

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

Audit Report for July-August-September '09



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Preface

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

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

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

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

The Survey and Audit modules for various circles within the Zones, due the sheer scale of data collection, had until recently been distributed across various Half Yearly periods. From July 2009 onwards the distribution is on a quarterly basis. IMRB International Auditors carried out Audits across Haryana, Delhi, Orissa, Chennai and Tamil Nadu circles in the July-August-September period 2009. **This report details the performance of various service providers in Haryana circle against Quality of Services benchmarks for various parameters laid down by TRAI in respective regulations for Cellular (Mobile), Basic Wireline and Broadband services.**

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1. Background

The Telecom Regulatory Authority of India (TRAI) has a critical mandate to protect the interest of telecom consumers in addition to various other functions bestowed upon it. As part of the license conditions to telecom operators, it has the power and authority to measure the Quality of Service provided by various govt. (BSNL & MTNL) and private telecom operators. The parameters that need to be measured for Basic (Wireline) and Cellular Mobile (Wireless) services have been specified in the TRAI notification on Quality of Services of Basic (Wireline) and Cellular Mobile (Wireless) services dated 20th March, 2009. The parameters for Broadband Service have been specified in the TRAI notification for Quality of Services of Broadband Service Regulation, 2006

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

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

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

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

This report highlights the findings for the Audit module for Haryana circle that was covered in the 3rd Quarter (July – September 2009). The primary data collection and verification of records maintained by various operators of Cellular Mobile (Wireless), Basic wireline and Broadband services was undertaken by IMRB International during the period July – September 2009.



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



This report highlights the Audit Module findings for Haryana circle for Cellular Mobile, Basic Wireline and Broadband services

2. 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

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

- Any changes or discrepancies found in the methodology were reported to the service providers and changes were suggested by IMRB Auditors.
- PMR verification was done as per the old 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



All Network related and Non network related parameters notified by TRAI for Cellular Mobile were Audited

3. Sampling methodology

3.1 Sampling for Cellular Mobile (Wireless) service providers

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

	Name of Operator (Month of Audit)
Operator 1	Airtel (Sept.)
Operator 2	Vodafone (Sept.)
Operator 3	Idea (Sept.)
Operator 4	BSNL (Sept.)
Operator 5	TATA (Sept.)
Operator 6	RCOM CDMA (Aug.)
Operator 7	RCOM GSM (Aug.)

3.2 Sampling for Basic (Wireline) services

- For BSNL the sample of exchanges was selected in such a way that these exchanges were spread across 10% of SDCA's in the entire service.
- For Airtel, data was collected pertaining to all the exchanges present in the circle/service area

3.3 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 central node in Haryana and data submitted by 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. Also, the data pertaining to network related parameters was obtained by IMRB Auditors at the central node in Bangalore.
- For Sify the audit was conducted at their central exchange in Chennai.
- Following Broadband service providers were Audited for Haryana circle:

	Name of Operator (Month of Audit)
Operator 1	BSNL
Operator 2	Bharti Airtel
Operator 3	Hathway
Operator 4	Sify
Operator 5	VSNL
Operator 6	You Telecom

4. Audit methodology

4.1 Cellular Mobile Services

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

S.no	Parameter	AS REPORTED IN PMR	AS FOUND IN ACTUAL RECORDS AFTER VERIFICATION	AS FOUND IN VERIFICATION FOR THE MONTH OF AUDIT	AS FOUND IN 3 DAY LIVE MEASUREMENT DATA	LIVE CALLING	OPERATOR ASSISTED DRIVE TESTS	INDEPENDENT DRIVE TESTS
A	Network Performance							
A (i)	BTS accumulated down time	Yes	Yes	Yes				
A (ii)	Call setup success rate (within licensee own network)	Yes	Yes	Yes	Yes		Yes	Yes
A (iii)	Blocked Call Rate	Yes	Yes	Yes	Yes		Yes	Yes
A (iv)	Call Drop rate	Yes	Yes	Yes	Yes		Yes	Yes
A (v)	% Connections with good voice quality	Yes	Yes	Yes			Yes	Yes
A (vi)	Service Coverage	Yes	Yes	Yes			Yes	Yes
A (vii)	PoI Congestion	Yes	Yes	Yes			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		

4.2 Basic (Wireline) Services

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

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

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

4.3 Broadband Services

In a nutshell, the audit methodology was as follows:

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

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

5. 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 July 2009 to September 2009 in Haryana circle. The executive summary encapsulates the key findings of the Audit by providing: -

- “Service provider performance report” for Cellular mobile, Basic (Wireline) and Broadband service, which gives a glimpse of the performance of various operators against the benchmark specified by TRAI, during the month in which the Audit was carried out by IMRB Auditors
- “Parameter wise critical findings” for Cellular mobile, Basic (Wireline) and Broadband service: This indicates key observations and findings from different activities carried out during the Audit process.

Critical findings: Cellular Mobile Services

The audit for cellular mobile service providers were conducted at their respective MSCs in the Haryana 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
Bharti Airtel	1900 – 2000 hrs	1900 – 2000 hrs
BSNL	2000 – 2100 hrs	2000 – 2100 hrs
RCOM (CDMA)	1900 – 2000 hrs	1900 – 2000 hrs
Idea Cellular	2000 – 2100 hrs	2000 – 2100 hrs
TATA	1900 – 2000 hrs	1900 – 2000 hrs
Vodafone	2000 – 2100 hrs	2000 – 2100 hrs
RCOM (GSM)	1900 – 2000 hrs	1900 – 2000 hrs

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

BTS Accumulated Downtime:

In the Haryana circle, all the operators are meeting benchmark on the parameter BTS accumulated downtime as well as for worst affected BTS due to downtime. For BTS accumulated downtime, Airtel and Tata performed better than any other operator.

Call Set-up Success Rate (CSSR):

All the operators were comfortably meeting the benchmark on this parameter with BSNL (95.4%) just above the benchmark. During the audits the maximum CSSR was observed for Vodafone with 99.4% of their calls getting completed. All the operators were found to be calculating the parameter as per the norm specified by TRAI. CSSR was established as the ratio of total number of successful call attempts (establishment) to the total number of call attempts made.

Network Congestion parameters:

SDCCH / Paging Channel Congestion, TCH and POI are part of the network congestion parameters. All the operators are meeting the TRAI specified benchmarks on the network congestion parameters. TATA and RCOM GSM are leading the way in network congestion parameters with almost negligible Paging/SDCCH 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. There was almost negligible POI congestion on almost all individual POI links between a service provider vis-à-vis other service providers.

Call Drop Rate:

During the audit it was found that all the service providers were measuring this parameter as per the TRAI guidelines. The call drop rate was measured as the ratio of total calls dropped to the total number of call attempts for all operators. Also, all of service providers were found to be meeting the TRAI specified benchmark. The lowest call drop rate was of RCOM at 0.62%.

connections with good voice quality:

All the operators are measuring this parameter via their periodic drive tests. However, for Vodafone 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. Drive test was conducted by IMRB with the help of service providers to measure this parameter. In the drive test it was found that all the operators except BSNL are meeting the TRAI benchmark.

Customer Care / Helpline Assessment

For the IVR aspect all the service providers meet the TRAI benchmark. However, in case of Reliance no breakup of IVR calls by circle is present. The figure reported is for all India level. In case of calls answered by operators (for percentage calls answered within 60 seconds), BSNL, TATA and RCOM does not meet the benchmark for the month of audit.

Billing performance

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

Inter operator calls assessment

Inter operator call Assessment		Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
From ↓	To →							
Airtel		-	100%	99%	100%	100%	99%	98%
Vodafone		100%	-	100%	100%	100%	100%	100%
Idea		100%	100%	-	100%	100%	99%	97%
BSNL		99%	100%	100%	-	100%	100%	99%
TATA		95%	99%	99%	99%	-	95%	98%
RCOM CDMA		100%	100%	100%	100%	100%	-	98%
RCOM GSM		98%	99%	96%	100%	99%	99%	-

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. TATA found it tough connecting to a RCOM and Airtel number with only 95 out of 100 calls getting connected. Similarly RCOM had difficulty in connecting to an Idea number with 96% of their calls getting completed.

Results of Operator assisted Drive test

The drive test was conducted simultaneously for all the operators present in the Haryana circle. There was in total of three drive tests conducted in the circle. These tests were conducted in the cities of Panipat, Hisar and Mahendergarh. 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 Haryana telecom circle was covered.

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

The drive tests in the Haryana circle were conducted in the cities of Panipat, Hisar and Mahendergarh was conducted along the following route:

	Type of location	Panipat	Hisar	Mahendergarh
Outdoor	Peiphery of the city	Sector 13/17, Ansal Suncity, Huda indl area, Nangal kheri, New Model town, Choti nehar, Shanti nagar, Hari nagar	Hissar Outer city	Dalna, buch village, Mahindragarh bypass
	Congested area	Sanoli road, Sector 12	Hissar conested	Mahindragarh Nehar colony
	Across the city	Sector 6, Panipat	Hissar boundry	Post Office Road, Mahindragarh
	Office complex	Post office, Panipat	Electric Board	ITI Mahendergarh
Indoor	Shopping complex	Mittal Mega Mall	Suncity Towers	Rattan shopping Complex

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

Drive Test – Panipat

Benchmark	Airtel		Vodafone		Idea		BSNL		TATA		Reliance CDMA		Reliance GSM	
	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	99.27%	96.46%	96.61%	96.23%	96.10%	94.52%	95.40%	95.26%	100%	98.16%	100.00%	98.13%	100.00%	99.41%
CSSR	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	94.26%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	5.74%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Call drop rate	0.00%	0.00%	0.00%	0.00%	0.00%	1.05%	0.00%	4.35%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Drive Test – Hissar

Benchmark	Airtel		Vodafone		Idea		BSNL		TATA		Reliance CDMA		Reliance GSM	
	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	100.00%	95.71%	98.58%	95.35%	97.17%	95.07%	93.44%	93.28%	100.00%	98.97%	99.90%	99.57%	100.00%	98.05%
CSSR	100.00%	100.00%	100.00%	100.00%	100.00%	98.51%	93.33%	89.80%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls	0.00%	0.00%	0.00%	0.00%	0.00%	1.49%	6.67%	10.20%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Call drop rate	0.00%	0.00%	0.00%	0.00%	0.00%	1.59%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.72%
Hands off success rate	-	100.00%	100.00%	100.00%	100.00%	99.12%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Drive Test – Mahendergarh

	Benchmark	Airtel		Vodafone		Idea		BSNL		TATA		Reliance CDMA		Reliance GSM	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	≥ 95%	99.68%	96.13%	97.42%	95.57%	97.47%	96.52%	97.47%	96.52%	100.00%	98.77%	100.00%	99.07%	99.64%	95.42%
CSSR	≥ 95%	100.00%	100.00%	100.00%	96.25%	100.00%	98.68%	100.00%	98.68%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls		0.00%	0.00%	0.00%	3.75%	0.00%	1.32%	0.00%	1.32%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	1.25%	0.00%	1.35%	0.00%	1.35%	0.00%	0.00%	0.00%	1.18%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Not meeting the benchmark

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

ALL SERVICE PROVIDERS

Panipat: There was interference and low signal strength recorded for BSNL in the outdoor areas near Devimurthy colony and near Sugar Mill. All other operators were not having any significant problems. Also in the indoor areas inadequate coverage was not found in any of the areas.

Hissar: There was interference and low signal strength recorded for all the operators in the outdoor areas of Hisar by-pass, small patch at water bodies near Nahar Road, small patch in HAU and near Railway Crossing, City hospital while in the indoor areas there was no inadequate coverage or interference recorded.


Mahendargarh: There was interference and low signal strength recorded for all operators in the outdoor areas between Chelawas and Mohmadpur, Jhagroli and Rewasa, Near Sabji Mandi and 2 km from Birjatawas Village while in the indoor areas no interference and inadequate coverage was recorded.

Conclusions:

1. BSNL does not meet the TRAI benchmark on voice quality in Hisar
2. Idea and BSNL in Panipat do not meet the benchmark for voice quality, CSSR and call drop rate in outdoor areas

Summary of Live Measurement Results – Cellular Mobile Services

Name of Service Provider	Connection Establishment (Accessibility)			Connection Maintenance (Retainability)			POI Point of Interconnection (POI) Congestion	Metering and Billing %age complaints resolved within 4 weeks	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			Accessibility of call centre/customer care	Percentage of calls answered by the operators (voice to voice) within 60 seconds
B'mark	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 5%	≥ 95%	≤ 0.5%	100%	≥ 95%	≥ 90%
Airtel	99.30%	0.00%	0.29%	0.59%	9.44%	96.99%	0.00%	100.00%	100.00%	98.00%
Vodafone	99.60%	0.04%	0.08%	1.01%	3.06%	96.49%	0.00%	74.00%	100.00%	100.00%
Idea	99.90%	0.18%	0.53%	1.60%	8.66%	95.89%	0.00%	74.36%	100.00%	98.00%
BSNL	96.92%	0.47%	0.65%	0.95%	4.87%	94.44%	0.00%	60.00%	100.00%	68.89%
TATA	98.32%	0.00%	0.01%	0.87%	3.67%	96.14%	0.00%	63.00%	100.00%	94.00%
RCOM CDMA	99.59%	0.00%	0.16%	0.81%	0.23%	96.54%	0.00%	72.41%	100.00%	93.00%
RCOM GSM	98.96%	0.01%	0.02%	0.63%	1.05%	98.26%	0.00%	66.67%	100.00%	84.00%

 Not meeting the benchmark

During the three day live measurement and live calling, all operators except Airtel for metering and billing were found to be not meeting the TRAI benchmark. Airtel and Idea are very high on the worst affected cells parameter benchmark with 9.44% and 8.66% respectively.

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

Parameters	Benchmarks	BSNL	Airtel
Percentage connections completed within 7 days	100%	85.40%	99.80%
Faults incidences (No. of faults/100 Subs./month)	≤5	4.06	4.93
% of faults repaired by next working day	≥ 90%	56.84%	97.98%
% of faults repaired within 3 days	100%	33.30%	99.10%
Faults pending for > 3days and ≤7 days	Rent rebate of 7 days	NA	100.00%
Faults pending for > 7 days and ≤15 days	Rent rebate of 15 days	NA	100.00%
Faults pending for > 15 days	Rent rebate of 1 month	100.00%	100.00%
Mean Time to Repair (MTTR)	≤ 8 Hrs	6.89	5.74
Call Completion Rate (CCR)	≥ 55%	61.34%	95.34%
Answer to Seizure ratio (ASR)	≥ 75%	53.86%	NA
POI Congestion	≤0.5	0.00	0.00
Metering and billing credibility - Number of bills disputed during over a billing cycle	≤ 0.1%	0.04%	0.00%
Resolution of billing complaints within 4 weeks	100%	82.35%	100.00%
Period of applying credit / waiver	≤ 1 week	100.00%	100.00%
Customer care/helpline promptness			
Percentage shift requests attended within 3 days	≥ 95%	80.61%	96.23%
Closure within 7 days	100%	93.89%	100.00%
Response time to customer for assistance			
% age calls getting connected and answered	≥ 95%	100.00%	97.54%
% age call answered by operator in 60 seconds	≥ 90%	34.87%	96.01%
Time taken for refund of deposits after closures within 60 days	100%	89.79%	100.00%

(*Note: For BSNL data pertains to the sample 5% of exchanges audited during the period of January to March 2009, 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

DNP: Details not provided

Summary of Live Measurement Results – Wireline Services

Parameters	Benchmarks	BSNL	Airtel
Percentage connections completed within 7 days	100%	55.67%	100.00%
% of faults repaired by next working day	≥ 90%	21.59%	73.00%
% of faults repaired within 3 days	100%	55.68%	98.00%
Call Completion Rate (CCR)	≥ 55%	75.56%	99.00%
Answer to Seizure ratio (ASR)	≥ 75%	53.20%	NA
POI Congestion	≤ 0.5	DNA	0.00
Resolution of billing complaints within 4 weeks	100%	69.23%	NA
Customer care/helpline promptness			
Percentage shift requests attended within 3 days	≥ 95%	60.00%	96.67%
Response time to customer for assistance			
% age calls getting connected and answered	≥ 95%	98.00%	51.81%
% age call answered by operator in 60 seconds	≥ 90%	48.00%	44.04%

Not meeting the benchmark
 DNA: Details not available
 DNP: Details not provided
 NA: Not applicable

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

BSNL and Airtel are the only operators providing Basic (Wireline) Services in Haryana circle to retail customers. During the audit process it was observed that BSNL could not meet TRAI specified benchmark on most of the parameters in both 1 month audit as well as for live measurement.

The live calling results were found to be different from the 1 month audit data collection in certain places for both the operators. To some extent the difference can be attributed to the smaller sample size undertaken for the live calling.

For verification of raw data for the period of January to March 2009, there was significant variation observed in the BSNL data when compared to the figures reported in the PMR. This can be attributed to the fact that for BSNL only sample exchanges were covered.

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

Provision of telephone after registration of demand

- In Haryana circle, both BSNL and Airtel fall short of TRAI specified benchmark with a score of 85.40% and 99.80% respectively. In live calling Airtel managed to meet the benchmark whereas BSNL was found to be way below the benchmark.

Fault incidence / clearance statistics

- Fault repair remains pain point for BSNL with only 56.84% of the complaints being repaired within next working day.
- For live calling carried out by IMRB auditors only 21.59% of BSNL subscribers and 73.00% of the Airtel subscribers claimed that fault was repaired within 24 hrs.
- Even for fault repair within 3 days BSNL falls short of the TRAI specified benchmark during month of audit as well as live measurement.

Traffic statistics (CCR)

- Both the operators comfortably meet the benchmark on this parameter both during month in which audit was carried out as well as three days when live measurement was carried out.

Metering and billing credibility

- Both Airtel and BSNL met the TRAI specified benchmark with percentage billing complaints being less than 0.1% of the total bills generated.
- Also all the complaints registered were resolved within the time period stipulated by TRAI

Customer care/helpline promptness

- BSNL also needs to give attention to the promptness of customer care as BSNL falls short of TRAI specified benchmark for time taken to attend shift and closure requests for the month in which audit was carried out by IMRB auditors

Response time to customer for assistance

- For calls getting connected and answered electronically, both Airtel and BSNL meets the TRAI specified benchmark
- For calls answered by the operator within 60 seconds, BSNL was found to be way below the benchmark

Time taken for refund of deposits after closure

- For time taken for refund of deposit after closure BSNL was found to be below the TRAI benchmark with only 89.79% of the subscribers getting the refund within 60 days after applying for the closure

Level 1 service

Live calling for level 1 services			
Level 1 services	Benchmark	BSNL	Airtel
Total no. of calls made		50	50
Calls answered in 60 sec		38	46
Calls answered after 60 sec		12	4

To test the efficiency of level 1 services (Trunk booking, Child helpline, Women helpline, Airline booking, Fire, Police, Railways) offered by various service providers. 50 calls each were made for BSNL and Airtel to different numbers and time taken to answer the call was noticed. Out of which 76% and 92% of the calls made were answered in 60 seconds for BSNL and Airtel respectively.

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

Parameters	Benchmarks	BSNL	Airtel	You Telecom	VSNL	Sify
Service provisioning uptime						
Percentage connections provided within 15 days	100%	100.00%	93.93%	100.00%	100.00%	100.00%
Fault repair restoration time						
Percentage faults repaired by next working days	> 90%	76.70%	97.99%	99.44%	98.00%	95.65%
Percentage faults repaired within three working days	> 99%	100.00%	99.20%	100.00%	100.00%	100.00%
Billing performance						
Billing complaints per 100 bills issued	< 2%	0.07%	0.00%	0.22%	0.81%	NA
%age of billing complaints resolved in 4 weeks	100%	100.00%	NA	100.00%	100.00%	NA
%age cases in which refund of deposits after closure was made in 60 days	100%	NA	100.00%	100.00%	100.00%	NA
Customer care/helpline assessment (Voice to Voice)						
Percentage calls answered within 60 seconds	> 60%	89.90%	97.36%	83.53%	79.11%	99.11%
Percentage calls answered within 90 seconds	> 80%	100.00%	98.94%	88.76%	82.64%	100.00%
Bandwidth utilization/Throughput						
Intra network links (POP to ISP Node)		213	41	NA	19	400
Total number of intra network links > 90%		0	3	NA	0	0
Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)		280	NA	2	5	20
Percentage bandwidth utilized on upstream links	< 80%	70.01%	NA	78.57%	44.88%	83.22%
Broadband download speed	> 80%	91.70%	90.00%	85.00%	90.30%	87.50%
Service availability/uptime	> 98%	99.98%	100.00%	99.72%	99.70%	100.00%
Packet loss	< 1%	0.04%	0.00%	0.70%	0.00%	<1%
Network Latency						
POP/ISP Node to NIXI	< 120 msec	12	34	27.4	<80	<45
ISP node to NAP port (Terrestrial)	< 350 msec	232	75	278	<250	<300

(*Note: For BSNL data pertains to the sample 5% of exchanges audited during the period of August to September 2009. For VSNL data pertains to the North region as submitted in their PMR, whereas for rest of the operators figures pertain to all the exchanges present in the circle)

■ Figures provided on All India basis
■ Not meeting the benchmark
B'mark = TRAI Benchmark, **DNP** = Details not provided, **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 are highlighted below

Service provisioning/Activation time

- Airtel (93.93%) is the only service provider falling short of TRAI benchmark of 100% connections to be provided within 15 days.
- For Live calling carried out BSNL scores the lowest with 77.73% subscribers claiming that connection was provided within 15 days. For rest of the service providers scores are observed to be >95%.

Fault Repair/Restoration time

- BSNL (76.70%) is falling below the benchmark for fault repair within next working day. For fault repair within three working days rest all operators are meeting the TRAI specified benchmark of 99%
- 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.
- During live calling conducted by IMRB auditors no operator was found to be meeting benchmark for fault repair by next working day.
- All operators except BSNL were found to be meeting benchmark for fault repair within 3 working days.

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. Sify however claim that all its retail broadband customers are prepaid and hence there are no billing complaints for Sify.
- It should also be noted that the definition of billing complaints/disputes can be considered as lenient as service providers namely Airtel and Reliance include only those complaints where an internal ticket is opened and refund is made to the customer. Hence there is a need felt to have some clarity on the definition of billing complaints.

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 BSNL falls short of TRAI specified benchmark for calls answered by the operator in 60 seconds (54%).

Bandwidth Utilization:

- All the service providers were found to be using Multiple Router Traffic Grapher (MRTG) to measure the bandwidth utilization at intra network links.
- However, it was noticed that some of the service providers are reporting Average bandwidth utilized during the complete period to TRAI instead of Bandwidth utilized during Time Consistent Busy Hour (TCBH) as they claim that the peak hours generally range from 11.00AM in the morning to 4.00 PM in the evening owing to high corporate usage

during the period. Also, it was observed that there are multiple links and busy hour may vary for each link.

- 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, BSNL and VSNL (TATA Communications) was obtained on all India bases. None of the links tested for these operators were found to be having above 90% bandwidth utilization for the month in which audit was carried out
- 3 intra network links for Airtel were found to be having above 90% bandwidth utilization for the month in which audit was carried out
- Also It was observed that all the links (tested during three day live measurement) in the access segment for most of the service providers were found be below 80%.
- For Bandwidth utilization on upstream links (From ISP Node to IGSP/NIXI), all the operators meet the TRAI specified benchmark. Sify are slightly above the 80% bandwidth utilization mark with utilization of 83.22%,

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 January to March 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 in which audit was carried out.

Packet Loss and Network Latency

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

5.3.1 Summary of Live Measurement Results – Broadband Services

Parameters	Benchmarks	BSNL	Airtel	You Telecom	VSNL	Sify
Service provisioning uptime						
Percentage connections provided within 15 days	100%	72.73%	98.00%	100.00%	100.00%	100.00%
Fault repair restoration time						
Percentage faults repaired by next working days	> 90%	25.86%	76.00%	71.00%	79.00%	70.00%
Percentage faults repaired within three working days	> 99%	51.72%	100.00%	100.00%	100.00%	100.00%
Billing performance						
%age of billing complaints resolved in 4 weeks	100%	100.00%	NA	100.00%	100.00%	NA
Customer care/helpline assessment (Voice to Voice)						
Percentage calls answered within 60 seconds	> 60%	54.00%	71.00%	71.00%	81.00%	79.00%
Percentage calls answered within 90 seconds	> 80%	90.00%	94.00%	92.00%	96.00%	95.00%
Bandwidth utilization/Throughput						
Intra network links (POP to ISP Node)		143	41	NA	19	394
Total number of intra network links > 90%		0	3	NA	0	0
Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)		280	NA	2	5	20
Percentage bandwidth utilized on upstream links	< 80%	77.60%	NA	78.57%	54.97%	83.04%
Broadband download speed	> 80%	91.70%	90.00%	85.00%	90.30%	87.50%
Service availability/uptime	> 98%	99.98%	99.93%	100.00%	99.66%	100.00%
Packet loss	< 1%	0.01%	0.00%	0.60%	0.00%	0.00%
Network Latency						
POP/ISP Node to NIXI	< 120 msec	18	40	26.4	56	44
ISP node to NAP port (Terrestrial)	< 350 msec	224	70	267	105	228

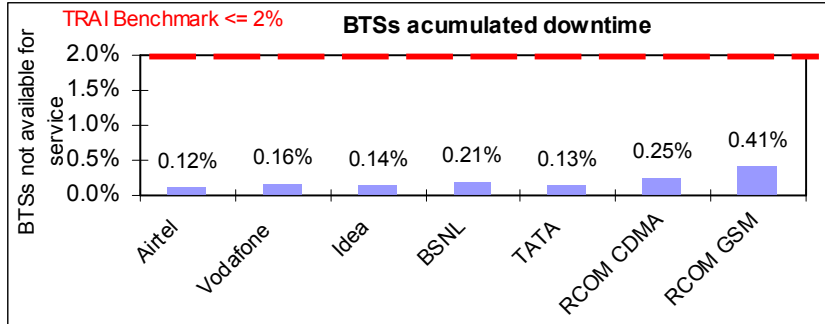
■ Figures provided on All India basis
■ Not meeting the benchmark
B'mark = TRAI Benchmark, **DNP** = Details not provided, **NA**: Not Applicable

- All the service providers are meeting the benchmark on service availability/uptime for three day live measurements.
- The testing for Bandwidth utilization during live measurement was carried out on sample basis by IMRB auditors for intra network links. There were 3 intra network links for Airtel that were found to have a utilization of more than 90%
- For Bandwidth utilization on upstream links, all the service providers except Sify 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.

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

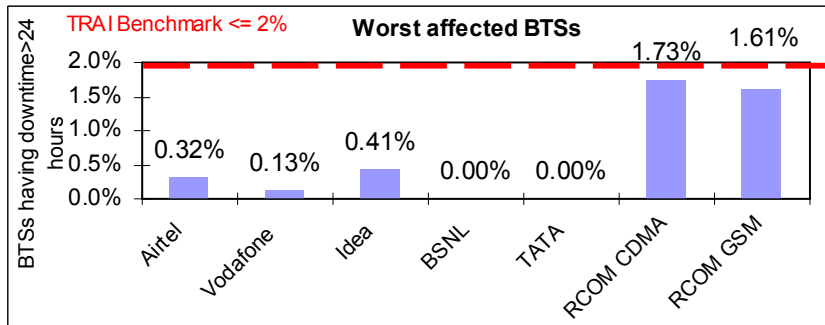
6.1 Graphical/Tabular Representations for Cellular Mobile Services

BTSs Accumulated Downtime



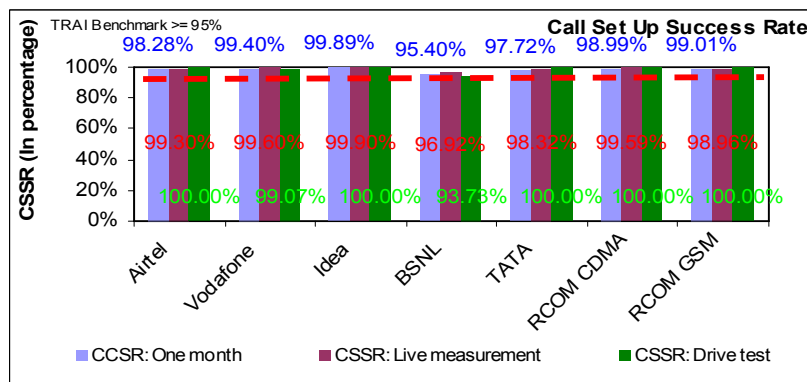
All operators are meeting the benchmark

Worst Affected BTSs



All operators are meeting the benchmark

Call Set-up Success Rate (CSSR)



One month

All operators are meeting the benchmark

Live measurement

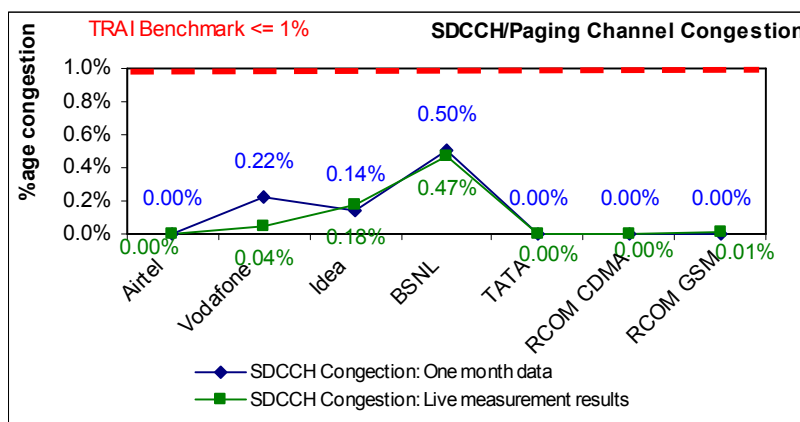
All operators are meeting the benchmark

Drive test

Operator meeting benchmark: Airtel, Vodafone, Idea, TATA, RCOM CDMA, RCOM GSM

Operator not meeting benchmark: BSNL

SDCCH / Paging Channel Congestion



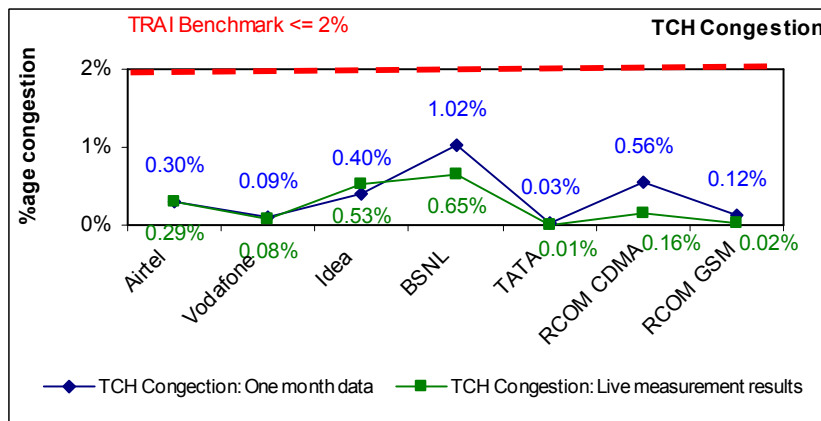
One month

All operators are meeting the benchmark

Live measurement

All operators are meeting the benchmark

TCH Congestion



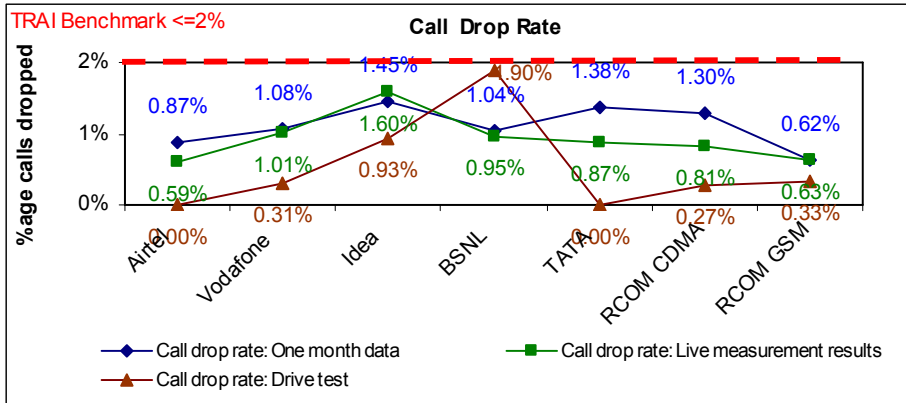
One month

All operators are meeting the benchmark

Live measurement

All operators are meeting the benchmark

Call Drop Rate



One month

All operators are meeting the benchmark

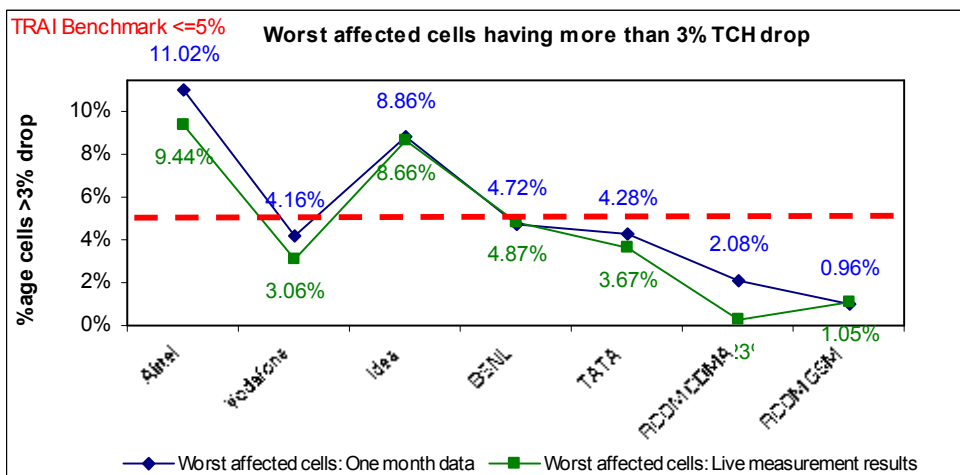
Live measurement

All operators are meeting the benchmark

Drive test

All operators are meeting the benchmark

Worst affected cells having more than 3% TCH drop



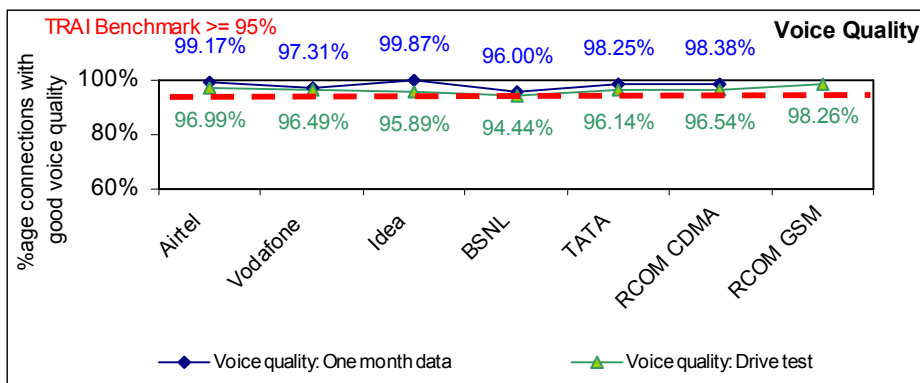
One month

Operator meeting benchmark: Vodafone, TATA, RCOM CDMA, RCOM GSM, BSNL
 Operator not meeting benchmark: Airtel, Idea

Live measurement

Operator meeting benchmark: Vodafone, TATA, RCOM CDMA, RCOM GSM, BSNL
 Operator not meeting benchmark: Airtel, Idea

Voice quality



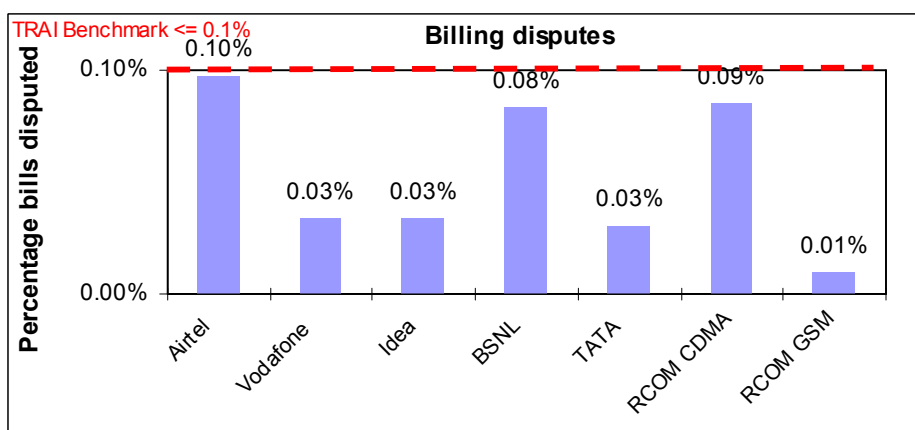
One month

All operators are meeting the benchmark

Drive test

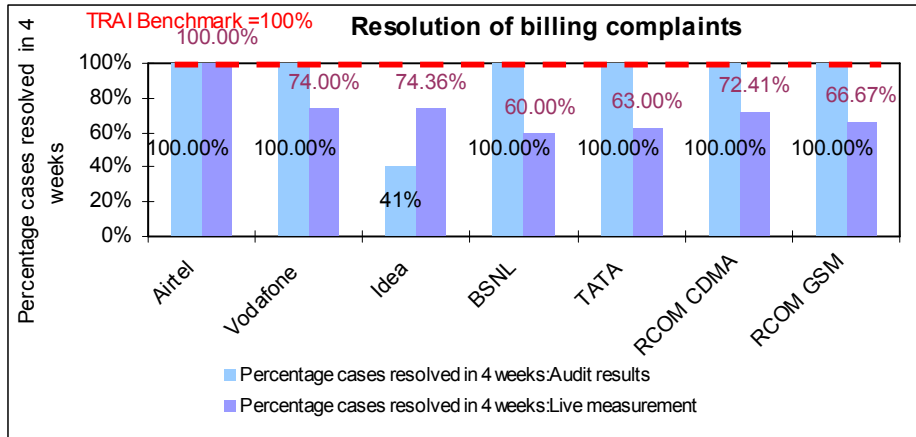
Operator meeting benchmark: Airtel, Vodafone, Idea, TATA, RCOM CDMA, RCOM GSM
 Operator not meeting benchmark: BSNL

Billing Disputes



All operators are meeting the benchmark

Resolution of billing complaints



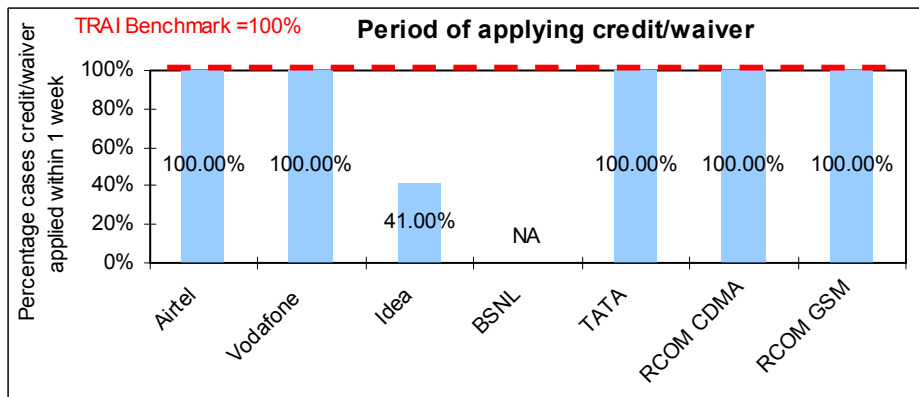
One month

Operator meeting benchmark: Airtel, Vodafone, BSNL, TATA, RCOM CDMA, RCOM GSM
 Operator not meeting benchmark: Idea

Live calling

Operator meeting benchmark: Airtel
 Operator not meeting benchmark: Vodafone, Idea, BSNL, TATA, RCOM CDMA, RCOM GSM

Period of applying credit / waiver



NA: Not applicable

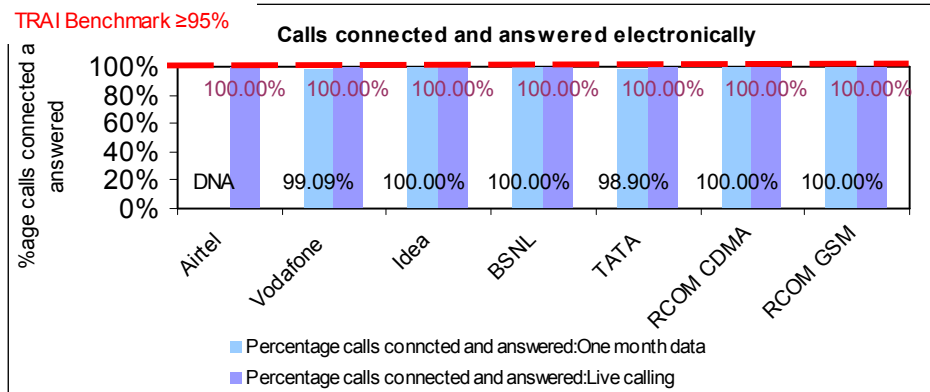
Operator meeting benchmark: Airtel, Vodafone, TATA, RCOM CDMA, RCOM GSM
 Operator not meeting benchmark: Idea

Live calling for billing Complaints

Resolution of billing complaints	Benchmark	Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
Total Number of calls made		50	100	39	50	100	29	6
Number of cases resolved in 4 weeks		50	74	29	30	63	21	4
Percentage cases resolved in four weeks	100%	100.00%	74.00%	74.36%	60.00%	63.00%	72.41%	66.67%

Operators not meeting the benchmark

Customer Care / Helpline: Calls answered electronically



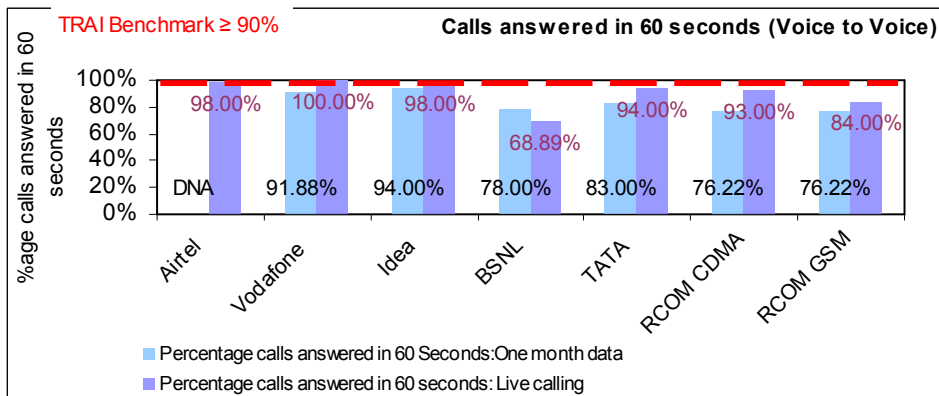
One month

All operators are meeting the benchmark

Live calling

All operators are meeting the benchmark

Customer Care / Helpline: Calls answered voice to voice



One month

Operator meeting benchmark: Vodafone, Idea

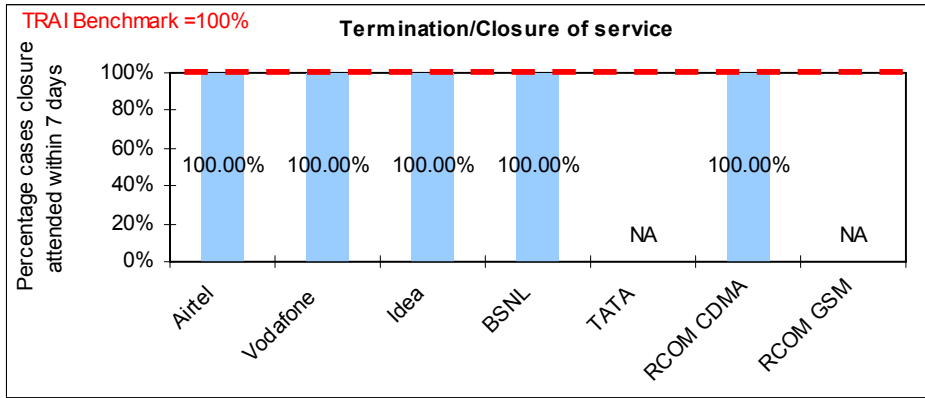
Operator not meeting benchmark: BSNL, TATA, RCOM CDMA, RCOM GSM

Live calling

Operator meeting benchmark: Airtel, Vodafone, Idea, TATA, RCOM CDMA

Operator not meeting benchmark: BSNL, RCOM GSM

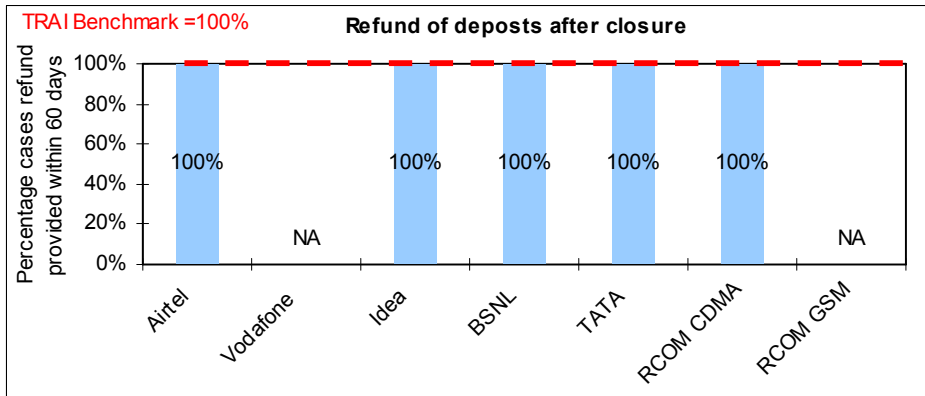
Termination / Closure of service



NA: Not applicable

All operators are meeting the benchmark

Refund of deposits



NA: Not applicable

All operators are meeting the benchmark

Inter operator calls assessment

Inter operator call Assessment								
From ↓	To →	Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
Airtel		-	100%	99%	100%	100%	99%	98%
Vodafone		100%	-	100%	100%	100%	100%	100%
Idea		100%	100%	-	100%	100%	99%	97%
BSNL		99%	100%	100%	-	100%	100%	99%
TATA		95%	99%	99%	99%	-	95%	98%
RCOM CDMA		100%	100%	100%	100%	100%	-	98%
RCOM GSM		98%	99%	96%	100%	99%	99%	-

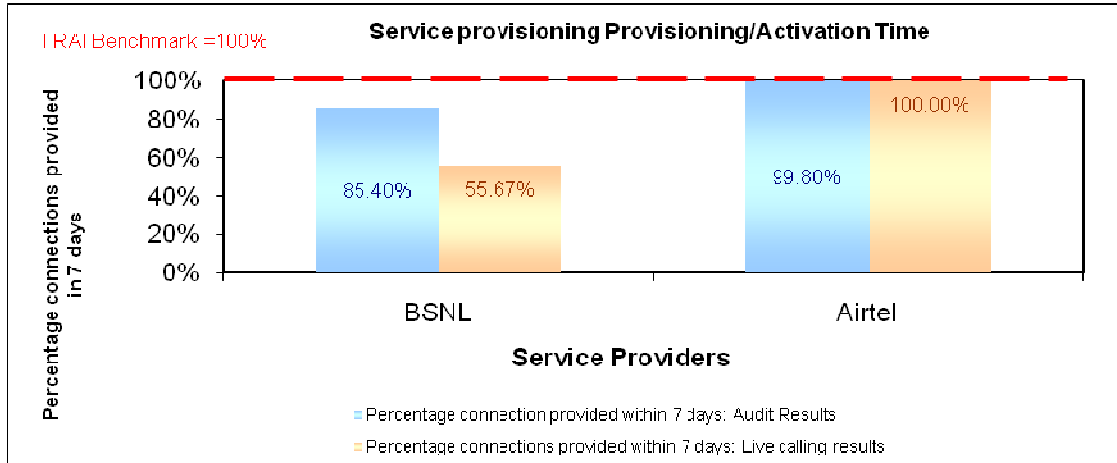


The maximum problem faced by the calling operator to other operators

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. TATA found it tough connecting to a RCOM and Airtel number with only 95 out of 100 calls getting connected. Similarly RCOM had difficulty in connecting to a Idea number with 96% of their calls getting completed.

6.2 Graphical/Tabular Representations for Basic (Wireline) services

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



One month

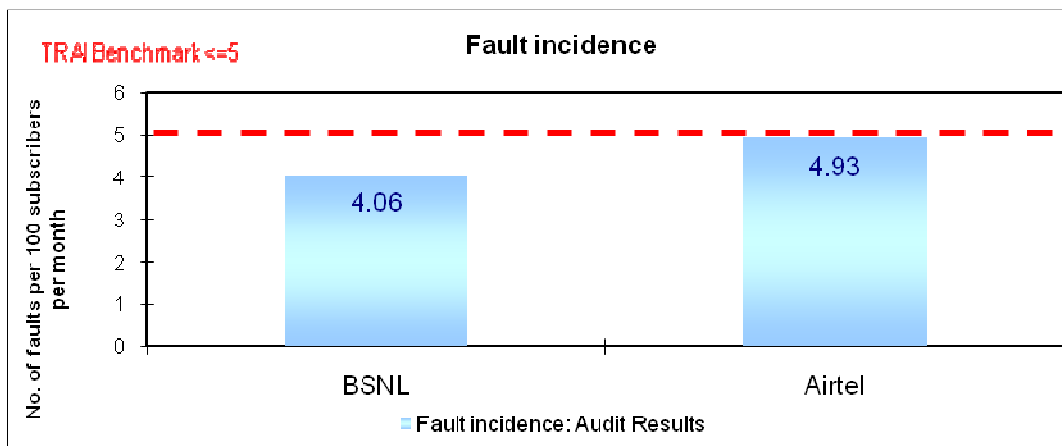
No operator is meeting the benchmark

Live calling

Operator meeting benchmark: Airtel

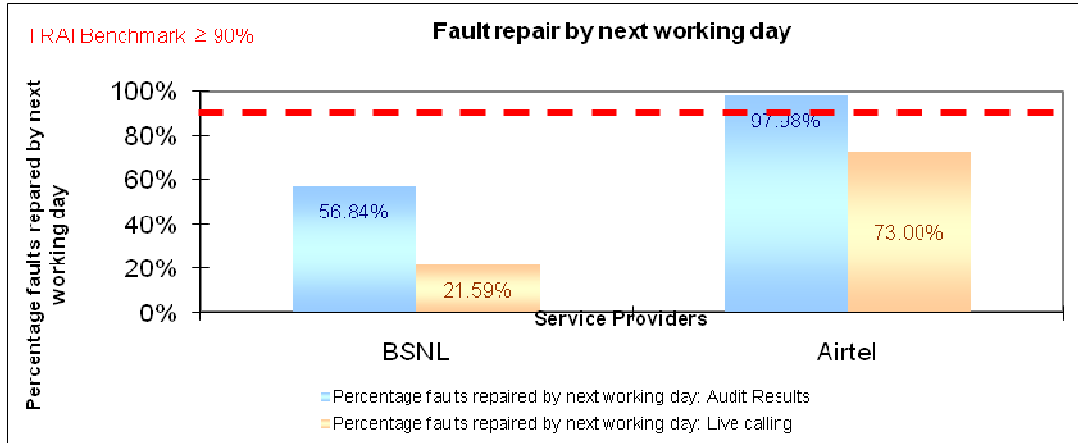
Operator not meeting benchmark: BSNL

Fault incidence



All operators are meeting the benchmark

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

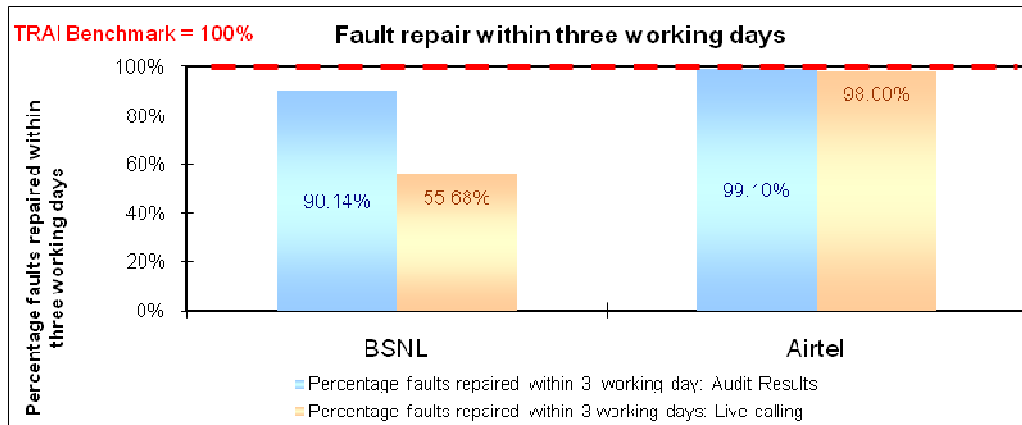


One month

Operator meeting benchmark: Airtel
 Operator not meeting benchmark: BSNL

Live calling

No operator is meeting the benchmark



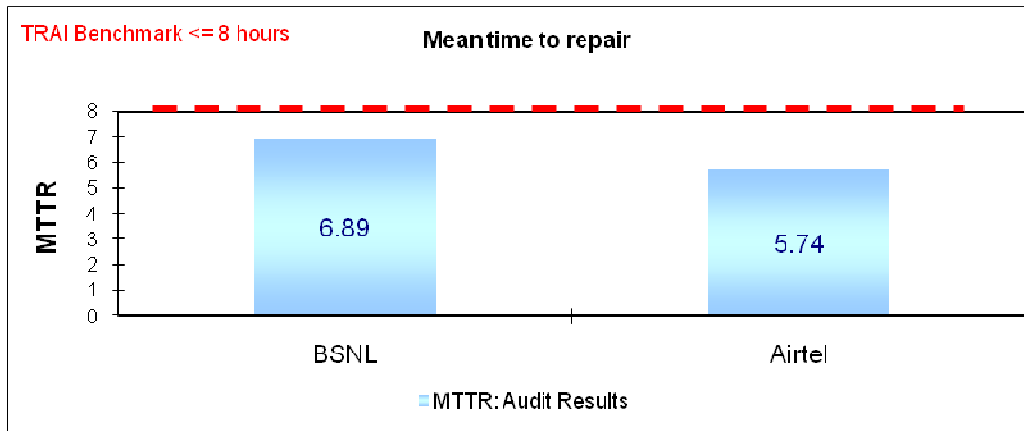
One month

No operator is meeting the benchmark

Live calling

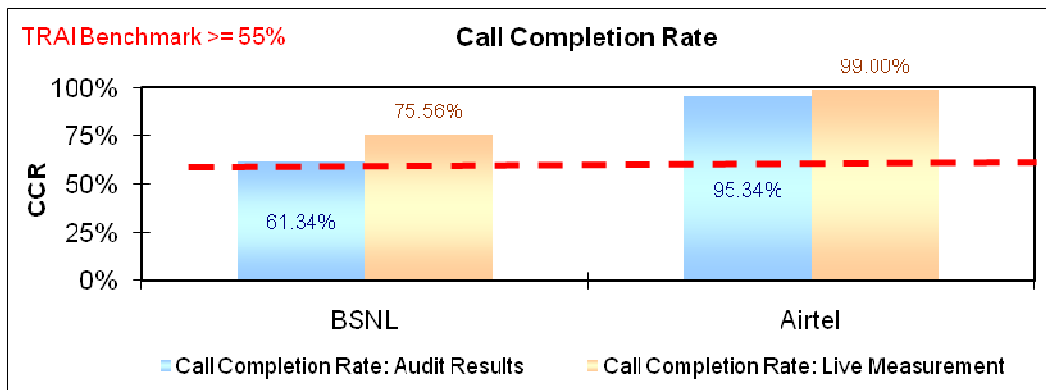
No operator is meeting the benchmark

Mean time to repair



All operators are meeting the benchmark

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



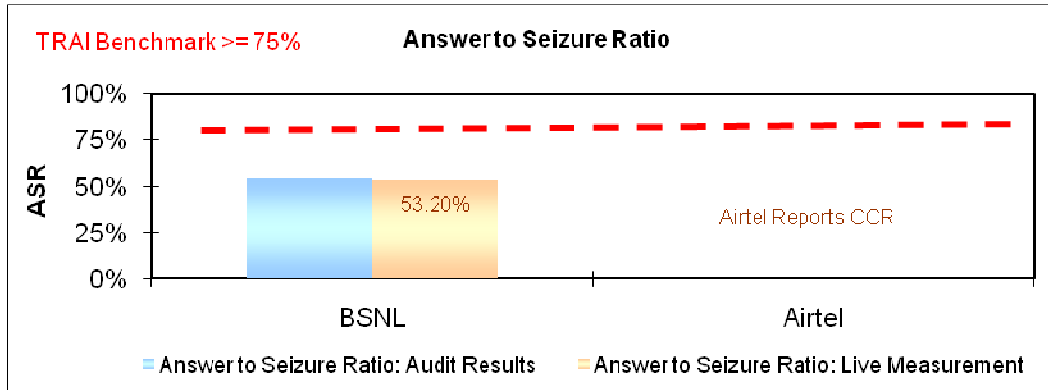
One month

All operators are meeting the benchmark

Live measurement

All operators are meeting the benchmark

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



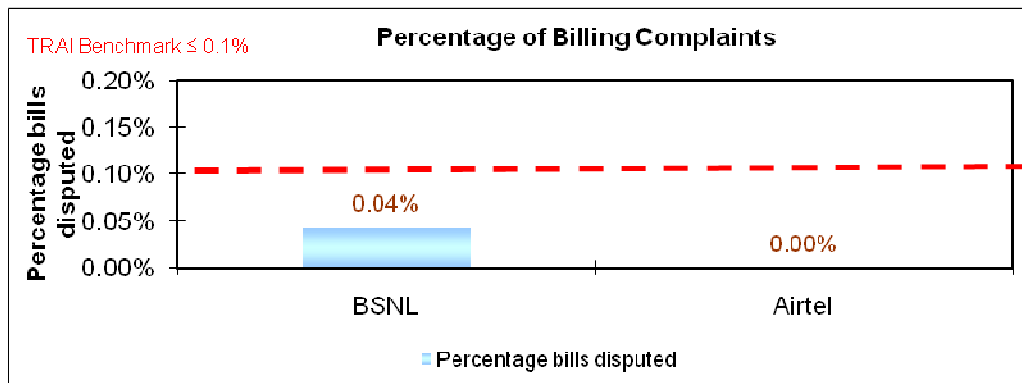
One month

BSNL is not meeting the benchmark

Live measurement

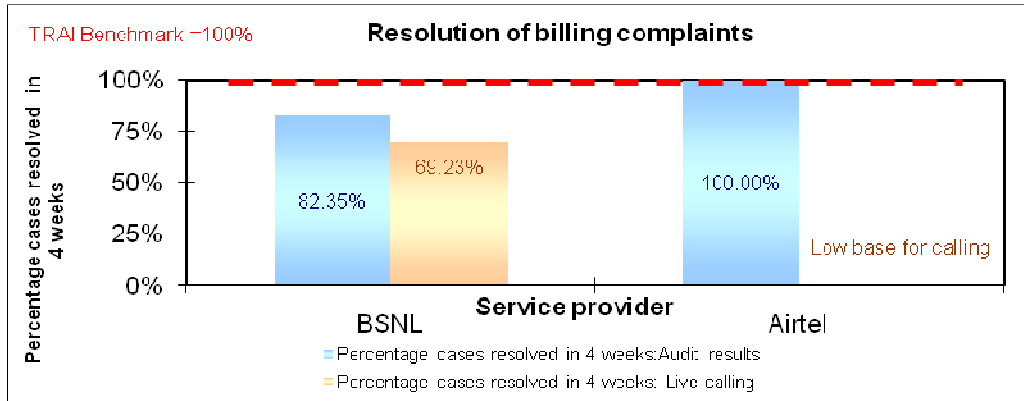
BSNL is not meeting the benchmark

Percentage bills disputed



All operators are meeting the benchmark

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



One month

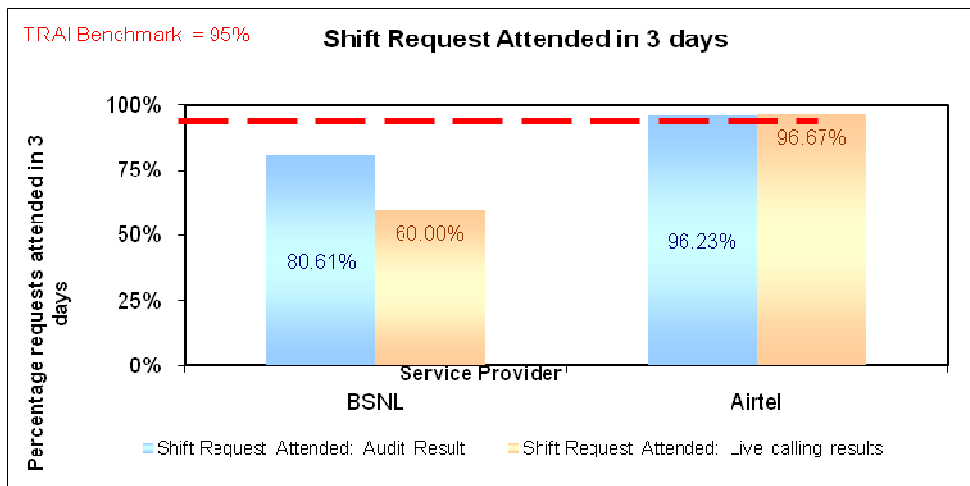
Operator meeting benchmark: Airtel

Operator not meeting benchmark: BSNL

Live calling

No operator is meeting the benchmark

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



One month

Operator meeting benchmark: Airtel

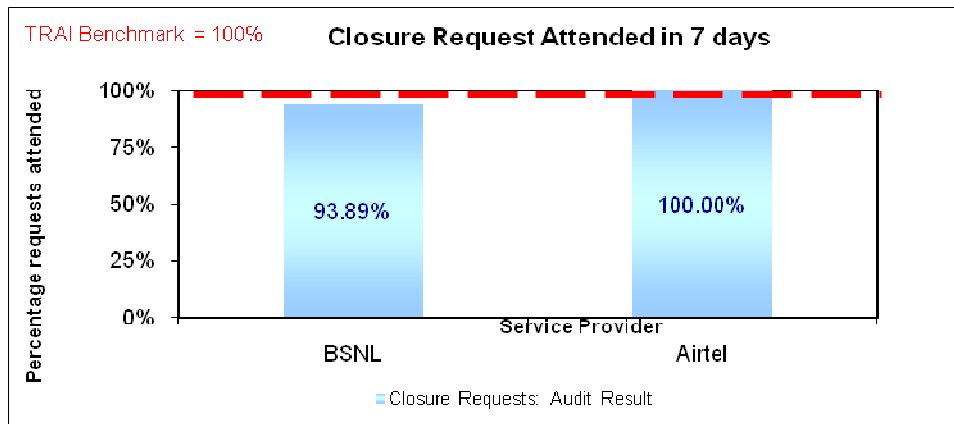
Operator not meeting benchmark: BSNL

Live calling

Operator meeting benchmark: Airtel

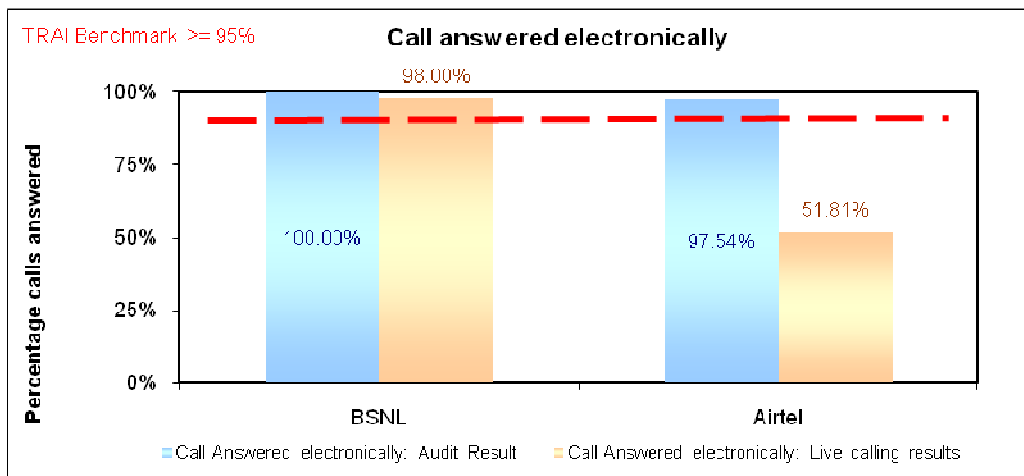
Operator not meeting benchmark: BSNL

Closure requests attended within 7 days



Operator meeting benchmark: Airtel
 Operator not meeting benchmark: BSNL

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



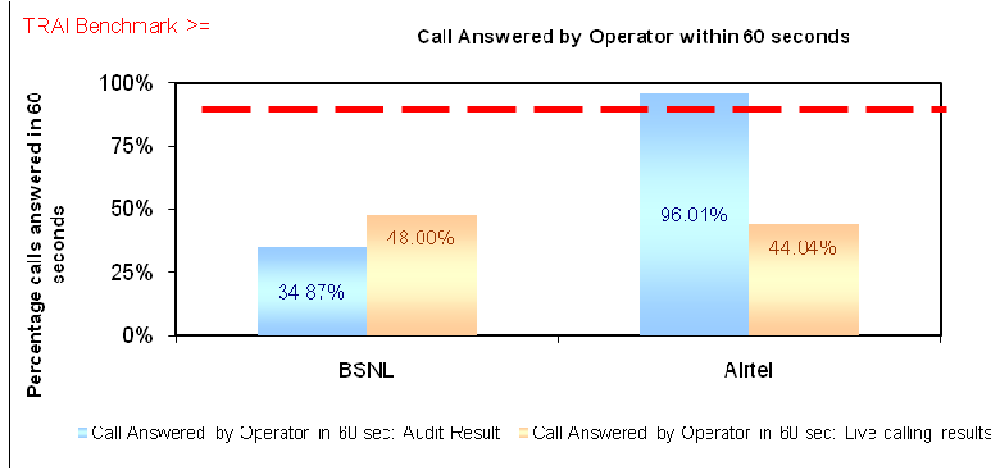
One month

All operators are meeting the benchmark

Live calling

Operator meeting benchmark: BSNL
 Operator not meeting benchmark: Airtel

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



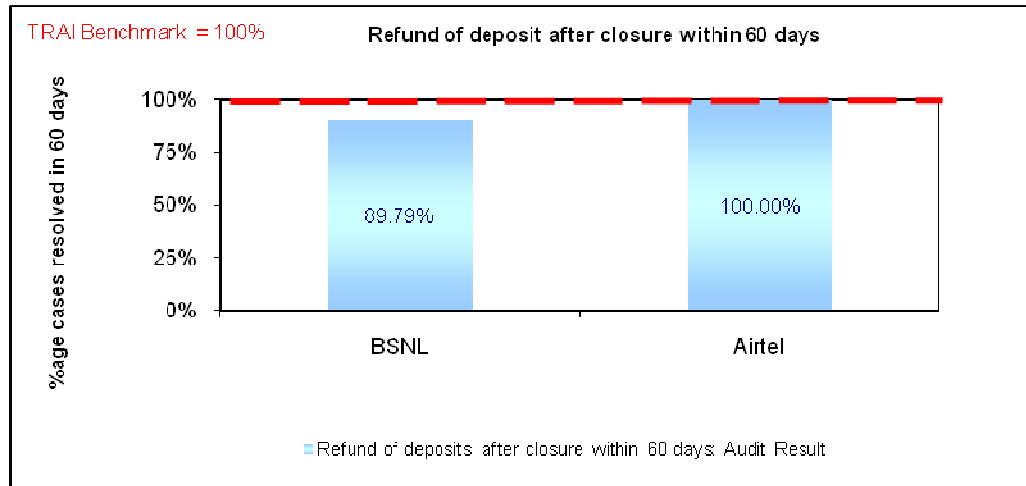
One month

Operator meeting benchmark: Airtel
 Operator not meeting benchmark: BSNL

Live calling

No operator is meeting the benchmark

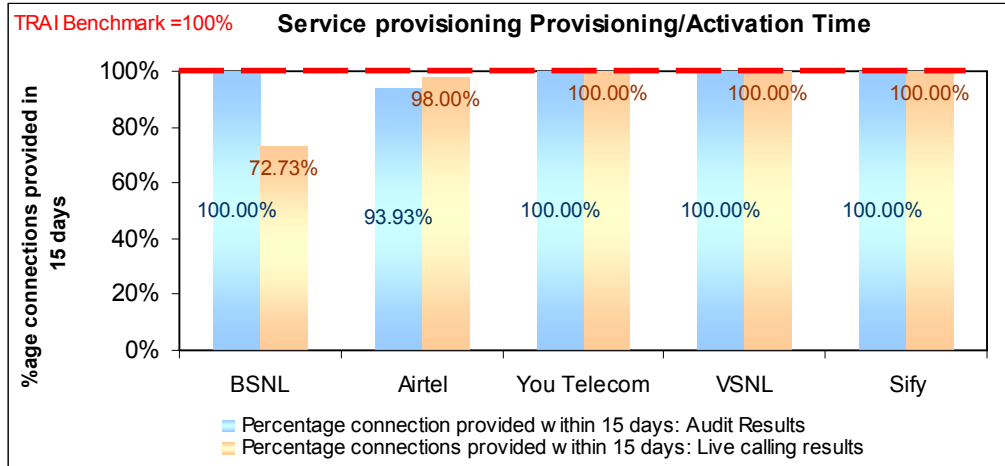
Time taken to refund of deposits after closure



Operator meeting benchmark: Airtel
 BSNL is not meeting the benchmark

6.3 Graphical/Tabular Representations for Broadband services

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



One month

Operator meeting benchmark: BSNL, You Telecom, VSNL, Sify

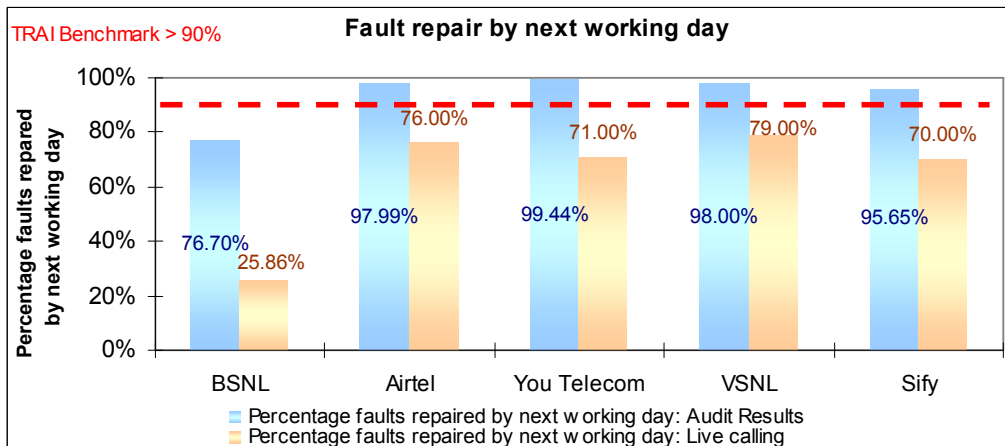
Operator not meeting benchmark: Airtel

Live calling

Operator meeting benchmark: You Telecom, VSNL, Sify

Operator not meeting benchmark: BSNL, Airtel

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



One month

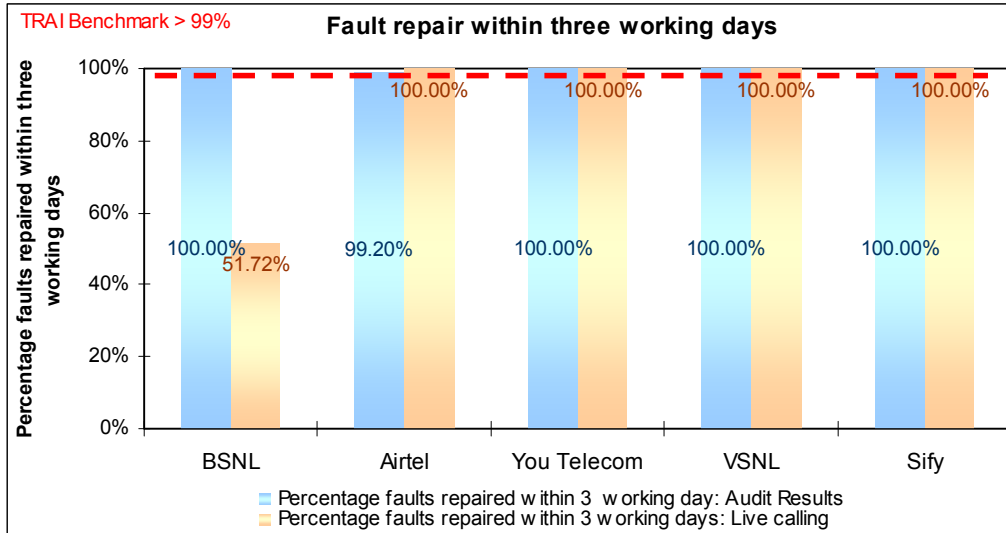
Operator meeting benchmark: Airtel, You Telecom, VSNL, Sify

Operator not meeting benchmark: BSNL

Live calling

No operator is meeting the benchmark

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



One month

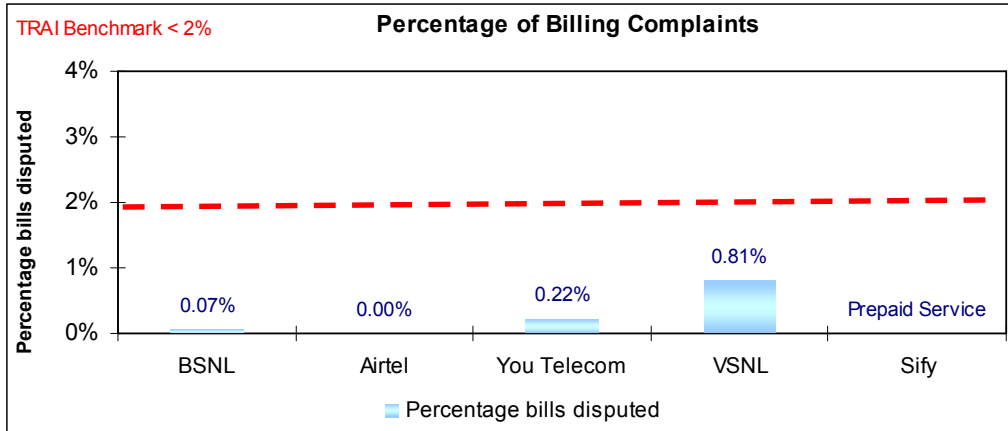
All operators are meeting the benchmark

Live calling

Operator meeting benchmark: Airtel, You Telecom, VSNL, Sify

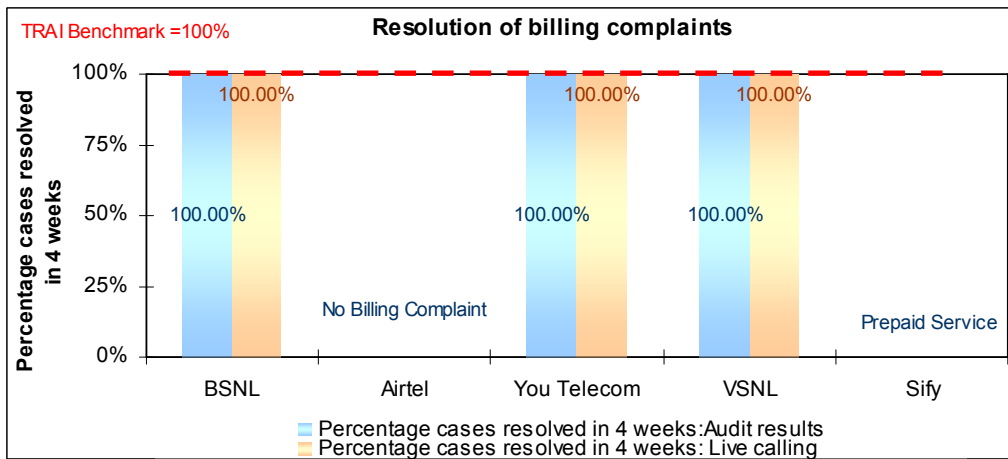
Operator not meeting benchmark: BSNL

Percentage bills disputed



All operators are meeting the benchmark

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



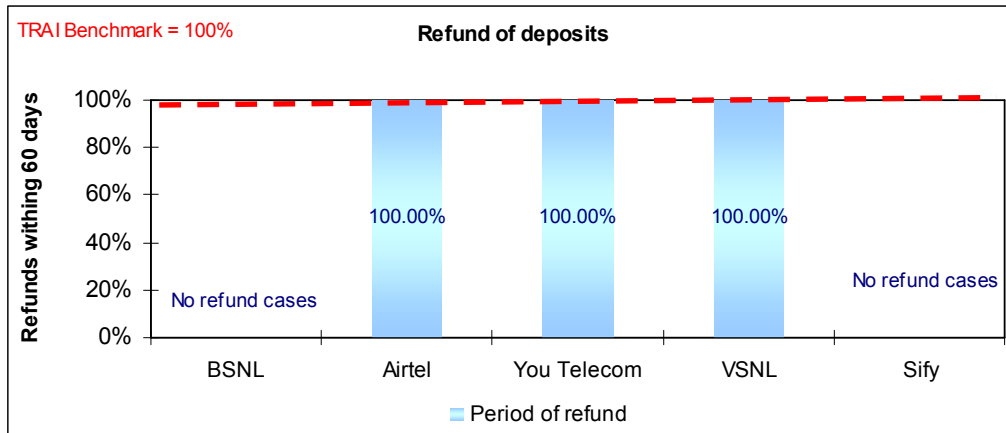
One month

All operators are meeting the benchmark

Live calling

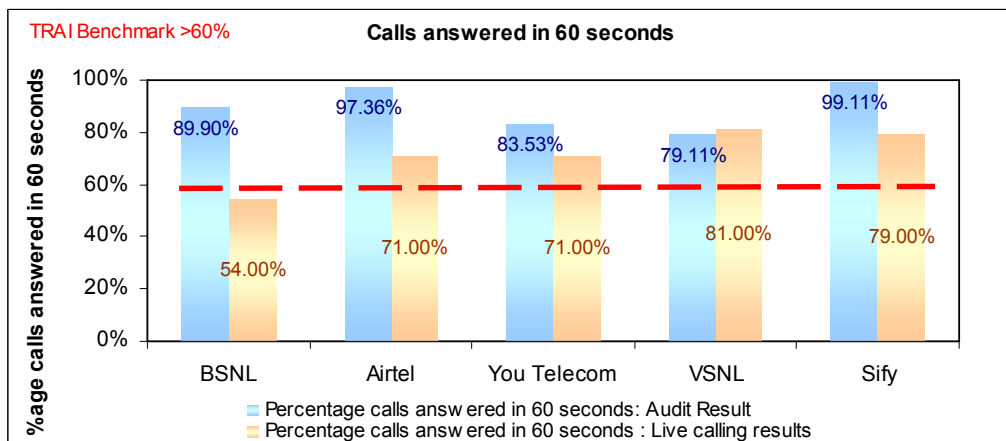
All operators are meeting the benchmark

Refund of deposits after closure



All operators are meeting the benchmark

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



One month

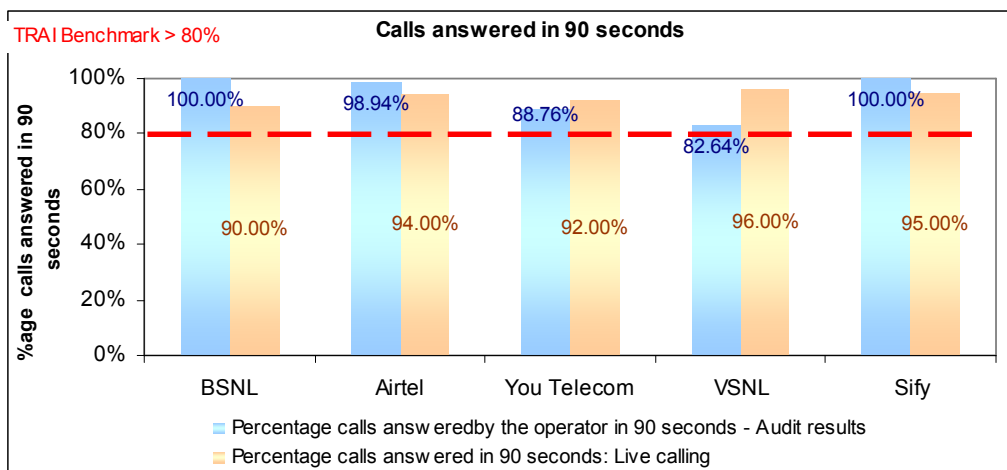
All operators are meeting the benchmark

Live calling

Operator meeting benchmark: Airtel, You Telecom, VSNL, Sify

Operator not meeting benchmark: BSNL

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 Utilization	B'mark	BSNL	Airtel	You Telecom	VSNL	Sify
Total number of intra network links		213	41	NA	19	400
No of Intra network found to be above 90%		0	3	NA	0	0

Bandwidth Utilization	B'mark	BSNL	Airtel	You Telecom	VSNL	Sify
Total number of intra network links		143	41	NA	19	394
No of Intra network found to be above 90%		0	3	NA	0	0

Broadband download speed	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify
Total committed download speed to the sample subscribers (In mpbs) (A)		25600	12800	2	12800	12800
Total average download speed observed during TCBH (In Mpbs) (B)		23474	11520	1.7	11558	11200
%age subscribed speed available to the subscriber during TCBH (B/A)*100	>80%	91.70%	90.00%	85.00%	90.30%	87.50%

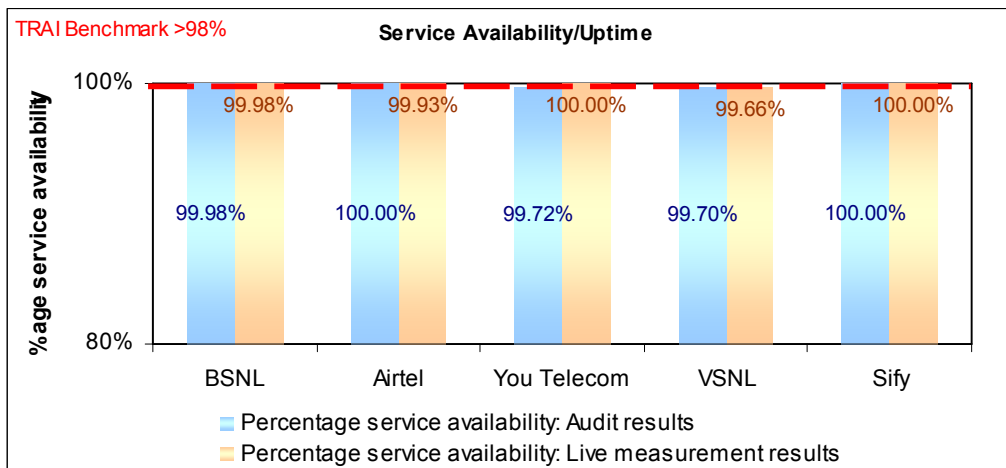
NA: Not applicable

As far as bandwidth utilization on the intra network links is concerned all the operators seem to performing well as all the sample intra network links (Access segment) tested during live measurement were found to be below 90%. 3 intra network links for Airtel were found to be above 90% utilized.

However, the level from which the bandwidth utilization at Intra network links is being reported varied because of the difference in networks. For e.g. Airtel was found to be reporting Bandwidth from links running from each RSU (Collection of DSLAM's) to the main node in a circle. Whereas VSNL (TATA Communications) considers the links between core distribution routers (located at 8 locations in India) and Routers being used for National long distance connectivity (Located at Chennai, Ernakulam and Mumbai)

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

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

7.0 Compliance reports: Results of Verification of Records for January to March 2009

7.1 Cellular Mobile services

Name of Service Provider	Network Performance						Billing complaints				Customer's Helpline			
	Accumulated downtime of Community isolation (in hours)	Call Set-up Success Rate (within licensee's own network)	SDDCH/ Paging Chi. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	%age of connection with good voice quality	Point of Interconnection (POI) Congestion	Billing complaints per 100 bills issued	%age complaints resolved within 4 weeks	Period of all refunds/payments due to customers from date of resolution	Percentage of calls answered electronically within 20 seconds	Percentage of calls answered electronically within 40 seconds	Percentage of calls answered by the operators (voice to voice) within 60 seconds	Percentage of calls answered by the operators (voice to voice) within 90 seconds
B'mark*	≤24	≥95%	≤1%	≤2%	≤3%	≥95%	≤0.5%	≤0.1%	100%	≤4 weeks	≥ 80%	≥ 95%	≥ 80%	≥ 95%
Airtel	Complied	98.69%	0.30%	0.64%	1.08%	98.57%	Complied	0.00%	100.00%	< 4 weeks	Complied	Complied	84.39%	Complied
Vodafone	Complied	98.69%	0.30%	0.64%	1.08%	98.57%	DNA	0.00%	100.00%	< 4 weeks	Complied	Complied	84.39%	Complied
Idea	Complied	99.96%	0.11%	0.10%	1.19%	96.97%	DNA	0.02%	100.00%	16 days	Complied	Complied	99.30%	Complied
BSNL	Complied	99.96%	0.11%	0.10%	1.19%	96.97%	DNA	0.02%	100.00%	< 4 weeks	Complied	Complied	99.30%	Complied
TATA	Complied	99.97%	0.35%	0.32%	1.13%	96.95%	0.00%	0.04%	100.00%	<4 weeks	Complied	Complied	95.00%	Complied
RCOM CDMA	Complied	99.97%	0.35%	0.32%	1.13%	96.95%	0.00%	0.04%	100.00%	<4 weeks	Complied	Complied	95.00%	Complied
	Complied	95.00%	0.83%	1.80%	2.90%	96.00%	0.00%	0.01%	100.00%	<4 weeks	Complied	Complied	80.00%	Complied
	Complied	95.00%	0.83%	1.80%	2.90%	96.00%	0.00%	0.01%	100.00%	<4 weeks	Complied	Complied	80.00%	Complied
	Complied	99.94%	0.00%	0.08%	0.86%	98.33%	0.00%	0.03%	100.00%	<4 weeks	Complied	Complied	94.00%	Complied
	Complied	99.94%	0.00%	0.08%	0.86%	98.33%	0.00%	0.03%	100.00%	<4 weeks	Complied	Complied	94.00%	Complied
	Complied	99.28%	0.00%	0.53%	0.97%	98.38%	1.40%	0.09%	100.00%	<4 weeks	Complied	Complied	66.67%	Complied
	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	Complied	Complied	DNA	Complied

Figures do not match with those reported in PMR

Not meeting benchmark

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

* As per the PMR reports for JFM 2009 quarter

For all the parameters related to wireless audits, RCOM (CDMA) could not provide auditors with data pertaining to Jan-Mar '09 period, Hence PMR verification for the same could not be done.

Some of the operators have recently started with their services for which the PMR data was not available. IMRB auditors have advised these operators to start submitting their PMRs to TRAI.

7.1.1 Conclusions - Cellular Mobile services

1. The figures reported by all the operators on all parameters completely match with the figures obtained on verification
2. RCOM CDMA does not meet the benchmark for percentage calls answered by the operator in 60 seconds and POI Congestion.

7.2 Basic (Wireline) services

Parameters	Benchmarks	BSNL		Airtel	
		PMR	IMRB	PMR	IMRB
Percentage connections completed within 7 days	100%	99.81%	92.00%	100.00%	100.00%
Faults incidences (No. of faults/100 Subs./month)	≤5	0.05	0.00	0.03	0.03
% of faults repaired by next working day	≥ 90%	95.12%	65.00%	97.00%	97.00%
Faults pending for > 3days and ≤7 days	Rent rebate of 7 days	42	42	241	241
Faults pending for > 7 days and ≤15 days	Rent rebate of 15 days	539	539	0	0
Faults pending for > 15 days	Rent rebate of 1 month	0	0	0	0
Mean Time to Repair (MTTR)	≤ 8 Hrs	7.13	6.93	6.00	6.00
Call Completion Rate (CCR)	≥ 55%	74.00%	77.00%	98.00%	98.00%
Metering and billing credibility - Number of bills disputed during over a billing cycle	< 0.1%	0.00%	0.00%	0.03%	0.03%
Resolution of billing complaints within 4 weeks	100%	100.00%	100.00%	100.00%	100.00%
Customer care/helpline promptness					
Shift requests (Total number received)					
Percentage shift requests attended within 3 days	>95%	100.00%	80.00%	97.00%	97.00%
Closure request attended					
Closure within 24 hours	>95%	99.78%	88.00%	100.00%	100.00%
Supplementary (additional) service requests attended)					
Additional facility provided within 24 hours	>95%	Complied		Complied	
Response time to customer for assistance					
% age call answered through IVR in 20 seconds	>80%	Complied		Complied	
% age call answered through IVR in 40 seconds	100%	Complied		Complied	
% age call answered by operator in 60 seconds	>80%	80.00%	0.00%	96.00%	96.00%
% age call answered by operator in 90 seconds	>95%	Complied		Complied	
Time taken for refund of deposits after closures within 60 days	100%	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



Figures verified on all India basis

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



Not meeting the benchmark

DNP: Details not provided

7.2.1 Conclusions - Basic Wireline Services

1. Significant variation is observed in figures reported in PMR and those verified in sample exchanges for shifts and new connections
2. For rest of the parameters, 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
3. Raw data on call centre details was not available at the exchanges audited and hence the same could not be verified by IMRB auditors

7.3 Broadband services

Parameters	Benchmarks	BSNL		Airtel		You Telecom		VSNL		Sify	
		PMR	IMRB	PMR	IMRB	PMR	IMRB	PMR	IMRB	PMR	IMRB
Service provisioning uptime											
Percentage connections provided within 15 days	100%	100.00%	100.00%	100.00%	97.00%	100.00%	100.00%	97.00%	95.00%	100.00%	100.00%
Fault repair restoration time											
Percentage faults repaired by next working days	> 90%	95.00%	54.00%	99.00%	99.00%	99.00%	100.00%	94.00%	91.00%	92.00%	92.00%
Percentage faults repaired within three working days	> 99%	100.00%	58.00%	100.00%	100.00%	100.00%	100.00%	99.00%	97.00%	99.00%	100.00%
Billing performance											
Billing complaints per 100 bills issued	< 2%	0.10%	0.00%	0.00%	0.00%	0.35%	0.35%	0.67%	0.62%	NA	NA
%age of billing complaints resolved in 4 weeks	100%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	NA
%age cases in which refund of deposits after closure was made in 60 days	100%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	NA
Customer care/helpline assessment (Voice to Voice)											
Percentage calls answered within 60 seconds	> 60%	85.00%	85.00%	94.00%	94.00%	82.00%	82.00%	98.00%	98.26%	98.00%	98.60%
Percentage calls answered within 90 seconds	> 80%	93.00%	93.00%	97.00%	97.00%	87.00%	87.00%	99.00%	99.13%	99.00%	100.00%
Bandwidth utilization/Throughput											
Intra network links (POP to ISP Node)		DNP	186	21	39	NA	4	16	16	432	432
Total number of intra network links > 90%		DNP	0	0	0	NA	46	0	0	0	0
Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)		DNP	26557	42	42	15	35	4	4	27	27
Percentage bandwidth utilized on upstream links	< 80%	NA	77.00%	50.00%	50.00%	76.00%	75.00%	53.00%	53.35%	79.00%	83.00%
Broadband download speed	> 80%	92.00%	92.00%	100.00%	100.00%	85.00%	85.00%	>80%	>80%	95.00%	85.00%
Service availability/uptime	> 98%	99.00%	99.99%	100.00%	100.00%	99.00%	99.00%	98.75%	97.60%	100.00%	100.00%
Packet loss	< 1%	NA	0.05%	0.00%	0.00%	<1%	0.90%	0.00%	0.00%	<1%	<1%
Network Latency											
POP/ISP Node to NIXI (in msec)	< 120 msec	DNP	59	0	35	40	27	<80	<80	< 45	< 45
ISP node to NAP port (Terrestrial) (in msec)	< 350 msec	DNP	276	0	75	300	264	<250	<250	< 300	< 300



Figures do not match with those reported in PMR



Not meeting the benchmark

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

DNP: Details not provided

7.3.1 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 all the service providers.
4. Although all the service providers claimed that they conduct random ping tests and latency to check the packet loss but there is no book keeping at their end. Records of old ping tests were found to be nonexistent.
5. There were some discrepancies reported for You Telecom for bandwidth utilization and network latency. Also there was small discrepancy reported in customer care assessment for VSNL and Sify

8. Annexure - I

8.1 Parameter wise performance reports for Cellular Mobile services

1. Network Availability

Audit Results for Network Availability

	Benchmark	Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
Number of BTSs in the licensed service area		2478	2371	1931	1379	522	867	1177
Sum of downtime of BTSs in a month (in hours)		2101.9	2709	1956	2038	477	1541	3467
BTSs accumulated downtime (not available for service)	≤ 2%	0.12%	0.16%	0.14%	0.21%	0.13%	0.25%	0.41%
Number of BTSs having accumulated downtime >24 hours		8	3	8	0	0	15	19
Worst affected BTSs due to downtime	≤ 2%	0.32%	0.13%	0.41%	0.00%	0.00%	1.73%	1.61%

2. Connection Establishment (Accessibility)

Audit Results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
Total number of call attempts		53484596	DNA	3632286	256267	44018081	28506405	11360677
Total number of successful calls established		52564661	DNA	3628343	244484	43013610	28218490	11248041
CSSR	≥ 95%	98.28%	99.40%	99.89%	95.40%	97.72%	98.99%	99.01%

SDCCH congestion	Benchmark	Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
Total number of SDCCH/Paging channel attempts		116417084	176070739	5291205	739156	10883577	DNA	DNA
Number of successful SDCCH/Paging channel attempts		116184249.8	175677447	5283718	735460	10883577	DNA	DNA
SDCCH/Paging channel congestion	≤ 1%	0.00%	0.22%	0.14%	0.50%	0.00%	0.00%	0.00%

TCH congestion	Benchmark	Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
TCH attempts		53484596	76289772	2287198	630375	44018081	DNA	DNA
Number of successful TCH attempts		53324142	76222954	2278046	623946	44007000	DNA	DNA
TCH congestion	≤ 2%	0.30%	0.09%	0.40%	1.02%	0.03%	0.56%	0.12%

Live measurement results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
Total number of call attempts		1980891	DNA	3854925	224991	63585292	2912147	1198168
Total number of successful calls established		1967025	DNA	3851157	218065	62518551	2900100	1185687
CSSR	≥ 95%	99.30%	99.60%	99.90%	96.92%	98.32%	99.59%	98.96%

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

SDCCH congestion	Benchmark	Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
Total number of SDCCH/Paging channel attempts		4240953	17514330	5657990	694989	34957397	DNA	DNA
Number of successful SDCCH/Paging channel attempts		4236288	17506592	5647805	691722	34957397	DNA	DNA
SDCCH/Paging channel congestion	≤ 1%	0.00%	0.04%	0.18%	0.47%	0.00%	0.00%	0.01%

TCH congestion	Benchmark	Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
TCH attempts		1980891	7867945	2421288	569347	63585292	DNA	DNA
Number of successful TCH attempts		1967025	7861709	2408476	565647	63578414	DNA	DNA
TCH congestion	≤ 2%	0.29%	0.08%	0.53%	0.65%	0.01%	0.16%	0.02%

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

CSSR	Benchmark	Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
Total number of call attempts		100	108	109	133	133	123	100
Total number of successful calls established		100	107	109	125	133	123	100
CSSR	≥ 95%	100.00%	99.07%	100.00%	93.73%	100.00%	100.00%	100.00%

Blocked calls	Benchmark	Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
%age blocked calls		0.00%	0.93%	0.00%	6.27%	0.00%	0.00%	0.00%

3. Connection Maintenance (Retainability)

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

Call drop rate	Benchmark	Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
Total number of calls established		53148246	75323851	2170083	623946	38580190	DNA	DNA
Total number of calls dropped		754705	814822	31433	6484	530486	DNA	DNA
Call drop rate	≤ 2%	0.87%	1.08%	1.45%	1.04%	1.38%	1.30%	0.62%

Cells having more than 3% TCH	Benchmark	Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
Total number of cells in the network		7341	7144	5697	657	1564	867	3525
Total number of cells having more than 3% TCH		809	297	505	31	67	18	34
Worst affected cells having more than 3% TCH	≤ 5%	11.02%	4.16%	8.86%	4.72%	4.28%	2.08%	0.96%

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

Call drop rate	Benchmark	Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
Total number of calls established		1967025	7766204	2283168	565647	56171344	DNA	DNA
Total number of calls dropped		19473	78811	36512	5380	487236	DNA	DNA
Call drop rate	≤ 2%	0.59%	1.01%	1.60%	0.95%	0.87%	0.81%	0.63%

Operators not meeting the benchmark

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

Cells having more than 3% TCH	Benchmark	Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
Total number of cells in the network		7341	7148	5694	657	112608	867	3525
Total number of cells having more than 3% TCH		693	219	493	32	4131	2	37
Worst affected cells having more than 3% TCH	≤ 5%	9.44%	3.06%	8.66%	4.87%	3.67%	0.23%	1.05%

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

Call drop rate	Benchmark	Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
Total number of calls established		100	108	107	123	133	123	100
Total number of calls dropped		0	0.3	1	2	0	0	0
Call drop rate	≤ 2%	0.00%	0.31%	0.93%	1.90%	0.00%	0.27%	0.33%

4. Voice quality

Audit Results for Voice quality

Voice quality	Benchmark	Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
Total number of sample calls		DNA	10107220402	287232313	150	2224	DNA	DNA
Total number of calls with good voice quality		DNA	9834870828	286864494	144	2185	DNA	DNA
%age calls with good voice quality	≥ 95%	99.17%	97.31%	99.87%	96.00%	98.25%	98.38%	97.87%

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

Voice quality	Benchmark	Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
Total number of sample calls		225219	188584	177445	164479	22715	7267	6247
Total number of calls with good voice quality		218437	181960	170143	155336	21837	7016	6138
%age calls with good voice quality	≥ 95%	96.99%	96.49%	95.89%	94.44%	96.14%	96.54%	98.26%

5. POI Congestion

Audit Results for POI Congestion

POI congestion	Benchmark	Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
POI traffic offered on all individual POI's		DNA	DNA	DNA	14350	403924.06	4290	4290.18
Served traffic for all POI's		DNA	DNA	DNA	14350	403924.06	4287	4287.22
Traffic failed on all POI's	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.07%	0.07%

Live measurement results for POI congestion

POI congestion	Benchmark	Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
POI traffic offered on all individual POI's		DNA	DNA	DNA	14289	559192.22	3979	3979.4
Served traffic for all POI's		DNA	DNA	DNA	14289	559192.22	3979	3979.3
Traffic failed on all POI's	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Operators not meeting the benchmark

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

6. Inter Operator Call Assessment

Inter operator call Assessment		Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
From ↓	To →							
Airtel		-	100%	99%	100%	100%	99%	98%
Vodafone		100%	-	100%	100%	100%	100%	100%
Idea		100%	100%	-	100%	100%	99%	97%
BSNL		99%	100%	100%	-	100%	100%	99%
TATA		95%	99%	99%	99%	-	95%	98%
RCOM CDMA		100%	100%	100%	100%	100%	-	98%
RCOM GSM		98%	99%	96%	100%	99%	99%	-

7. Metering and Billing credibility
Audit Results for billing performance

Billing Performance	Benchmark	Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
Billing disputes – Postpaid								
Total bills generated during the period		36820	26657	76997	22779	132854	76307	76307
Total number of bills disputed		36	9	26	19	41	65	7
Percentage bills disputed	≤0.1%	0.10%	0.03%	0.03%	0.08%	0.03%	0.09%	0.01%
Billing disputes – Prepaid								
Total number of prepaid customers in that period		1272244	240000	5088168	2021640	1297136	1959500	NA
Number of complaints related to charging, credit & validity		182	279	1653	401	347	1285	NA
Percentage of complaints	≤0.1%	0.01%	0.12%	0.03%	0.02%	0.03%	0.02%	NA
Resolution of billing complaints								
Total complaints resolved in 4 weeks from date of receipt		0	9	118	422	388	349	29
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%
Period of applying credit / waiver								
Total number of cases requiring credit/waiver		0	9	DNA	0	388	65	7
Total number of cases where credit/waiver was made within 1 week		0	9	DNA	0	388	65	7
Percentage cases in which credit/waiver was received within 1 week	100%	NA	100.00%	41.00%	NA	100.00%	100.00%	100.00%

Live calling results for resolution of billing complaints

Resolution of billing complaints	Benchmark	Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
Total Number of calls made		50	100	39	50	100	29	6
Number of cases resolved in 4 weeks		50	74	29	30	63	21	4
Percentage cases resolved in four weeks	100%	100.00%	74.00%	74.36%	60.00%	63.00%	72.41%	66.67%

Operators not meeting the benchmark

NA: Not applicable

8. Customer Care**Audit results for customer care (Electronically)**

Customer Care Assessment	Benchmark	Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
Total Number of calls received		1036630	6388977	4394205	65727	2084410	DNA	DNA
Total Number of calls getting connected and answered		1019004	6330840	4394205	65727	2061534	19239314	19239314
Percentage calls getting connected and answered	≥ 95%	98.30%	99.09%	100.00%	100.00%	98.90%	100.00%	100.00%

Live calling results for customer care (Electronically)

Customer Care Assessment	Benchmark	Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
Total Number of calls received		100	100	100	100	100	100	100
Total Number of calls getting connected and answered		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%

Audit results for customer care (Voice to Voice)

Customer Care Assessment	Benchmark	Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
Total Number of calls answered within 60 seconds		DNA	1730211	1561706	22517	416633	705549	705549
Percentage calls answered within 60 seconds	≥ 90%	70.00%	91.88%	94.00%	78.00%	83.00%	76.22%	76.22%

Live calling results for customer care (Voice to Voice)

Customer Care Assessment	Benchmark	Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
Total Number of calls received		100	100	100	90	100	100	100
Total Number of calls answered within 60 seconds		98	100	98	62	94	93	84
Percentage calls answered within 60 seconds	≥ 90%	98.00%	100.00%	98.00%	68.89%	94.00%	93.00%	84.00%

9. Termination / closure of service**Audit results for termination / closure of service**

Termination	Benchmark	Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
Total number of closure request		167	109	1787	89	0	833	0
Number of requests attended within 7 days		167	109	1787	89	0	833	0
Percentage cases in which termination done within 7 days	100%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	NA



Operators not meeting the benchmark

NA: Not applicable

10. Time taken for refund of deposits after closure

Audit results for refund of deposits

Refund	Benchmark	Airtel	Vodafone	Idea	BSNL	TATA	RCOM CDMA	RCOM GSM
Total number of cases requiring refund of deposits		78	234	0	10	271	141	0
Total number of cases where refund was made within 60 days		78	234	0	10	271	141	0
Percentage cases in which refund was receive within 60 days	100%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA

DNA: Details not available

NA: Not applicable

Service provider performance report based on one month data verification: 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 / closure of service			
	BTS Accumulated downtime (not available for service) (%age)	Worst affected BTSs due to downtime (%age)	Call Set-up Success Rate (within licensee's own network)	SDDCH/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	Point of Interconnection Congestion	Metering and billing credibility	%age complaints resolved within 4 weeks	Period of applying credit/waiver less than 1 week	Accessibility of call centre/customer care (IVR)	Percentage of calls answered by the operators (voice to voice) within 60 seconds	%age requests for Termination of service complied within 7 days
➔ B'mark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 5%	≥ 95%	≤ 0.5%	≤ 0.1%	100%	100%	≥ 95%	≥ 90%	100%	100%
Airtel	0.12%	0.32%	98.28%	0.00%	0.30%	0.87%	11.02%	99.17%	0.00%	0.10%	100.00%	100.00%	98.30%	70.00%	100.00%	100.00%
Vodafone	0.16%	0.13%	99.40%	0.22%	0.09%	1.08%	4.16%	97.31%	0.00%	0.03%	100.00%	100.00%	99.09%	91.88%	100.00%	NA
Idea	0.14%	0.41%	99.89%	0.14%	0.40%	1.45%	8.86%	99.87%	0.00%	0.03%	100.00%	41.00%	100.00%	94.00%	100.00%	100.00%
BSNL	0.21%	0.00%	95.40%	0.50%	1.02%	1.04%	4.72%	96.00%	0.00%	0.08%	100.00%	NA	100.00%	78.00%	100.00%	100.00%
TATA	0.13%	0.00%	97.72%	0.00%	0.03%	1.38%	4.28%	98.25%	0.00%	0.03%	100.00%	100.00%	99.90%	83.00%	NA	100.00%
RCOM																
CDMA	0.25%	1.73%	98.99%	0.00%	0.56%	1.30%	2.08%	98.38%	0.07%	0.09%	100.00%	100.00%	100.00%	76.22%	100.00%	100.00%
RCOM GSM	0.41%	1.61%	99.01%	0.00%	0.12%	0.62%	0.96%	97.87%	0.07%	0.01%	100.00%	100.00%	100.00%	76.22%	NA	NA

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

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

8.1.1 Monthly Point of Interconnection (POI) Congestion Report

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

POI Congestion Report will contain the name of only those POIs, where benchmark is not met where POI Congestion is measured during Time Consistent Busy Hour (TCBH)

8.2 Parameter wise performance reports for Basic Wireline services

1.1 Audit Results for Service provisioning			
	Benchmark	BSNL	Airtel
Total registrations / OB note issued in General category		322	504
Number of connections provided within 7 days		275	503
Percentage of connections provided within 7 days	100%	85.40%	99.80%
Connections completed after 7 days including pending connections		55	1

1.2 Live calling for Service provisioning			
	Benchmark	BSNL	Airtel
Total registrations / OB note issued in General category		97	100
Number of connections provided within 7 days		54	100
Percentage of connections provided within 7 days	100%	55.67%	100.00%
Connections completed after 7 days including pending connections		42	0

2.1 Audit Results for Fault repair			
	Benchmark	BSNL	Airtel
Fault incidences (No. of faults/100 Subs./month)	≤ 5	0	4.93

Fault repair (Urban areas)			
	Benchmark	BSNL	Airtel
Total No. of faults registered during the month		11090	892
No. of faults repaired by next working day during the month		6304	874
Percentage of faults repaired by next working day during the month	≥ 90%	56.84%	97.98%
No. of faults repaired within 3 days during the month		9997	884
Percentage of faults repaired within 3 days during the month	100%	90.14%	99.10%

Rent rebate			
	Benchmark	BSNL	Airtel
No. of cases with faults pending for >3 days and ≤7 days		0	19
Out of these number of cases where rent rebate for 7 days was given		0	19
Percentage of cases where rent rebate for 7 days was given	100%	NA	100.00%
No. of cases with faults pending for >7 days and ≤15 days		0	10
Out of these number of cases where rent rebate for 15 days was given		0	10
Percentage of cases where rent rebate for 15 days was given	100%	NA	100.00%
No. of cases with faults pending for ≥15 days		2	27
Out of these number of cases where rent rebate for 30 days was given		2	27
Percentage of cases where rent rebate for 30 days was given	100%	100.00%	100.00%

MTTR			
	Benchmark	BSNL	Airtel
Mean time taken to repair the fault in hours	≤ 8	6.89	5.74

Not meeting the benchmark
 DNA: Details not available
 DNP: Details not provided
 NA: Not applicable

2.2 Live calling for fault repair			
Urban area	Benchmark	BSNL	Airtel
Total Number of calls made		88	100
Number of cases where faults were repaired by next working day		19	73
Percentage cases where faults were repaired by next working day	≥ 90%	21.59%	73.00%
Number of cases where faults were repaired within 3 days		49	98
Percentage cases where faults were repaired within 3 days	100%	55.68%	98.00%

Rural & Hilly area	Benchmark	BSNL	Airtel
Total Number of calls made		14	NA
Number of cases where faults were repaired by next working day		7	NA
Percentage cases where faults were repaired by next working day	≥ 90%	50.00%	NA
Number of cases where faults were repaired within 5 days		7	NA
Percentage cases where faults were repaired within 5 days	100%	50.00%	NA

3.1 Audit Results for Call Completion Rate (CCR)

Traffic statistics - Answer to Seizure Ratio	Benchmark	BSNL	Airtel
Total number of calls processed by the switch		159700	NA
Total number of calls answered		86014	NA
Answer to Seizure Ratio (ASR)	≥ 75%	53.86%	NA

3.2 Live measurement results for Call Completion Rate (CCR)

Traffic statistics - Call Completion Rate	Benchmark	BSNL	Airtel
Total local call attempts		16034	57638
Total number of successful local calls		12116	57061
Call Completion Rate (CCR) in the local network	≥ 55%	75.56%	99.00%

Traffic statistics - Answer to Seizure Ratio	Benchmark	BSNL	Airtel
Total number of calls processed by the switch		115570	NA
Total number of calls answered		61478	NA
Answer to Seizure Ratio (ASR)	≥ 75%	53.20%	NA

4.1 Audit Results for POI Congestion

POI congestion	Benchmark	BSNL	Airtel
POI traffic offered on all individual POI's		3582	642
Served traffic for all POI's		3582	642
Traffic failed on all POI's	≤ 0.5%	0.00%	0.00%

Not meeting the benchmark
 DNA: Details not available
 DNP: Details not provided
 NA: Not applicable

4.2 Live measurement results for POI congestion			
POI congestion	Benchmark	BSNL	Airtel
POI traffic offered on all individual POI's		NA	642
Served traffic for all POI's		NA	642
Traffic failed on all POI's	≤ 0.5%	NA	0.00%

5.1 Audit Results for Billing performance			
Billing Performance	Benchmark	BSNL	Airtel
Billing disputes - Postpaid			
Total bills generated during the period		39446	9295
Total number of bills disputed		17	1
Percentage bills disputed	≤ 0.1%	0.04%	0.00%
Resolution of billing complaints			
Total complaints resolved in 4 weeks from date of receipt		14	1
Percentage complaints resolved within 4 weeks of date of receipt	100%	82.35%	100.00%
Period of applying credit / waiver			
Total number of cases requiring credit/waiver		5	1
Total number of cases where credit/waiver was made within 1 week		5	1
Percentage cases in which credit/waiver was received within 1 week	100%	100.00%	100.00%

5.2 Live calling results for resolution of billing complaints			
Resolution of billing complaints	Benchmark	BSNL	Airtel
Total Number of calls made		13	NA
Number of cases resolved in 4 weeks		9	NA
Percentage cases resolved in 4 weeks	100%	69.23%	NA

6.1 Audit Results for Requests			
Shift Requests	Benchmark	BSNL	Airtel
Total no. of requests received for Shifts		98	53
Total no. of requests for shifts attended within 3 days		79	51
Percentage of requests for shifts attended within 3 days	≥ 95%	80.61%	96.23%
Total no. of requests for shifts not attended or attended beyond 3 days		34	2

Closure Requests	Benchmark	BSNL	Airtel
Total no. of requests received for Closures		262	308
Total no. of requests for closures attended within 7 days		246	308
Percentage of requests for closures attended within 7 days	100%	93.89%	100.00%
Total no. of requests for closures not attended or attended beyond 7 days		27	0

Not meeting the benchmark
 DNA: Details not available
 DNP: Details not provided
 NA: Not applicable

6.2 Live calling for Requests			
Shift Requests	Benchmark	BSNL	Airtel
Total no. of requests received for Shifts		40	30
Total no. of requests for shifts attended within 3 days		24	29
Percentage of requests for shifts attended within 3 days	≥ 95%	60.00%	96.67%
Total no. of requests for shifts not attended or attended beyond 3 days		14	1

7.1 Audit results for customer care (Electronically)			
Customer Care Assessment	Benchmark	BSNL	Airtel
Total Number of calls received		13149568	99033
Total Number of calls getting connected and answered		13149568	96593
Percentage calls getting connected and answered	≥ 95%	100.00%	97.54%

7.2 Live calling results for customer care (Electronically)			
Customer Care Assessment	Benchmark	BSNL	Airtel
Total Number of calls received		100	193
Total Number of calls getting connected and answered		98	100
Percentage calls getting connected and answered	≥ 95%	98.00%	51.81%

7.3 Audit results for customer care (Voice to Voice)			
Customer Care Assessment	Benchmark	BSNL	Airtel
Total Number of calls received		13149568	99033
Total Number of calls answered within 60 seconds		4585024	95084
Percentage calls answered within 60 seconds	≥ 90%	34.87%	96.01%

7.4 Live calling results for customer care (Voice to Voice)			
Customer Care Assessment	Benchmark	BSNL	Airtel
Total Number of calls received		100	193
Total Number of calls answered within 60 seconds		48	85
Percentage calls answered within 60 seconds	≥ 90%	48.00%	44.04%

8.1 Audit results for refund of deposits			
Refund	Benchmark	BSNL	Airtel
Total number of cases requiring refund of deposits		235	33
Total number of cases where refund was made within 60 days		211	33
Percentage cases in which refund was receive within 60 days	100%	89.79%	100.00%

9.1 Live calling for level 1 services			
Level 1 services	Benchmark	BSNL	Airtel
Total no. of calls made		50	50
Calls answered in 60 sec		38	46
Calls answered after 60 sec		12	4



Not meeting the benchmark

DNA: Details not available

DNP: Details not provided

NA: Not applicable

8.3 Parameter wise performance reports for Broadband services

1. Service Provisioning

1.1 Audit Results for Service provisioning						
	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify
Total connections registered during the period		684	379	73	2199	74
Number of connections provided within 15 days		684	356	73	2199	74
Percentage of connections provided within 15 days	100%	100.00%	93.93%	100.00%	100.00%	100.00%
Number of connections provided after 15 days of registration of demand		0	23	0	0	0
Number of customers to whom credit is given for delayed connections		0	0	0	0	0
Percentage of customers to whom credit is given for delayed connections	100%	NA	0.00%	NA	NA	NA

1.2 Live calling for Service provisioning						
	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify
Total connections registered during the period		110	100	50	25	40
Number of connections provided within 15 days		80	98	50	25	40
Percentage of connections provided within 15 days	100%	72.73%	98.00%	100.00%	100.00%	100.00%

2. Fault Incidence / Clearance Statistics

2.1 Audit Results for Fault repair						
Fault repair	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify
Total No. of faults registered during the month		704	249	357	9648	69
No. of faults repaired by next working day during the month		540	244	355	9455	66
Percentage of faults repaired by next working day during the month	> 90%	76.70%	97.99%	99.44%	98.00%	95.65%
No. of faults repaired within 3 days during the month		704	247	357	9648	69
Percentage of faults repaired within 3 days during the month	>99%	100.00%	99.20%	100.00%	100.00%	100.00%

Rent rebate	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify
No. of cases with faults pending for >3 days and ≤7 days		0	2	0	3238	NA
Out of these number of cases where rent rebate for 7 days was given		0	2	0	3238	NA
Percentage of cases where rent rebate for 7 days was given	100%	NA	100.00%	NA	100.00%	NA
No. of cases with faults pending for >7 days and ≤15 days		0	0	0	302	NA
Out of these number of cases where rent rebate for 15 days was given		0	0	0	302	NA
Percentage of cases where rent rebate for 15 days was given	100%	NA	NA	NA	100.00%	NA
No. of cases with faults pending for ≥15 days		0	0	0	80	NA
Out of these number of cases where rent rebate for 30 days was given		0	0	0	80	NA
Percentage of cases where rent rebate for 30 days was given	100%	NA	NA	NA	100.00%	NA

■ Figures provided on All India basis
■ Not meeting the benchmark
B'mark = TRAI Benchmark, **DNP** = Details not provided, **NA**: Not Applicable

2.2 Live calling for fault repair						
Fault repair	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify
Total Number of calls made		58	100	100	100	30
Number of cases where faults were repaired by next working day		15	76	71	79	21
Percentage cases where faults were repaired by next working day	> 90%	25.86%	76.00%	71.00%	79.00%	70.00%
Number of cases where faults were repaired within 3 days		30	100	100	100	30
Percentage cases where faults were repaired within 3 days	>99%	51.72%	100.00%	100.00%	100.00%	100.00%

3. Billing performance

3.1 Audit Results for Billing performance						
Billing Performance	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify
Billing disputes						
Total bills generated during the period		8971	10291	1850	11676	NA
Total number of bills disputed		6	0	4	95	NA
Percentage bills disputed	< 2%	0.07%	0.00%	0.22%	0.81%	NA
Resolution of billing complaints						
Total complaints resolved in 4 weeks from date of receipt		6	0	4	95	NA
Percentage complaints resolved within 4 weeks of date of receipt	100%	100.00%	NA	100.00%	100.00%	NA
Period of refund						
Total number of cases requiring refund		0	1	1	DNA	NA
Total number of cases where credit/waiver was made within 60 days		0	1	1	DNA	NA
Percentage cases in which credit/waiver was received within 60 days	100%	NA	100.00%	100.00%	100.00%	NA

3.2 Live calling results for resolution of billing complaints						
Resolution of billing complaints	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify
Total Number of calls made		4	0	2	5	NA
Number of cases resolved in 4 weeks		4	0	2	5	NA
Percentage cases resolved in 4 weeks	100%	100.00%	NA	100.00%	100.00%	NA

4. Response time to the customer for assistance

4.1 Audit results for customer care (Voice to Voice)						
Customer Care Assessment	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify
Total Number of calls received		36524	82469	2999	447054	112
Total Number of calls answered within 60 seconds		32835	80294	2505	353664	111
Percentage calls answered within 60 seconds	> 60%	89.90%	97.36%	83.53%	79.11%	99.11%

Operators not meeting the benchmark
 DNA: Details not available
 DNP: Details not provided
 NA: Not applicable

4.2 Live calling results for customer care (Voice to Voice)						
Customer Care Assessment	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify
Total Number of calls received		100	100	100	100	100
Total Number of calls answered within 60 seconds		54	71	71	81	79
Percentage calls answered within 60 seconds	> 60%	54.00%	71.00%	71.00%	81.00%	79.00%

4.3 Audit results for customer care (Voice to Voice)						
Customer Care Assessment	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify
Total Number of calls received		36524	82469	2999	447054	112
Total Number of calls answered within 90 seconds		36524	81592	2662	369445	112
Percentage calls answered within 90 seconds	> 80%	100.00%	98.94%	88.76%	82.64%	100.00%

4.4 Live calling results for customer care (Voice to Voice)						
Customer Care Assessment	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify
Total Number of calls received		100	100	100	100	100
Total Number of calls answered within 90 seconds		90	94	92	96	95
Percentage calls answered within 90 seconds	> 80%	90.00%	94.00%	92.00%	96.00%	95.00%

5. Bandwidth utilization

5.1 Audit results for Bandwidth Utilization						
Bandwidth utilization	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify
Intra-network links (POP to ISP Node)						
Total number of intra network links		213	41	NA	19	400
Total Bandwidth Available at the links (in Mbps)		213000	DNA	NA	11826	14614
Total Bandwidth utilized at all the links during TCBH (In Mbps)		34784	DNA	NA	7908	4620
Percentage Bandwidth utilized	<80%	16.33%	<80%	NA	66.87%	31.61%
No of Intra network found to be above 90%		0	3	NA	0	0
International Bandwidth						
Total number of upstream links		280	NA	2	5	20
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In mpbs)		43400	NA	14	59142	2830
Total International Bandwidth utilized during peak hours		30386	NA	11	26545	2355
Percentage Bandwidth utilization during peak hours (In mpbs)	<80%	70.01%	NA	78.57%	44.88%	83.22%
No of Intra network found to be above 90%		0	NA	0	0	0

Operators not meeting the benchmark
 DNA: Details not available
 DNP: Details not provided
 NA: Not applicable

5.2 Live measurement results for Bandwidth Utilization						
Bandwidth utilization	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify
Intra-network links (POP to ISP Node)						
Total number of intra network links		143	41	NA	19	394
Total Bandwidth Available at the links (in Mbps)		143000	DNA	NA	DNA	15813
Total Bandwidth utilized at all the links during TCBH (In Mbps)		19765	DNA	NA	DNA	4550
Percentage Bandwidth utilized	<80%	13.82%	<80%	NA	<80%	28.77%
No of Intra network found to be above 90%		0	3	NA	0	0
International Bandwidth						
Total number of upstream links		280	NA	2	5	20
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In mpbs)		43400	NA	14	10240	2730
Total International Bandwidth utilized during peak hours		33677	NA	11	5629.13	2267
Percentage Bandwidth utilization during peak hours (In mpbs)	<80%	77.60%	NA	78.57%	54.97%	83.04%
No of Intra network found to be above 90%		0	NA	0	0	0

6. Broadband download speed

6.2 Live calling results for broadband download speed						
Broadband download speed	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify
Total committed download speed to the sample subscribers (In mpbs) (A)		25600	12800	2	12800	12800
Total average download speed observed during TCBH (In Mpbs) (B)		23474	11520	1.7	11558	11200
%age subscribed speed available to the subscriber during TCBH (B/A)*100	>80%	91.70%	90.00%	85.00%	90.30%	87.50%

7. Service availability/uptime

7.1 Audit results for service availability						
Service Availability	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify
Total Operational Hours		126000	13015440	2310492	141120	744
Total Downtime		23	0	6359	419	0
Total time when the service was available		125977	13015440	2304133	140701	744
Service Availability Uptime in Percentage	>98%	99.98%	100.00%	99.72%	99.70%	100.00%

7.2 Live measurement results for service availability						
Service Availability	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify
Total Operational Hours		7416	650772	222960	4704	72
Total Downtime		1.4	456	0	16	0
Total time when the service was available		7414.6	650316	222960	4688	72
Service Availability Uptime in Percentage	>98%	99.98%	99.93%	100.00%	99.66%	100.00%

Operators not meeting the benchmark
 DNA: Details not available
 DNP: Details not provided
 NA: Not applicable

8. Network latency / Packet loss

8.1 Audit results for Latency and packet loss						
Network Latency and Packet Loss	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify
Packet Loss (Percentage)	< 1%	0.04%	0.00%	0.70%	0.00%	<1%
Network Latency						
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	12	34	27.4	<80	<45
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	232	75	278	<250	<300

8.2 Live measurement results for Latency and packet loss						
Network Latency and Packet Loss	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify
Packet Loss (Percentage)	< 1%	0.01%	0.00%	0.60%	0.00%	0.00%
Network Latency						
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	18	40	26.4	56	44
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	224	70	267	105	228

Operators not meeting the benchmark
 DNA: Details not available
 DNP: Details not provided
 NA: Not applicable

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

9.1 Cellular Mobile services

1. Accumulated Downtime of the Network	
Computational Methodology as per QoS definition	<p>BTSs accumulated downtime (not available for service) shall basically measure the downtime of the BTSs, including its transmission links/circuits during the period of a month, but excludes all planned service downtime for any maintenance or software upgradation.</p> <p>Computational Methodology:</p> <ul style="list-style-type: none"> BTSs Accumulated downtime = $\frac{\text{Sum of downtime of BTSs in a month in hours}}{24 \times \text{No. of days in the month} \times \text{No. of BTSs in the network in the licensed service area}} \times 100$ Worst affected BTSs due to downtime = $\frac{\text{No. of BTSs having accumulated downtime} > 24 \text{ hours in a month}}{\text{Total No. of BTSs in the network in the licensed service area}} \times 100$
Benchmark	<ul style="list-style-type: none"> BTSs Accumulated downtime (not available for service) $\leq 2\%$ Worst affected BTSs due to downtime $\leq 2\%$
Audit Procedure	<p>IMRB auditors collected and verified data pertaining to:</p> <p>The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) used for arriving at the benchmark reported to TRAI were audit</p>

2. Call Set-Up Success Rate (CSSR)	
Computational Methodology as per QoS definition	<p>The ratio of calls established to total calls is known CSSR.</p> <p>Call Established means the following events have happened in call setup:-</p> <ul style="list-style-type: none"> ↪ call attempt is made ↪ the TCH is allocated ↪ the call is routed to the outward path of the concerned MSC <p>Computational Methodology: $\text{Calls Established} / \text{Total Call Attempts} \times 100$</p>
Benchmark	> 95%
Audit Procedure	<p>IMRB auditors collected and verified data pertaining to</p> <ul style="list-style-type: none"> ↪ The cell-wise data generated through counters/ MMC available in the switch for traffic measurements was verified by the auditors ↪ CSSR calculation was measured using OMC generated data only ↪ Measurement was done only in Time Consistent Busy Hour (TCBH) period for all days of the week

3. Network Congestion Parameters

<p>Computational Methodology as per QoS definition</p>	<p>It means a call is not connected because there is no free channel to serve the call attempt. This parameter represents congestion in the network. It happens at three levels:</p> <ul style="list-style-type: none"> ↳ SDCCH Level: Stand-alone dedicated control channel ↳ TCH Level: Traffic Channel ↳ POI Level: Point of Interconnect <p>Computational Methodology:</p> <ul style="list-style-type: none"> ↳ SDCCH / TCH Congestion% = $[(A1 \times C1) + (A2 \times C2) + \dots + (An \times Cn)] / (A1 + A2 + \dots + An)$ <ul style="list-style-type: none"> ● Where:-A1 = Number of attempts to establish SDCCH / TCH made on day 1 ● C1 = Average SDCCH / TCH Congestion % on day 1 ● A2 = Number of attempts to establish SDCCH / TCH made on day 2 ● C2 = Average SDCCH / TCH Congestion % on day 2 ● An = Number of attempts to establish SDCCH / TCH made on day n ● Cn = Average SDCCH / TCH Congestion % on day n ↳ POI Congestion% = $[(A1 \times C1) + (A2 \times C2) + \dots + (An \times Cn)] / (A1 + A2 + \dots + An)$ <ul style="list-style-type: none"> ● Where:-A1 = POI traffic offered on all POIs (no. of calls) on day 1 ● C1 = Average POI Congestion % on day 1 ● A2 = POI traffic offered on all POIs (no. of calls) on day 2 ● C2 = Average POI Congestion % on day 2 ● An = POI traffic offered on all POIs (no. of calls) on day n ● Cn = Average POI Congestion % on day n
<p>Benchmark</p>	<p>SDCCH Congestion: ≤ 1% TCH Congestion: ≤ 2% POI Congestion: ≤ 0.5%</p>
<p>Audit Procedure</p>	<p>IMRB Auditors collected and verified records pertaining to:</p> <ul style="list-style-type: none"> ↳ Audit of the details of SDCCH and TCH congestion percentages computed by the operator (using OMC–Switch data only) was conducted ↳ The operator should be measuring this parameter during Time consistent busy hour (TCBH) only SDCCH ↳ The POI details were verified from the switch for all the links of the operators

<p>4. Call Drop Rate</p>	
<p>Computational Methodology as per QoS definition</p>	<p>The dropped call rate is the ratio of successfully originated calls that were found to drop to the total number of successfully originated calls that were correctly released</p> <ul style="list-style-type: none"> ↳ Total calls dropped = All calls ceasing unnaturally i.e. due to handover or due to radio loss ↳ Total calls established = All calls that have TCH allocation during busy hour <p>Computational Methodology: Total Calls Dropped / Total Calls Established x 100</p>
<p>Benchmark</p>	<p>≤ 2%</p>
<p>Audit Procedure</p>	<p>IMRB Auditors collected and verified records pertaining to:</p> <ul style="list-style-type: none"> ↳ Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR was conducted. ↳ The operator should only be considering those calls which are dropped during Time consistent busy hour (TCBH) for all days of the relevant quarter

5. Connections with Good Voice Quality

<p>Computational Methodology as per QoS definition</p>	<p>Definition:</p> <ul style="list-style-type: none"> ↪ for GSM service providers the calls having a value of 0 – 4 are considered to be of good quality (on a seven point scale) ↪ For CDMA the measure of voice quality is Frame Error Rate (FER). FER is the probability that a transmitted frame will be received incorrectly. Good voice quality of a call is considered when it FER value lies between 0 – 4 % <p>Computational Methodology:</p> <ul style="list-style-type: none"> ↪ connections with good voice quality = (No. of voice samples with good voice quality / Total number of samples) x 100
<p>Benchmark</p>	<p>≥ 95%</p>
<p>Audit Procedure</p>	<p>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</p> <ul style="list-style-type: none"> ↪ Operator to conduct <u>at least one</u> drive test using standard drive test equipment every week during TCBH ↪ Each drive test should evenly cover the following 5 types of locations: ↪ 3 Outdoor (Periphery of the city, Congested Area, Across the City), and 2 Indoor (Office Complex and Shopping Complex) ↪ 2 minute long calls to be initiated and held throughout the drive test ↪ The speed of the vehicle should be kept at around 50km/hr. (around 30 km/hr in case of geographically small cities) – This was ensured during the drive tests conducted by IMRB Auditors ↪ RxQual / FER samples generated during the drive test collected by the operator were verified ↪ <i>Measurements using Engineering handsets were not acceptable</i> ↪ All the operators were not maintaining this data at the switch level

<p>6. Service Coverage</p>	
<p>Computational Methodology as per QoS definition</p>	<p>Definition:</p> <ul style="list-style-type: none"> ↪ The level of signal available in a particular part of a city is known as signal strength. <p>Computational Methodology:</p> <ul style="list-style-type: none"> ↪ Service Coverage for route type x = $[(N1 \times CSS1) + (N2 \times CSS2) + \dots + (Nn \times CSSn)] / (N1 + N2 + \dots + Nn)$ ↪ 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)
<p>Benchmark</p>	<p>Indoor >= -75 dBm In-vehicle >= -85 dBm Outdoor – in city >= -95 dBm</p>
<p>Audit Procedure</p>	<p>IMRB Auditors collected and verified call centre records pertaining to:</p> <ul style="list-style-type: none"> ↪ Audit was conducted based on the details of periodic drive tests conducted at different part of the network during Time consistent busy hour (TCBH) which were used to arrive at the benchmarks reported to TRAI. ↪ Procedures were verified that were to be followed by operator for obtaining relevant details for computing this parameter:- <ul style="list-style-type: none"> ↪ Operator to conduct at least one drive test using standard drive test equipment* every week during Time consistent

	<p>↳ busy hour (TCBH). ↳ Each drive test should evenly cover the following 5 types of locations: –</p> <ul style="list-style-type: none"> ↳ 3 Outdoor (Periphery of the city, Congested Area, Across the City), and ↳ 2 Indoor (Office Complex and Shopping Complex) <p>↳ Measurements using Engineering handsets were not acceptable</p>
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7. Response time to customer (Electronically and Voice to Voice)	
Computational Methodology	<p>To connect to IVR: The time taken to connect a person (as soon as he presses call) to the IVR of the service provider</p> <p>To connect to operator: The time taken to connect a person (as soon as he presses 9) to the customer care executive</p> <p>Computational Methodology:</p> <ul style="list-style-type: none"> • % age of calls getting connected (electronically) = $\frac{\text{Total number of calls getting connected electronically}}{\text{Total number of calls made}} \times 100$ • % age of calls answered within 60 sec (voice to voice) = $\frac{\text{Total number of calls answered within 60 seconds}}{\text{Total number of calls made}} \times 100$
Benchmark	<p>↳ % age of calls getting connected and answered (electronically) ≥ 95%</p> <p>↳ % age of calls answered by operator (voice to voice) within 60 seconds ≥ 90%</p>
Audit Procedure	<p>-IMRB auditors made test calls from the exchanges to the operator’s customer care / helpline / toll free numbers. They will record the time taken to connect a customer’s call both to the IVR as well as to a customer care executive.</p> <p>- All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.</p> <p>- Time to answer the call by the operator should be taken from the time auditor has pressed the requisite button for being assisted by the operator.</p> <p>Live calling: -</p> <p>- Overall sample size is 2*50 calls per service provider per circle at different points of time, evenly distributed across the selected exchanges – 50 calls between 1000 HRS to 1300 HRS and 50 calls between 1500 HRS to 1700 HRS</p> <p>- Time to answer the call by the operator was assessed from the time interviewer pressed the requisite button for being assisted by the operator.</p> <p>- All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.</p>

8.1 Billing complaints per 100 bills issued
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<p>Computational Methodology as per QoS definition</p>	<p>Billing complaints includes any of the following complaints related to billing from the point of view of customer:</p> <ul style="list-style-type: none"> • Local call charges billed as STD/ISD or vice-versa • Toll free numbers charged • Wrong roaming charges • Call made/received disputed • Wrongly charged extra for some service (SIM replacement charged twice, service not used but charged etc.) • Cheque submitted on time but charged penalty for paying beyond due date (in case customer is not at fault i.e. all those that operator cannot prove that he/she is not lying) • Payment made but not reflected (may be wrongly adjusted to another customer etc.) <p>Billing complaints per 100 bills issued = Total billing complaints** received during the relevant quarter / Total bills generated* during the relevant quarter</p> <p><i>* All types of bills generated for customers i.e. printed bills, online bills and any other forms of bills generated are to be included</i></p> <p><i>** Only dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end) are to be included. It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.</i></p>
<p>Benchmark</p>	<p>< 0.1% billing complaints per 100 bills</p>
<p>Audit Procedure</p>	<p>IMRB auditors collected and verified data pertaining to</p> <ul style="list-style-type: none"> - Number of bills generated - Number of billing complaints received - %age complaints per 100 bills

<p>8.2 Resolution of billing complaints</p>	
<p>Computational Methodology as per QoS definition</p>	<p>%age of billing complaints resolved within 4 weeks=(Complaints resolved in 4 weeks from date of receipt / Total billing complaints received during the relevant period) x 100</p> <p><i>Only dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end) are to be included. It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.</i></p> <p><i>Date of resolution in this case would refer to the date when a communication has taken place from the operator's end to inform the complainant about the final resolution of the issue / dispute.</i></p>
<p>Benchmark</p>	<p>100% cases to be resolved within 4 weeks</p>
<p>Audit Procedure</p>	<p>IMRB Auditors collected and verified data pertaining to</p> <ul style="list-style-type: none"> - Total number of billing complaints/bills disputed - Number of complaints resolved in 4 weeks <p>Live calling : - Overall 100 number of live calls made in a licensed service area/circle for each service provider. However in certain cases the sample could not be achieved as bills disputed (prior to the month of Audit) were found to be less than 100</p>

8.3 Period of refunds / payments due to customers

Computational Methodology as per QoS definition	Period of all refunds = Maximum value of 'Time taken to refund' where:-Time taken to refund = Date of refund – date of resolution of complaint
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:- <ul style="list-style-type: none"> • <u>Dates of resolution</u> of all billing complaints resolved in favour of customer and resulting in requirement of a refund by the operator • <u>Dates of refund</u> pertaining to all billing complaints received during the relevant quarter Also random live checks of all subscribers entitled for refund were conducted

9.2 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 where request is still pending <u>Live calling : -</u> - 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	<p>IMRB Auditors to verify and collect data pertaining to number of fault received at the service provider's level in the following time frames:- Number of faults cleared within 24 hours Number of cleared in more than 1 day but less than 3 days Number of cleared in more than 3 days but less than 7 days Number of cleared in more than 7 days but less than 15 days Number of cleared in more than 15 days</p> <p>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.</p>

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 <ul style="list-style-type: none"> - Number of Billing complaints received at the service provider's level - Last billing cycle stated should be such that due date for payment of bills must be beyond the date when this form is filled. - 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 : - <ul style="list-style-type: none"> - IMRB Auditors collected the list of all the subscribers who have made billing complaints in the month prior to the Audit. - 100 such subscribers per service provider were called to check the time taken to resolve the billing complaint. However, in some cases where number of billing complaints were less the sample size could not be achieved

4. Customer care promptness (Shifts and Closures)	
Computational Methodology	Shifts and closure requests
Benchmark	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) <ul style="list-style-type: none"> - 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) <ul style="list-style-type: none"> - The operator includes all Requests for volunteer Permanent Closure and External (shifts to other exchanges) Shift requests received at their exchange. - 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 (Electronically and Voice to Voice)	
Computational Methodology	Percentage of calls answered in a specified time = (Total no. of calls answered within that specified time / Total no. of calls dialed for a particular service)*100
Benchmark	(i) % age of calls answered (electronically): 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 $CCR = [(Call\ attempts - Calls\ blocked) / Call\ attempts] \times 100$
Benchmark	Call Completion Rate (CCR) within local network: More than 55%
Audit Procedure	IMRB Auditors verified and collected data pertaining to Sample Traffic Data during Time Consistent Busy Hour (TCBH). These details were collected separately for - Three days in which live measurement was carried out - For the complete month in which audit was carried out

9.3 Broadband services

1. Service provisioning/Activation time	
Computational Methodology as per QoS definition	<p>Service provisioning time refers to the time taken from the date of receipt of an application to the date when the service is activated</p> <p>Percentage connections provided within X working days = No of connections provided within X working days/ Total number of connections registered during the period * 100</p> <p>Technically Non Feasible (TNF) cases such as unavailability of Broadband infrastructure/ equipment in the Area or Spare Capacity i.e. Broadband Ports including equipment to be installed at the customer premises for activating Broadband connection shall be excluded from the calculation of this parameter.</p> <p>Also, problems relating to customer owned equipment such as PC, LAN Card/ USB Port and internal wiring or non-availability of such equipment shall be excluded from the calculation of this parameter.</p>
Benchmark	100 % cases in =<15 working days.
Audit Procedure	<p>IMRB auditors collected and verified data pertaining to</p> <ul style="list-style-type: none"> -Number of applications received at the service provider's level -Number of connections provided within 15 days -Number of connections provided after 15 days <p>Live calling : At least 10% of the subscribers who had requested for new connections in month prior to Audit were called to check whether connection was provided in 15 days</p>

2. Fault repair/Restoration time	
Computational Methodology as per QoS definition	<p>This refers to the time taken to restore the existing customer service to operational level from the time that a problem or fault is reported</p> <p>Percentage faults repaired in X working days = (Total no of faults repaired in X working days /Total number of faults reported during the period)*100</p> <p>The time period for fault repair starts from the time when the fault is reported to the service provider either through customer care help line or in person by the subscriber</p> <p>Only the complaints registered till the close of the business hours of the day are to be taken into account. All the complaints registered after the business hours are to be considered as being registered in the next day business hours</p>
Benchmark	By next working day: > 90% and within 3 working days: 99%
Audit Procedure	<p>IMRB auditors collected and verified data pertaining to</p> <ul style="list-style-type: none"> -Number of applications received at the service provider's level -Number of connections provided within 15 days -Number of connections provided after 15 days <p>Live calling : At least 10% of the subscribers who had requested for new connections in month prior to Audit were called to check whether connection was provided in 15 days</p>

3. Billing complaints per 100 bills issued

<p>Computational Methodology as per QoS definition</p>	<p>Billing complaints includes any of the following complaints related to billing from the point of view of customer:</p> <ul style="list-style-type: none"> • Wrongly charged extra for some service • Cheque submitted on time but charged penalty for paying beyond due date • Payment made but not reflected (may be wrongly adjusted to another customer etc.) <p>Billing complaints per 100 bills issued = Total billing complaints** received during the relevant quarter / Total bills generated* during the relevant quarter</p> <p>* All types of bills generated for customers i.e. printed bills, online bills and any other forms of bills generated are to be included</p> <p>** <u>Only</u> dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end) are to be included. It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.</p>
<p>Benchmark</p>	<p>< 2% billing complaints per 100 bills</p>
<p>Audit Procedure</p>	<p>IMRB auditors collected and verified data pertaining to</p> <ul style="list-style-type: none"> - Number of bills generated - Number of billing complaints received - %age complaints per 100 bills

<p>3.1. Resolution of billing complaints</p>	
<p>Computational Methodology as per QoS definition</p>	<p>%age of billing complaints resolved within 4 weeks=(Complaints resolved*** in 4 weeks from date of receipt / Total billing complaints** received during the period 2009) x 100</p> <p><u>Only</u> dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end) are to be included. It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.</p> <p>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.</p>
<p>Benchmark</p>	<p>100% cases to be resolved within 4 weeks</p>
<p>Audit Procedure</p>	<p>IMRB Auditors collected and verified data pertaining to</p> <ul style="list-style-type: none"> - Total number of billing complaints/bills disputed - Number of complaints resolved in 4 weeks <p>Live calling : -</p> <p>-Overall 100 number of live calls are to be made in a licensed service area/circle for each service provider. However in certain cases the sample could not be achieved as bills disputed (prior to the month of Audit) were found to be less than 100</p>

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

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 dialed
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)

6. Broadband download speed	
Computational Methodology as per QoS definition	This refers to the ratio of size of the file to be downloaded and total time required for error free transmission of the file
Benchmark	Subscribed broadband connection speed to be met >80% from ISP Node to user
Audit Procedure	<p>Live calling : -</p> <ul style="list-style-type: none"> -Details of live customers were obtained from the service providers -Overall 50 number of live calls at were made during peak hours in a licensed service area/circle for each service provider to assess the download speed available to subscribers. Tool provided by the on the service providers website was used for the same -Details of total committed download speed and speed available to the users were recorded for each of the subscriber - Percentage download speed available was calculated as = Sum of total speed available for 50 customers/Total committed download speed for 50 customers*100

7. Service availability/Uptime	
Computational Methodology as per QoS definition	<p>Service availability/uptime is the measure of the degree to which the broadband access network including ISP Node is operable and not in a state of failure or outage at any point of time for all users</p> <p>Service availability/Uptime = $(\text{Total operational hours} - \text{Total Downtime hrs}) * 100 / \text{Total operational hours}$</p> <p>Total downtime for all users, including the LAN switches, Routers, Servers, Etc at ISP Node and connectivity to upstream service provider are to be included</p> <p>Planned outages for routine maintenance of the system are excluded from the calculation of service availability/uptime</p>
Benchmark	<ul style="list-style-type: none"> - 90% for quarter ending June 2007 - 98% with effect from quarter ending September 2007 and onwards
Audit Procedure	<p>IMRB Auditors collected and verified call centre records pertaining to</p> <ul style="list-style-type: none"> -Total operational hrs -Total downtime hrs <p>The above mentioned data was obtained and verified separately for three days in which the live measurement was carried out, Month in which audit was carried out Also, verification of old records(July to September 2007) was verified</p>

8. Packet loss

<p>Computational Methodology as per QoS definition</p>	<p>Packet loss is the percentage of packets lost to total packets transmitted between two designated Customer Premises Equipments/Router ports. It is the measurement of packet lost from the broadband customer (User) configuration/User reference point at POP/ISP Node to IGSP/NIXI Gateway and to the nearest NAP port abroad</p> <p>The packet loss is measured by computing the percent packet loss of 1000 pings of 64 byte packet each.</p> <p>Service provider needs to carry out such tests daily during Time Consistent Busy Hour(TCBH) and report the average results for the month in the performance monitoring report to TRAI</p> <p>Minimum sample reference points for each service area shall be three in number or multiple reference points if required</p> <p>Hence Packet loss is computed by the formula - (Total number of ping packets lost during the period/Total number of ping packets transmitted)* 100</p>
<p>Benchmark</p>	<p><1 %</p>
<p>Audit Procedure</p>	<p>IMRB Auditors collected and verified call centre records pertaining to</p> <ul style="list-style-type: none"> - Records maintained for ping tests conducted during the period of July to September 2007 - Smoked ping test (wherever available) results for the period of July to September 2007 - Results of live ping tests conducted during three day live measurement and month of Audit (During peak hours) - Live ping tests were conducting by selecting a minimum of three user reference test points at POP/ISP Node in each circle

<p>9. Network Latency</p>	
<p>Computational Methodology as per QoS definition</p>	<p>Latency is the measure of duration of a round trip for a data packet between specific source and destination Router Port/Customer Premises Equipment (CPE). The round trip delay for the ping packets from ISP premises to the IGSP premises to the IGSP/NIXI gateway and to the nearest NAP port abroad are measured by computing delay for 1000 pings of 64 bytes each (Pings are to be sent subsequent to acknowledgement received for the same for previous ping)</p> <p>Service provider needs to carry out such tests daily during Time Consistent Busy Hour(TCBH) and report the average results for the month in the performance monitoring report to TRAI</p> <p>Minimum sample reference points for each service area shall be three in number or multiple reference points if required</p> <p>Hence the formula for network latency would be Network latency for X days= Total round trip time for all the ping packets transmitted in X days /No of days during the period</p>
<p>Benchmark</p>	<p>< 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)</p>
<p>Audit Procedure</p>	<p>IMRB Auditors collected and verified call centre records pertaining to</p> <ul style="list-style-type: none"> - Records maintained for ping tests conducted during the period of July to September 2007 - Smoked ping test (wherever available) results for the period of July to September 2007 - Results of live ping tests conducted during three day live measurement and month of Audit (During peak hours) - Live ping tests were conducting by selecting a minimum of three user reference test points at POP/ISP Node in each circle
