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

Report: January-February-March - 2010

-

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

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IMRB international

Preface

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

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

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

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

The Survey and Audit modules for various circles within the Zones, due the sheer scale of data collection, have been distributed across various Half Yearly periods. The auditor - IMRB International carried out the audits across UP (East), UP (West), Andhra Pradesh, Uttar Pradesh (East) and West-Bengal circles in the January-February-March 2010 period. **This report details the performance of various service providers in Uttar Pradesh (East) 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

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

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

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

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

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

This report highlights the findings for the Audit module for Uttar Pradesh (East) circle that was covered in the period of January – March 2010. The primary data collection and verification of records maintained by various operators of Basic (Wireline), Cellular Mobile (Wireless) and broadband services was undertaken by IMRB International during the period January – March 2010.

2.0 Objectives And Methodology

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

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

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

- 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 UP (E) circle –

Circle	Uttar Pradesh (East)
Operator 1	BSNL
Operator 2	Airtel
Operator 3	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 July to September 2009 was carried out for all network and non network related parameters.

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

5.0 Executive Summary

The objective assessment of Quality of Services (QoS) was carried out by IMRB International for all the Basic (Wireline) and Broadband service providers during the period starting from January to March 2010 in Uttar Pradesh (East) 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	RCOM
Faults incidences (No. of faults/100 Subs./month)	≤5	4.66	2.35	3.7
% of faults repaired by next working day	≥ 90%	91.74%	96.18%	99.21%
% of faults repaired within 3 days	100%	95.78%	100.00%	100.00%
Faults pending for> 3days and ≤7 days	Rent rebate of 7 days	100.00%	NA	NA
Faults pending for > 7 days and ≤15 days	Rent rebate of 15 days	100.00%	NA	NA
Faults pending for > 15 days	Rent rebate of 1 month	100.00%	NA	NA
Mean Time to Repair (MTTR)	≤ 8 Hrs	10.32	7.41	3.34
Call Completion Rate (CCR)	≥ 55%	63.93%	99.84%	NA
Answer to Seizure ratio (ASR)	≥ 75%	NA	NA	89.43%
No. of POIs with congestion > 0.5%		0	0	0
Metering and billing credibility - Number of bills disputed during over a billing cycle	≤ 0.1%	0.18%	0.00%	0.01%
Resolution of billing complaints within 4 weeks	100%	100.00%	NA	100.00%
Period of applying credit / waiver	≤ 1 week	100.00%	100.00%	100.00%
Closure within 7 days	100%	100.00%	100.00%	100.00%
Response time to customer for assistance				
% age calls getting connected and answered	≥ 95%	95.19%	98.29%	100.00%
% age call answered by operator in 60 seconds	≥ 90%	97.66%	95.48%	91.00%
Time taken for refund of deposits after closures within 60 days	100%	96.77%	100.00%	NA

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

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

Summary of Live Measurement Results – Wireline Services

Parameters	Benchmarks	BSNL	Airtel	RCOM
% of faults repaired by next working day	≥ 90%	26.08%	10.00%	NA
% of faults repaired within 3 days	100%	79.58%	60.00%	NA
Call Completion Rate (CCR)	≥ 55%	63.37%	97.64%	NA
Answer to Seizure ratio (ASR)	≥ 75%	NA	NA	89.02%
Resolution of billing complaints within 4 weeks	100%	100.00%	NA	NA
Response time to customer for assistance				
% age calls getting connected and answered	≥ 95%	63.37%	100.00%	100.00%
% age call answered by operator in 60 seconds	≥ 90%	58.99%	94.00%	100.00%

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

The Basic (Wireline) services audit for UP (E) circle broadly indicates that BSNL could not 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 Uttar Pradesh (East) circle are as under –

Fault incidence / clearance statistics

- Fault incidence and repair is a pain point for BSNL subscribers in Uttar Pradesh (East) with 95% of the total complaints registered were repaired within 3 working days which is short of TRAI specified benchmark of 100%.
- For live calling carried out by IMRB auditors both BSNL and Airtel fail to meet the TRAI benchmark of more than 90% of subscribers claim that fault was repaired within 24 hrs. and for fault repair within 3 days

Traffic statistics (CCR & ASR)

- All service providers comfortably meet the benchmark on CCR parameter both during month in which audit was carried out and three days when live measurement was carried out in auditor's presence at various exchanges
- RCOM reports ASR in place of CCR and comfortably meets TRAI benchmark

Metering and billing credibility

- BSNL (0.18%) falls short of TRAI specified benchmark with percentage billing complaints being less than equal to 0.1% of the total bills generated.
- All the complaints registered were resolved within the time period stipulated by TRAI

Response time to customer for assistance

- All service providers meet the TRAI benchmark for response time to customer for assistance parameter.

- However, BSNL falls short of TRAI specified benchmark for calls connected and answered and answered by the operator in 60 seconds during live calling

Time taken for refund of deposits after closure

- BSNL was found to be not meeting TRAI benchmark on this parameter
- There were no cases of refunds observed for Tata and RCOM

Level 1 service

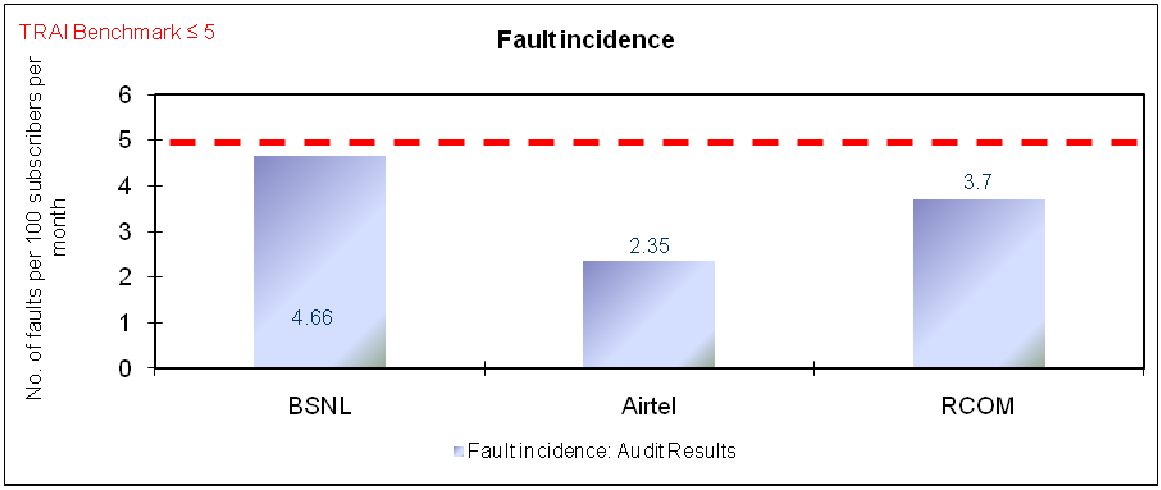
Level 1 services	Benchmark	BSNL	Airtel	RCOM
Total no. of calls made		2510	30	30
Calls answered in 60 sec		1404	30	30
Calls answered after 60 sec		1106	0	0

To test the efficiency of level 1 services (Trunk booking, Child helpline, Women helpline, Airline booking, Fire, Police, Railways) offered by various service providers. 2510 calls were made for BSNL to different numbers and time taken to answer the call was noticed. Out of which only 1404 of calls made were answered in 60 seconds. For private service providers 100% of calls were answered within 60 seconds

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

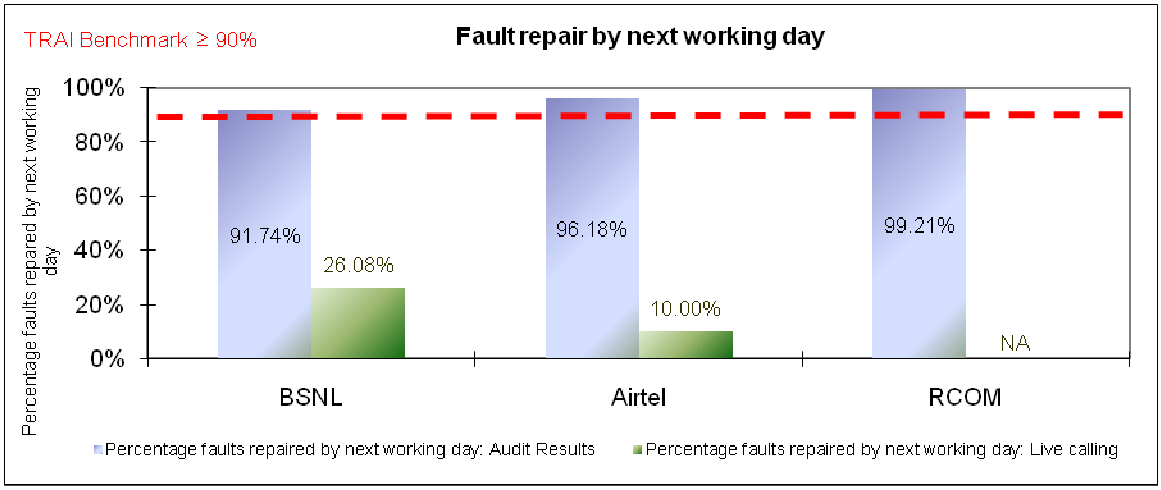
6.1 Graphical/Tabular Representations for Basic (Wireline) services

Fault incidence



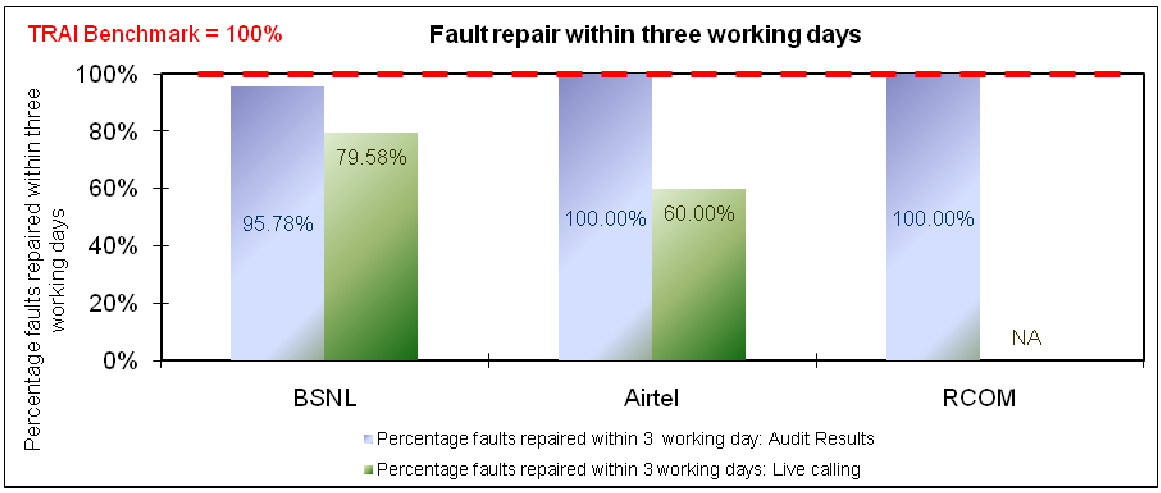
All operators are meeting the benchmark

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



One month
All operators are meeting the benchmark

Live calling
No operator is meeting the benchmark



One month

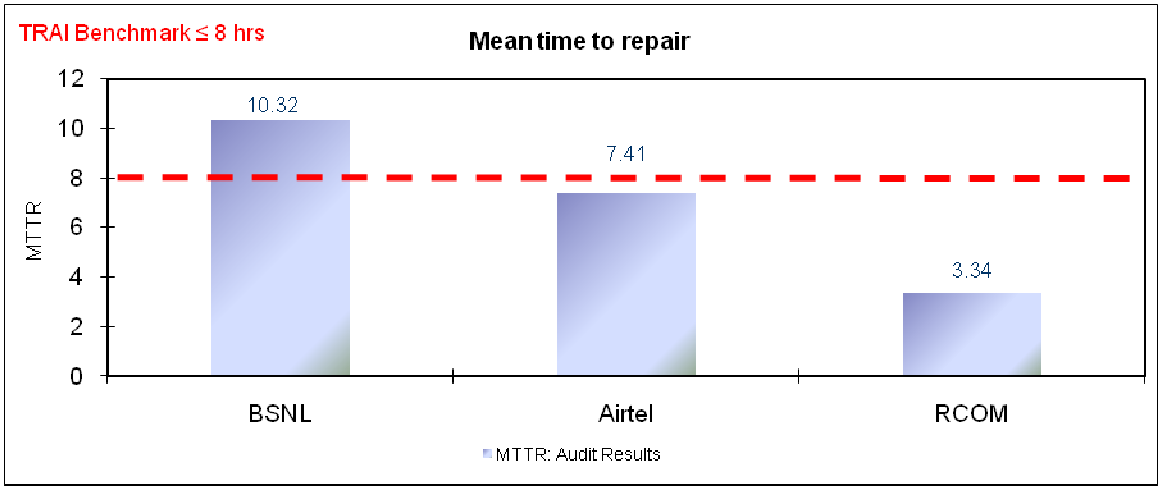
Operator meeting benchmark: Airtel, RCOM

Operator not meeting benchmark: BSNL

Live calling

No operator is meeting the benchmark

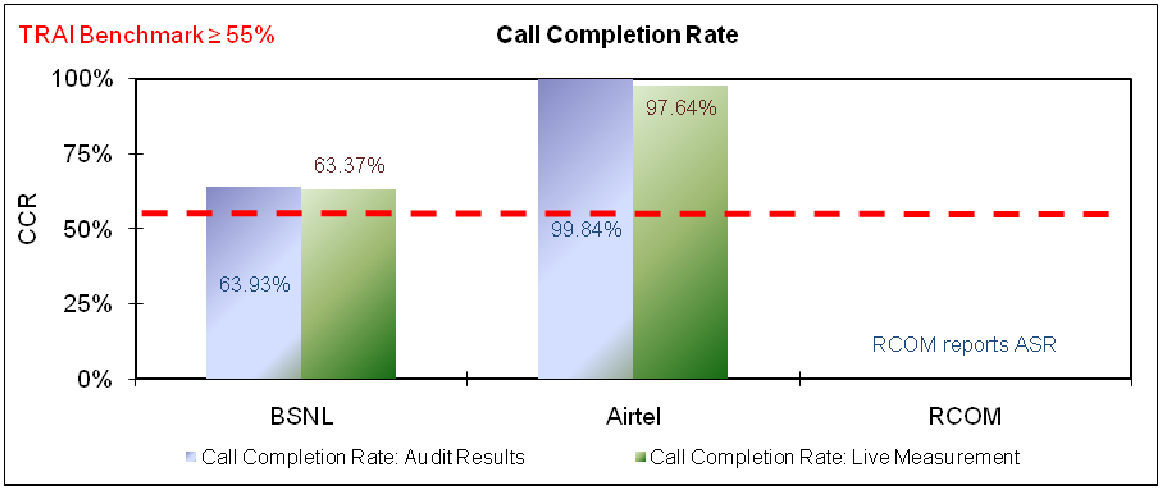
Mean time to repair



Operator meeting benchmark: Airtel, RCOM

Operator not meeting benchmark: BSNL

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



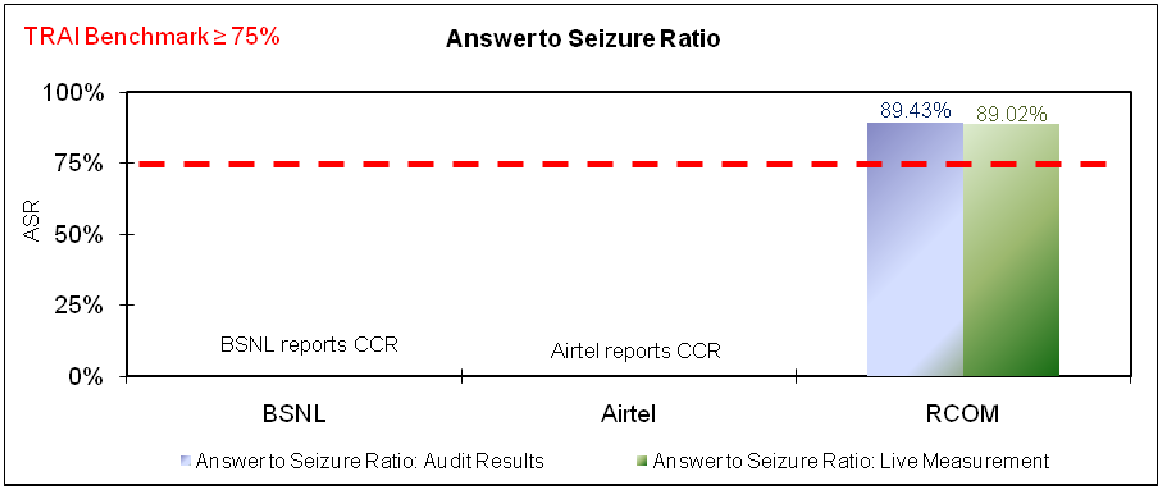
One month

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)



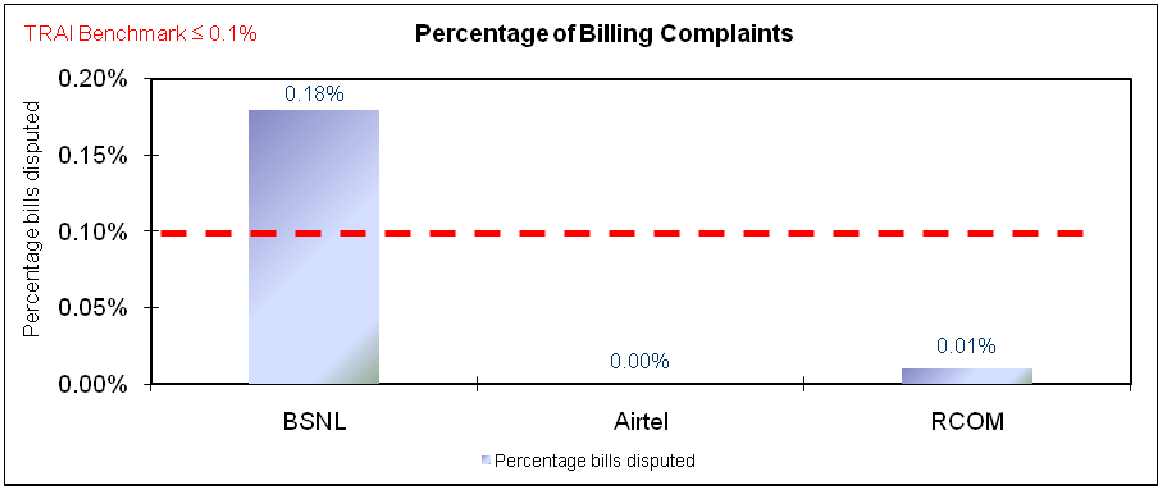
One month

All operators are meeting the benchmark

Live measurement

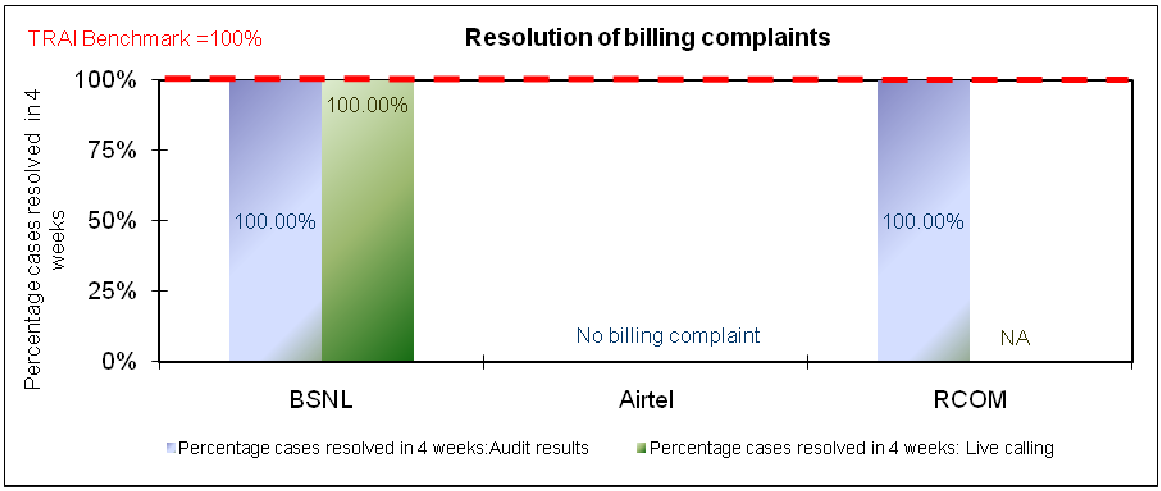
All operators are meeting the benchmark

Percentage bills disputed



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

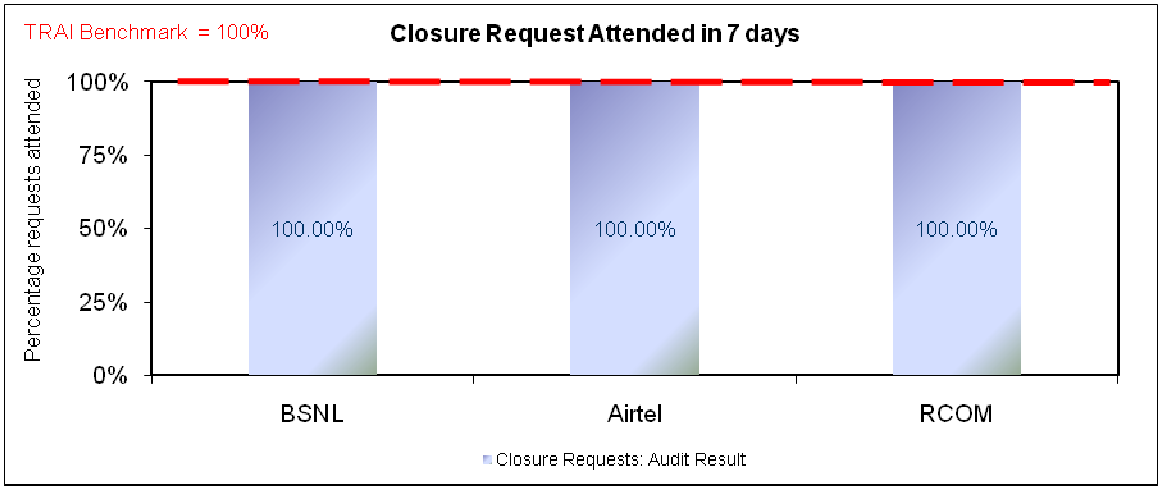
Resolution of billing complaints - postpaid (Comparison between one month audit results and live calling results)



One month
All operators are meeting the benchmark

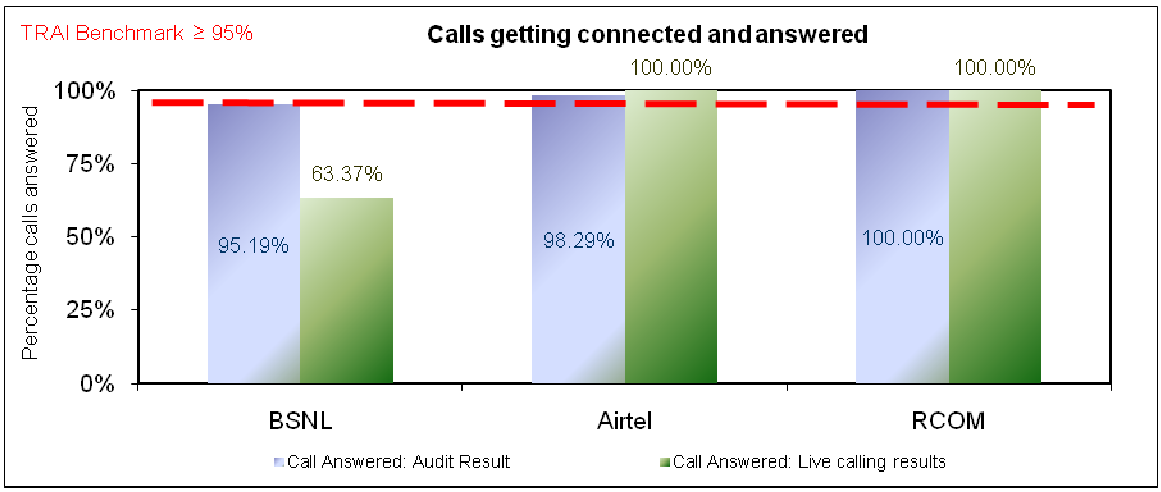
Live calling
All operators are meeting the benchmark

Closure requests attended within 7 days



All operators are meeting the benchmark

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



One month

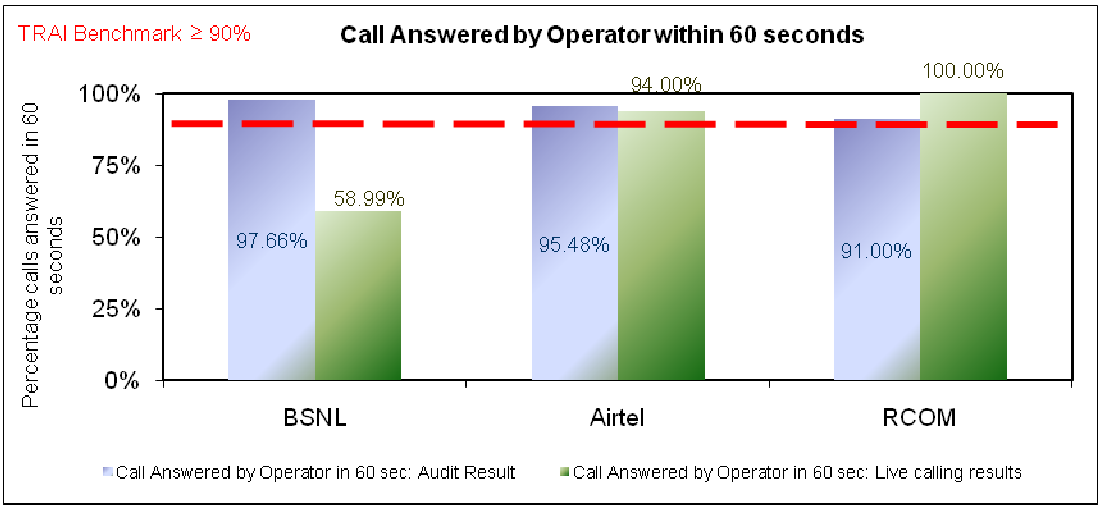
All operators are meeting the benchmark

Live calling

Operator meeting benchmark: Airtel, RCOM

Operator not meeting benchmark: BSNL

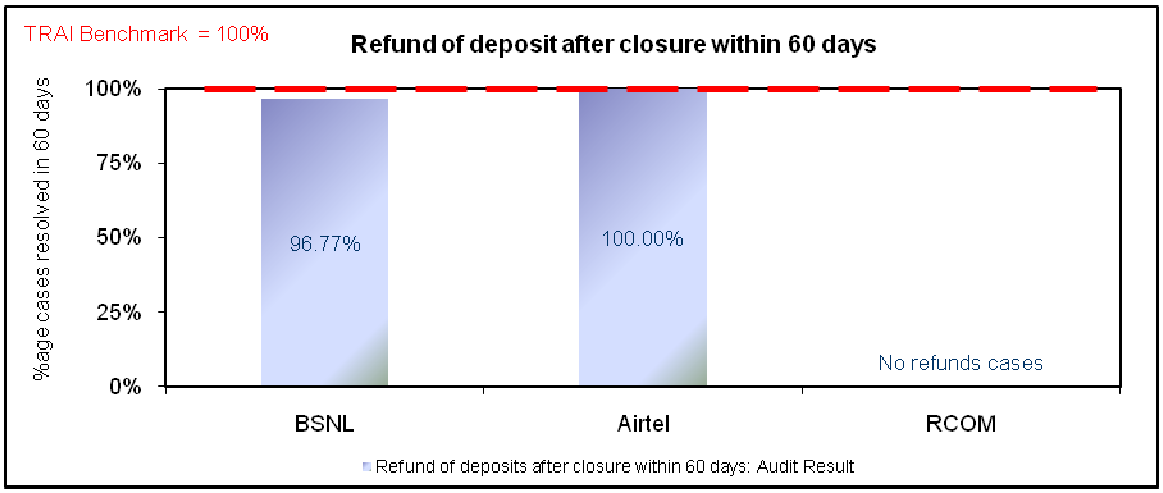
Response time to customer for assistance - Calls answered by the operator within 60 seconds (Comparison between one month audit results and live calling results)



One month
All operators are meeting the benchmark

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

Time taken to refund of deposits after closure



Operator meeting benchmark: Airtel
Operator not meeting benchmark: BSNL

7.0 Compliance reports: Results of Verification of Records

7.1 Basic (Wireline) services

Parameters	Benchmarks	BSNL*		Airtel		RCOM	
		PMR	IMRB	PMR	IMRB	PMR	IMRB
Faults incidences (No. of faults/100 Subs./month)	≤5	4.16	5.60	3.26	3.26	2.62	2.62
% of faults repaired by next working day	By next working day: ≥ 90%	94.92%	91.95%	95.70%	95.70%	100.00%	100.00%
Total No. of faults registered during the quarter		173961	55642	4995	4995	2762	2762
No. of faults repaired by next working day during the quarter		165112	51165	4780	4780	2762	2762
No. of faults repaired within 3 days during the quarter	For urban areas	127069	53190	4961	4961	2762	2762
% of faults repaired within 3 days	For urban areas: ≥ 100%	97.40%	95.59%	99.31%	99.31%	100.00%	100.00%
No. of faults repaired within 5 days during the quarter	For rural and hilly areas	43351	5383	0	0	NA	NA
% of faults repaired within 5 days	For rural and hilly areas:	99.60%	99.67%	NA	NA	NA	NA
Rent Rebate :	≥ 100%						
Faults pending for> 3days and ≤7 days	Rent Rebate for 7 days	457	9	63	63	10	10
Faults pending for > 7 days and ≤15 days	Rent Rebate for 15 days	464	38	44	44	3	3
Faults pending for > 15 days	Rent Rebate for 30 days	481	93	36	36	1	1
Mean Time to Repair (MTTR)	≤ 8 Hrs	6.80	10.90	7.43	7.43	1.10	1.10
Call Completion Rate (CCR)	≥ 55%	70.71%	57.22%	99.78%	99.78%	NA	NA
Total Number of successful local calls		DNA	4659804	53473154	53473154	NA	NA
Total local call attempts		DNA	8143842	53589447	53589447	NA	NA
Answer to Seizure Ratio (ASR)	≥ 75 %	NA	75.06%	NA	NA	86.74	86.74
Total I/C seizures		NA	14055151	NA	NA	86.74	86.74
No. of answered calls		NA	10549779	NA	NA	2261880	2261880
Point of Interconnection (POI) Congestion (No. of PoIs not meeting benchmark)	≤ 0.5%	9	0	0	0	0	0
Total number of working POI Service Area wise		NA	NA	DNA	DNA	100	100
Metering and billing credibility - post paid	Not more than 0.1%	0.01%	0.23%	4.63%	4.63%	0.09%	0.09%
No. of bills issued during the period		30000	714837	25321	25321	54914	54914
No. of bills disputed including billing complaints during the period		10	1643	1172	1172	47	47
Metering and billing credibility - pre paid	Not more than 0.1%	NA	NA	NA	NA	NA	NA
No. of charging / credit / validity complaints during the quarter		0	0	NA	NA	NA	NA

Total no. of pre-paid customers at the end of the quarter		0	0	NA	NA	NA	NA
Resolution of billing/ charging/ validity complaints	100% within 4 weeks	NA	100.00%	100.00%	100.00%	100.00%	100.00%
No. of billing/(post paid) and charging, credit / validity (pre paid) complaints resolved within 4 weeks during the quarter		0	1643	1172	1172	47	47
Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		0	1643	1172	1172	47	47
No. of billing complaints (post paid) and charging, credit/validity complaints (pre paid) resolved in favour of the customer during the quarter		1068	1407	2	2	47	47
No. of complaints disposed on account of not considered as valid complaints during the quarter		0	180	1170	1170	47	47
Period of applying credit/ waiver/ adjustment to customer's account from the date of resolution of complaints	within 1 week of resolution of complaint	NA	100%	100%	100%	100%	100%
Response time to the customer for assistance	≥ 95%	93.84%	86.43%	89.88%	89.88%	96.00%	96.00%
Accessibility of call centre/ customer care		DNA	3630	0	0	480405	480405
Total no. of call attempts to call centre / customer care nos. during TCBH		DNA	240	331997	331997	460381	460381
Percentage of calls answered by the operators (voice to voice) within 60 seconds	≥ 90%	100.00%	80.00%	90.00%	90.00%	92.00%	92.00%
Termination / closure of service	≤ 7 days						
%age requests for Termination / Closure of service complied within 7 days	100.00%	99.96%	100.00%	100.00%	100.00%	100.00%	100.00%
Total No. of requests for Termination / Closure of service received during the quarter		9614	2622	2616	2616	206	206
No.of requests for Termination / Closure of service complied within 7 days during the quarter		9611	2622	2616	2616	206	206
Time taken for refund of deposits after closures	100% within 60 days.	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 July to September 2009, there was significant variation observed when compared to the figures reported in the PMR

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. Most of the service providers were found not to meeting benchmark for fault repair within 3 working days, MTTR, billing credibility and Response time to customer for assistance

Section B
WIRELESS

8.0 Sampling methodology

8.1 Sampling for Cellular Mobile (Wireless) service providers

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

	Name of Operator
Operator 1	Vodafone
Operator 2	Idea
Operator 3	Airtel
Operator 4	Aircel
Operator 5	BSNL
Operator 6	DoCoMo
Operator 7	RCOM – GSM
Operator 8	Uninor
Operator 9	Tata CDMA
Operator 10	RCOM – CDMA

9.0 Audit methodology

9.1 Cellular Mobile Services

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

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

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

10.0 Executive Summary

The objective assessment of Quality of Services (QoS) was carried out by IMRB International for all the Cellular mobile service providers during the period starting from January 2010 to March 2010 in Uttar Pradesh (East) 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%				
Vodafone	2000-2100	7784	15855	0.27%	115	1.48%	95.77%	0.56%	1.48%	1.44%	1378	23323	5.91%	95.82%	0	64	393000	313000	7936000
Idea	1900-2000	4335	9579.36	0.30%	7	0.16%	99.05%	0.39%	1.05%	1.07%	974	13001	7.49%	97.80%	1	142	137087	80885	3212528
Airtel	2000-2100	6543	8023	0.16%	32	0.49%	99.21%	0.14%	0.34%	1.12%	862	19598	4.40%	98.00%	0	44	358385	260508	8382216
Aircel	1900-2000	1826	1490	0.11%	5	0.27%	98.28%	0.05%	0.52%	1.00%	747	5477	13.64%	96.32%	1	47	72077	7046	312195
BSNL	1900-2000	4220	22656	0.72%	269	6.37%	97.48%	0.07%	0.03%	0.96%	570	12660	4.50%	99.22%	0	84	16000	9535	216974
DoCoMo	1900-2000	1645	8151	0.67%	30	1.82%	99.04%	0.03%	0.09%	0.60%	124	4284	2.89%	98.95%	NA	NA	740231	8550	381949
RCOM - GSM	2000-2100	2816	11844	0.57%	39	1.38%	98.44%	0.03%	0.33%	0.58%	26	8448	0.31%	98.01%	7	142	DNA	DNA	DNA
Uninor	1900-2000	2128	43577	2.75%	647	30.40%	98.81%	0.02%	0.27%	1.21%	2985	183462	1.63%	97.05%	4	25	76900	10155	226488
Tata CDMA	1900-2000	836	1466	0.24%	0	0.00%	98.28%	0.00%	0.07%	0.69%	18	2512	0.72%	98.49%	0	95	189871	47845	750557
RCOM - CDMA	2000-2100	2191	6290	0.39%	12	0.55%	98.34%	0.00%	0.50%	0.97%	13	2191	0.59%	97.66%	7	142	348000	141007	3163884

*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 Uttar Pradesh (East) 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
Vodafone	2000-2100 Hrs.	2000-2100 Hrs.
Idea	1900-2000 Hrs.	1900-2000 Hrs.
Airtel	2000-2100 Hrs.	2000-2100 Hrs.
Aircel	1900-2000 Hrs.	1900-2000 Hrs.
BSNL	1900-2000 Hrs.	1900-2000 Hrs.
DoCoMo	1900-2000 Hrs.	1900-2000 Hrs.
RCOM – GSM	2000-2100 Hrs.	2000-2100 Hrs
Uninor	2000-2100 Hrs.	1900-2000 Hrs.
Tata CDMA	1900-2000 Hrs.	1900-2000 Hrs.
RCOM – CDMA	2000-2100 Hrs.	2000-2100 Hrs

The TCBH reported by all the service providers except Uninor matched the network busy hour calculated by IMRB auditors for the Uttar Pradesh (East) circle.

BTSs Accumulated Downtime:

In the Uttar Pradesh (East) circle, BSNL and Uninor failed to meet the benchmark for Worst effected BTSs due to downtime with 6.37% and 30.40% of the BTSs having downtime of more than 24 hrs.

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 Airtel with 99.21% of their calls getting completed. Except Reliance, all other operators were found to be calculating the parameter as per the norm specified by TRAI. Reliance was found to be reporting Traffic Channel Allocation Success Ratio (TASR). IMRB auditors communicated the correct way of measuring the parameter and also asked them to submit the details as per the correct methodology from next month onwards. CSSR was computed as the ratio of total number of successful call attempts (establishment) to the total number of call attempts made.

Network Congestion parameters:

SDCCH / Paging Channel Congestion, TCH and POI are part of the network congestion parameters. All the operators are meeting the TRAI specified benchmarks for TCH and SDCCH/Paging channel congestion parameters. TATA CDMA leads the way in network congestion parameters with almost negligible paging as well as traffic channel congestion. The calculation methodology of these parameters was found to be in complete accordance with what has been specified by TRAI. Both RCOM CDMA and Tata Teleservices measure paging channel utilization. When the value of this parameter is less than 100%, it is counted as 0% congestion. Number of

POIs with congestion more than the benchmark (≤0.5%) for 1 POI each of Idea and Aircel, 4 of Uninor and 7 of Reliance (GSM and CDMA).

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 Reliance GSM at 0.58%.

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, BSNL, DoCoMo and Tata CDMA failed to meet the benchmark score for calls getting connected and answered by IVR. For calls answered by the operator within 60 seconds, Idea, Aircel and Tata CDMA were the only operators meeting the TRAI benchmark.

Billing performance

All the operators were found to be meeting the benchmark of ≤ 0.1% complaints registered per 100 bills issued except Vodafone for postpaid and DoCoMo and Uninor for Prepaid. All the operators were found to be meeting the benchmark score of 100% billing complaints being resolved within 4 weeks. However Tata CDMA failed to meet the TRAI benchmark of 100% with 1 week.

Inter operator calls assessment

Inter operator call Assessment To ↓ From →	Vodafone	Idea	Airtel	Aircel	BSNL	DoCoMo	RCOM - GSM	Uninor	Tata CDMA	RCOM - CDMA
Vodafone	NA	97%	95%	91%	91%	89%	93%	96%	90%	90%
Idea	88%	NA	95%	85%	90%	91%	91%	95%	87%	90%
Airtel	96%	95%	NA	87%	96%	90%	92%	90%	90%	91%
Aircel	90%	96%	95%	NA	92%	93%	95%	90%	92%	91%
BSNL	87%	97%	95%	88%	NA	93%	94%	95%	97%	92%
DoCoMo	89%	97%	95%	89%	93%	NA	91%	87%	87%	93%
RCOM - GSM	87%	96%	97%	86%	97%	94%	NA	96%	86%	93%
Uninor	90%	96%	95%	88%	93%	92%	90%	NA	92%	89%
Tata CDMA	96%	96%	97%	95%	96%	93%	95%	96%	NA	96%
RCOM - CDMA	99%	96%	94%	95%	93%	94%	92%	93%	93%	NA

The maximum problem faced by the calling operator to other operators

In the inter-operator call assessment, calls were made from the test SIMs of service provider whose audit was being conducted to all the other service providers. Aircel and BSNL found it tough connecting to an Idea number. From Vodafone, only 87 out of 100 calls got connected to BSNL and RCOM GSM number.

Results of Operator assisted Drive test

The drive test was conducted simultaneously for all the operators present in the Uttar Pradesh (East) circle. There was in total of three drive tests conducted in the circle. These tests were conducted in the cities of Lucknow, Kanpur and Barabanki city. 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 Uttar Pradesh (East) 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 Uttar Pradesh (East) circle were conducted in the cities of Lucknow, Kanpur and Barabanki city was conducted along the following route:

	Type of location	Lucknow	Kanpur	Barabanki City
Outdoor	Periphery of the city	Indira Nagar, West end mall, Vivek Khand, River side mall, Dilkush, Amausi Airport	Koyala Nagar, Yashoda Nagar, Keshav Nagar, Barra, Gujaini, Panki, Avash Vikas, Kalyanpur, Indira Nagar	Somia Nagar, Abhay Nagar, Barel, Paisar, Dasharabag, Fatahbad
	Congested area	West end mall, Indira Nagar, Nirala Nagar, Royal heritage, High court, Aminabad	Generalganj, Mall Road, Civil Line, The Landmark, Chunniganj, Tilak Nagar, Swaroop Nagar, RK Nagar, Sarojini Nagar, Lajpat Nagar, Vijay Nagar, Govind Nagar, Saket Nagar	From Station to Ghantaghar, to Chaya Cinema hall, to Kamal Talkies, Then back to Chaya Cinema Hall
	Across the city	Amausi 'airport, Nadarganj, TP Nagar, Alambag, Hussainganj, Mahanagar, Nishatganj, Fun Republic	Naubasta, Kidwai Nagar, TP Nagar, Jakar Patti, General Gan, Mall Road, Civil Line, Gwaltoil, Nawab Ganj, Klyanpur	Lucknow to Barabanki Road
Indoor	Office complex	Pickup Building	Sky Tower	BSNL Office
	Shopping complex	Fun (Shopping Mall)	G Mail	Vishal Mega Mart

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

Drive Test – Lucknow

	Benchmark	Vodafone		Idea		Airtel		Aircel		BSNL		DoCoMo		RCOM - GSM		Uninor		Tata CDMA		RCOM - CDMA	
		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%	99.21%	94.98%	98.91%	95.41%	98.57%	95.73%	99.54%	95.00%	97.33%	94.30%	99.42%	95.77%	98.27%	98.22%	99.30%	95.97%	98.56%	99.81%	99.31%	97.58%
CSSR	≥ 95%	100.00 %	100.00%	98.41%	97.52%	100.00 %	100.00%	100.00 %	99.31%	100.00 %	99.24%	100.00 %	98.80%	100.00 %	97.78%	100.00 %	99.38%	100.00 %	99.26%	100.00 %	96.30%
%age Blocked calls		0.00%	0.00%	1.59%	2.48%	0.00%	0.00%	0.00%	0.69%	0.00%	0.76%	0.00%	1.20%	0.00%	2.22%	0.00%	0.62%	0.00%	0.74%	0.00%	3.70%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.49%	0.00%	0.00%	0.60%	0.00%	3.17%	0.00%	0.63%	0.00%	0.00%	0.00%	1.59%
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 %	99.49%	100.00 %	100.00%	100.00 %	99.69%	100.00 %	100.00%	100.00 %	100.00%

Drive Test – Kanpur

	Benchmark	Vodafone		Idea		Airtel		Aircel		BSNL		DoCoMo		RCOM – GSM		Uninor		Tata CDMA		RCOM - CDMA	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	≥ 95%	98.63%	94.03%	99.78%	96.42%	97.83%	96.31%	97.92%	94.60%	94.98%	94.24%	99.60%	96.05%	97.46%	98.08%	99.06%	94.75%	100.00 %	99.53%	98.76%	96.67%
CSSR	≥ 95%	100.00 %	99.30%	100.00 %	97.99%	100.00 %	100.00%	100.00 %	97.48%	91.38%	92.65%	100.00 %	99.37%	100.00 %	98.68%	100.00 %	98.03%	100.00 %	99.26%	100.00 %	100.00%
%age Blocked calls		0.00%	0.70%	0.00%	2.01%	0.00%	0.00%	0.00%	2.52%	8.62%	7.35%	0.00%	0.63%	0.00%	1.32%	0.00%	1.97%	0.00%	0.74%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.65%	0.47%	1.59%	0.00%	1.91%	0.00%	1.52%	0.00%	1.34%	0.00%	0.00%	0.00%	1.18%
Hands off success rate		100.00 %	100.00%	100.00 %	100.00%	100.00 %	100.00%	100.00 %	99.57%	100.00 %	100.00%	100.00 %	97.17%	100.00 %	100.00%	100.00 %	99.50%	100.00 %	100.00%	100.00 %	100.00%

Drive Test – Barabanki City

	Benchmark	Vodafone		Idea		Airtel		Aircel		BSNL		DoCoMo		RCOM - GSM		Uninor		Tata CDMA		RCOM - CDMA	
		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%	99.06%	97.08%	99.12%	96.97%	99.26%	98.69%	99.30%	95.13%	98.89%	95.02%	99.33%	96.91%	98.46%	98.09%	98.17%	96.69%	100.00%	99.98%	99.94%	99.69%
CSSR	≥ 95%	100.00%	100.00%	97.83%	100.00%	100.00%	100.00%	100.00%	97.54%	100.00%	99.17%	100.00%	99.13%	100.00%	97.81%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls		0.00%	0.00%	2.17%	0.00%	0.00%	0.00%	0.00%	2.46%	0.00%	0.83%	0.00%	0.87%	0.00%	2.19%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.84%	0.00%	0.84%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.59%	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

Lucknow: There was interference and low signal strength recorded for Aircel around Polytechnic, Cantt area, hanuman Setu, Alambagh chowk and Mavaiya and for DoCoMo in Cantt area.

Conclusions:
Drive test was conducted by IMRB with the help of service providers to measure this parameter.

1. Vodafone and BSNL failed to meet the benchmark for Voice quality in both Lucknow and Kanpur
2. RCOM GSM does not meet the TRAI benchmark on call drop rate in Lucknow
3. Aircel and Uninor failed to meet the benchmark for voice quality in Kanpur
4. BSNL also failed to meet the benchmark for CSSR in Kanpur

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%**
Vodafone	96.28%	0.58%	2.04%	1.68%	6.69%	96.57%	92.00%	100.00%	99.00%
Idea	99.43%	0.54%	1.81%	0.72%	4.57%	97.49%	88.00%	100.00%	97.00%
Airtel	99.21%	0.01%	0.32%	1.11%	3.88%	97.48%	66.67%	100.00%	98.00%
Aircel	98.31%	0.11%	0.36%	0.99%	13.46%	96.42%	75.00%	100.00%	100.00%
BSNL	96.55%	0.07%	0.09%	0.77%	1.81%	95.70%	NA	100.00%	10.00%
DoCoMo	98.82%	0.06%	0.01%	0.65%	2.78%	97.06%	100.00%	100.00%	93.00%
RCOM - GSM	98.93%	0.17%	0.42%	0.75%	0.63%	98.11%	80.00%	100.00%	96.00%
Uninor	99.18%	0.02%	0.06%	0.83%	8.28%	96.70%	81.00%	100.00%	95.00%
Tata CDMA	98.29%	0.00%	0.04%	0.63%	0.64%	99.66%	78.67%	100.00%	97.00%
RCOM - CDMA	98.05%	NA	0.55%	1.06%	1.16%	98.29%	93.33%	100.00%	94.00%

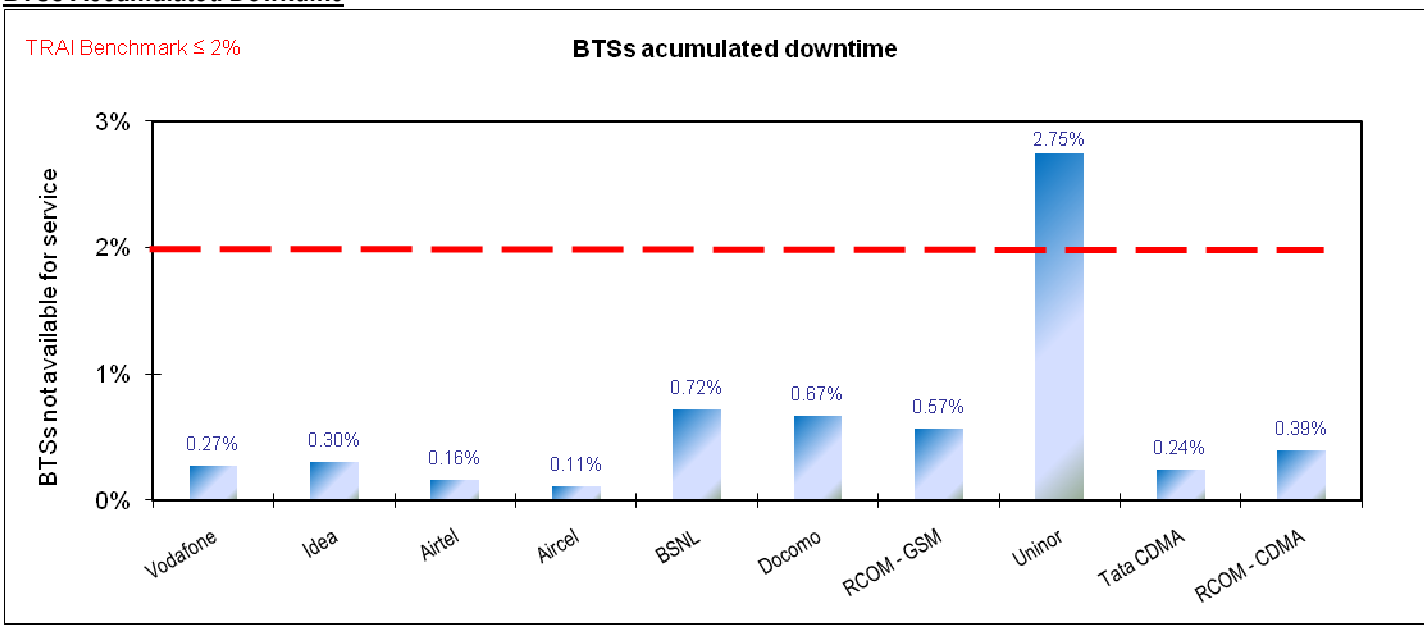
Not meeting the benchmark

* Based on operator assisted drive tests conducted by IMRB

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

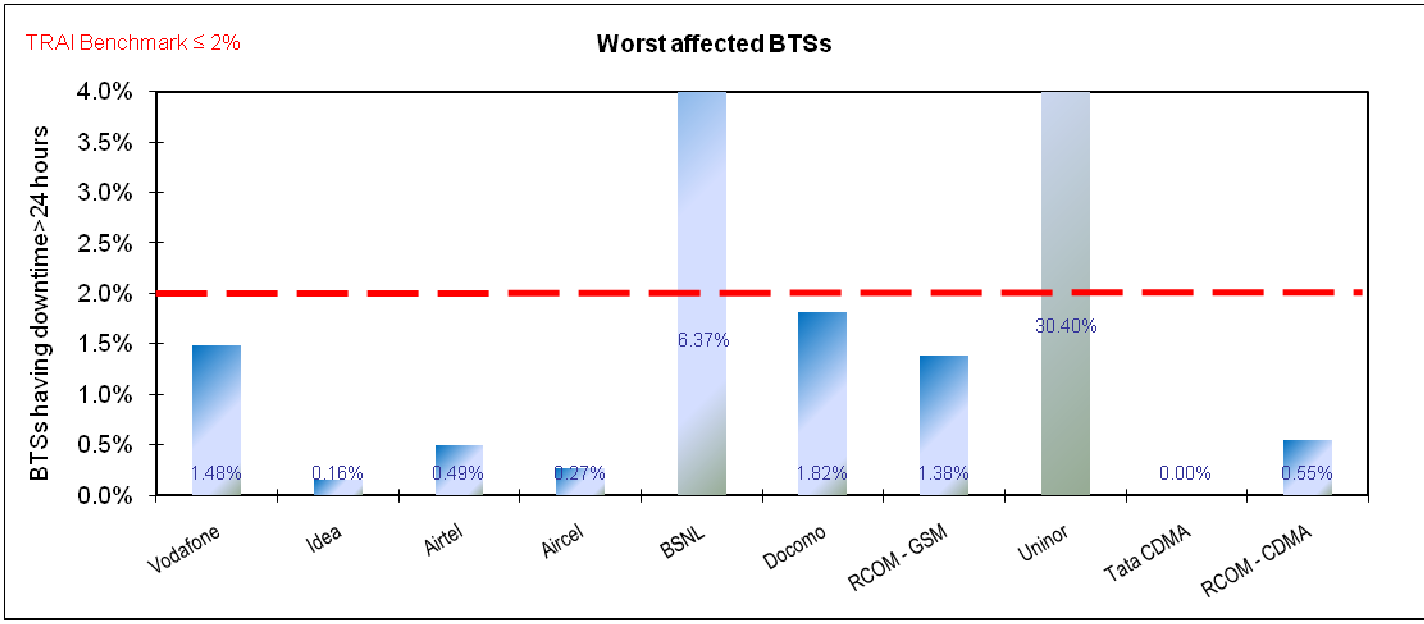
11.1 Graphical/Tabular Representations for Cellular Mobile Services

BTSs Accumulated Downtime



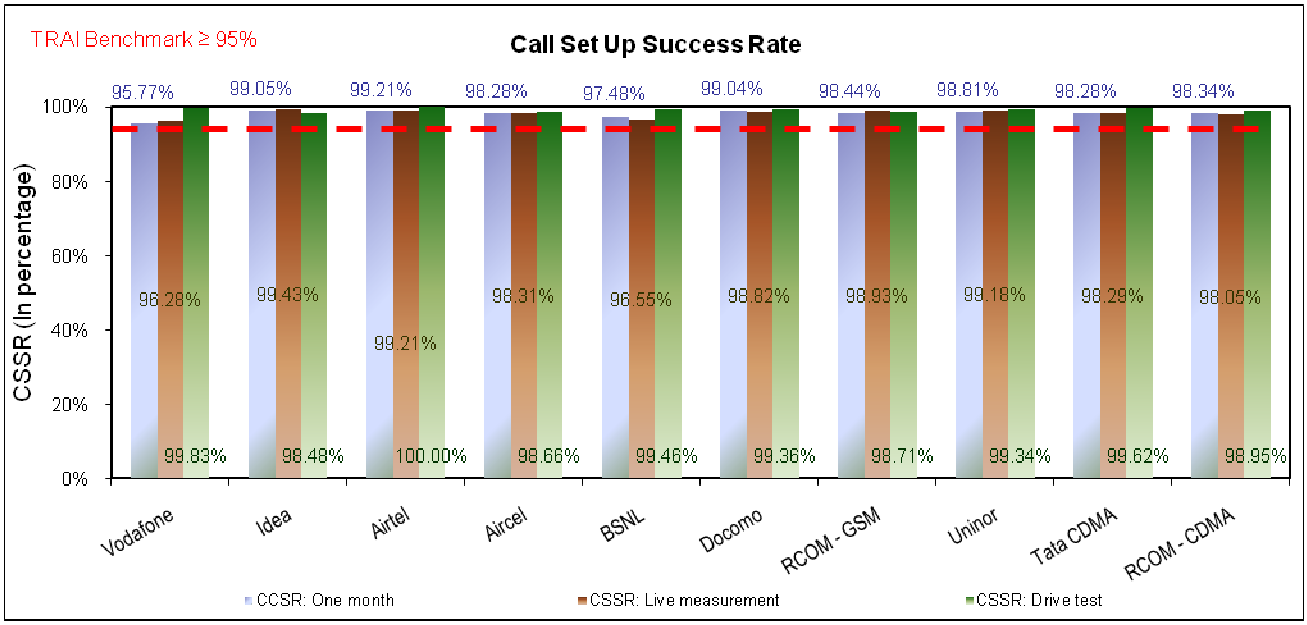
Operator(s) meeting benchmark: Vodafone, Idea, Airtel, Aircel, BSNL, DoCoMo, RCOM - GSM, Tata CDMA, RCOM - CDMA
Operator(s) not meeting the benchmark: Uninor

Worst Affected BTSs



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

Call Set-up Success Rate (CSSR)



One month

All the operators meet the benchmark

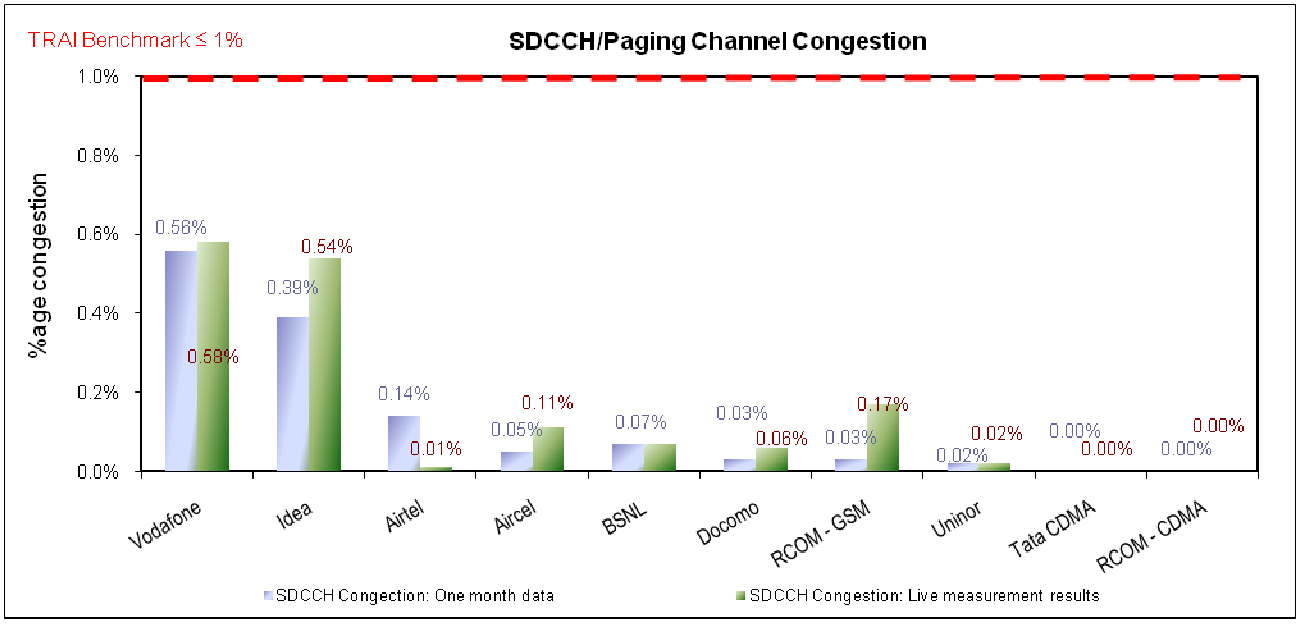
Live measurement

All the operators meet the benchmark

Drive test

All the operators meet the benchmark

SDCCH / Paging Channel Congestion



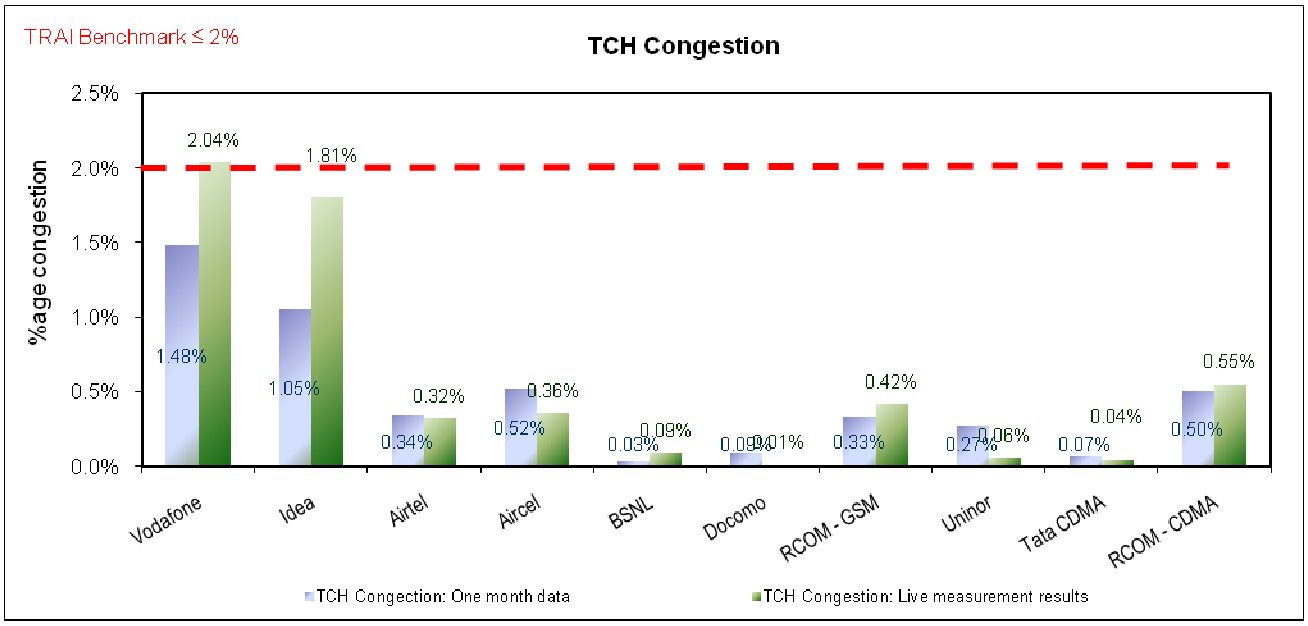
One month

All the operators meet the benchmark

Live measurement

All the operators meet the benchmark

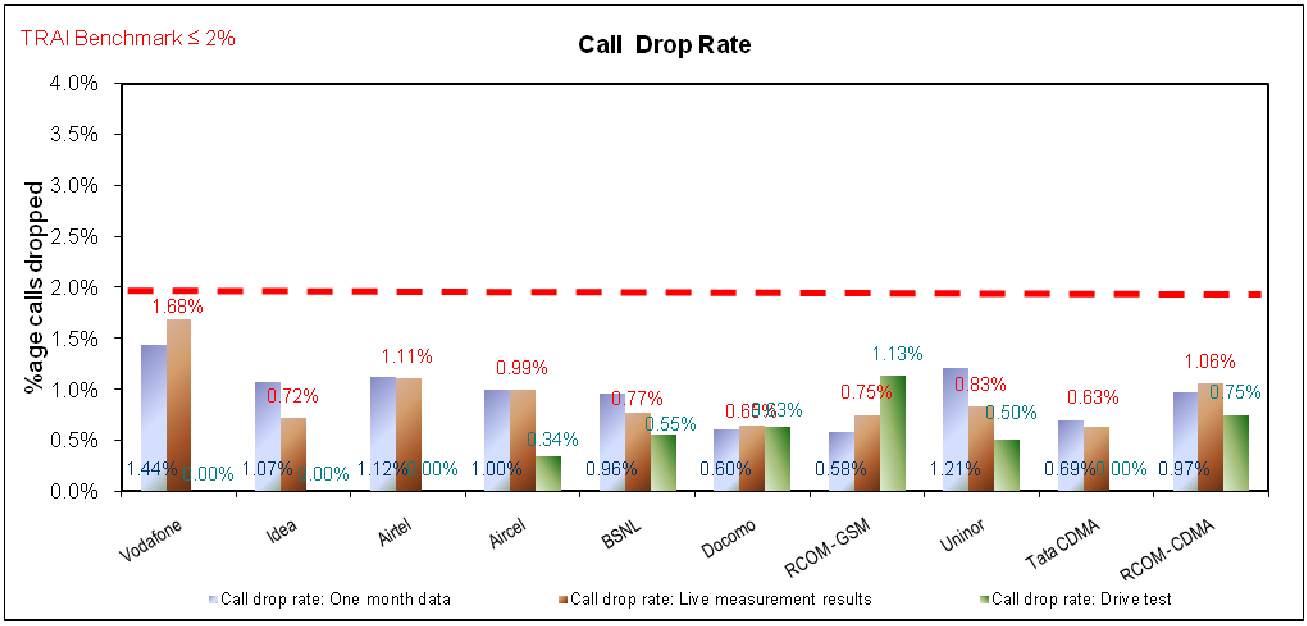
TCH Congestion



One month
All the operators meet the benchmark

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

Call Drop Rate

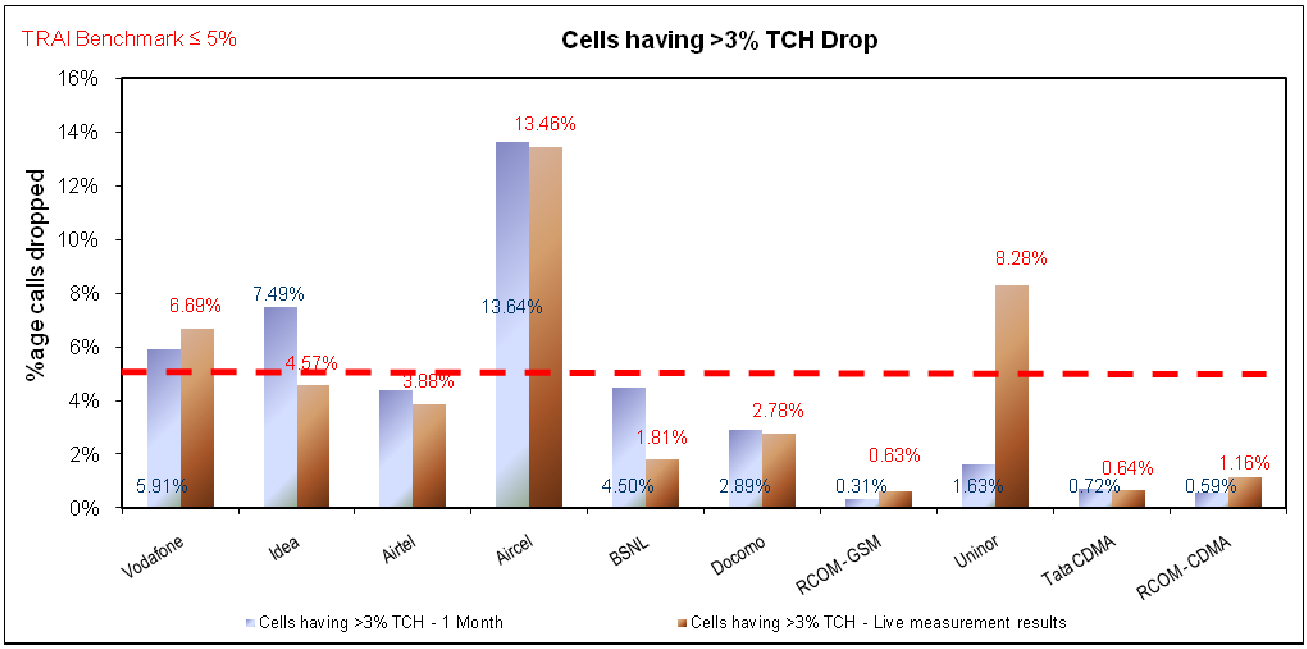


One month
All the operators meet the benchmark

Live measurement
All the operators meet the benchmark

Drive test
All the operators meet the benchmark

Cells with more than 3% Call Drop Rate



One month

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

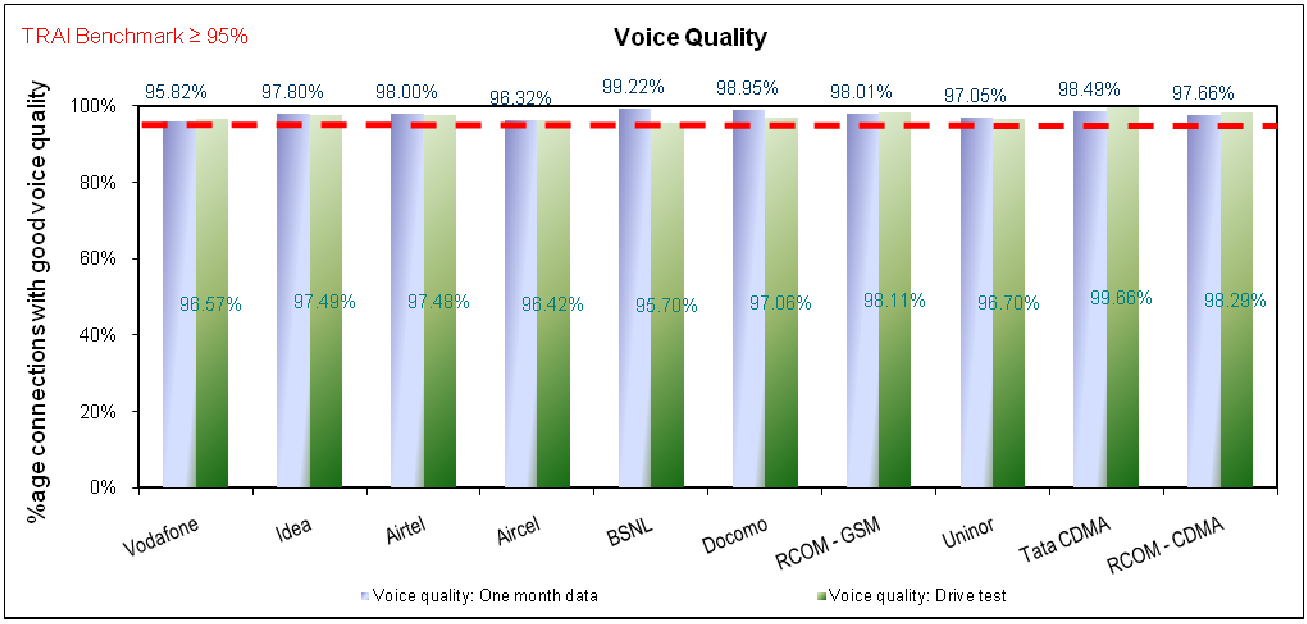
Operator(s) not meeting the benchmark: Vodafone, Idea, Aircel

Live measurement

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

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

Voice quality



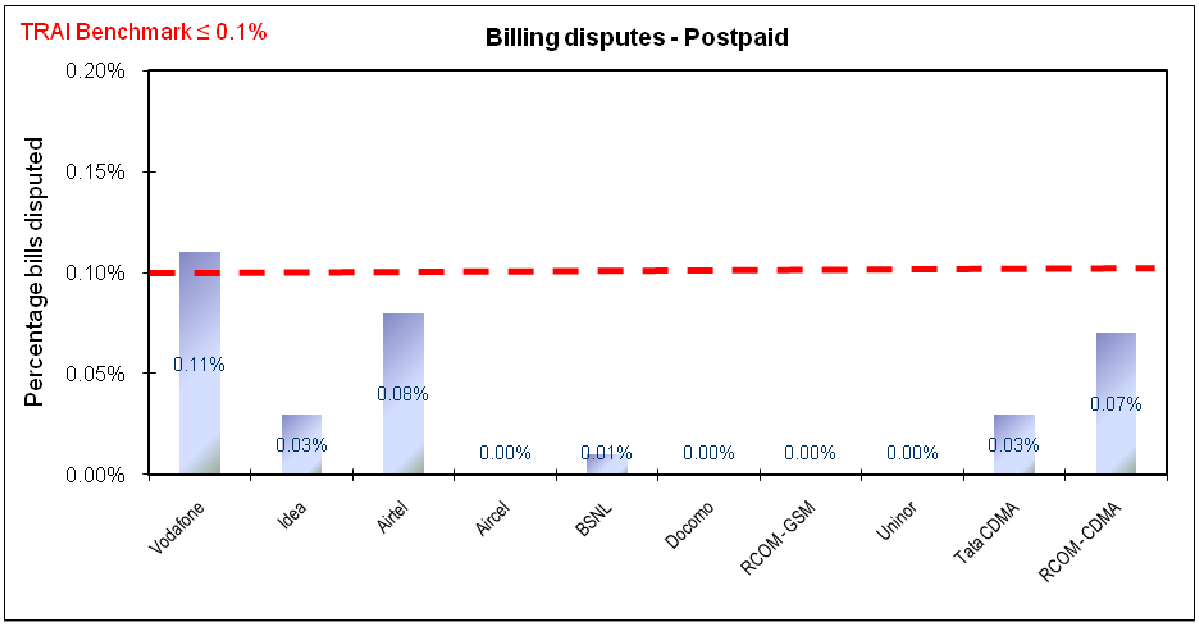
One month

All the operators meet the benchmark

Live measurement (Drive test)

All the operators meet the benchmark

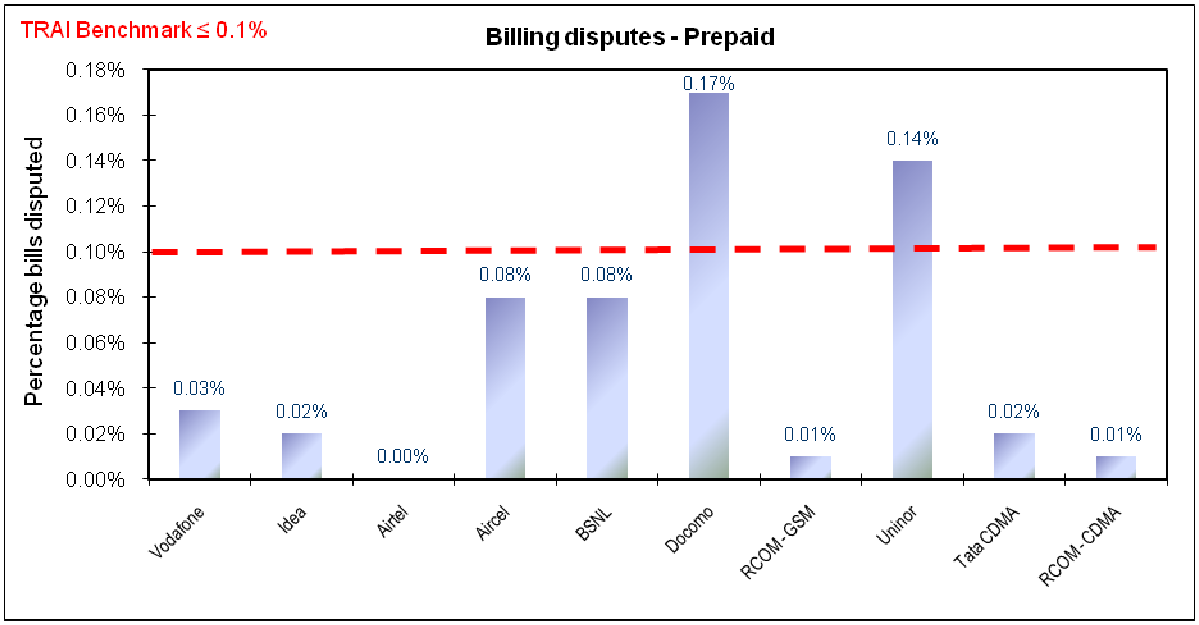
Billing Disputes - Postpaid



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

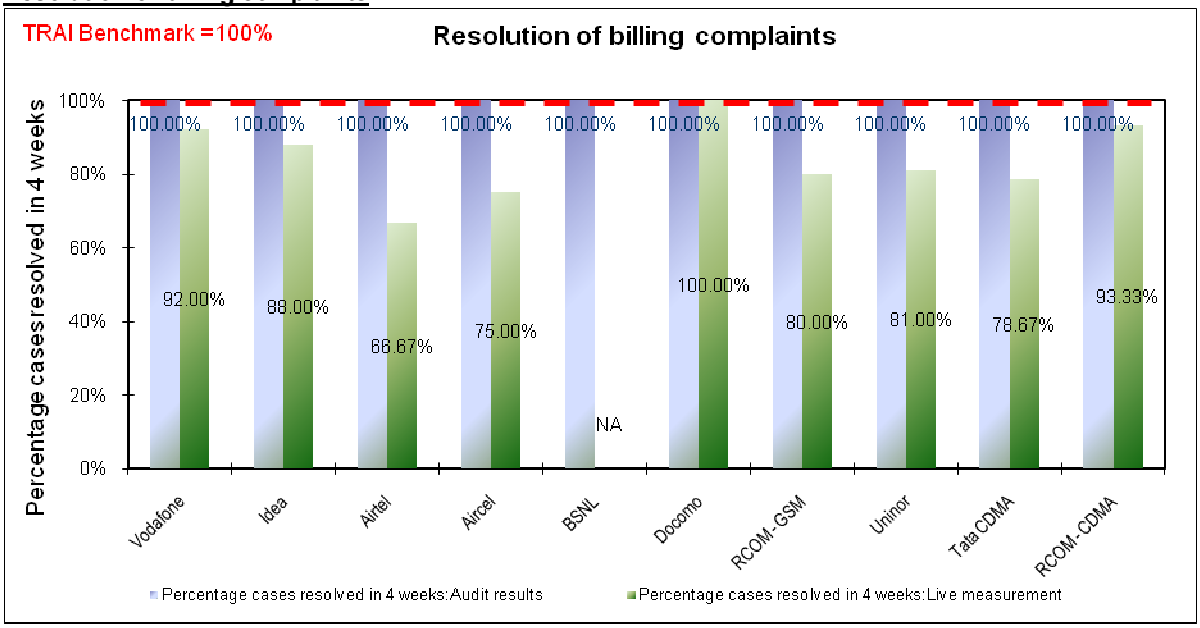
Operator(s) not meeting the benchmark: Vodafone

Complaints - Prepaid



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

Resolution of billing complaints



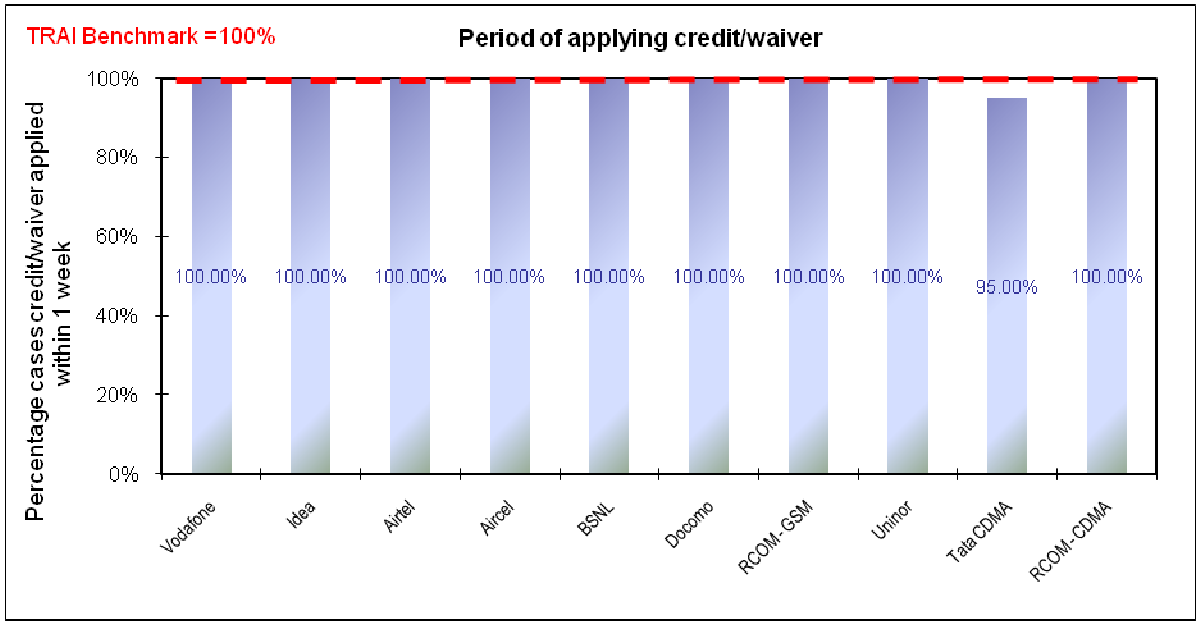
One month
All the operators meet the benchmark

Live measurement

Operator(s) meeting benchmark: DoCoMo

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

Period of applying credit / waiver



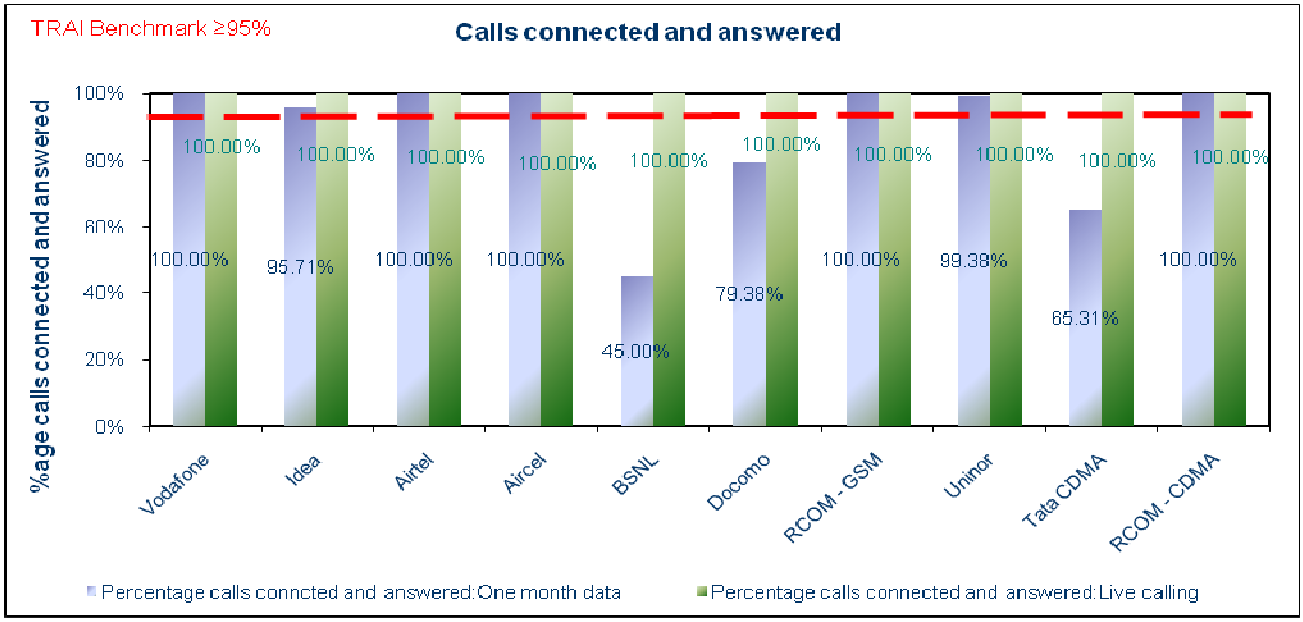
Operator(s) meeting benchmark: Vodafone, Idea, Airtel, Aircel, BSNL, DoCoMo, RCOM - GSM, Uninor, RCOM - CDMA

Operator(s) not meeting the benchmark: Tata CDMA

Live calling for billing Complaints

Resolution of billing complaints	Benchmark	Vodafone	Idea	Airtel	Aircel	BSNL	DoCoMo	RCOM - GSM	Uninor	Tata CDMA	RCOM - CDMA
Total Number of calls made		100	100	36	100	NA	3	5	100	75	30
Number of cases resolved in 4 weeks		92	88	24	75	NA	3	4	81	59	28
Percentage cases resolved in four weeks	100%	92.00%	88.00%	66.67%	75.00%	NA	100.00%	80.00%	81.00%	78.67%	93.33%

Customer Care / Helpline: Calls answered



One month

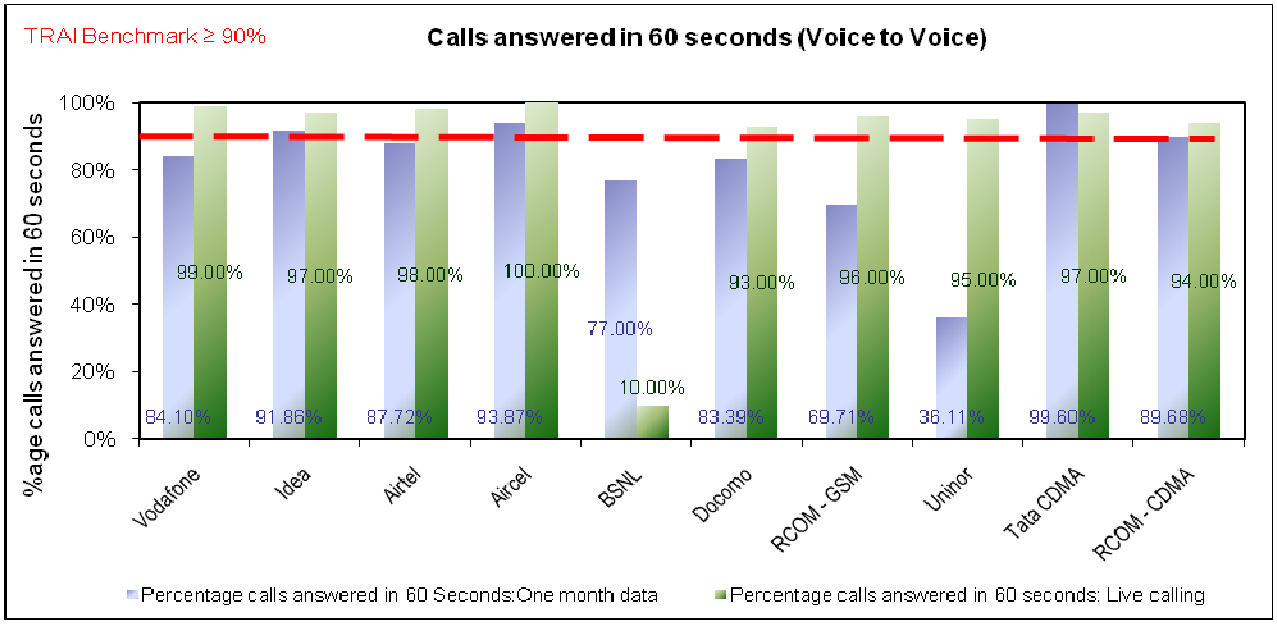
Operator(s) meeting benchmark: Vodafone, Idea, Airtel, Aircel, RCOM - GSM, Uninor, RCOM - CDMA

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

Live measurement

All the operators meet the benchmark

Customer Care / Helpline: Calls answered voice to voice



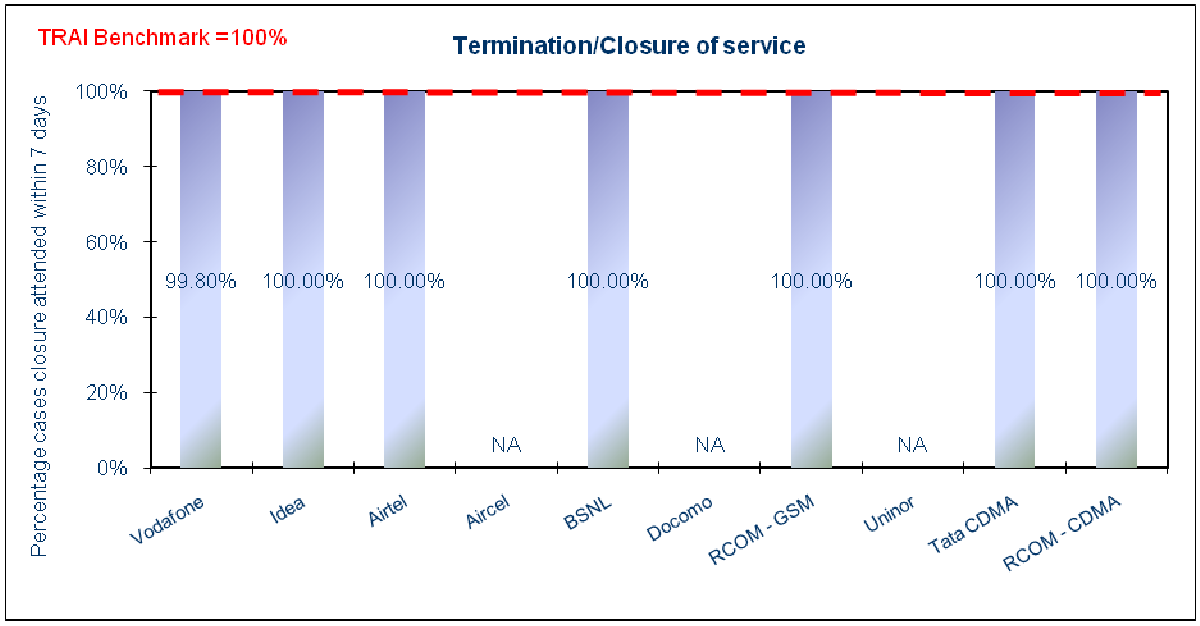
One month

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

Live measurement

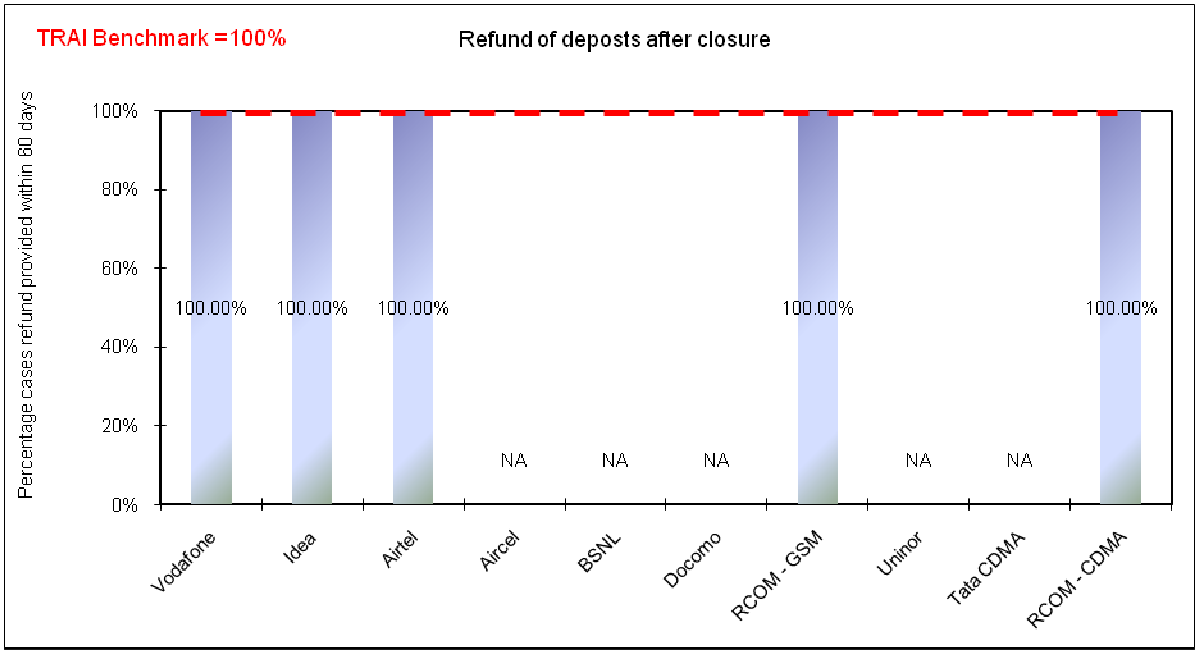
Operator(s) meeting benchmark: Vodafone, Idea, Airtel, Aircel, DoCoMo, RCOM - GSM, Uninor, Tata CDMA, RCOM - CDMA
Operator(s) not meeting the benchmark: BSNL

Termination / Closure of service



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

Refund of deposits



All the operators meet the benchmark

Inter operator calls assessment

Inter operator call Assessment To ↓ From →	Vodafone	Idea	Airtel	Aircel	BSNL	DoCoMo	RCOM - GSM	Uninor	Tata CDMA	RCOM - CDMA
Vodafone	NA	97%	95%	91%	91%	89%	93%	96%	90%	90%
Idea	88%	NA	95%	85%	90%	91%	91%	95%	87%	90%
Airtel	96%	95%	NA	87%	96%	90%	92%	90%	90%	91%
Aircel	90%	96%	95%	NA	92%	93%	95%	90%	92%	91%
BSNL	87%	97%	95%	88%	NA	93%	94%	95%	97%	92%
DoCoMo	89%	97%	95%	89%	93%	NA	91%	87%	87%	93%
RCOM - GSM	87%	96%	97%	86%	97%	94%	NA	96%	86%	93%
Uninor	90%	96%	95%	88%	93%	92%	90%	NA	92%	89%
Tata CDMA	96%	96%	97%	95%	96%	93%	95%	96%	NA	96%
RCOM - CDMA	99%	96%	94%	95%	93%	94%	92%	93%	93%	NA

The maximum problem faced by the calling operator to other operators

In the inter-operator call assessment, calls were made from the test SIMs of service provider whose audit was being conducted to all the other service providers. Aircel and BSNL found it tough connecting to an Idea number. From Vodafone, only 87 out of 100 calls got connected to BSNL and RCOM GSM number.

12.0 Compliance reports: Results of Verification of PMR

12.1 Cellular Mobile services

Name of Service Provider		Network availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)			POI	Metering and Billing				Response time to customer for assistance		Termination of service	
		BTSs Accumulated downtime	Worst affected BTSs due to downtime	Call Set-up Success Rate	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality	Point of Interconnection (POI) Congestion	Metering and billing credibility - Postpaid	Metering and billing credibility - Prepaid	%age complaints resolved within 4 weeks	Period of applying credit/waiver less than 1 week	Accessibility of call centre/ customer care	%age of calls answered by the operators within 60 sec	%age requests for Termination within 7 days	Refund of deposits after closure within 60 days
Benchmark		**≤ 2%**	**≤ 2%**	**≥ 95%**	**≤ 1%**	**≤ 2%**	**≤ 2%**	**≤ 5%**	**≥ 95%**	**≤ 0.5%**	**≤ 0.1%**	**≤ 0.1%**	**100%**	**100%**	**≥ 95%**	**≥ 90%**	**100%**	**100%**
Vodafone	PMR	0.20%	2.28%	97.26%	0.67%	1.36%	1.71%	4.05%	95.51%	0.00%	0.10%	0.07%	100.00%	100.00%	99.00%	99.00%	100.00%	100.00%
	IMRB	1.00%	2.00%	97.26%	0.67%	1.36%	1.71%	6.00%	95.51%	0.00%	0.10%	0.10%	100.00%	100.00%	99.00%	95.00%	100.00%	100.00%
Idea	PMR	0.37%	0.41%	99.75%	0.30%	0.95%	0.95%	7.04%	96.61%	0.00%	0.02%	0.01%	100.00%	100.00%	98.80%	96.00%	100.00%	100.00%
	IMRB	0.27%	0.15%	99.54%	0.33%	1.04%	1.00%	7.56%	96.40%	0.00%	0.05%	0.01%	100.00%	100.00%	99.00%	96.00%	100.00%	100.00%
Airtel	PMR	0.67%	4.05%	95.38%	1.07%	1.66%	2.05%	19.49%	91.33%	0.33%	0.02%	0.01%	100.00%	100.00%	83.28%	88.00%	99.00%	100.00%
	IMRB	0.67%	4.05%	95.38%	1.07%	1.66%	2.05%	19.49%	91.33%	0.41%	0.02%	0.01%	100.00%	100.00%	83.28%	88.27%	98.00%	100.00%
Aircel	PMR	0.49%	1.32%	97.83%	0.04%	0.15%	0.86%	14.43%	95.88%	0.00%	NA	0.70%	NA	100.00%	100.00%	71.00%	NA	NA
	IMRB	0.48%	1.31%	96.45%	0.19%	0.20%	1.20%	14.43%	89.77%	0.00%	NA	0.70%	100.00%	0.00%	77.00%	71.00%	NA	NA
BSNL	PMR	0.64%	7.12%	97.00%	0.69%	1.50%	1.53%	3.50%	96.67%	0.33%	0.00%	0.00%	100.00%	100.00%	100.00%	92.00%	100.00%	100.00%
	IMRB	DNP	DNP	98.00%	0.60%	1.40%	1.50%	0.00%	97.00%	0.30%	0.08%	0.09%	100.00%	100.00%	100.00%	92.00%	100.00%	100.00%
Tata CDMA	PMR	0.37%	0.23%	98.24%	0.00%	0.07%	0.76%	0.75%	98.53%	0.00%	0.04%	0.02%	100.00%	100.00%	97.00%	76.00%	93.75%	100.00%
	IMRB	0.05%	0.00%	98.54%	0.00%	0.02%	0.66%	0.69%	99.15%	0.00%	0.04%	0.02%	100.00%	100.00%	97.00%	82.00%	93.75%	96.66%
RCOM - CDMA	PMR	0.32%	0.97%	98.92%	0.00%	0.47%	1.06%	0.85%	99.69%	0.00%	0.10%	0.01%	100.00%	100.00%	87.00%	72.00%	100.00%	100.00%
	IMRB	0.32%	0.97%	98.92%	0.00%	0.47%	1.06%	0.85%	99.69%	0.00%	0.10%	0.01%	100.00%	100.00%	70.00%	72.00%	100.00%	100.00%

Figures do not match with those reported in PMR

Figures verified on all India basis

Not meeting benchmark

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

13.0 Conclusions

13.1 Cellular Mobile services

1. Discrepancies were found in data reported by TRAI and that found by IMRB auditors for almost all the operators
2. For BSNL, Aircel and Idea, discrepancies were found in almost all the network related parameters

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

- For Reliance, the data pertaining to all parameters was obtained by IMRB Auditors at the central NOC in Mumbai.

- Following Broadband service providers were Audited in UP (East) circle:

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

15.0 Audit methodology

15.1 Broadband Services

In a nutshell, the audit methodology was as follows:

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

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

16.0 Executive Summary

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

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

Parameters	Benchmarks	BSNL	Airtel	RCOM	Sify
Service provisioning uptime					
Percentage connections provided within 15 days	100%	84.18%	98.46%	100.00%	100.00%
Fault repair restoration time					
Percentage faults repaired by next working days	> 90%	86.18%	98.69%	100.00%	90.48%
Percentage faults repaired within three working days	> 99%	99.33%	100.00%	100.00%	100.00%
Billing performance					
Billing complaints per 100 bills issued	< 2%	0.67%	0.00%	0.11%	NA
%age of billing complaints resolved in 4 weeks	100%	97.00%	NA	100.00%	NA
%age cases in which refund of deposits after closure was made in 60 days	100%	91.21%	NA	100.00%	NA
Customer care/helpline assessment (Voice to Voice)					
Percentage calls answered within 60 seconds	> 60%	96.67%	96.24%	82.00%	100.00%
Percentage calls answered within 90 seconds	> 80%	96.67%	98.29%	84.00%	100.00%
Bandwidth utilization/Throughput					
Intra network links (POP to ISP Node)		152	45	19	420
Total number of intra network links > 90%		4	0	0	0
Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)		296	12	9	23
Percentage bandwidth utilized on upstream links	< 80%	80.44%	81.46%	39.84%	87.33%
Broadband download speed	> 80%	90.00%	100.00%	91.00%	95.00%
Service availability/uptime	> 98%	99.82%	100.00%	100.00%	100.00%
Packet loss	< 1%	0.00%	0.00%	0.15%	0.00%
Network Latency					
POP/ISP Node to NIXI	< 120 msec	20	0	0	< 45
ISP node to NAP port (Terrestrial)	< 350 msec	242	35	15.8	< 300

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

** Methodology not in line with QoS

Figures provided on All India basis

Not meeting the benchmark

B'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 UP (east) circle are highlighted below

Service provisioning/Activation time

- BSNL (84.18%) and Airtel (98.46%) marginally fall short of TRAI benchmark of 100% connections to be provided within 15 days.
- For Live calling carried out all service providers except Sify are not meeting benchmark on connections provided within 15 days.

Fault Repair/Restoration time

- BSNL (86.18%) is falling below the benchmark for fault repair within next working day.
- For fault repair within three working days all service providers are meeting the TRAI specified benchmark of 99% connections repaired in three 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.
- Also, Sify was found to be reporting only those fault complaints which are booked at the call centre. All the fault complaints booked at the cable operator's end are not taken into consideration while reporting in PMR

Billing performance

- All the service providers were found to be meeting the benchmark of percentage billings complaints received and time taken for resolution of billing complaints for the month in which data was collected.
- BSNL was found to be not meeting benchmark on 100% complaints resolved within 4 weeks
- Sify however claim that all its retail broadband customers are prepaid and hence there are no billing complaints for Sify.

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 Airtel for calls answered in 60 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

Bandwidth Utilisation:

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

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

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 September 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

Packet Loss and Network Latency

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

Summary of Live Measurement Results – Broadband Services

Parameters	Benchmarks	BSNL	Airtel	RCOM	Sify
Service provisioning uptime					
Percentage connections provided within 15 days	100%	90.71%	94.00%	90.00%	100.00%
Fault repair restoration time					
Percentage faults repaired by next working days	> 90%	29.25%	30.00%	55.56%	95.24%
Percentage faults repaired within three working days	> 99%	47.62%	53.33%	77.78%	100.00%
Billing performance					
%age of billing complaints resolved in 4 weeks	100%	100.00%	NA	NA	NA
Customer care/helpline assessment (Voice to Voice)					
Percentage calls answered within 60 seconds	> 60%	86.86%	50.00%	85.00%	100.00%
Percentage calls answered within 90 seconds	> 80%	90.57%	98.00%	100.00%	100.00%
Bandwidth utilization/Throughput					
Intra network links (POP to ISP Node)		152	45	19	420
Total number of intra network links > 90%		0	0	0	0
Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)		325	14	9	23
Percentage bandwidth utilized on upstream links	< 80%	65.56%	94.02%	39.84%	87.33%
Broadband download speed	> 80%	90.00%	100.00%	91.00%	95.00%
Service availability/uptime	> 98%	99.32%	100.00%	100.00%	98.61%
Packet loss	< 1%	0.00%	0.00%	0.00%	0.00%
Network Latency					
POP/ISP Node to NIXI	< 120 msec	19	0	0	40
ISP node to NAP port (Terrestrial)	< 350 msec	228	40	26.17	286

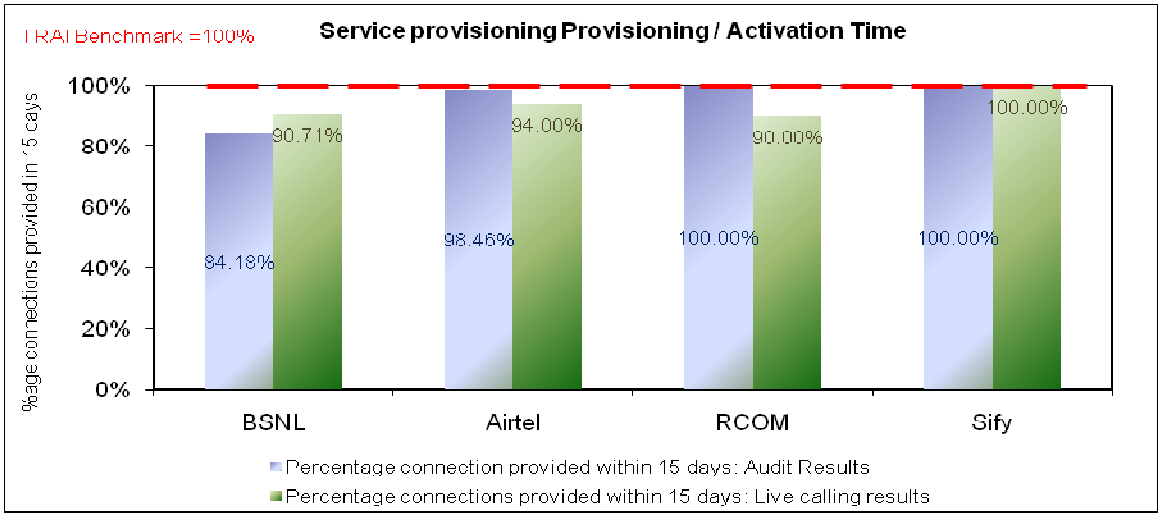
** Methodology not in line with QoS Figures provided on All India basis Not meeting the benchmark **B'mark** = TRAI Benchmark, **DNA** = Details not available, **NA:** Not Applicable

- Airtel was found to be not meeting benchmark on service availability/uptime during three day live measurements
- The testing for Bandwidth utilization during live measurement was carried out on sample basis by IMRB auditors for intra network links. None of the links tested for these operators was found to be having above 90% bandwidth utilization for the month in which audit was carried out
- For Bandwidth utilization on upstream links, all the service providers except Sify and Airtel 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

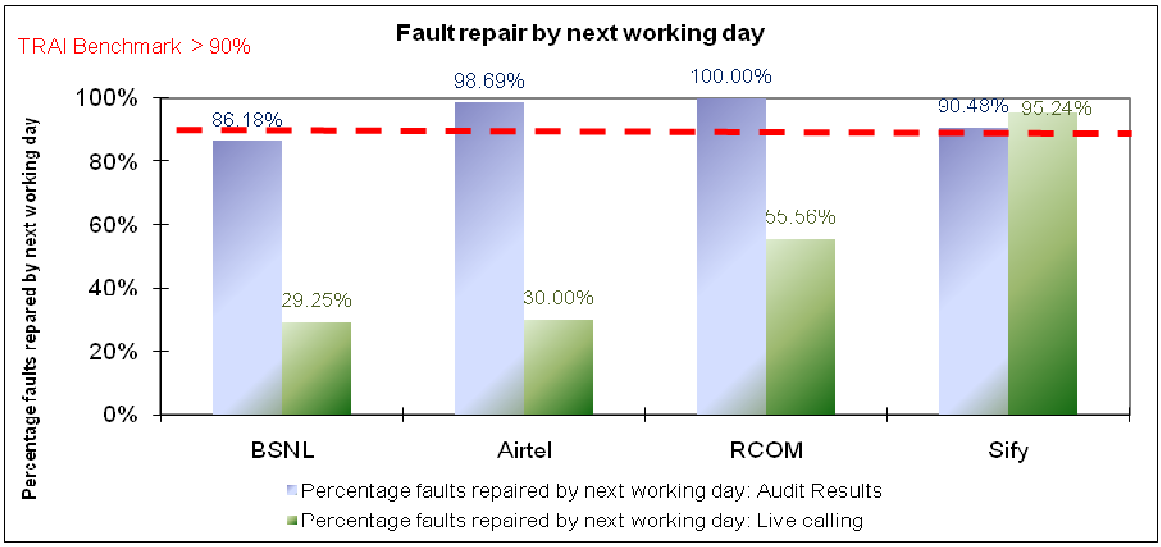
Service provisioning / Activation time (Comparison between one month audit results and live calling results)



One month
Operator meeting benchmark: RCOM, Sify
Operator not meeting benchmark: BSNL, Airtel

Live calling
Operator meeting benchmark: Sify
Operator not meeting benchmark: BSNL, Airtel, RCOM

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, Sify

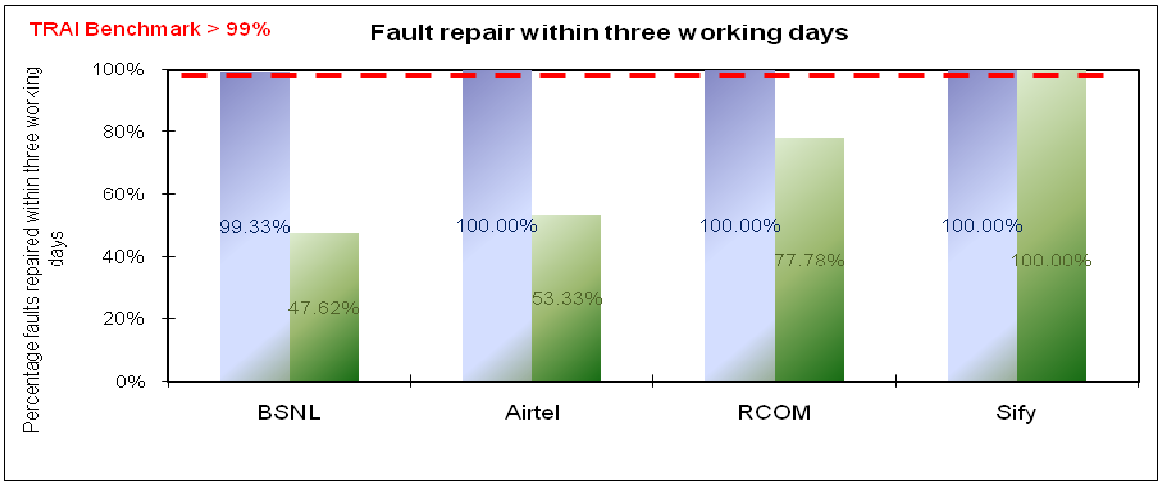
Operator not meeting benchmark: BSNL

Live calling

Operator meeting benchmark: Sify

Operator not meeting benchmark: BSNL, Airtel, RCOM

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



One month

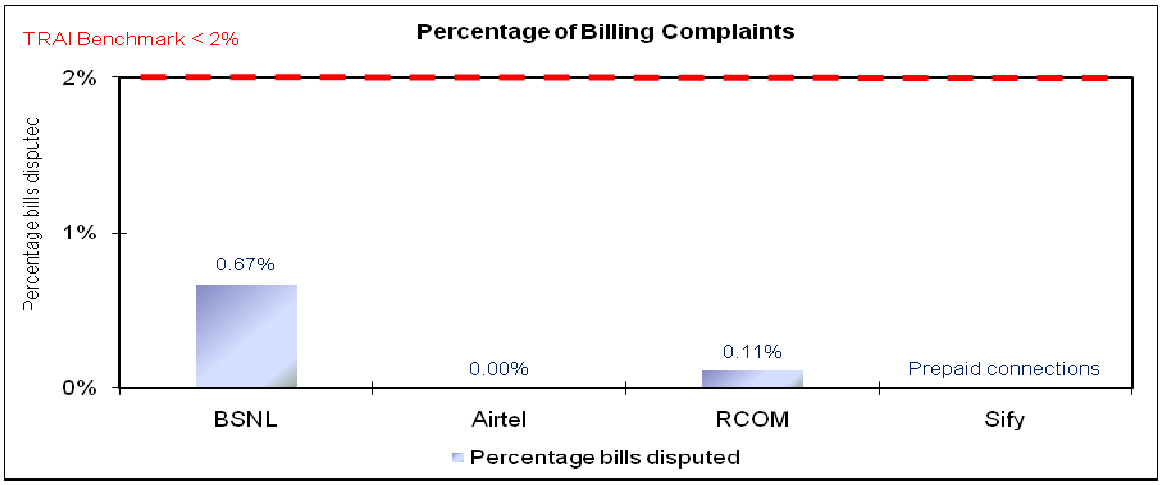
All operators are meeting the benchmark

Live calling

Operator meeting benchmark: Sify

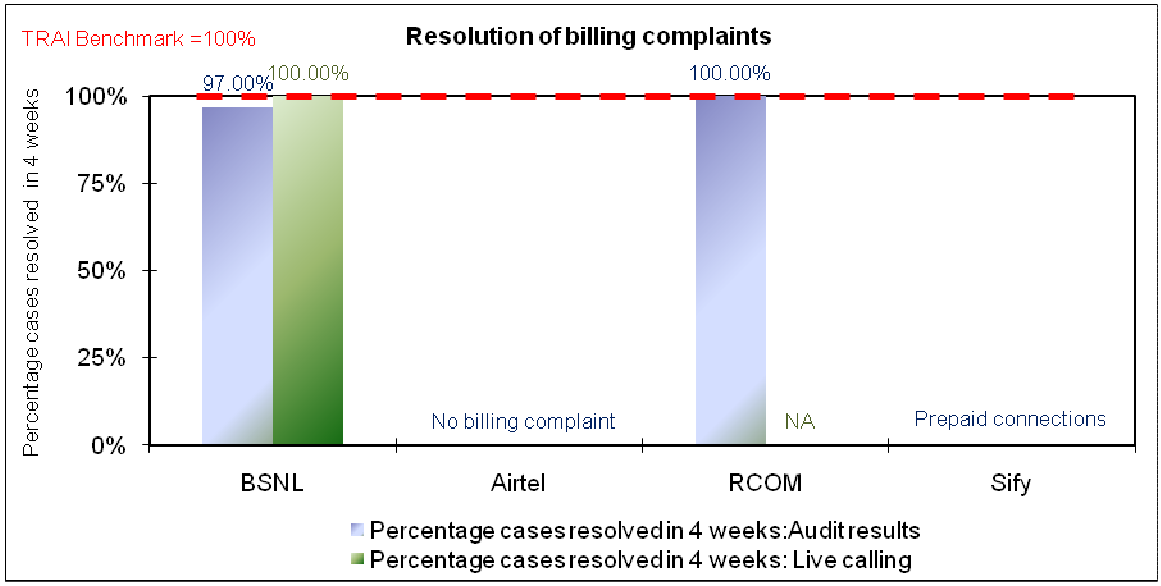
Operator not meeting benchmark: BSNL, Airtel, RCOM

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

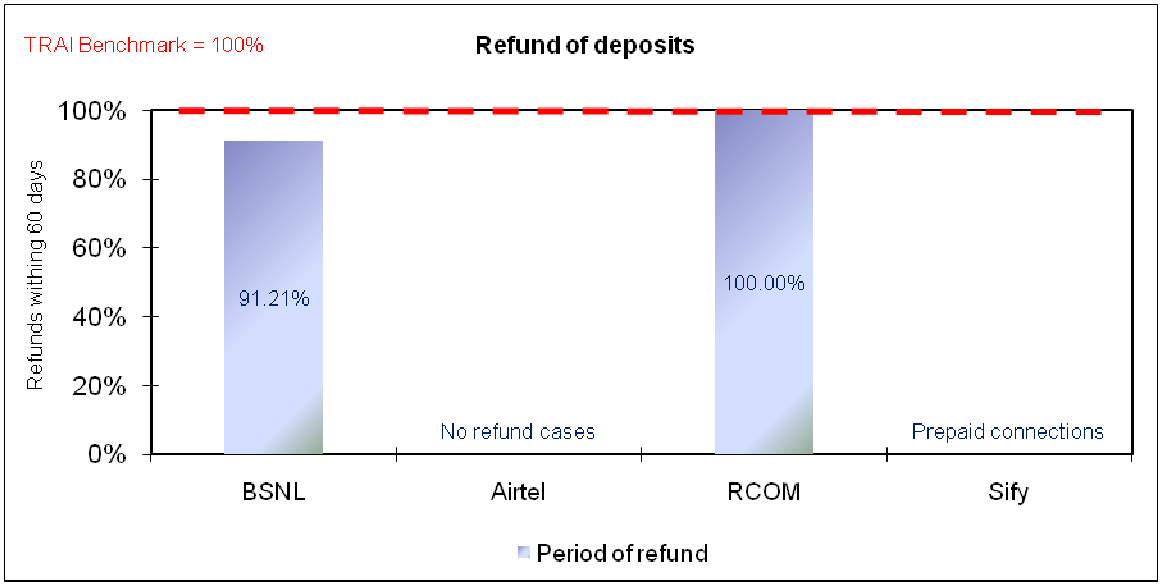
Operator meeting benchmark: RCOM

Operator not meeting benchmark: BSNL

Live calling

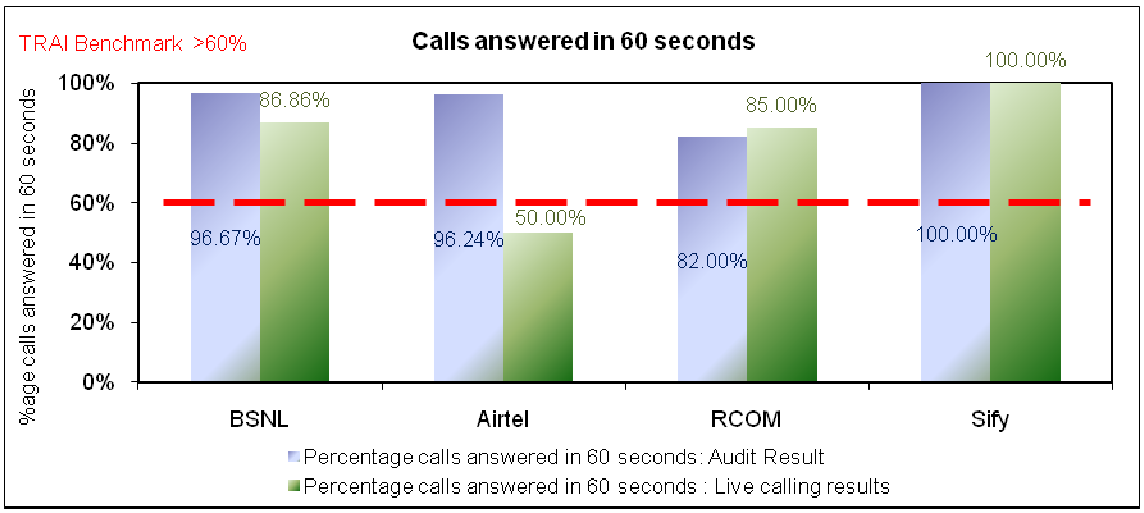
All operators are meeting the benchmark

Refund of deposits after closure



Operator meeting benchmark: RCOM
Operator not meeting benchmark: BSNL

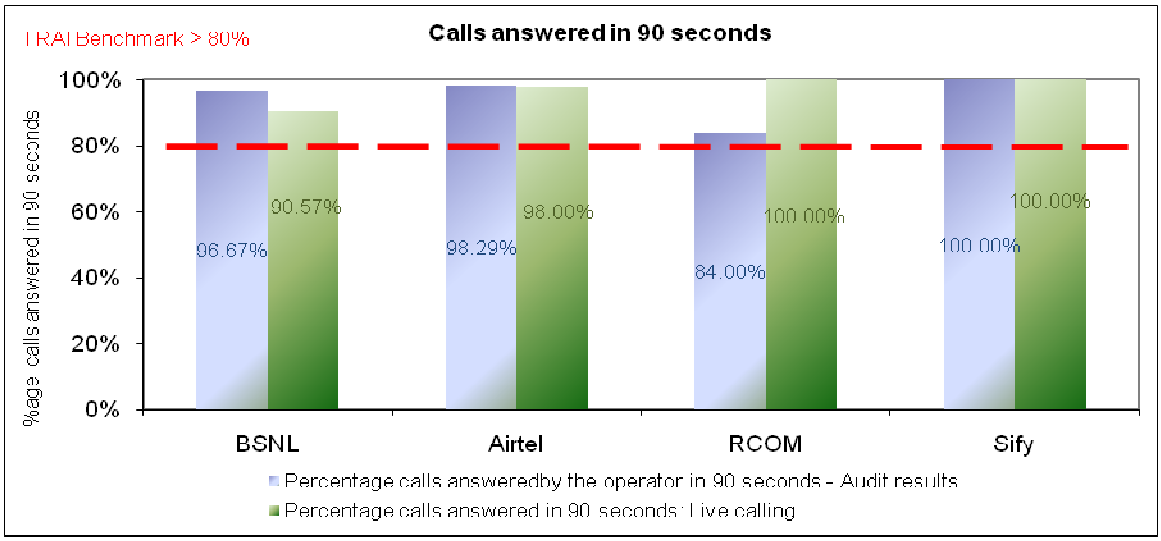
Response time to customer for assistance - Calls answered by the operator within 60 seconds (Comparison between one month audit results and live calling results)



One month
All operators are meeting the benchmark

Live calling
Operator meeting benchmark: BSNL, RCOM, Sify
Operator not meeting benchmark: Airtel

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



One month

All operators are meeting the benchmark

Live calling

All operators are meeting the benchmark

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

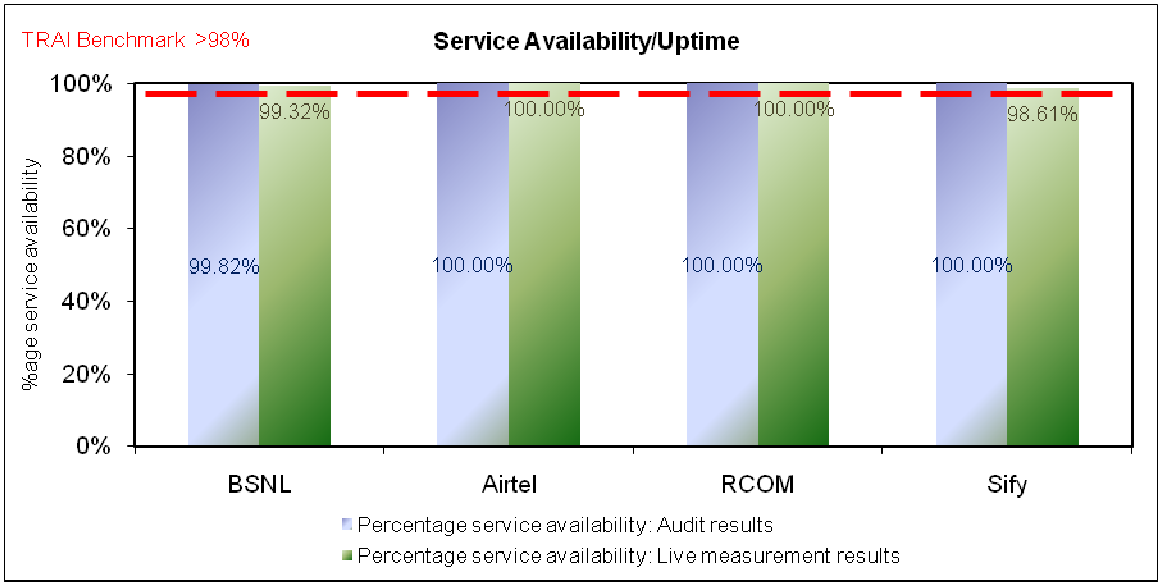
Bandwidth Utilisation (One month)	B'mark	BSNL	Airtel	RCOM	Sify
Total number of intra network links		152	45	19	420
No of Intra network found to be above 90%		4	0	0	0

Bandwidth Utilisation (Live measurement)	B'mark	BSNL	Airtel	RCOM	Sify
Total number of intra network links		152	45	19	420
No of Intra network found to be above 90%		0	0	0	0

Broadband download speed	Benchmark	BSNL	Airtel	RCOM	Sify
Total committed download speed to the sample subscribers (In mpbs) (A)		2	2	1	1
Total average download speed observed during TCBH (In Mpbs) (B)		1.8	2	0.91	0.95
%age subscribed speed available to the subscriber during TCBH (B/A)*100	>80%	90.00%	100.00%	91.00%	95.00%

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

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



One month

All operators are meeting the benchmark

Live calling

All operators are meeting the benchmark

18.0 Compliance reports: Results of Verification of Records

18.1 Broadband services

Parameters	Benchmarks	BSNL*		Airtel		RCOM		Sify	
		PMR	IMRB	PMR	IMRB	PMR	IMRB	PMR	IMRB
Service provisioning uptime									
Percentage connections provided within 15 days	100%	100.00%	100.00%	100.00%	94.12%	100.00%	100.00%	100.00%	100.00%
Fault repair restoration time									
Percentage faults repaired by next working days	> 90%	86.80%	71.67%	97.00%	97.00%	100.00%	100.00%	90.00%	91.00%
Percentage faults repaired within three working days	> 99%	100.00%	81.72%	99.00%	99.00%	100.00%	100.00%	99.00%	100.00%
Billing performance									
Billing complaints per 100 bills issued	< 2%	0.60%	0.83%	0.00%	0.00%	0.38%	0.38%	NA	NA
%age of billing complaints resolved in 4 weeks	100%	100.00%	98.72%	NA	NA	100.00%	100.00%	NA	NA
%age cases in which refund of deposits after closure was made in 60 days	100%	100.00%	91.11%	100.00%	100.00%	100.00%	100.00%	NA	NA
Customer care/helpline assessment (Voice to Voice)									
Percentage calls answered within 60 seconds	> 60%	87.70%	72.99%	91.00%	91.00%	85.00%	85.00%	90.00%	100.00%
Percentage calls answered within 90 seconds	> 80%	100.00%	86.34%	95.00%	95.00%	87.00%	87.00%	100.00%	100.00%
Bandwidth utilisation/Throughput									
Intra network links (POP to ISP Node)		Project 2.2:- BRAS-23, T1-24, T2-624, DSLAM-5960, Multiplay Phase 1&2:- BNG-18, RPR-1181, OCLAN-2906, DSLAM-37036	220	45	135	73	73	421	421
Total number of intra network links > 90%		0	3	0	0	0	0	0	0
Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)		285	259	730	2190	61277	61277	2763	2763
Percentage bandwidth utilized on upstream links	< 80%	71.10%	71.10%	70.00%	70.00%	34.00%	34.00%	85.00%	85.00%
Broadband download speed	> 80%	DNA	100.00%	100.00%	100.00%	90.00%	90.00%	95.00%	95.00%
Service availability/uptime	> 98%	99.99%	99.99%	100.00%	100.00%	99.83%	99.83%	100.00%	100.00%
Packet loss	< 1%	0.04%	0.04%	0.00%	0.00%	< 1%	0.48%	< 1%	< 1%
Network Latency									
POP/ISP Node to NIXI (in msec)	< 120 msec	12	12	35	35	< 45	48	< 45	< 45
ISP node to NAP port (Terrestrial) (in msec)	< 350 msec	234	234	5	5	< 300	233	< 300	< 300

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

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

18.2 Conclusions

Broadband services

1. Complete data for Sify was verified on an all India level
2. For BSNL there is slight variation observed in for some parameters when compared to the figures reported in PMR. But the reason is largely the fact that data was obtained for sample 5% of exchanges whereas reporting is done for 100% of exchanges.
3. Historic data for Broadband download speed and Ping test conducted to check the latency and packet loss was not available for verification for most of the service providers
4. Service providers were found to not meeting benchmark on service provisioning and fault repair parameters

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

2.1 Audit Results for Fault repair

Fault incidences	Benchmark	BSNL	Airtel	RCOM
Faults incidences (No. of faults/100 Subs./month)	≤ 5	4.66	2.35	3.7

Fault repair (Urban areas)	Benchmark	BSNL	Airtel	RCOM
Total No. of faults registered during the month		16035	1046	1263
No. of faults repaired by next working day during the month		14710	1006	1253
Percentage of faults repaired by next working day during the month	≥ 90%	91.74%	96.18%	99.21%
No. of faults repaired within 3 days during the month		15359	1046	1263
Percentage of faults repaired within 3 days during the month	100%	95.78%	100.00%	100.00%

Rent rebate	Benchmark	BSNL	Airtel	RCOM
No. of cases with faults pending for >3 days and ≤7 days		8	6	0
Out of these number of cases where rent rebate for 7 days was given		8	6	0
Percentage of cases where rent rebate for 7 days was given	100%	100.00%	100.00%	NA
No. of cases with faults pending for >7 days and ≤15 days		14	0	0
Out of these number of cases where rent rebate for 15 days was given		14	0	0
Percentage of cases where rent rebate for 15 days was given	100%	100.00%	NA	NA
No. of cases with faults pending for ≥15 days		5	0	0
Out of these number of cases where rent rebate for 30 days was given		5	0	0
Percentage of cases where rent rebate for 30 days was given	100%	100.00%	NA	NA

MTTR	Benchmark	BSNL	Airtel	RCOM
Mean time taken to repair the fault in hours	≤ 8	10.32	7.41	3.34

Not meeting the benchmark

2.2 Live calling for fault repair

Rural & Hilly area	Benchmark	BSNL	Airtel	RCOM
Total Number of calls made		NA	NA	NA
Number of cases where fauls were repaired by next working day		NA	NA	NA
Percentage cases where faults were repaired by next working day	≥ 90%	NA	NA	NA
Number of cases where faults were repaired within 5 days		NA	NA	NA
Percentage cases where faults were repaired within 5 days	100%	NA	NA	NA

3.1 Audit Results for Call Completion Rate (CCR)

Traffic statistics - Call Completion Rate	Benchmark	BSNL	Airtel	RCOM
Total local call attempts		7225693	15022922	NA
Total number of successful local calls		4619169	14998804	NA
Call Completion Rate (CCR) in the local network	≥ 55%	63.93%	99.84%	NA

Traffic statistics - Answer to Seizure Ratio	Benchmark	BSNL	Airtel	RCOM
Total number of calls processed by the switch		NA	NA	699530
Total number of calls answered		NA	NA	625568
Answer to Seizure Ratio (ASR)	≥ 75%	NA	NA	89.43%

3.2 Live measurement results for Call Completion Rate (CCR)

Traffic statistics - Call Completion Rate	Benchmark	BSNL	Airtel	RCOM
Total local call attempts		6015	1627700	NA
Total number of successful local calls		3812	1589353	NA
Call Completion Rate (CCR) in the local network	≥ 55%	63.37%	97.64%	NA

Traffic statistics - Answer to Seizure Ratio	Benchmark	BSNL	Airtel	RCOM
Total number of calls processed by the switch		NA	NA	89673
Total number of calls answered		NA	NA	79828
Answer to Seizure Ratio (ASR)	≥ 75%	NA	NA	89.02%

POI congestion	Benchmark	BSNL	Airtel	RCOM
No. of POIs not meeting benchmark		0	0	0
Total number of working POIs		NA	NA	506

5.1 Audit Results for Billing performance

Billing Performance	Benchmark	BSNL	Airtel	RCOM
Billing diputes – Postpaid				
Total bills generated during the period		233217	33953	16467
Total number of bills disputed		415	0	1
Percentage bills disputed	≤ 0.1%	0.18%	0.00%	0.01%

Not meeting the benchmark

Billing diputes – Prepaid

No. of charging / credit / validity complaints during the month		2	0	0
Total no. of pre-paid customers at the end of the month		2	0	0
Number of complaints per 100 customers	≤ 0.1%	0.00%	NA	NA

Resolution of billing complaints

Total number of billing/charging complaints		417	0	1
Total complaints resolved in 4 weeks from date of receipt		417	0	1
Percentage complaints resolved within 4 weeks of date of receipt	100%	100.00%	NA	100.00%

Period of applying credit / waiver

No. of complaints resolved in favour of the customer during the month		64	0	1
No. of complaints disposed on account of not considered as valid complaints		1	147	1
Percentage cases in which credit/waiver was received within 1 week	100%	100.00%	100.00%	100.00%

5.2 Live calling results for resolution of billing complaints

Resolution of billing complaints	Benchmark	BSNL	Airtel	RCOM
Total Number of calls made		64	0	0
Number of cases resolved in 4 weeks		64	0	0
Percentage cases resolved in 4 weeks	100%	100.00%	NA	NA

6.1 Audit Results for Requests

Closure Requests	Benchmark	BSNL	Airtel	RCOM
Total no. of requests received for Closures		782	590	82
Total no. of requests for closures attended within 7 days		782	590	82
Percentage of requests for closures attended within 7 days	100%	100.00%	100.00%	100.00%
Total no. of requests for closures not attended or attended beyond 7 days		0	0	0

7.1 Audit results for customer care

Customer Care Assessment	Benchmark	BSNL	Airtel	RCOM
Total no. of call attempts to call centre / customer care nos. during TCBH		22054	34082	132389
No. of calls connected and answered successfully to call centre / customer care nos. during TCBH		20994	33498	132389
Percentage of calls getting connected and answered electronically	≥ 95%	95.19%	98.29%	100.00%
Percentage of calls answered by the operators (voice to voice) within 60 seconds	≥ 90%	97.66%	95.48%	91.00%

7.2 Live calling results for customer care

Customer Care Assessment	Benchmark	BSNL	Airtel	RCOM
Total Number of calls received		6015	100	100
Total Number of calls getting connected and answered		3812	100	100
Percentage calls getting connected and answered	≥ 95%	63.37%	100.00%	100.00%

Not meeting the benchmark

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

Customer Care Assessment	Benchmark	BSNL	Airtel	RCOM
Total Number of calls received		6015	50	100
Total Number of calls answered within 60 seconds		3548	47	100
Percentage calls answered within 60 seconds	≥ 90%	58.99%	94.00%	100.00%

8.1 Audit results for refund of deposits

Refund	Benchmark	BSNL	Airtel	RCOM
Total number of cases requiring refund of deposits		681	1	0
Total number of cases where refund was made within 60 days		659	1	0
Percentage cases in which refund was receive within 60 days	100%	96.77%	100.00%	NA

9.1 Live calling for level 1 services

Level 1 services	Benchmark	BSNL	Airtel	RCOM
Total no. of calls made		2510	30	30
Calls answered in 60 sec		1404	30	30
Calls answered after 60 sec		1106	0	0

10.1 Exchange capacity and Subscribers

	Benchmark	BSNL	Airtel	RCOM
Equipped Capacity of the exchange		500746	6396 (erlangs)	128000
Total number of customers served		278381	44510	34094

Not meeting the benchmark

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%**
Vodafone	0.27%	1.48%	95.77%	0.56%	1.48%	1.44%	5.91%	95.82%	0.11%	0.03%	100.00%	100.00%	100.00%	84.10%	99.80%	100.00%
Idea	0.30%	0.16%	99.05%	0.39%	1.05%	1.07%	7.49%	97.80%	0.03%	0.02%	100.00%	100.00%	95.71%	91.86%	100.00%	100.00%
Airtel	0.16%	0.49%	99.21%	0.14%	0.34%	1.12%	4.40%	98.00%	0.08%	0.00%	100.00%	100.00%	100.00%	87.72%	100.00%	100.00%
Aircel	0.11%	0.27%	98.28%	0.05%	0.52%	1.00%	13.64%	96.32%	NA	0.08%	100.00%	100.00%	100.00%	93.87%	NA	NA
BSNL	0.72%	6.37%	97.48%	0.07%	0.03%	0.96%	4.50%	99.22%	0.01%	0.08%	100.00%	100.00%	45.00%	77.00%	100.00%	NA
DoCoMo	0.67%	1.82%	99.04%	0.03%	0.09%	0.60%	2.89%	98.95%	0.00%	0.17%	100.00%	100.00%	79.38%	83.39%	NA	NA
RCOM - GSM	0.57%	1.38%	98.44%	0.03%	0.33%	0.58%	0.31%	98.01%	0.00%	0.01%	100.00%	100.00%	100.00%	69.71%	100.00%	100.00%
Uninor	2.75%	30.40%	98.81%	0.02%	0.27%	1.21%	1.63%	97.05%	NA	0.14%	100.00%	100.00%	99.38%	36.11%	NA	NA
Tata CDMA	0.24%	0.00%	98.28%	0.00%	0.07%	0.69%	0.72%	98.49%	0.03%	0.02%	100.00%	95.00%	65.31%	99.60%	100.00%	NA
RCOM – CDMA	0.39%	0.55%	98.34%	0.00%	0.50%	0.97%	0.59%	97.66%	0.07%	0.01%	100.00%	100.00%	100.00%	89.68%	100.00%	100.00%

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
Vodafone	All POIs Meet the TRAI Benchmark					
Idea	BSNL Cellone UPE RTTC MSC2	1945	38467	1908.36	9.34%	Demand Note Paid, AT to be Conducted
Airtel	All POIs Meet the TRAI Benchmark					
Aircel	Reliance	1081	58107.13	652.34	1.23%	21E new POI with RCOM
BSNL	All POIs Meet the TRAI Benchmark					
DoCoMo	No Direct POI in UP(E)					
Uninor	Airtel(O)	309	53147	309	77.84%	
	Idea(I/O)	60	11086	59	71.58%	
	KaiserbaghL1TAX(I/O)	56	42339	55	61.71%	
	TataCom NLD (I/O)	60	3146	44	0.10%	
Tata CDMA	All POIs Meet the TRAI Benchmark					

Not meeting the benchmark

RCOM	Airtel Lucknow MSC-1_Wireless	1327	92364	1284	More than 100% utilization	
	Airtel Lucknow MSC-2_Wireless	775	60014	513		
	Hutch Meerut(RIM)	123	5019	101		
	Cellone BSNL RTTC Ashiyana	1949	202096	643		
	HUTCH POI	804	87897	775		
	RC-G-LUKH-GMSC-01-HU	961	60447	919		
	RC-G-LUKH-GMSC-01-HU	464	14522	459		

20.3 Parameter wise performance reports for Cellular Mobile services

1. Network Availability

Audit Results for Network Availability

	Benchmark	Vodafone	Idea	Airtel	Aircel	BSNL	DoCoMo	RCOM – GSM	Uninor	Tata CDMA	RCOM - CDMA
Number of BTSs in the licensed service area		7784	4335	6543	1826	4220	1645	2816	2128	836	2191
Sum of downtime of BTSs in a month (in hours)		15855	9579.36	8023	1490	22656	8151	11844	43577	1466	6290
BTSs accumulated downtime (not available for service)	≤ 2%	0.27%	0.30%	0.16%	0.11%	0.72%	0.67%	0.57%	2.75%	0.24%	0.39%
Number of BTSs having accumulated downtime >24 hours		115	7	32	5	269	30	39	647	0	12
Worst affected BTSs due to downtime	≤ 2%	1.48%	0.16%	0.49%	0.27%	6.37%	1.82%	1.38%	30.40%	0.00%	0.55%

2. Connection Establishment (Accessibility)

Audit Results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Vodafone	Idea	Airtel	Aircel	BSNL	DoCoMo	RCOM - GSM	Uninor	Tata CDMA	RCOM - CDMA
CSSR	≥ 95%	95.77%	99.05%	99.21%	98.28%	97.48%	99.04%	98.44%	98.81%	98.28%	98.34%

SDCCH congestion	Benchmark	Vodafone	Idea	Airtel	Aircel	BSNL	DoCoMo	RCOM – GSM	Uninor	Tata CDMA	RCOM - CDMA
SDCCH/Paging channel congestion	≤ 1%	0.56%	0.39%	0.14%	0.05%	0.07%	0.03%	0.03%	0.02%	0.00%	0.00%

TCH congestion	Benchmark	Vodafone	Idea	Airtel	Aircel	BSNL	DoCoMo	RCOM – GSM	Uninor	Tata CDMA	RCOM - CDMA
TCH congestion	≤ 2%	1.48%	1.05%	0.34%	0.52%	0.03%	0.09%	0.33%	0.27%	0.07%	0.50%

Not meeting the benchmark

Live measurement results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Vodafone	Idea	Airtel	Aircel	BSNL	DoCoMo	RCOM - GSM	Uninor	Tata CDMA	RCOM - CDMA
CSSR	≥ 95%	96.28%	99.43%	99.21%	98.31%	96.55%	98.82%	98.93%	99.18%	98.29%	98.05%

SDCCH congestion	Benchmark	Vodafone	Idea	Airtel	Aircel	BSNL	DoCoMo	RCOM – GSM	Uninor	Tata CDMA	RCOM - CDMA
SDCCH/Paging channel congestion	≤ 1%	0.58%	0.54%	0.01%	0.11%	0.07%	0.06%	0.17%	0.02%	0.00%	NA

TCH congestion	Benchmark	Vodafone	Idea	Airtel	Aircel	BSNL	DoCoMo	RCOM – GSM	Uninor	Tata CDMA	RCOM - CDMA
TCH congestion	≤ 2%	2.04%	1.81%	0.32%	0.36%	0.09%	0.01%	0.42%	0.06%	0.04%	0.55%

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

CSSR	Benchmark	Vodafone	Idea	Airtel	Aircel	BSNL	DoCoMo	RCOM - GSM	Uninor	Tata CDMA	RCOM - CDMA
Total number of call attempts		592	593	542	598	368	628	622	603	520	665
Total number of successful calls established		591	584	542	590	366	624	614	599	518	658
CSSR	≥ 95%	99.83%	98.48%	100.00%	98.66%	99.46%	99.36%	98.71%	99.34%	99.62%	98.95%

Blocked calls	Benchmark	Vodafone	Idea	Airtel	Aircel	BSNL	DoCoMo	RCOM – GSM	Uninor	Tata CDMA	RCOM - CDMA
%age blocked calls		0.17%	1.52%	0.00%	1.34%	0.54%	0.64%	1.29%	0.66%	0.38%	1.05%

3. Connection Maintenance (Retainability)

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

Call drop rate	Benchmark	Vodafone	Idea	Airtel	Aircel	BSNL	DoCoMo	RCOM - GSM	Uninor	Tata CDMA	RCOM - CDMA
Total number of calls established		14103840	5686393	854799730	20612184	35374441	10705325	DNA	6950524	1409743	DNA
Total number of calls dropped		202703	60874	9606846	205735	629579	110423	DNA	83778	9787	DNA
Call drop rate	≤ 2%	1.44%	1.07%	1.12%	1.00%	0.96%	0.60%	0.58%	1.21%	0.69%	0.97%

Not meeting the benchmark

Cells having more than 3% TCH	Benchmark	Vodafone	Idea	Airtel	Aircel	BSNL	DoCoMo	RCOM – GSM	Uninor	Tata CDMA	RCOM - CDMA
Total number of cells in the network		23323	13001	19598	5477	12660	4284	8448	183462	2512	2191
Total number of cells having more than 3% TCH		1378	974	862	747	570	124	26	2985	18	13
Worst affected cells having more than 3% TCH	≤ 5%	5.91%	7.49%	4.40%	13.64%	4.50%	2.89%	0.31%	1.63%	0.72%	0.59%

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

Call drop rate	Benchmark	Vodafone	Idea	Airtel	Aircel	BSNL	DoCoMo	RCOM - GSM	Uninor	Tata CDMA	RCOM - CDMA
Total number of calls established		18419928.33	6930379	92731446	2286146	3455236	587826	DNA	1109259	1575990	DNA
Total number of calls dropped		309476.67	49759	1026228	22709	60255	6060	DNA	9160	9968	DNA
Call drop rate	≤ 2%	1.68%	0.72%	1.11%	0.99%	0.77%	0.65%	0.75%	0.83%	0.63%	1.06%

Cells having more than 3% TCH	Benchmark	Vodafone	Idea	Airtel	Aircel	BSNL	DoCoMo	RCOM – GSM	Uninor	Tata CDMA	RCOM - CDMA
Total number of cells in the network		23421	13357	20099	5819	1215	6018	26877	18847	2518	6199
Total number of cells having more than 3% TCH		1566	610	779	783	22	167	169	1560	16	72
Worst affected cells having more than 3% TCH	≤ 5%	6.69%	4.57%	3.88%	13.46%	1.81%	2.78%	0.63%	8.28%	0.64%	1.16%

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

Call drop rate	Benchmark	Vodafone	Idea	Airtel	Aircel	BSNL	DoCoMo	RCOM – GSM	Uninor	Tata CDMA	RCOM - CDMA
Total number of calls established		592	584	540	590	366	636	530	599	518	665
Total number of calls dropped		0	0	0	2	2	4	6	3	0	5
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.34%	0.55%	0.63%	1.13%	0.50%	0.00%	0.75%

4. Voice quality

Audit Results for Voice quality

Voice quality	Benchmark	Vodafone	Idea	Airtel	Aircel	BSNL	DoCoMo	RCOM - GSM	Uninor	Tata CDMA	RCOM - CDMA
Total number of sample calls		1814357732	13001	81991206596	1313137716	203	60246	DNA	820225664	8295	DNA
Total number of calls		1738489281	12556	80453417707	1282048203	195	59313	DNA	796059336	8170	DNA

Not meeting the benchmark

with good voice quality											
%age calls with good voice quality	≥ 95%	95.82%	97.80 %	98.00%	96.32%	99.22 %	98.95%	98.01 %	97.05%	98.49 %	97.66 %

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

Voice quality	Benchmark	Vodafone	Idea	Airtel	Aircel	BSNL	DoCoMo	RCOM - GSM	Uninor	Tata CDMA	RCOM - CDMA
Total number of sample calls		1064100	864197	181132	1095798	92786	1123047	80525	1038405	65824	32640
Total number of calls with good voice quality		1027576	842487	176571	1056555	88796	1090073	79004	1004145	65601	32082
%age calls with good voice quality	≥ 95%	96.57%	97.49%	97.48%	96.42%	95.70%	97.06%	98.11%	96.70%	99.66%	98.29%

5. POI Congestion

Audit Results for POI Congestion

POI congestion	Benchmark	Vodafone	Idea	Airtel	Aircel	BSNL	DoCoMo	RCOM – GSM	Uninor	Tata CDMA	RCOM - CDMA
No. of POIs not meeting benchmark		0	1	0	1	0	NA	7	4	0	7
Total number of working POIs		64	142	44	47	84	NA	142	25	95	142

Live measurement results for POI congestion

6. Inter Operator Call Assessment

Inter operator call Assessment To ↓ From →	Vodafone	Idea	Airtel	Aircel	BSNL	DoCoMo	RCOM - GSM	Uninor	Tata CDMA	RCOM - CDMA
Vodafone	NA	97%	95%	91%	91%	89%	93%	96%	90%	90%
Idea	88%	NA	95%	85%	90%	91%	91%	95%	87%	90%
Airtel	96%	95%	NA	87%	96%	90%	92%	90%	90%	91%
Aircel	90%	96%	95%	NA	92%	93%	95%	90%	92%	91%
BSNL	87%	97%	95%	88%	NA	93%	94%	95%	97%	92%
DoCoMo	89%	97%	95%	89%	93%	NA	91%	87%	87%	93%
RCOM - GSM	87%	96%	97%	86%	97%	94%	NA	96%	86%	93%
Uninor	90%	96%	95%	88%	93%	92%	90%	NA	92%	89%
Tata CDMA	96%	96%	97%	95%	96%	93%	95%	96%	NA	96%
RCOM - CDMA	99%	96%	94%	95%	93%	94%	92%	93%	93%	NA

a The maximum problem faced by the calling operator to other operators

Not meeting the benchmark

Audit Results for Billing performance

Billing Performance	Benchmark	Vodafone	Idea	Airtel	Aircel	BSNL	DoCoMo	RCOM - GSM	Uninor	Tata CDMA	RCOM - CDMA
Billing disputes – Postpaid											
Total bills generated during the period		171093	30113	49178	NA	137401	541	2234	NA	48309	122294
Total number of bills disputed		184	8	38	NA	8	0	0	NA	16	80
Percentage bills disputed	≤ 0.1%	0.11%	0.03%	0.08%	NA	0.01%	0.00%	0.00%	NA	0.03%	0.07%
Billing disputes – Prepaid											
Number of complaints related to charging, credit & validity		2797	1064	1	633	5617	1293	271	440	265	495
Total number of prepaid customers in that period		8988383	5058381	11634656	841809	7180690	740231	2986401	319259	1273944	4644987
Percentage of complaints	≤ 0.1%	0.03%	0.02%	0.00%	0.08%	0.08%	0.17%	0.01%	0.14%	0.02%	0.01%
Resolution of billing complaints											
Total number of billing/charging complaints		184	761	151	4685	0	1293	644	440	116	2268
Total complaints resolved in 4 weeks from date of receipt		184	381	38	632	0	5	271	269	5	575
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 %
Period of applying credit / waiver											
No. of complaints resolved in favor of the customer during the month		DNA	381	38	632	0	5	271	269	5	575
No. of complaints disposed on account of not considered as valid complaints		DNA	380	113	4053	0	1288	373	171	111	1693

Not meeting the benchmark

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 %	95.00%	100.00 %

Live calling results for resolution of billing complaints

Resolution of billing complaints	Benchmark	Vodafone	Idea	Airtel	Aircel	BSNL	DoCoMo	RCOM - GSM	Uninor	Tata CDMA	RCOM - CDMA
Total Number of calls made		100	100	36	100	NA	3	5	100	75	30
Number of cases resolved in 4 weeks		92	88	24	75	NA	3	4	81	59	28
Percentage cases resolved in four weeks	100%	92.00%	88.00%	66.67%	75.00%	NA	100.00%	80.00%	81.00%	78.67%	93.33%

8. Customer Care

Audit results for customer care

Customer Care Assessment	Benchmark	Vodafone	Idea	Airtel	Aircel	BSNL	DoCoMo	RCOM – GSM	Uninor	Tata CDMA	RCOM - CDMA
Total number of call attempts to customer care for assistance		25785915	14927816	25395528	2856479	3921733	1553675	1768998	349405	531072	2952619
Number of calls getting connected and answered (electronically)		25785915	14287317	25395104	2856479	1752853	1233238	1768998	347228	346852	2952619
Percentage calls getting connected and answered	≥ 95%	100.00%	95.71%	100.00%	100.00%	45.00%	79.38%	100.00%	99.38%	65.31%	100.00%
Percentage calls answered within 60 seconds (V2V)	≥ 90%	84.10%	91.86%	87.72%	93.87%	77.00%	83.39%	69.71%	36.11%	99.60%	89.68%

Live calling results for customer care

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

Not meeting the benchmark

Live calling results for customer care (Voice to Voice)

Customer Care Assessment	Benchmark	Vodafone	Idea	Airtel	Aircel	BSNL	DoCoMo	RCOM - GSM	Uninor	Tata CDMA	RCOM - CDMA
Total Number of calls received		100	100	100	100	100	100	100	100	100	100
Total Number of calls answered within 60 seconds		99	97	98	100	10	93	96	95	97	94
Percentage calls answered within 60 seconds	≥ 90%	99.00%	97.00%	98.00%	100.00%	10.00%	93.00%	96.00%	95.00%	97.00%	94.00%

9. Termination / closure of service

Audit results for termination / closure of service

Termination	Benchmark	Vodafone	Idea	Airtel	Aircel	BSNL	DoCoMo	RCOM - GSM	Uninor	Tata CDMA	RCOM - CDMA
Total number of closure request		1016	197	360	NA	273	0	5	NA	784	127
Number of requests attended within 7 days		1014	197	360	NA	273	0	5	NA	784	127
Percentage cases in which termination done within 7 days	100%	99.80%	100.00%	100.00%	NA	100.00%	NA	100.00%	NA	100.00%	100.00%

Audit results for refund of deposits

Refund	Benchmark	Vodafone	Idea	Airtel	Aircel	BSNL	DoCoMo	RCOM - GSM	Uninor	Tata CDMA	RCOM - CDMA
Total number of cases requiring refund of deposits		618	111	30	NA	NIL	0	8	NA	164	305
Total number of cases where refund was made within 60 days		618	111	30	NA	NIL	NA	8	NA	164	305
Percentage cases in which refund was receive within 60 days	100%	100.00%	100.00%	100.00%	NA	NA	NA	100.00%	NA	NA	100.00%

11. Additional Network Related parameters

Audit Results for Total Traffic Handled in Erlang

Traffic in Erlang		Vodafone	Idea	Airtel	Aircel	BSNL	DoCoMo	RCOM - GSM	Uninor	Tata CDMA	RCOM - CDMA
Equipped capacity of the network		393000	137087	358385	72077	16000	740231	DNA	76900	189871	348000
Total traffic handled in erlang during TCBH		313000	80885	260508	7046	9535	8550	DNA	10155	47845	141007

Total number of customers as per VLR

		Vodafone	Idea	Airtel	Aircel	BSNL	DoCoMo	RCOM - GSM	Uninor	Tata CDMA	RCOM - CDMA
Total no. of customers served (as per VLR)		7936000	3212528	8382216	312195	216974	381949	DNA	226488	750557	3163884

Not meeting the benchmark

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	RCOM	Sify
Total connections registered during the period		3495	1297	24	227
Number of connections provided within 15 days		2942	1277	24	227
Percentage of connections provided within 15 days	100%	84.18%	98.46%	100.00%	100.00%
Number of connections provided after 15 days of registration of demand		0	20	0	0
Number of customers to whom credit is given for delayed connections		0	0	0	0
Percentage of customers to whom credit is given for delayed connections	100%	NA	0.00%	NA	NA

1.2 Live calling for Service provisioning					
	Benchmark	BSNL	Airtel	RCOM	Sify
Total connections registered during the period		420	100	20	21
Number of connections provided within 15 days		381	94	18	21
Percentage of connections provided within 15 days	100%	90.71%	94.00%	90.00%	100.00%

2. Fault Incidence / Clearance Statistics

2.1 Audit Results for Fault repair					
Fault repair	Benchmark	BSNL	Airtel	RCOM	Sify
Total No. of faults registered during the month		8308	840	84	84
No. of faults repaired by next working day during the month		7160	829	84	76
Percentage of faults repaired by next working day during the month	> 90%	86.18%	98.69%	100.00%	90.48%
No. of faults repaired within 3 days during the month		8252	840	84	84
Percentage of faults repaired within 3 days during the month	>99%	99.33%	100.00%	100.00%	100.00%

Rent rebate	Benchmark	BSNL	Airtel	RCOM	Sify
No. of cases with faults pending for >3 days and ≤7 days		2	11	0	8
Out of these number of cases where rent rebate for 7 days was given		2	11	0	0
Percentage of cases where rent rebate for 7 days was given	100%	100.00%	100.00%	NA	0.00%
No. of cases with faults pending for >7 days and ≤15 days		2	0	0	0
Out of these number of cases where rent rebate for 15 days was given		2	0	0	0
Percentage of cases where rent rebate for 15 days was given	100%	100.00%	NA	NA	NA
No. of cases with faults pending for ≥15 days		3	0	0	0
Out of these number of cases where rent rebate for 30 days was given		3	0	0	0
Percentage of cases where rent rebate for 30 days was given	100%	100.00%	NA	NA	NA

Not meeting the benchmark

2.2 Live calling for fault repair					
Fault repair	**Benchmark**	**BSNL**	**Airtel**	**RCOM**	**Sify**
Total Number of calls made		147	30	18	21
Number of cases where fauls were repaired by next working day		43	9	10	20
Percentage cases where faults were repaired by next working day	> 90%	29.25%	30.00%	55.56%	95.24%
Number of cases where faults were repaired within 3 days		70	16	14	21
Percentage cases where faults were repaired within 3 days	>99%	47.62%	53.33%	77.78%	100.00%

3. Billing performance

3.1 Audit Results for Billing performance					
Billing Performance	**Benchmark**	**BSNL**	**Airtel**	**RCOM**	**Sify**
Billing diputes					
Total bills generated during the period		78718	33953	2857	NA
Total number of bills disputed		524	0	3	NA
Percentage bills disputed	< 2%	0.67%	0.00%	0.11%	NA
Resolution of billing complaints					
Total number of complaints resolved in four weeks from date of receipt		142605	NA	3	NA
Total complaints resolved in 4 weeks from date of receipt		138331	NA	3	NA
Percentage complaints resolved within 4 weeks of date of receipt	100%	97.00%	NA	100.00%	NA
Period of refund					
Total number of cases requiring refund		398	NA	4	NA
Total number of cases where credit/waiver was made within 60 days		363	NA	4	NA
Percentage cases in which credit/waiver was received within 60 days	100%	91.21%	NA	100.00%	NA

3.2 Live calling results for resolution of billing complaints					
Resolution of billing complaints	**Benchmark**	**BSNL**	**Airtel**	**RCOM**	**Sify**
Total Number of calls made		32	0	0	NA
Number of cases resolved in 4 weeks		32	0	0	NA
Percentage cases resolved in 4 weeks	100%	100.00%	NA	NA	NA

4. Response time to the customer for assistance

4.1 Audit results for customer care (Voice to Voice)					
Customer Care Assessment	**Benchmark**	**BSNL**	**Airtel**	**RCOM**	**Sify**
Total Number of calls received		527857	38721	232418	119
Total Number of calls answered within 60 seconds		510273	37266	190583	119
Percentage calls answered within 60 seconds	> 60%	96.67%	96.24%	82.00%	100.00%

Not meeting the benchmark

4.2 Live calling results for customer care (Voice to Voice)					
Customer Care Assessment	**Benchmark**	**BSNL**	**Airtel**	**RCOM**	**Sify**
Total Number of calls received		350	100	100	27
Total Number of calls answered within 60 seconds		304	50	85	27
Percentage calls answered within 60 seconds	> 60%	86.86%	50.00%	85.00%	100.00%

4.3 Audit results for customer care (Voice to Voice)					
Customer Care Assessment	**Benchmark**	**BSNL**	**Airtel**	**RCOM**	**Sify**
Total Number of calls received		527857	38721	232418	119
Total Number of calls answered within 90 seconds		510273	38059	195231	119
Percentage calls answered within 90 seconds	> 80%	96.67%	98.29%	84.00%	100.00%

4.4 Live calling results for customer care (Voice to Voice)					
Customer Care Assessment	**Benchmark**	**BSNL**	**Airtel**	**RCOM**	**Sify**
Total Number of calls received		350	100	100	27
Total Number of calls answered within 90 seconds		317	98	100	27
Percentage calls answered within 90 seconds	> 80%	90.57%	98.00%	100.00%	100.00%

5. Bandwidth utilization

5.1 Audit results for Bandwidth Utilization					
Bandwidth utilization	**Benchmark**	**BSNL**	**Airtel**	**RCOM**	**Sify**
Intra-network links (POP to ISP Node)					
Total number of intra network links		152	45	19	420
No of Intra network found to be above 90%		4	0	0	0
International Bandwidth					
Total number of upstream links		296	12	9	23
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In mpbs)		45880	820	44544	2935
Total International Bandwidth utilised during peak hours		36904.96	668	17745	2563
Percentage Bandwidth utilisation during peak hours (In mpbs)	<80%	80.44%	81.46%	39.84%	87.33%
No of Intra network found to be above 90%		0	0	0	0

5.2 Live measurement results for Bandwidth Utilization					
Bandwidth utilization	**Benchmark**	**BSNL**	**Airtel**	**RCOM**	**Sify**
Intra-network links (POP to ISP Node)					
Total number of intra network links		152	45	19	420
No of Intra network found to be above 90%		0	0	0	0
International Bandwidth					
Total number of upstream links		325	14	9	23
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In mpbs)		50375	1000	44544	2935
Total International Bandwidth utilised during peak hours		33027.33	940.2	17745	2563
Percentage Bandwidth utilisation during peak hours (In mpbs)	<80%	65.56%	94.02%	39.84%	87.33%
No of Intra network found to be above 90%		0	0	0	0

6. Broadband download speed

6.1 Live calling results for broadband download speed					
Broadband download speed	**Benchmark**	**BSNL**	**Airtel**	**RCOM**	**Sify**
Total committed download speed to the sample subscribers (In mpbs) (A)		2	2	1	1
Total average download speed observed during TCBH (In Mpbs) (B)		1.8	2	0.91	0.95
%age subscribed speed available to the subscriber during TCBH (B/A)*100	>80%	90.00%	100.00%	91.00%	95.00%

7. Service availability/uptime

7.1 Audit results for service availability					
Service Availability	**Benchmark**	**BSNL**	**Airtel**	**RCOM**	**Sify**
Total Operational Hours		744	57144720	570888	672
Total Downtime		1.31	422	19.47	0
Total time when the service was available		742.69	57144298	570868.53	672
Service Availability Uptime in Percentage	>98%	99.82%	100.00%	100.00%	100.00%

7.2 Live measurement results for service availability					
Service Availability	**Benchmark**	**BSNL**	**Airtel**	**RCOM**	**Sify**
Total Operational Hours		74	2342256	632832	72
Total Downtime		0.5	0	2.47	1
Total time when the service was available		73.5	2342256	632829.53	71
Service Availability Uptime in Percentage	>98%	99.32%	100.00%	100.00%	98.61%

8. Network latency / Packet loss

8.1 Audit results for Latency and packet loss					
Network Latency and Packet Loss	**Benchmark**	**BSNL**	**Airtel**	**RCOM**	**Sify**
Packet Loss (Percentage)	< 1%	0.00%	0.00%	0.15%	0.00%
Network Latency					
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	20	0	0	< 45
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	242	35	15.8	< 300

8.2 Live measurement results for Latency and packet loss					
Network Latency and Packet Loss	**Benchmark**	**BSNL**	**Airtel**	**RCOM**	**Sify**
Packet Loss (Percentage)	< 1%	0.00%	0.00%	0.00%	0.00%
Network Latency					
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	19	0	0	40
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	228	40	26.17	286

Not meeting the benchmark

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

22.1 For Basic (Wireline) services

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

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

3. Metering and billing credibility – billing complaints	
Computational Methodology	Percentage incidence of billing complaints = (No. of billing complaints reported by the customer per month/ Total Number of Subscribers for that particular month)*100 Percentage resolution of billing complaints = (No. of billing complaints resolved over a particular period of time/Total No. of billing complaints of that period of time)*100
Benchmark	Percentage incidence of billing complaints: Not more than 0.1% of the bills issued Percentage resolution of billing complaints: 100% within a period of 4 weeks Period of applying credit/waiver/adjustment : In 100% of the cases within 1 week of resolution of complaint
Audit Procedure	IMRB Auditors to verify and collect data pertaining to - Number of Billing complaints received at the service provider's level - Last billing cycle stated should be such that due date for payment of bills must be beyond the date when this form is filled. - Include all types of bills generated for customers. This could include online as well as other forms of bills presentation including printed bills - Billing complaint is any of written complaint/ personal visit/ telephonic complaint related to: Excess metering/ wrong tariff scheme charged, Late receipt of bills/ Not received at all, Wrong name and address, Payment made in time but charged penalty/ not reflected in next bill, Last payment not reflected in bill, Adjustment/ waiver not done, Anything else related to bills, Toll free numbers charged etc. **Live calling : -** - IMRB Auditors collected the list of all the subscribers who have made billing complaints in the month prior to the Audit. -100 such subscribers per service provider were called to check the time taken to resolve t he billing complaint. However, in some cases where number of billing complaints were less the sample size could not be achieved

4. Customer care promptness (Shifts and Closures)	
Computational Methodology	Shifts and closure requests
Benchmark	Shifting of telephone line : Less than 3 days Processing of closure request: Less than 7 days
Audit procedure	**IMRB Auditors collected and verified data pertaining to** **Shifting Request: (Following key points were taken care of while verifying the data)** - Date of filing form should be at least 3 working days after the date of month appraised. - All the holidays are excluded and only working days are considered - The number of shift requests per month does not include the pending connections of the previous months. **Processing of closure request (Following key points were taken care of while verifying the data)** - The operator includes all Requests for volunteer Permanent Closure and External (shifts to other exchanges) Shift requests received at their exchange. - DNP (due to Non – payment) cases are excluded - All holidays are excluded for calculating 7 days. - Closure requests attended in the previous months are excluded - The period for closure starts from the time of submission of application by the subscriber.

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

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

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

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22.2 Cellular Mobile services

1. Accumulated Downtime of the Network	
Computational Methodology as per QoS definition	BTSs accumulated downtime (not available for service) shall basically measure the downtime of the BTSs, including its transmission links/circuits during the period of a month, but excludes all planned service downtime for any maintenance or software up gradation. **Computational Methodology:** • BTSs Accumulated downtime = Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month X 100 --- 24 X No. of days in the month X No. of BTSs in the network in the licensed service area • Worst affected BTSs due to downtime = No. of BTSs having accumulated downtime >24 hours in a month X 100 --- Total No. of BTSs in the network in the licensed service area
Benchmark	• BTSs Accumulated downtime (not available for service) ≤ 2% • Worst affected BTSs due to downtime ≤ 2%
Audit Procedure	**IMRB** auditors collected and verified data pertaining to: The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) used for arriving at the benchmark reported to TRAI were audit

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

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

4. Call Drop Rate	
Computational Methodology as per QoS definition	The dropped call rate is the ratio of successfully originated calls that were found to drop to the total number of successfully originated calls that were correctly released ➢ **Total calls dropped** = All calls ceasing unnaturally i.e. due to handover or due to radio loss ➢ **Total calls established** = All calls that have TCH allocation during busy hour **Computational Methodology:** Total Calls Dropped / Total Calls Established x 100
Benchmark	**≤ 2%**
Audit Procedure	**IMRB Auditors collected and verified records pertaining to**: ➢ Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR was conducted. ➢ The operator should only be considering those calls which are dropped during Time consistent busy hour (TCBH) for all days of the relevant quarter

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

6. Service Coverage	
Computational Methodology as per QoS definition	Definition: ➢ The level of signal available in a particular part of a city is known as signal strength. **Computational Methodology:** ➢ Service Coverage for route type x = [(N1 x CSS1) + (N2 x CSS2) + …..+ (Nn x CSSn)] / (N1 + N2 +……..+Nn) ➢ Where:-N1 = Number of calls on type of route x made in drive test 1 ➢ CSS1 = Average coverage signal strength on type of route x in drive test 1 (in dBm) ➢ N2 = Number of calls on type of route x made in drive test 2 ➢ CSS2 = Average coverage signal strength on type of route x in drive test 2 (in dBm) ➢ Nn = Number of calls on type of route x made in drive test n ➢ CSSn = Average coverage signal strength on type of route x in drive test n (in dBm)
Benchmark	**Indoor >= -75 dBm** **In-vehicle >= -85 dBm** **Outdoor – in city >= -95 dBm**
Audit Procedure	**IMRB Auditors collected and verified call centre records pertaining to**: ➢ Audit was conducted based on the details of periodic drive tests conducted at different part of the network during Time consistent busy hour (TCBH) which were used to arrive at the benchmarks reported to TRAI. ➢ Procedures were verified that were to be followed by operator for obtaining relevant details for computing this parameter:-

	➢ Operator to conduct at least one drive test using standard drive test equipment* every week during Time consistent busy hour (TCBH). ➢ Each drive test should evenly cover the following 5 types of locations: – ➢ 3 Outdoor (Periphery of the city, Congested Area, Across the City), and ➢ 2 Indoor (Office Complex and Shopping Complex) ➢ *Measurements using Engineering handsets were not acceptable*

7. Response time to customer	
Computational Methodology	**To connect to Customer care:** The time taken to connect a person (as soon as he presses call) to the IVR of the service provider **To connect to operator:** The time taken to connect a person (as soon as he presses 9) to the customer care executive **Computational Methodology:** • % age of calls getting connected = Total number of calls getting connected X 100 / Total number of calls made • % age of calls answered within 60 sec (voice to voice) = Total number of calls answered within 60 seconds X 100 / Total number of calls made
Benchmark	➢ % age of calls getting connected and answered ≥ 95% ➢ % age of calls answered by operator (voice to voice) within 60 seconds ≥ 90%
Audit Procedure	-IMRB auditors made test calls from the exchanges to the operator's customer care / helpline / toll free numbers. They will record the time taken to connect a customer's call both to the IVR as well as to a customer care executive. - All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services. - Time to answer the call by the operator should be taken from the time auditor has pressed the requisite button for being assisted by the operator. **Live calling: -** - Overall sample size is 2*50 calls per service provider per circle at different points of time, evenly distributed across the selected exchanges – 50 calls between 1000 HRS to 1300 HRS and 50 calls between 1500 HRS to 1700 HRS - Time to answer the call by the operator was assessed from the time interviewer pressed the requisite button for being assisted by the operator. - All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.

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

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

8.3 Period of refunds / payments due to customers	
Computational Methodology as per QoS definition	**Period of all refunds = Maximum value of 'Time taken to refund'** where:-Time taken to refund = Date of refund – date of complaint resolution
Benchmark	100% cases in less than 1 week
Audit Procedure	**Audit of refund details and complaints (only those resulting in refunds) resolution details used for arriving at the figures reported to TRAI to be conducted.** **Operator to provide details of:-** • **Dates of resolution of all billing complaints resolved in favour of customer and resulting in requirement of a refund by the operator** • **Dates of refund pertaining to all billing complaints received during the relevant quarter** **Also random live checks of all subscribers entitled for refund were conducted**

22.3 For Broadband services

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

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

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

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

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

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

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

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

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

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

Benchmark	<1 %
Audit Procedure	**IMRB Auditors collected and verified call centre records pertaining to** - Records maintained for ping tests conducted - 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	Latency is the measure of duration of a round trip for a data packet between specific source and destination Router Port/Customer Premises Equipment (CPE). The round trip delay for the ping packets from ISP premises to the IGSP premises to the IGSP/NIXI gateway and to the nearest NAP port abroad are measured by computing delay for **1000 pings of 64 bytes each** (Pings are to be sent subsequent to acknowledgement received for the same for previous ping) Service provider needs to carry out such tests daily during Time Consistent Busy Hour(TCBH) and report the average results for the month in the performance monitoring report to TRAI Minimum sample reference points for each service area shall be three in number or multiple reference points if required **Hence the formula for network latency would be Network latency for X days= Total round trip time for all the ping packets transmitted in X days /No of days during the period**
Benchmark	< 120 msec from user reference point at POP/ISP Node to International Gateway < 350 msec from User reference point at ISP Gateway Node to International nearest NAP port (Terrestrial) < 800 msec from User reference point at ISP Gateway Node to International nearest Nap port (Satellite)
Audit Procedure	**IMRB Auditors collected and verified call centre records pertaining to** - Records maintained for ping tests conducted - 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

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