

Objective Assessment of Quality of Services for (QoS) for Basic Wireline, Cellular and Broadband Service Providers - Kerala Circle

Report: April – May – June, 2010



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

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Preface

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

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

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

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

The Survey and Audit modules for various circles within the Zones, due the sheer scale of data collection, have been distributed across various Half Yearly periods. The auditor - IMRB International carried out the audits across Jammu & Kashmir, Himachal Pradesh, Bihar & Jharkhand and Kerala circles in the April – May – June period 2010. **This report details the performance of various service providers in Kerala circle against Quality of Services benchmarks for various parameters laid down by TRAI in respective regulations for Basic (Wireline), Cellular mobile (Wireless) and broadband services.**

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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

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 Kerala circle that was covered in the period of April – June 2010. The primary data collection and verification of records maintained by various operators of Basic (Wireline), Cellular Mobile (Wireless) and broadband services was undertaken by IMRB International during the period April – June 2010.



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

2.0 Objectives And Methodology

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



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

1. **Verification of the data submitted by service providers:** This involved verification of the quarterly Performance Monitoring Reports (PMR's) and monthly Point of Interconnect (POI) Congestion reports being submitted by various service providers. The raw data in the records maintained by service providers was audited to assess the book keeping methodology.
2. **Live measurement for three days:** Network performance of service providers was assessed for three days in the month in which the Audit was carried out. Live figures from the server/ NMS software were recorded for various network related parameters.
3. **Data verification for the month in which Audits were carried out:** Subsequent to the visits for Audit during the live measurement at various Exchanges/ISP Nodes/Exchanges, data for all the network and Non network related parameters was collected from various service providers for the complete month in which the Audit was carried out. Raw data/records pertaining to these were also verified on sample basis to check the veracity of data provided by the operators.
4. **Live calling:** Live testing was done on a sample basis to check efficiency of the customer care, inter operator call assessment, Back check calls for service provisioning and fault repair

- Any changes or discrepancies found in the methodology were reported to the service providers and changes were suggested by IMRB Auditors.
- PMR verification was done as per the new parameters being reported to TRAI by all operators.
- Live measurement and 1 month data collection was done as per the new regulations published by TRAI on 20th March, 2009.
- Separate formats were designed each for Basic (Wireline), Cellular mobile (Wireless) and Broadband services to collect the information on various parameters

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.
- For rest of the service providers (private service providers) data was collected pertaining to all the exchanges present in the circle/service area at their main exchange
- For reliance the data was obtained from their central NOC at Mumbai
- Following service providers are providing Basic (Wireline) service in Kerala circle –

	Name of Operator
Operator 1	BSNL
Operator 2	Airtel
Operator 3	TTSL
Operator 4	RCOM

4.0 Audit methodology

4.1 Basic (Wireline) Services

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

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

* In addition to above verification of records for PMR submitted during October to December 2009 was carried out for all network and non network related parameters.

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

5.0 Executive Summary

The objective assessment of Quality of Services (QoS) was carried out by IMRB International for all the Basic (Wireline) and Broadband service providers during the period starting from April to June 2010 in Kerala 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*	Airtel	TTSL#	RCOM
Faults incidences (No. of faults/100 Subs./month)	≤5	5.09	2.8	0	0.99
% of faults repaired by next working day	≥ 90%	67.69%	98.67%	NA	100.00%
% of faults repaired within 3 days	100%	88.14%	99.84%	NA	100.00%
Faults pending for > 3days and ≤7 days	Rent rebate of 7 days	0.06%	100.00%	NA	NA
Faults pending for > 7 days and ≤15 days	Rent rebate of 15 days	0.00%	100.00%	NA	NA
Faults pending for > 15 days	Rent rebate of 1 month	0.00%	NA	NA	NA
Mean Time to Repair (MTTR)	≤ 8 Hrs	14.63	4.06	NA	3.37
Call Completion Rate (CCR)	≥ 55%	78.14%	90.62%	98.61%	NA
Answer to Seizure ratio (ASR)	≥ 75%	77.02%	NA	NA	82.37%
No. of POIs with congestion > 0.5%	≤ 0.5%	0.00	0.00	0.00	0.00
Metering and billing credibility - Number of bills disputed during over a billing cycle	≤ 0.1%	0.09%	0.03%	0.00%	0.00%
Resolution of billing complaints within 4 weeks	100%	100.00%	100.00%	NA	100.00%
Period of applying credit / waiver	≤ 1 week	100.00%	100.00%	NA	100.00%
Closure within 7 days	100%	99.11%	100.00%	NA	100.00%
Response time to customer for assistance					
% age calls getting connected and answered	≥ 95%	99.02%	92.85%	NA	95.88%
% age call answered by operator in 60 seconds	≥ 90%	97.90%	96.06%	94.56%	92.00%
Time taken for refund of deposits after closures within 60 days	100%	87.16%	100.00%	NA	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}

#Tata has a very limited presence in the circle with no retail customers

** Methodology not in line with QoS

■ Figures provided on All India basis

■ Not meeting the benchmark

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

Summary of Live Measurement Results – Wireline Services

Parameters	Benchmarks	BSNL	Airtel	TTSL	RCOM
% of faults repaired by next working day	≥ 90%	27.61%	53.33%	NA	33.33%
% of faults repaired within 3 days	100%	67.99%	86.67%	NA	63.33%
Call Completion Rate (CCR)	≥ 55%	63.94%	93.05%	99.14%	NA
Answer to Seizure ratio (ASR)	≥ 75%	72.13%	NA	NA	89.31%
Resolution of billing complaints within 4 weeks	100%	79.17%	70.00%	NA	100.00%
Response time to customer for assistance					
% age calls getting connected and answered	≥ 95%	89.33%	100.00%	100.00%	100.00%
% age call answered by operator in 60 seconds	≥ 90%	61.57%	95.00%	99.00%	78.00%

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

The Basic (Wireline) services audit for Kerala circle broadly indicates that all the service provider could meet benchmarks as specified by Telecom Regulatory Authority of India on most of the parameters.

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 Kerala circle are as under –

Fault incidence / clearance statistics

- Fault repair is a pain point for BSNL subscribers which falls short of TRAI specified benchmark of 100% repair in 3 working days.
- For live calling carried out by IMRB auditors no operator meets TRAI benchmark for fault was repair within 24 hrs and within 3 days.
- Live calling could not be done for Tata as there were no faults registered at their exchange

Traffic statistics (CCR & ASR)

- All service providers comfortably meets 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
- RCOM reports ASR in place of CCR and comfortably meets TRAI benchmark although BSNL was found to be falling short of benchmark on ASR during live measurement

Metering and billing credibility

- All service providers meet TRAI specified benchmark with percentage billing complaints being less than equal to 0.1% of the total bills generated.
- Also all the complaints registered were resolved within the time period stipulated by TRAI
- BSNL and Airtel were found to be not meeting TRAI benchmark for resolution of complaints within 4 weeks for live calling done by IMRB auditors

Response time to customer for assistance

- Airtel falls short of TRAI specified benchmark for % age calls getting connected and answered
- However for the live calling carried out by IMRB auditors BSNL does not meet benchmark for response time to customer for assistance
- Also RCOM failed to meet the benchmark for calls answered in 60 seconds for live calling done by IMRB auditors

Time taken for refund of deposits after closure

- All service providers except BSNL were found to meeting TRAI benchmark on this parameter
- There were no cases of refunds observed for Tata

Level 1 service

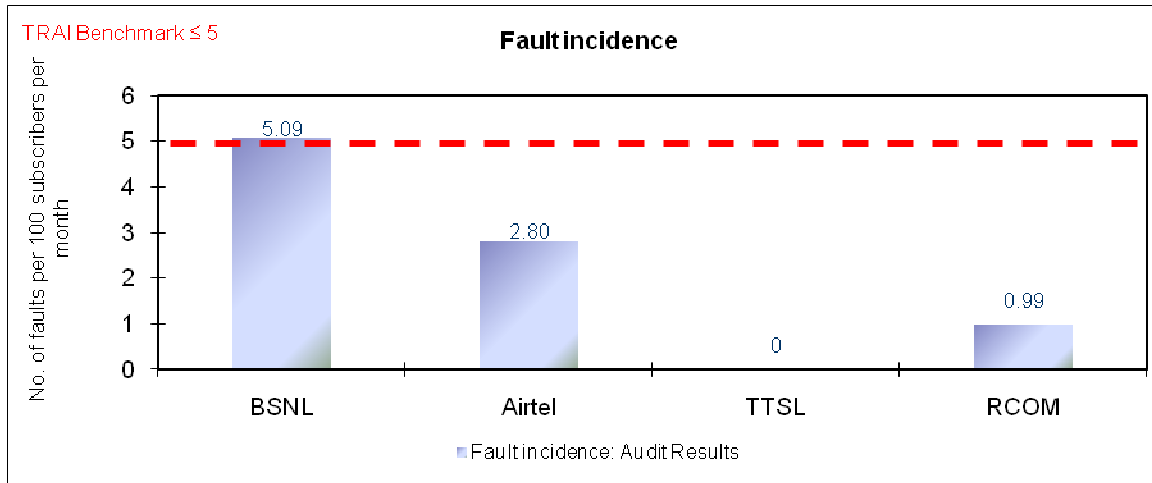
Level 1 services	Benchmark	BSNL	Airtel	TTSL	RCOM
Total no. of calls made		210	30	30	30
Calls answered in 60 sec		202	28	24	26
Calls answered after 60 sec		8	2	6	4

To test the efficiency of level 1 services (Trunk booking, Child helpline, Women helpline, Airline booking, Fire, Police, Railways) offered by various service providers. 210 calls were made for BSNL to different numbers and time taken to answer the call was noticed. Out of which 202 calls made were answered in 60 seconds.

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

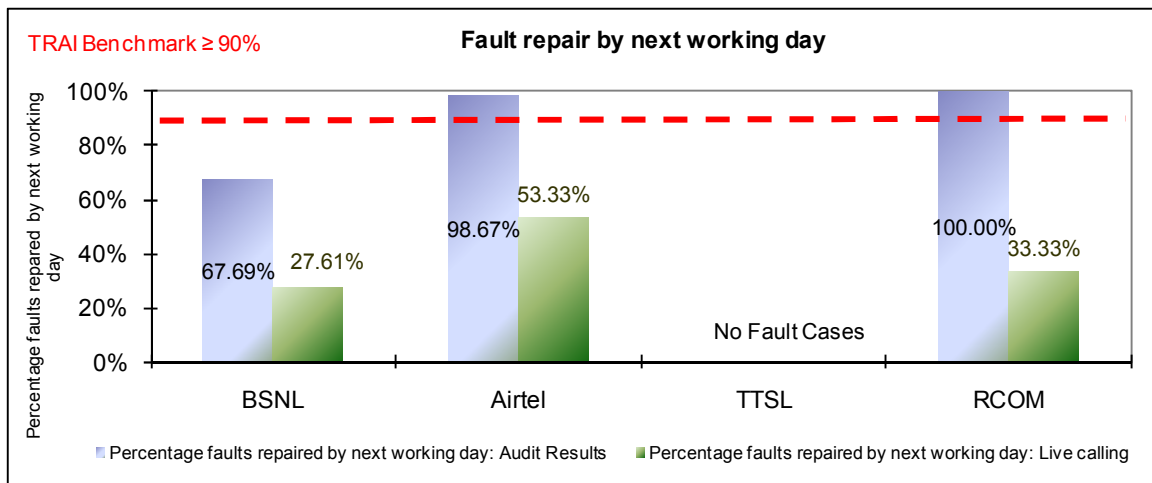
6.1 Graphical/Tabular Representations for Basic (Wireline) services

Fault incidence



Operator meeting benchmark: Airtel, TTSL, RCOM
 Operator not meeting benchmark: BSNL

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

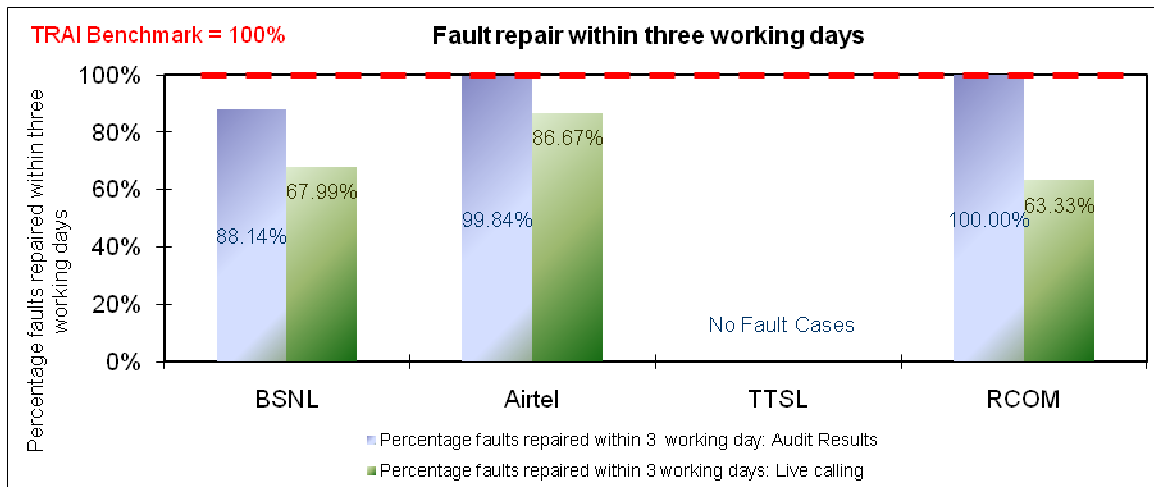


One month

Operator meeting benchmark: Airtel, RCOM
 Operator not meeting benchmark: BSNL

Live calling

No operator is meeting the benchmark



One month

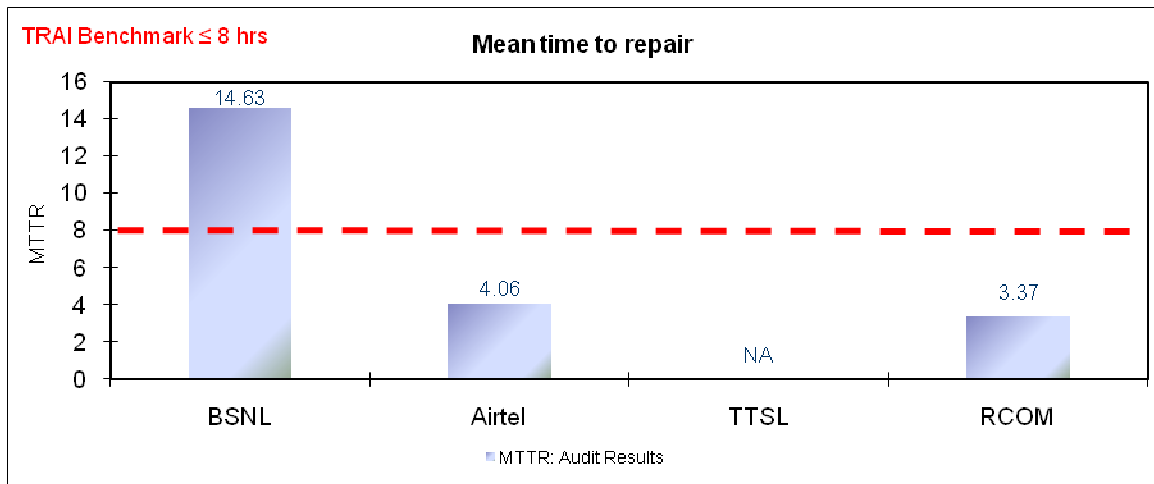
Operator meeting benchmark: RCOM

Operator not meeting benchmark: BSNL, Airtel

Live calling

No operator is meeting the benchmark

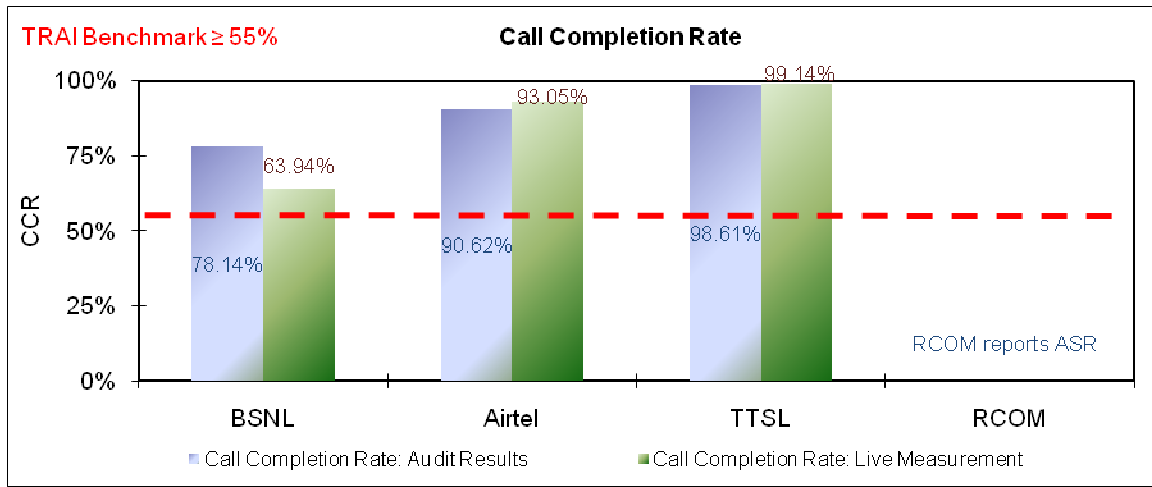
Mean time to repair



Operator meeting benchmark: Airtel, RCOM

Operator not meeting benchmark: BSNL

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



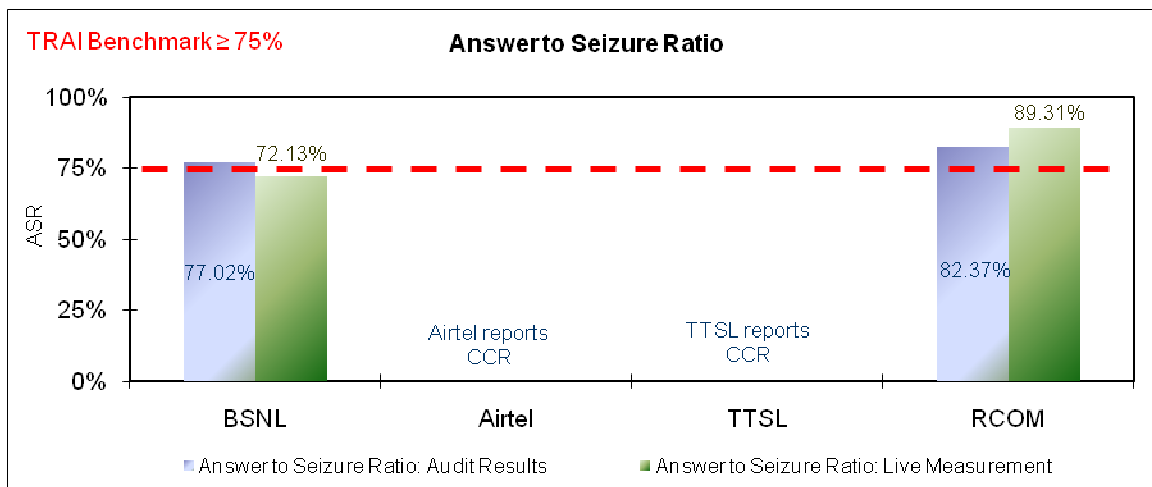
One month

All operators are meeting the benchmark

Live measurement

All operators are meeting the benchmark

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



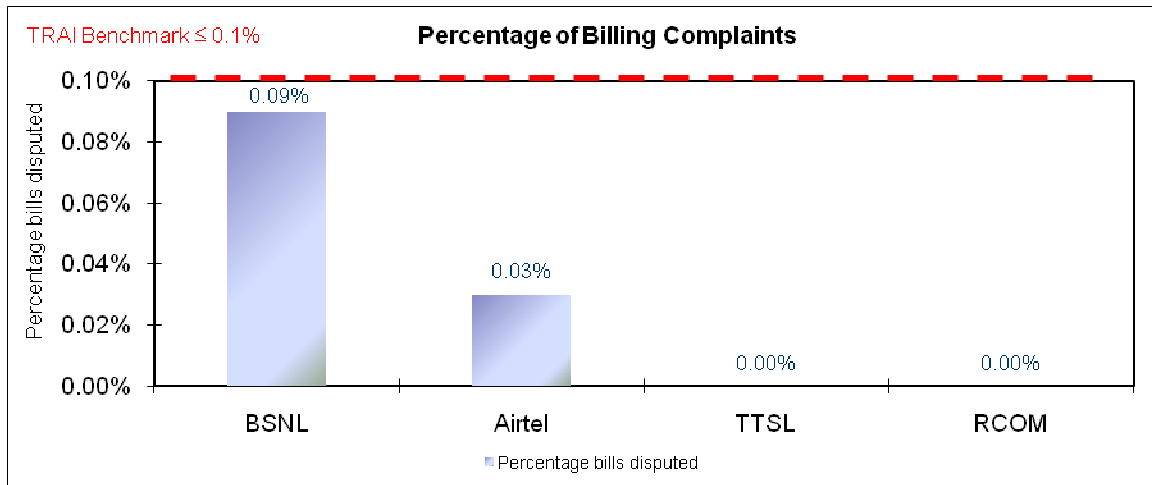
One month

All operators are meeting the benchmark

Live measurement

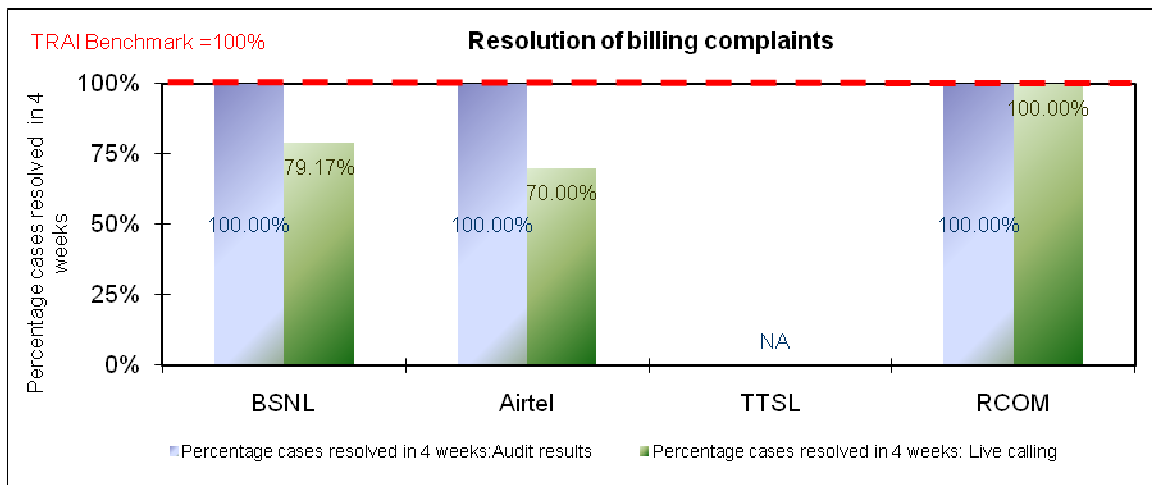
Operator meeting benchmark: RCOM
 Operator not meeting benchmark: BSNL

Percentage bills disputed



All operators are meeting the benchmark

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



One month

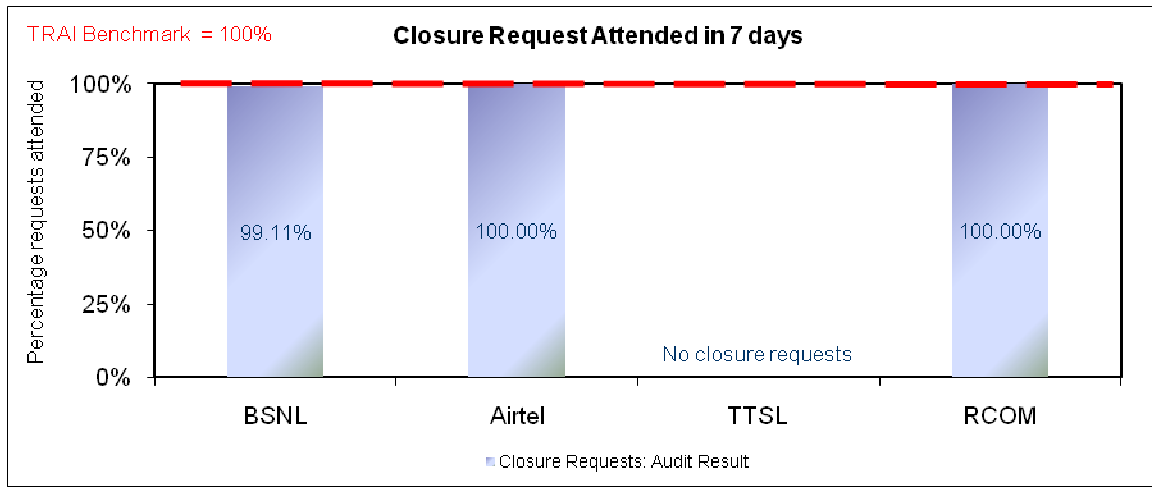
All operators are meeting the benchmark

Live calling

Operator meeting benchmark: RCOM

Operator not meeting benchmark: BSNL, Airtel

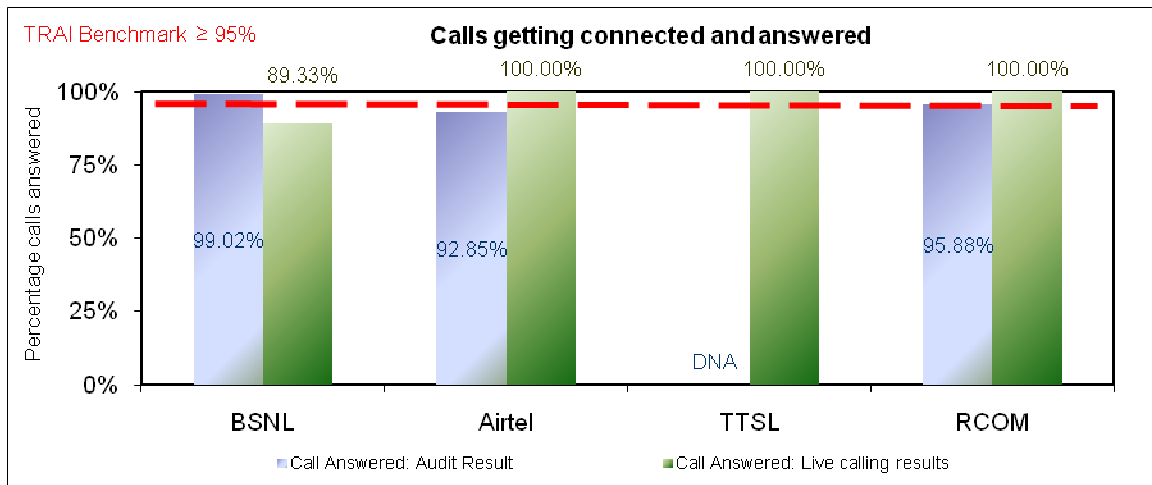
Closure requests attended within 7 days



Operator meeting benchmark: Airtel, RCOM

Operator not meeting benchmark: BSNL

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



One month

Operator meeting benchmark: BSNL, RCOM

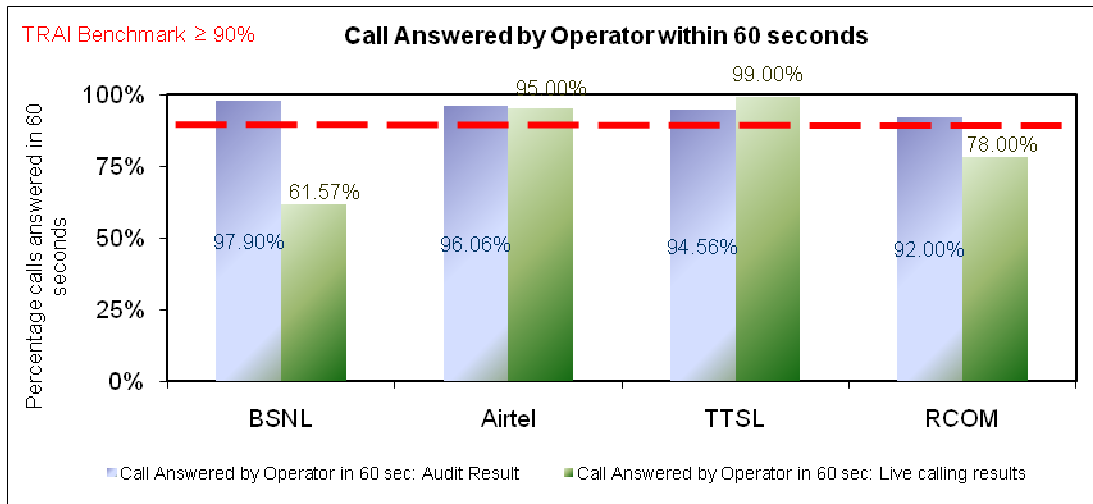
Operator not meeting benchmark: Airtel

Live calling

Operator meeting benchmark: Airtel, TTSL, RCOM

Operator not meeting benchmark: BSNL

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

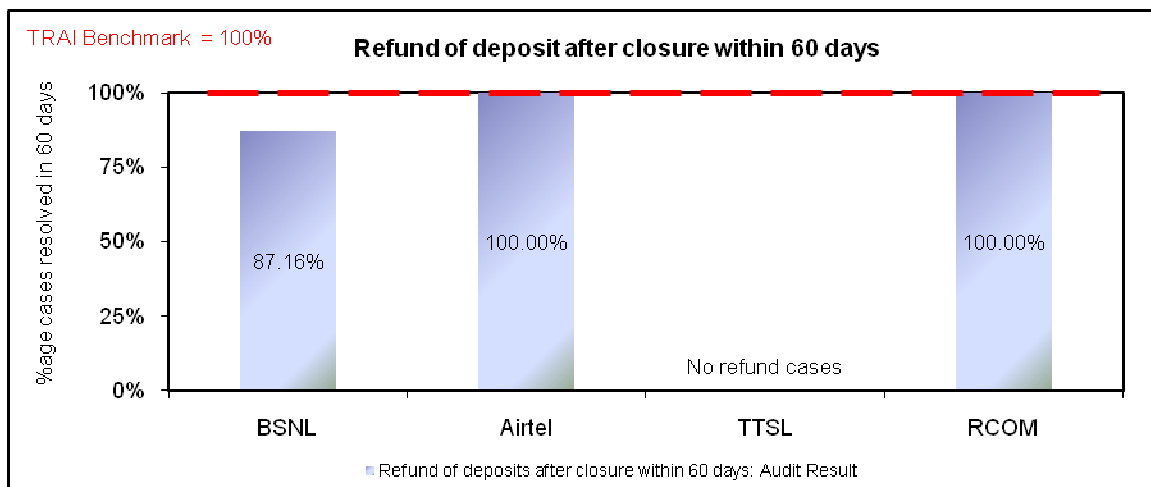
All operators are meeting the benchmark

Live calling

Operator meeting benchmark: Airtel, TTSL

Operator not meeting benchmark: BSNL, RCOM

Time taken to refund of deposits after closure



Operator meeting benchmark: Airtel, RCOM

Operator not meeting benchmark: BSNL


7.0 Compliance reports: Results of Verification of Records

7.1 Basic (Wireline) services

Parameters	Benchmarks	BSNL*		Airtel		TTSL		RCOM	
		PMR	IMRB	PMR	IMRB	PMR	IMRB	PMR	IMRB
Faults incidences (No. of faults/100 Subs./month)	≤5	6.56	5.70	3.00	3.00	0.10	0.10	0.19	0.19
% of faults repaired by next working day	By next working day: ≥ 90%	87.03%	76.80%	99.39%	99.39%	81.30%	81.30%	100.00%	100.00%
Total No. of faults registered during the quarter		643171	17208	4251	4251	16	16	102	102
No. of faults repaired by next working day during the quarter		544178	13215	4225	4225	13	13	102	102
No. of faults repaired within 3 days during the quarter	For urban areas	188756	7648	4241	4241	14	14	102	102
% of faults repaired within 3 days	For urban areas: ≥ 100%	95.53%	94.92%	99.82%	99.82%	87.50%	87.50%	100.00%	100.00%
No. of faults repaired within 5 days during the quarter	For rural and hilly areas	416757	8486	NA	NA	15	15	NA	NA
% of faults repaired within 5 days	For rural and hilly areas:	93.21%	92.73%	NA	NA	93.80%	93.80%	NA	NA
Rent Rebate :	≥ 100%								
Faults pending for > 3days and ≤7 days	Rent Rebate for 7 days	8	1151	35	37	1	1	0	0
Faults pending for > 7 days and ≤15 days	Rent Rebate for 15 days	1626	352	7	7	1	1	0	0
Faults pending for > 15 days	Rent Rebate for 30 days	1004	66	0	0	0	0	0	0
Mean Time to Repair (MTTR)	≤ 8 Hrs	13.91	13.13	3.67	3.67	13.00	13.00	0.00	0.00
Call Completion Rate (CCR)	≥ 55%	71.14%	77.67%	92.74%	92.69%	98.38%	98.38%	NA	NA
Total Number of successful local calls		0	14489384	5149709	1715151	6279924	6279924	0	0
Total local call attempts		0	18655752	5554322	1850384	6383397	6383397	0	0
Answer to Seizure Ratio (ASR)	≥ 75 %	NA	NA	NA	NA	NA	NA	80.71%	80.71%
Total I/C seizures		0	0	NA	NA	NA	NA	671464	671464
No. of answered calls		0	0	NA	NA	NA	NA	541925	541925
Point of Interconnection (POI) Congestion (No. of Pols not meeting benchmark)	≤ 0.5%	0	0	0	0	0	0	0	0
Total number of working POI Service Area wise		0	0	NA	NA	0	0	0	0
Metering and billing credibility - post paid	Not more than 0.1%	DNA	0.11%	0.04%	0.04%	0.00%	0.00%	0.03%	0.03%
No. of bills issued during the period		5711287	174714	70412	70412	19363	19363	66760	66760
No. of bills disputed including billing complaints during the period		87	189	31	31	0	0	17	17
Metering and billing credibility - pre paid	Not more than 0.1%	NA	NA	NA	NA	NA	NA	NA	NA
No. of charging / credit / validity complaints during the quarter		0	0	NA	NA	NA	NA	NA	NA
Total no. of pre-paid customers at the end of the quarter		0	0	NA	NA	NA	NA	0	0

Resolution of billing/ charging/ validity complaints	100% within 4 weeks	DNA	100.00%	100.00%	100.00%	NA	NA	100.00%	100.00%
No. of billing/(post paid) and charging, credit / validity (pre paid) complaints resolved within 4 weeks during the quarter		0	188	403	403	0	0	17	17
Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		0	188	405	405	0	0	0	0
No. of billing complaints (post paid) and charging, credit/validity complaints (pre paid) resolved in favor of the customer during the quarter		227	132	31	31	0	0	0	0
No. of complaints disposed on account of not considered as valid complaints during the quarter		0	56	374	374	0	0	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	DNA	100%	100%	100%	100%	100%	100%	100%
Response time to the customer for assistance	≥ 95%	DNA	98.35%	99.28%	99.28%	94.10%	94.10%	96.00%	96.00%
Total no. of call attempts to call centre / customer care nos. during TCBH		98	452832	46544	46544	84954	84954	445651	445651
Accessibility of call centre/ customer care		859	445354	46414	46414	79949	79949	427175	427175
Percentage of calls answered by the operators (voice to voice) within 60 seconds	≥ 90%	96.51%	96.50%	98.77%	98.77%	90.70%	90.70%	92.00%	92.00%
Termination / closure of service	≤ 7 days								
%age requests for Termination / Closure of service complied within 7 days	100.00%	96.41%	98.96%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Total No. of requests for Termination / Closure of service received during the quarter		21004	865	3065	3065	111	111	25	25
No. of requests for Termination / Closure of service complied within 7 days during the quarter		20250	856	2744	2744	111	111	25	25
Time taken for refund of deposits after closures	100% within 60 days.	100.00%	100.00%	100.00%	100.00%	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 October to December 2009, there was significant variation observed when compared to the figures reported in the PMR for BSNL

1. For variation observed in figures for BSNL is owing to the fact that only 5% of the total exchanges were audited for the operator whereas the data provided in the PMR is basis all the exchanges in the circle
2. All service providers except RCOM were found not to meeting benchmark for fault repair within 3 working days
3. BSNL and Tata were found to be not meeting benchmark on fault repair by next working day and MTTR

Section B
WIRELESS

8.0 Sampling methodology

8.1 Sampling for Cellular Mobile (Wireless) service providers

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

	Name of Operator	Month of Audit
Operator 1	BSNL	May
Operator 2	Vodafone	April
Operator 3	Aircel	April
Operator 4	Idea	April
Operator 5	Tata CDMA	April
Operator 6	DoCoMo	April
Operator 7	Airtel	April
Operator 8	RCOM CDMA	April
Operator 9	RCOM GSM	April
Operator 10	MTS	April
Operator 11	Uninor	April

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 ASSISTED DRIVE TESTS	INDEPENDENT DRIVE TESTS
A	Network Performance							
A (i)	BTS accumulated down time	Yes	Yes	Yes				
A (ii)	Call setup success rate (within licensee own network)	Yes	Yes	Yes	Yes		Yes	Yes
A (iii)	Blocked Call Rate	Yes	Yes	Yes	Yes		Yes	Yes
A (iv)	Call Drop rate	Yes	Yes	Yes	Yes		Yes	Yes
A (v)	% Connections with good voice quality	Yes	Yes	Yes			Yes	Yes
A (vi)	Service Coverage	Yes	Yes	Yes			Yes	Yes
A (vii)	PoI Congestion	Yes	Yes	Yes				
B	Customer Helpline							
B (i)	Response time to the customer for assistance	Yes	Yes	Yes		Yes		
C	Billing Complaints							
C (i)	Billing complaints per 100 bills issued	Yes	Yes	Yes				
C (ii)	%age of billing complaints resolved within 4 weeks	Yes	Yes	Yes		Yes		
C (iii)	Period of all refunds/payments due to customers from date of resolution as in (ii) above	Yes	Yes	Yes		Yes		

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

10.0 Executive Summary

The objective assessment of Quality of Services (QoS) was carried out by IMRB International for all the Cellular mobile service providers during the period starting from April 2010 to June 2010 in Kerala 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%				
BSNL	20.00 to 21.00 hrs	3357	23057	0.92%	92	2.74%	96.87%	0.34%	3.13%	0.52%	211	9535	2.21%	99.81%	0	69	4519298	2540735	2802229
Vodafone	20.00 to 21.00 hrs	3780	1172	0.04%	5	0.13%	98.87%	0.25%	0.67%	0.64%	112	11320	0.99%	97.30%	0	35	135139	111180	3353263
Aircel	20.00 to 21.00 hrs	2068	658.27	0.04%	0	0.00%	99.28%	0.04%	0.06%	0.51%	218	6185	3.52%	97.56%	0	51	48073	11865	606650
Idea	20.00 to 21.00 hrs	4553	4808	0.14%	6	0.13%	99.82%	0.29%	0.46%	0.94%	235	13644	1.72%	96.31%	0	108	187131	158155	4984063
Tata CDMA	20.00 to 21.00 hrs	561	155	0.04%	0	0.00%	98.98%	0.00%	0.00%	0.58%	12	1680	0.71%	98.49%	0	64	107575	24547	399465
DoCoMo	20.00 to 21.00 hrs	1810	891	0.07%	0	0.00%	99.99%	0.06%	0.60%	0.51%	4266	161970	2.63%	97.70%	0	11	110000	17762	699229
Airtel	20.00 to 21.00 hrs	4190	2571	0.08%	0	0.00%	99.75%	0.13%	0.10%	0.52%	107	12503	0.86%	98.63%	0	38	156098	86578	2819544
RCOM CDMA	20.00 to 21.00 hrs	1205	461	0.05%	0	0.00%	99.69%	DNA	0.11%	0.81%	18	1205	1.49%	99.16%	0	12	142000	44784	1760058
RCOM GSM	19.00 to 20.00 hrs	1960	375	0.03%	0	0.00%	99.26%	0.02%	0.01%	0.31%	13	5880	0.22%	99.03%	0	12	142000	44784	1760058
MTS	20.00 to 21.00 hrs	681	520	0.10%	0	0.00%	99.07%	0.00%	0.00%	0.25%	47	4086	1.15%	98.02%	0	34	12891	2659	97846
Uninor	20.00 to 21.00 hrs	1182	157	0.02%	2	0.17%	99.17%	5.30%	1.40%	0.91%	306	3518	8.70%	97.08%	0	39	48000	1371	1100000

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

** Methodology not in line with QoS



Figures provided on All India basis



Not meeting the benchmark

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

Critical findings: Cellular Mobile Services

The audit for cellular mobile service providers were conducted at their respective MSCs in the Kerala 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
BSNL	20.00 -21.00 hrs	20.00 -21.00 hrs
Vodafone	20.00 -21.00 hrs	20.00 -21.00 hrs
Aircel	20.00 -21.00 hrs	20.00 -21.00 hrs
Idea	20.00 -21.00 hrs	20.00 -21.00 hrs
Tata CDMA	20.00 -21.00 hrs	20.00 -21.00 hrs
DoCoMo	20.00 -21.00 hrs	20.00 -21.00 hrs
Airtel	20.00 -21.00 hrs	20.00 -21.00 hrs
RCOM CDMA	20.00 -21.00 hrs	20.00 -21.00 hrs
RCOM GSM	19.00-20.00 hrs	19.00-20.00 hrs
MTS	20.00 -21.00 hrs	20.00 -21.00 hrs
Uninor	20.00 -21.00 hrs	20.00 -21.00 hrs

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

BTSS Accumulated Downtime:

In the Kerala circle, BSNL had the highest number of BTSSs with a downtime of more than 24 hours per month. BSNL also did not meet the TRAI benchmark for worst affected BTSSs due to downtime in percentage.

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 DoCoMo with 99.99% of their calls getting completed. All the operators were found to be calculating the parameter as per the norm specified by TRAI. CSSR was established as the ratio of total number of successful call attempts (establishment) to the total number of call attempts made.

Network Congestion parameters:

SDCCH / Paging Channel Congestion, TCH and POI are part of the network congestion parameters. All the operators except BSNL for Traffic channel congestion and Uninor for SDCCH Channel Congestion are meeting the TRAI specified benchmarks on the congestion parameters. BSNL does not meet the TRAI specified benchmark with a Traffic Channel congestion of 3.13% which was found during the one month data collected for the month of audit. Uninor does not meet the TRAI specified benchmark with a SDCCH Channel congestion of 5.30%. MTS and TATA lead

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. There were almost no POIs with congestion more than the benchmark ($\leq 0.5\%$).

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. Also, all of service providers were found to be meeting the TRAI specified benchmark. The lowest call drop rate was of MTS at 0.25% while the highest was for Idea at 0.94%.

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. Aircel, MTS and TATA Indicom do not meet the benchmark for the month of audit for the parameter percentage of calls getting connected and answered.

Billing performance

All the operators, except for Aircel, were found to be meeting the benchmark of $\leq 0.1\%$ complaints registered per 100 bills issued. All the operators were found to be meeting the benchmark of 100% billing complaints being resolved within 4 weeks. 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		BSNL	Vodafone	Aircel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor
To ↓	From →											
BSNL		NA	100%	100%	100%	97%	92%	85%	99%	100%	98%	100%
Vodafone		99%	NA	100%	100%	100%	100%	100%	100%	100%	100%	96%
Aircel		98%	100%	NA	99%	100%	100%	98%	100%	100%	98%	100%
Idea		84%	99%	100%	NA	91%	85%	100%	100%	97%	96%	98%
Tata CDMA		89%	100%	96%	100%	NA	100%	100%	100%	99%	96%	100%
DoCoMo		98%	100%	98%	100%	99%	NA	100%	99%	100%	99%	100%
Airtel		72%	100%	100%	100%	100%	98%	NA	100%	98%	99%	100%
RCOM CDMA		99%	100%	100%	100%	97%	97%	98%	NA	100%	95%	100%
RCOM GSM		100%	100%	100%	100%	97%	100%	96%	99%	NA	99%	99%
MTS		99%	100%	100%	100%	100%	99%	97%	100%	100%	NA	100%
Uninor		100%	100%	100%	100%	100%	100%	100%	100%	82%	84%	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. RCOM GSM and MTS found it tough to connect to a Uninor number with only 82 and 84 out of 100 calls getting connected. BSNL had difficulty in connecting to Airtel, Idea and Tata Indicom numbers. TATA DoCoMo had some difficulty in connecting to Idea and BSNL numbers. From Airtel, only 85 out of 100 calls to a BSNL number got connected. TATA CDMA had difficulty in connecting to an Idea number.

Results of Operator assisted Drive test

The drive test was conducted simultaneously for all the operators present in the Kerala circle. There was in total of three drive tests conducted in the circle. These tests were conducted in the cities of Ernakulam, Calicut and Kannur. 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 Kerala telecom circles were covered.

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

The drive tests in the Kerala circle were conducted in the cities of Ernakulam, Calicut and Kannur was conducted along the following route:

	Type of location	ERNAKULAM	CALICUT	KANNUR
Outdoor	Periphery of the city	Cusat, Kakkanad, Irumpanam	Ramanattukara, Feroke, Areekadu, Meenchantha	Thazhechowa, kunchipally, Puthiyatheruvu
	Congested area	M.G ROAD, Marine drive	Mankavu, Kalyan Kendra, Asokapuram	Melechowa, Thana, Podikkunnu, Valapattanam
	Across the city	Kundanoor, Vytilla, Kadavanthara	Thodayad, Mavoor Road, West Hill, Eranipalam	Valapattanam, Manal, Thalap, Old city
Indoor	Office complex	Max NewYork Office, Palarivattom	Asianet Communications	BSNL Bhavan
	Shopping complex	Oberon Mall	Focus Mall	Kasa Marina Complex

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

Drive Test – Ernakulam


	B'mark	BSNL		Vodafone		Aircel		Idea		Tata CDMA		DoCoMo		Airtel		RCOM CDMA		RCOM GSM		MTS		Uninor	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	≥ 95%	95.01%	97.06%	95.52%	96.33%	99.68%	98.70%	99.64%	97.75%	100.00%	99.53%	98.92%	97.90%	99.75%	95.61%	99.70%	97.99%	94.91%	92.18%	99.75%	99.50%	99.58%	96.51%
CSSR	≥ 95%	100.00%	98.68%	100.00%	98.66%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	98.27%	100.00%	96.82%	100.00%	100.00%	100.00%	95.92%
%age Blocked calls		0.00%	3.89%	0.00%	4.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	5.39%	0.00%	9.45%	0.00%	0.00%	0.00%	4.08%
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%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.97%	0.00%	0.00%	0.00%	1.42%
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%	0.00%	100.00%	100.00%	100.00%	100.00%	99.27%	100.00%	100.00%	100.00%	98.45%

Drive Test – Calicut

	B'mark	BSNL		Vodafone		Aircel		Idea		Tata CDMA		DoCoMo		Airtel		RCOM CDMA		RCOM GSM		MTS		Uninor		
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	
Voice quality	≥ 95%	99.32%	97.89%	99.03%	98.43%	99.20%	99.08%	99.49%	97.22%	100.00%	99.86%	97.03%	98.22%	98.42%	96.42%	99.58%	97.50%	99.77%	99.30%	99.80%	99.73%	95.58%	97.62%	
CSSR	≥ 95%	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%	96.97%	99.30%	
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	3.03%	0.70%
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%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	3.13%	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%	100.00%	96.96%	100.00%

Drive Test – Kannur

	B'mark	BSNL		Vodafone		Aircel		Idea		Tata CDMA		DoCoMo		Airtel		RCOM CDMA		RCOM GSM		MTS		Uninor	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	≥ 95%	99.44%	99.17%	99.22%	98.65%	97.97%	98.24%	96.81%	97.91%	100.00%	99.78%	98.57%	98.69%	97.40%	96.55%	99.61%	96.92%	99.86%	99.14%	99.76%	99.77%	99.26%	96.28%
CSSR	≥ 95%	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%	100.00%	99.37%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.63%
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%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.27%
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%	100.00%	100.00%

 Not meeting the benchmark

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

ALL SERVICE PROVIDERS

Ernakulam: Except for Reliance CDMA and Tata Indicom, there was interference and low signal strength recorded for all the operators in the outdoor areas near the periphery of the city, especially in areas such as Thrikakara and Seaport, Interference was also recorded at areas like Shenoy Junction, North Overbridge and Maradu. In the Indoor areas inadequate coverage was found on the 5th Floor for Reliance GSM.

Calicut: Except for Reliance CDMA and Tata Indicom, there was interference and low signal strength recorded for all the operators in the outdoor areas near the periphery of the city, especially in areas such as Feroke and Feroke Chunkam, Interference was also recorded at areas like Karaparamba town, between East Hill and West Hill, YMCA and MMS Hospital. In the Indoor areas, no region of inadequate coverage or interference was found for all operators.

Kannur: Except for Reliance CDMA and Tata Indicom, there was interference and low signal strength recorded for all the operators in the outdoor areas near the periphery of the city, especially in areas such as Kunjipally, Puthiyatheru and Puzhathiwad, In the Indoor areas inadequate coverage was found on the Inside office in 2nd floor of Kasamarina for Aircel.

Conclusions:


Drive test was conducted by IMRB with the help of service providers to measure this parameter. In the drive test it was found that all the operators except for Reliance GSM meet the TRAI benchmark on voice quality.

1. Uninor does not meet the TRAI benchmark on call drop rate in Calicut.
2. Reliance GSM does not meet the benchmark for voice quality in indoor areas in Ernakulam.

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%
BSNL	96.40%	0.32%	3.60%	0.50%	2.30%	98.06%	84.00%	85.00%	55.00%
Vodafone	98.48%	0.43%	0.77%	0.68%	2.25%	97.49%	66.00%	100.00%	87.00%
Aircel	99.48%	0.00%	0.02%	0.54%	5.12%	98.69%	46.00%	53.00%	39.00%
Idea	99.92%	0.34%	0.43%	0.95%	2.24%	97.85%	66.00%	100.00%	95.00%
Tata CDMA	98.73%	0.00%	0.00%	0.54%	0.66%	99.76%	75.00%	100.00%	86.00%
DoCoMo	99.99%	0.03%	0.56%	0.48%	2.39%	98.26%	44.44%	100.00%	96.00%
Airtel	99.59%	0.12%	0.27%	0.64%	0.84%	96.69%	59.09%	100.00%	30.00%
RCOM CDMA	99.69%	NA	0.18%	0.68%	1.17%	97.85%	68.09%	99.00%	78.00%
RCOM GSM	99.28%	0.02%	0.00%	0.29%	0.23%	97.38%	70.00%	100.00%	93.00%
MTS	99.12%	0.00%	0.00%	0.59%	1.91%	99.68%	100.00%	100.00%	78.00%
Uninor	99.08%	0.58%	0.06%	1.09%	5.71%	97.14%	24.00%	100.00%	100.00%

* Based on operator assisted drive tests conducted by IMRB

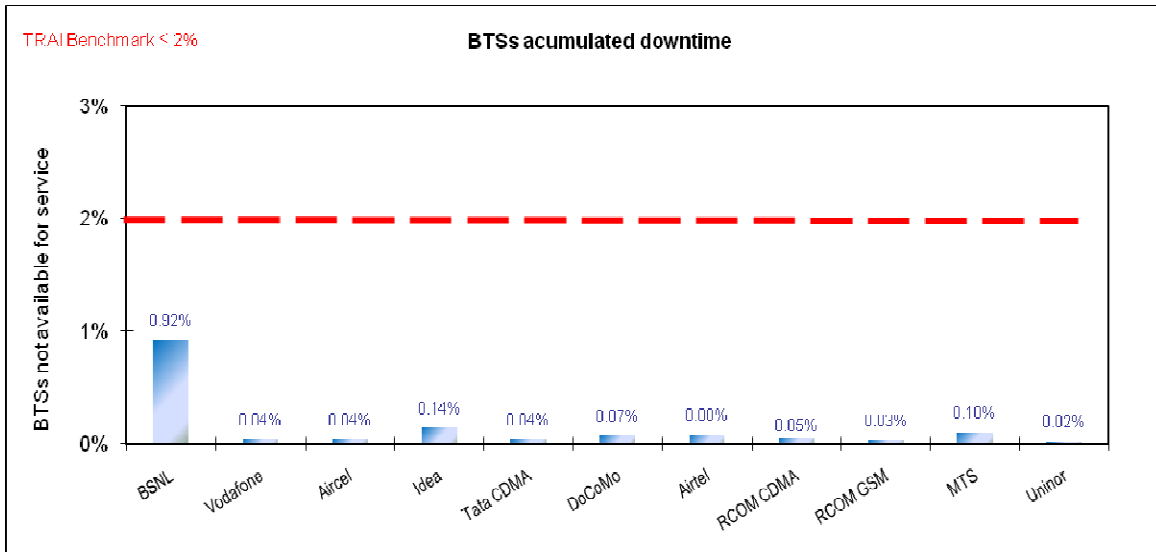
 Not meeting the benchmark

During the three day live measurement, all operators except MTS were found to be not meeting the TRAI benchmark for metering and billing. For the parameter percentage of calls answered by the operators (voice to voice) within 60 seconds, it was found that with the exception of Reliance GSM, IDEA and TATA DoCoMo, all the operators were not meeting the benchmarks set by TRAI.

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

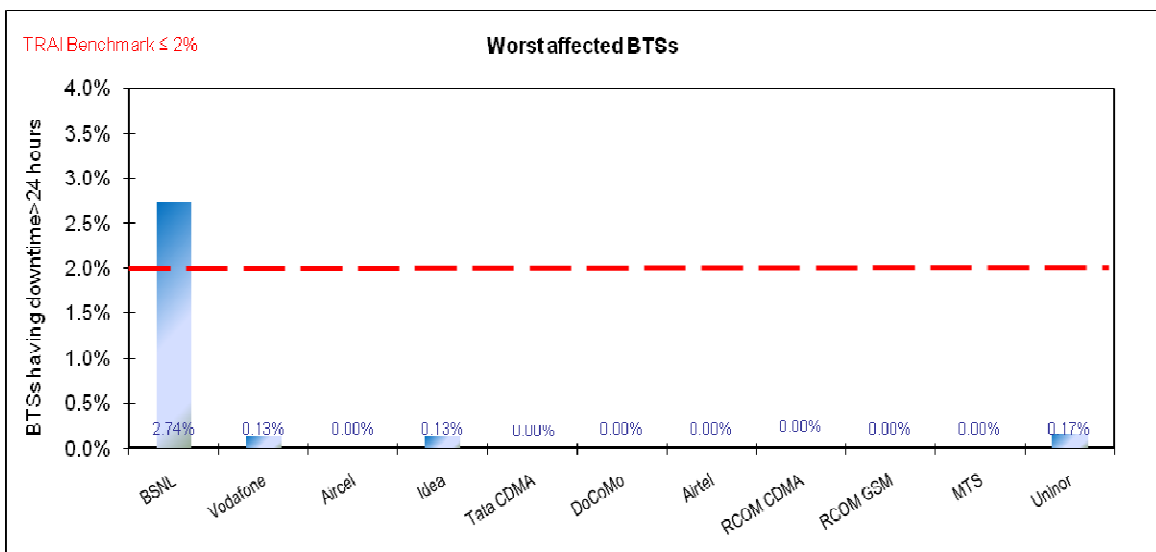
11.1 Graphical/Tabular Representations for Cellular Mobile Services

BTs Accumulated Downtime



All the operators meet the benchmark

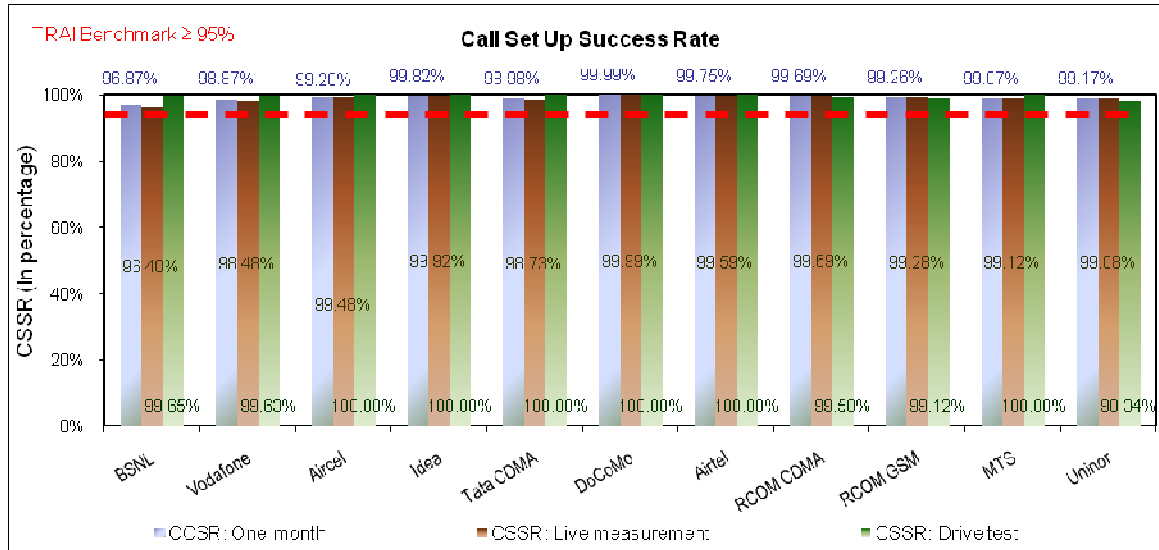
Worst Affected BTs



Operator(s) meeting benchmark: Vodafone, Aircel, Idea, Tata CDMA, DoCoMo, Airtel, RCOM CDMA, RCOM GSM, MTS, Uninor

Operator(s) not meeting the benchmark: BSNL

Call Set-up Success Rate (CSSR)



One month

All the operators meet the benchmark

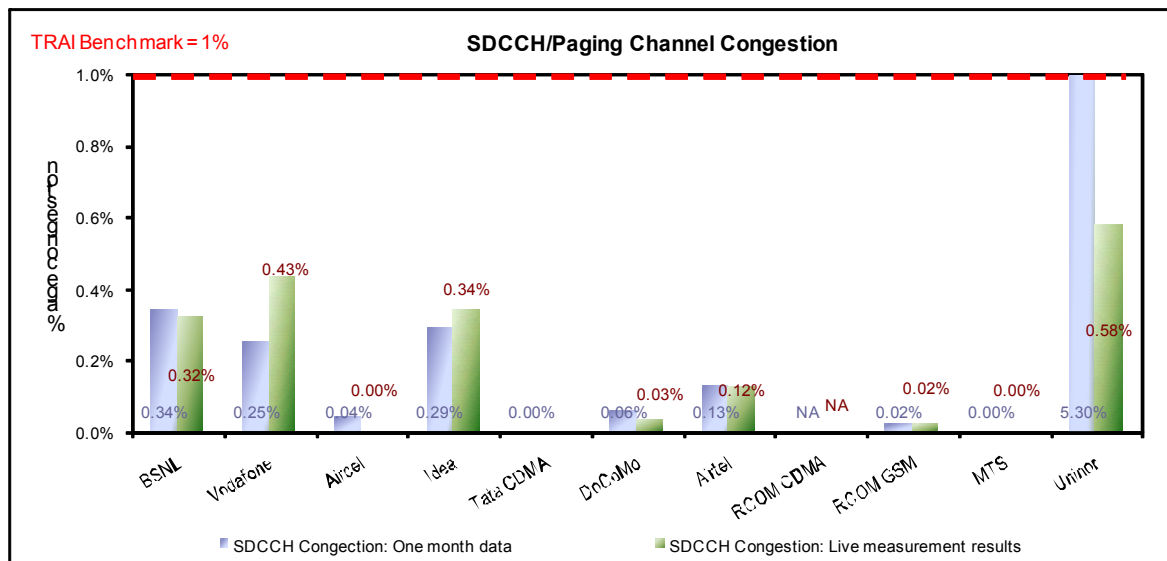
Live measurement

All the operators meet the benchmark

Drive test

All the operators meet the benchmark

SDCCH / Paging Channel Congestion



One month

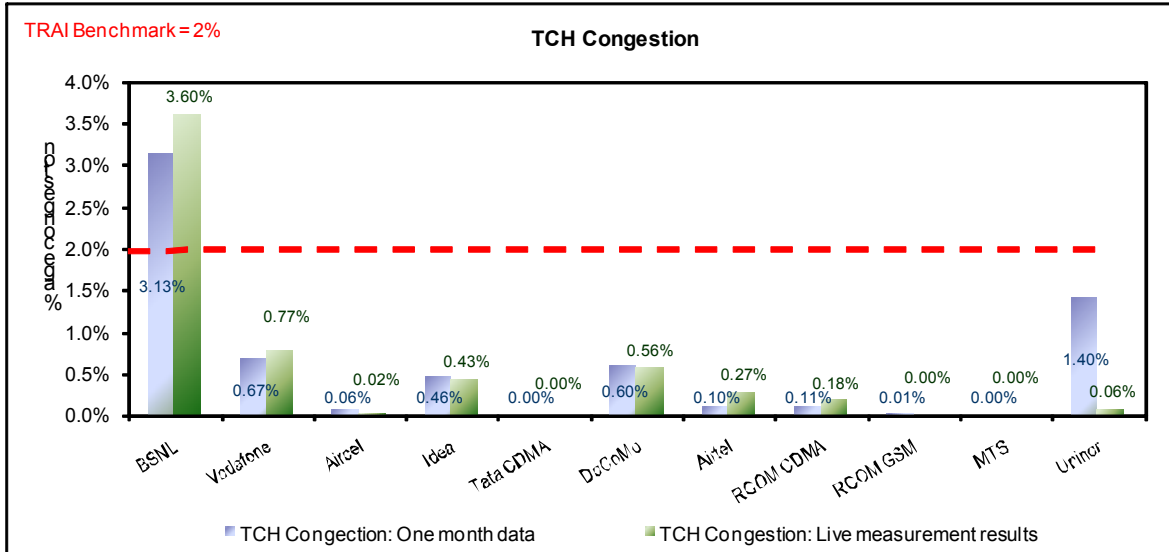
Operator(s) meeting benchmark: BSNL, Vodafone, Aircel, Idea, Tata CDMA, DoCoMo, Airtel, RCOM GSM, MTS

Operator(s) not meeting the benchmark: Uninor

Live measurement

All the operators meet the benchmark

TCH Congestion



One month

Operator(s) meeting benchmark: Vodafone, Aircel, Idea, Tata CDMA, DoCoMo, Airtel, RCOM CDMA, RCOM GSM, MTS, Uninor

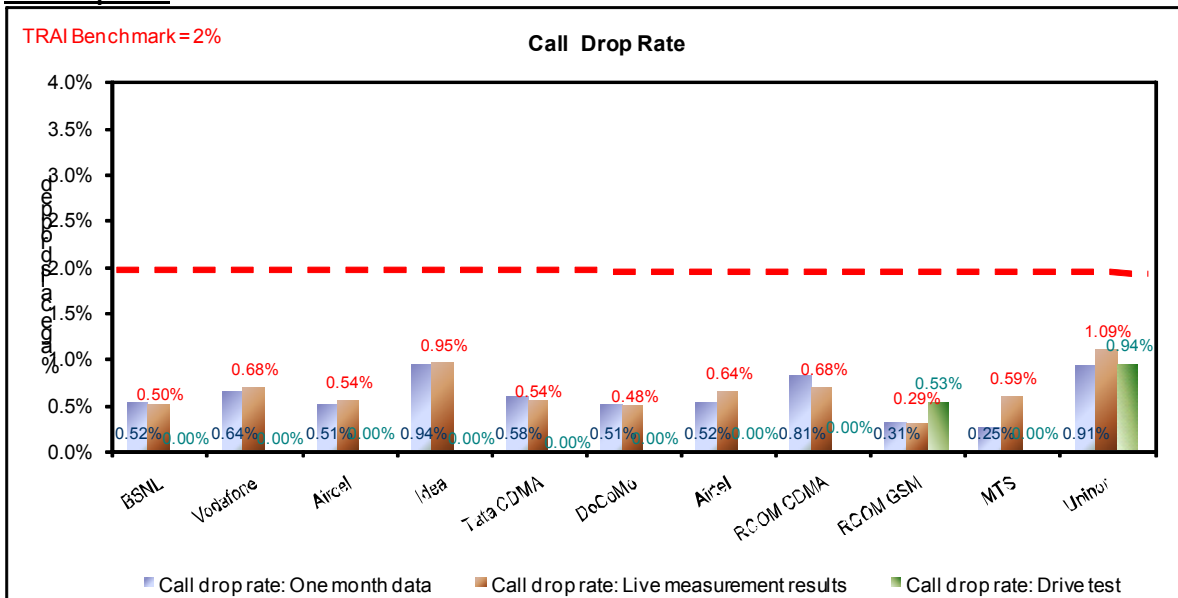
Operator(s) not meeting the benchmark: BSNL

Live measurement

Operator(s) meeting benchmark: Vodafone, Aircel, Idea, Tata CDMA, DoCoMo, Airtel, RCOM CDMA, RCOM GSM, MTS, Uninor

Operator(s) not meeting the benchmark: BSNL

Call Drop Rate



One month

All the operators meet the benchmark

Live measurement

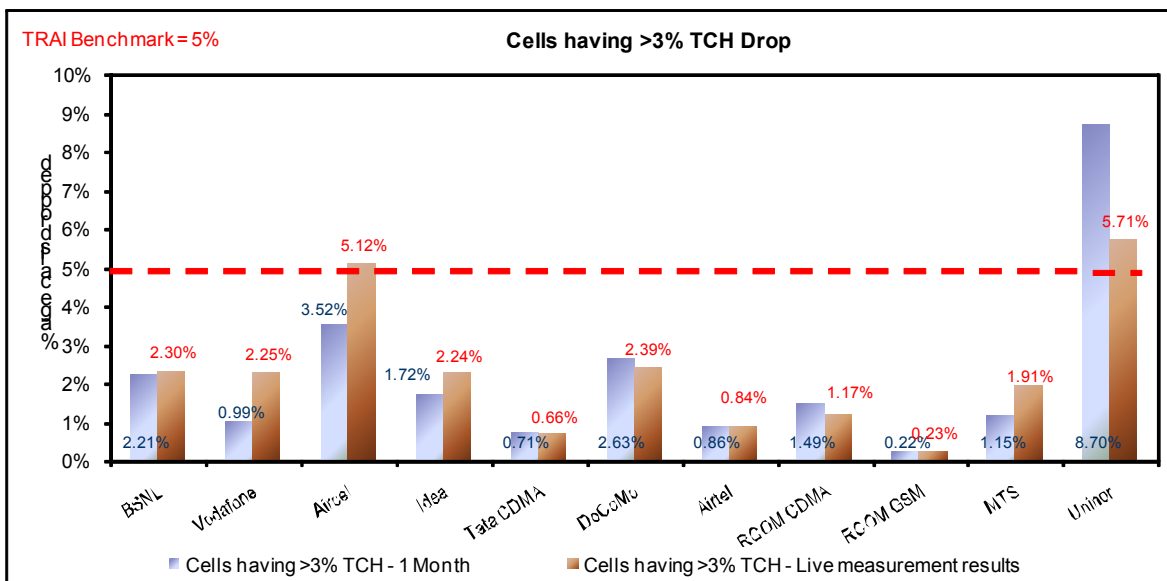
All the operators meet the benchmark

Drive test

Operator(s) meeting benchmark: Vodafone, Aircel, Idea, Tata CDMA, DoCoMo, Airtel, RCOM CDMA, RCOM GSM, MTS, Uninor

Operator(s) not meeting the benchmark: BSNL

Cells with more than 3% Call Drop Rate



One month

Operator(s) meeting benchmark: BSNL, Vodafone, Aircel, Idea, Tata CDMA, DoCoMo, Airtel, RCOM CDMA, RCOM GSM, MTS

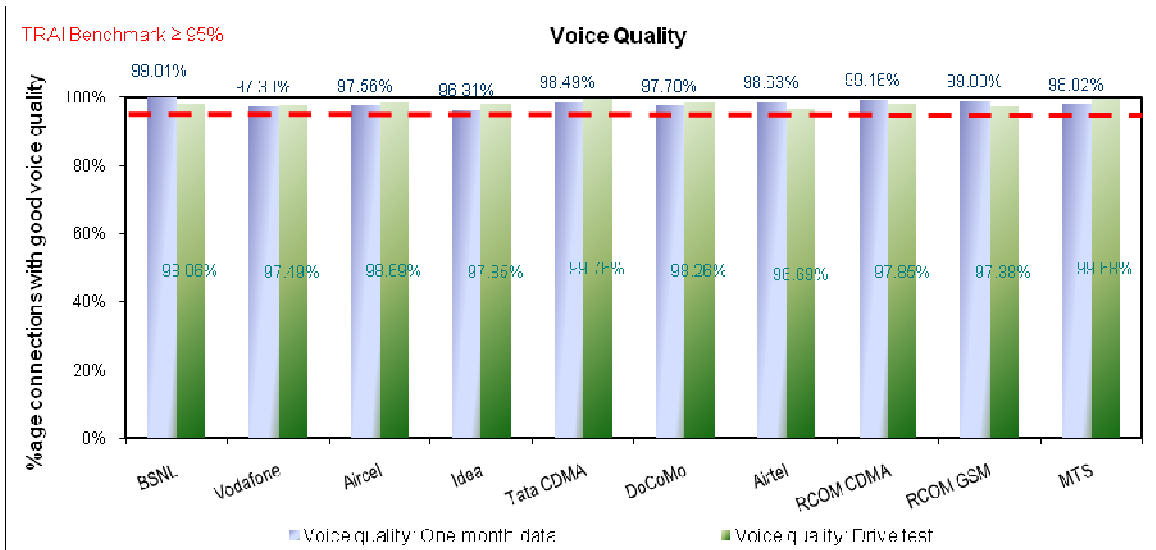
Operator(s) not meeting the benchmark: Uninor

Live measurement

Operator(s) meeting benchmark: BSNL, Vodafone, Idea, Tata CDMA, DoCoMo, Airtel, RCOM CDMA, RCOM GSM, MTS

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

Voice quality



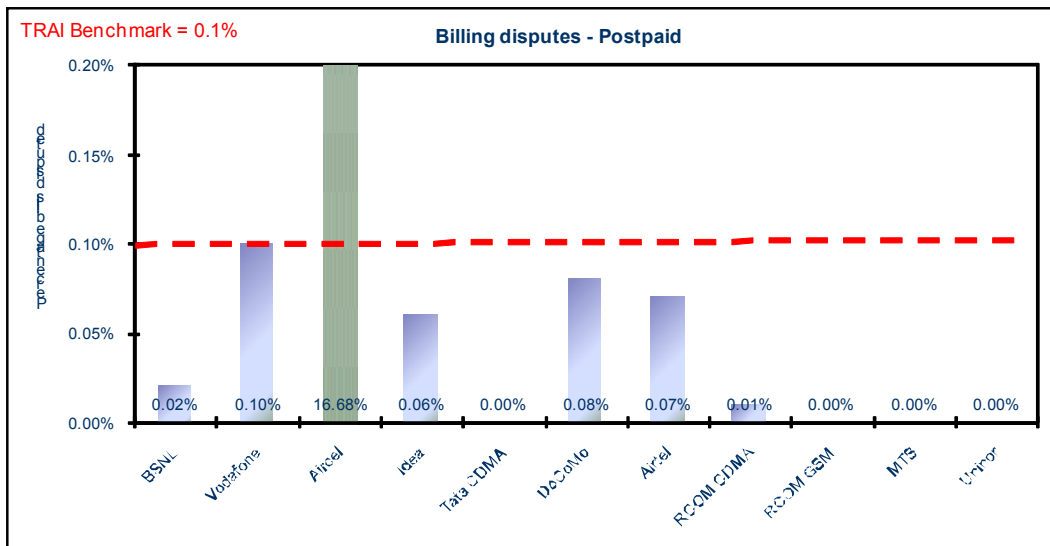
One month

All the operators meet the benchmark

Live measurement (Drive test)

All the operators meet the benchmark

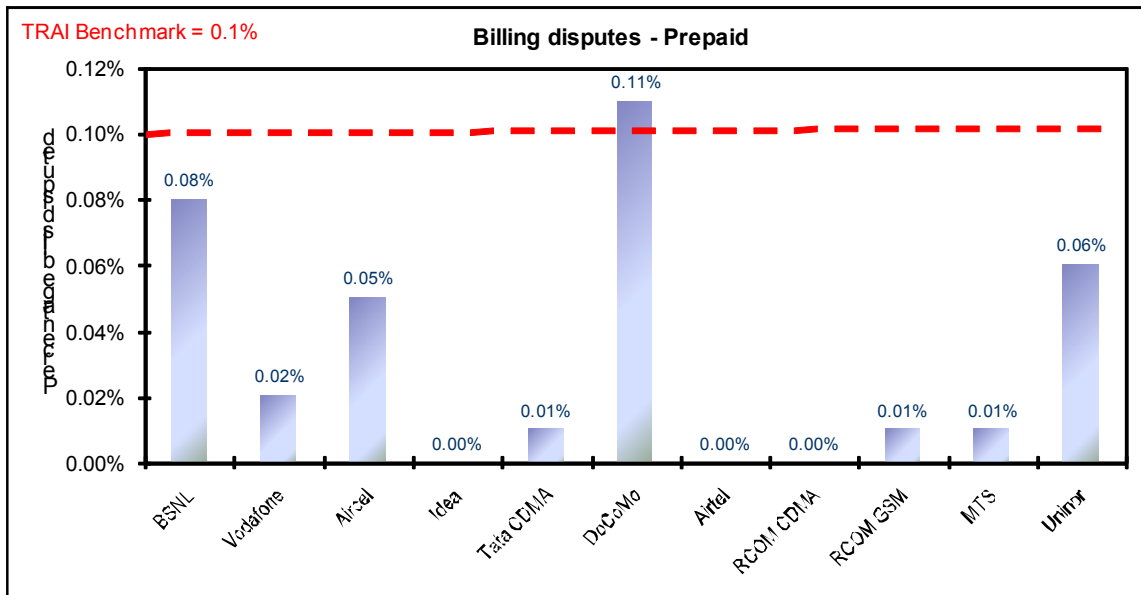
Billing Disputes - Postpaid



Operator(s) meeting benchmark: BSNL, Vodafone, Idea, Tata CDMA, DoCoMo, Airtel, RCOM CDMA, RCOM GSM, Uninor

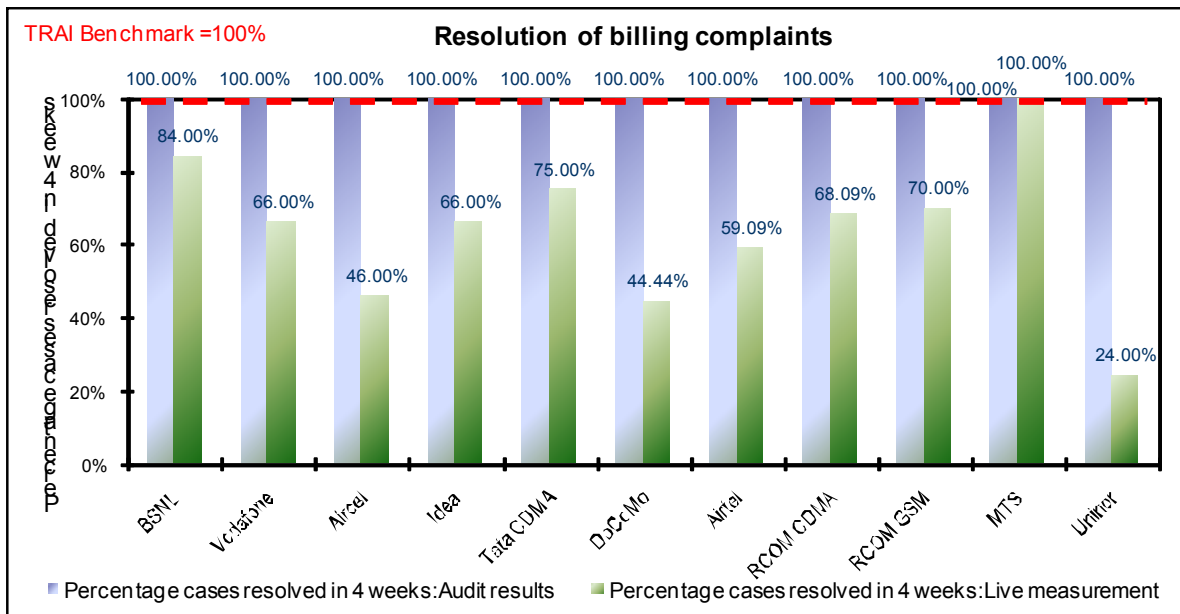
Operator(s) not meeting the benchmark: Aircel

Complaints - Prepaid



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

Resolution of billing complaints



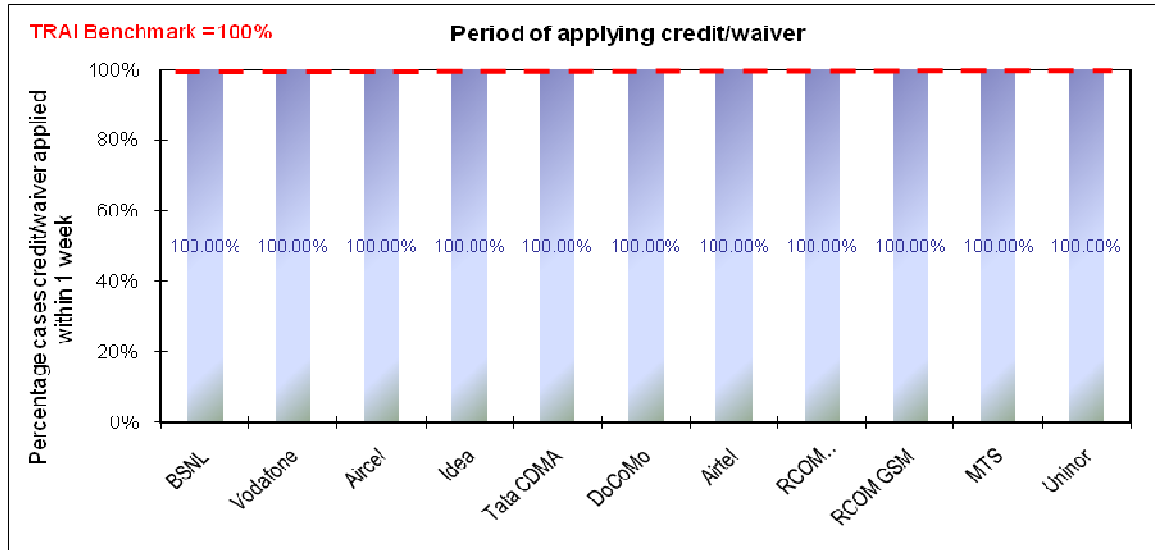
One month
 All the operators meet the benchmark

Live measurement

Operator(s) meeting benchmark: MTS

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

Period of applying credit / waiver

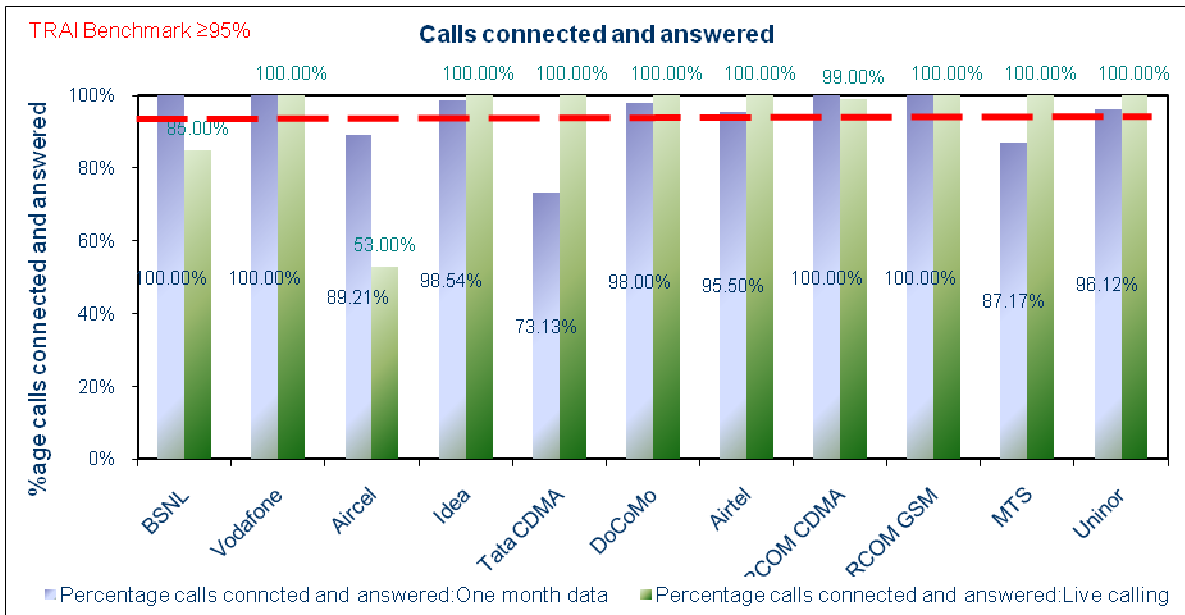


All the operators meet the benchmark

Live calling for billing Complaints

Resolution of billing complaints	Benchmark	BSNL	Vodafone	Aircel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor
Total Number of calls made		50	50	50	50	28	18	44	47	20	8	25
Number of cases resolved in 4 weeks		42	33	23	33	21	8	26	32	14	8	6
Percentage cases resolved in four weeks	100%	84.00%	66.00%	46.00%	66.00%	75.00%	44.44%	59.09%	68.09%	70.00%	100.00%	24.00%

Customer Care / Helpline: Calls answered



One month

Operator(s) meeting benchmark: BSNL, Vodafone, Idea, DoCoMo, Airtel, RCOM CDMA, RCOM GSM, Uninor

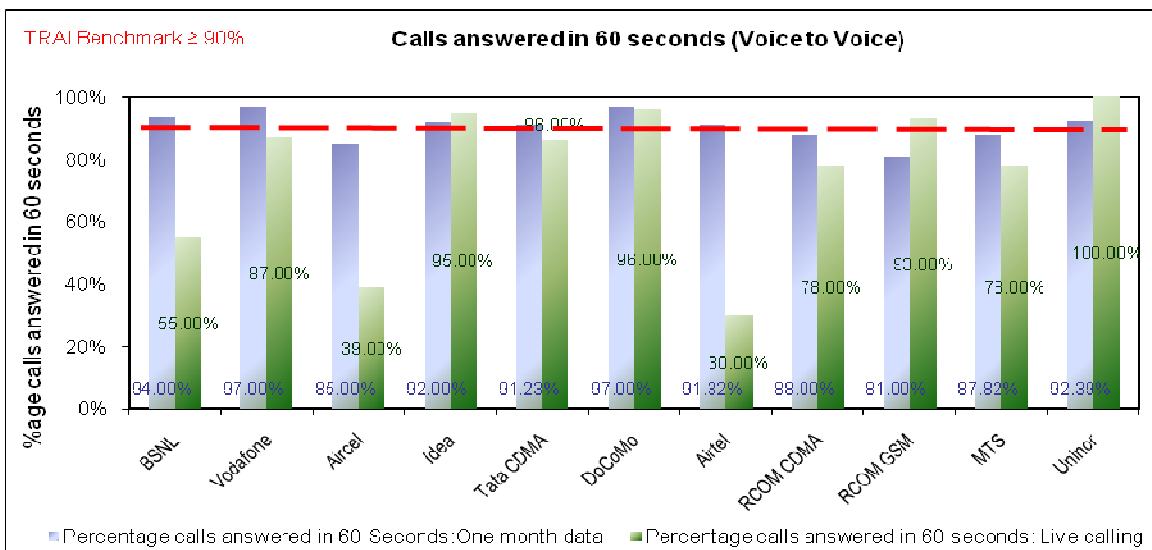
Operator(s) not meeting the benchmark: Aircel, Tata CDMA, MTS

Live measurement

Operator(s) meeting benchmark: Vodafone, Idea, Tata CDMA, DoCoMo, Airtel, RCOM CDMA, RCOM GSM, MTS, Uninor

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

Customer Care / Helpline: Calls answered voice to voice



One month

Operator(s) meeting benchmark: BSNL, Vodafone, Idea, Tata CDMA, DoCoMo, Airtel, Uninor

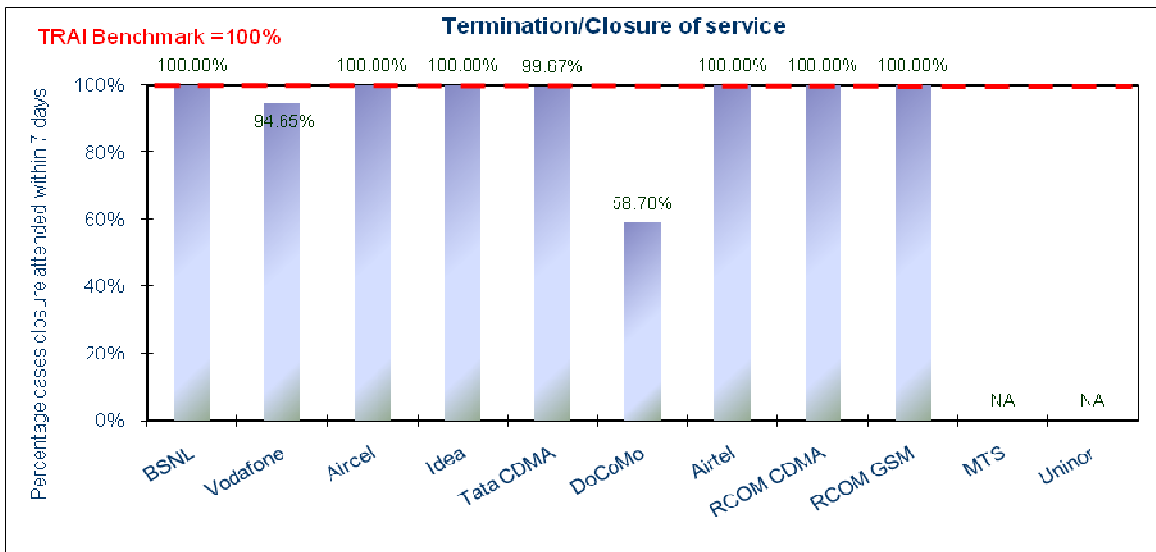
Operator(s) not meeting the benchmark: Aircel, RCOM CDMA, RCOM GSM, MTS

Live measurement

Operator(s) meeting benchmark: Idea, DoCoMo, RCOM GSM, Uninor

Operator(s) not meeting the benchmark: BSNL, Vodafone, Aircel, Tata CDMA, Airtel, RCOM CDMA, MTS

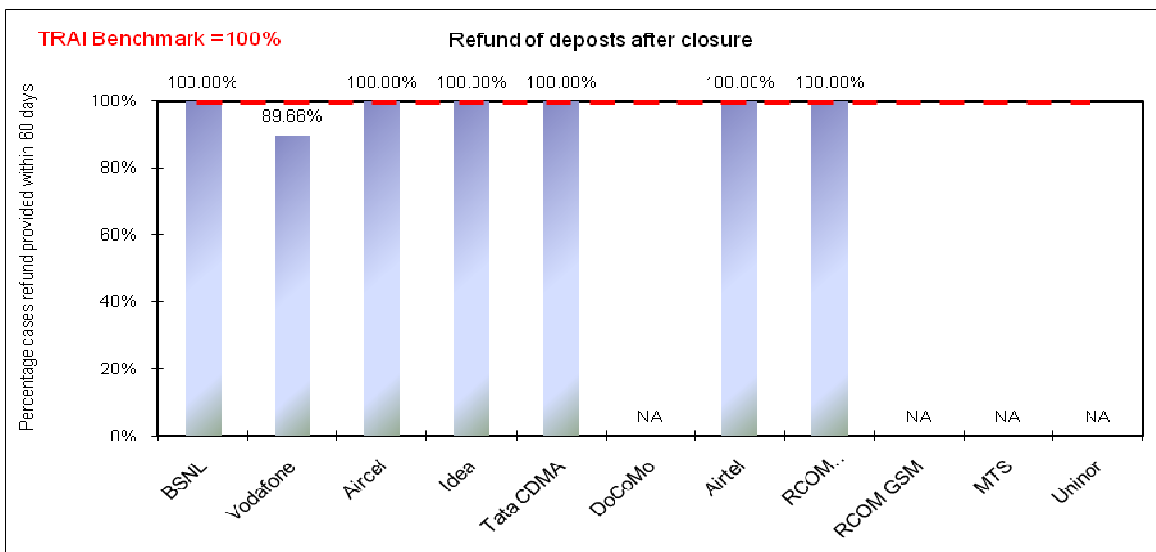
Termination / Closure of service



Operator(s) meeting benchmark: BSNL, Aircel, Idea, Airtel, RCOM CDMA, RCOM GSM

Operator(s) not meeting the benchmark: Vodafone, Tata CDMA, DoCoMo

Refund of deposits



Operator(s) meeting benchmark: BSNL, Aircel, Idea, Tata CDMA, Airtel, RCOM CDMA

Operator(s) not meeting the benchmark: Vodafone

Inter operator calls assessment

Inter operator call Assessment To ↓ From →	BSNL	Vodafone	Aircel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor
BSNL	NA	100%	100%	100%	97%	92%	85%	99%	100%	98%	100%
Vodafone	99%	NA	100%	100%	100%	100%	100%	100%	100%	100%	96%
Aircel	98%	100%	NA	99%	100%	100%	98%	100%	100%	98%	100%
Idea	84%	99%	100%	NA	91%	85%	100%	100%	97%	96%	98%
Tata CDMA	89%	100%	96%	100%	NA	100%	100%	100%	99%	96%	100%
DoCoMo	98%	100%	98%	100%	99%	NA	100%	99%	100%	99%	100%
Airtel	72%	100%	100%	100%	100%	98%	NA	100%	98%	99%	100%
RCOM CDMA	99%	100%	100%	100%	97%	97%	98%	NA	100%	95%	100%
RCOM GSM	100%	100%	100%	100%	97%	100%	96%	99%	NA	99%	99%
MTS	99%	100%	100%	100%	100%	99%	97%	100%	100%	NA	100%
Uninor	100%	100%	100%	100%	100%	100%	100%	100%	82%	84%	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. RCOM GSM and MTS found it tough to connect to a Uninor number with only 82 and 84 out of 100 calls getting connected. BSNL had difficulty in connecting to Airtel, Idea and Tata Indicom numbers. TATA DoCoMo had some difficulty in connecting to Idea and BSNL numbers. From Airtel, only 85 out of 100 calls to a BSNL number got connected. TATA CDMA had difficulty in connecting to an Idea number.

12.0 Compliance reports: Results of Verification of PMR

12.1 Cellular Mobile services

Name of Service Provider	Network availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)			POI	Metering and Billing				Response time to customer for assistance		Termination of service		
	BTSS Accumulated downtime	Worst affected BTSS due to downtime	Call Set-up Success Rate	SDCCH/Paging Chl. Congestion	TCH Congestion	Call Drop Rate	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality	Point of Interconnection (POI) Congestion	Metering and billing credibility – Postpaid	Metering and billing credibility - Prepaid	%age complaints resolved within 4 weeks	Period of applying credit/waiver less than 1 week	Accessibility of call centre/customer care	%age of calls answered by the operators within 60 sec	%age requests for Termination within 7 days	Refund of deposits after closure within 60 days	
Benchmark		≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 5%	≥ 95%	≤ 0.5%	≤ 0.1%	≤ 0.1%	100%	100%	≥ 95%	≥ 90%	100%	100%	
BSNL	PMR	0.50%	1.20%	97.00%	0.10%	0.90%	3.20%	98.00%	3.00%	0.00%	0.10%	100.00%	100.00%	97.00%	91.50%	100.00%	100.00%	
	IMRB	0.52%	1.27%	97.15%	0.05%	2.85%	0.90%	4.14%	98.30%	0.00%	0.09%	0.10%	100.00%	100.00%	100.00%	91.60%	100.00%	100.00%
Vodafone	PMR	0.01%	0.00%	98.98%	0.00%	0.04%	1.89%	2.59%	97.61%	0.00%	0.06%	0.10%	100.00%	100.00%	99.00%	94.00%	100.00%	100.00%
	IMRB	0.01%	0.00%	99.38%	0.07%	0.04%	0.63%	0.67%	97.46%	0.00%	0.06%	0.05%	100.00%	100.00%	99.00%	92.00%	82.37%	92.00%
Aircel	PMR	0.04%	0.02%	98.70%	0.01%	0.08%	0.65%	6.21%	97.92%	0.00%	3.63%	0.27%	100.00%	100.00%	100.00%	69.00%	100.00%	100.00%
	IMRB	0.04%	0.05%	98.74%	0.01%	0.08%	0.64%	3.28%	97.92%	0.00%	15.00%	0.37%	100.00%	100.00%	88.00%	69.00%	100.00%	100.00%
Idea	PMR	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	0.07%	0.01%	100.00%	100.00%	98.00%	100.00%	100.00%	100.00%
	IMRB	0.10%	0.05%	99.82%	0.23%	0.35%	1.04%	3.93%	96.23%	0.00%	0.07%	0.02%	100.00%	100.00%	99.00%	92.00%	100.00%	100.00%
Tata CDMA	PMR	0.02%	0.37%	98.90%	0.00%	0.00%	0.67%	0.76%	98.54%	0.33%	0.04%	0.03%	99.53%	100.00%	99.00%	97.00%	100.00%	70.47%
	IMRB	0.02%	0.00%	98.90%	0.00%	0.00%	0.67%	0.76%	98.54%	0.00%	0.03%	0.02%	100.00%	100.00%	75.00%	88.00%	99.70%	76.00%
Airtel	PMR	0.06%	0.07%	98.83%	0.21%	0.21%	1.02%	6.17%	98.42%	0.67%	0.00%	0.00%	100.00%	100.00%	98.19%	87.00%	100.00%	100.00%
	IMRB	0.06%	0.07%	98.83%	0.21%	0.21%	0.99%	6.15%	98.42%	DNA	0.00%	0.00%	100.00%	100.00%	98.00%	84.00%	71.00%	100.00%
RCOM CDMA	PMR	0.03%	0.00%	99.65%	0.00%	0.10%	0.78%	0.39%	99.34%	0.00%	0.02%	0.05%	100.00%	100.00%	NA	84.00%	100.00%	100.00%
	IMRB	0.03%	0.00%	99.64%	0.00%	0.08%	0.80%	0.66%	DNA	0.00%	0.02%	0.05%	100.00%	100.00%	NA	84.00%	100.00%	100.00%
MTS	PMR	0.09%	0.00%	99.16%	0.00%	0.00%	0.31%	2.69%	99.18%	0.00%	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA
	IMRB	0.09%	0.00%	99.11%	0.00%	0.00%	0.35%	1.61%	99.16%	0.00%	NA	0.01%	100.00%	100.00%	89.50%	84.00%	DNA	DNA

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 ,
 NA = Not Applicable

13.0 Conclusions

13.1 Cellular Mobile services

1. The figures reported by all the operators on completely match the figures obtained on verification only for the parameter period of applying credit/waiver.
2. Aircel, TATA Indicom, Airtel, Reliance CDMA and MTS do not meet the benchmark for the parameter % of calls answered by the operator in 60 seconds.
3. Aircel is significantly exceeding the benchmark for the parameter of postpaid billing and metering credibility.
4. BSNL does not meet the benchmark on TCH congestion.

Section C
BROADBAND

14.0 Sampling Methodology

14.1 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.
- For Reliance and VSNL, the data pertaining to all parameters was obtained by IMRB Auditors at the central NOC in Mumbai.
- Following Broadband service providers were Audited in Kerala circle:

	Name of Operator
Operator 1	BSNL
Operator 2	Airtel
Operator 3	VSNL
Operator 4	RCOM
Operator 5	Asianet

15.0 Audit methodology

15.1 Broadband Services

In a nutshell, the audit methodology was as follows:

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

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

16.0 Executive Summary

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

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

Parameters	Benchmarks	BSNL*	Airtel	VSNL	RCOM	Asianet
Service provisioning uptime						
Percentage connections provided within 15 days	100%	86.37%	100.00%	100.00%	100.00%	100.00%
Fault repair restoration time						
Percentage faults repaired by next working days	> 90%	59.72%	98.39%	88.45%	100.00%	90.74%
Percentage faults repaired within three working days	> 99%	80.25%	100.00%	98.45%	100.00%	99.94%
Billing performance						
Billing complaints per 100 bills issued	< 2%	0.65%	0.01%	0.19%	0.08%	0.47%
%age of billing complaints resolved in 4 weeks	100%	99.29%	100.00%	100.00%	100.00%	100.00%
%age cases in which refund of deposits after closure was made in 60 days	100%	58.33%	100.00%	100.00%	NA	100.00%
Customer care/helpline assessment (Voice to Voice)						
Percentage calls answered within 60 seconds	> 60%	79.68%	94.06%	97.12%	76.00%	DNA
Percentage calls answered within 90 seconds	> 80%	93.18%	95.86%	97.23%	81.00%	DNA
Bandwidth utilization/Throughput						
Intra network links (POP to ISP Node)		297	82	2	19	9
Total number of intra network links > 90%		4	0	0	0	0
Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)		345	0	6	8	10
Percentage bandwidth utilized on upstream links	< 80%	72.20%	NA	15.75%	41.84%	61.69%
Broadband download speed	> 80%	88.50%	105.00%	85.00%	96.00%	95.00%
Service availability/uptime	> 98%	99.48%	100.00%	98.16%	100.00%	99.86%
Packet loss	< 1%	0.00%	0.00%	0.00%	0.23%	0.00%
Network Latency						
POP/ISP Node to NIXI	< 120 msec	15	57	41	0	56
ISP node to NAP port (Terrestrial)	< 350 msec	219	288	252	16.5	205

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

** Methodology not in line with QoS

Figures provided on All India basis

Not meeting the benchmark

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

Critical findings and Key take outs: Broadband services

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

Service provisioning/Activation time

- BSNL (86.37%) falls short of TRAI benchmark of 100% connections to be provided within 15 days during month of audit
- For Live calling carried out by IMRB auditors none of the service provider was able to meet the benchmark of 100% connections to be provided within 15 days.

Fault Repair/Restoration time

- BSNL and VSNL are falling below the benchmark for fault repair within next working day for month of audit.
- All service providers except BSNL and VSNL are meeting the TRAI specified benchmark of 99% for fault repair within three working days
- TRAI can consider including Mean Time to Repair (MTTR) for faults as one of the parameters for measuring Quality of Services (QoS) in future for Broadband services as well.

Billing performance

- All the service providers were found to be meeting the benchmark of percentage billings complaints received.
- BSNL did not meet the benchmark for 100% resolution of billing complaints within 4 weeks for the month in which data was collected.

Customer Care/Helpline Assessment

- All the operators meet the TRAI specified benchmark for calls answered by the operator in 60 and 90 seconds for the month in which audit was carried out
- For live calling done by IMRB auditors all service providers except BSNL for calls answered in 90 seconds were found to meeting TRAI specified benchmark for calls answered by the operator in 60 and 90 seconds
- TRAI can look into making benchmark of Customer care/Helpline assessment for Broadband services more stringent in line with Basic and Cellular services
- Asianet was found to be not monitoring the data for customer care helpline assessment.

Bandwidth Utilization:

- All the service providers were found to be using Multiple Router Traffic Grapher (MRTG) to measure the bandwidth utilization at intra network links.
- All the service providers were found to be reporting combined bandwidth utilization for corporate and household customers as there is no mechanism available to provide it separately for different users.

- For Intra network link, data for RCOM and BSNL was obtained on all India bases. 4 of the 297 links tested for BSNL was found to be having above 90% bandwidth utilization for the month in which audit was carried out.
- For Bandwidth utilization on upstream links (From ISP Node to IGSP/NIXI), all operators are meeting TRAI specified benchmark for month of audit

Download speed

- During live measurements carried out at Pop's/ISP Node it was observed that all the operators are meeting the TRAI prescribed benchmark of greater than 80% speed available to the customer. These measurements were carried out by IMRB auditors on a sample basis during visits at PoPs and ISP Node
- However, no historic data was available for verification of records for month of Audit as well as quarter ending October to December 2009 with the service providers. Most of them claimed that they are reporting to TRAI basis live tests conducted at customer premises during field visits and tests conducted at POPs/ISP Node

Service Availability/Uptime:

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

Packet Loss and Network Latency

- It was observed that 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	Airtel	VSNL	RCOM	Asianet
Service provisioning uptime						
Percentage connections provided within 15 days	100%	69.20%	95.00%	90.00%	94.03%	95.00%
Fault repair restoration time						
Percentage faults repaired by next working days	> 90%	24.67%	70.00%	13.33%	30.77%	46.67%
Percentage faults repaired within three working days	> 99%	76.67%	96.67%	80.00%	61.54%	66.67%
Billing performance						
Percentage of billing complaints resolved in 4 weeks	100%	90.70%	60.00%	100.00%	100.00%	100.00%
Customer care/helpline assessment (Voice to Voice)						
Percentage calls answered within 60 seconds	> 60%	70.50%	93.00%	90.00%	74.00%	100.00%
Percentage calls answered within 90 seconds	> 80%	77.00%	100.00%	90.00%	88.00%	100.00%
Bandwidth utilization/Throughput						
Intra network links (POP to ISP Node)		297	82	2	19	9
Total number of intra network links > 90%		5	0	0	0	0
Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)		377	0	6	8	10
Percentage bandwidth utilized on upstream links	< 80%	84.11%	NA	15.75%	49.46%	66.21%
Broadband download speed	> 80%	88.50%	105.00%	85.00%	96.00%	95.00%
Service availability/uptime	> 98%	99.96%	100.00%	98.94%	100.00%	100.00%
Packet loss	< 1%	0.05%	0.00%	0.00%	0.00%	0.30%
Network Latency						
POP/ISP Node to NIXI	< 120 msec	73	58	41	0	70
ISP node to NAP port (Terrestrial)	< 350 msec	279	289	252	36.18	293

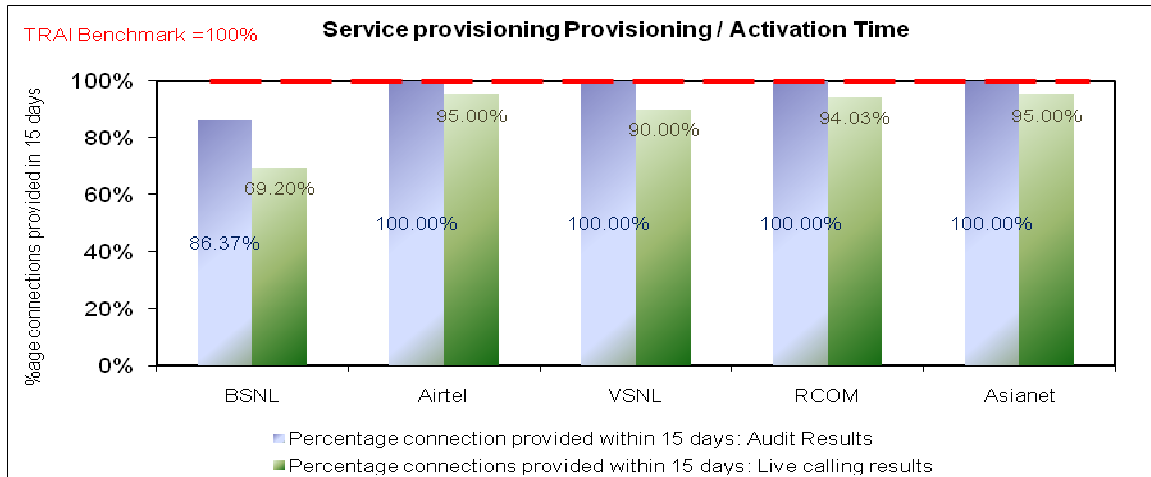
** Methodology not in line with QoS ■ Figures provided on All India basis ■ Not meeting the benchmark **B'mark** = TRAI Benchmark, **DNA** = Details not available, **NA**: Not Applicable

- All the service providers are meeting the benchmark on service availability/uptime for three day live measurements
- The testing for Bandwidth utilization during live measurement was carried out on sample basis by IMRB auditors for intra network links. 5 of the links tested for BSNL were found to be having above 90% bandwidth utilization during 3 day live measurement
- For Bandwidth utilization on upstream links, all the service providers except BSNL are 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.

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

17.1 Graphical/Tabular Representations for Broadband services

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



One month

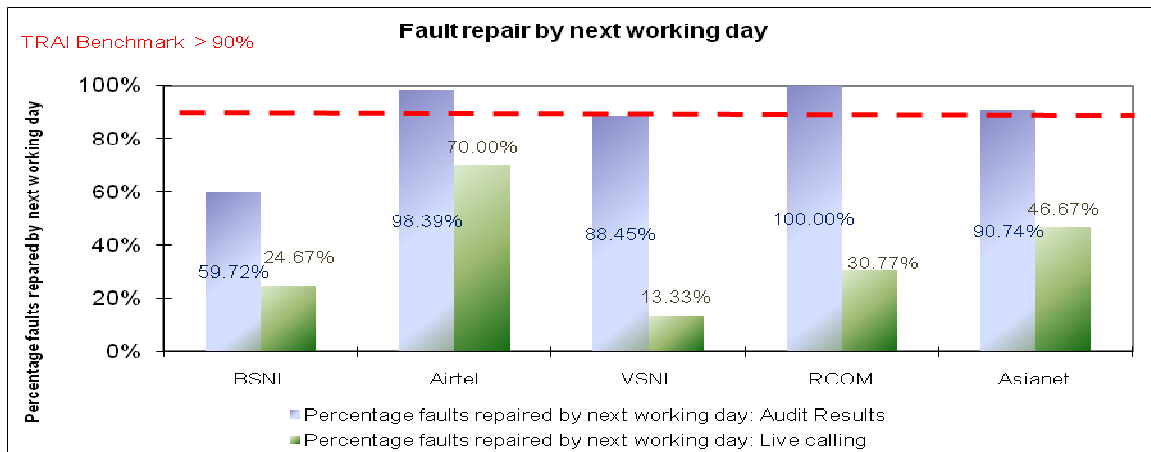
Operator meeting benchmark: Airtel, VSNL, RCOM, Asianet

Operator not meeting benchmark: BSNL

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

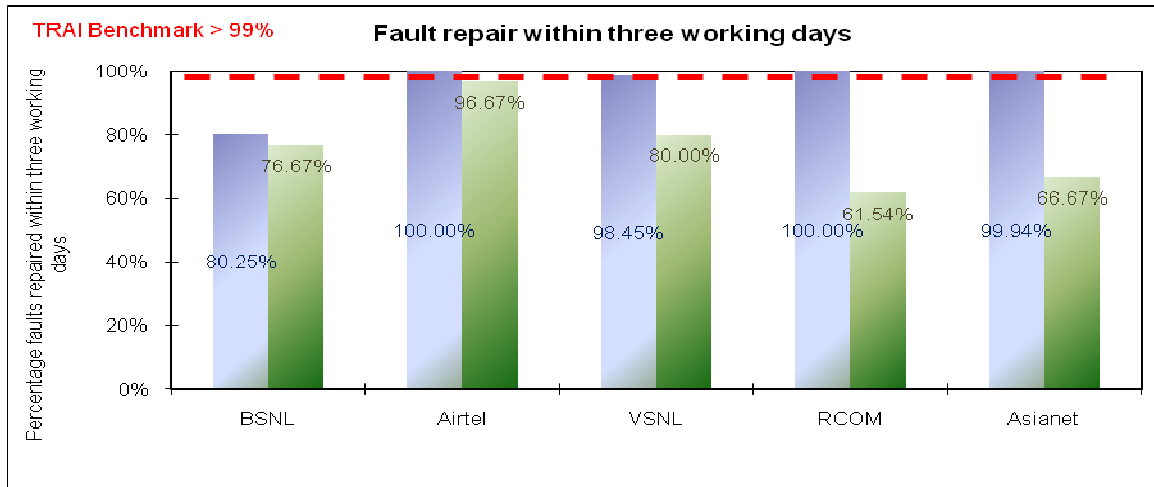
Operator meeting benchmark: Airtel, RCOM, Asianet

Operator not meeting benchmark: BSNL, VSNL

Live calling

No operator is meeting the benchmark

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



One month

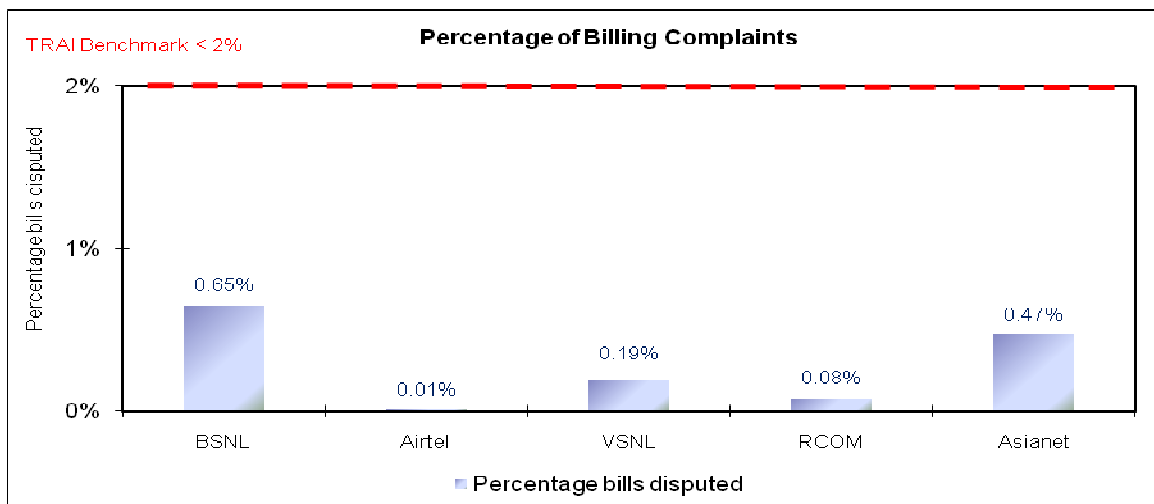
Operator meeting benchmark: Airtel, RCOM, Asianet

Operator not meeting benchmark: BSNL, VSNL

Live calling

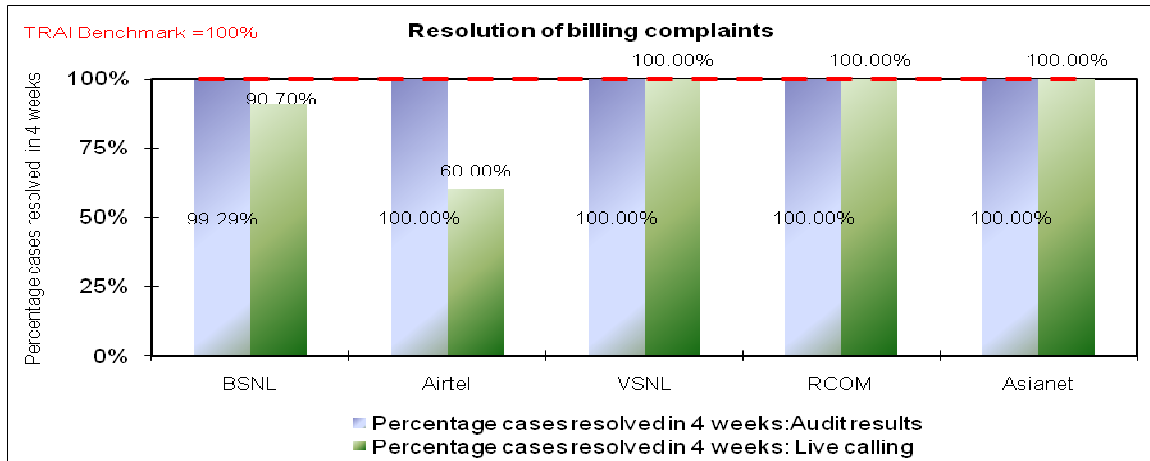
No operator is meeting the benchmark

Percentage bills disputed



All operators are meeting the benchmark

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



One month

Operator meeting benchmark: Airtel, VSNL, RCOM, Asianet

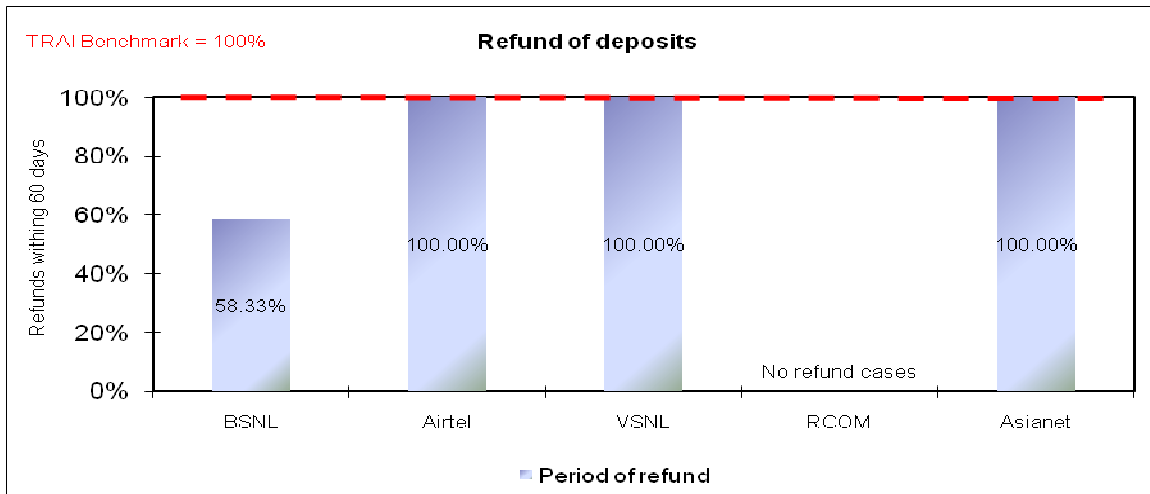
Operator not meeting benchmark: BSNL

Live calling

Operator meeting benchmark: VSNL, RCOM, Asianet

Operator not meeting benchmark: BSNL, Airtel

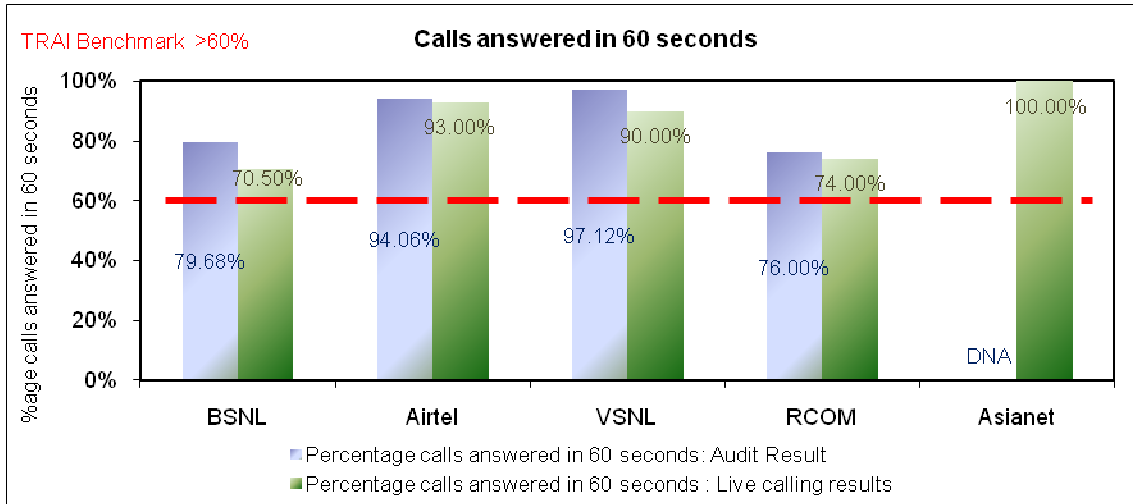
Refund of deposits after closure



Operator meeting benchmark: Airtel, VSNL, Asianet

Operator not meeting benchmark: BSNL

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



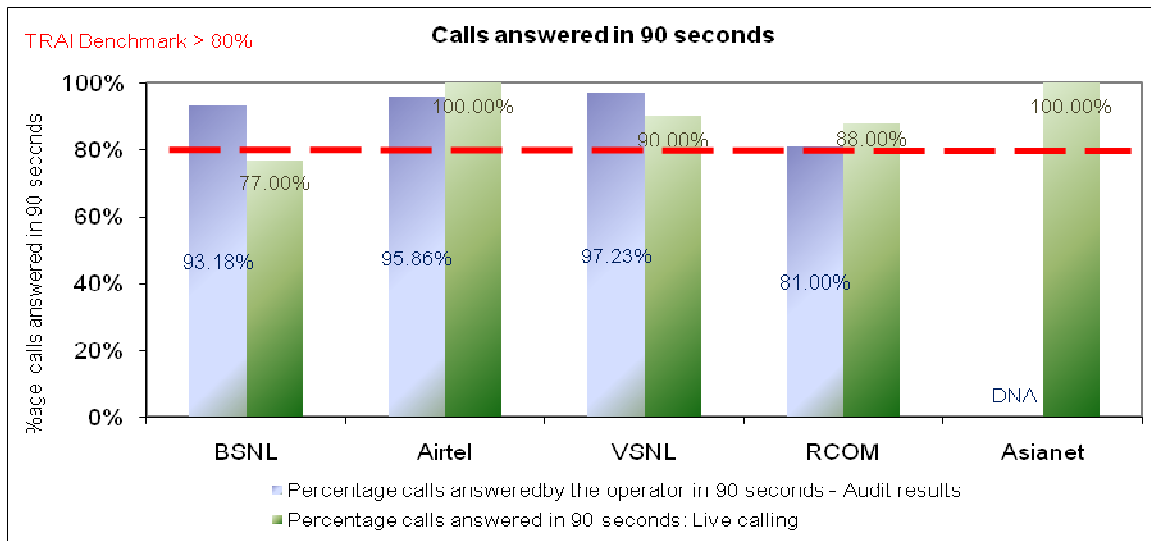
One month

All operators are meeting the benchmark

Live calling

All operators are meeting the benchmark

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



One month

All operators are meeting the benchmark

Live calling

Operator meeting benchmark: Airtel, VSNL, RCOM, Asianet

Operator not meeting benchmark: BSNL

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

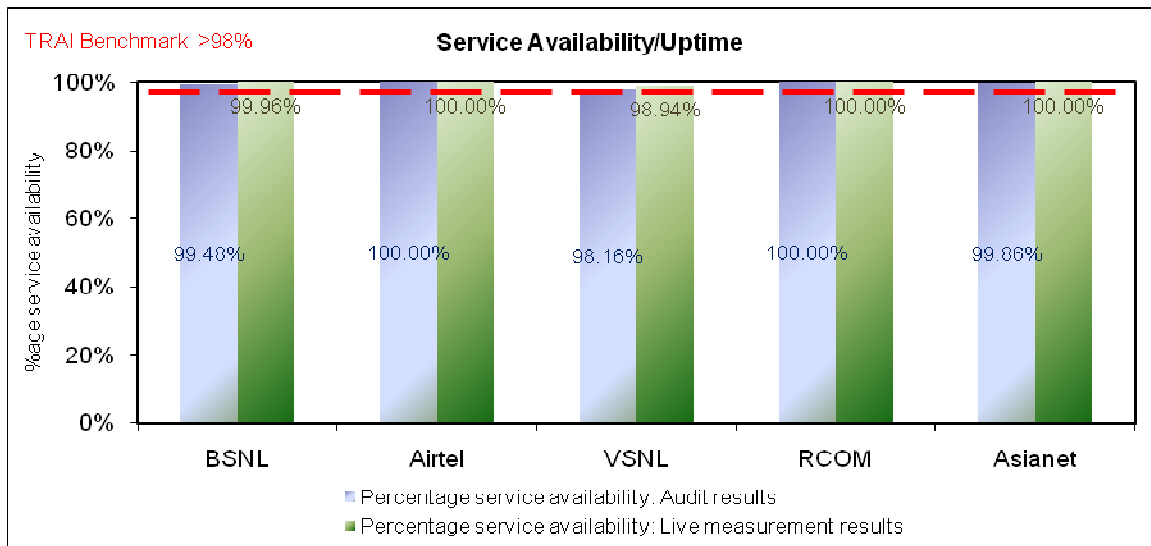
Bandwidth Utilization (One month)	B'mark	BSNL	Airtel	VSNL	RCOM	Asianet
Total number of intra network links		297	82	2	19	9
No of Intra network found to be above 90%		4	0	0	0	0

Bandwidth Utilization (Live measurement)	B'mark	BSNL	Airtel	VSNL	RCOM	Asianet
Total number of intra network links		297	82	2	19	9
No of Intra network found to be above 90%		5	0	0	0	0

Broadband download speed	Benchmark	BSNL	Airtel	VSNL	RCOM	Asianet
Total committed download speed to the sample subscribers (In mpbs) (A)		2	2	2	1	2
Total average download speed observed during TCBH (In Mpbs) (B)		1.77	2.1	1.7	0.96	1.9
%age subscribed speed available to the subscriber during TCBH (B/A)*100	>80%	88.50%	105.00%	85.00%	96.00%	95.00%

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

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



One month

All operators are meeting the benchmark

Live calling

All operators are meeting the benchmark

18.0 Compliance reports: Results of Verification of Records

18.1 Broadband services

Parameters	B'marks	BSNL*		Airtel		VSNL		RCOM		Asianet		
		PMR	IMRB	PMR	IMRB	PMR	IMRB	PMR	IMRB	PMR	IMRB	
Service provisioning uptime												
Percentage connections provided within 15 days	100%	100.00%	82.95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	
Fault repair restoration time												
Percentage faults repaired by next working days	> 90%	95.40%	66.07%	99.00%	99.56%	92.00%	92.00%	100.00%	100.00%	90.50%	90.50%	
Percentage faults repaired within three working days	> 99%	100.00%	86.60%	100.00%	100.00%	98.00%	98.00%	100.00%	100.00%	99.30%	99.30%	
Billing performance												
Billing complaints per 100 bills issued	< 2%	0.20%	0.46%	0.03%	0.03%	0.74%	0.74%	0.24%	0.10%	1.86%	2.15%	
%age of billing complaints resolved in 4 weeks	100%	99.40%	99.67%	96.30%	96.30%	100.00%	100.00%	100.00%	100.00%	99.46%	99.46%	
%age cases in which refund of deposits after closure was made in 60 days	100%	100.00%	63.44%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	
Customer care/helpline assessment (Voice to Voice)												
Percentage calls answered within 60 seconds	> 60%	83.50%	81.32%	97.68%	97.68%	96.00%	96.00%	84.00%	84.00%	DNA	DNA	
Percentage calls answered within 90 seconds	> 80%	93.70%	93.85%	98.52%	98.52%	96.33%	96.33%	88.00%	88.00%	DNA	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		173	243	81	18	18	149	149	9	9
Total number of intra network links > 90%		0	5	0	0	0	0	0	0	0	0	
Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)		32316.4	32316.4	0	0	61098	61098	129464	129464	1086	1086	
Percentage bandwidth utilized on upstream links	< 80%	73.10%	73.07%	NA	NA	44.40%	44.40%	34.91%	34.91%	66.00%	66.00%	
Broadband download speed	> 80%	89.50%	84.00%	105.00%	105.00%	> 80%	> 80%	90.00%	90.00%	> 90%	95.00%	
Service availability/uptime	> 98%	99.90%	99.90%	100.00%	100.00%	96.94%	96.94%	99.86%	99.86%	99.00%	99.73%	
Packet loss	< 1%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	< 1%	0.45%	< 1%	0.00%	
Network Latency												
POP/ISP Node to NIXI (in msec)	< 120 msec	13.7	13.7	169	56	< 100	< 100	Delhi NIXI - 43.2ms, Mumbai VSNL - 24.6ms, Chennai NIXI - 31ms	45	< 50	91	
ISP node to NAP port (Terrestrial) (in msec)	< 350 msec	229	229	756	252	< 250	< 250	21.2	160	< 270	227	

Figures do not match with those reported in PMR

Not meeting the benchmark

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

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

18.2 Conclusions

Broadband services

1. 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.
2. Also for VSNL the PMR data for all parameters was reported on region level and we have verified the same for the whole region
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 providers were found to not meeting benchmark on fault repair and percentage of cases resolved within 4 weeks

19.0 Annexure - I (Wireline)

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

19.1 Parameter wise performance reports for Basic Wireline services

Fault incidences	Benchmark	BSNL	Airtel	TTSL	RCOM
Faults incidences (No. of faults/100 Subs./month)	≤ 5	5.09	2.80	0	0.99

Fault repair (Urban areas)	Benchmark	BSNL	Airtel	TTSL	RCOM
Total No. of faults registered during the month		13874	1280	0	531
No. of faults repaired by next working day during the month		9392	1263	0	531
Percentage of faults repaired by next working day during the month	≥ 90%	67.69%	98.67%	NA	100.00%
No. of faults repaired within 3 days during the month		5476	1278	0	531
Percentage of faults repaired within 3 days during the month	100%	88.14%	99.84%	NA	100.00%

Fault repair (Rural & Hilly areas)	Benchmark	BSNL	Airtel	TTSL	RCOM
Total No. of faults registered during the month		13874	NA	NA	NA
No. of faults repaired by next working day during the month		9392	NA	NA	NA
Percentage of faults repaired by next working day during the month	≥ 90%	67.69%	NA	NA	NA
No. of faults repaired within 5 days during the month		6691	NA	NA	NA
Percentage of faults repaired within 5 days during the month	100%	87.34%	NA	NA	NA

Rent rebate	Benchmark	BSNL	Airtel	TTSL	RCOM
No. of cases with faults pending for >3 days and ≤7 days		1609	1	0	0
Out of these number of cases where rent rebate for 7 days was given		1	1	0	0
Percentage of cases where rent rebate for 7 days was given	100%	0.06%	100.00%	NA	NA
No. of cases with faults pending for >7 days and ≤15 days		573	1	0	0
Out of these number of cases where rent rebate for 15 days was given		0	1	0	0
Percentage of cases where rent rebate for 15 days was given	100%	0.00%	100.00%	NA	NA
No. of cases with faults pending for ≥15 days		227	0	0	0
Out of these number of cases where rent rebate for 30 days was given		0	0	0	0

Percentage of cases where rent rebate for 30 days was given	100%	0.00%	NA	NA	NA
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MTRR	Benchmark	BSNL	Airtel	TTSL	RCOM
Mean time taken to repair the fault in hours	≤ 8	14.63	4.06	NA	3.37

Live calling for fault repair

Urban area	Benchmark	BSNL	Airtel	TTSL	RCOM
Total Number of calls made		681	30	0	30
Number of cases where faults were repaired by next working day		188	16	0	10
Percentage cases where faults were repaired by next working day	≥ 90%	27.61%	53.33%	NA	33.33%
Number of cases where faults were repaired within 3 days		463	26	0	19
Percentage cases where faults were repaired within 3 days	100%	67.99%	86.67%	NA	63.33%

Audit Results for Call Completion Rate (CCR)

Traffic statistics - Call Completion Rate	Benchmark	BSNL	Airtel	TTSL	RCOM
Total local call attempts		6809704	1159629	271857	NA
Total number of successful local calls		5321105	1050849	268077	NA
Call Completion Rate (CCR) in the local network	≥ 55%	78.14%	90.62%	98.61%	NA

Traffic statistics - Answer to Seizure Ratio	Benchmark	BSNL	Airtel	TTSL	RCOM
Total number of calls processed by the switch		31599884	NA	NA	400104
Total number of calls answered		24338323	NA	NA	329551
Answer to Seizure Ratio (ASR)	≥ 75%	77.02%	NA	NA	82.37%

Live measurement results for Call Completion Rate (CCR)

Traffic statistics - Call Completion Rate	Benchmark	BSNL	Airtel	TTSL	RCOM
Total local call attempts		430938	239814	277631	NA
Total number of successful local calls		275563	223139	275243	NA
Call Completion Rate (CCR) in the local network	≥ 55%	63.94%	93.05%	99.14%	NA

Traffic statistics - Answer to Seizure Ratio	Benchmark	BSNL	Airtel	TTSL	RCOM
Total number of calls processed by the switch		1133990	NA	NA	67884
Total number of calls answered		817919	NA	NA	60625
Answer to Seizure Ratio (ASR)	≥ 75%	72.13%	NA	NA	89.31%

Audit Results for POI Congestion

POI congestion	Benchmark	BSNL	Airtel	TTSL	RCOM
POI traffic offered on all individual POI's		29897767	19988890	NA	2906.7
Served traffic for all POI's		29893052	19988890	NA	2906.7
Traffic failed on all POI's	≤ 0.5%	0.00	0.00	NA	0.00

Live measurement results for POI congestion

POI congestion	Benchmark	BSNL	Airtel	TTSL	RCOM
POI traffic offered on all individual POI's		225879	224906	NA	7853

Served traffic for all POI's		225223	224906	NA	7853
Traffic failed on all POI's	≤ 0.5%	0.00	0.00	NA	0.00

POI congestion	Benchmark	BSNL	Airtel	TTSL	RCOM
No. of POIs not meeting benchmark		0	0	0	0
Total number of working POIs		NA	32	NA	59

Audit Results for Billing performance

Billing Performance	Benchmark	BSNL	Airtel	TTSL	RCOM
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Billing disputes – Postpaid

Total bills generated during the period		143347	23882	6805	22468
Total number of bills disputed		129	8	0	1
Percentage bills disputed	≤ 0.1%	0.09%	0.03%	0.00%	0.00%

Billing disputes – Prepaid

No. of charging / credit / validity complaints during the month		NA	NA	NA	NA
Total no. of pre-paid customers at the end of the month		NA	NA	NA	NA
Number of complaints per 100 customers	≤ 0.1%	NA	NA	NA	NA

Resolution of billing complaints

Total number of billing/charging complaints		129	160	0	1
Total complaints resolved in 4 weeks from date of receipt		129	160	NA	1
Percentage complaints resolved within 4 weeks of date of receipt	100%	100.00%	100.00%	NA	100.00%

Period of applying credit / waiver

No. of complaints resolved in favor of the customer during the month		76	8	NA	1
No. of complaints disposed on account of not considered as valid complaints		53	152	NA	0
Percentage cases in which credit/waiver was received within 1 week	100%	100.00%	100.00%	NA	100.00%

Live calling results for resolution of billing complaints

Resolution of billing complaints	Benchmark	BSNL	Airtel	TTSL	RCOM
Total Number of calls made		24	50	0	1
Number of cases resolved in 4 weeks		19	35	0	1
Percentage cases resolved in 4 weeks	100%	79.17%	70.00%	NA	100.00%

Audit Results for Requests

Closure Requests	Benchmark	BSNL	Airtel	TTSL	RCOM
Total no. of requests received for Closures		447	690	0	91
Total no. of requests for closures attended within 7 days		443	690	0	91
Percentage of requests for closures attended within 7 days	100%	99.11%	100.00%	NA	100.00%
Total no. of requests for closures not attended or attended beyond 7 days		4	0	0	0

Audit results for customer care

Customer Care Assessment	Benchmark	BSNL	Airtel	TTSL	RCOM
Total no. of call attempts to call centre / customer care nos. during TCBH		276711	7855	NA	140550
No. of calls connected and answered successfully to call centre / customer care nos. during TCBH		273987	7293	NA	134759
Percentage of calls getting connected and answered electronically	≥ 95%	99.02%	92.85%	NA	95.88%
Percentage of calls answered by the operators (voice to voice) within 60 seconds	≥ 90%	97.90%	96.06%	94.56%	92.00%

Live calling results for customer care

Customer Care Assessment	Benchmark	BSNL	Airtel	TTSL	RCOM
Total Number of calls received		300	100	100	100
Total Number of calls getting connected and answered		268	100	100	100
Percentage calls getting connected and answered	≥ 95%	89.33%	100.00%	100.00%	100.00%

Live calling results for customer care (Voice to Voice)

Customer Care Assessment	Benchmark	BSNL	Airtel	TTSL	RCOM
Total Number of calls received		268	100	100	100
Total Number of calls answered within 60 seconds		165	95	99	78
Percentage calls answered within 60 seconds	≥ 90%	61.57%	95.00%	99.00%	78.00%

Audit results for refund of deposits

Refund	Benchmark	BSNL	Airtel	TTSL	RCOM
Total number of cases requiring refund of deposits		148	60	0	2
Total number of cases where refund was made within 60 days		129	60	0	2
Percentage cases in which refund was receive within 60 days	100%	87.16%	100.00%	NA	100.00%

Live calling for level 1 services

Level 1 services	Benchmark	BSNL	Airtel	TTSL	RCOM
Total no. of calls made		210	30	30	30
Calls answered in 60 sec		202	28	24	26
Calls answered after 60 sec		8	2	6	4

Exchange capacity and Subscribers

	Benchmark	BSNL	Airtel	TTSL	RCOM
Equipped Capacity of the exchange (number of subscribers)		254442	54978	50000	128000
Total number of customers served		210417	46182	6805	53194

20.0 Annexure - I (Wireless)

20.1 Service provider performance report based on one month data

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)			Metering and Billing				Response time to customer for assistance		Termination / closure of service	
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality	Metering and billing credibility (Postpaid)	Metering and billing credibility (Prepaid)	%age complaints resolved within 4 weeks	Period of applying credit/waiver less than 1 week	Accessibility of call centre/customer care	Percentage of calls answered by operators within 60 sec	%age requests for Termination complied within 7 days	Refund of deposits after closure within 60 days
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 5%	≥ 95%	≤ 0.1%	≤ 0.1%	100%	100%	≥ 95%	≥ 90%	100%	100%
BSNL	0.92%	2.74%	96.87%	0.34%	3.13%	0.52%	2.21%	99.81%	0.02%	0.08%	100.00%	100.00%	100.00%	94.00%	100.00%	100.00%
Vodafone	0.04%	0.13%	98.87%	0.25%	0.67%	0.64%	0.99%	97.30%	0.10%	0.02%	100.00%	100.00%	100.00%	97.00%	94.65%	89.66%
Airtel	0.04%	0.00%	99.28%	0.04%	0.06%	0.51%	3.52%	97.56%	16.68%	0.05%	100.00%	100.00%	89.21%	85.00%	100.00%	100.00%
Idea	0.14%	0.13%	99.82%	0.29%	0.46%	0.94%	1.72%	96.31%	0.06%	0.00%	100.00%	100.00%	98.54%	92.00%	100.00%	100.00%
Tata CDMA	0.04%	0.00%	98.98%	0.00%	0.00%	0.58%	0.71%	98.49%	0.00%	0.01%	100.00%	100.00%	73.13%	91.23%	99.67%	100.00%
DoCoMo	0.07%	0.00%	99.99%	0.06%	0.60%	0.51%	2.63%	97.70%	0.08%	0.11%	100.00%	100.00%	98.00%	97.00%	58.70%	NA
Airtel	0.08%	0.00%	99.75%	0.13%	0.10%	0.52%	0.86%	98.63%	0.07%	0.00%	100.00%	100.00%	95.50%	91.32%	100.00%	100.00%
RCOM CDMA	0.05%	0.00%	99.69%	DNA	0.11%	0.81%	1.49%	99.16%	0.01%	0.00%	100.00%	100.00%	100.00%	88.00%	100.00%	100.00%
RCOM GSM	0.03%	0.00%	99.26%	0.02%	0.01%	0.31%	0.22%	99.03%	0.00%	0.01%	100.00%	100.00%	100.00%	81.00%	100.00%	NA
MTS	0.10%	0.00%	99.07%	0.00%	0.00%	0.25%	1.15%	98.02%	NA	0.01%	100.00%	100.00%	87.17%	87.82%	NA	NA

20.2 Monthly Point of Interconnection (POI) Congestion Report

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

RCOM CDMA	All POI meet benchmark
RCOM GSM	All POI meet benchmark
MTS	All POI meet benchmark
Uninor	All POI meet benchmark

20.3 Parameter wise performance reports for Cellular Mobile services

1. Network Availability

Audit Results for Network Availability

	Benchmark	BSNL	Vodafone	Airtel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor
Number of BTSs in the licensed service area		3357	3780	2068	4553	561	1810	4190	1205	1960	681	1182
Sum of downtime of BTSs in a month (in hours)		23057	1172	658.27	4808	155	891	2571	461	375	520	157.4
BTSs accumulated downtime (not available for service)	≤ 2%	0.92%	0.04%	0.04%	0.14%	0.04%	0.07%	0.08%	0.05%	0.03%	0.10%	0.02%
Number of BTSs having accumulated downtime >24 hours		92	5	0	6	0	0	0	0	0	0	2
Worst affected BTSs due to downtime	≤ 2%	2.74%	0.13%	0.00%	0.13%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.17%

2. Connection Establishment (Accessibility)

Audit Results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	BSNL	Vodafone	Airtel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor
CSSR	≥ 95%	96.87%	98.87%	99.28%	99.82%	98.98%	99.99%	99.75%	99.69%	99.26%	99.07%	99.17%

SDCCH congestion	Benchmark	BSNL	Vodafone	Airtel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor
SDCCH/Paging channel congestion	≤ 1%	0.34%	0.25%	0.04%	0.29%	0.00%	0.06%	0.13%	DNA	0.02%	0.00%	5.30%

TCH congestion	Benchmark	BSNL	Vodafone	Airtel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor
TCH congestion	≤ 2%	3.13%	0.67%	0.06%	0.46%	0.00%	0.60%	0.10%	0.11%	0.01%	0.00%	1.40%

Live measurement results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	BSNL	Vodafone	Airtel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor
CSSR	≥ 95%	96.40%	98.48%	99.48%	99.92%	98.73%	99.99%	99.59%	99.69%	99.28%	99.12%	99.08%

SDCCH congestion	Benchmark	BSNL	Vodafone	Airtel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor
SDCCH/Paging channel congestion	≤ 1%	0.32%	0.43%	0.00%	0.34%	0.00%	0.03%	0.12%	NA	0.02%	0.00%	0.58%

TCH congestion	Benchmark	BSNL	Vodafone	Aircel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor
TCH congestion	≤ 2%	3.60%	0.77%	0.02%	0.43%	0.00%	0.56%	0.27%	0.18%	0.00%	0.00%	0.06%

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

CSSR	Benchmark	BSNL	Vodafone	Aircel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor
Total number of call attempts		564	543	626	500	505	556	538	596	570	588	543
Total number of successful calls established		562	541	626	500	505	556	538	593	565	588	534
CSSR	≥ 95%	99.65%	99.63%	100.00%	100.00%	100.00%	100.00%	100.00%	99.50%	99.12%	100.00%	98.34%

Blocked calls	Benchmark	BSNL	Vodafone	Aircel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor
%age blocked calls			0.35%	0.37%	0.00%	0.00%	0.00%	0.00%	0.50%	0.88%	0.00%	1.66%

3. Connection Maintenance (Retainability)

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

Call drop rate	Benchmark	BSNL	Vodafone	Aircel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor
Total number of calls established		224704011	167155404	22993655	247977366	18059426	35435895	127494247	DNA	DNA	9708955	1011675
Total number of calls dropped		1170220	1072988	117678	2332363	104312	181142	664414	DNA	DNA	23919	9192
Call drop rate	≤ 2%	0.52%	0.64%	0.51%	0.94%	0.58%	0.51%	0.52%	0.81%	0.31%	0.25%	0.91%

Cells having more than 3% TCH	Benchmark	BSNL	Vodafone	Aircel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor	
Total number of cells in the network			9535	11320	6185	13644	1680	161970	12503	1205	5880	4086	3518
Total number of cells having more than 3% TCH			211	112	218	235	12	4266	107	18	13	47	306
Worst affected cells having more than 3% TCH	≤ 5%		2.21%	0.99%	3.52%	1.72%	0.71%	2.63%	0.86%	1.49%	0.22%	1.15%	8.70%

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

Call drop rate	Benchmark	BSNL	Vodafone	Aircel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor
Total number of calls established		22561301	17154516	2285816	26149450	1839738	3553148	12871929	DNA	DNA	1051693	53069
Total number of calls dropped		111887	116036	12337	248337	10024	17057	82633	DNA	DNA	6239	501
Call drop rate	≤ 2%	0.50%	0.68%	0.54%	0.95%	0.54%	0.48%	0.64%	0.68%	0.29%	0.59%	1.09%

Cells having more than 3% TCH	Benchmark	BSNL	Vodafone	Aircel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor
Total number of cells in the network		8825	11335	6189	13644	1677	16309	12503	2136	11514	2043	3518
Total number of cells having more than 3% TCH		203	255	317	305	11	390	105	25	27	39	201
Worst affected cells having more than 3% TCH	≤ 5%	2.30%	2.25%	5.12%	2.24%	0.66%	2.39%	0.84%	1.17%	0.23%	1.91%	5.71%

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

Call drop rate	Benchmark	BSNL	Vodafone	Aircel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor
Total number of calls established		563	537	626	500	505	556	538	594	565	586	533
Total number of calls dropped		171	0	0	0	0	0	0	0	3	0	5
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.53%	0.00%	0.94%

4. Voice quality

Audit Results for Voice quality

Voice quality	Benchmark	BSNL	Vodafone	Aircel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor
Total number of sample calls		295571	23285295642	3077931520	35891012151	4495	5171591332	466168195	DNA	DNA	101	87347588
Total number of calls with good voice quality		295002	22657605867	3002909081	34567348839	4427	5052732602	459800957	DNA	DNA	2	84795609
%age calls with good voice quality	≥ 95%	99.81%	97.30%	97.56%	96.31%	98.49%	97.70%	98.63%	99.16%	99.03%	98.02%	97.08%

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

Voice quality	Benchmark	BSNL	Vodafone	Aircel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor
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Total number of sample calls		71406	841717	158773	57072	12357	141871	980932	34261	66581	130892	920432
Total number of calls with good voice quality		70023	820615	156699	55846	12327	139398	948497	33525	64837	130476	894144
%age calls with good voice quality	≥ 95%	98.06%	97.49%	98.69%	97.85%	99.76%	98.26%	96.69%	97.85%	97.38%	99.68%	97.14%


5. POI Congestion

Audit Results for POI Congestion

POI congestion	Benchmark	BSNL	Vodafone	Aircel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0	0
Total number of working POIs		69	35	51	108	64	11	38	12	12	34	39

6. Inter Operator Call Assessment

Inter operator call Assessment To ↓ From →	BSNL	Vodafone	Aircel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor
	BSNL	NA	100%	100%	100%	97%	92%	85%	99%	100%	98%
Vodafone	99%	NA	100%	100%	100%	100%	100%	100%	100%	100%	96%
Aircel	98%	100%	NA	99%	100%	100%	98%	100%	100%	98%	100%
Idea	84%	99%	100%	NA	91%	85%	100%	100%	97%	96%	98%
Tata CDMA	89%	100%	96%	100%	NA	100%	100%	100%	99%	96%	100%
DoCoMo	98%	100%	98%	100%	99%	NA	100%	99%	100%	99%	100%
Airtel	72%	100%	100%	100%	100%	98%	NA	100%	98%	99%	100%
RCOM CDMA	99%	100%	100%	100%	97%	97%	98%	NA	100%	95%	100%
RCOM GSM	100%	100%	100%	100%	97%	100%	96%	99%	NA	99%	99%
MTS	99%	100%	100%	100%	100%	99%	97%	100%	100%	NA	100%
Uninor	100%	100%	100%	100%	100%	100%	100%	100%	82%	84%	NA

 The maximum problem faced by the calling operator to other operators

7. Metering and Billing credibility

Audit Results for Billing performance

Billing Performance	B'mark	BSNL	Vodafone	Aircel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor
Billing disputes – Postpaid												
Total bills generated during the period		189767	184845	1043	145972	78057	3696	87200	187748	7425	NA	NA
Total number of bills disputed		39	179	174	81	0	3	62	12	0	NA	NA
Percentage bills disputed	≤ 0.1%	0.02%	0.10%	16.68%	0.06%	0.00%	0.08%	0.07%	0.01%	0.00%	NA	NA
Billing disputes – Prepaid												
Number of complaints related to charging, credit & validity		2645	996	628	89	93	2353	8	106	53	18	169
Total number of prepaid customers in that period		3348551	4117974	1292054	5143082	696213	2083380	3027358	2198619	918551	227081	287925
Percentage of complaints	≤ 0.1%	0.08%	0.02%	0.05%	0.00%	0.01%	0.11%	0.00%	0.00%	0.01%	0.01%	0.06%
Resolution of billing complaints												
Total number of billing/charging complaints		2684	1175	802	170	93	2356	317	636	181	18	169
Total complaints resolved in 4 weeks from date of receipt		2684	1175	802	170	93	2356	317	636	181	18	169
Percentage complaints resolved within 4 weeks of date of receipt	100%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Period of applying credit / waiver												
No. of complaints resolved in favor of the customer during the month		885	1147	151	160	NA	133	62	118	53	9	93
No. of complaints disposed on account of not considered as valid complaints		1799	28	651	12	0	2223	247	518	128	9	128
Percentage cases in which credit/waiver was received within 1 week	100%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Live calling results for resolution of billing complaints

Resolution of billing complaints	Benchmark	BSNL	Vodafone	Aircel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor
Total Number of calls made		50	50	50	50	28	18	44	47	20	8	25
Number of cases resolved in 4 weeks		42	33	23	33	21	8	26	32	14	8	6
Percentage cases resolved in four weeks	100%	84.00%	66.00%	46.00%	66.00%	75.00%	44.44%	59.09%	68.09%	70.00%	100.00%	24.00%

8. Customer Care

Audit results for customer care

Customer Care Assessment	Benchmark	BSNL	Vodafone	Aircel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor
Total number of call attempts to customer care for assistance		1672478	5488243	1542497	586232	89806	1506838	8438200	NA	NA	153542	118543
Number of calls getting connected and answered (electronically)		1672478	5488243	1375989	577652	65675	1476702	8058220	633980	238495	133849	113948
Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	89.21%	98.54%	73.13%	98.00%	95.50%	100.00%	100.00%	87.17%	96.12%
Percentage calls answered within 60 seconds (V2V)	≥ 90%	94.00%	97.00%	85.00%	92.00%	91.23%	97.00%	91.32%	88.00%	81.00%	87.82%	92.39%

Live calling results for customer care

Customer Care Assessment	Benchmark	BSNL	Vodafone	Aircel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor
Total Number of calls received		100	100	100	100	100	100	100	100	100	100	100
Total Number of calls getting connected and answered		85	100	53	100	100	100	100	99	100	100	100
Percentage calls getting connected and answered	≥ 95%	85.00%	100.00%	53.00%	100.00%	100.00%	100.00%	100.00%	99.00%	100.00%	100.00%	100.00%

Live calling results for customer care (Voice to Voice)

Customer Care Assessment	Benchmark	BSNL	Vodafone	Aircel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor
Total Number of calls received		100	100	100	100	100	100	100	100	100	100	100
Total Number of calls answered within 60 seconds		55	87	39	95	86	96	30	78	93	78	100
Percentage calls answered within 60 seconds	≥ 90%	55.00%	87.00%	39.00%	95.00%	86.00%	96.00%	30.00%	78.00%	93.00%	78.00%	100.00%

9. Termination / closure of service

Audit results for termination / closure of service

Termination	Benchmark	BSNL	Vodafone	Aircel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor
Total number of closure request		414	803	56	1358	306	46	451	874	158	NA	NA
Number of requests attended within 7 days		414	760	56	1358	305	27	451	874	158	NA	NA
Percentage cases in which termination done within 7 days	100%	100.00%	94.65%	100.00%	100.00%	99.67%	58.70%	100.00%	100.00%	100.00%	NA	NA

Audit results for refund of deposits

Refund	Benchmark	BSNL	Vodafone	Aircel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor
Total number of cases requiring refund of deposits		1869	87	29	209	31	0	395	739	0	NA	NA
Total number of cases where refund was made within 60 days		1869	78	29	209	31	0	395	739	0	NA	NA
Percentage cases in which refund was receive within 60 days	100%	100.00%	89.66%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	NA	NA	NA

11. Additional Network Related parameters

Audit Results for Total Traffic Handled in Erlang

Traffic in Erlang	BSNL	Vodafone	Aircel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor
Equipped capacity of the network	4519298	135139	48072.56	187131	107575	110000	156097.64	142000	142000	12891	48,000
Total traffic handled in erlang during TCBH	2540735	111180	11865.26	158155	24547	17762	86577.65	44784	44784	2658.72	1,371

Total number of customers as per VLR

	BSNL	Vodafone	Aircel	Idea	Tata CDMA	DoCoMo	Airtel	RCOM CDMA	RCOM GSM	MTS	Uninor
Total no. of customers served (as per VLR)	2802229	3353263	606650	4984063	399465	699229	2819544	1760058	1760058	97846	1,100,000

21.0 Annexure - I (Broadband)

21.1 Parameter wise performance reports for Broadband services

1. Service Provisioning

1.1 Audit Results for Service provisioning

	Benchmark	BSNL	Airtel	VSNL	RCOM	Asianet
Total connections registered during the period		4462	488	78	104	1387
Number of connections provided within 15 days		3854	488	78	104	1387
Percentage of connections provided within 15 days	100%	86.37%	100.00%	100.00%	100.00%	100.00%
Number of connections provided after 15 days of registration of demand		608	0	0	0	0
Number of customers to whom credit is given for delayed connections		0	0	0	0	0
Percentage of customers to whom credit is given for delayed connections	100%	0.00%	NA	NA	NA	NA

1.2 Live calling for Service provisioning

	Benchmark	BSNL	Airtel	VSNL	RCOM	Asianet
Total connections registered during the period		500	100	30	67	100
Number of connections provided within 15 days		346	95	27	63	95
Percentage of connections provided within 15 days	100%	69.20%	95.00%	90.00%	94.03%	95.00%

2. Fault Incidence / Clearance Statistics

2.1 Audit Results for Fault repair

Fault repair	Benchmark	BSNL	Airtel	VSNL	RCOM	Asianet
Total No. of faults registered during the month		4531	558	10290	115	14314
No. of faults repaired by next working day during the month		2706	549	9102	115	12989
Percentage of faults repaired by next working day during the month	> 90%	59.72%	98.39%	88.45%	100.00%	90.74%
No. of faults repaired within 3 days during the month		3636	558	10131	115	14306
Percentage of faults repaired within 3 days during the month	>99%	80.25%	100.00%	98.45%	100.00%	99.94%

Rent rebate	Benchmark	BSNL	Airtel	VSNL	RCOM	Asianet
No. of cases with faults pending for >3 days and ≤7 days		617	0	80	0	8
Out of these number of cases where rent rebate for 7 days was given		617	0	80	0	0
Percentage of cases where rent rebate for 7 days was given	100%	100.00%	NA	100.00%	NA	0.00%
No. of cases with faults pending for >7 days and ≤15 days		211	0	26	0	0
Out of these number of cases where rent rebate for 15 days was given		207	0	26	0	0
Percentage of cases where rent rebate for 15 days was given	100%	98.10%	NA	100.00%	NA	NA
No. of cases with faults pending for ≥15 days		67	0	1	0	0
Out of these number of cases where rent rebate for 30 days was given		65	0	1	0	0

Percentage of cases where rent rebate for 30 days was given	100%	97.01%	NA	100.00%	NA	NA
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2.2 Live calling for fault repair

Fault repair	Benchmark	BSNL	Airtel	VSNL	RCOM	Asianet
Total Number of calls made		150	30	30	13	30
Number of cases where faults were repaired by next working day		37	21	4	4	14
Percentage cases where faults were repaired by next working day	> 90%	24.67%	70.00%	13.33%	30.77%	46.67%
Number of cases where faults were repaired within 3 days		115	29	24	8	20
Percentage cases where faults were repaired within 3 days	>99%	76.67%	96.67%	80.00%	61.54%	66.67%

3. Billing performance

3.1 Audit Results for Billing performance

Billing Performance	Benchmark	BSNL	Airtel	VSNL	RCOM	Asianet
Billing disputes						
Total bills generated during the period		129226	23882	8476	4924	48662
Total number of bills disputed		841	3	16	4	229
Percentage bills disputed	< 2%	0.65%	0.01%	0.19%	0.08%	0.47%
Resolution of billing complaints						
Total number of complaints		841	3	16	4	229
Total complaints resolved in 4 weeks from date of receipt		835	3	16	4	229
Percentage complaints resolved within 4 weeks of date of receipt	100%	99.29%	100.00%	100.00%	100.00%	100.00%
Period of refund						
Total number of cases requiring refund		84	1	10	0	36
Total number of cases where credit/waiver was made within 60 days		49	1	10	0	36
Percentage cases in which credit/waiver was received within 60 days	100%	58.33%	100.00%	100.00%	NA	100.00%

3.2 Live calling results for resolution of billing complaints

Resolution of billing complaints	Benchmark	BSNL	Airtel	VSNL	RCOM	Asianet
Total Number of calls made		86	15	6	1	50
Number of cases resolved in 4 weeks		78	9	6	1	50
Percentage cases resolved in 4 weeks	100%	90.70%	60.00%	100.00%	100.00%	100.00%

4. Response time to the customer for assistance

4.1 Audit results for customer care (Voice to Voice)

Customer Care Assessment	Benchmark	BSNL	Airtel	VSNL	RCOM	Asianet
Total Number of calls received		4533	4714	324520	316605	DNA
Total Number of calls answered within 60 seconds		3612	4434	315185	240620	DNA
Percentage calls answered within 60 seconds	> 60%	79.68%	94.06%	97.12%	76.00%	DNA

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

Customer Care Assessment	Benchmark	BSNL	Airtel	VSNL	RCOM	Asianet
Total Number of calls received		600	100	50	50	100
Total Number of calls answered within 60 seconds		423	93	45	37	100
Percentage calls answered within 60 seconds	> 60%	70.50%	93.00%	90.00%	74.00%	100.00%

4.3 Audit results for customer care (Voice to Voice)

Customer Care Assessment	Benchmark	BSNL	Airtel	VSNL	RCOM	Asianet
Total Number of calls received		4533	4714	324520	316605	DNA
Total Number of calls answered within 90 seconds		4224	4519	315541	256450	DNA
Percentage calls answered within 90 seconds	> 80%	93.18%	95.86%	97.23%	81.00%	DNA

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

Customer Care Assessment	Benchmark	BSNL	Airtel	VSNL	RCOM	Asianet
Total Number of calls received		600	100	50	50	100
Total Number of calls answered within 90 seconds		462	100	45	44	100
Percentage calls answered within 90 seconds	> 80%	77.00%	100.00%	90.00%	88.00%	100.00%

5. Bandwidth utilization

5.1 Audit results for Bandwidth Utilization

Bandwidth utilization	Benchmark	BSNL	Airtel	VSNL	RCOM	Asianet
Intra-network links (POP to ISP Node)						
Total number of intra network links		297	82	2	19	9
No of Intra network found to be above 90%		4	0	0	0	0
International Bandwidth						
Total number of upstream links		345	0	6	8	10
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In mpbs)		53475	0	40000	44245	1198
Total International Bandwidth utilised during peak hours		38611	NA	6300	18510	739
Percentage Bandwidth utilization during peak hours (In mpbs)	<80%	72.20%	NA	15.75%	41.84%	61.69%
No of Intra network found to be above 90%		1	0	0	0	0

5.2 Live measurement results for Bandwidth Utilization

Bandwidth utilization	Benchmark	BSNL	Airtel	VSNL	RCOM	Asianet
Intra-network links (POP to ISP Node)						
Total number of intra network links		297	82	2	19	9
No of Intra network found to be above 90%		5	0	0	0	0
International Bandwidth						
Total number of upstream links		377	0	6	8	10
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In mpbs)		58435	0	40000	44245	1086
Total International Bandwidth utilised during peak hours		49152	NA	6300	21882	719
Percentage Bandwidth utilization during peak hours (In mpbs)	<80%	84.11%	NA	15.75%	49.46%	66.21%

No of Intra network found to be above 90%		0	0	0	0	0
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6. Broadband download speed

6.2 Live calling results for broadband download speed						
Broadband download speed	Benchmark	BSNL	Airtel	VSNL	RCOM	Asianet
Total committed download speed to the sample subscribers (In mpbs) (A)		2	2	2	1	2
Total average download speed observed during TCBH (In Mpbs) (B)		1.77	2.1	1.7	0.96	1.9
%age subscribed speed available to the subscriber during TCBH (B/A)*100	>80%	88.50%	105.00%	85.00%	96.00%	95.00%

7. Service availability/uptime

7.1 Audit results for service availability						
Service Availability	Benchmark	BSNL	Airtel	VSNL	RCOM	Asianet
Total Operational Hours		170376	10329120	971280	615120	720
Total Downtime		883	0	17865	0.82	1
Total time when the service was available		169493	10329120	953415	615119.18	719
Service Availability Uptime in Percentage	>98%	99.48%	100.00%	98.16%	100.00%	99.86%

7.2 Live measurement results for service availability						
Service Availability	Benchmark	BSNL	Airtel	VSNL	RCOM	Asianet
Total Operational Hours		16560	9525744	97128	615120	72
Total Downtime		6	0	1031	0.82	0
Total time when the service was available		16554	9525744	96097	615119.18	72
Service Availability Uptime in Percentage	>98%	99.96%	100.00%	98.94%	100.00%	100.00%

8. Network latency / Packet loss

8.1 Audit results for Latency and packet loss						
Network Latency and Packet Loss	Benchmark	BSNL	Airtel	VSNL	RCOM	Asianet
Packet Loss (Percentage)	< 1%	0.00%	0.00%	0.00%	0.23%	0.00%
Network Latency						
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	15	57	41	0	56
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	219	288	252	16.5	205

8.2 Live measurement results for Latency and packet loss						
Network Latency and Packet Loss	Benchmark	BSNL	Airtel	VSNL	RCOM	Asianet
Packet Loss (Percentage)	< 1%	0.05%	0.00%	0.00%	0.00%	0.30%
Network Latency						

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From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	73	58	41	0	70
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	279	289	252	36.18	293

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

22.1 For Basic (Wireline) services

1. Provision of telephone after registration of demand	
Computational Methodology as per QoS definition	<p>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</p> <p>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.</p>
Benchmark	100% cases in <7 days, subject to technical feasibility
Audit Procedure	<p>IMRB Auditors verified and collected data pertaining to number of applications received at the service provider's level in the following time frames:-</p> <ul style="list-style-type: none"> - Number of connections provided within 7 days - Number of connections provided after 7 days - Number of connections where request is still pending <p style="text-align: center;">Live calling : -</p> <ul style="list-style-type: none"> - 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	<p>Fault incidence = (No. of faults reported by the customer per month/ Total Number of Subscribers for that particular month)*100</p>
Benchmark	<p>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.</p>
Audit Procedure	<p>IMRB Auditors to verify and collect data pertaining to number of fault received at the service provider's level in the following time frames:-</p> <ul style="list-style-type: none"> 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 <p style="text-align: center;">Live calling : -</p> <ul style="list-style-type: none"> -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	<p>Percentage incidence of billing complaints = (No. of billing complaints reported by the customer per month/ Total Number of Subscribers for that particular month)*100</p> <p>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</p>
Benchmark	<p>Percentage incidence of billing complaints: Not more than 0.1% of the bills issued</p> <p>Percentage resolution of billing complaints: 100% within a period of 4 weeks</p> <p>Period of applying credit/waiver/adjustment : In 100% of the cases within 1 week of resolution of complaint</p>
Audit Procedure	<p>IMRB Auditors to verify and collect data pertaining to</p> <ul style="list-style-type: none"> - 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. <p>- Include all types of bills generated for customers. This could include online as well as other forms of bills presentation including printed bills</p> <p>- 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.</p> <p>Live calling : -</p> <ul style="list-style-type: none"> - 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 the 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	<p>Shifting of telephone line : Less than 3 days</p> <p>Processing of closure request: Less than 7 days</p>
Audit procedure	<p>IMRB Auditors collected and verified data pertaining to</p> <p>Shifting Request: (Following key points were taken care of while verifying the data)</p> <ul style="list-style-type: none"> - Date of filing form should be at least 3 working days after the date of month appraised. <ul style="list-style-type: none"> - 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. <p>Processing of closure request (Following key points were taken care of while verifying the data)</p> <ul style="list-style-type: none"> - The operator includes all Requests for volunteer Permanent Closure and External (shifts to other exchanges) Shift requests received at their exchange. <ul style="list-style-type: none"> - 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	<p>-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.</p> <p>- All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.</p> <p>- 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.</p> <p style="text-align: center;">Live calling: -</p> <p>- 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</p> <p>- Time to answer the call by the operator was assessed from the time interviewer pressed the requisite button for being assisted by the operator.</p> <p>- All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.</p>

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	<p>IMRB Auditors verified and collected data pertaining to</p> <p>- Cases requiring refund of deposits after closure are to be included</p> <p>- 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</p> <p style="text-align: center;">Live calling : -</p> <p>- Collect the details of all the cases for which the refund was provided by the operator prior to the month of Audit</p> <p>- 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)</p>

7. Call completion rate	
Computational Methodology	<p>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:-</p> <p style="text-align: center;">Other exchange not working / lines blocked Calling exchange is blocked</p> <p style="text-align: center;">CCR = [(Call attempts – Calls blocked)/Call attempts] X 100</p>
Benchmark	Call Completion Rate (CCR) within local network: More than 55%
Audit Procedure	<p>IMRB Auditors verified and collected data pertaining to Sample Traffic Data during Time Consistent Busy Hour (TCBH). These details were collected separately for</p> <p>-Three days in which live measurement was carried out</p> <p>- For the complete month in which audit was carried out</p>

22.2 Cellular Mobile services

1. Accumulated Downtime of the Network	
Computational Methodology as per QoS definition	<p>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.</p> <p>Computational Methodology:</p> <ul style="list-style-type: none"> BTSS Accumulated downtime = $\frac{\text{Sum of downtime of BTSSs in a month in hours}}{24 \times \text{No. of days in the month} \times \text{No. of BTSSs in the network in the licensed service area}} \times 100$ Worst affected BTSSs due to downtime = $\frac{\text{No. of BTSSs having accumulated downtime >24 hours in a month}}{\text{Total No. of BTSSs in the network in the licensed service area}} \times 100$
Benchmark	<ul style="list-style-type: none"> BTSS Accumulated downtime (not available for service) $\leq 2\%$ Worst affected BTSSs due to downtime $\leq 2\%$
Audit Procedure	<p>IMRB auditors collected and verified data pertaining to:</p> <p>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</p>

2. Call Set-Up Success Rate (CSSR)	
Computational Methodology as per QoS definition	<p>The ratio of calls established to total calls is known CSSR.</p> <p>Call Established means the following events have happened in call setup:-</p> <ul style="list-style-type: none"> ↪ call attempt is made ↪ the TCH is allocated ↪ the call is routed to the outward path of the concerned MSC <p>Computational Methodology: $\text{Calls Established} / \text{Total Call Attempts} \times 100$</p>
Benchmark	> 95%
Audit Procedure	<p>IMRB auditors collected and verified data pertaining to</p> <ul style="list-style-type: none"> ↪ 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	<p>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:</p> <ul style="list-style-type: none"> ↳ SDCCH Level: Stand-alone dedicated control channel ↳ TCH Level: Traffic Channel ↳ POI Level: Point of Interconnect <p>Computational Methodology:</p> <ul style="list-style-type: none"> ↳ SDCCH / TCH Congestion% = $[(A1 \times C1) + (A2 \times C2) + \dots + (An \times Cn)] / (A1 + A2 + \dots + An)$ <ul style="list-style-type: none"> ● Where:-A1 = Number of attempts to establish SDCCH / TCH made on day 1 ● C1 = Average SDCCH / TCH Congestion % on day 1 ● A2 = Number of attempts to establish SDCCH / TCH made on day 2 ● C2 = Average SDCCH / TCH Congestion % on day 2 ● An = Number of attempts to establish SDCCH / TCH made on day n ● Cn = Average SDCCH / TCH Congestion % on day n ↳ POI Congestion% = $[(A1 \times C1) + (A2 \times C2) + \dots + (An \times Cn)] / (A1 + A2 + \dots + An)$ <ul style="list-style-type: none"> ● Where:-A1 = POI traffic offered on all POIs (no. of calls) on day 1 ● C1 = Average POI Congestion % on day 1 ● A2 = POI traffic offered on all POIs (no. of calls) on day 2 ● C2 = Average POI Congestion % on day 2 ● An = POI traffic offered on all POIs (no. of calls) on day n ● Cn = Average POI Congestion % on day n
Benchmark	<p>SDCCH Congestion: ≤ 1% TCH Congestion: ≤ 2% POI Congestion: ≤ 0.5%</p>
Audit Procedure	<p>IMRB Auditors collected and verified records pertaining to:</p> <ul style="list-style-type: none"> ↳ Audit of the details of SDCCH and TCH congestion percentages computed by the operator (using OMC–Switch data only) was conducted ↳ The operator should be measuring this parameter during Time consistent busy hour (TCBH) only SDCCH ↳ The POI details were verified from the switch for all the links of the operators

4. Call Drop Rate	
Computational Methodology as per QoS definition	<p>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</p> <ul style="list-style-type: none"> ↳ 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 <p>Computational Methodology: Total Calls Dropped / Total Calls Established x 100</p>
Benchmark	<p>≤ 2%</p>
Audit Procedure	<p>IMRB Auditors collected and verified records pertaining to:</p> <ul style="list-style-type: none"> ↳ 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	<p>Definition:</p> <ul style="list-style-type: none"> ↪ 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 % <p>Computational Methodology:</p> <ul style="list-style-type: none"> ↪ % Connections with good voice quality = (No. of voice samples with good voice quality / Total number of samples) x 100
Benchmark	≥ 95%
Audit Procedure	<p>IMRB Auditors collected and verified records pertaining to:</p> <p>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.</p> <p>Procedures that were to be followed by operator for obtaining relevant details for computing this parameter were audited</p> <ul style="list-style-type: none"> ↪ 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 ↪ <i>Measurements using Engineering handsets were not acceptable</i> ↪ All the operators were not maintaining this data at the switch level

6. Service Coverage	
Computational Methodology as per QoS definition	<p>Definition:</p> <ul style="list-style-type: none"> ↪ The level of signal available in a particular part of a city is known as signal strength. <p>Computational Methodology:</p> <ul style="list-style-type: none"> ↪ 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	<p>Indoor >= -75 dBm</p> <p>In-vehicle >= -85 dBm</p> <p>Outdoor – in city >= -95 dBm</p>
Audit Procedure	<p>IMRB Auditors collected and verified call centre records pertaining to:</p> <ul style="list-style-type: none"> ↪ 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:- <ul style="list-style-type: none"> ↪ Operator to conduct at least one drive test using standard

	<p>drive test equipment* every week during Time consistent busy hour (TCBH).</p> <p>↳ Each drive test should evenly cover the following 5 types of locations: –</p> <ul style="list-style-type: none"> ↳ 3 Outdoor (Periphery of the city, Congested Area, Across the City), and ↳ 2 Indoor (Office Complex and Shopping Complex) <p>↳ <i>Measurements using Engineering handsets were not acceptable</i></p>
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7. Response time to customer	
Computational Methodology	<p>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</p> <p>To connect to operator: The time taken to connect a person (as soon as he presses 9) to the customer care executive</p> <p>Computational Methodology:</p> <ul style="list-style-type: none"> • % age of calls getting connected = $\frac{\text{Total number of calls getting connected}}{\text{Total number of calls made}} \times 100$ • % age of calls answered within 60 sec (voice to voice) = $\frac{\text{Total number of calls answered within 60 seconds}}{\text{Total number of calls made}} \times 100$
Benchmark	<p>↳ % age of calls getting connected and answered ≥ 95%</p> <p>↳ % age of calls answered by operator (voice to voice) within 60 seconds ≥ 90%</p>
Audit Procedure	<p>-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.</p> <p>- All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.</p> <p>- 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.</p> <p>Live calling: -</p> <p>- 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</p> <p>- Time to answer the call by the operator was assessed from the time interviewer pressed the requisite button for being assisted by the operator.</p> <p>- All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.</p>

8.1 Billing complaints per 100 bills issued	
Computational Methodology as per QoS definition	<p>Billing complaints includes any of the following complaints related to billing from the point of view of customer:</p> <ul style="list-style-type: none"> • 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.) <p>Billing complaints per 100 bills issued = Total billing complaints** received during the relevant quarter / Total bills generated* during the relevant quarter</p> <p><i>* All types of bills generated for customers i.e. printed bills, online bills and any other forms of bills generated are to be included</i></p> <p><i>** 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.</i></p>
Benchmark	< 0.1% billing complaints per 100 bills
Audit Procedure	<p>IMRB auditors collected and verified data pertaining to</p> <ul style="list-style-type: none"> - 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	<p>%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</p> <p><i>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.</i></p> <p><i>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.</i></p>
Benchmark	100% cases to be resolved within 4 weeks
Audit Procedure	<p>IMRB Auditors collected and verified data pertaining to</p> <ul style="list-style-type: none"> - Total number of billing complaints/bills disputed - Number of complaints resolved in 4 weeks <p>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 than 100</p>

8.3 Period of refunds / payments due to customers	
Computational Methodology as per QoS definition	<p>Period of all refunds = Maximum value of 'Time taken to refund' where:-Time taken to refund = Date of refund – date of complaint resolution</p>
Benchmark	100% cases in less than 1 week
Audit Procedure	<p>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:-</p> <ul style="list-style-type: none"> • 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 <p>Also random live checks of all subscribers entitled for refund were conducted</p>

22.3 For Broadband services

1. Service provisioning/Activation time	
Computational Methodology as per QoS definition	<p>Service provisioning time refers to the time taken from the date of receipt of an application to the date when the service is activated</p> <p>Percentage connections provided within X working days = No of connections provided within X working days/ Total number of connections registered during the period * 100</p> <p>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.</p> <p>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.</p>
Benchmark	100 % cases in =<15 working days.
Audit Procedure	<p>IMRB auditors collected and verified data pertaining to</p> <ul style="list-style-type: none"> -Number of applications received at the service provider's level -Number of connections provided within 15 days -Number of connections provided after 15 days <p>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</p>

2. Fault repair/Restoration time	
Computational Methodology as per QoS definition	<p>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</p> <p>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</p> <p>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</p> <p>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</p>

Benchmark	By next working day: > 90% and within 3 working days: 99%
Audit Procedure	<p>IMRB auditors collected and verified data pertaining to</p> <ul style="list-style-type: none"> -Number of applications received at the service provider's level -Number of connections provided within 15 days -Number of connections provided after 15 days <p>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</p>

3. Billing complaints per 100 bills issued	
Computational Methodology as per QoS definition	<p>Billing complaints includes any of the following complaints related to billing from the point of view of customer:</p> <ul style="list-style-type: none"> • 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.) <p>Billing complaints per 100 bills issued = Total billing complaints** received during the relevant quarter / Total bills generated* during the relevant quarter</p> <p>* All types of bills generated for customers i.e. printed bills, online bills and any other forms of bills generated are to be included</p> <p>** 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.</p>
Benchmark	< 2% billing complaints per 100 bills
Audit Procedure	<p>IMRB auditors collected and verified data pertaining to</p> <ul style="list-style-type: none"> - 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	<p>%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</p> <p><i>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.</i></p> <p><i>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.</i></p>
Benchmark	100% cases to be resolved within 4 weeks
Audit Procedure	<p>IMRB Auditors collected and verified data pertaining to</p> <ul style="list-style-type: none"> - Total number of billing complaints/bills disputed - Number of complaints resolved in 4 weeks <p>Live calling :-</p> <p>-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 than 100</p>

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 <u>time taken for operator to respond</u> * >= n sec / Total number of calls where an attempt to route to the operator was made) x 100 <u>Time taken for operator to respond</u> = 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	<p>Live calling : -</p> <ul style="list-style-type: none"> -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	<p>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</p> <p>Service availability/Uptime = $(\text{Total operational hours} - \text{Total Downtime hrs}) * 100 / \text{Total operational hours}$</p> <p>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</p> <p>Planned outages for routine maintenance of the system are excluded from the calculation of service availability/uptime</p>
Benchmark	- 98%
Audit Procedure	<p>IMRB Auditors collected and verified call centre records pertaining to</p> <ul style="list-style-type: none"> -Total operational hrs -Total downtime hrs <p>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 was carried out</p>

Packet loss	
Computational Methodology as per QoS definition	<p>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</p> <p>The packet loss is measured by computing the percent packet loss of 1000 pings of 64 byte packet each.</p> <p>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</p> <p>Minimum sample reference points for each service area shall be three in number or multiple reference points if required</p> <p>Hence Packet loss is computed by the formula - (Total number of ping packets lost</p>

	during the period/Total number of ping packets transmitted)* 100
Benchmark	<1 %
Audit Procedure	<p>IMRB Auditors collected and verified call centre records pertaining to</p> <ul style="list-style-type: none"> - Records maintained for ping tests conducted - Smoked ping test (wherever available) results - 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	<p>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)</p> <p>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</p> <p>Minimum sample reference points for each service area shall be three in number or multiple reference points if required</p> <p>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</p>
Benchmark	<p>< 120 msec from user reference point at POP/ISP Node to International Gateway</p> <p>< 350 msec from User reference point at ISP Gateway Node to International nearest NAP port (Terrestrial)</p> <p>< 800 msec from User reference point at ISP Gateway Node to International nearest Nap port (Satellite)</p>
Audit Procedure	<p>IMRB Auditors collected and verified call centre records pertaining to</p> <ul style="list-style-type: none"> - Records maintained for ping tests conducted - Smoked ping test (wherever available) results - 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
