96.44%	99.31%	DNP

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

Voice quality	Benchmark	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom
Total number of sample calls		1854791	783512	805689	593523	984754	380550	724744	527466	522591	23048	26948	71096
Total number of calls with good voice quality		1805401	731772	771865	562612	950971	354322	709470	502019	494773	19621	26890	70042
%age calls with good voice quality	≥ 95%	97.34%	93.40%	95.80%	94.79%	96.57%	93.11%	97.89%	95.18%	94.68%	85.13%	99.78%	98.52%

5. POI Congestion

Audit Results for POI Congestion

POI congestion	Benchmark	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom

No. of POIs not meeting benchmark		0	2	41	0	0	0	3	30	0	0	0	0
Total number of working POIs		47	35	41	225	75	10	41	46	10	12	35	187

Live measurement results for POI congestion

6. Inter Operator Call Assessment

Inter operator call Assessment To↓ From→	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom
Airtel	NA	99%	100%	100%	98%	100%	70%	99%	100%	99%	100%	100%
Aircel	99%	NA	100%	100%	100%	100%	99%	100%	93%	96%	100%	100%
Vodafone	99%	100%	NA	99%	99%	100%	98%	100%	96%	100%	100%	99%
BSNL	100%	99%	100%	NA	99%	97%	100%	100%	98%	99%	100%	100%
Idea	100%	100%	100%	99%	NA	100%	100%	100%	99%	100%	100%	100%
Tata Docomo	98%	100%	100%	96%	98%	NA	100%	99%	90%	98%	100%	97%
S-Tel	100%	99%	93%	100%	100%	100%	NA	99%	99%	100%	99%	100%
Uninor	100%	100%	72%	83%	100%	99%	100%	NA	99%	94%	98%	100%
RTL	100%	100%	100%	43%	100%	100%	99%	100%	NA	100%	100%	100%
RCOM	99%	97%	99%	46%	100%	100%	97%	99%	100%	NA	87%	81%
MTS	100%	100%	100%	93%	100%	100%	100%	99%	99%	98%	NA	100%
Tata Indicom	100%	97%	98%	99%	100%	100%	100%	100%	95%	100%	100%	NA

The maximum problem faced by the calling operator to other operators

7. Metering and Billing credibility

Audit Results for Billing performance

Billing Performance	B'mark	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom
Billing diputes – Postpaid													
Total bills generated during the period		13742	329	6107	48701	7238	3425	NA	NA	7140	73168	NA	71940
Total number of bills disputed		9	0	3	6	7	3	NA	NA	0	22	NA	38
Percentage bills disputed	≤ 0.1%	0.07%	0.00%	0.05%	0.01%	0.10%	0.09%	NA	NA	0.00%	0.03%	NA	0.05%
Billing diputes – Prepaid													
Number of complaints related to charging, credit & validity		44	94305	200	6196	63	1116	86	277	1582	1997	274	268
Total number of prepaid customers in		14830372	3881350	4767078	4322529	3077004	1387310	706112	696917	3669274	3282119	330853	2349663

that period													
Percentage of complaints	≤ 0.1%	0.00%	2.43%	0.00%	0.14%	0.00%	0.08%	0.01%	0.04%	0.04%	0.06%	0.08%	0.01%
Resolution of billing complaints													
Total number of billing/charging complaints		33117	94305	208	6040	2284	1119	86	277	3080	3556	274	306
Total complaints resolved in 4 weeks from date of receipt		33117	94305	208	6040	2284	315	86	277	3080	3556	274	5
Percentage complaints resolved within 4 weeks of date of receipt	100%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00 %	100.00%
Period of applying credit / waiver													
No. of complaints resolved in favour of the customer during the month		49	5483	206	2	70	315	2	85	1582	2019	252	5
No. of complaints disposed on account of not considered as valid complaints		33068	88822	2	6038	2214	804	84	192	1498	1537	22	5
Percentage cases in which credit/waiver was received within 1 week	100%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00 %	100.00%

Live calling results for resolution of billing complaints

Resolution of billing complaints	B' mark	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom
Total Number of calls made		7	0	1	1	2	1	NA	NA	50	50	NA	4
Number of cases resolved in 4 weeks		3	0	1	1	2	1	NA	NA	33	31	NA	1
Percentage cases resolved in four weeks	100%	42.86%	NA	100.00%	100.00%	100.00%	100.00%	NA	NA	66.00%	62.00%	NA	25.00%

8. Customer Care

Audit results for customer care

Customer Care Assessment	Benchmark	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom
Total number of call attempts		36866751	4772494	10313645	1825020	10448440	1882736	720882	793862	948909	2220208	585511	4139678

to customer care for assistance													
Number of calls getting connected and answered (electronically)		36573512	4772494	10305677	1824937	9577933	910306	713930	735405	948909	2220208	583630	4030914
Percentage calls getting connected and answered	≥ 95%	99.20%	100.00%	99.92%	100.00%	91.67%	48.35%	99.04%	92.64%	100.00%	100.00%	99.68%	97.37%
Percentage calls answered within 60 seconds (V2V)	≥ 90%	86.00%	57.00%	97.00%	85.39%	97.00%	89.00%	98.71%	99.53%	99.00%	60.00%	99.99%	90.00%

Live calling results for customer care

Customer Care Assessment	Benchmark	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom
Total Number of calls received		50	50	50	100	50	50	50	50	50	50	50	50
Total Number of calls getting connected and answered		50	18	50	56	44	50	50	50	50	50	47	50
Percentage calls getting connected and answered	≥ 95%	100.00%	36.00%	100.00%	56.00%	88.00%	100.00%	100.00%	100.00%	100.00%	100.00%	94.00%	100.00%

Live calling results for customer care (Voice to Voice)

Customer Care Assessment	B'mark	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom
Total Number of calls received		50	6	50	100	50	50	50	50	50	50	50	50
Total Number of calls answered within 60 seconds		46	6	50	51	44	50	50	50	43	49	45	49
Percentage calls answered within 60 seconds	≥ 90%	92.00%	100.00%	100.00%	51.00%	88.00%	100.00%	100.00%	100.00%	86.00%	98.00%	90.00%	98.00%

9. Termination / closure of service

Audit results for termination / closure of service

Termination	B'mark	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom
Total number of closure request		153	0	118	232	69	99	NA	NA	2	97	NA	671
Number of requests attended within 7 days		153	0	118	232	69	99	NA	NA	2	97	NA	671
Percentage cases in which termination	100%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	NA	NA	100.00%	100.00%	NA	100.00%

done within 7 days													

Audit results for refund of deposits

Refund	Benchmark	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom
Total number of cases requiring refund of deposits		13	0	0	96	40	5	NA	NA	12	308	NA	52
Total number of cases where refund was made within 60 days		13	0	0	96	40	5	NA	NA	12	308	NA	44
Percentage cases in which refund was receive within 60 days	100%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	NA	NA	100.00%	100.00%	NA	84.62%

Traffic in Erlang	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom
Equipped capacity of the network	475600	107613	118182.6	84000	93522	65398	25562.64	43286	262000	262000	18900	156950
Total taffic handled in erlang during TCBH	3712567	49764	82946.28	32188	75422	10309	3887.43	3853	84828	84828	2670.76	44813.59

	Airtel	Aircel	Vodafone	BSNL	Idea	Tata Docomo	S-Tel	Uninor	RTL	RCOM	MTS	Tata Indicom
Total no. of customers served (as per VLR)	10744866	2116319	2628260	806097	2387643	452820	112081	696917	2211340	2211340	80219	1146363

21.0 Annexure - I (Broadband)

21.1 Parameter wise performance reports for Broadband services

1. Service Provisioning

1.1 Audit Results for Service provisioning				
	Benchmark	BSNL - Bihar	BSNL - Jharkhand	Sify
Total connections registered during the period		719	1299	345
Number of connections provided within 15 days		717	1298	345
Percentage of connections provided within 15 days	100%	99.72%	99.92%	100.00%
Number of connections provided after 15 days of registration of demand		2	1	0
Number of customers to whom credit is given for delayed connections		0	0	0
Percentage of customers to whom credit is given for delayed connections	100%	0.00%	0.00%	NA

1.2 Live calling for Service provisioning				
	Benchmark	BSNL - Bihar	BSNL - Jharkhand	Sify
Total connections registered during the period		136	275	100
Number of connections provided within 15 days		49	234	98
Percentage of connections provided within 15 days	100%	36.03%	85.09%	98.00%

2. Fault Incidence / Clearance Statistics

2.1 Audit Results for Fault repair				
Fault repair	Benchmark	BSNL - Bihar	BSNL - Jharkhand	Sify
Total No. of faults registered during the month		379	2114	877
No. of faults repaired by next working day during the month		350	1939	832
Percentage of faults repaired by next working day during the month	> 90%	92.35%	91.72%	94.87%
No. of faults repaired within 3 days during the month		371	2114	877
Percentage of faults repaired within 3 days during the month	>99%	97.89%	100.00%	100.00%

Rent rebate	Benchmark	BSNL - Bihar	BSNL - Jharkhand	Sify
No. of cases with faults pending for >3 days and ≤7 days		0	0	0
Out of these number of cases where rent rebate for 7 days was given		0	0	0
Percentage of cases where rent rebate for 7 days was given	100%	NA	NA	NA
No. of cases with faults pending for >7 days and ≤15 days		0	27	0
Out of these number of cases where rent rebate for 15 days was given		0	27	0
Percentage of cases where rent rebate for 15 days was given	100%	NA	100.00%	NA
No. of cases with faults pending for ≥15 days		6	11	0

Out of these number of cases where rent rebate for 30 days was given		6	11	0
Percentage of cases where rent rebate for 30 days was given	100%	100.00%	100.00%	NA

2.2 Live calling for fault repair				
Fault repair	**Benchmark**	**BSNL - Bihar**	**BSNL - Jharkhand**	**Sify**
Total Number of calls made		178	83	30
Number of cases where fauls were repaired by next working day		41	12	5
Percentage cases where faults were repaired by next working day	> 90%	23.03%	14.46%	16.67%
Number of cases where faults were repaired within 3 days		107	49	17
Percentage cases where faults were repaired within 3 days	>99%	60.11%	59.04%	56.67%

3. Billing performance

3.1 Audit Results for Billing performance				
Billing Performance	**Benchmark**	**BSNL - Bihar**	**BSNL - Jharkhand**	**Sify**
Billing disputes				
Total bills generated during the period		10303	45071	NA
Total number of bills disputed		0	55	NA
Percentage bills disputed	< 2%	0.00%	0.12%	NA
Resolution of billing complaints				
Total number of complaints		0	55	NA
Total complaints resolved in 4 weeks from date of receipt		0	55	NA
Percentage complaints resolved within 4 weeks of date of receipt	100%	NA	100.00%	NA
Period of refund				
Total number of cases requiring refund		0	176	NA
Total number of cases where credit/waiver was made within 60 days		0	176	NA
Percentage cases in which credit/waiver was received within 60 days	100%	NA	100.00%	NA

3.2 Live calling results for resolution of billing complaints				
Resolution of billing complaints	**Benchmark**	**BSNL - Bihar**	**BSNL - Jharkhand**	**Sify**
Total Number of calls made		0	33	NA
Number of cases resolved in 4 weeks		0	24	NA
Percentage cases resolved in 4 weeks	100%	NA	72.73%	NA

4. Response time to the customer for assistance

4.1 Audit results for customer care (Voice to Voice)				
Customer Care Assessment	**Benchmark**	**BSNL - Bihar**	**BSNL - Jharkhand**	**Sify**
Total Number of calls received		747		72

Total Number of calls answered within 60 seconds		747		72
Percentage calls answered within 60 seconds	> 60%	100.00%		100.00%

4.2 Live calling results for customer care (Voice to Voice)				
Customer Care Assessment	**Benchmark**	**BSNL - Bihar**	**BSNL - Jharkhand**	**Sify**
Total Number of calls received		400	97	50
Total Number of calls answered within 60 seconds		376	91	49
Percentage calls answered within 60 seconds	> 60%	94.00%	93.81%	98.00%

4.3 Audit results for customer care (Voice to Voice)				
Customer Care Assessment	**Benchmark**	**BSNL - Bihar**	**BSNL - Jharkhand**	**Sify**
Total Number of calls received		689		72
Total Number of calls answered within 90 seconds		650		72
Percentage calls answered within 90 seconds	> 80%	94.34%		100.00%

4.4 Live calling results for customer care (Voice to Voice)				
Customer Care Assessment	**Benchmark**	**BSNL - Bihar**	**BSNL - Jharkhand**	**Sify**
Total Number of calls received		400	97	50
Total Number of calls answered within 90 seconds		400	97	50
Percentage calls answered within 90 seconds	> 80%	100.00%	100.00%	100.00%

5. Bandwidth utilization

5.1 Audit results for Bandwidth Utilization				
Bandwidth utilization	**Benchmark**	**BSNL - Bihar**	**BSNL - Jharkhand**	**Sify**
Intra-network links (POP to ISP Node)				
Total number of intra network links		297		422
No of Intra network found to be above 90%		4		0
International Bandwidth				
Total number of upstream links		345		23
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In mpbs)		53475		3085
Total International Bandwidth utilised during peak hours		38611		2658
Percentage Bandwidth utilisation during peak hours (In mpbs)	<80%	72.20%		86.16%
No of Intra network found to be above 90%		1		0

5.2 Live measurement results for Bandwidth Utilization				
Bandwidth utilization	**Benchmark**	**BSNL - Bihar**	**BSNL - Jharkhand**	**Sify**
Intra-network links (POP to ISP Node)				

Total number of intra network links		297	422
No of Intra network found to be above 90%		5	0
International Bandwidth			
Total number of upstream links		377	23
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In mpbs)		58435	3085
Total International Bandwidth utilised during peak hours		49152	2658
Percentage Bandwidth utilisation during peak hours (In mpbs)	<80%	84.11%	86.16%
No of Intra network found to be above 90%		0	0

6. Broadband download speed

6.2 Live calling results for broadband download speed				
Broadband download speed	**Benchmark**	**BSNL - Bihar**	**BSNL - Jharkhand**	**Sify**
Total committed download speed to the sample subscribers (In mpbs) (A)		2		1
Total average download speed observed during TCBH (In Mpbs) (B)		1.8		0.95
%age subscribed speed available to the subscriber during TCBH (B/A)*100	>80%	90.00%		95.00%

7. Service availability/uptime

7.1 Audit results for service availability				
Service Availability	**Benchmark**	**BSNL - Bihar**	**BSNL - Jharkhand**	**Sify**
Total Operational Hours		170376		744
Total Downtime		883		0
Total time when the service was available		169493		744
Service Availability Uptime in Percentage	>98%	99.48%		100.00%

7.2 Live measurement results for service availability				
Service Availability	**Benchmark**	**BSNL - Bihar**	**BSNL - Jharkhand**	**Sify**
Total Operational Hours		16560		72
Total Downtime		6		1
Total time when the service was available		16554		71
Service Availability Uptime in Percentage	>98%	99.96%		98.61%

8. Network latency / Packet loss

8.1 Audit results for Latency and packet loss				
Network Latency and Packet Loss	**Benchmark**	**BSNL - Bihar**	**BSNL - Jharkhand**	**Sify**
Packet Loss (Percentage)	< 1%	0.00%		<1%
Network Latency				
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	15		< 45

From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	219	< 300

8.2 Live measurement results for Latency and packet loss				
Network Latency and Packet Loss	**Benchmark**	**BSNL - Bihar**	**BSNL - Jharkhand**	**Sify**
Packet Loss (Percentage)	< 1%	0.05%		0.00%
Network Latency				
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	73		40
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	279		226

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

22.1 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: <=5 complaints per 100 subscribers Fault repair by next working day: >=90% and within 3 days: 100%, averaged over a quarter.
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.

3. 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 Period of applying credit/waiver/adjustment : In 100% of the cases within 1 week of resolution of complaint
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

4. Customer care promptness (Shifts and Closures)	
Computational Methodology	Shifts and closure requests
Benchmark	Shifting of telephone line : Less than 3 days Processing of closure request: Less than 7 days
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 7 days. - Closure requests attended in the previous months are excluded - The period for closure starts from the time of submission of application by the subscriber.

5. Response time to customer	
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 getting connected and answered: In 95% of the cases or more (ii) % age of calls answered by operator / voice to voice) within 60 seconds: In 90% of the cases or more

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.

6. 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)

7. 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

22.2 Cellular Mobile services

1. Accumulated Downtime of the Network	
Computational Methodology as per QoS definition	BTSs accumulated downtime (not available for service) shall basically measure the downtime of the BTSs, including its transmission links/circuits during the period of a month, but excludes all planned service downtime for any maintenance or software up gradation. **Computational Methodology:** • BTSs Accumulated downtime = Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month X 100 --- 24 X No. of days in the month X No. of BTSs in the network in the licensed service area • Worst affected BTSs due to downtime = No. of BTSs having accumulated downtime >24 hours in a month X 100 --- Total No. of BTSs in the network in the licensed service area
Benchmark	• BTSs Accumulated downtime (not available for service) ≤ 2% • Worst affected BTSs due to downtime ≤ 2%
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 audit

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. 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

4. 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	**≤ 2%**
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

5. 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

6. 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*

7. Response time to customer	
Computational Methodology	**To connect to Customer care:** 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:** • % age of calls getting connected = Total number of calls getting connected X 100 / Total number of calls made • % age of calls answered within 60 sec (voice to voice) = Total number of calls answered within 60 seconds X 100 / Total number of calls made
Benchmark	➪ % age of calls getting connected and answered ≥ 95% ➪ % age of calls answered by operator (voice to voice) within 60 seconds ≥ 90%
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.

8.1 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

8.2 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

8.3 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 complaint resolution
Benchmark	100% cases in less than 1 week
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 resolution 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**

22.3 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 :** At least 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 :** At least 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** is 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 (Satellite)
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

*****