Objective Assessment of Quality of Services for (QoS) for Basic Wireline, Wireless and Broadband Service Providers - West Bengal Circle

Report: January-February-March - 2010

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

By: **eTech Group@IMRB**

A specialist unit of IMRB International

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Preface

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

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

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

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

The Survey and Audit modules for various circles within the Zones, due the sheer scale of data collection, have been distributed across various Half Yearly periods. The auditor - IMRB International carried out the audits across UP (East), UP (West), Andhra Pradesh, Kolkata and West-Bengal circles in the January-February-March 2010 period. **This report details the performance of various service providers in West Bengal circle against Quality of Services benchmarks for various parameters laid down by TRAI in respective regulations for Cellular (Mobile), Basic Wireline and Broadband services.**

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1.0 Background

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

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- 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

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Section A: WIRELINE

3.0 Sampling Methodology

3.1 Sampling for Basic (Wireline) services

- For BSNL the sample of exchanges was selected was spread across 5% of exchanges and 10% of SDCA's in the entire service.

- Following service providers are providing Basic (Wireline) service in West Bengal circle –

Circle	West Bengal
Operator 1	BSNL – WB
Operator 2	BSNL – A&N

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 July to September 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 January to March 2010 in West Bengal 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 - WB	BSNL - A&N
Faults incidences (No. of faults/100 Subs./month)	≤5	11.04	3.33
% of faults repaired by next working day	≥ 90%	54.02%	99.41%
% of faults repaired within 3 days	100%	83.92%	100.00%
Faults pending for> 3days and ≤7 days	Rent rebate of 7 days	3.58%	NA
Faults pending for > 7 days and ≤15 days	Rent rebate of 15 days	8.70%	NA
Faults pending for > 15 days	Rent rebate of 1 month	5.00%	NA
Mean Time to Repair (MTTR)	≤ 8 Hrs	27.79	22.1
Call Completion Rate (CCR)	≥ 55%	60.26%	56.33%
Answer to Seizure ratio (ASR)	≥ 75%	64.87%	58.82%
No. of POIs with congestion > 0.5%	≤ 0.5%	0	0
Metering and billing credibility - Number of bills disputed during over a billing cycle	≤ 0.1%	0.21%	0.00%
Resolution of billing complaints within 4 weeks	100%	100.00%	NA
Period of applying credit / waiver	≤ 1 week	100.00%	NA
Closure within 7 days	100%	99.79%	100.00%
Response time to customer for assistance			
% age calls getting connected and answered	≥ 95%	99.12%	NA
% age call answered by operator in 60 seconds	≥ 90%	92.03%	NA
Time taken for refund of deposits after closures within 60 days	100%	99.43%	100.00%

{*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 - WB	BSNL - A&N
% of faults repaired by next working day	≥ 90%	17.50%	28.57%
% of faults repaired within 3 days	100%	50.53%	59.52%
Call Completion Rate (CCR)	≥ 55%	49.04%	52.52%
Answer to Seizure ratio (ASR)	≥ 75%	53.03%	55.17%
Resolution of billing complaints within 4 weeks	100%	100.00%	NA
Response time to customer for assistance			
% age calls getting connected and answered	≥ 95%	100.00%	NA
% age call answered by operator in 60 seconds	≥ 90%	99.61%	NA

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

BSNL is the only operator providing Basic (Wireline) Services in West Bengal circle to retail customers. During the audit process it was observed that the service provider 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 operators who are reporting the same to TRAI were meeting the benchmark.

The parameter wise key takeouts for the wireline service providers for the West Bengal circle are as under –

Fault incidence / clearance statistics

- Fault incidence and repair is a pain point for BSNL subscribers in West Bengal as only 54% of the total complaints registered were repaired within 24 hrs which is significantly short of TRAI specified benchmark of >90%.
- For live calling carried out by IMRB auditors, BSNL (WB and A&N) fail to meet the TRAI benchmark of more than 90% of subscribers claim that fault was repaired within 24 hrs.
- For fault repair within 3 days all service providers are meeting TRAI specified benchmark

Traffic statistics (CCR & ASR)

- BSNL comfortably meet the benchmark on CCR 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
- The service provider however fail to meet the benchmark on ASR both in West Bengal and Andaman & Nicobar

Metering and billing credibility

- BSNL in West Bengal fail to meet TRAI specified benchmark with percentage billing complaints being less than equal to 0.1% of the total bills generated.
- There were no billing complaints found in sample exchanges audited in Andaman & Nicobar
- Also all the complaints registered were resolved within the time period stipulated by TRAI

Response time to customer for assistance

- During the Audit process it was discovered that there is no dedicated call centre in Andaman.
- BSNL in West Bengal falls short of TRAI specified benchmark for calls answered by the operator in 60 seconds.
- However for the live calling carried out by IMRB auditors all service provider except BSNL for calls answered within 60 seconds comfortably meets the TRAI specified benchmark

Time taken for refund of deposits after closure

- BSNL was found to be meeting TRAI benchmark on this parameter

Level 1 service

Level 1 services	BSNL - WB	BSNL - A&N
Total no. of calls made	2640	30
Calls answered in 60 sec	2460	30
Calls answered after 60 sec	180	0

To test the efficiency of level 1 services (Trunk booking, Child helpline, Women helpline, Airline booking, Fire, Police, Railways) offered by various service providers. 2640 calls were made for BSNL to different numbers and time taken to answer the call was noticed. Out of which 2460 of calls made were answered in 60 seconds. For BSNL - Andaman 100% of calls were answered within 60 seconds

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
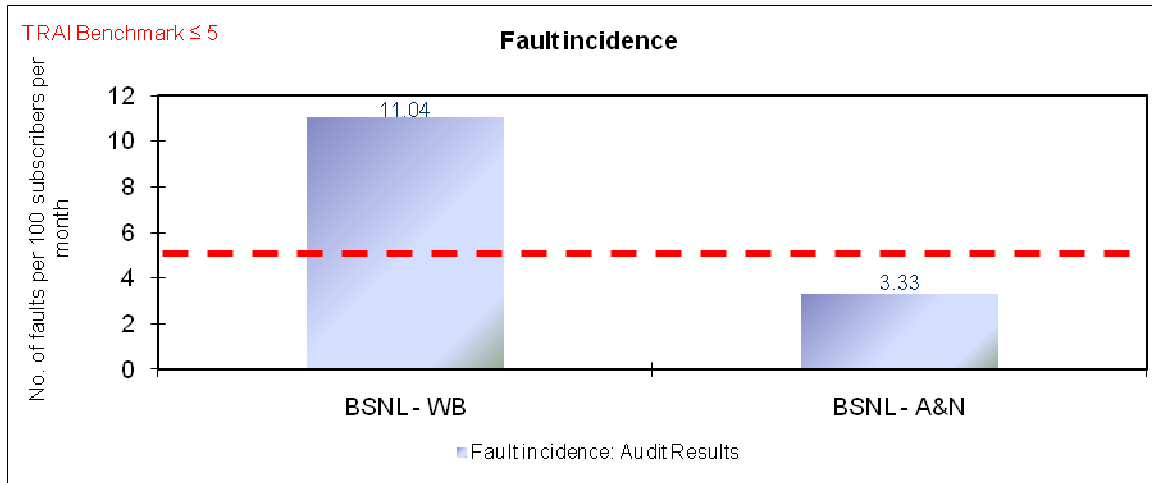
Operator meeting benchmark: BSNL - A&N
Operator not meeting benchmark: BSNL - WB

Fault repair/Restoration time (Comparison between one month audit results and live calling results)
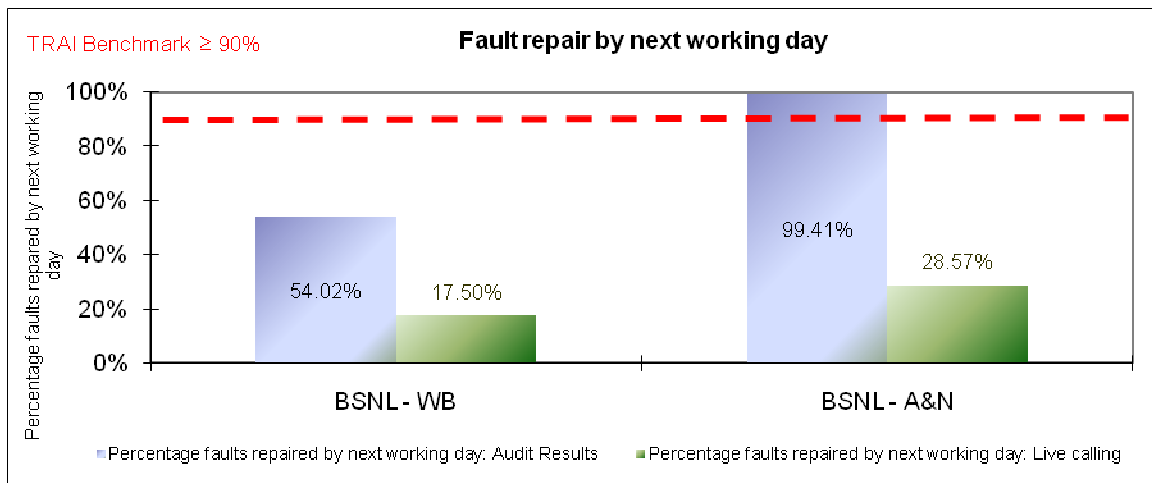
One month
Operator meeting benchmark: BSNL - A&N
Operator not meeting benchmark: BSNL - WB

Live calling
No operator is meeting the benchmark
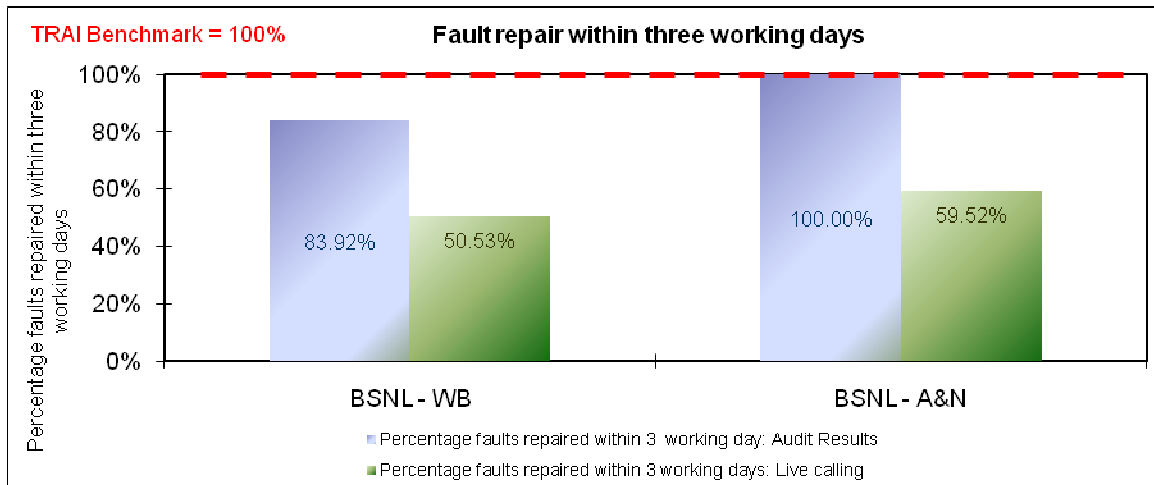
One month
Operator meeting benchmark: BSNL - A&N
Operator not meeting benchmark: BSNL - WB

Live calling
No operator is meeting the benchmark

Mean time to repair
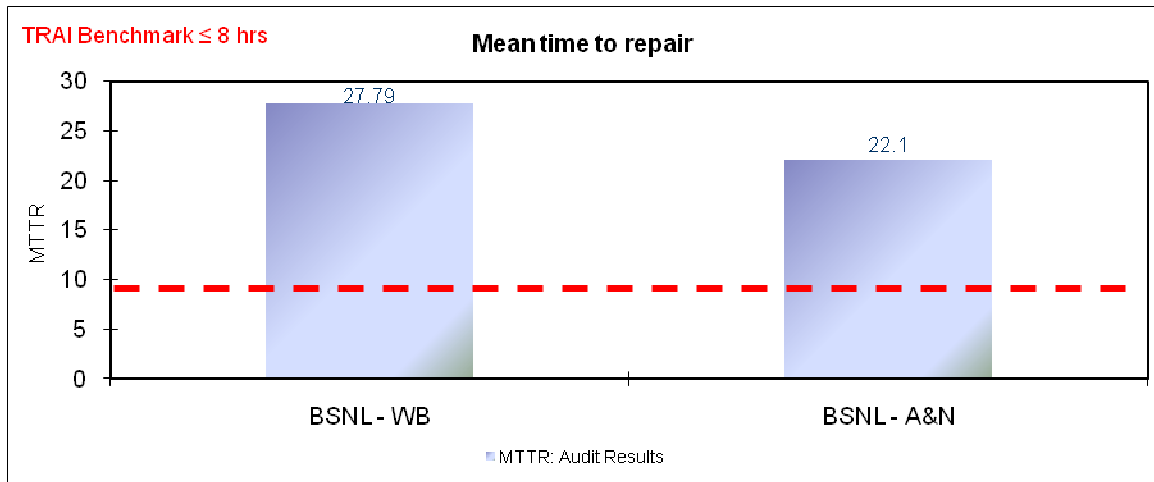
No operator is meeting the benchmark

Call completion rate (Comparison between one month audit results and three day live measurement)
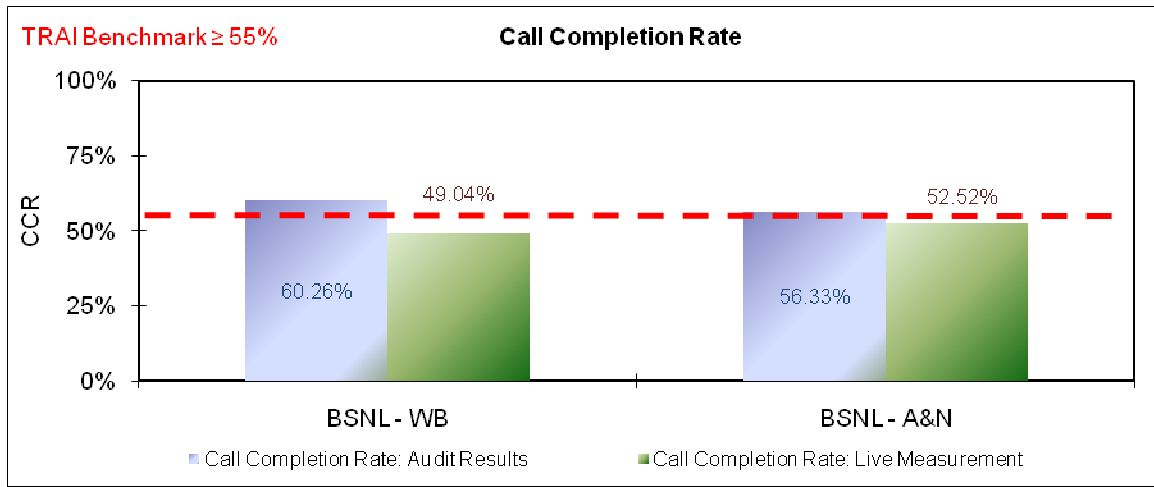
One month
All operators are meeting the benchmark

Live measurement
No operator is meeting the benchmark

Answer to Seizure Ratio (Comparison between one month audit results and three day live measurement)
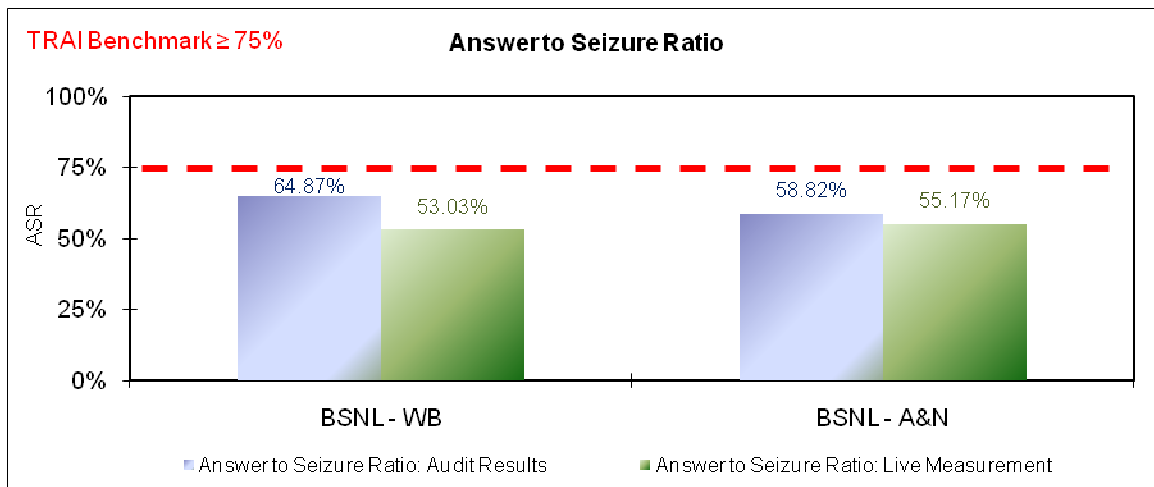
One month
No operator is meeting the benchmark

Live measurement
No operator is meeting the benchmark

Percentage bills disputed
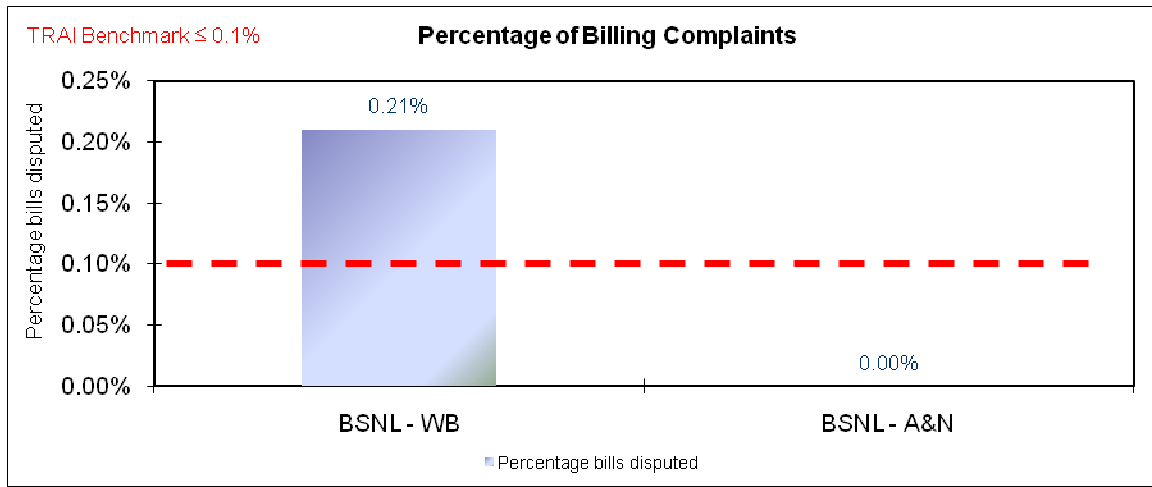
Operator meeting benchmark: BSNL - A&N
Operator not meeting benchmark: BSNL - WB

Resolution of billing complaints - postpaid (Comparison between one month audit results and live calling results)
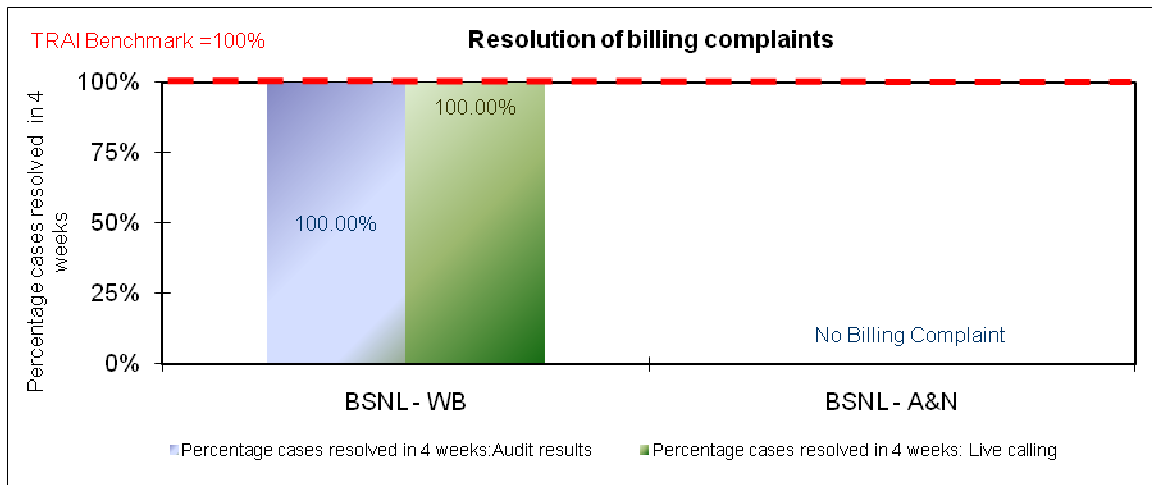
One month
All operators are meeting the benchmark

Live calling
All operators are meeting the benchmark

Closure requests attended within 7 days
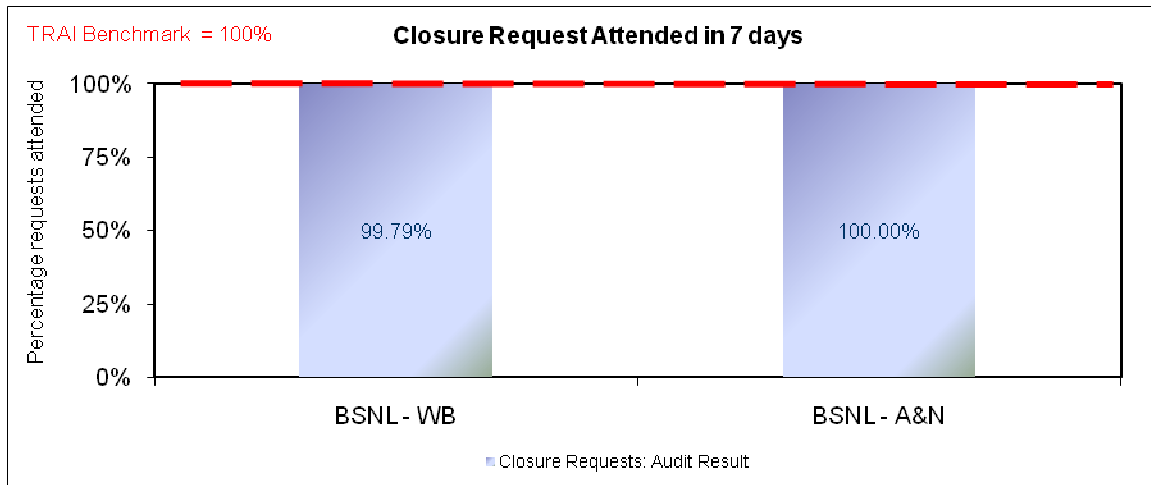
Operator meeting benchmark: BSNL - A&N
Operator not meeting benchmark: BSNL - WB

Response time to customer for assistance - Calls answered and getting connected (Comparison between one month audit and live calling results)
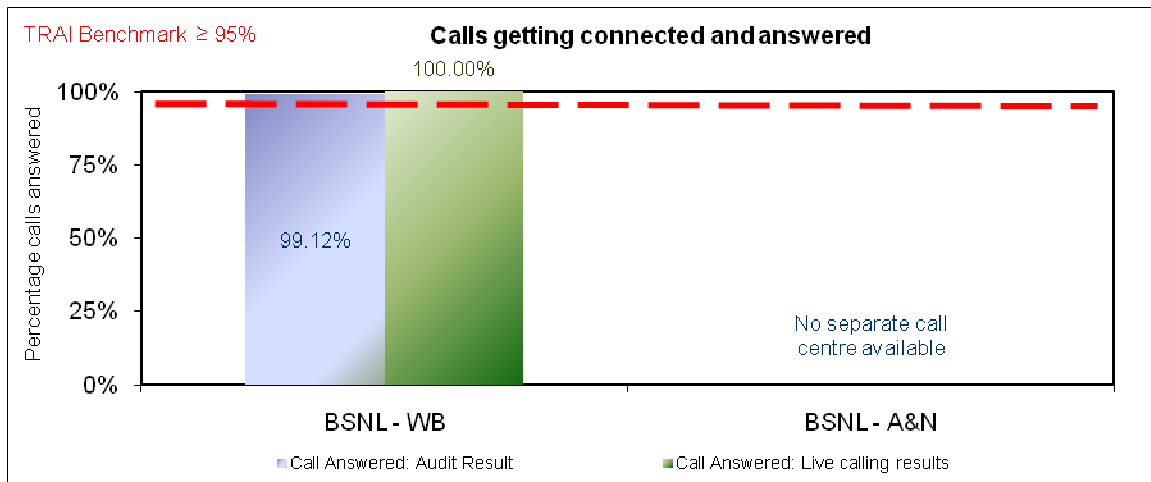
One month
All operators are meeting the benchmark

Live calling
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)
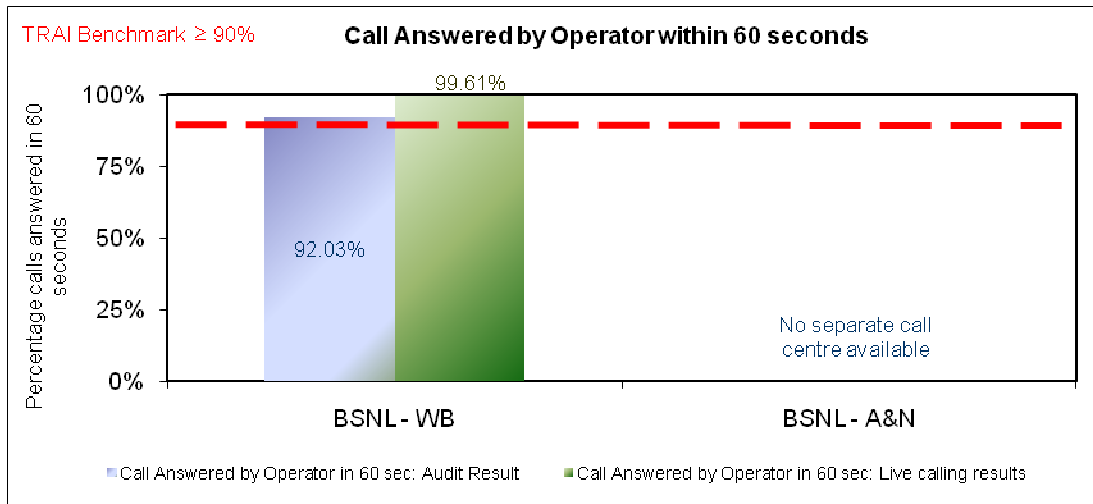
One month
All operators are meeting the benchmark

Live calling
All operators are meeting the benchmark

Time taken to refund of deposits after closure
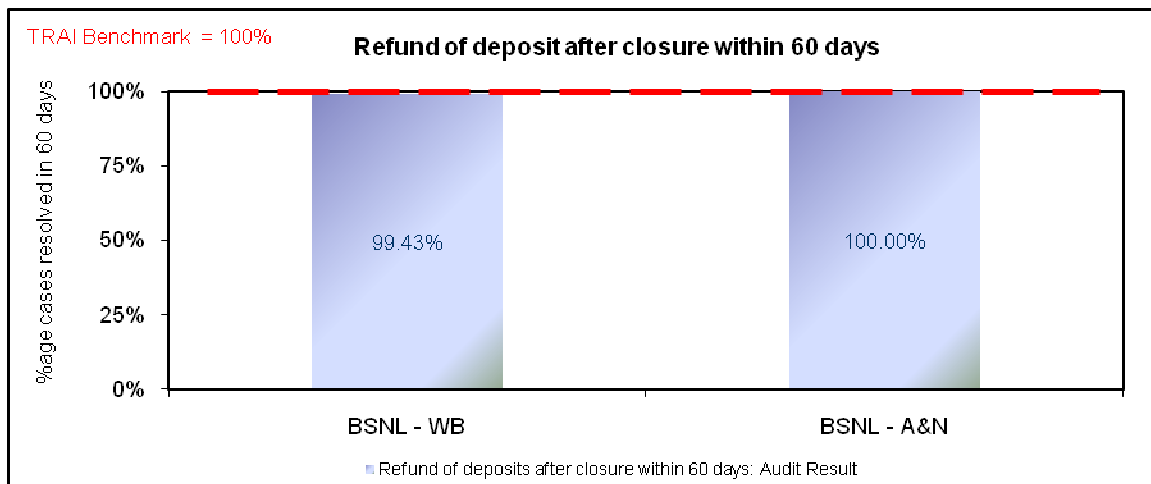
Operator meeting benchmark: BSNL - A&N
Operator not meeting benchmark: BSNL - WB

7.0 Compliance reports: Results of Verification of Records

7.1 Basic (Wireline) services

Parameters	Benchmarks	BSNL – WB*		BSNL - A&N*	
		PMR	IMRB	PMR	IMRB
Faults incidences (No. of faults/100 Subs./month)	≤5	6.20	16.84	4.15	8.96
% of faults repaired by next working day	By next working day: ≥ 90%	86.91%	47.08%	88.50%	84.69%
Total No. of faults registered during the quarter		175647	41171	2292	738
No. of faults repaired by next working day during the quarter		152768	19385	2038	625
No. of faults repaired within 3 days during the quarter	For urban areas	92528	30092	1330	738
% of faults repaired within 3 days	For urban areas: ≥ 100%	93.60%	73.09%	94.20%	100.00%
No. of faults repaired within 5 days during the quarter	For rural and hilly areas	75221	8471	NA	NA
% of faults repaired within 5 days	For rural and hilly areas:	97.30%	92.46%	NA	NA
Rent Rebate :	≥ 100%				
Faults pending for> 3days and ≤7 days	Rent Rebate for 7 days	0	68	0	0
Faults pending for > 7 days and ≤15 days	Rent Rebate for 15 days	174	17	0	0
Faults pending for > 15 days	Rent Rebate for 30 days	519	5	0	0
Mean Time to Repair (MTTR)	≤ 8 Hrs	10.31	26.67	7.70	24.82
Call Completion Rate (CCR)	≥ 55%	64.48%	55.69%	56.86%	58.07%
Total Number of successful local calls		DNA	3126960	DNA	DNA
Total local call attempts		DNA	1741384	DNA	DNA
Answer to Seizure Ratio (ASR)	≥ 75 %	NA	NA	NA	NA
Total I/C seizures		NA	NA	NA	NA
No. of answered calls		NA	NA	NA	NA
Point of Interconnection (POI) Congestion (No. of PoIs not meeting benchmark)	≤ 0.5%	20	0	0	0
Total number of working POI Service Area wise		NA	NA	NA	0
Metering and billing credibility - post paid	Not more than 0.1%	0.06%	0.15%	0.00%	0.00%
No. of bills issued during the period		1805773	243098	83164	21166
No. of bills disputed including billing complaints during the period		394	355	0	0
Metering and billing credibility - pre paid	Not more than 0.1%	NA	NA	NA	NA
No. of charging / credit / validity complaints during the quarter		NA	NA	NA	NA
Total no. of pre-paid customers at the end of the quarter		NA	NA	NA	NA

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Resolution of billing/ charging/ validity complaints	100% within 4 weeks	100.00%	100.00%	NA	NA
No. of billing/(post paid) and charging, credit / validity (pre paid) complaints resolved within 4 weeks during the quarter		0	355	0	0
Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		0	355	0	0
No. of billing complaints (post paid) and charging, credit/validity complaints (pre paid) resolved in favor of the customer during the quarter		402	3	0	0
No. of complaints disposed on account of not considered as valid complaints during the quarter		0	352	0	0
Period of applying credit/ waiver/ adjustment to customer's account from the date of resolution of complaints	within 1 week of resolution of complaint	NA	NA	NA	NA
Response time to the customer for assistance	≥ 95%	75.41%	100.00%	NA	NA
Accessibility of call centre/ customer care		DNA	2621080	NA	NA
Total no. of call attempts to call centre / customer care nos. during TCBH		DNA	2615130	NA	NA
Percentage of calls answered by the operators (voice to voice) within 60 seconds	≥ 90%	84.33%	92.00%	NA	NA
Termination / closure of service	≤ 7 days				
%age requests for Termination / Closure of service complied within 7 days	100.00%	100.00%	99.68%	99.78%	100.00%
Total No. of requests for Termination / Closure of service received during the quarter		9469	2821	463	204
No. of requests for Termination / Closure of service complied within 7 days during the quarter		9469	2812	462	204
Time taken for refund of deposits after closures	100% within 60 days.	100.00%	100.00%	100.00%	100.00%

* 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 July to September 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. The service provider was found not to meeting benchmark for fault repair within 3 working days, MTTR and closure request within 7 days

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 Centers (MSC's) of all the Cellular Mobile Service Providers or Unified Access Service Providers (UASP) was collected and verified in specified circles/service areas. Following are the various operators covered in West Bengal circle

	Name of Operator	Month of Audit
Operator 1	Airtel	Jan '10
Operator 2	Aircel	Jan '10
Operator 3	BSNL	Feb '10
Operator 4	Idea	Jan '10
Operator 5	RCOM CDMA	Jan '10
Operator 6	RCOM GSM	Jan '10
Operator 7	Tata CDMA	Jan '10
Operator 8	DoCoMo	Jan '10
Operator 9	MTS	Jan '10
Operator 10	Vodafone	Jan '10

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 January 2010 to March 2010 in West Bengal 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) Note :2)	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	19:00 - 20:00	4193	3029.72	0.10%	4	0.10%	98.92%	0.24%	0.54%	1.25%	245	13197	1.86%	98.66%	0	27	167352	130881	4586187
Aircel	19:00 - 20:00	2409	2425	0.14%	41	1.70%	95.16%	0.63%	1.59%	2.23%	47013	214627	21.90%	97.80%	0	5	3381227	1498300	45304573
BSNL	19:00 - 20:00	2061	>984	0.00%	41	1.99%	98.21%	0.91%	1.36%	0.68%	282	6014	4.69%	98.00%	0	90	118250	83841	1502867
Idea	19:00 - 20:00	900	3136	0.47%	14	1.56%	97.90%	0.46%	0.97%	0.75%	2442	77292	3.16%	96.32%	2	25	19984	4579	253757
RCOM CDMA	19:00 - 20:00	1273	2332	0.25%	5	0.39%	99.58%	0.00%	0.13%	1.10%	7	1273	0.55%	97.35%	10	106	148000	33585	1175583
RCOM GSM	19:00 - 20:00	1922	1185	0.08%	5	0.26%	98.19%	0.05%	0.25%	0.83%	19	5766	0.33%	98.05%	10	106	DNP	DNP	DNP
Tata CDMA	19:00 - 20:00	639	371	0.08%	1	0.16%	98.55%	0.00%	0.01%	0.72%	16	1915	0.84%	97.90%	0	96	147395	30770	491557
DoCoMo	19:00 - 20:00	898	4543	0.68%	104	11.58%	98.29%	0.26%	0.22%	0.75%	9	2694	0.33%	97.28%	0	3	62500	1906	142513
MTS	20:00 - 21:00	700	2328	0.45%	12	1.71%	98.03%	0.00%	0.48%	1.28%	85	2100	4.05%	98.92%	0	38	6969	4332	316436
Vodafone	19:00 - 20:00	5601	10349	0.25%	99	1.77%	96.98%	0.75%	1.55%	1.51%	501	16762	2.99%	96.72%	1	38	204487	169237	5648195

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

Critical findings: Cellular Mobile Services

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

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
BSNL	19:00 - 20:00	19:00 - 20:00
Idea	19:00 - 20:00	19:00 - 20:00
RCOM CDMA	19:00 - 20:00	19:00 - 20:00
RCOM GSM	19:00 - 20:00	19:00 - 20:00
Tata CDMA	19:00 - 20:00	19:00 - 20:00
DoCoMo	19:00 - 20:00	19:00 - 20:00
MTS	19:00 - 20:00	20:00 - 21:00
Vodafone	19:00 - 20:00	19:00 - 20:00

The TCBH reported by all the service providers except MTS matched the network busy hour calculated by IMRB auditors for the West Bengal circle.

BTSs Accumulated Downtime & Worst affected BTSs:
In the West Bengal circle, all the operators were found to be meeting the TRAI benchmark for this parameter. BSNL experienced the lowest outage hours in the month of audit. All operators except DoCoMo (11.58%) were found to be meeting the TRAI benchmark for worst affected BTSs due to 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 RCOM CDMA with 99.58% 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 are meeting the TRAI specified benchmarks on the congestion parameters. MTS, TATA CDMA and RCOM CDMA 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 Tata Teleservices measure paging channel utilization. When the value of this parameter is less than 100%, it is counted as 0% congestion. POIs for Idea, RCOM and Vodafone were found with congestion more than the TRAI benchmark (≤0.5%).

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. All service providers except Aircel (2.23%) were found to be meeting the TRAI specified benchmark. The lowest call drop rate was of BSNL at 0.68%.

Aircel (21.90%) does not meet the TRAI benchmark for worst affected cells having more than 3% TCH drop.

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.

Customer Care / Helpline Assessment
For the accessibility of customer care aspect all the service providers meet the TRAI benchmark. RCOM GSM does not meet benchmark for percentage calls answered within 60 seconds for the month of audit.

Billing performance
BSNL and Tata CDMA were found to be falling short of benchmark of ≤ 0.1% complaints registered per 100 bills issued. All operators except TATA CDMA are meeting benchmark of 100% billing complaints being resolved within 4 weeks and 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	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
Airtel	NA	100%	95%	100%	100%	100%	97%	66%	100%	86%
Aircel	100%	NA	85%	100%	100%	100%	96%	69%	100%	87%
BSNL	96%	53%	NA	100%	100%	100%	97%	78%	100%	92%
Idea	96%	91%	73%	NA	94%	96%	92%	92%	100%	92%
RCOM CDMA	97%	81%	89%	100%	NA	100%	96%	92%	86%	90%
RCOM GSM	100%	94%	77%	93%	92%	NA	95%	93%	89%	92%
Tata CDMA	86%	93%	94%	91%	100%	100%	NA	91%	89%	88%
DoCoMo	100%	84%	89%	92%	96%	97%	92%	NA	90%	92%
MTS	90%	94%	94%	95%	92%	95%	92%	92%	NA	89%
Vodafone	99%	74%	99%	100%	94%	97%	96%	75%	93%	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, RCOM CDMA and GSM found tough connecting to a MTS number. DoCoMo and Vodafone found tough connecting to Airtel number. Aircel had difficulty in connecting to a BSNL number with only 53% of their calls getting completed.

Results of Operator assisted Drive test

The drive test was conducted simultaneously for all the operators present in the West Bengal circle. There was in total three drive tests conducted in the circle. These tests were conducted in the cities of Beharampur, Tamluk and Port Blair. IMRB auditors were present in vehicles of every operator. A sample of 15 – 30 test calls were made along each of the routes. The holding period for all test calls was between 120 seconds to 180 seconds. The drive test vehicle across all routes plied at a speed of less than 20 km per hour. Taking into consideration the route that was taken for the drive test; most of the major areas West Bengal 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 dbm for in-vehicle and > -95 dbm outdoor routes.

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

	Type of location	Beharampur City	Tamluk	Port Blair
Outdoor	Periphery of the city	Kasimbazar railway station to kazi nazrul islam avenue through the bank of river,to railway crossing to ITI berhampur to kasim bazaar railway station	Maniktala Mode- Police Station- Tumluk Municipal-Bargavilla Temple- Nimtala mode- Maniktala mode	BSNL Telephone Bhavan-Chiriatapu via Carvin Scove to Chattam Shaw Mill
	Congested area	Khagra market,Gora bazaar, judge court, bus stand,laldighi market	District Library -Bargavilla Temple- Ramakrishna Mission School- Police Station- Behind Tumluk Municipality - District Library	Abedin Bazar
	Across the city	From civil hospital to Cathdrell church to kazi nazul islam avenue via mental hospital to kasim bazaar	Tumluk Railway Station- Nimtala mode- DM office- Sankarara- Hospital Rd- Maniktala Mode- Ratnali	Water sports Complex to Air Port
Indoor	Office complex	Supritendent of police (government office building)	TAMLUK DM OFFICE	APWD
	Shopping complex	Shopping complex near civil hospital	HOSPITAL MODE SHOPPING COMPLEX	CLOCK TOWER

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

Drive Test – Beharampur City

	Benchmark	Airtel		Aircel		BSNL		Idea		RCOM CDMA		RCOM GSM		Tata CDMA		DoCoMo		MTS		Vodafone	
		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%	98.25%	96.61%	89.72%	92.05%	97.70%	97.33%	98.00%	97.24%	99.06%	99.32%	97.94%	93.82%	98.84%	98.05%	98.32%	93.58%	99.07%	98.42%	96.11%	95.96%
CSSR	≥ 95%	100.00%	100.00%	100.00%	96.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.42%	100.00%	100.00%	100.00%	96.30%	100.00%	99.73%	100.00%	100.00%
%age Blocked calls		0.00%	0.00%	0.00%	4.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.58%	0.00%	0.00%	0.00%	3.70%	0.00%	0.27%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	2.00%	0.00%	0.00%	0.00%	0.00%	6.45%	1.91%	0.00%	0.58%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	94.98%	100.00%	99.51%	100.00%	100.00%	98.96%	99.70%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Drive Test – Tamluk

	Benchmark	Airtel		Aircel		BSNL		Idea		RCOM CDMA		RCOM GSM		Tata CDMA		DoCoMo		MTS		Vodafone	
		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%	99.75%	98.82%	93.85%	97.50%	97.69%	97.25%	99.16%	98.43%	99.01%	100.00%	98.03%	93.83%	99.12%	98.99%	98.20%	96.86%	98.74%	99.64%	95.95%	95.28%
CSSR	≥ 95%	100.00%	100.00%	100.00%	99.23%	100.00%	100.00%	100.00%	99.43%	100.00%	99.67%	96.97%	99.39%	100.00%	100.00%	100.00%	98.43%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls		0.00%	0.00%	0.00%	0.77%	0.00%	0.00%	0.00%	0.57%	0.00%	0.33%	3.03%	0.61%	0.00%	0.00%	0.00%	1.57%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.61%	0.00%	0.00%	0.00%	0.00%	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%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Drive Test – Port Blair

	Benchmark	Airtel		BSNL		RCOM CDMA		Vodafone	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	≥ 95%	97.80%	93.22%	98.00%	87.76%	96.83%	95.32%	97.34%	95.27%
CSSR	≥ 95%	100.00%	100.00%	100.00%	96.00%	100.00%	98.68%	100.00%	100.00%
%age Blocked calls		0.00%	0.00%	0.00%	4.00%	0.00%	1.32%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	4.17%	0.00%	2.60%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	96.33%	100.00%	99.20%	100.00%	100.00%

☐ Not meeting the benchmark

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

Beharampur: There was interference and low signal strength recorded for operators in the outdoor areas near Nirupama Devi Road, Gora bazar, Kandi Purana Bus Stand, Kasim Bazar while in the indoor areas inadequate coverage was not found in any of the areas.

Tamluk: There was interference and low signal strength recorded for operators in the outdoor areas of District Magistrate building, Nimta more, Baro bazar, Fancy market and Sankarara while in the indoor areas there was no inadequate coverage or interference recorded.

Port Blair: There was interference and low signal strength recorded for in the outdoor areas of Water Sports Complex, Hotel Sinclarias, Science Museum, Chiratappu, Indian Airlines Office, UCO Bank, Sagarika, Phonix Jetty, Haddo, Chattam Show Mill and in the indoor areas interference and inadequate coverage was recorded in APWD office.

Conclusions:

Three drive tests were conducted by IMRB with the help of service providers to measure voice quality, CSSR and call drop rate parameters.

1. Aircel and RCOM GSM does not meet the TRAI benchmark on voice quality in Behrampur and Tamluk
2. Airtel and BSNL does not meet the TRAI benchmark on voice quality in outdoor areas of Port Blair
3. BSNL and RCOM CDMA do not meet the benchmark for call drop rate in outdoor areas of Port Blair

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	98.95%	0.25%	0.66%	1.17%	3.01%	96.53%	100.00%	100.00%	90.00%
Aircel	97.19%	0.26%	0.73%	2.05%	17.75%	94.22%	40.00%	100.00%	62.00%
BSNL	98.47%	0.53%	1.31%	1.17%	0.00%	97.37%	100.00%	100.00%	80.00%
Idea	97.71%	0.18%	1.04%	0.95%	3.53%	97.98%	100.00%	100.00%	100.00%
RCOM CDMA	99.37%	0.00%	0.37%	1.01%	0.50%	98.35%	98.00%	95.00%	95.00%
RCOM GSM	97.75%	0.02%	0.19%	0.56%	0.38%	94.58%	100.00%	100.00%	98.00%
Tata CDMA	98.39%	0.00%	0.01%	0.66%	0.89%	98.58%	65.91%	100.00%	94.00%
DoCoMo	98.65%	0.31%	0.39%	0.69%	0.75%	95.87%	100.00%	100.00%	78.00%
MTS	97.21%	0.00%	0.86%	1.83%	4.33%	81.14%	100.00%	100.00%	25.00%
Vodafone	98.96%	0.44%	0.60%	1.15%	2.84%	95.71%	42.00%	100.00%	96.00%

▢ Not meeting the benchmark

* Based on operator assisted drive tests conducted by IMRB

During the three day live measurement, all operators are meeting Connection Establishment benchmark. Also for Connection Maintenance parameters all operators except Aircel for call drop rate and worst affected cells meet benchmark on all parameters. Aircel, RCOM GSM and MTS do not meet benchmark for %age calls with good voice quality. All operators except BSNL, Aircel, DoCoMo and MTS meet TRAI benchmark for Percentage of calls answered by the operators within 60 seconds during live calling.

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
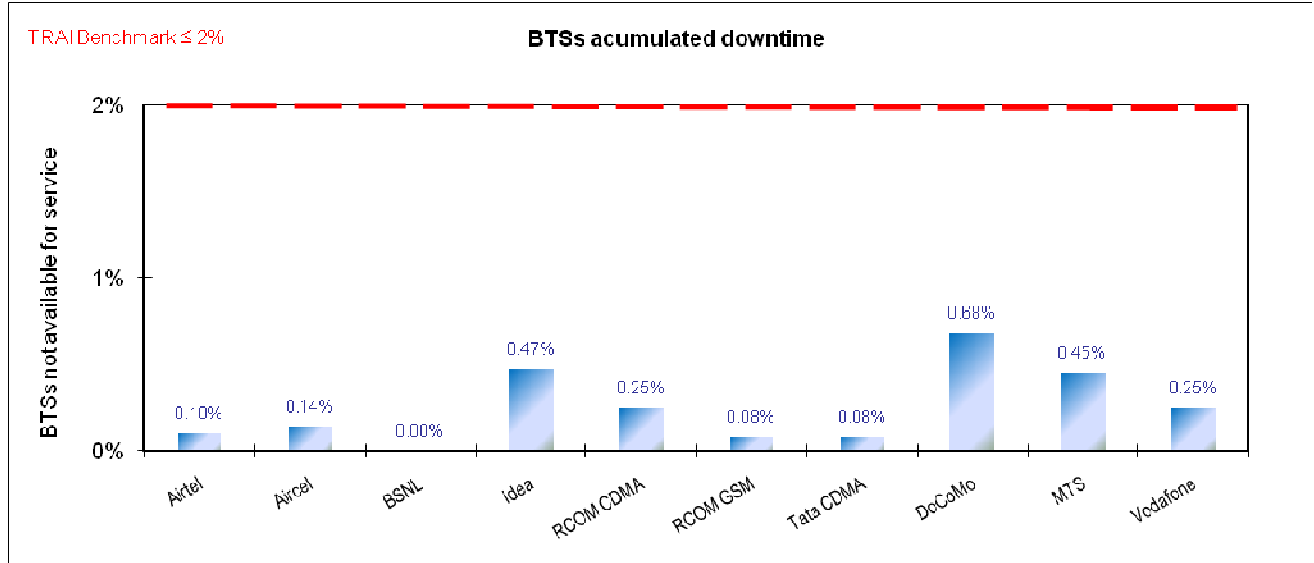
All the operators meet the benchmark

Worst Affected BTSs
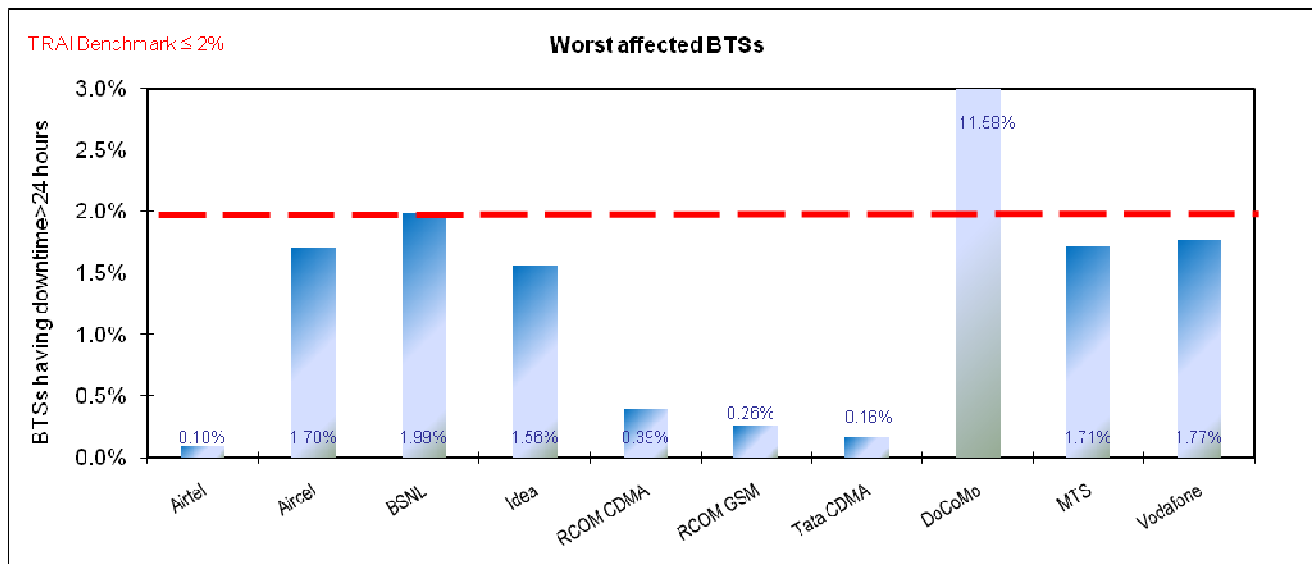
Operator(s) meeting benchmark: Airtel, Aircel, BSNL, Idea, RCOM CDMA, RCOM GSM, Tata CDMA, MTS, Vodafone
Operator(s) not meeting the benchmark: DoCoMo

Call Set-up Success Rate (CSSR)

One month
All the operators meet the benchmark

Live measurement
All the operators meet the benchmark

Drive test
All the operators meet the benchmark

SDCCH / Paging Channel Congestion
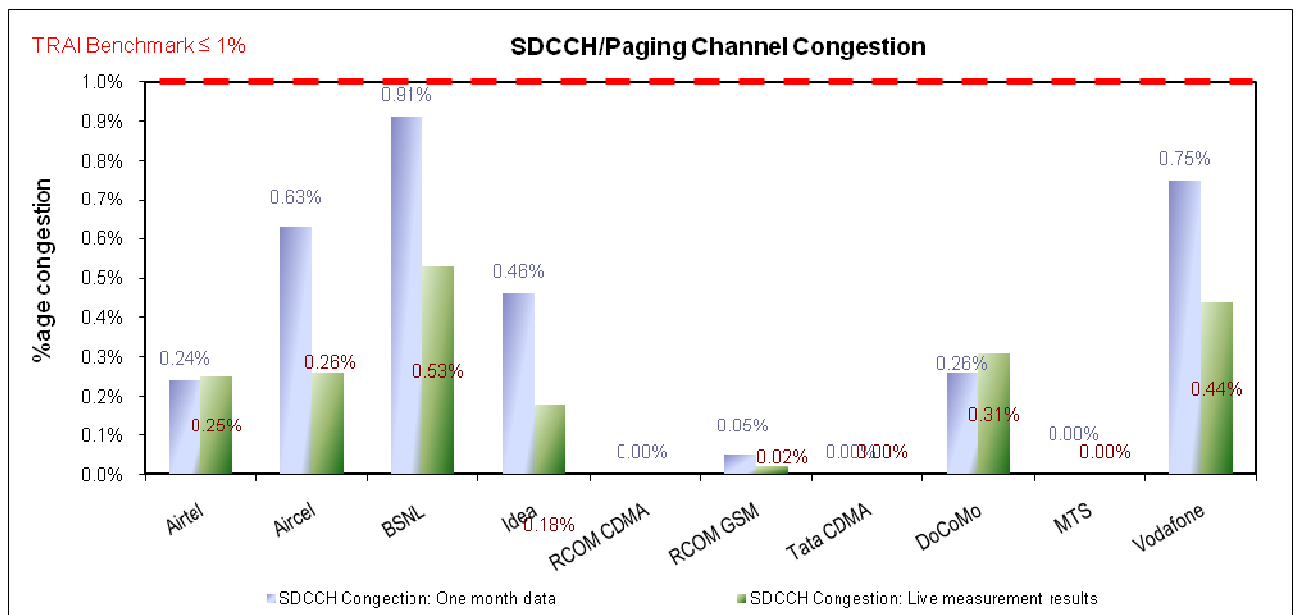
One month
All the operators meet the benchmark

Live measurement
All the operators meet the benchmark

TCH Congestion
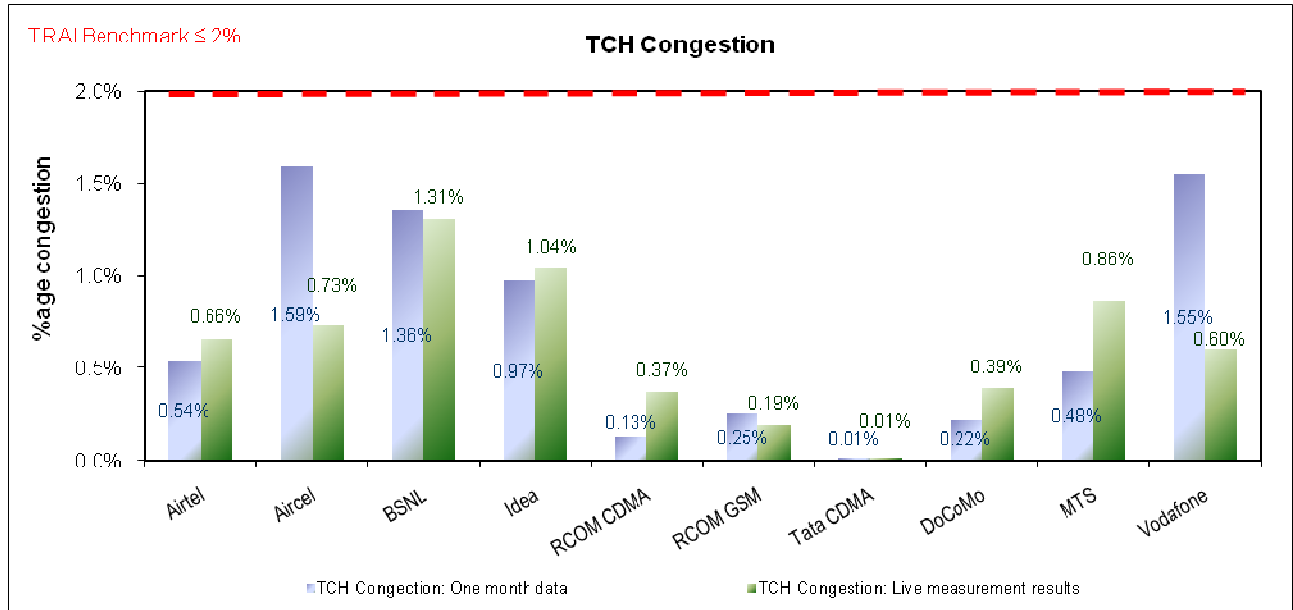
One month
All the operators meet the benchmark

Live measurement
All the operators meet the benchmark

Call Drop Rate
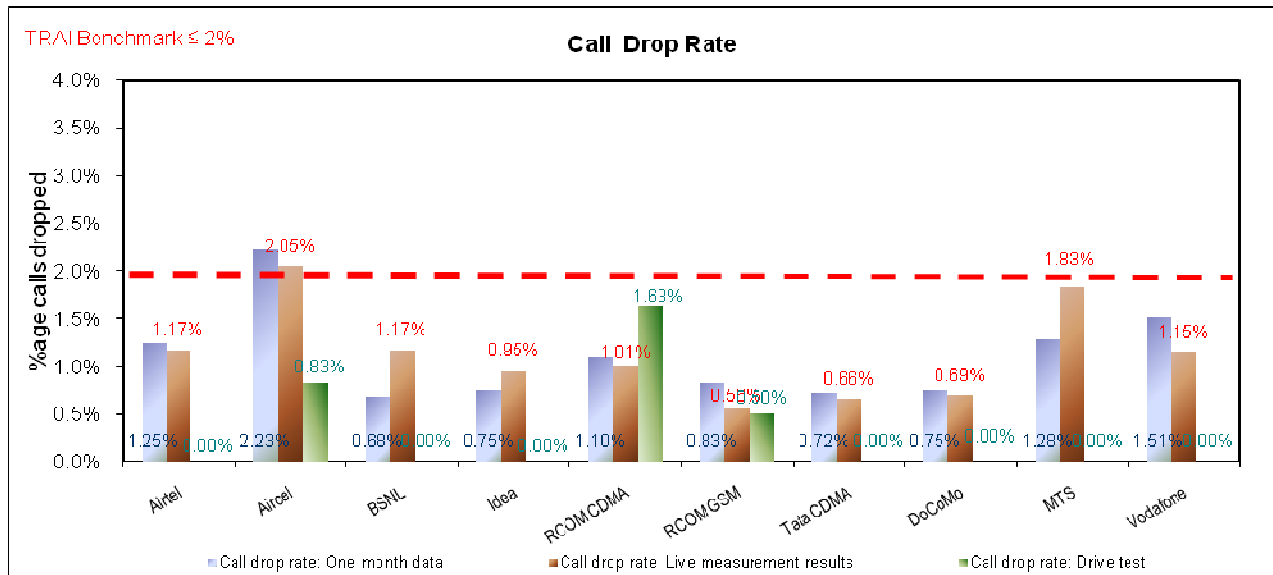
One month
Operator(s) meeting benchmark: Airtel, BSNL, Idea, RCOM CDMA, RCOM GSM, Tata CDMA, DoCoMo, MTS, Vodafone
Operator(s) not meeting the benchmark: Aircel

Live measurement
Operator(s) meeting benchmark: Airtel, BSNL, Idea, RCOM CDMA, RCOM GSM, Tata CDMA, DoCoMo, MTS, Vodafone
Operator(s) not meeting the benchmark: Aircel

Drive test
All the operators meet the benchmark

<u>Cells with more than 3% Call Drop Rate</u>
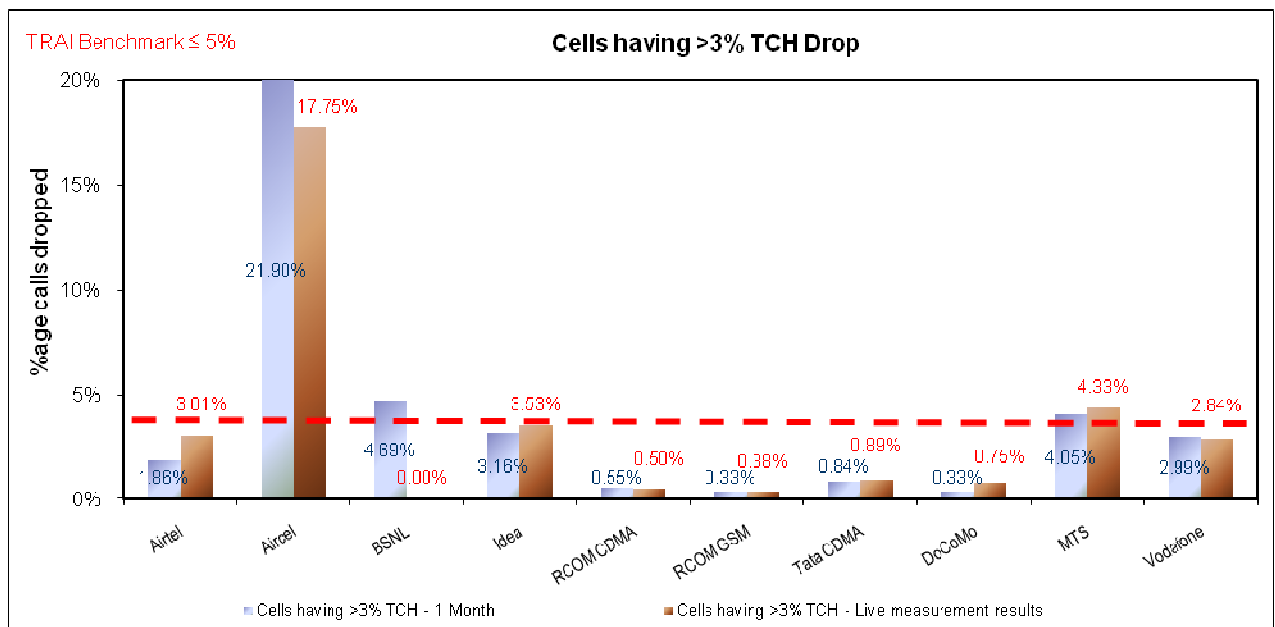
One month
Operator(s) meeting benchmark: Airtel, BSNL, Idea, RCOM CDMA, RCOM GSM, Tata CDMA, DoCoMo, MTS, Vodafone
Operator(s) not meeting the benchmark: Aircel

Live measurement
Operator(s) meeting benchmark: Airtel, BSNL, Idea, RCOM CDMA, RCOM GSM, Tata CDMA, DoCoMo, MTS, Vodafone
Operator(s) not meeting the benchmark: Aircel

Voice quality
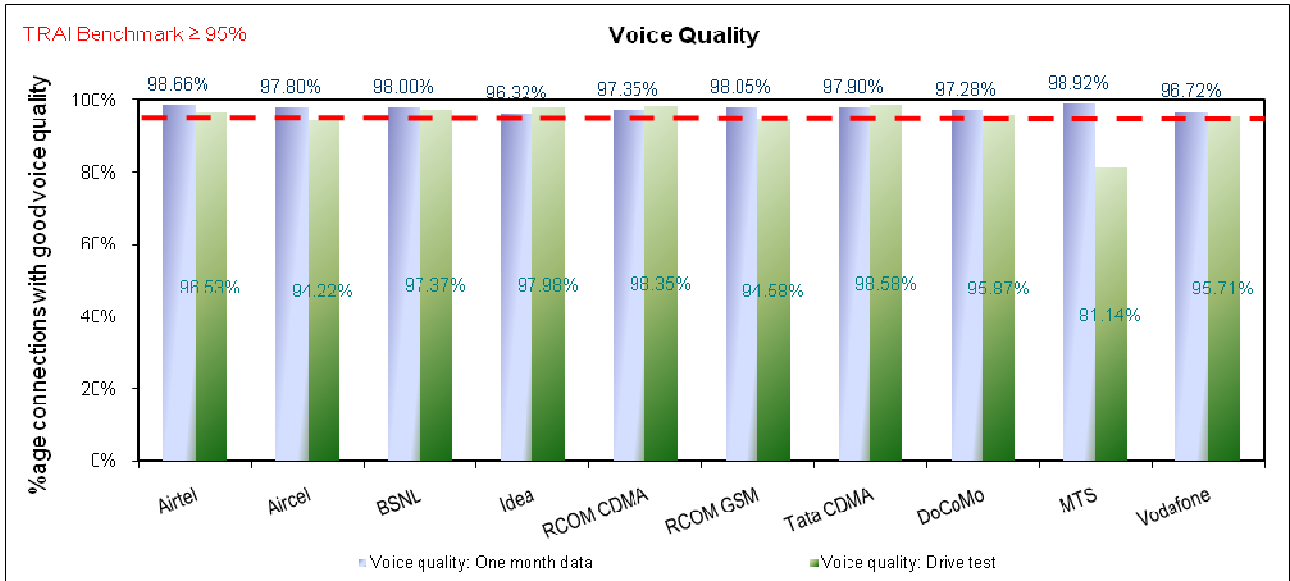
One month
All the operators meet the benchmark

Live measurement (Drive test)
Operator(s) meeting benchmark: Airtel, BSNL, Idea, RCOM CDMA, Tata CDMA, DoCoMo, Vodafone
Operator(s) not meeting the benchmark: Aircel, RCOM GSM, MTS

Billing Disputes - Postpaid
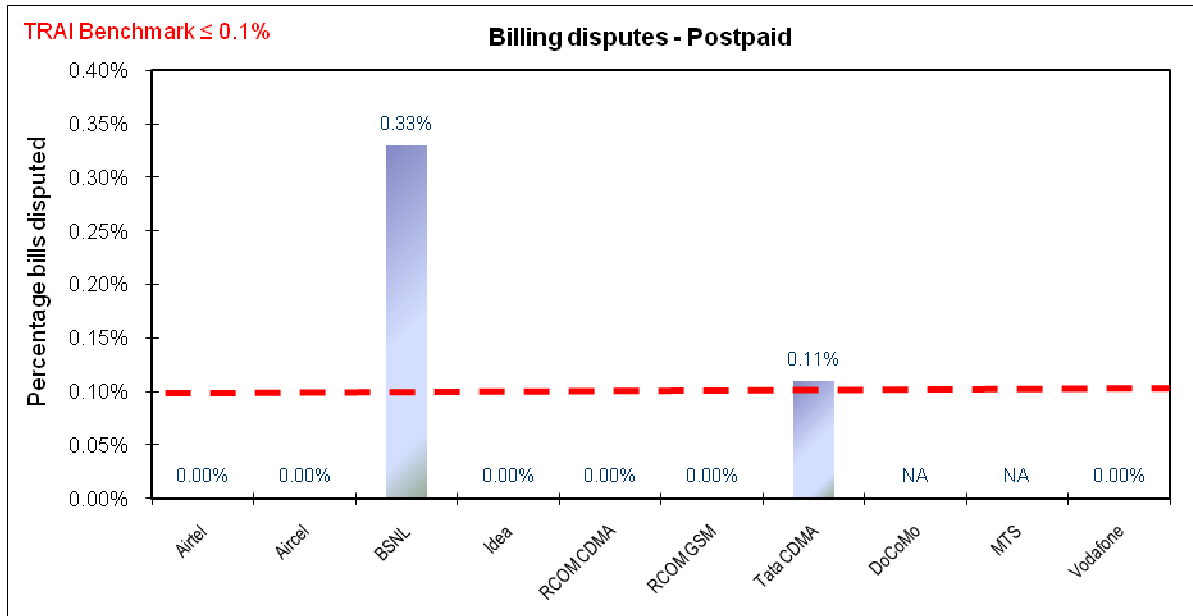
Operator(s) meeting benchmark: Airtel, Aircel, Idea, RCOM CDMA, RCOM GSM, Vodafone
Operator(s) not meeting the benchmark: BSNL, Tata CDMA

Complaints - Prepaid
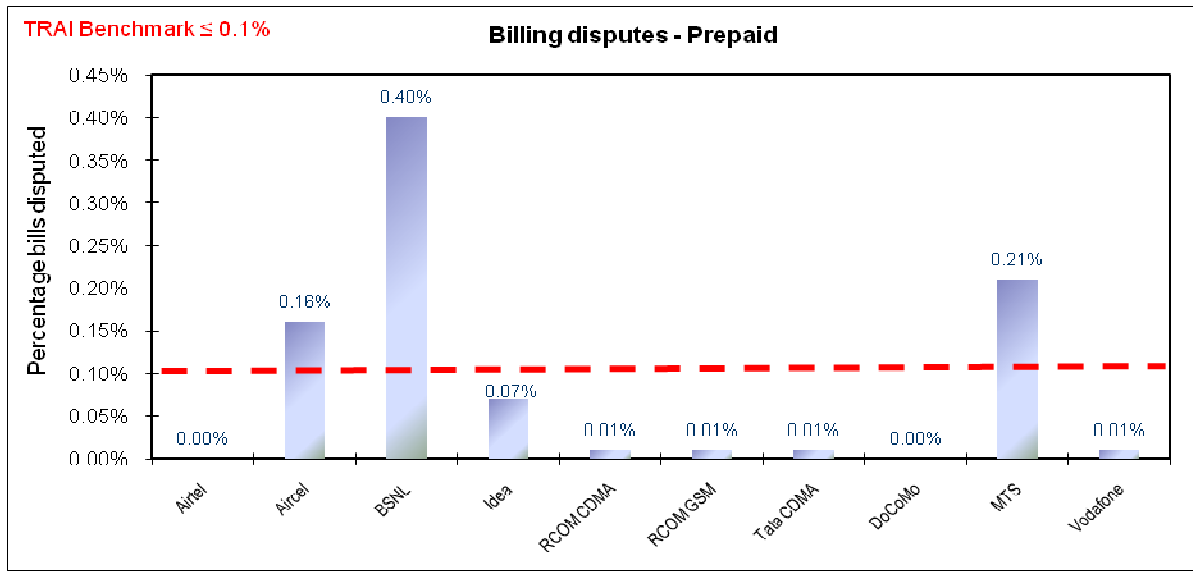
Operator(s) meeting benchmark: Airtel, Idea, RCOM CDMA, RCOM GSM, Tata CDMA, DoCoMo, Vodafone
Operator(s) not meeting the benchmark: Aircel, BSNL, MTS

Resolution of billing complaints
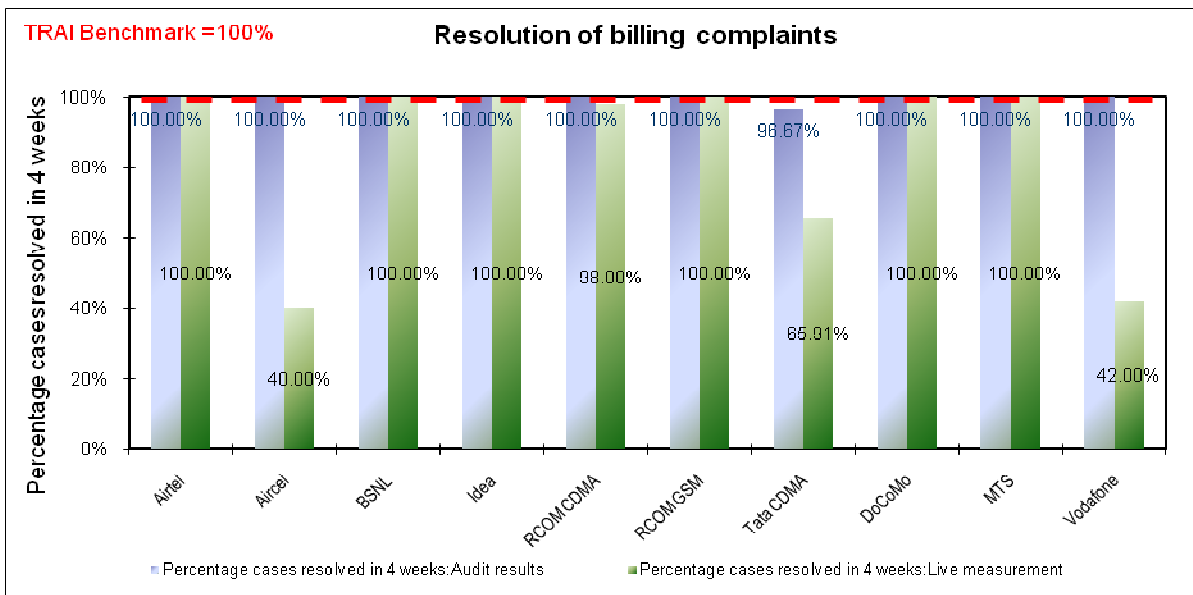
One month
Operator(s) meeting benchmark: Airtel, Aircel, BSNL, Idea, RCOM CDMA, RCOM GSM, DoCoMo, MTS, Vodafone
Operator(s) not meeting the benchmark: Tata CDMA

Live measurement
Operator(s) meeting benchmark: Airtel, BSNL, Idea, RCOM GSM, DoCoMo, MTS
Operator(s) not meeting the benchmark: Aircel, RCOM CDMA, Tata CDMA, Vodafone

Period of applying credit / waiver
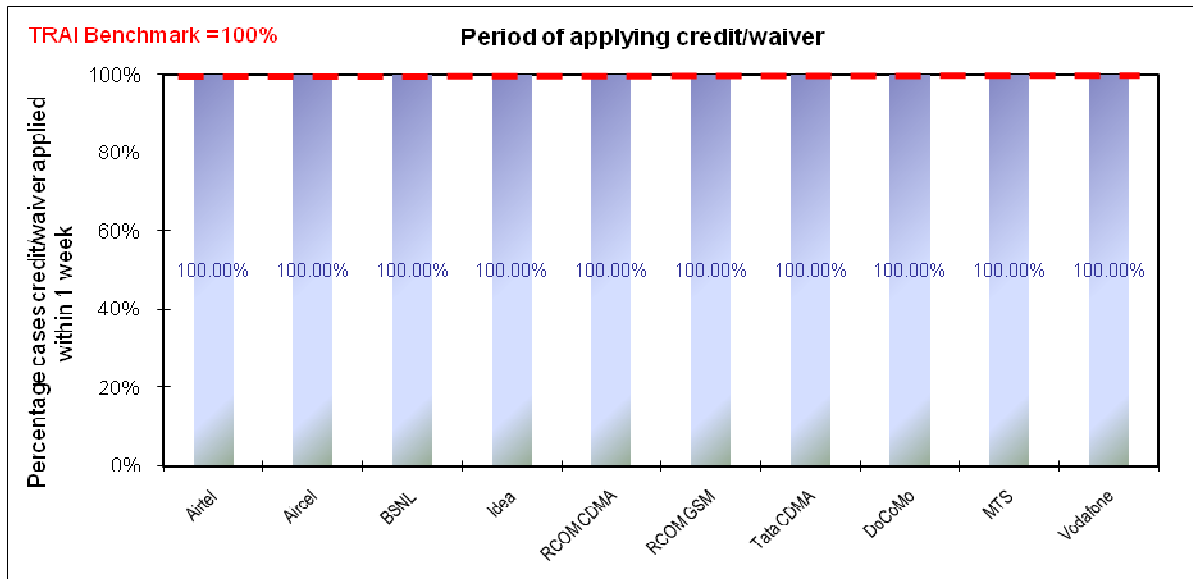
All the operators meet the benchmark

Live calling for billing Complaints

Resolution of billing complaints	Benchmark	Airtel	Aircel	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
Total Number of calls made		50	50	34	50	100	50	44	16	50	50
Number of cases resolved in 4 weeks		50	20	34	50	98	50	29	16	50	21
Percentage cases resolved in four weeks	100%	100.00%	40.00%	100.00%	100.00%	98.00%	100.00%	65.91%	100.00%	100.00%	42.00%

Customer Care / Helpline: Calls answered
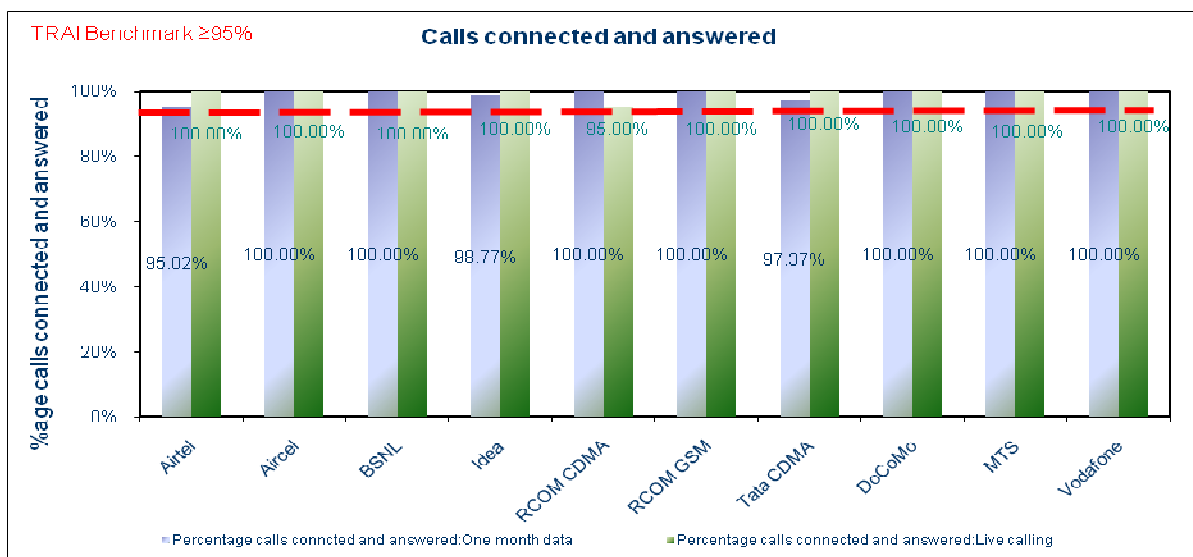
One month
All the operators meet the benchmark

Live measurement
All the operators meet the benchmark

Customer Care / Helpline: Calls answered voice to voice
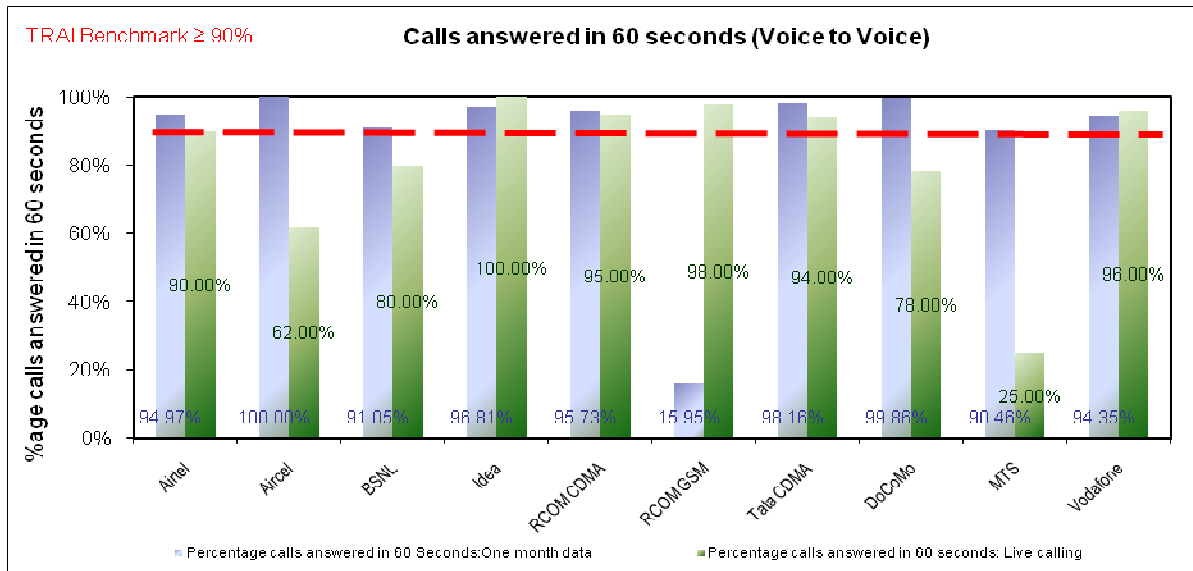
One month
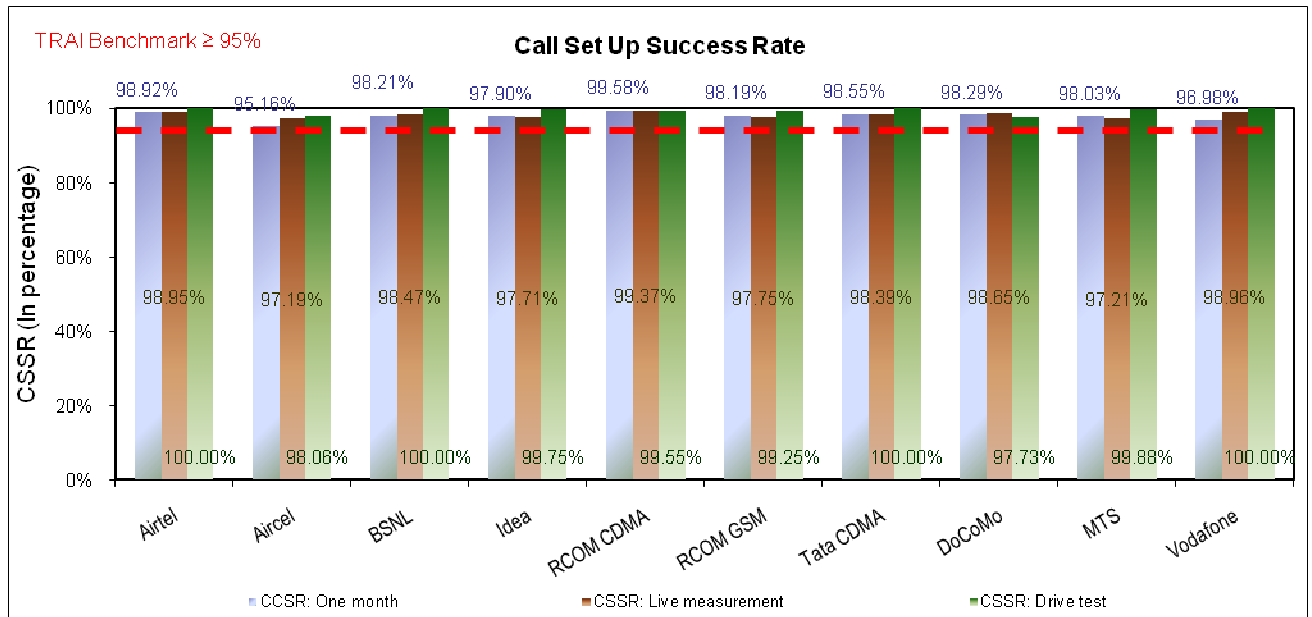Operator(s) meeting benchmark: Airtel, Aircel, BSNL, Idea, RCOM CDMA, Tata CDMA, DoCoMo, MTS, Vodafone
Operator(s) not meeting the benchmark: RCOM GSM

Live measurement
Operator(s) meeting benchmark: Airtel, Idea, RCOM CDMA, RCOM GSM, Tata CDMA, Vodafone
Operator(s) not meeting the benchmark: Aircel, BSNL, DoCoMo, MTS

Termination / Closure of service
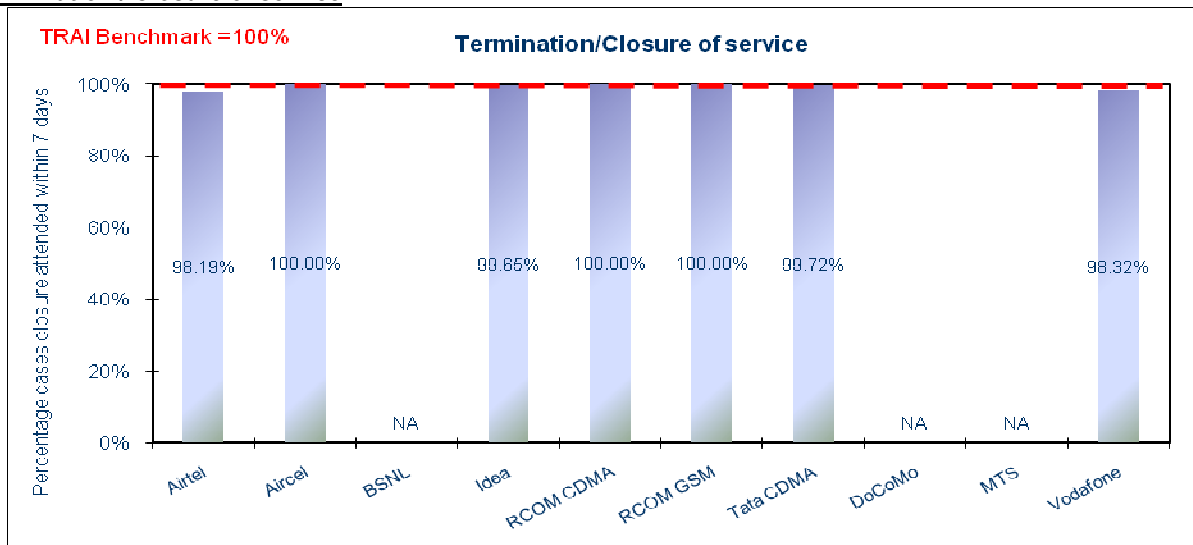
Operator(s) meeting benchmark: Aircel, RCOM CDMA, RCOM GSM
Operator(s) not meeting the benchmark: Airtel, Idea, Tata CDMA, Vodafone

Refund of deposits
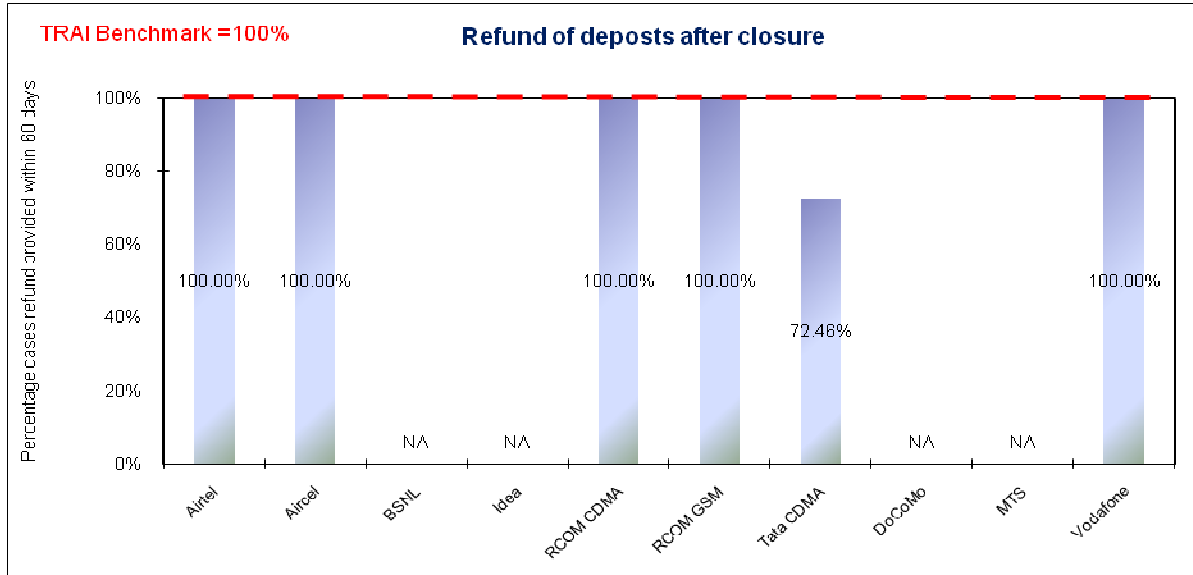
Operator(s) meeting benchmark: Airtel, Aircel, RCOM CDMA, RCOM GSM, Vodafone
Operator(s) not meeting the benchmark: Tata CDMA

Inter operator calls assessment

| Inter operator call Assessment To ↓ From →	Airtel	Aircel	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
Airtel	NA	100%	95%	100%	100%	100%	97%	66%	100%	86%
Aircel	100%	NA	85%	100%	100%	100%	96%	69%	100%	87%
BSNL	96%	53%	NA	100%	100%	100%	97%	78%	100%	92%
Idea	96%	91%	73%	NA	94%	96%	92%	92%	100%	92%
RCOM CDMA	97%	81%	89%	100%	NA	100%	96%	92%	86%	90%
RCOM GSM	100%	94%	77%	93%	92%	NA	95%	93%	89%	92%
Tata CDMA	86%	93%	94%	91%	100%	100%	NA	91%	89%	88%
DoCoMo	100%	84%	89%	92%	96%	97%	92%	NA	90%	92%
MTS	90%	94%	94%	95%	92%	95%	92%	92%	NA	89%
Vodafone	99%	74%	99%	100%	94%	97%	96%	75%	93%	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, RCOM CDMA and GSM found tough connecting to a MTS number. DoCoMo and Vodafone found tough connecting to Airtel number. Aircel had difficulty in connecting to a BSNL number with only 53% of their calls getting completed.

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	0.42%	2.91%	96.28%	1.10%	1.12%	1.59%	15.91%	96.90%	0	0.02%	0.01%	100.00%	100.00%	99.81%	89.00%	90.00%	100.00%
Airtel	IMRB	0.42%	2.91%	96.28%	1.10%	1.12%	1.59%	15.91%	96.87%	0	0.02%	0.01%	100.00%	100.00%	93.88%	69.00%	90.00%	100.00%
Aircel	PMR	0.52%	3.86%	94.85%	0.65%	1.43%	2.70%	33.64%	94.01%	4.3%	0.50%	6.30%	100.00%	100.00%	100.00%	71.00%	100.00%	100.00%
Aircel	IMRB	0.36%	3.63%	94.87%	0.65%	1.38%	2.70%	33.41%	94.01%	4.3%	0.09%	0.58%	100.00%	100.00%	100.00%	71.00%	100.00%	100.00%
BSNL	PMR	0.93%	2.63%	97.00%	1.00%	1.33%	1.57%	9.93%	96.00%	0	0.00%	0.00%	100.00%	100.00%	98.00%	91.00%	100.00%	100.00%
BSNL	IMRB	0.93%	2.63%	97.66%	1.00%	1.14%	1.53%	9.93%	96.91%	0	0.08%	0.00%	100.00%	100.00%	98.00%	91.00%	100.00%	100.00%
RCOM GSM	PMR	0.12%	0.90%	98.90%	0.52%	0.36%	0.83%	0.53%	98.40%	0	0.04%	0.07%	100.00%	100.00%	82.00%	27.00%	100.00%	100.00%
RCOM GSM	IMRB	0.12%	0.90%	97.76%	0.52%	0.19%	0.56%	0.38%	98.40%	0	0.04%	0.07%	100.00%	100.00%	82.00%	27.00%	100.00%	100.00%
RCOM CDMA	PMR	0.32%	1.31%	98.95%	0.00%	0.20%	1.20%	0.90%	97.01%	0	0.10%	0.03%	100.00%	100.00%	88.00%	78.00%	100.00%	100.00%
RCOM CDMA	IMRB	0.32%	1.31%	98.95%	0.00%	0.20%	1.20%	0.90%	97.01%	0	0.10%	0.03%	100.00%	100.00%	70.00%	78.00%	100.00%	100.00%
Tata CDMA	PMR	0.05%	0.23%	98.42%	0.00%	0.01%	0.83%	0.83%	98.92%	0	0.05%	0.01%	100.00%	100.00%	96.00%	80.00%	93.50%	100.00%
Tata CDMA	IMRB	0.05%	0.16%	98.42%	0.00%	0.01%	0.83%	0.83%	98.92%	0	0.05%	0.01%	100.00%	100.00%	96.00%	80.00%	100.00%	100.00%
MTS	PMR	1.47%	0.75%	99.19%	DNA	0.13%	0.75%	0.86%	96.36%	0	NA	DNA	100.00%	DNA	95.00%	91.89%	NA	NA
MTS	IMRB	1.47%	0.75%	99.10%	DNA	0.16%	0.75%	2.86%	96.36%	0	NA	1.95%	100.00%	100.00%	98.00%	82.63%	NA	NA
Vodafone	PMR	0.55%	0.91%	96.82%	0.81%	1.28%	1.47%	3.58%	96.95%	0	0.00%	0.00%	100.00%	100.00%	99.00%	94.00%	NA	NA
Vodafone	IMRB	0.55%	0.91%	96.82%	0.81%	1.28%	1.47%	3.58%	96.64%	0	0.00%	0.00%	100.00%	100.00%	99.00%	94.00%	99.00%	100.00%

As per the PMR submitted by the operators in the 3rd quarter of 2009

 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

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12.2 Conclusions (Wireless)

Cellular Mobile services

1. The figures reported by all the operators were found to be not completely matching with the figures obtained on verification with small rounding off errors
2. Airtel, Aircel and BSNL do not meet the benchmark for worst affected BTSs and cells and also for % calls answered by operators in 60 seconds during the period of July, August and September 2009.
3. All operators except Vodafone fail to meet the benchmark for percentage calls answered by the operator in 60 seconds

Section C
BROADBAND

13.0 Sampling Methodology

13.1 Sampling for Broadband service providers

- Audits for various Broadband service providers were conducted at the service provider's central node. Since most of the private operators have a centralized system of monitoring their network data was obtained for all the Point of Presence (POPs) present in the circle.

- 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 at least 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 NOC in Bangalore.

- Following Broadband service providers were Audited in West Bengal circle:

	Name of Operator
Operator 1	BSNL – WB
Operator 2	BSNL – A&N

14.0 Audit methodology

14.1 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}

15.0 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 January 2010 to March 2010 in West Bengal circle.

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

Parameters	Benchmarks	BSNL - WB	BSNL - A&N
Service provisioning uptime			
Percentage connections provided within 15 days	100%	99.82%	100.00%
Fault repair restoration time			
Percentage faults repaired by next working days	> 90%	96.96%	100.00%
Percentage faults repaired within three working days	> 99%	99.67%	100.00%
Billing performance			
Billing complaints per 100 bills issued	< 2%	0.11%	0.00%
%age of billing complaints resolved in 4 weeks	100%	100.00%	NA
%age cases in which refund of deposits after closure was made in 60 days	100%	100.00%	NA
Customer care/helpline assessment (Voice to Voice)			
Percentage calls answered within 60 seconds	> 60%	91.90%	NA
Percentage calls answered within 90 seconds	> 80%	94.88%	NA
Bandwidth utilization/Throughput			
Intra network links (POP to ISP Node)		152	
Total number of intra network links > 90%		4	
Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)		296	
Percentage bandwidth utilised on upstream links	< 80%	80.44%	
Broadband download speed	> 80%	90.00%	
Service availability/uptime	> 98%	99.95%	
Packet loss	< 1%	0.00%	
Network Latency			
POP/ISP Node to NIXI	< 120 msec	20	
ISP node to NAP port (Terrestrial)	< 350 msec	242	

{*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

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 and VSNL has been reporting PMR on the regional basis where 1 region would cover multiple circles. 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 for broadband service providers in West Bengal circle are highlighted below

Service provisioning/Activation time

- BSNL –WB (99.82%) falls marginally short of TRAI benchmark of 100% connections to be provided within 15 days.
- For Live calling carried out BSNL failed to meet the benchmark in both West Bengal and Andaman & Nicobar with 70% and 95% of subscribers claiming that connection was provided within 15 days.

Fault Repair/Restoration time

- BSNL is meeting the TRAI benchmark for fault repair within next working day and three days in both West Bengal and Andaman & Nicobar.
- 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

- The service provider (BSNL) was found to be meeting the benchmark of percentage billings complaints received and time taken for resolution of billing complaints for the month in which data was collected.
- There was no billing complaints found in sample exchanges during the audit month

Customer Care/Helpline Assessment

- BSNL meets the TRAI specified benchmark for calls answered by the operator in 60 and 90 seconds for the month in which audit was carried out
- BSNL - Andaman & Nicobar does not have a separate dedicated call center to record the details of calls received and answered by the operator currently

Bandwidth Utilization:

- The service provider (BSNL) was 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 BSNL was obtained on all India bases. 4 of the 152 links tested for BSNL was found to be having above 90% bandwidth utilization for the month in which audit was carried out.
- It was observed that all the links (tested during three day live measurement) in the access segment for BSNL were found be below 80%.
- For Bandwidth utilization on upstream links (From ISP Node to IGSP/NIXI), BSNL do not meet the TRAI specified benchmark.

Download speed

- During live measurements carried out at Pop's/ISP Node it was observed that BSNL is 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

Service Availability/Uptime:

- BSNL meets 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 - WB	BSNL - A&N
Service provisioning uptime			
Percentage connections provided within 15 days	100%	70.81%	95.65%
Fault repair restoration time			
Percentage faults repaired by next working days	> 90%	37.66%	NA
Percentage faults repaired within three working days	> 99%	80.52%	NA
Billing performance			
%age of billing complaints resolved in 4 weeks	100%	100.00%	NA
Customer care/helpline assessment (Voice to Voice)			
Percentage calls answered within 60 seconds	> 60%	100.00%	NA
Percentage calls answered within 90 seconds	> 80%	100.00%	NA
Bandwidth utilization/Throughput			
Intra network links (POP to ISP Node)		152	
Total number of intra network links > 90%		0	
Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)		325	
Percentage bandwidth utilised on upstream links	< 80%	65.56%	
Broadband download speed	> 80%	90.00%	
Service availability/uptime	> 98%	99.92%	
Packet loss	< 1%	0.00%	
Network Latency			
POP/ISP Node to NIXI	< 120 msec	19	
ISP node to NAP port (Terrestrial)	< 350 msec	228	

** 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

- BSNL meets 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. None of the links tested for these operators was found to be having above 90% bandwidth utilization for the month in which audit was carried out
- For Bandwidth utilization on upstream links, BSNL is comfortably meeting the benchmark during the three day live measurement and have excess capacities available on their upstream links.
- For network latency all the service providers comfortably meet the TRAI specified benchmark for ping tests carried out during live measurements.

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

16.1 Graphical/Tabular Representations for Broadband services

Service provisioning / Activation time (Comparison between one month audit results and live calling results)
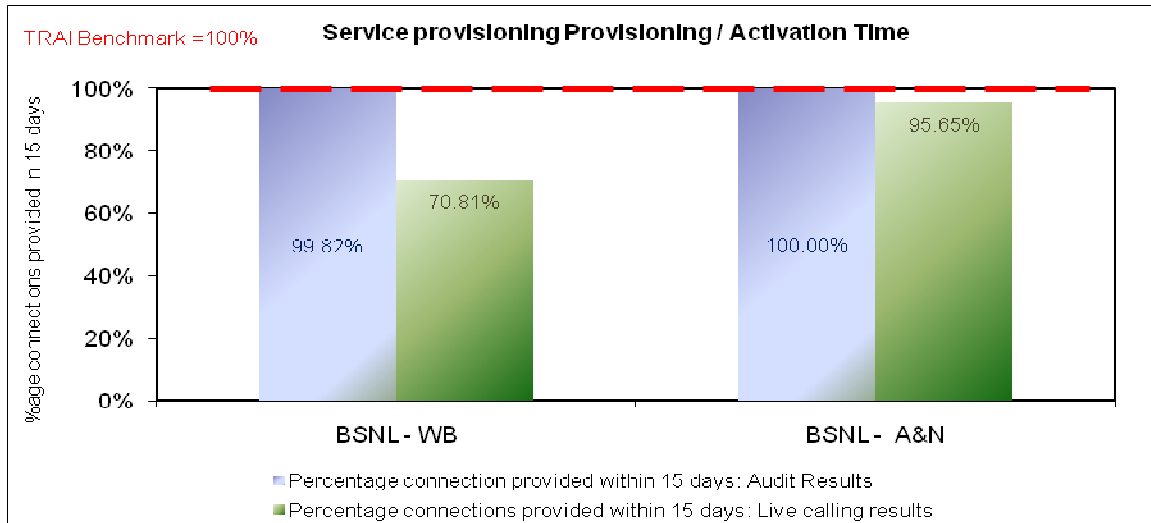
One month
Operator meeting benchmark: BSNL - A&N
Operator not meeting benchmark: BSNL - WB

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
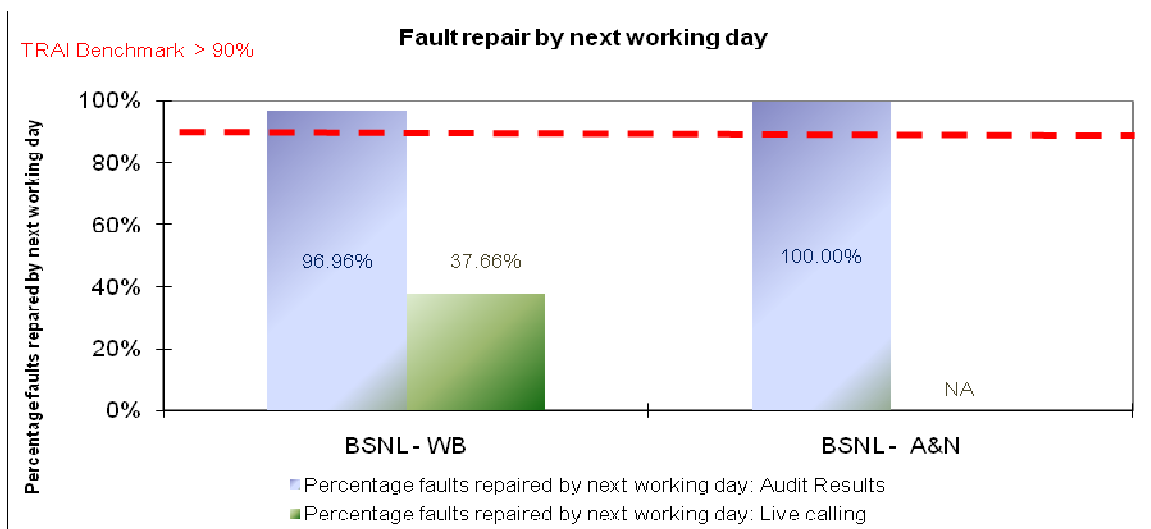
One month
All operators are meeting the benchmark

Live calling
Operator not meeting benchmark: BSNL - WB

Fault repair/Restoration time within three working days (Comparison between one month audit results and live calling results
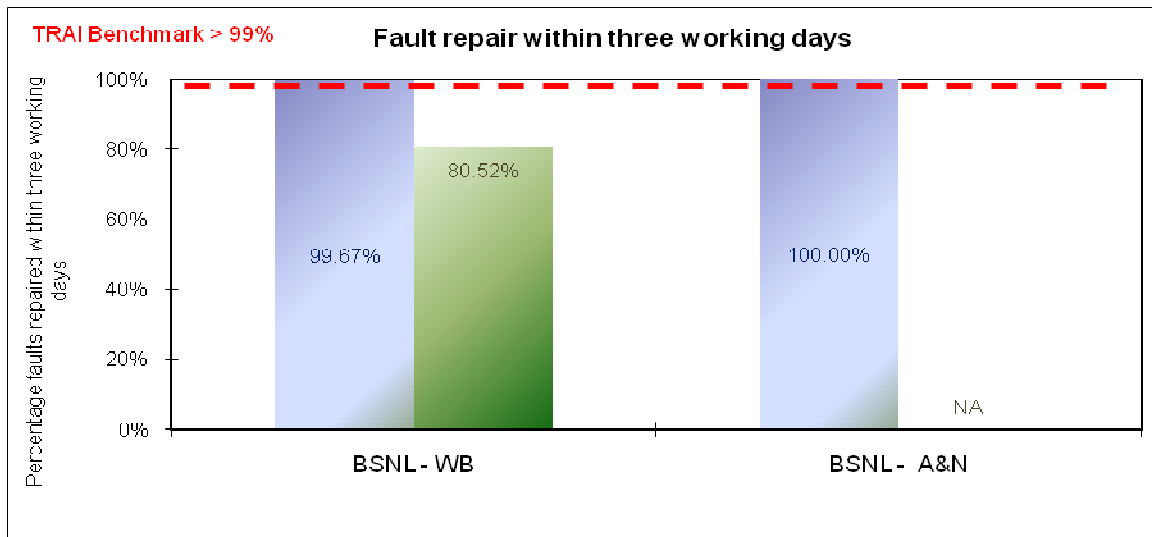
One month
All operators are meeting the benchmark

Live calling
Operator not meeting benchmark: BSNL - WB

Percentage bills disputed
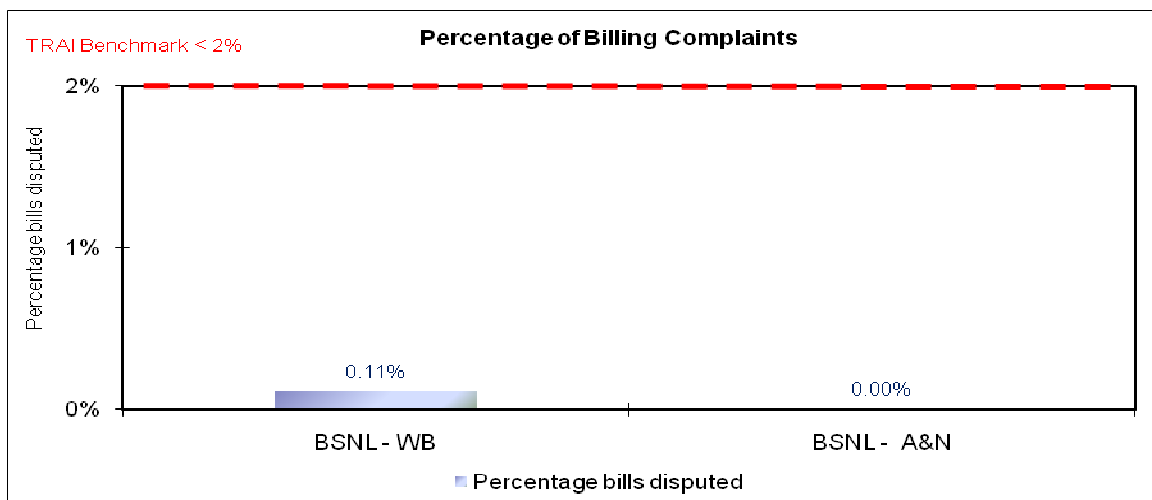
All operators are meeting the benchmark

Resolution of billing complaints (Comparison between one month audit results and live calling results)
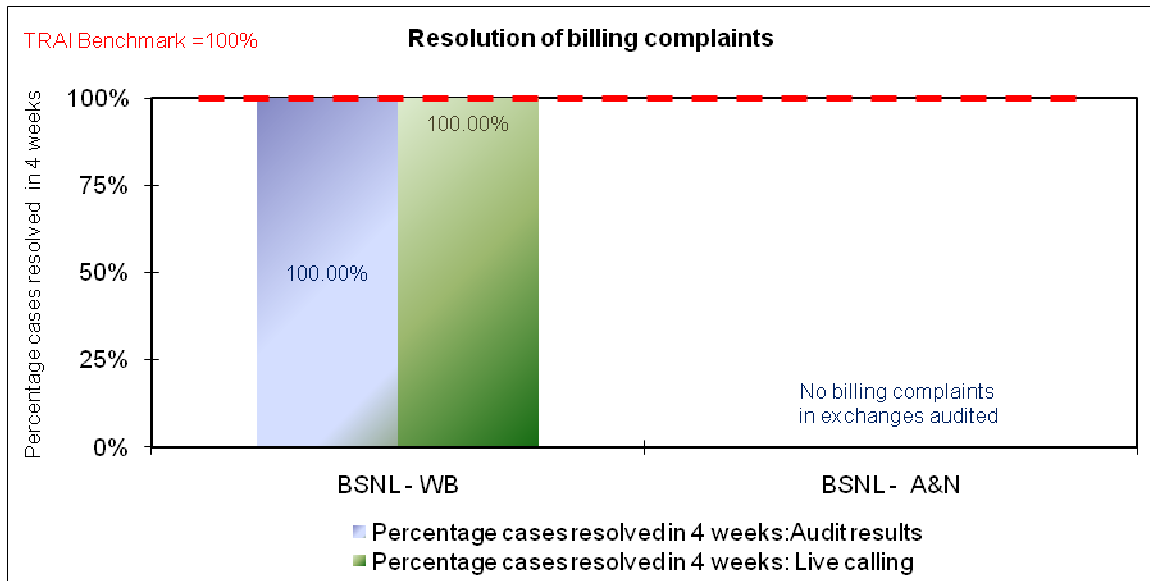
One month
All operators are meeting the benchmark

Live calling
All operators are meeting the benchmark

Refund of deposits after closure
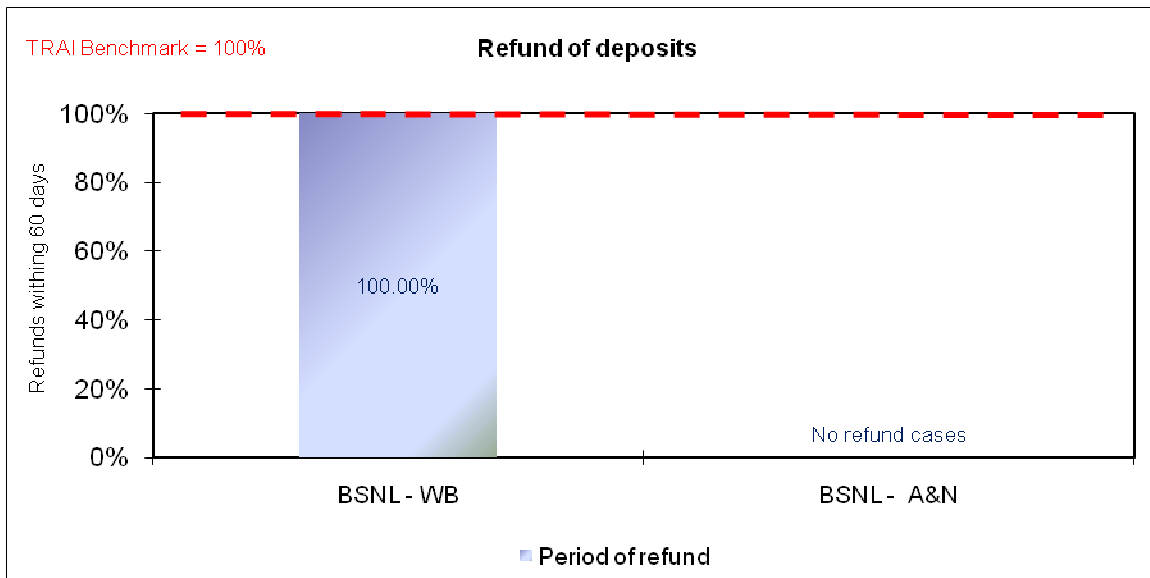
Operator meeting benchmark: BSNL - WB

Response time to customer for assistance - Calls answered by the operator within 60 seconds (Comparison between one month audit results and live calling results)
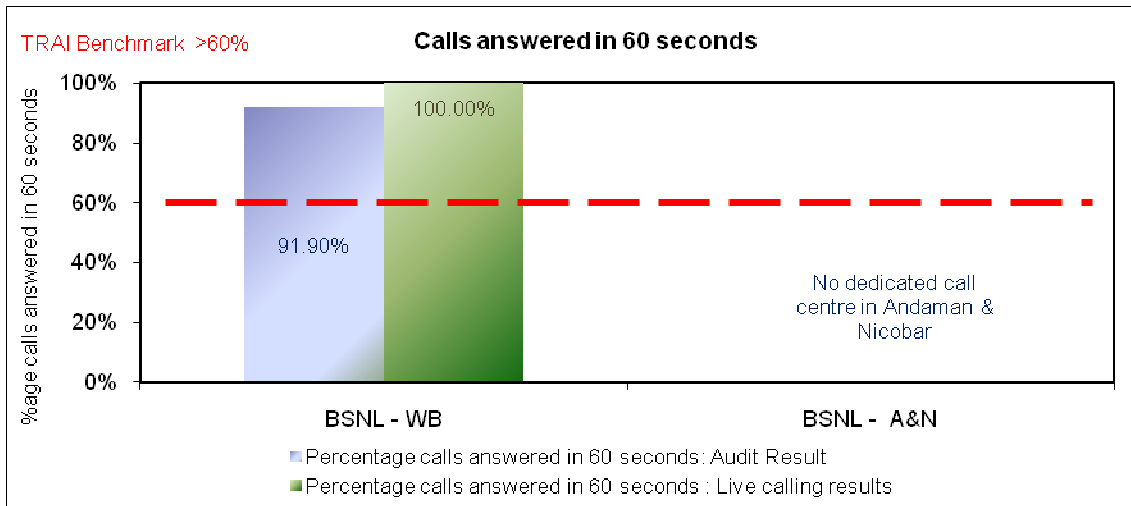
One month
Operator meeting benchmark: BSNL - WB

Live calling
Operator meeting benchmark: BSNL - WB

Response time to customer for assistance - Calls answered by the operator within 90 seconds (Comparison between one month audit results and live calling results)
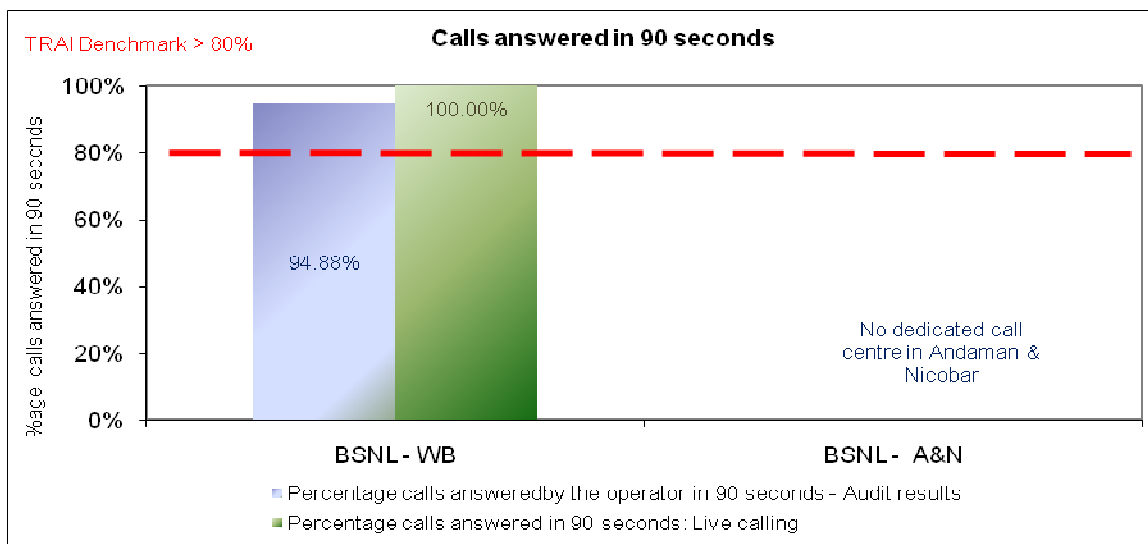
One month
Operator meeting benchmark: BSNL - WB

Live calling
Operator meeting benchmark: BSNL - WB

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

Bandwidth Utilization (One month)	B'mark	BSNL - WB	BSNL - A&N
Total number of intra network links		152	
No of Intra network found to be above 90%		4	

Bandwidth Utilization (Live measurement)	B'mark	BSNL - WB	BSNL - A&N
Total number of intra network links		152	
No of Intra network found to be above 90%		0	

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

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

17.0 Compliance reports: Results of Verification of Records

17.1 Broadband services

Parameters	Benchmarks	BSNL – WB*		BSNL - A&N*	
		PMR	IMRB	PMR	IMRB
Service provisioning uptime					
Percentage connections provided within 15 days	100%	97.34%	98.17%	98.70%	98.70%
Fault repair restoration time					
Percentage faults repaired by next working days	> 90%	91.07%	97.73%	92.40%	92.40%
Percentage faults repaired within three working days	> 99%	96.07%	99.83%	100.00%	100.00%
Billing performance					
Billing complaints per 100 bills issued	< 2%	0.69%	0.35%	0.00%	0.00%
%age of billing complaints resolved in 4 weeks	100%	100.00%	100.00%	100.00%	100.00%
%age cases in which refund of deposits after closure was made in 60 days	100%	100.00%	100.00%	100.00%	100.00%
Customer care/helpline assessment (Voice to Voice)					
Percentage calls answered within 60 seconds	> 60%	92.00%	72.99%	81.70%	DNA
Percentage calls answered within 90 seconds	> 80%	98.33%	86.34%	100.00%	DNA
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	220	Project 2.2:- BRAS-23, T1-24, T2-624, DSLAM-5960, Multiplay Phase 1&2:- BNG-18, RPR-1181, OCLAN-2906, DSLAM-37036	220
Total number of intra network links > 90%		0	3	0	3
Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)		285	259	285	259
Percentage bandwidth utilised on upstream links	< 80%	71.10%	71.10%	71.10%	71.10%
Broadband download speed	> 80%	DNA	100.00%	DNA	100.00%
Service availability/uptime	> 98%	99.99%	99.99%	99.99%	99.99%
Packet loss	< 1%	0.04%	0.04%	0.04%	0.04%
Network Latency					
POP/ISP Node to NIXI (in msec)	< 120 msec	12	12	12	12
ISP node to NAP port (Terrestrial) (in msec)	< 350 msec	234	234	234	234

* 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'mar**k = TRAI Benchmark,   **DNA** = Details not available,   **NA:** Not Applicable

17.2 Conclusions (Broadband)

Broadband services

1. 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
4. Service provider was found to be not meeting benchmark on service provisioning parameter in both West Bengal and Andaman & Nicobar

18.0 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 - WB	All POIs meeting benchmark					
BSNL - A&N	All POIs meeting benchmark					

18.1 Parameter wise performance reports for Basic Wireline services

1.1 Audit Results for Fault repair

Fault incidences	Benchmark	BSNL - WB	BSNL - A&N
Faults incidences (No. of faults/100 Subs./month)	≤ 5	11.04	3.33

Fault repair (Urban areas)	Benchmark	BSNL - WB	BSNL - A&N
Total No. of faults registered during the month		9206	170
No. of faults repaired by next working day during the month		4973	169
Percentage of faults repaired by next working day during the month	≥ 90%	54.02%	99.41%
No. of faults repaired within 3 days during the month		7726	170
Percentage of faults repaired within 3 days during the month	100%	83.92%	100.00%

Fault repair (Rural & Hilly areas)	Benchmark	BSNL - WB	BSNL - A&N
Total No. of faults registered during the month		2703	11
No. of faults repaired by next working day during the month		1888	8
Percentage of faults repaired by next working day during the month	≥ 90%	69.85%	72.73%
No. of faults repaired within 5 days during the month		2466	11
Percentage of faults repaired within 5 days during the month	100%	91.23%	100.00%

Rent rebate	Benchmark	BSNL - WB	BSNL - A&N
No. of cases with faults pending for >3 days and ≤7 days		419	0
Out of these number of cases where rent rebate for 7 days was given		15	0
Percentage of cases where rent rebate for 7 days was given	100%	3.58%	NA
No. of cases with faults pending for >7 days and ≤15 days		92	0
Out of these number of cases where rent rebate for 15 days was given		8	0
Percentage of cases where rent rebate for 15 days was given	100%	8.70%	NA
No. of cases with faults pending for ≥15 days		20	0
Out of these number of cases where rent rebate for 30 days was given		1	0
Percentage of cases where rent rebate for 30 days was given	100%	5.00%	NA

MTTR	Benchmark	BSNL - WB	BSNL - A&N
Mean time taken to repair the fault in hours	≤ 8	27.79	22.1

　　　　 Not meeting the benchmark

2.1 Live calling for fault repair

Urban area	Benchmark	BSNL - WB	BSNL - A&N
Total Number of calls made		3137	84
Number of cases where faults were repaired by next working day		549	24
Percentage cases where faults were repaired by next working day	≥ 90%	17.50%	28.57%
Number of cases where faults were repaired within 3 days		1585	50
Percentage cases where faults were repaired within 3 days	100%	50.53%	59.52%

3.1 Audit Results for Call Completion Rate (CCR)

Traffic statistics - Call Completion Rate	Benchmark	BSNL - WB	BSNL - A&N
Total local call attempts		3039427	4353
Total number of successful local calls		1831634	2452
Call Completion Rate (CCR) in the local network	≥ 55%	60.26%	56.33%

Traffic statistics - Answer to Seizure Ratio	Benchmark	BSNL - WB	BSNL - A&N
Total number of calls processed by the switch		4231491	1870
Total number of calls answered		2745052	1100
Answer to Seizure Ratio (ASR)	≥ 75%	64.87%	58.82%

3.2 Live measurement results for Call Completion Rate (CCR)

Traffic statistics - Call Completion Rate	Benchmark	BSNL - WB	BSNL - A&N
Total local call attempts		2028505	912
Total number of successful local calls		994718	479
Call Completion Rate (CCR) in the local network	≥ 55%	49.04%	52.52%

Traffic statistics - Answer to Seizure Ratio	Benchmark	BSNL - WB	BSNL - A&N
Total number of calls processed by the switch		2221701	580
Total number of calls answered		1178184	320
Answer to Seizure Ratio (ASR)	≥ 75%	53.03%	55.17%

POI congestion	Benchmark	BSNL - WB	BSNL - A&N
No. of POIs not meeting benchmark		0	0
Total number of working POIs		NA	NA

5.1 Audit Results for Billing performance

Billing Performance	Benchmark	BSNL - WB	BSNL - A&N
Billing disputes – Postpaid			
Total bills generated during the period		86274	7044
Total number of bills disputed		180	0
Percentage bills disputed	≤ 0.1%	0.21%	0.00%
Billing disputes – Prepaid			
No. of charging / credit / validity complaints during the month		NA	NA

　　　 Not meeting the benchmark

Total no. of pre-paid customers at the end of the month		NA	NA
Number of complaints per 100 customers	≤ 0.1%	NA	NA

Resolution of billing complaints

Total number of billing/charging complaints		180	0
Total complaints resolved in 4 weeks from date of receipt		180	0
Percentage complaints resolved within 4 weeks of date of receipt	100%	100.00%	NA

Period of applying credit / waiver

No. of complaints resolved in favor of the customer during the month		180	0
No. of complaints disposed on account of not considered as valid complaints		0	0
Percentage cases in which credit/waiver was received within 1 week	100%	100.00%	NA

5.2 Live calling results for resolution of billing complaints

Resolution of billing complaints	Benchmark	BSNL - WB	BSNL - A&N
Total Number of calls made		10	0
Number of cases resolved in 4 weeks		10	0
Percentage cases resolved in 4 weeks	100%	100.00%	NA

6.1 Audit Results for Requests

Closure Requests	Benchmark	BSNL - WB	BSNL - A&N
Total no. of requests received for Closures		486	36
Total no. of requests for closures attended within 7 days		485	36
Percentage of requests for closures attended within 7 days	100%	99.79%	100.00%
Total no. of requests for closures not attended or attended beyond 7 days		1	0

7.1 Audit results for customer care

Customer Care Assessment	Benchmark	BSNL - WB	BSNL - A&N
Total no. of call attempts to call centre / customer care nos. during TCBH		927520	NA
No. of calls connected and answered successfully to call centre / customer care nos. during TCBH		919336	NA
Percentage of calls getting connected and answered electronically	≥ 95%	99.12%	NA
Percentage of calls answered by the operators (voice to voice) within 60 seconds	≥ 90%	92.03%	NA

7.2 Live calling results for customer care

Customer Care Assessment	Benchmark	BSNL - WB	BSNL - A&N
Total Number of calls received		8800	NA
Total Number of calls getting connected and answered		8800	NA
Percentage calls getting connected and answered	≥ 95%	100.00%	NA

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

Customer Care Assessment	Benchmark	BSNL - WB	BSNL - A&N
Total Number of calls received		8800	NA
Total Number of calls answered within 60 seconds		8766	NA
Percentage calls answered within 60 seconds	≥ 90%	99.61%	NA

Not meeting the benchmark

8.1 Audit results for refund of deposits

Refund	Benchmark	BSNL - WB	BSNL - A&N
Total number of cases requiring refund of deposits		5572	210
Total number of cases where refund was made within 60 days		5540	210
Percentage cases in which refund was receive within 60 days	100%	99.43%	100.00%

9.1 Live calling for level 1 services

Level 1 services	Benchmark	BSNL - WB	BSNL - A&N
Total no. of calls made		2640	30
Calls answered in 60 sec		2460	30
Calls answered after 60 sec		180	0

10.1 Exchange capacity and Subscribers

	Benchmark	BSNL - WB	BSNL - A&N
Equipped Capacity of the exchange (in erlangs)		244287	10008
Total number of customers served		124065	3250

Not meeting the benchmark

19.0 Annexure - I

19.1 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	0.10%	0.10%	98.92%	0.24%	0.54%	1.25%	1.86%	98.66%	0.00%	0.00%	100.00%	100.00%	95.02%	94.97%	98.19%	100.00%
Aircel	0.14%	1.70%	95.16%	0.63%	1.59%	2.23%	21.90%	97.80%	0.00%	0.16%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
BSNL	0.00%	1.99%	98.21%	0.91%	1.36%	0.68%	4.69%	98.00%	0.33%	0.40%	100.00%	100.00%	100.00%	91.05%	NA	NA
Idea	0.47%	1.56%	97.90%	0.46%	0.97%	0.75%	3.16%	96.32%	0.00%	0.07%	100.00%	100.00%	98.77%	96.81%	99.65%	NA
RCOM CDMA	0.25%	0.39%	99.58%	0.00%	0.13%	1.10%	0.55%	97.35%	0.00%	0.01%	100.00%	100.00%	100.00%	95.73%	100.00%	100.00%
RCOM GSM	0.08%	0.26%	98.19%	0.05%	0.25%	0.83%	0.33%	98.05%	0.00%	0.01%	100.00%	100.00%	100.00%	15.95%	100.00%	100.00%
Tata CDMA	0.08%	0.16%	98.55%	0.00%	0.01%	0.72%	0.84%	97.90%	0.11%	0.01%	96.67%	100.00%	97.37%	98.16%	99.72%	72.46%
DoCoMo	0.68%	11.58%	98.29%	0.26%	0.22%	0.75%	0.33%	97.28%	NA	0.00%	100.00%	100.00%	100.00%	99.86%	NA	NA
MTS	0.45%	1.71%	98.03%	0.00%	0.48%	1.28%	4.05%	98.92%	NA	0.21%	100.00%	100.00%	100.00%	90.46%	NA	NA
Vodafone	0.25%	1.77%	96.98%	0.75%	1.55%	1.51%	2.99%	96.72%	0.00%	0.01%	100.00%	100.00%	100.00%	94.35%	98.32%	100.00%

19.2 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	All POIs meeting benchmark					
BSNL	All POIs meeting benchmark					
Idea	Airtel Local	309	57962	304.13	0.80%	E1 request already sent to operator
	RCOM CDMA Local	153	27453	107.38	0.60%	E1 request already sent to operator
RCOM	KHRG-GMSC-01-ZT244	433	28111	408	More than 100% utilized	
	KHRG-GMSC-01-ZT420	152	12162	130.19		
	MSC 1 KHARAGPUR1905	247	21380	236.66		
	KHRG-MSC-05-ZT40	461	31301	443.48		
	VODASNO_7	278	15500	247.28		
	ARCELOG_42	215	15867	202.07		
	ARTASNO_12	154	9228	131.40		
	IDEDGPB_39	153	11368	129.80		
	SHYMDGP_27	372	24660	366.58		
	HUTSLG_24	635	40210	612.61		
Tata CDMA	All POIs meeting benchmark					
DoCoMo	All POIs meeting benchmark					
MTS	All POIs meeting benchmark					
Vodafone	Salkia TAX	310	10978	268.7	1.99%	

19.3 Parameter wise performance reports for Cellular Mobile services

1. Network Availability

Audit Results for Network Availability

	Benchmark	Airtel	Aircel	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
Number of BTSs in the licensed service area		4193	2409	2061	900	1273	1922	639	898	700	5601
Sum of downtime of BTSs in a month (in hours)		3029.72	2425	>984	3136	2332	1185	371	4543	2328	10349.11
BTSs accumulated downtime (not available for service)	≤ 2%	0.10%	0.14%	0.00%	0.47%	0.25%	0.08%	0.08%	0.68%	0.45%	0.25%
Number of BTSs having accumulated downtime >24 hours		4	41	41	14	5	5	1	104	12	99
Worst affected BTSs due to downtime	≤ 2%	0.10%	1.70%	1.99%	1.56%	0.39%	0.26%	0.16%	11.58%	1.71%	1.77%

2. Connection Establishment (Accessibility)

Audit Results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Airtel	Aircel	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
CSSR	≥ 95%	98.92%	95.16%	98.21%	97.90%	99.58%	98.19%	98.55%	98.29%	98.03%	96.98%

SDCCH congestion	Benchmark	Airtel	Aircel	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.24%	0.63%	0.91%	0.46%	0.00%	0.05%	0.00%	0.26%	0.00%	0.75%

TCH congestion	Benchmark	Airtel	Aircel	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
TCH congestion	≤ 2%	0.54%	1.59%	1.36%	0.97%	0.13%	0.25%	0.01%	0.22%	0.48%	1.55%

Live measurement results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Airtel	Aircel	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
CSSR	≥ 95%	98.95%	97.19%	98.47%	97.71%	99.37%	97.75%	98.39%	98.65%	97.21%	98.96%

SDCCH congestion	Benchmark	Airtel	Aircel	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.25%	0.26%	0.53%	0.18%	0.00%	0.02%	0.00%	0.31%	0.00%	0.44%

TCH congestion	Benchmark	Airtel	Aircel	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
TCH congestion	≤ 2%	0.66%	0.73%	1.31%	1.04%	0.37%	0.19%	0.01%	0.39%	0.86%	0.60%

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

CSSR	Benchmark	Airtel	Aircel	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
Total number of call attempts		630	360	381	408	1103	400	427	441	845	420
Total number of successful calls established		630	353	381	407	1098	397	427	431	844	420
CSSR	≥ 95%	100.00%	98.06%	100.00%	99.75%	99.55%	99.25%	100.00%	97.73%	99.88%	100.00%

Operators not meeting the benchmark

DNA: Detailed breakup was not available with the operator. IMRB auditors have taken data the data directly from the counters.

Blocked calls	Benchmark	Airtel	Aircel	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
%age blocked calls		0.00%	1.94%	0.00%	0.25%	0.45%	0.75%	0.00%	2.27%	0.12%	0.00%

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	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
Total number of calls established		199109228	68685202	28950099	9170979	DNA	DNA	26081395	3271838	20706887	287049929
Total number of calls dropped		2495874	1531680	196860	69238	DNA	DNA	187469	24622	265810	4334873
Call drop rate	≤ 2%	1.25%	2.23%	0.68%	0.75%	1.10%	0.83%	0.72%	0.75%	1.28%	1.51%

Cells having more than 3% TCH	Benchmark	Airtel	Aircel	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
Total number of cells in the network		13197	214627	6014	77292	1273	5766	1915	2694	2100	16762
Total number of cells having more than 3% TCH		245	47013	282	2442	7	19	16	9	85	501
Worst affected cells having more than 3% TCH	≤ 5%	1.86%	21.90%	4.69%	3.16%	0.55%	0.33%	0.84%	0.33%	4.05%	2.99%

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

Call drop rate	Benchmark	Airtel	Aircel	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
Total number of calls established		22365991	81626	3818821	1103449	DNA	DNA	29741485	4797818	2013078	327075692
Total number of calls dropped		261888	1673.34	44680	10506	DNA	DNA	195683	33315	36776	3768116
Call drop rate	≤ 2%	1.17%	2.05%	1.17%	0.95%	1.01%	0.56%	0.66%	0.69%	1.83%	1.15%

Cells having more than 3% TCH	Benchmark	Airtel	Aircel	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
Total number of cells in the network		13195	493374	6017	8121	3570	13085	1915	2664	6300	16762
Total number of cells having more than 3% TCH		397	87595	226	287	18	50	17	20	273	476
Worst affected cells having more than 3% TCH	≤ 5%	3.01%	17.75%	0.00%	3.53%	0.50%	0.38%	0.89%	0.75%	4.33%	2.84%

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

Call drop rate	Benchmark	Airtel	Aircel	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
Total number of calls established		630	360	381	407	553	397	427	438	422	420
Total number of calls dropped		0	3	0	0	9	2	0	0	0	0
Call drop rate	≤ 2%	0.00%	0.83%	0.00%	0.00%	1.63%	0.50%	0.00%	0.00%	0.00%	0.00%

Operators not meeting the benchmark

DNA: Detailed breakup was not available with the operator. IMRB auditors have taken data the data directly from the counters.

4. Voice quality

Audit Results for Voice quality

Voice quality	Benchmark	Airtel	Aircel	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
Total number of sample calls		2694	7962294720	512	9170979	DNA	DNA	100	123531990	20691658	37343268231
Total number of calls with good voice quality		2658	7502870315	501	8927958	DNA	DNA	99	120058421	20468847	36118911192
%age calls with good voice quality	≥ 95%	98.66%	97.80%	98.00%	96.32%	97.35%	98.05%	97.90%	97.28%	98.92%	96.72%

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

Voice quality	Benchmark	Airtel	Aircel	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
Total number of sample calls		45588	619612	479821	102266	66420	763201	25952	709873	25683	757816
Total number of calls with good voice quality		44007	583793	467214	100197	65321	721825	25583	680543	20840	725335
%age calls with good voice quality	≥ 95%	96.53%	94.22%	97.37%	97.98%	98.35%	94.58%	98.58%	95.87%	81.14%	95.71%

5. POI Congestion

Audit Results for POI Congestion

POI congestion	Benchmark	Airtel	Aircel	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
No. of POIs not meeting benchmark		0	0	0	2	10	10	0	0	0	1
Total number of working POIs		27	5	90	25	106	106	96	3	38	38

Live measurement results for POI congestion
6. Inter Operator Call Assessment

Inter operator call Assessment To ↓ From →	Airtel	Aircel	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
Airtel	NA	100%	95%	100%	100%	100%	97%	66%	100%	86%
Aircel	100%	NA	85%	100%	100%	100%	96%	69%	100%	87%
BSNL	96%	53%	NA	100%	100%	100%	97%	78%	100%	92%
Idea	96%	91%	73%	NA	94%	96%	92%	92%	100%	92%
RCOM CDMA	97%	81%	89%	100%	NA	100%	96%	92%	86%	90%
RCOM GSM	100%	94%	77%	93%	92%	NA	95%	93%	89%	92%
Tata CDMA	86%	93%	94%	91%	100%	100%	NA	91%	89%	88%
DoCoMo	100%	84%	89%	92%	96%	97%	92%	NA	90%	92%
MTS	90%	94%	94%	95%	92%	95%	92%	92%	NA	89%
Vodafone	99%	74%	99%	100%	94%	97%	96%	75%	93%	NA

[orange box] The maximum problem faced by the calling operator to other operators

[pink box] Operators not meeting the benchmark

DNA: Detailed breakup was not available with the operator. IMRB auditors have taken data the data directly from the counters.

7. Metering and Billing credibility

Audit Results for Billing performance

Billing Performance	Benchmark	Airtel	Aircel	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
Billing disputes – Postpaid											
Total bills generated during the period		24825	1225	4607	14	32574	1773	27149	NA	NA	41361
Total number of bills disputed		1	0	15	0	0	0	30	NA	NA	0
Percentage bills disputed	≤ 0.1%	0.00%	0.00%	0.33%	0.00%	0.00%	0.00%	0.11%	NA	NA	0.00%
Billing disputes – Prepaid											
Number of complaints related to charging, credit & validity		0	3521	5586	204	172	193	120	2	586	332
Total number of prepaid customers in that period		NA	2244477	1396191	310723	1809447	2452110	1018151	75823	279264	6489997
Percentage of complaints	≤ 0.1%	0.00%	0.16%	0.40%	0.07%	0.01%	0.01%	0.01%	0.00%	0.21%	0.01%
Resolution of billing complaints											
Total number of billing/charging complaints		1	2756	5601	207	632	1335	150	2	586	345
Total complaints resolved in 4 weeks from date of receipt		1	2756	5601	207	632	1335	145	2	586	345
Percentage complaints resolved within 4 weeks of date of receipt	100%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	96.67%	100.00%	100.00%	100.00%
Period of applying credit / waiver											
No. of complaints resolved in favor of the customer during the month		1	1	548	61	170	193	51	2	24	20
No. of complaints disposed on account of not considered as valid complaints		0	705	5038	176	460	1142	99	32	562	325
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%

Live calling results for resolution of billing complaints

Resolution of billing complaints	Benchmark	Airtel	Aircel	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
Total Number of calls made		50	50	34	50	100	50	44	16	50	50
Number of cases resolved in 4 weeks		50	20	34	50	98	50	29	16	50	21
Percentage cases resolved in four weeks	100%	100.00%	40.00%	100.00%	100.00%	98.00%	100.00%	65.91%	100.00%	100.00%	42.00%

Operators not meeting the benchmark

DNA: Detailed breakup was not available with the operator. IMRB auditors have taken data the data directly from the counters.

8. Customer Care

Audit results for customer care

Customer Care Assessment	Benchmark	Airtel	Aircel	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
Total number of call attempts to customer care for assistance		18515659	6796615	1261	1512383	1096785	678779	1196028	176088	750220	14576443
Number of calls getting connected and answered (electronically)		17592765	6796615	1261	1493743	1096785	678779	1164595	176088	750220	14576433
Percentage calls getting connected and answered	≥ 95%	95.02%	100.00%	100.00%	98.77%	100.00%	100.00%	97.37%	100.00%	100.00%	100.00%
Percentage calls answered within 60 seconds (V2V)	≥ 90%	94.97%	100.00%	91.05%	96.81%	95.73%	15.95%	98.16%	99.86%	90.46%	94.35%

Live calling results for customer care

Customer Care Assessment	Benchmark	Airtel	Aircel	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
Total Number of calls received		100	100	100	100	100	100	100	100	100	100
Total Number of calls getting connected and answered		100	100	100	100	95	100	100	100	100	100
Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	100.00%	100.00%	95.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Live calling results for customer care (Voice to Voice)

Customer Care Assessment	Benchmark	Airtel	Aircel	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
Total Number of calls received		100	100	100	100	100	100	100	100	100	100
Total Number of calls answered within 60 seconds		90	62	80	100	95	98	94	78	25	96
Percentage calls answered within 60 seconds	≥ 90%	90.00%	62.00%	80.00%	100.00%	95.00%	98.00%	94.00%	78.00%	25.00%	96.00%

9. Termination / closure of service

Audit results for termination / closure of service

Termination	Benchmark	Airtel	Aircel	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
Total number of closure request		331	65	0	7892	143	8	354	NA	NA	476
Number of requests attended within 7 days		325	65	0	7864	143	8	353	NA	NA	468
Percentage cases in which termination done within 7 days	100%	98.19%	100.00%	NA	99.65%	100.00%	100.00%	99.72%	NA	NA	98.32%

Operators not meeting the benchmark

DNA: Detailed breakup was not available with the operator. IMRB auditors have taken data the data directly from the counters.

Audit results for refund of deposits

Refund	Benchmark	Airtel	Aircel	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
Total number of cases requiring refund of deposits		48	34	0	0	152	6	69	NA	NA	132
Total number of cases where refund was made within 60 days		48	34	0	0	152	6	50	NA	NA	132
Percentage cases in which refund was receive within 60 days	100%	100.00%	100.00%	NA	NA	100.00%	100.00%	72.46%	NA	NA	100.00%

11. Additional Network Related parameters											
Audit Results for Total Traffic Handled in Erlang											
Traffic in Erlang		Airtel	Aircel	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
Equipped capacity of the network		167352	3381227	118250	19984	148000	DNP	147395	62500	6968.86	204487
Total traffic handled in erlang during TCBH		130881	1498300	83841	4579	33585	DNP	30770	1906	4332	169237

Total number of customers as per VLR											
		Airtel	Aircel	BSNL	Idea	RCOM CDMA	RCOM GSM	Tata CDMA	DoCoMo	MTS	Vodafone
Total no. of customers served (as per VLR)		4586187	45304573	1502867	253757	1175583	DNP	491557	142513	316436	5648195

Operators not meeting the benchmark

DNA: Detailed breakup was not available with the operator. IMRB auditors have taken data the data directly from the counters.

20.0 Annexure – I (Broadband)

20.1 Parameter wise performance reports for Broadband services

1. Service Provisioning

1.1 Audit Results for Service provisioning			
	Benchmark	BSNL - WB	BSNL - A&And
Total connections registered during the period		1102	121
Number of connections provided within 15 days		1100	121
Percentage of connections provided within 15 days	100%	99.82%	100.00%
Number of connections provided after 15 days of registration of demand		2	0
Number of customers to whom credit is given for delayed connections		2	0
Percentage of customers to whom credit is given for delayed connections	100%	100.00%	NA

1.2 Live calling for Service provisioning			
	Benchmark	BSNL - WB	BSNL - A&And
Total connections registered during the period		298	23
Number of connections provided within 15 days		211	22
Percentage of connections provided within 15 days	100%	70.81%	95.65%

2. Fault Incidence / Clearance Statistics

2.1 Audit Results for Fault repair			
Fault repair	Benchmark	BSNL - WB	BSNL - A&And
Total No. of faults registered during the month		1843	75
No. of faults repaired by next working day during the month		1787	75
Percentage of faults repaired by next working day during the month	> 90%	96.96%	100.00%
No. of faults repaired within 3 days during the month		1837	75
Percentage of faults repaired within 3 days during the month	>99%	99.67%	100.00%

Rent rebate	Benchmark	BSNL - WB	BSNL - A&And
No. of cases with faults pending for >3 days and ≤7 days		0	0
Out of these number of cases where rent rebate for 7 days was given		0	0
Percentage of cases where rent rebate for 7 days was given	100%	NA	NA
No. of cases with faults pending for >7 days and ≤15 days		0	0
Out of these number of cases where rent rebate for 15 days was given		0	0
Percentage of cases where rent rebate for 15 days was given	100%	NA	NA
No. of cases with faults pending for ≥15 days		0	0
Out of these number of cases where rent rebate for 30 days was given		0	0
Percentage of cases where rent rebate for 30 days was given	100%	NA	NA

2.2 Live calling for fault repair			
Fault repair	Benchmark	BSNL - WB	BSNL - A&And
Total Number of calls made		77	0
Number of cases where faults were repaired by next working day		29	0
Percentage cases where faults were repaired by next working day	> 90%	37.66%	NA
Number of cases where faults were repaired within 3 days		62	0
Percentage cases where faults were repaired within 3 days	>99%	80.52%	NA

3. Billing performance

3.1 Audit Results for Billing performance			
Billing Performance	Benchmark	BSNL - WB	BSNL - A&And
Billing disputes			
Total bills generated during the period		30243	1832
Total number of bills disputed		33	0
Percentage bills disputed	< 2%	0.11%	0.00%
Resolution of billing complaints			
Total number of complaints resolved in four weeks from date of receipt		33	0
Total complaints resolved in 4 weeks from date of receipt		33	0
Percentage complaints resolved within 4 weeks of date of receipt	100%	100.00%	NA
Period of refund			
Total number of cases requiring refund		97	0
Total number of cases where credit/waiver was made within 60 days		97	0
Percentage cases in which credit/waiver was received within 60 days	100%	100.00%	NA

3.2 Live calling results for resolution of billing complaints			
Resolution of billing complaints	Benchmark	BSNL - WB	BSNL - A&And
Total Number of calls made		1	NA
Number of cases resolved in 4 weeks		1	NA
Percentage cases resolved in 4 weeks	100%	100.00%	NA

4. Response time to the customer for assistance

4.1 Audit results for customer care (Voice to Voice)			
Customer Care Assessment	Benchmark	BSNL - WB	BSNL - A&And
Total Number of calls received		2285	NA
Total Number of calls answered within 60 seconds		2100	NA
Percentage calls answered within 60 seconds	> 60%	91.90%	NA

4.2 Live calling results for customer care (Voice to Voice)			
Customer Care Assessment	Benchmark	BSNL - WB	BSNL - A&And
Total Number of calls received		100	NA
Total Number of calls answered within 60 seconds		100	NA
Percentage calls answered within 60 seconds	> 60%	100.00%	NA

4.3 Audit results for customer care (Voice to Voice)			
Customer Care Assessment	Benchmark	BSNL - WB	BSNL - A&And
Total Number of calls received		2285	NA
Total Number of calls answered within 90 seconds		2168	NA
Percentage calls answered within 90 seconds	> 80%	94.88%	NA

4.4 Live calling results for customer care (Voice to Voice)			
Customer Care Assessment	Benchmark	BSNL - WB	BSNL - A&And
Total Number of calls received		100	NA
Total Number of calls answered within 90 seconds		100	NA
Percentage calls answered within 90 seconds	> 80%	100.00%	NA

5. Bandwidth utilization

5.1 Audit results for Bandwidth Utilization			
Bandwidth utilization	Benchmark	BSNL - WB	BSNL - A&And
Intra-network links (POP to ISP Node)			
Total number of intra network links		152	152
No of Intra network found to be above 90%		4	4
International Bandwidth			
Total number of upstream links		296	296
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In mpbs)		45880	45880
Total International Bandwidth utilised during peak hours		36904.96	36904.96
Percentage Bandwidth utilization during peak hours (In mpbs)	<80%	80.44%	80.44%
No of Intra network found to be above 90%		0	0

5.2 Live measurement results for Bandwidth Utilization			
Bandwidth utilization	Benchmark	BSNL - WB	BSNL - A&And
Intra-network links (POP to ISP Node)			
Total number of intra network links		152	152
No of Intra network found to be above 90%		0	0
International Bandwidth			
Total number of upstream links		325	325
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In mpbs)		50375	50375
Total International Bandwidth utilised during peak hours		33027.33	33027.33
Percentage Bandwidth utilization during peak hours (In mpbs)	<80%	65.56%	65.56%
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 - WB	BSNL - A&And
Total committed download speed to the sample subscribers (In mpbs) (A)		2	2
Total average download speed observed during TCBH (In Mpbs) (B)		1.8	1.8
%age subscribed speed available to the subscriber during TCBH (B/A)*100	>80%	90.00%	90.00%

7. Service availability/uptime

7.1 Audit results for service availability			
Service Availability	Benchmark	BSNL - WB	BSNL - A&And
Total Operational Hours		117600	117600
Total Downtime		63	63
Total time when the service was available		117537	117537
Service Availability Uptime in Percentage	>98%	99.95%	99.95%

7.2 Live measurement results for service availability			
Service Availability	Benchmark	BSNL - WB	BSNL - A&And
Total Operational Hours		12600	12600
Total Downtime		9.71	9.71
Total time when the service was available		12590	12590
Service Availability Uptime in Percentage	>98%	99.92%	99.92%

8. Network latency / Packet loss

8.1 Audit results for Latency and packet loss			
Network Latency and Packet Loss	Benchmark	BSNL - WB	BSNL - A&N
Packet Loss (Percentage)	< 1%	0.00%	0.00%
Network Latency			
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	20	20
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	242	242

8.2 Live measurement results for Latency and packet loss			
Network Latency and Packet Loss	Benchmark	BSNL - WB	BSNL - A&N
Packet Loss (Percentage)	< 1%	0.00%	0.00%
Network Latency			
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	19	19
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	228	228

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

21.1 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

21.2 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 /

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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

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SDCCH Congestion: ≤ 1%
TCH Congestion: ≤ 2%
POI Congestion: ≤ 0.5%

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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

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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

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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 <u>at least one</u> 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**

21.3 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** are to be made in a licensed service area/circle for each service provider. However in certain cases the sample could not be achieved as bills disputed (prior to the month of Audit) were found to be less than100

3.2 Time taken to refund after closure	
Computational Methodology as per QoS definition	Time taken to refund = Date of refund – Date of closure Date of closure is considered to be the date on which the connection is discontinued in the service provider database of active customers

Benchmark	100% cases in less than 60 days
Audit Procedure	**IMRB Auditors collected and verified data pertaining to** -Number of cases requiring refund of deposits -Number of cases where refund was made within 60 days -%age cases where refund was made within 60 days

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

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

Broadband download speed	
Computational Methodology as per QoS definition	This refers to the ratio of size of the file to be downloaded and total time required for error free transmission of the file

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

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

Packet loss	
Computational Methodology as per QoS definition	Packet loss is the percentage of packets lost to total packets transmitted between two designated Customer Premises Equipments/Router ports. It is the measurement of packet lost from the broadband customer (User) configuration/User reference point at POP/ISP Node to IGSP/NIXI Gateway and to the nearest NAP port abroad The packet loss is measured by computing the percent packet loss of **1000 pings of 64 byte packet each**. Service provider needs to carry out such tests daily during Time Consistent Busy Hour(TCBH) and report the average results for the month in the performance monitoring report to TRAI Minimum sample reference points for each service area shall be three in number or multiple reference points if required **Hence Packet loss is computed by the formula - (Total number of ping packets lost during the period/Total number of ping packets transmitted)* 100**
Benchmark	<1 %

Audit Procedure	**IMRB Auditors collected and verified call centre records pertaining to** - Records maintained for ping tests conducted during the period of July to September 2007 - Smoked ping test (wherever available) results for the period of July to September 2007 - Results of live ping tests conducted during three day live measurement and month of Audit (During peak hours) - Live ping tests were conducting by selecting a minimum of three user reference test points at POP/ISP Node in each circle

Network Latency	
Computational Methodology as per QoS definition	Latency is the measure of duration of a round trip for a data packet between specific source and destination Router Port/Customer Premises Equipment (CPE). The round trip delay for the ping packets from ISP premises to the IGSP premises to the IGSP/NIXI gateway and to the nearest NAP port abroad are measured by computing delay for **1000 pings of 64 bytes each** (Pings are to be sent subsequent to acknowledgement received for the same for previous ping) Service provider needs to carry out such tests daily during Time Consistent Busy Hour(TCBH) and report the average results for the month in the performance monitoring report to TRAI Minimum sample reference points for each service area shall be three in number or multiple reference points if required **Hence the formula for network latency would be Network latency for X days= Total round trip time for all the ping packets transmitted in X days /No of days during the period**
Benchmark	< 120 msec from user reference point at POP/ISP Node to International Gateway < 350 msec from User reference point at ISP Gateway Node to International nearest NAP port (Terrestrial) < 800 msec from User reference point at ISP Gateway Node to International nearest Nap port (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

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