

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

Orissa Circle

Audit Report for July-August-September '09



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

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Preface

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

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

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

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

The Survey and Audit modules for various circles within the Zones, due the sheer scale of data collection, 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 Orissa 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 Orissa 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 Orissa 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



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

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

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 cellular mobile operators covered in Orissa circle.

	Name of Operator
Operator 1	Airtel
Operator 2	Vodafone
Operator 3	BSNL
Operator 4	TATA
Operator 5	RTL
Operator 6	RCOM CDMA
Operator 7	Dishnet Wireless
Operator 8	Idea

For all the operators audit was conducted in the month of September '09.

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.
- Following are the various cellular mobile operators covered in Orissa circle:

	Name of Operator
Operator 1	BSNL

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 Orissa 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.
- Following Broadband service providers were Audited for Orissa circle:

	Name of Operator
Operator 1	BSNL
Operator 2	Ortel

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

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 for Broadband 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 all three services is explained in Annexure}

5. Executive Summary

5.1 Cellular Mobile Services

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 Orissa circle. The executive summary encapsulates the key findings of the Audit by providing: -

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

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

Name of Service Provider	Time Consistent Busy Hour (TCBH)	Network Availability					Connection Establishment (Accessibility)			Connection Maintenance (Retainability)					POI		Network Traffic Capacity and Utilization			
		Total no. of BTSs in the licensed service area	Sum of downtime of BTSs in a month in hours	BTSs Accumulated downtime (not available for service) (%age)	No. of BTSs having accumulated downtime of >24 hours in a month	Worst affected BTSs due to downtime (%age)	Call Set-up Success Rate (within licensee's own network)	SDCCH/Paging Chl. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Total No. of cells exceeding 3% TCH drop (call drop)	Total no. of cells in the network	Worst affected cells having more than 3% TCH drop	Connection with good voice quality	Point of Interconnection (POI) Congestion (No. of POIs not meeting the benchmark)	Total number of working POI Service Area wise	Equipped Capacity of Network in respect of Traffic in erlang	Total traffic handled in TCBH in erlang	Total no. of customers served (as per VLR) on last day of the month	
Benchmark				≤ 2%		≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%			≤ 5%	≥ 95%	≤ 0.5%					
Airtel	19:00	2757	23659	1.19	2	0.07	95.32	0.39	0.37	1.70	1156	8370	13.81	96.81	0	252	180773	108446	3276767	
Vodafone	19:00	2300	2460	0.15	18	0.78	99.16	0.12	0.54	1.62	1407	6044	23.28	98.99	0	35	61921	23764	473680	
BSNL	19:00	260	2912	1.56	3	1.15	99.21	0.96	0.79	1.81	1252	5885	21.28	94.99	0	15	151600	89017	1349189	
TATA	19:00	467	0.33	0.00	0	0.00	98.02	0.00	0.08	0.97	20	467	4.28	98.64	0	28	65998.8	18078.2	373099	
RTL	19:00	1348	933	0.10	5	0.37	98.89	0.19	0.78	0.96	20	4044	0.49	95.33	0	19	8500	24481	498556	
RCOM CDMA	19:00	852	248.2	0.04	4	0.47	99.37	0.00	0.11	1.02	10	852	1.17	99.14	0	19				
Dishnet	19:00	2260	782	0.05	0	0.00	98.73	7.18	1.27	1.81	1252	5885	21.28	96.83	7	50	82463.6	19607.4	707207	

Not meeting the benchmark

B'mark = TRAI Benchmark, DNA = Details not available, DNP: Data not provided

Critical findings: Cellular Mobile Services

The audit for cellular mobile service providers were conducted at their respective MSCs in the Orissa 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	1900 – 2000 hrs.	1900 – 2000 hrs.
RCOM	1900 – 2000 hrs.	1900 – 2000 hrs.
Dishnet	1900 – 2000 hrs.	1900 – 2000 hrs.
TATA	1900 – 2000 hrs.	1900 – 2000 hrs.
Vodafone	1900 – 2000 hrs.	1900 – 2000 hrs.
RTL	1900 – 2000 hrs.	1900 – 2000 hrs.

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

BTS Accumulated Downtime:

In Orissa circle, all the operators are meeting benchmark for the parameter BTS accumulated downtime and worst affected BTS. BSNL with 1.56% BTS accumulated downtime is just below the benchmark.

Call Set-up Success Rate (CSSR):

All the operators were comfortably meeting the benchmark on this parameter. During the audits the maximum CSSR was observed for RCOM GSM with 99.37% of their calls getting completed. All the operators were found to be calculating the parameter as per the norm specified by TRAI. CSSR was established as the ratio of total number of successful call attempts (establishment) to the total number of call attempts made.

Network Congestion parameters:

SDCCH / Paging Channel Congestion, TCH and POI are part of the network congestion parameters. All the operators are meeting the TRAI specified benchmarks on the congestion parameters except Dishnet wireless for SDCCH congestion. TATA leads the way in network congestion parameters with almost negligible paging as well as traffic channel congestion. The calculation methodology of these parameters was found to be in complete accordance with what has been specified by TRAI. Both Reliance CDMA and Tata Teleservices measure paging channel utilization. When the value of this parameter is less than 100%, it is counted as 0% congestion. There was negligible POI congestion on almost all individual POI links between a service provider vis-à-vis other service providers except for Dishnet Wireless with 7 out of 50 POIs having congestion more than TRAI specified benchmark of 0.5%. RCOM is having common POIs for CDMA and GSM as permitted by TRAI.

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 is measured as the ratio of total calls dropped to the total number of call attempts for all operators. Also, all the service providers were found to be meeting the TRAI specified benchmark. Airtel, BSNL and Dishnet wireless are just meeting the TRAI benchmark with 1.7% and 1.81% call drop respectively. Airtel, Vodafone, BSNL and Dishnet Wireless are well above the 5% benchmark for worst affected cells with >3% TCH drop.

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, RTL and Airtel met the TRAI benchmark.

Customer Care / Helpline Assessment

For the IVR parameter 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. Also, RCOM claimed that whatever calls cannot be routed to the IVR is directly routed to the voice to voice operator. In case of calls answered by operators within 60 seconds, Airtel, BSNL, RTL and Dishnet wireless do not meet the benchmark for the month of audit.

Billing performance

All the operators Tata and RCOM CDMA 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 BSNL meet the TRAI benchmark of 100% within 1 week.

Inter operator calls assessment

Inter operator call Assessment		Airtel	Vodafone	BSNL	TATA	RTL	RCOM CDMA	Dishnet	Idea
From ↓	To →								
Airtel		-	95%	96%	96%	94%	92%	94%	92%
Vodafone		90%	-	93%	91%	86%	93%	90%	91%
BSNL		100%	99%	-	99%	93%	98%	99%	86%
TATA		89%	96%	95%	-	92%	95%	92%	81%
RTL		95%	97%	97%	97%	-	99%	99%	72.5%
RCOM CDMA		96%	99%	94%	99%	96%	-	100%	97%
Dishnet		94%	90%	87%	94%	87%	92%	-	87%
Idea		95%	93%	98%	93%	98%	93%	96%	-

The maximum problem faced by the calling operator to other operators

In the inter-operator call assessment, calls were made from the test SIMs of service provider whose audit was being conducted to all the other service providers. BSNL, Tata, RTL and Dishnet found tough connecting to an Idea number with less than 90 out of 100 calls getting connected. Dishnet had difficulty in connecting to a BSNL, RTL and Idea number with 87% of their calls getting completed. From TATA, only 89 out of 100 calls to a Bharti number got connected.

Results of Operator assisted Drive test

The drive test was conducted simultaneously for all the operators present in the Orissa circle. There was in total of three drive tests conducted in the circle. These tests were conducted in the cities of Berhampur, Bhadrak and Bhubhneswar. 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 Orissa 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 Orissa circle were conducted in the cities of Berhampur, Bhadrak and Bhubhneswar was conducted along the following route:

	Type of location	Berhampur	Bhadrak	Bhubaneswar
Outdoor	Peiphery of the city	Ankushpur, Aska road, Gate bazar, Tata benz square, Kotapeta, Nilakanthanagar	NH-5, Orion Hotel, Bont Chowk, Bagurei Chowk, College overbridge, Dahanigadia chowk, Bypass Salandi, Haladidiha bypass	Garage sqr, Pokhariput, Gandamumda, Jagamara, Khandagiri, Baramunda, Fire station, Rental colony, Saliasahi
	Congested area	Gandhi nagar, Giri road, Moti hotel square, Ramalingam tank road, New bus stand road	Bagurei chowk, College overbridge, Dahanigadia chowk, Station parking point, Haladidiha bypass, Women college sqr.	Nayapalli, Mayfair lagoon sqr, Kalinga hospital, Sainik school, Acharya nagar, Bapuji nagar, Vani vihar
	Across the city	Haradakhandi, Main road, State bank square	Station parking point, Bypass salandi, syndicate bank, Goshala chowk, Women college, Tarini paridhan	Vani vihar, Rasulgarh, Jharapada, Kalpana Sqr, Louis road, Samantarapur petrol pump
Indoor	Office complex	Reliance office, Aska road	Syndicate bank complex - indoor office	IMRB Office, Nayapalli
	Shopping complex	Sai complex (Gandhi Nagar)	Tarini paridhan - Indoor shopping complex	Mobile store, Ravi talkies square

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

Drive Test – Berhampur

	Benchmark	Airtel		Vodafone		BSNL		TATA		RTL		RCOM CDMA		Dishnet		Idea	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	≥ 95%	96.4%	95.1%	96.36%	95.71%	95.15%	94.32%	99.89%	98.16%	97.54%	94.75%	98.87%	98.77%	98.84%	97.61%	99.79%	97.59%
CSSR	≥ 95%	100.0%	100.0%	100.0%	99.27%	100.0%	99.27%	100.0%	100.00%	100.00%	100.00%	100.00%	100.00%	90.91%	95.24%	100.00%	100.00%
%age Blocked calls		0.0%	0.0%	0.0%	0.7%	0.0%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	9.1%	4.8%	0.0%	0.0%
Call drop rate	≤ 2%	0.0%	0.0%	0.0%	0.00%	0.00%	1.48%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.0%	100.0%	100.0%	100.00%	100.00%	98.67%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%


Drive Test – Bhadrak

	Benchmark	Airtel		Vodafone		BSNL		TATA		RTL		RCOM CDMA		Dishnet		Idea	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	≥ 95%	97.47%	93.37%	98.28%	96.38%	95.19%	93.60%	99.58%	98.31%	98.91%	94.78%	99.74%	99.54%	98.83%	97.01%	99.12%	98.37%
CSSR	≥ 95%	100.0%	98.5%	100.00%	100.00%	100.00%	98.56%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.26%	100.00%	100.00%
%age Blocked calls		0.0%	1.5%	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%	0.0%	0.0%
Call drop rate	≤ 2%	0.0%	0.0%	0.00%	0.00%	0.00%	8.03%	0.00%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.74%	0.0%	0.0%
Hands off success rate		100.0%	100.0%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.29%	100.00%	100.00%

Not meeting the benchmark

Drive Test – Bhubaneshwar

	Benchmark	Airtel		Vodafone		BSNL		TATA		RTL		RCOM CDMA		Dishnet		Idea	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	≥ 95%	98.81%	93.08%	98.08%	95.01%	93.10%	94.02%	99.23%	98.06%	96.34%	95.13%	99.78%	98.07%	97.99%	97.04%	98.46%	97.79%
CSSR	≥ 95%	97.22%	97.55%	100.00%	98.96%	100.00%	99.45%	100.00%	100.00%	100.00%	98.45%	100.00%	100.00%	100.00%	98.95%	100.00%	66.67%
%age Blocked calls		2.78%	2.45%	0.00%	1.04%	0.00%	0.55%	0.00%	0.00%	0.00%	1.55%	0.00%	0.00%	0.00%	1.05%	0.00%	33.33%
Call drop rate	≤ 2%	0.00%	0.50%	0.00%	0.00%	0.00%	0.55%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.06%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	99.64%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.61%	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

Berhampur: There was interference and low signal strength recorded for the given operators in the outdoor areas given below

BSNL: Fort gate, Minto chowk, aska chowk, SMIT college, ashok nagar, Gandhi chowk. While in the indoor areas inadequate coverage was found in LIC jivan jyoti building.

RTL: Sanjay smarak institute, Laxmi bazaar, Aurbindo nagar road, Nehru nagar, Kumapalli, Haridhakhandi chowk. While in the indoor areas inadequate coverage was not found in any area.

Dishnet: Haridhakhandi chowk, Gandhi nagar, UCP college, Bhavnagar. While in the indoor areas inadequate coverage was not found in any area.

Vodafone: Royal college, university law college, Sai market complex and near LIC building. While in the indoor areas inadequate coverage was not found in any area.

Airtel: Jagbandhu school, Gandhi nagar, Bidhipur road, Khoda singh road, Katmandu road. While in the indoor areas inadequate coverage was not found in any area.

Bhadrak: There was interference and low signal strength recorded for the given operators in the outdoor areas given below

BSNL: Near bagurai, agriculture office, charampa station road/overbridge, prafful chand ITI center. While in the indoor areas inadequate coverage was found in syndicate bank office complex and mohan plaza.

RTL: Haladidha bypass, bagurai chowk, shankarpur, maya bazaar and charampa road. While in the indoor areas inadequate coverage was not found in any area.

Dishnet: Gailpur substation, Bagurai chowk, charampa road and Shankarpur. While in the indoor areas inadequate coverage was not found in any area.

Vodafone: Bhadrak college overbridge, PWD colony, Bagurai chowk and Charampa road. While in the indoor areas inadequate coverage was not found in any area.

Airtel: Bhadrak bypass, Bagurai chowk, Charampur road and Dahanigodiya chowk. While in the indoor areas inadequate coverage was not found in any area.

Bhubaneshwar: There was interference and low signal strength recorded for the given operators in the outdoor areas given below

BSNL: Gandamunda, Near Union Bank of India, Rental colony, Jagmohan nagar and CRPF square. While in the indoor areas inadequate coverage was found in Nayapalli office complex.

RTL: Union Bank of India, Jagmara Chowk, Near Laxmisagar anant plaza and rental colony. While in the indoor areas inadequate coverage was not found in any area.

Dishnet: Gandamunda, Surya nagar, Garage chowk and lingraj cable road/Indira Gandhi memorial. While in the indoor areas inadequate coverage was not found in any area.

Vodafone: Khandagari Chowk, Jagmora, Samaltanpur and sainik school. While in the indoor areas inadequate coverage was not found in any area.

Airtel: Level crossing Kargil road, Lingraj chowk, Barmunda bus stand and Khandagari Chowk, Jagmora, Samaltanpur and sainik school. While in the indoor areas inadequate coverage was not found in any area.

Drive test Conclusions – Cellular Mobile Services:

1. BSNL does not meet the TRAI benchmark on Voice quality (outdoor) in all the three cities
2. Idea in Bhubaneshwar and BSNL in Behrampur does not meet the TRAI benchmark for CSSR.
3. Airtel does not meet the TRAI benchmark for Voice quality in Bhadrak and Bhubaneshwar.

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	connections 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	93.61%	0.39%	0.29%	2.21%	22.52%	94.30%	0.00%	76.39%	100.00%	100.00%
Vodafone	99.19%	0.06%	0.35%	1.50%	21.08%	96.06%	0.00%	100.00%	100.00%	79.57%
BSNL	99.41%	0.80%	0.59%	1.45%	20.32%	94.12%	0.00%	100.00%	100.00%	5.56%
TATA	98.38%	0.00%	0.09%	0.86%	4.50%	98.41%	0.00%	100.00%	100.00%	100.00%
RTL	99.20%	0.12%	0.65%	0.98%	0.35%	95.37%	0.00%	NA	100.00%	74.23%
RCOM CDMA	99.80%	0.00%	0.23%	0.87%	0.35%	98.83%	0.00%	100.00%	100.00%	75.76%
Dishnet	99.34%	5.39%	0.66%	1.45%	20.32%	97.53%	0.00%	NA	100.00%	82.00%



Not meeting the benchmark

NA: Not applicable

Airtel, Vodafone, BSNL and Dishnet were found to be short of the TRAI benchmark of worst affected cells by a huge margin. For calls answered by the operator, Airtel and Tata were the only operators meeting the benchmark.. For the same parameter, BSNL was way below the TRAI benchmark.

5.2 Basic (Wireline) Services

The objective assessment of Quality of Services (QoS) was carried out by IMRB International for all the Basic (Wireline) and Broadband service providers during the period starting from January 2009 to March 2009 in Orissa circle. The executive summary encapsulates the key findings of the Audit by providing: -

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

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

Parameters	Benchmarks	BSNL
Percentage connections completed within 7 days	100%	71.66%
Faults incidences (No. of faults/100 Subs./month)	≤5	6.9
% of faults repaired by next working day	≥ 90%	28.48%
% of faults repaired within 3 days	100%	75.24%
Faults pending for > 3days and ≤7 days	Rent rebate of 7 days	0.00%
Faults pending for > 7 days and ≤15 days	Rent rebate of 15 days	0.00%
Faults pending for > 15 days	Rent rebate of 1 month	0.00%
Mean Time to Repair (MTTR)	≤ 8 Hrs	18.8
Call Completion Rate (CCR)	≥ 55%	87.44%
Answer to Seizure ratio (ASR)	≥ 75%	NA
POI Congestion	≤0.5	0.24
Metering and billing credibility - Number of bills disputed during over a billing cycle	< 0.1%	0.00%
Resolution of billing complaints within 4 weeks	100%	NA
Period of applying credit / waiver	< 1 week	NA
Customer care/helpline promptness		
Percentage shift requests attended within 3 days	>95%	46.51%
Closure within 7 days	100%	78.49%
Response time to customer for assistance		
% age calls getting connected and answered	≥ 95%	100.00%
% age call answered by operator in 60 seconds	≥ 90%	30.26%
Refund of deposits after closures within 60 days	100%	43.52%

{*Note: For BSNL data pertains to the sample 5% of exchanges audited during the period of to January to March 2009, whereas for rest of the operators figures pertain to all the exchanges present in the circle}

DNP: Details not provided

** Methodology not in line with QoS

■ Figures provided on All India basis
 ■ Not meeting the benchmark

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

Summary of Live Measurement Results – Wireline Services

Parameters	Benchmarks	BSNL
Percentage connections completed within 7 days	100%	55.45%
% of faults repaired by next working day	≥ 90%	65.64%
% of faults repaired within 3 days	100%	85.20%
Call Completion Rate (CCR)	≥ 55%	70.49%
Answer to Seizure ratio (ASR)	≥ 75%	NA
POI Congestion	≤0.5	0.00
Resolution of billing complaints within 4 weeks	100%	100.00%
Customer care/helpline promptness		
Percentage shift requests attended within 3 days	>95%	30.23%
Closure within 7 days	100%	0.00%
Response time to customer for assistance		
% age calls getting connected and answered	≥ 95%	99.92%
% age call answered by operator in 60 seconds	≥ 90%	94.08%

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 is the only operator providing Basic (Wireline) Services to retail customers in Orissa circle. During the audit process it was observed that the service provider could not meet TRAI specified benchmark on most of the parameters specified by TRAI.

The live calling results were found to be different from the 1 month audit data collection in certain places. To some extent the difference can be attributed to the smaller sample size undertaken for the live calling. For live measurements conducted to assess Call Completion Rate (CCR) it was found that the service provider meets the TRAI specified benchmark with CCR during three days observed to be 70.49%.

For verification of raw data for the period of January to March 2009, there was significant variation observed when compared to the figures reported in the PMR for service provisioning which can attributed to the fact that PMR consist of data from all the exchanges whereas data verification was carried out in sample exchanges only.

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

Provision of telephone after registration of demand

- In Orissa circle, BSNL falls short of TRAI specified benchmark with a score of 71.66%. Service provider score on live calling was also found to be poor with only 55.45% of the total subscribers called claiming that connection was provided to them within the time period stipulated by TRAI.

Fault incidence / clearance statistics

- BSNL failed to meet the TRAI specified benchmark for number of faults registered with 6.9 faults per 100 subscribers per month
- Fault repair was also found to be a pain point with less than 30% of the total complaints registered in the sample exchanges found to be repaired within 24 hrs which is significantly short of TRAI specified benchmark of >90%.
- For live calling carried out by IMRB auditors only 65.64% of subscribers claimed that fault was repaired within 24 hrs.
- Even for fault repair within 3 days BSNL falls short of the TRAI specified benchmark with a score of 75.24%.

Traffic statistics (CCR)

- BSNL comfortably meets the benchmark on this parameter both during month in which audit was carried out as well as during three days when live measurement was carried out in auditor's presence at various exchanges

Metering and billing credibility

- The service provider (BSNL) met the TRAI specified benchmark with percentage billing complaints being less than 0.1% of the total bills generated.

Customer care/helpline promptness

- Attention is also required on 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 and the same was observed during the live calling as well

Response time to customer for assistance

- BSNL was found to be way below the TRAI specified benchmark for calls answered electronically as well as by the operator within 60 seconds.
- However for the live calling carried out by IMRB auditors, BSNL comfortably met the TRAI specified benchmark

Time taken for refund of deposits after closure

- BSNL Scored less than 50% for cases where refund of deposit was required within 60 days

Level 1 service

Live calling for level 1 services		
Level 1 services	Benchmark	BSNL
Total no. of calls made		360
Calls answered in 60 sec		280
Calls answered after 60 sec		70

To test the efficiency of level 1 services (Trunk booking, Child helpline, Women helpline, Airline booking, Fire, Police, Railways) offered by various service providers. 360 calls were made for BSNL to different numbers and time taken to answer the call was noticed. Out of which around 78% of calls made were answered within 60 seconds.

5.3 Broadband Services

The objective assessment of Quality of Services (QoS) was carried out by IMRB International for all the Broadband service providers during the period starting from January 2009 to March 2009 in Orissa circle.

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

Parameters	Benchmarks	BSNL	Ortel
Service provisioning uptime			
Percentage connections provided within 15 days	100%	93.45%	100.00%
Fault repair restoration time			
Percentage faults repaired by next working days	> 90%	39.77%	90.87%
Percentage faults repaired within three working days	> 99%	75.26%	99.14%
Billing performance			
Billing complaints per 100 bills issued	< 2%	0.12%	1.45%
%age of billing complaints resolved in 4 weeks	100%	19.51%	100.00%
%age cases in which refund of deposits after closure was made in 60 days	100%	100.00%	100.00%
Customer care/helpline assessment (Voice to Voice)			
Percentage calls answered within 60 seconds	> 60%	100.00%	100.00%
Percentage calls answered within 90 seconds	> 80%	100.00%	100.00%
Bandwidth utilization/Throughput			
Intra network links (POP to ISP Node)		213	5
Total number of intra network links > 90%		0	0
Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)		280	2
Percentage bandwidth utilized on upstream links	< 80%	70.01%	69.44%
Broadband download speed	> 80%	91.70%	89.46%
Service availability/uptime	> 98%	99.98%	98.06%
Packet loss	< 1%	0.04%	0.00%
Network Latency			
POP/ISP Node to NIXI	< 120 msec	12	40
ISP node to NAP port (Terrestrial)	< 350 msec	232	76

{*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}

■ 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

In Orissa circle, BSNL and Ortel are the only two operator offering Broadband services in Orissa circle

The key conclusions (Parameter wise) emerging out from the Audit exercise of five Broadband service providers are highlighted below

Service provisioning/Activation time

- BSNL (93.45%) fall short of TRAI benchmark of 100% connections to be provided within 15 days.
- For Live calling as well, BSNL is falling short of benchmark with 94% subscribers claiming that connection was provided within 15 days.

Fault Repair/Restoration time

- BSNL (39.77%) is falling below the benchmark for fault repair within next working day. Also for fault repair within three working days the operator does not meet 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.
- Live calling scores for fault repair within 24 hrs are observed to be 21% and 100% for BSNL and Ortel respectively.

Billing performance

- Both the service providers were found to be meeting the benchmark of percentage billings complaints received and time taken for resolution of billing complaints for the month in which data was collected.
- BSNL falls short of TRAI benchmark for resolution of billing complaints within 4 weeks both for audit month and live calling

Customer Care/Helpline Assessment

- Both 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 Ortel falls short of TRAI specified benchmark for calls answered by the operator in 90 (70%) seconds.

Bandwidth Utilization:

- Both the service providers were found to be using Multiple Router Traffic Grapher (MRTG) to measure the bandwidth utilization at intra network links.
- Both the service providers were found to be reporting combined bandwidth utilization for corporate and household customers as there is no mechanism available to provide it separately for different users.
- For Intra network link, data for BSNL was obtained on all India basis. It was observed that all the links (tested during three day live measurement) in the access segment for both the service providers were found be below 80%.

- For Bandwidth utilization on upstream links both the operators meet the TRAI specified benchmark

Download speed

- During live measurements carried out at Pop's/ISP Node it was observed that all the operators are meeting the TRAI prescribed benchmark of greater than 80% speed available to the customer. These measurements were carried out by IMRB auditors on a sample basis during visits at PoPs and ISP Node
- However, no historic data was available for verification of records for month of Audit as well as quarter ending 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:

- Both 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

- Due to non availability of the records of old ping tests, verification process could not be conducted for Ortel
- However, ping tests conducted/smoked ping results during live measurements revealed that both the service providers are meeting the benchmark prescribed by TRAI.

5.3.2 Summary of Live Measurement Results – Broadband Services

Parameters	Benchmarks	BSNL	Ortel
Service provisioning uptime			
Percentage connections provided within 15 days	100%	94.00%	100.00%
Fault repair restoration time			
Percentage faults repaired by next working days	> 90%	21.11%	100.00%
Percentage faults repaired within three working days	> 99%	66.67%	100.00%
Billing performance			
%age of billing complaints resolved in 4 weeks	100%	98.21%	100.00%
Customer care/helpline assessment (Voice to Voice)			
Percentage calls answered within 60 seconds	> 60%	91.33%	82.50%
Percentage calls answered within 90 seconds	> 80%	97.67%	70.00%
Bandwidth utilization/Throughput			
Intra network links (POP to ISP Node)		143	5
Total number of intra network links > 90%		0	0
Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)		280	2
Percentage bandwidth utilized on upstream links	< 80%	77.60%	59.52%
Broadband download speed	> 80%	91.70%	89.46%
Service availability/uptime	> 98%	99.98%	100.00%
Packet loss	< 1%	0.01%	1.65%
Network Latency			
POP/ISP Node to NIXI	< 120 msec	18	26
ISP node to NAP port (Terrestrial)	< 350 msec	224	28

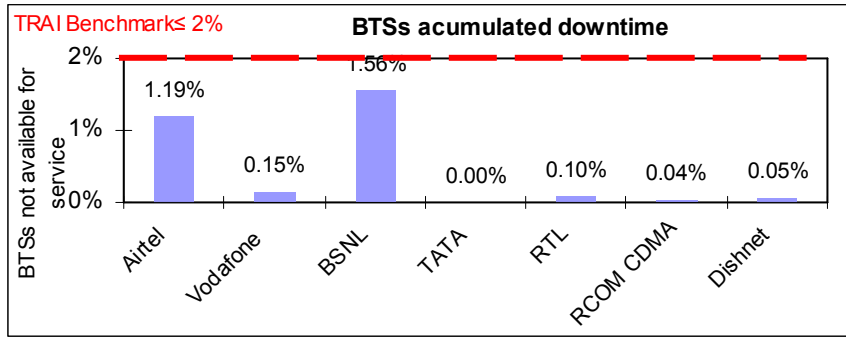
■ Figures provided on All India basis
■ Not meeting the benchmark
B'mark = TRAI Benchmark, **DNP** = Details not provided, **NA**: Not Applicable

- Both 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 no intra network links that were found to have a utilization of more than 90% for both the operators
- 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

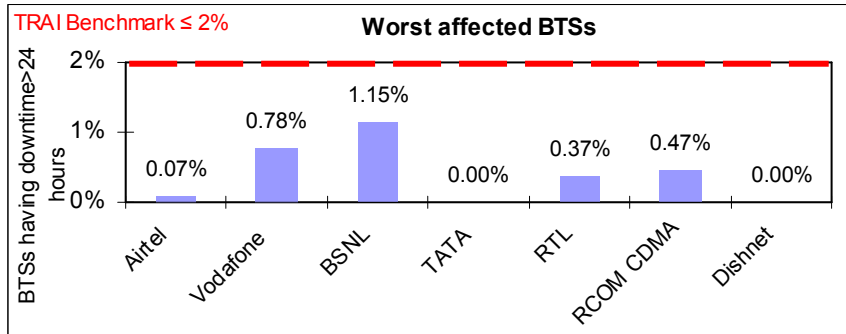
6.1 Graphical/Tabular Representations for Cellular Mobile Services

BTSS Accumulated Downtime



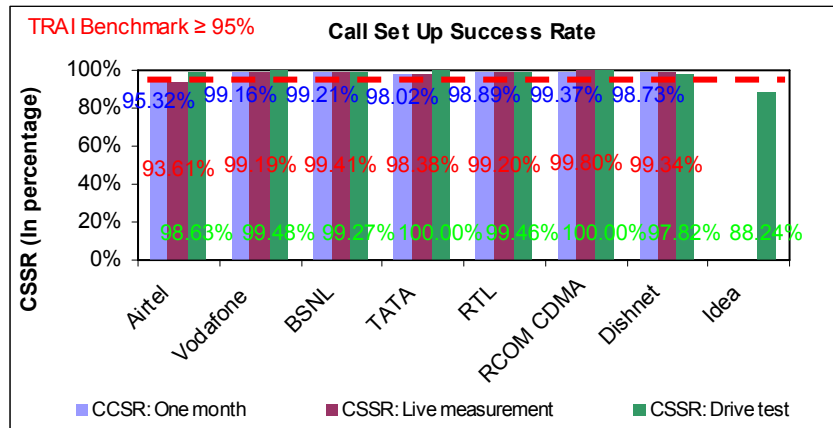
All operators are meeting the benchmark

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

Operator meeting benchmark: Vodafone, BSNL, TATA, RTL, RCOM CDMA, Dishnet

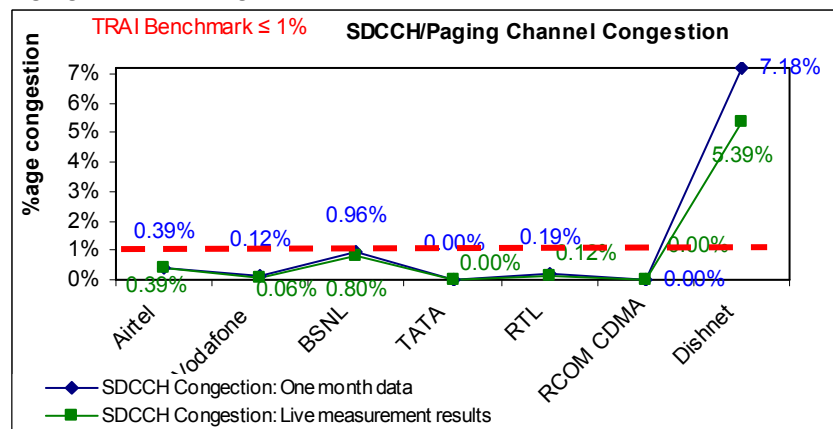
Operator not meeting benchmark: Airtel

Drive test

Operator meeting benchmark: Airtel, Vodafone, BSNL, TATA, RTL, RCOM CDMA, Dishnet

Operator not meeting benchmark: Idea

SDCCH / Paging Channel Congestion



One month

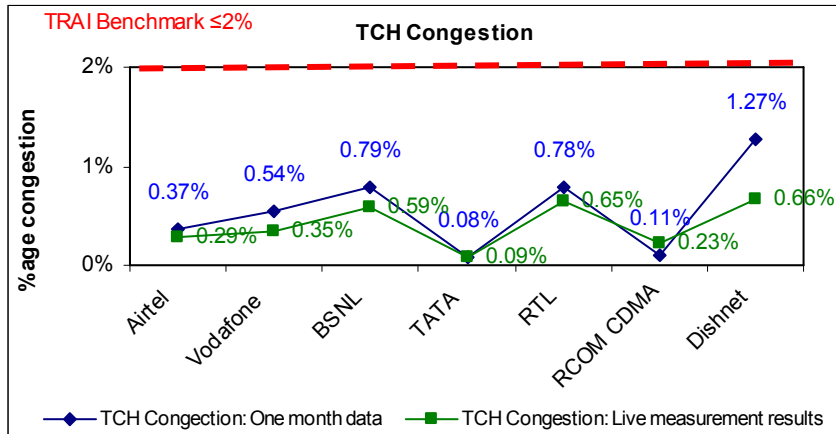
Operator meeting benchmark: Airtel, Vodafone, BSNL, TATA, RTL, RCOM CDMA

Operator not meeting benchmark: Dishnet

Live measurement

Operator meeting benchmark: Airtel, Vodafone, BSNL, TATA, RTL, RCOM CDMA
 Operator not meeting benchmark: Dishnet

TCH Congestion



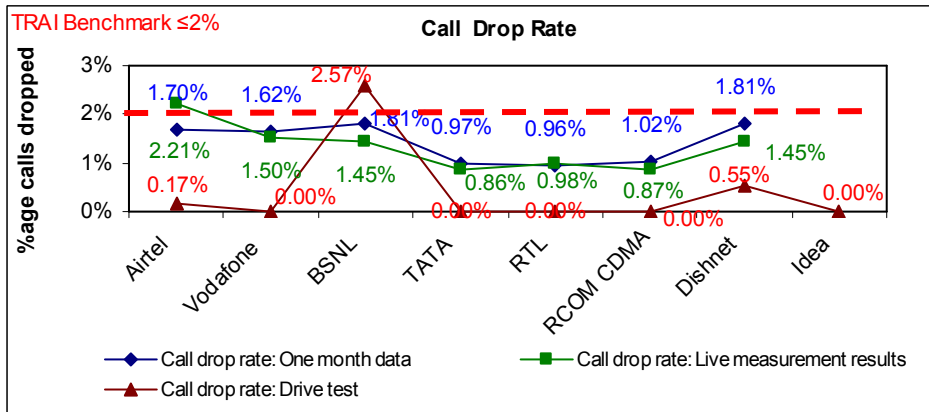
One month

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

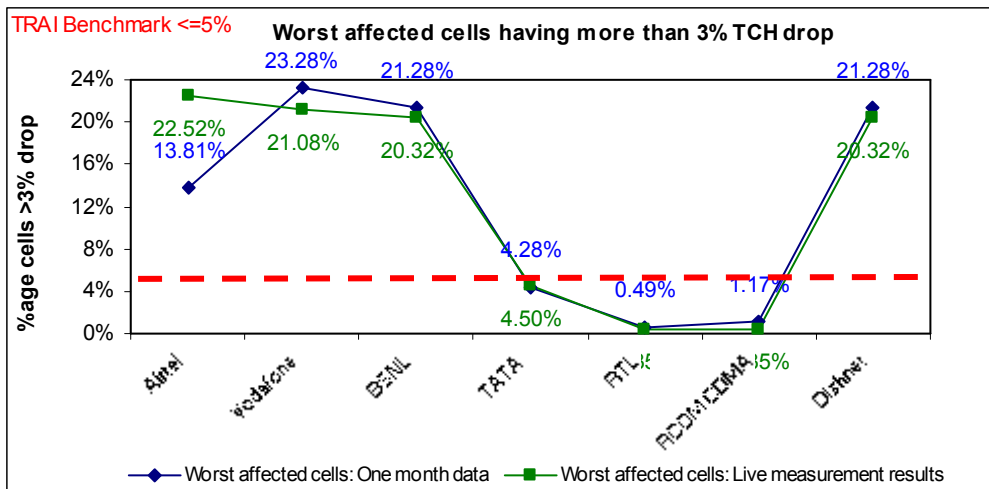
Operator meeting benchmark: Vodafone, BSNL, TATA, RTL, RCOM CDMA, Dishnet
 Operator not meeting benchmark: Airtel

Drive test

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

Operator not meeting benchmark: BSNL

Worst affected cells having more than 3% TCH drop



One month

Operator meeting benchmark: TATA, RTL, RCOM CDMA

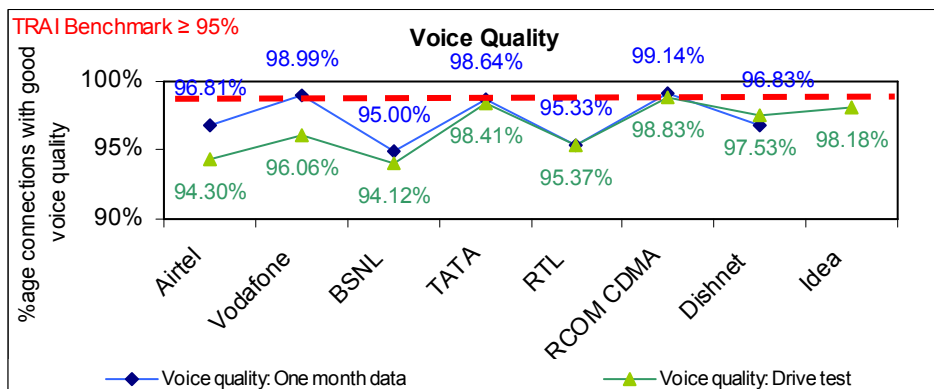
Operator not meeting benchmark: Airtel, Vodafone, BSNL, Dishnet

Live measurement

Operator meeting benchmark: TATA, RTL, RCOM CDMA

Operator not meeting benchmark: Airtel, Vodafone, BSNL, Dishnet

Voice quality



One month

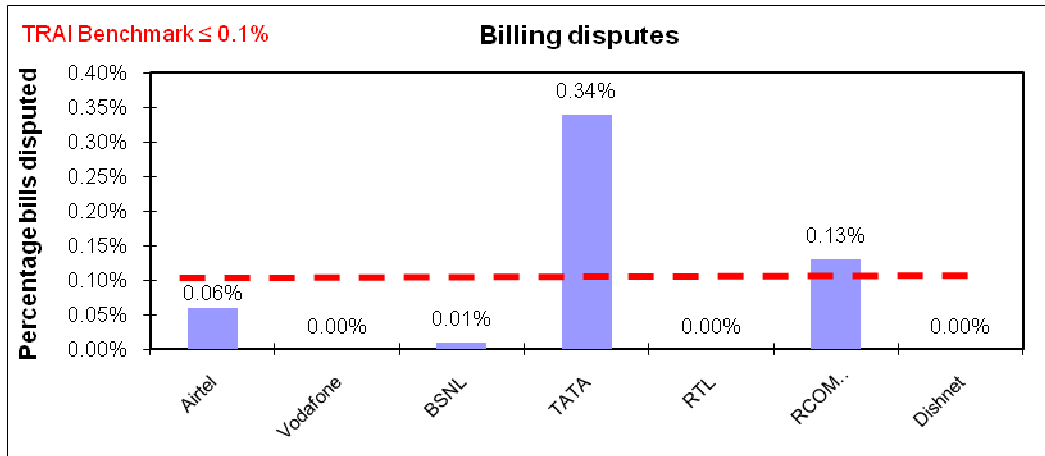
Operator meeting benchmark: Airtel, Vodafone, TATA, RTL, RCOM CDMA, Dishnet

Operator not meeting benchmark: BSNL

Drive test

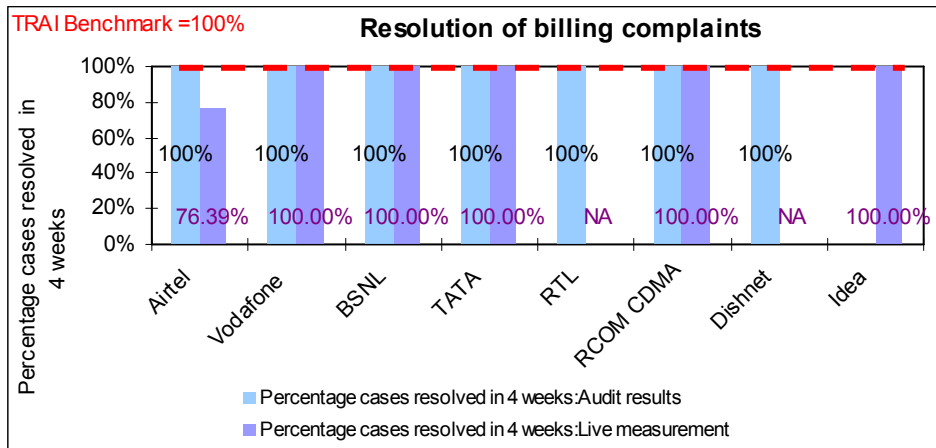
Operator meeting benchmark: Vodafone, TATA, RTL, RCOM CDMA, Dishnet, Idea
 Operator not meeting benchmark: Airtel, BSNL

Billing Disputes



Operator meeting benchmark: Vodafone, BSNL, RTL, Dishnet, Airtel
 Operator not meeting benchmark: TATA, RCOM CDMA

Resolution of billing complaints



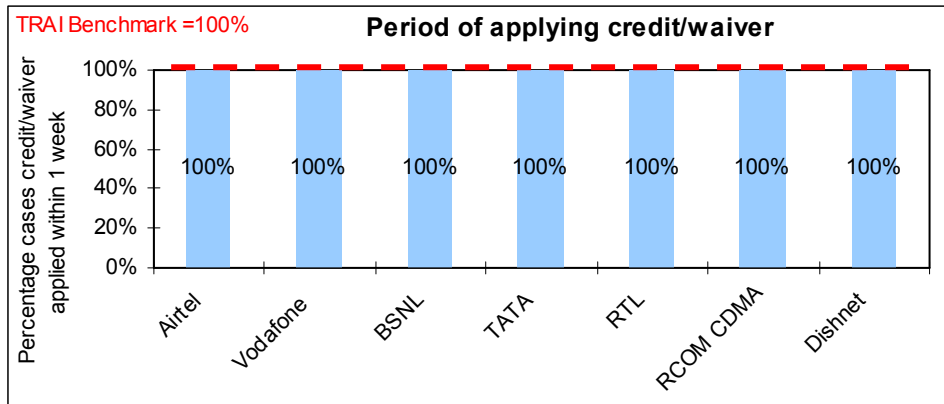
One month

All operators are meeting the benchmark

Live calling

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

Period of applying credit / waiver



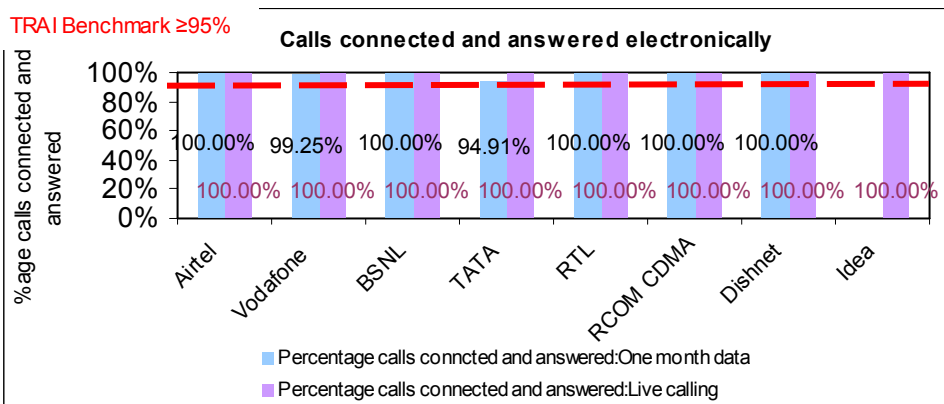
All operators are meeting the benchmark

Live calling for billing Complaints

Resolution of billing complaints	Benchmark	Airtel	Vodafone	BSNL	TATA	RTL	RCOM CDMA	Dishnet	Idea
Total Number of calls made		72	2	4	18	0	100	0	1
Number of cases resolved in 4 weeks		55	2	4	18	0	100	0	1
Percentage cases resolved in four weeks	100%	76.39%	100.00%	100.00%	100.00%	NA	100.00%	NA	100.00%

Operators not meeting the benchmark

Customer Care / Helpline: Calls answered electronically



One month

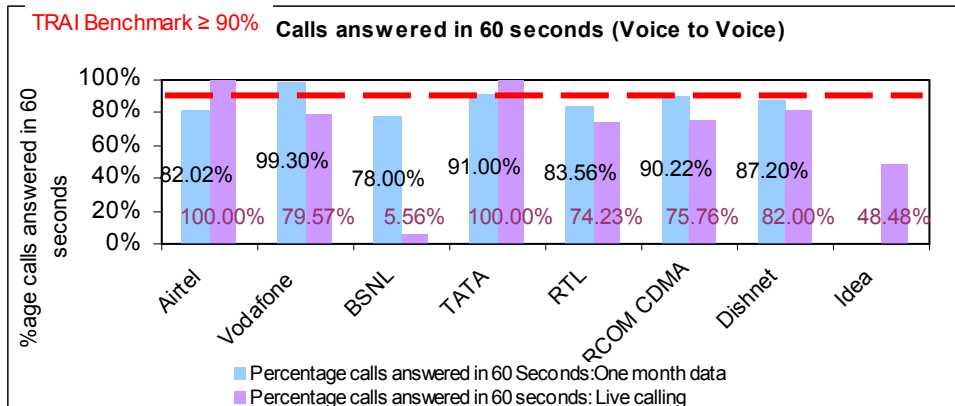
Operator meeting benchmark: Airtel, Vodafone, BSNL, RTL, RCOM CDMA, Dishnet

Operator not meeting benchmark: TATA

Live calling

All operators are meeting the benchmark

Customer Care / Helpline: Calls answered voice to voice



One month

Operator meeting benchmark: Vodafone, TATA, RCOM CDMA

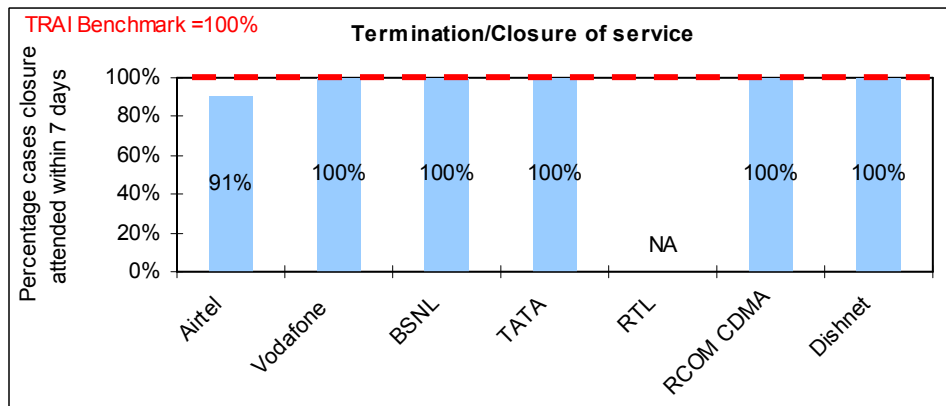
Operator not meeting benchmark: Airtel, BSNL, RTL, Dishnet

Live calling

Operator meeting benchmark: Airtel, TATA

Operator not meeting benchmark: Vodafone, BSNL, RTL, RCOM CDMA, Dishnet, Idea

Termination / Closure of service

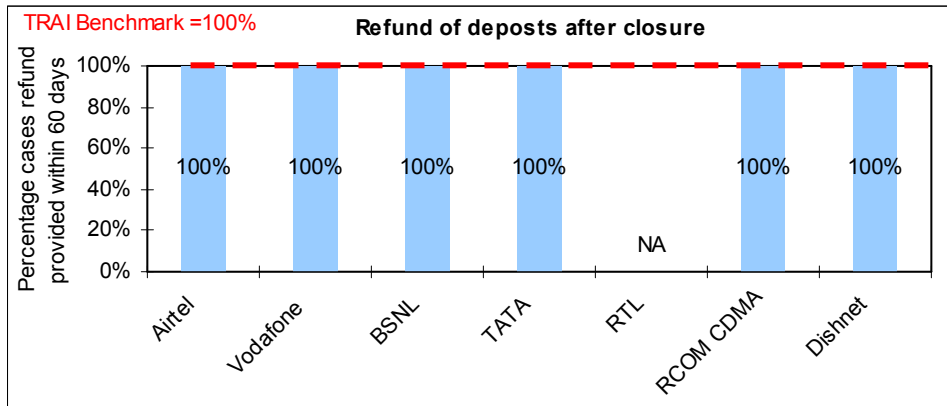


NA: Not Applicable

Operator meeting benchmark: Vodafone, BSNL, TATA, RCOM CDMA, Dishnet

Operator not meeting benchmark: Airtel

Refund of deposits



All operators are meeting the benchmark

NA: Not Applicable

Inter operator calls assessment

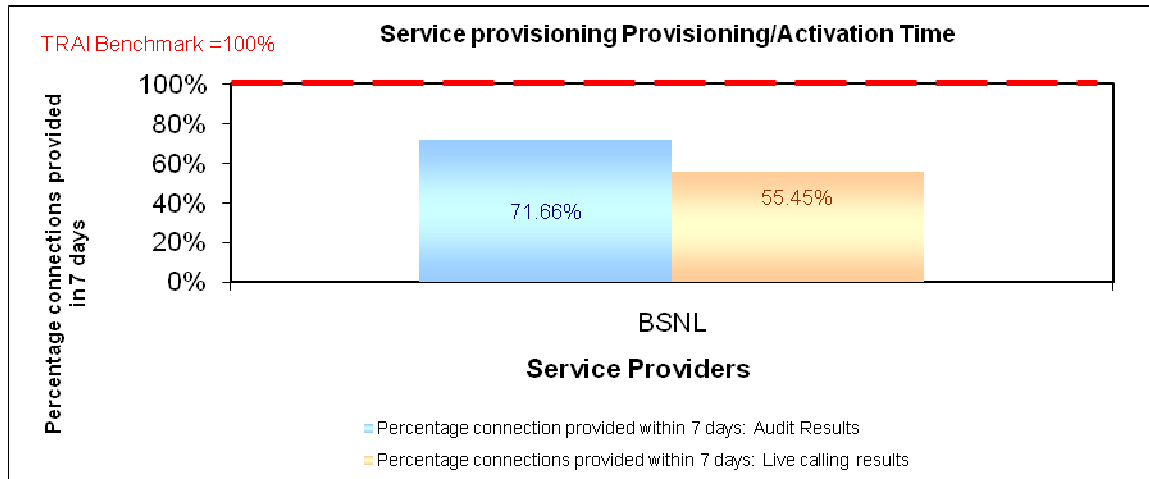
Inter operator call Assessment		Airtel	Vodafone	BSNL	TATA	RTL	RCOM CDMA	Dishnet	Idea
From ↓	To →								
Airtel	Airtel	-	95%	96%	96%	94%	92%	94%	92%
Vodafone	Airtel	90%	-	93%	91%	86%	93%	90%	91%
BSNL	Airtel	100%	99%	-	99%	93%	98%	99%	86%
TATA	Airtel	89%	96%	95%	-	92%	95%	92%	81%
RTL	Airtel	95%	97%	97%	97%	-	99%	99%	72.5%
RCOM CDMA	Airtel	96%	99%	94%	99%	96%	-	100%	97%
Dishnet	Airtel	94%	90%	87%	94%	87%	92%	-	87%
Idea	Airtel	95%	93%	98%	93%	98%	93%	96%	-

The maximum problem faced by the calling operator to other operators

In the inter-operator call assessment, calls were made from the test SIMs of service provider whose audit was being conducted to all the other service providers. BSNL, Tata, RTL and Dishnet found tough connecting to an Idea number with less than 90 out of 100 calls getting connected. Dishnet had difficulty in connecting to a BSNL, RTL and Idea number with 87% of their calls getting completed. From TATA, only 89 out of 100 calls to a Bharti number got connected.

6.2 Graphical/Tabular Representations for Basic (Wireline) services

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



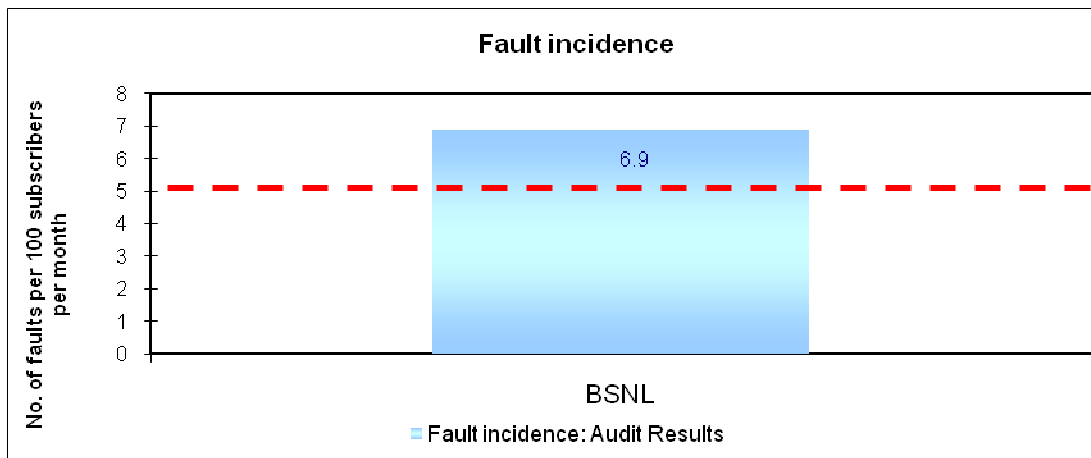
One month

BSNL is not meeting the benchmark

Live calling

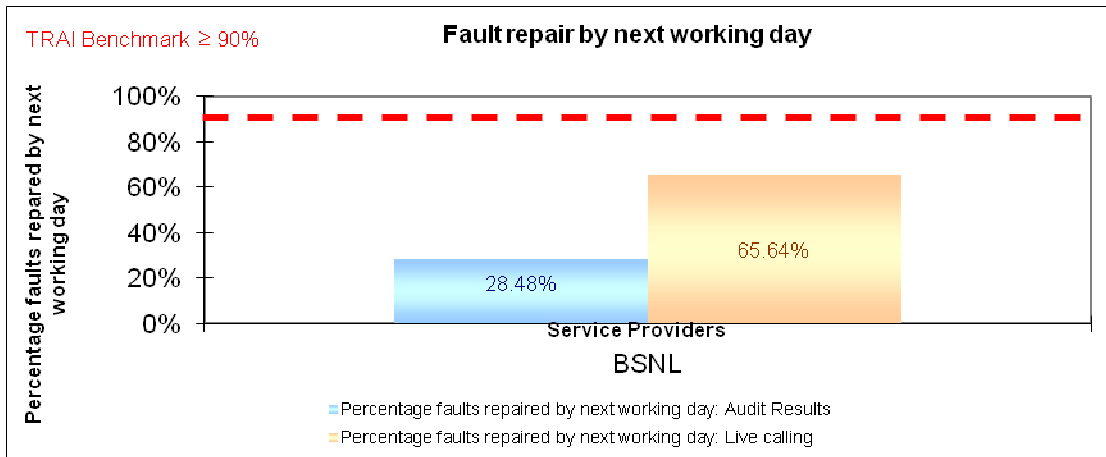
BSNL is not meeting the benchmark

Fault incidence (<=5)



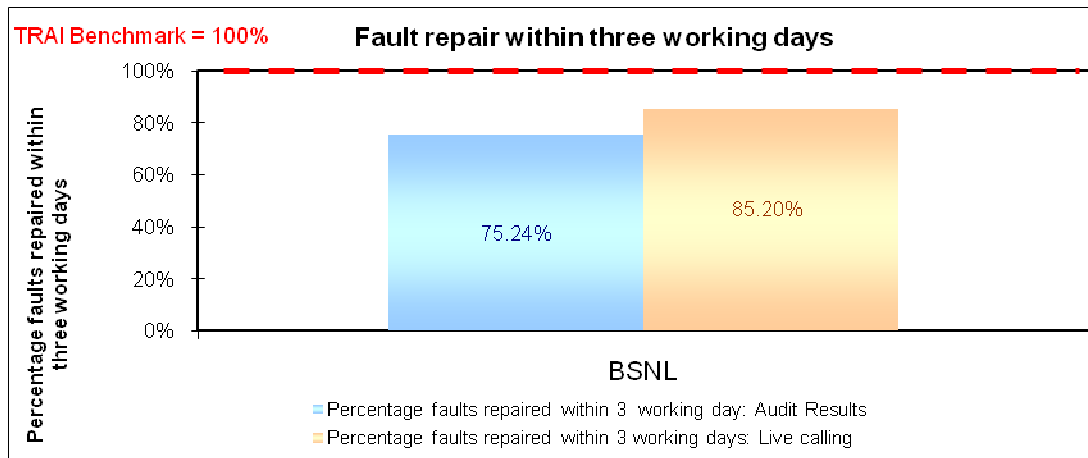
BSNL is not meeting the benchmark

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



One month
BSNL is meeting the benchmark

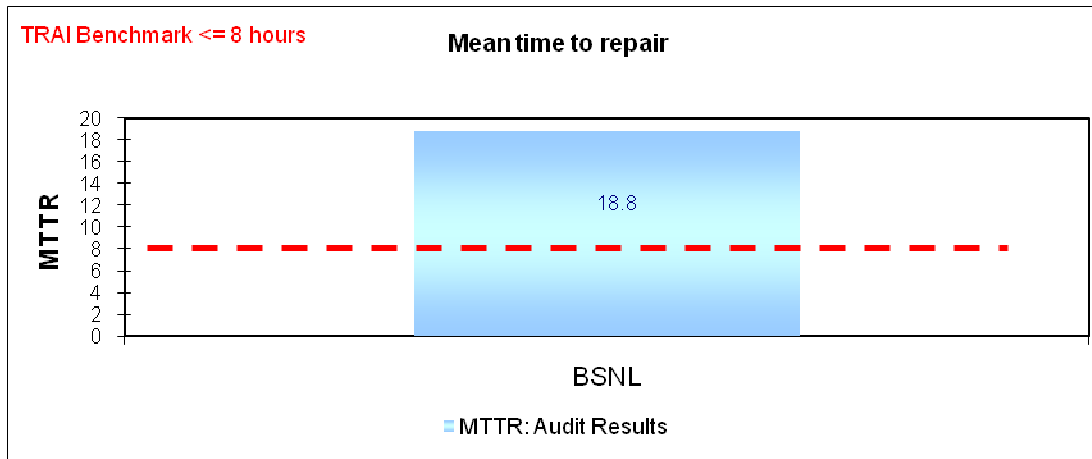
Live calling
BSNL is meeting the benchmark



One month
BSNL is not meeting the benchmark

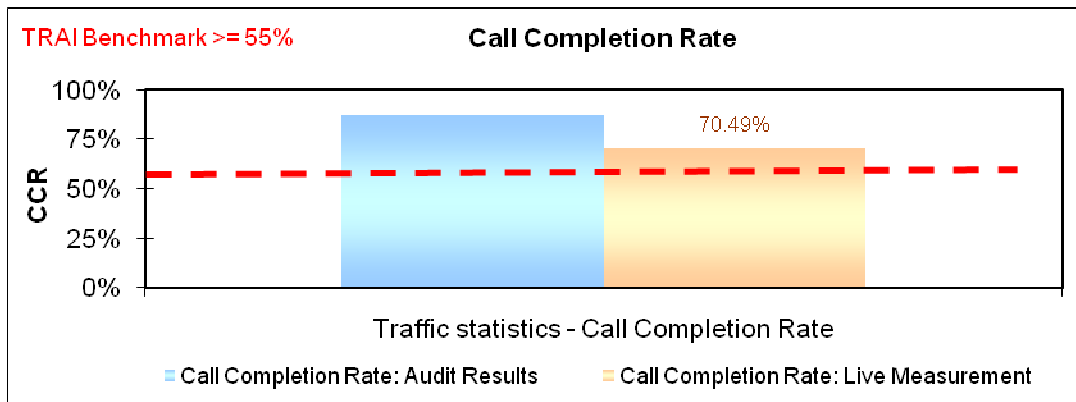
Live calling
BSNL is not meeting the benchmark

Mean time to repair



BSNL is not meeting the benchmark

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



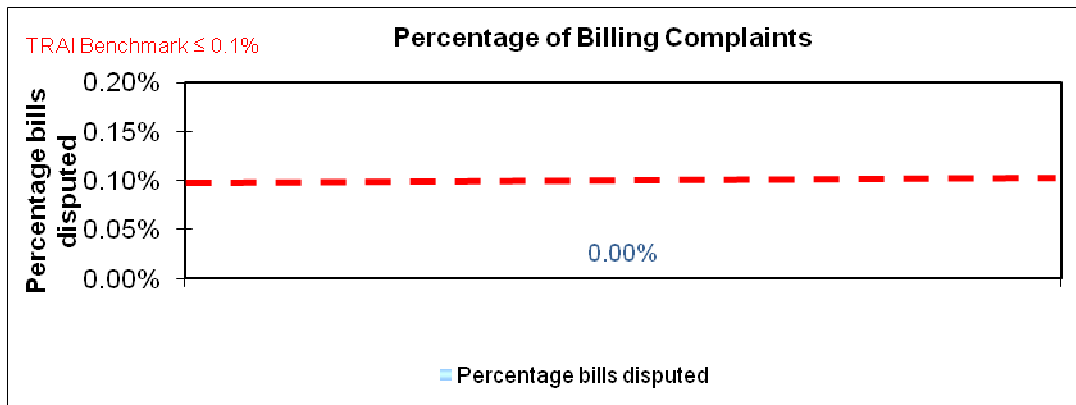
One month

BSNL is meeting the benchmark

Live measurement

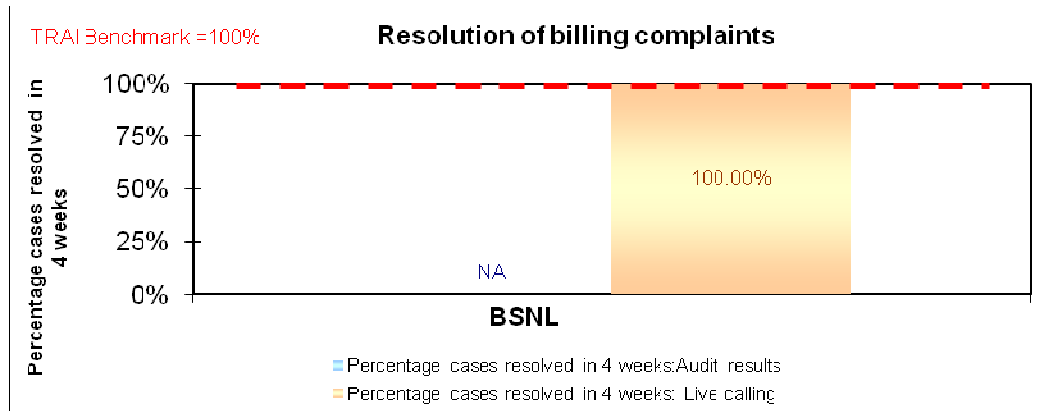
BSNL is meeting the benchmark

Percentage bills disputed



BSNL is meeting the benchmark

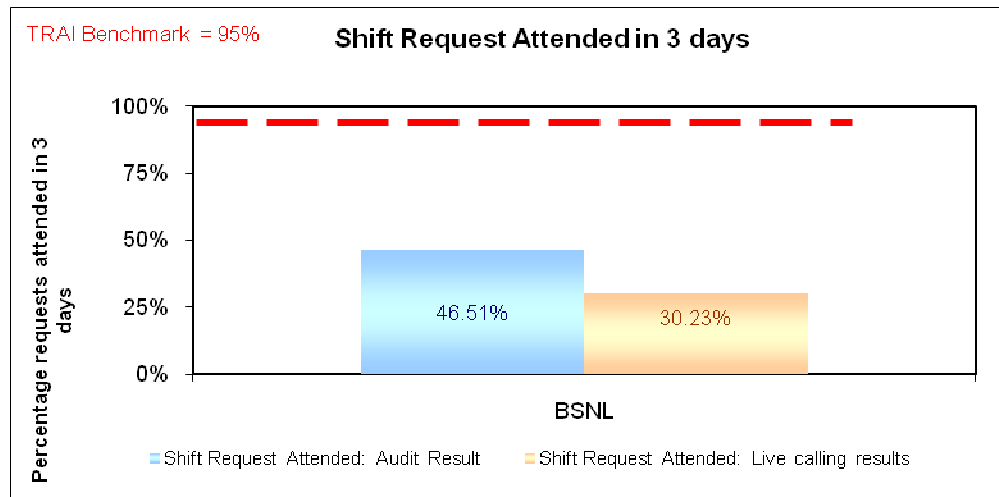
Resolution of billing complaints (Comparison between one month audit results and live calling results)



Live calling

BSNL is meeting the benchmark

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



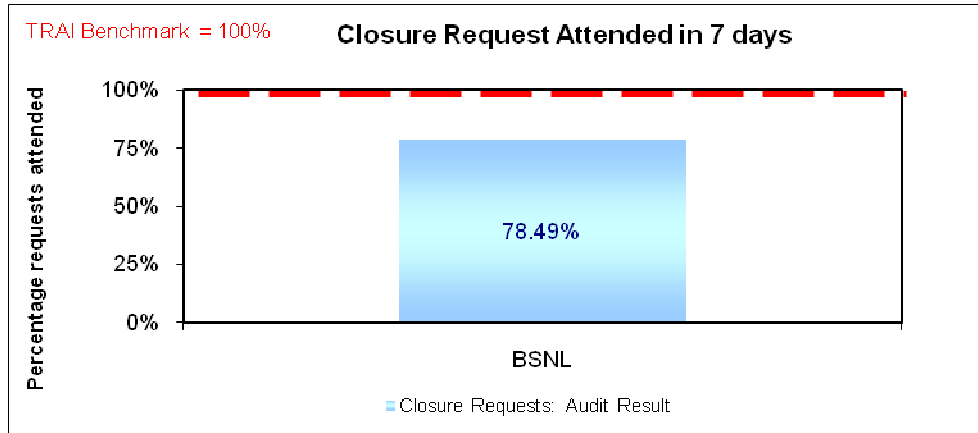
One month

BSNL is meeting the benchmark

Live calling

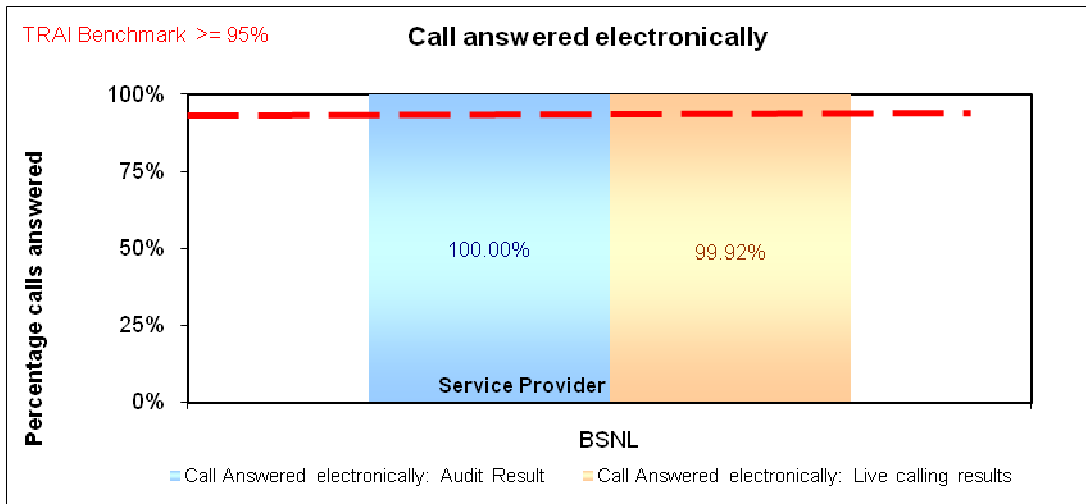
BSNL is meeting the benchmark

Closure requests attended within 7 days



BSNL is not meeting the benchmark

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



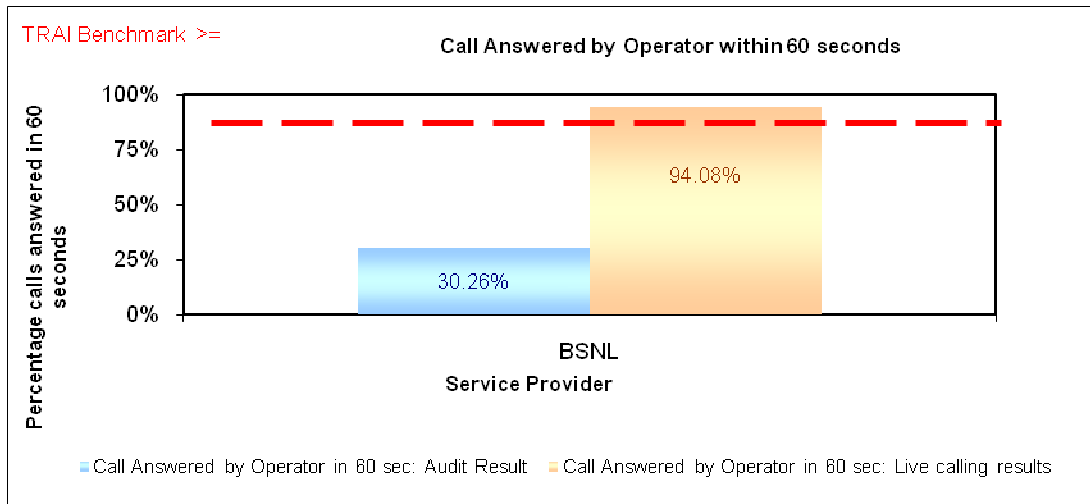
One month

BSNL is meeting the benchmark

Live calling

BSNL is meeting the benchmark

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



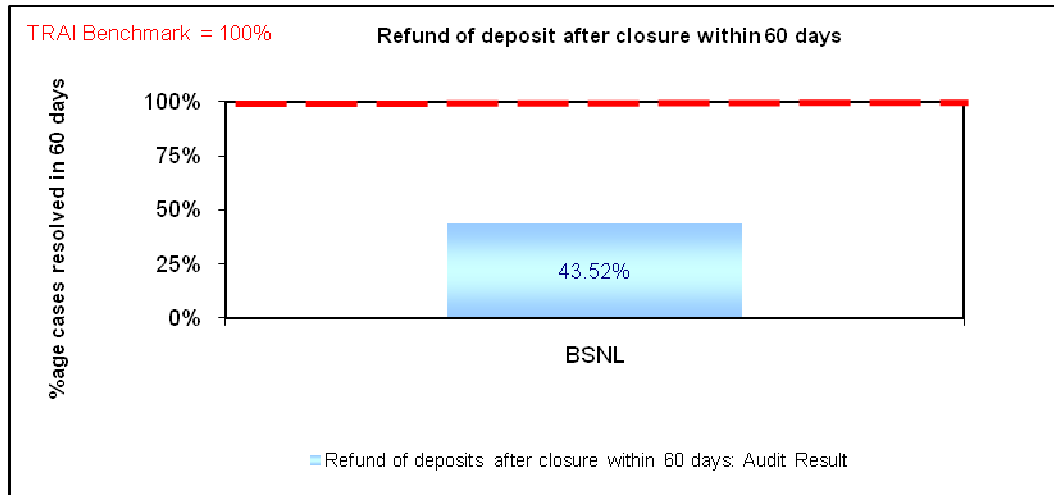
One month

BSNL is not meeting the benchmark

Live calling

BSNL is meeting the benchmark

Time taken to refund of deposits after closure

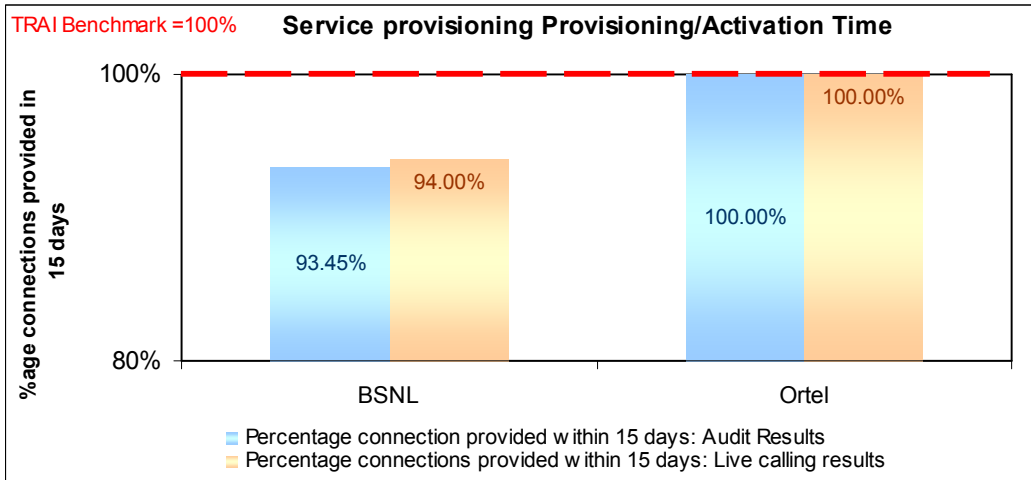


One month

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)



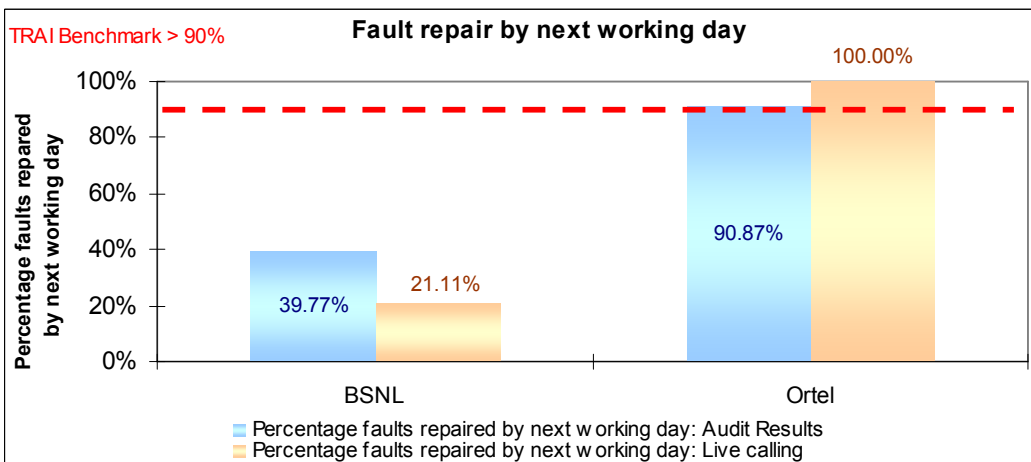
One month

Operator meeting benchmark: Ortel
 Operator not meeting benchmark: BSNL

Live calling

Operator meeting benchmark: Ortel
 Operator not meeting benchmark: BSNL

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



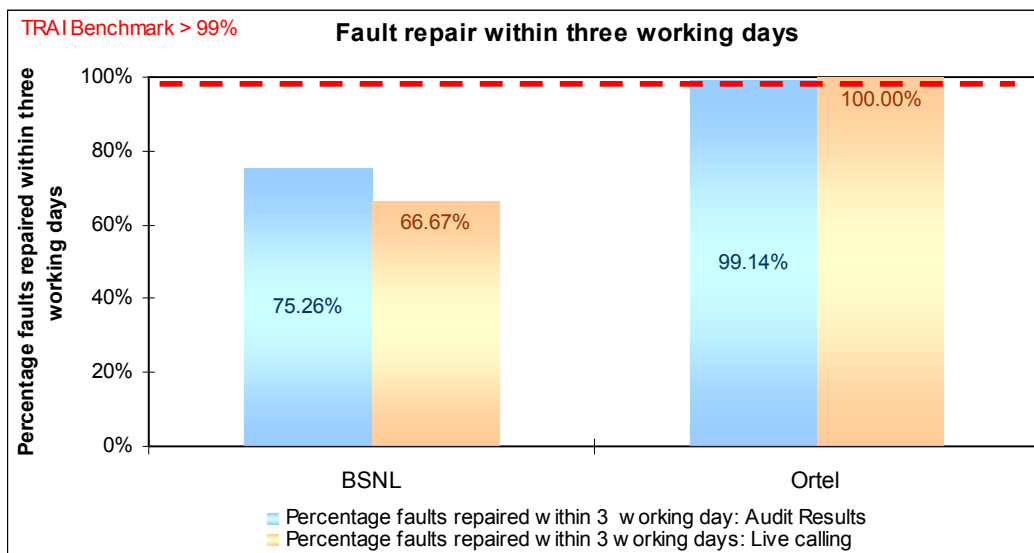
One month

Operator meeting benchmark: Ortel
Operator not meeting benchmark: BSNL

Live calling

Operator meeting benchmark: Ortel
Operator not meeting benchmark: BSNL

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



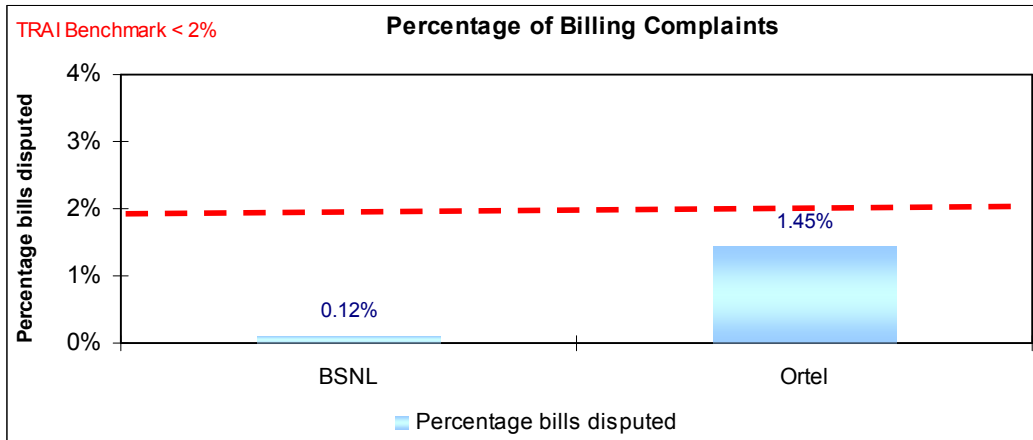
One month

Operator meeting benchmark: Ortel
Operator not meeting benchmark: BSNL

Live calling

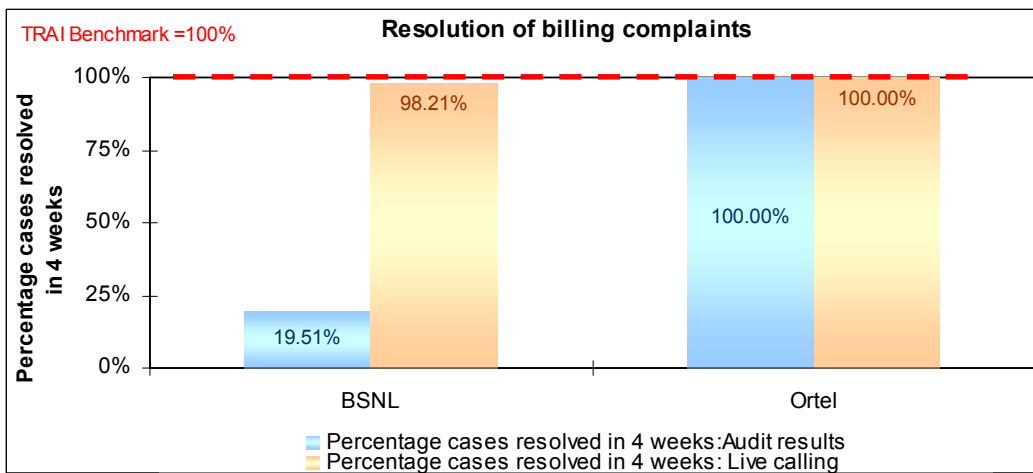
Operator meeting benchmark: Ortel
Operator not meeting benchmark: BSNL

Percentage bills disputed



All operators are meeting the benchmark

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



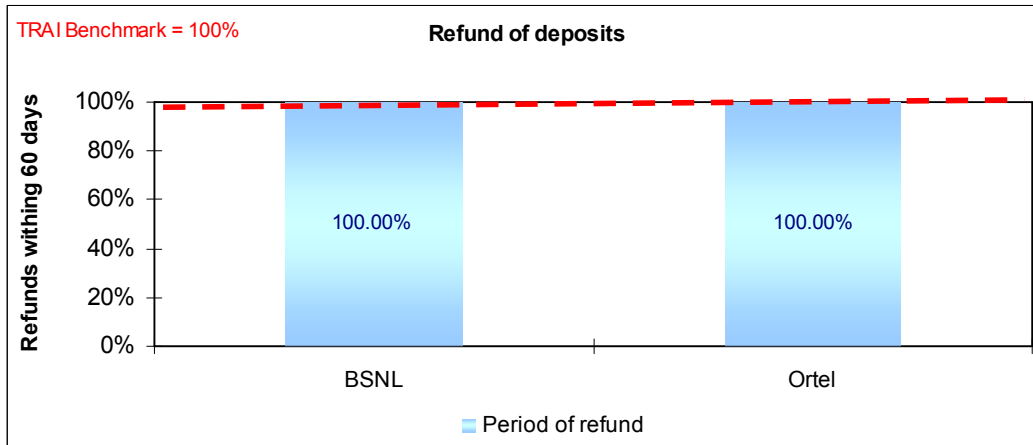
One month

Operator meeting benchmark: Ortel
 Operator not meeting benchmark: BSNL

Live calling

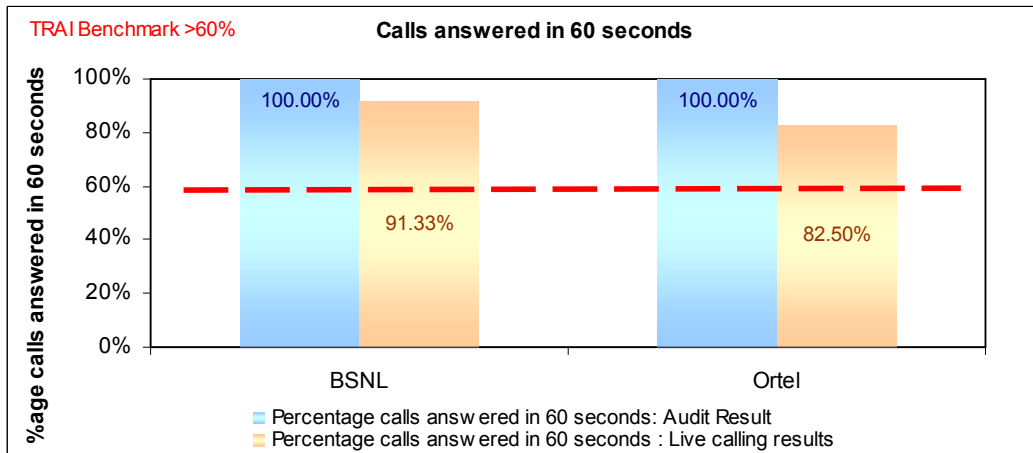
Operator meeting benchmark: Ortel
 Operator not meeting benchmark: BSNL

Refund of deposits after closure



All operators are meeting the benchmark

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



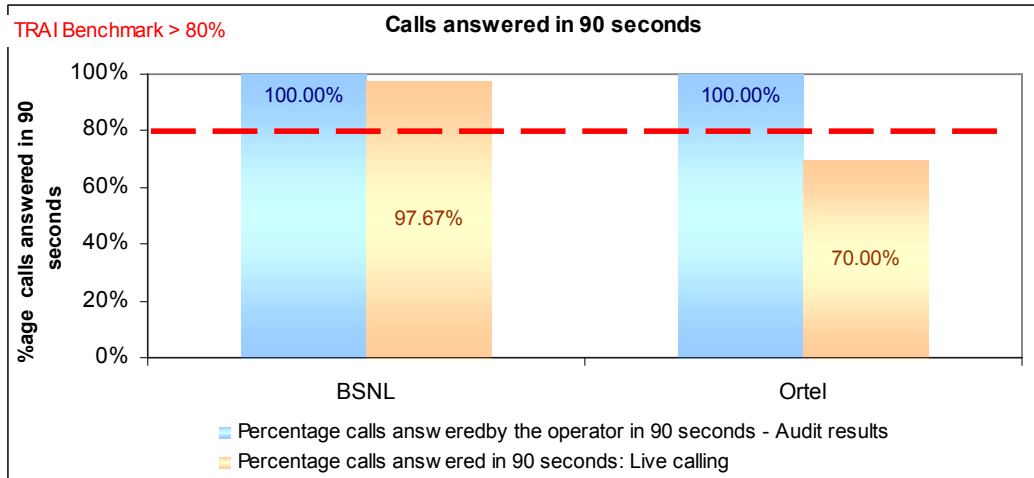
One month

All operators are meeting the benchmark

Live calling

All operators are meeting the benchmark

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



One month

All operators are meeting the benchmark

Live calling

Operator meeting benchmark: BSNL

Operator not meeting benchmark: Ortel

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

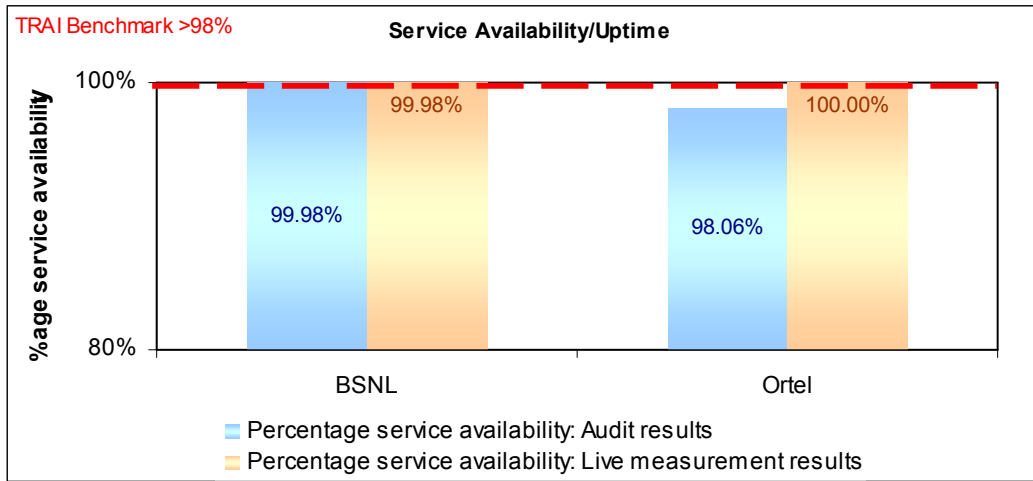
Bandwidth Utilization	B'mark	BSNL	Ortel
Total number of intra network links		213	5
No of Intra network found to be above 90%		0	0

Bandwidth Utilization	B'mark	BSNL	Ortel
Total number of intra network links		143	5
No of Intra network found to be above 90%		0	0

Broadband download speed	Benchmark	BSNL	Ortel
Total committed download speed to the sample subscribers (In mpbs) (A)		25600	12800
Total average download speed observed during TCBH (In Mpbs) (B)		23474	11451
%age subscribed speed available to the subscriber during TCBH (B/A)*100	>80%	91.70%	89.46%

As far as bandwidth utilization on the intra network links is concerned both 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%.

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)	SDCCH/Paging Chl. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	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	PMR	Complied	95.52%	0.57%	0.81%	1.63%	99.03%	Complied	0.00%	100.00%	<4 week	Complied	Complied	80.55%	Complied
	IMRB		95.52%	0.57%	0.81%	1.63%	99.03%		0.00%	100.00%	<4 week			80.55%	
Vodafone	PMR	Complied	97.70%	0.04%	0.41%	1.44%	96.50%	DNA	0.04%	100.00%	16 days	Complied	Complied	89.60%	Complied
	IMRB		97.70%	0.04%	0.41%	1.44%	96.50%	DNA	0.04%	100.00%	<4 week			89.60%	
BSNL	PMR	Complied	98.00%	0.59%	1.31%	1.24%	99.00%	0.00%	0.00%	100.00%	0.00%	Complied	Complied	85.00%	Complied
	IMRB		98.00%	0.59%	1.31%	1.79%	99.00%	0.00%	0.03%	100.00%	0.00%			85.00%	
TATA	PMR	Complied	99.50%	0.00%	0.56%	0.92%	99.18%	0.00%	0.03%	100.00%	< 4 weeks	Complied	Complied	92.00%	Complied
	IMRB		99.50%	0.00%	0.56%	0.92%	99.18%	0.00%	0.03%	100.00%	< 4 weeks			92.00%	
RTL	PMR	Complied	99.17%	0.68%	1.87%	1.08%	95.33%	0.00%	0.00%	100.00%	100.00%	Complied	Complied	86.18%	Complied
	IMRB		99.17%	0.68%	1.87%	1.08%	95.33%	0.00%	0.00%	100.00%	100.00%			86.18%	
RCOM GSM	PMR	Complied	98.66%	0.00%	0.74%	1.28%	99.14%	0.00%	0.07%	100.00%	<4 weeks	Complied	Complied	90.71%	Complied
	IMRB		98.66%	0.00%	0.74%	1.28%	99.14%	0.00%	0.07%	100.00%	<4 weeks			90.71%	
Dishnet	PMR	Complied	95.84%	0.17%	1.74%	1.79%	94.98%	3.11%	0.06%	100.00%	100.00%	Complied	Complied	98.22%	Complied
	IMRB		95.84%	0.17%	1.74%	1.79%	94.98%	3.11%	0.06%	100.00%	100.00%			98.22%	

 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 Service

1. The figures reported by all the operators except BSNL for call drop rate and billing complaints, match the figures obtained on verification for all the parameters.
2. Dishnet fails to meet the benchmark for good voice quality and POI congestion.

7.2 Basic (Wireline) services

Parameters	B'marks	BSNL	
		PMR	IMRB
Percentage connections completed within 7 days	100%	100%	63%
Faults incidences (No. of faults/100 Subs./month)	≤5	4.50%	7.8%
% of faults repaired by next working day	≥ 90%	93%	33%
Faults pending for > 3days and ≤7 days	Rent rebate of 7 days	1039	1009
Faults pending for > 7 days and ≤15 days	Rent rebate of 15 days	57	229
Faults pending for > 15 days	Rent rebate of 1 month	0	70
Mean Time to Repair (MTTR)	≤ 8 Hrs	7.87	23.28
Call Completion Rate (CCR)	≥ 55%	65%	92%
Metering and billing credibility - Number of bills disputed during over a billing cycle	< 0.1%	0.04%	0.02%
Resolution of billing complaints within 4 weeks	100%	75%	88%
Shift requests (Total number received)			
Percentage shift requests attended within 3 days	>95%	97%	62%
Closure request attended			
Closure within 24 hours	>95%	99%	93%
Supplementary (additional) service requests attended			
Additional facility provided within 24 hours	>95%	Complied	
Response time to customer for assistance			
% age call answered through IVR in 20 seconds	>80%	Complied	
% age call answered through IVR in 40 seconds	100%	Complied	
% age call answered by operator in 60 seconds	>80%	100%	34%
% age call answered by operator in 90 seconds	>95%	Complied	
Time taken for refund of deposits after closures within 60 days	100%	100%	36%

* 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

7.2.1 Conclusions – Basic (Wireline) Services

1. Significant variation is observed in figures reported in PMR and those verified in sample exchanges for all the parameters
2. This variation observed in figures for BSNL is mainly 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.

7.3 Broadband services

Parameters	Benchmarks	BSNL		Ortel	
		PMR	IMRB	PMR	IMRB
Service provisioning uptime					
Percentage connections provided within 15 days	100%	97.00%	94.00%	100.00%	100.00%
Fault repair restoration time					
Percentage faults repaired by next working days	> 90%	96.00%	50.00%	91.00%	89.00%
Percentage faults repaired within three working days	> 99%	100.00%	76.00%	99.00%	99.00%
Billing performance					
Billing complaints per 100 bills issued	< 2%	0.20%	0.20%	0.00%	0.00%
%age of billing complaints resolved in 4 weeks	100%	100.00%	84.00%	100.00%	100.00%
%age cases in which refund of deposits after closure was made in 60 days	100%	100.00%	88.00%	98.00%	98.00%
Customer care/helpline assessment (Voice to Voice)					
Percentage calls answered within 60 seconds	> 60%	87.00%	87.00%	100.00%	100.00%
Percentage calls answered within 90 seconds	> 80%	95.00%	95.00%	100.00%	100.00%
Bandwidth utilization/Throughput					
Intra network links (POP to ISP Node)		DNP	186	3	5
Total number of intra network links > 90%		DNP	0	0	0
Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)		DNP	26557	255	255
Percentage bandwidth utilized on upstream links	< 80%	NA	77.00%	74.00%	74.00%
Broadband download speed	> 80%	92.00%	92.00%	91.00%	91.00%
Service availability/uptime	> 98%	99.00%	99.99%	98.50%	98.50%
Packet loss	< 1%	NA	0.05%	0.06%	0.06%
Network Latency					
POP/ISP Node to NIXI (in msec)	< 120 msec	DNP	59	87.56	87.56
ISP node to NAP port (Terrestrial) (in msec)	< 350 msec	DNP	276	257.66	257.66

 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. For BSNL there is slight variation observed in for some parameters when compared to the figures reported in PMR. But the reason is largely the fact that data was obtained for sample 5% of exchanges whereas reporting is done for 100% of exchanges.
2. Historic data for Broadband download speed and Ping test conducted to check the latency and packet loss was not available for verification for Ortel.
3. Although the service providers claimed that they conduct random ping tests and latency to check the packet loss but there is no book keeping which is maintained at their end. Records of old ping tests were found to be maintained only by BSNL.
4. Both Ortel and BSNL were found to be not meeting benchmark for fault repair and billing performance for the period of Jan to March, 2009

8. Annexure - I

8.1 Parameter wise performance reports for Cellular Mobile services

1. Network Availability

Audit Results for Network Availability

	Benchmark	Airtel	Vodafone	BSNL	TATA	RTL	RCOM CDMA	Dishnet
Number of BTSs in the licensed service area		2757	2300	260	467	1348	852	2260
Sum of downtime of BTSs in a month (in hours)		23659	2460	2912	0.33	933	248.2	782
BTSs accumulated downtime (not available for service)	≤ 2%	1.19%	0.15%	1.56%	0.00%	0.10%	0.04%	0.05%
Number of BTSs having accumulated downtime >24 hours		2	18	3	0	5	4	0
Worst affected BTSs due to downtime	≤ 2%	0.07%	0.78%	1.15%	0.00%	0.37%	0.47%	0.00%

2. Connection Establishment (Accessibility)

Audit Results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Airtel	Vodafone	BSNL	TATA	RTL	RCOM CDMA	Dishnet
Total number of call attempts		181717919	24444897	127043202	25757862	23276988	20266483	27857962
Total number of successful calls established		173220996	24239761	126044373	25248066	23017926	20138804	27503454
CSSR	≥ 95%	95.32%	99.16%	99.21%	98.02%	98.89%	99.37%	98.73%

SDCCH congestion	Benchmark	Airtel	Vodafone	BSNL	TATA	RTL	RCOM CDMA	Dishnet
Total number of SDCCH/Paging channel attempts		391447203	52336391	313980824	11717615	DNA	DNA	67842629
Number of successful SDCCH/Paging channel attempts		389921171	52274714	310967981	11717615	DNA	DNA	62974706
SDCCH/Paging channel congestion	≤ 1%	0.39%	0.12%	0.96%	0.00%	0.19%	0.00%	7.18%

TCH congestion	Benchmark	Airtel	Vodafone	BSNL	TATA	RTL	RCOM CDMA	Dishnet
TCH attempts		182276731	24444897	127043202	25757862	DNA	DNA	27857962
Number of successful TCH attempts		181601943	24312159	126044373	25737602	DNA	DNA	27503454
TCH congestion	≤ 2%	0.37%	0.54%	0.79%	0.08%	0.78%	0.11%	1.27%

Live measurement results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Airtel	Vodafone	BSNL	TATA	RTL	RCOM CDMA	Dishnet
Total number of call attempts		6035209	942809	5035827	10935242	2559478	671061	13229990
Total number of successful calls established		5649440	935213	5006118	10757555	2539067	669741	13142201
CSSR	≥ 95%	93.61%	99.19%	99.41%	98.38%	99.20%	99.80%	99.34%

Operators not meeting the benchmark

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

SDCCH congestion	Benchmark	Airtel	Vodafone	BSNL	TATA	RTL	RCOM CDMA	Dishnet
Total number of SDCCH/Paging channel attempts		13501030.67	2017177	12846697	4901128	DNA	DNA	34113264
Number of successful SDCCH/Paging channel attempts		13448350.33	2016059	12743813	4901128	DNA	DNA	32274101
SDCCH/Paging channel congestion	≤ 1%	0.39%	0.06%	0.80%	0.00%	0.12%	0.00%	5.39%

TCH congestion	Benchmark	Airtel	Vodafone	BSNL	TATA	RTL	RCOM CDMA	Dishnet
TCH attempts		6060808	942809	5035827	10935244	DNA	DNA	13229990
Number of successful TCH attempts		6033916	939476	5006118	10925324	DNA	DNA	13142201
TCH congestion	≤ 2%	0.29%	0.35%	0.59%	0.09%	0.65%	0.23%	0.66%

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

CSSR	Benchmark	Airtel	Vodafone	BSNL	TATA	RTL	RCOM CDMA	Dishnet	Idea
Total number of call attempts		585	579	549	546	556	1500	551	510
Total number of successful calls established		577	576	545	546	553	1500	539	450
CSSR	≥ 95%	98.63%	99.48%	99.27%	100.00%	99.46%	100.00%	97.82%	88.24%

Blocked calls	Benchmark	Airtel	Vodafone	BSNL	TATA	RTL	RCOM CDMA	Dishnet	Idea
%age blocked calls		1.37%	0.52%	0.73%	0.00%	0.54%	0.00%	2.18%	11.76%

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	BSNL	TATA	RTL	RCOM CDMA	Dishnet
Total number of calls established		177229338	24444897	27503454	25248066	DNA	DNA	27503454
Total number of calls dropped		3017616	396951	498034	244219	DNA	DNA	498034
Call drop rate	≤ 2%	1.70%	1.62%	1.81%	0.97%	0.96%	1.02%	1.81%

Cells having more than 3% TCH	Benchmark	Airtel	Vodafone	BSNL	TATA	RTL	RCOM CDMA	Dishnet
Total number of cells in the network		8370	6044	5885	467	4044	852	5885
Total number of cells having more than 3% TCH		1156	1407	1252.1	20	20	10	1252.1
Worst affected cells having more than 3% TCH	≤ 5%	13.81%	23.28%	21.28%	4.28%	0.49%	1.17%	21.28%

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

Call drop rate	Benchmark	Airtel	Vodafone	BSNL	TATA	RTL	RCOM CDMA	Dishnet
Total number of calls established		5789243	942809	13142201	10757554.67	DNA	DNA	13142201
Total number of calls dropped		127846	14148	189959	92056	DNA	DNA	189959
Call drop rate	≤ 2%	2.21%	1.50%	1.45%	0.86%	0.98%	0.87%	1.45%

Operators not meeting the benchmark

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

Cells having more than 3% TCH	Benchmark	Airtel	Vodafone	BSNL	TATA	RTL	RCOM CDMA	Dishnet
Total number of cells in the network		8511	7229	6398	467	4044	852	6398
Total number of cells having more than 3% TCH		1916	1524	1300	21	14	3	1300
Worst affected cells having more than 3% TCH	≤ 5%	22.52%	21.08%	20.32%	4.50%	0.35%	0.35%	20.32%

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

Call drop rate	Benchmark	Airtel	Vodafone	BSNL	TATA	RTL	RCOM CDMA	Dishnet	Idea
Total number of calls established		577	579	544	546	553	678	548	510
Total number of calls dropped		1	0	14	0	0	0	3	0
Call drop rate	≤ 2%	0.17%	0.00%	2.57%	0.00%	0.00%	0.00%	0.55%	0.00%

4. Voice quality

Audit Results for Voice quality

Voice quality	Benchmark	Airtel	Vodafone	BSNL	TATA	RTL	RCOM CDMA	Dishnet
Total number of sample calls		3477	44794	32456	3085	DNA	DNA	47228
Total number of calls with good voice quality		3366	44342	30833	3043	DNA	DNA	45731
%age calls with good voice quality	≥ 95%	96.81%	98.99%	94.99%	98.64%	95.33%	99.14%	96.83%

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

Voice quality	Benchmark	Airtel	Vodafone	BSNL	TATA	RTL	RCOM CDMA	Dishnet	Idea
Total number of sample calls		62041	1266091	903823	32985	850469	32513	637443	1332908
Total number of calls with good voice quality		58502	1216264	850688	32459	811095	32132	621728	1308619
%age calls with good voice quality	≥ 95%	94.30%	96.06%	94.12%	98.41%	95.37%	98.83%	97.53%	98.18%

5. POI Congestion

Audit Results for POI Congestion

POI congestion	Benchmark	Airtel	Vodafone	BSNL	TATA	RTL	RCOM CDMA	Dishnet
POI traffic offered on all individual POI's		134737.1	230364	42487	1352163	3106.8	3106.8	246869
Served traffic for all POI's		128979	230364	42480	892347	3106.5	3106.5	246869
Traffic failed on all POI's	≤ 0.5%	0.043	0.0	0.00	0.34	0.00	0.00	0.00

Live measurement results for POI congestion

POI congestion	Benchmark	Airtel	Vodafone	BSNL	TATA	RTL	RCOM CDMA	Dishnet
POI traffic offered on all individual POI's		DNA	DNA	DNA	DNA	DNA	3830.12	DNA
Served traffic for all POI's		DNA	DNA	DNA	DNA	DNA	3830.09	DNA
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 the data directly from the counters.

6. Inter Operator Call Assessment

Inter operator call Assessment		Airtel	Vodafone	BSNL	TATA	RTL	RCOM CDMA	Dishnet	Idea
From ↓	To →								
Airtel		-	95%	96%	96%	94%	92%	94%	92%
Vodafone		90%	-	93%	91%	86%	93%	90%	91%
BSNL		100%	99%	-	99%	93%	98%	99%	86%
TATA		89%	96%	95%	-	92%	95%	92%	81%
RTL		95%	97%	97%	97%	-	99%	99%	72.5%
RCOM CDMA		96%	99%	94%	99%	96%	-	100%	97%
Dishnet		94%	90%	87%	94%	87%	92%	-	87%
Idea		95%	93%	98%	93%	98%	93%	96%	-

7. Metering and Billing credibility

Audit Results for Billing performance

Billing Performance	Benchmark	Airtel	Vodafone	BSNL	TATA	RTL	RCOM CDMA	Dishnet
Billing disputes - Postpaid								
Total bills generated during the period		24977	6619	50678	24183	5232	42955	1604
Total number of bills disputed		21	0	4	83	0	54	0
Percentage bills disputed	≤0.1%	0.06%	0.00%	0.01%	0.34%	0.00%	0.13%	0.00%
Billing disputes - Prepaid								
Total number of prepaid customers in that period		3529957	748071	1713491	565961	1603520	750787	1159570
Number of complaints related to charging, credit & validity		12	3029	1694	65	3877	931	150
Percentage of complaints	≤0.1%	0.00%	0.14%	0.10%	0.01%	0.06%	0.08%	0.01%
Resolution of billing complaints								
Total complaints resolved in 4 weeks from date of receipt		32	0	4	38	0	180	150
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		32	0	3	38	0	54	150
Total number of cases where credit/waiver was made within 1 week		32	0	3	38	0	54	150
Percentage cases in which credit/waiver was received within 1 week	100%	100.00%	NA	100.00%	100.00%	NA	100.00%	100.00%

Live calling results for resolution of billing complaints

Resolution of billing complaints	Benchmark	Airtel	Vodafone	BSNL	TATA	RTL	RCOM CDMA	Dishnet	Idea
Total Number of calls made		72	2	4	18	0	100	0	1
Number of cases resolved in 4 weeks		55	2	4	18	0	100	0	1
Percentage cases resolved in four weeks	100%	76.39%	100.00%	100.00%	100.00%	NA	100.00%	NA	100.00%

Operators not meeting the benchmark

NA: Not applicable

8. Customer Care

Audit results for customer care (Electronically)

Customer Care Assessment	Benchmark	Airtel	Vodafone	BSNL	TATA	RTL	RCOM CDMA	Dishnet
Total Number of calls received		2272610	1664513	5929	348568	2245956	19239314	3346521
Total Number of calls getting connected and answered		2272610	1652064	5929	330833	2245956	19239314	3346521
Percentage calls getting connected and answered	≥ 95%	100.00%	99.25%	100.00%	94.91%	100.00%	100.00%	100.00%

Live calling results for customer care (Electronically)

Customer Care Assessment	Benchmark	Airtel	Vodafone	BSNL	TATA	RTL	RCOM CDMA	Dishnet	Idea
Total Number of calls received		100	100	100	100	100	100	100	100
Total Number of calls getting connected and answered		100	100	100	100	100	100	100	100
Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Audit results for customer care (Voice to Voice)

Customer Care Assessment	Benchmark	Airtel	Vodafone	BSNL	TATA	RTL	RCOM CDMA	Dishnet
Total Number of calls answered within 60 seconds		17966071	594976	4625	14836	972890	1318728	1045895
Percentage calls answered within 60 seconds	≥ 90%	82.02%	99.30%	78.00%	91.00%	83.56%	90.22%	87.20%

Live calling results for customer care (Voice to Voice)

Customer Care Assessment	Benchmark	Airtel	Vodafone	BSNL	TATA	RTL	RCOM CDMA	Dishnet	Idea
Total Number of calls received		85	93	90	66	97	99	100	99
Total Number of calls answered within 60 seconds		85	74	5	66	72	75	82	48
Percentage calls answered within 60 seconds	≥ 90%	100.00%	79.57%	5.56%	100.00%	74.23%	75.76%	82.00%	48.48%

9. Termination / closure of service

Audit results for termination / closure of service

Termination	Benchmark	Airtel	Vodafone	BSNL	TATA	RTL	RCOM CDMA	Dishnet
Total number of closure request		158	170	36	507	597	364	9
Number of requests attended within 7 days		144	170	36	507	597	364	9
Percentage cases in which termination done within 7 days	100%	91.14%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

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	BSNL	TATA	RTL	RCOM CDMA	Dishnet
Total number of cases requiring refund of deposits		10	1	14	64	DNA	800	9
Total number of cases where refund was made within 60 days		10	1	14	64	DNA	800	9
Percentage cases in which refund was receive within 60 days	100%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%

DNA: Details not available

NA: Not applicable

8.1.1 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	
	BTSs Accumulated downtime (not available for service) (%age)	Worst affected BTSs due to downtime (%age)	Call Set-up Success Rate (within licensee's own network)	SDCCH/Paging Chl. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	Connection with good voice quality	Point of Interconnection (POI) 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	Percentage of calls answered by the operators (voice to voice) within 60 seconds	%age requests for Termination / Closure of service complied within 7 days	Refund of deposits after closure within 60 days
B'mark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 5%	≥ 95%	≤ 0.5%	≤ 0.1%	100%	100%	≥ 95%	≥ 90%	100%	100%
Airtel	1.19%	0.07%	95.32%	0.39%	0.37%	1.70%	13.81%	96.81%	0.04.%	0.06%	100.00%	100.00%	100.00%	82.02%	91.14%	100.00%
Vodafone	0.15%	0.78%	99.16%	0.12%	0.54%	1.62%	23.28%	98.99%	0.00%	0.00%	100.00%	100.00%	99.25%	99.30%	100.00%	100.00%
BSNL	1.56%	1.15%	99.21%	0.96%	0.79%	1.81%	21.28%	94.99%	0.00%	0.01%	100.00%	100.00%	100.00%	78.00%	100.00%	100.00%
TATA	0.00%	0.00%	98.02%	0.00%	0.08%	0.97%	4.28%	98.64%	0.34%	0.34%	100.00%	100.00%	94.91%	91.00%	100.00%	100.00%
RTL	0.10%	0.37%	98.89%	0.19%	0.78%	0.96%	0.49%	95.33%	0.00%	0.00%	100.00%	100.00%	100.00%	83.56%	NA	NA
RCOM CDMA	0.04%	0.47%	99.37%	0.00%	0.11%	1.02%	1.17%	99.14%	0.00%	0.13%	100.00%	100.00%	100.00%	90.22%	100.00%	100.00%
Dishnet	0.05%	0.00%	98.73%	7.18%	1.27%	1.81%	21.28%	96.83%	0.00%	0.00%	100.00%	100.00%	100.00%	87.20%	100.00%	100.00%

** 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

8.1.2 Monthly Point of Interconnection (POI) Congestion Report

Name of the Service Provider	Name of POI not meeting the benchmark	Total No. of circuits on POI	Total No. of call attempts on POI	Total traffic served on POI (Erlang)	% of Congestion POI	Action already taken/ action plan for meeting the benchmark
Airtel	All POIs meeting benchmark					
Vodafone	All POIs meeting benchmark					
BSNL	All POIs meeting benchmark					
TATA	All POIs meeting benchmark					
RTL	All POIs meeting benchmark					
RCOM CDMA	All POIs meeting benchmark					
Dishnet	Balasore L2 Tax	92	27151	517.96	8.692	Media Issue
	Airtel BHU,Local	587	938685	15318.15	2.242	Media Constraint
	Angul L2 Tax	123	27887	500.99	1.039	Media Issue
	RTL Local-OG only	216	364118	5020.35	0.723	Media Constraint
	Bhawanipatna L2 Tax	61	7771	164.76	3.333	Media Issue
	Aircel NLD	730	1052408	16027.52	6.26	8 E1 added
	VSNL NLD	399	342421	6568.49	1.27	Due to over-flow of congested Aircel NLD

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
Total registrations / OB note issued in General category		247
Number of connections provided within 7 days		177
Percentage of connections provided within 7 days	100%	71.66%
Connections completed after 7 days including pending connections		67

1.2 Live calling for Service provisioning		
	Benchmark	BSNL
Total registrations / OB note issued in General category		211
Number of connections provided within 7 days		117
Percentage of connections provided within 7 days	100%	55.45%
Connections completed after 7 days including pending connections		94

2.1 Audit Results for Fault repair		
Fault incidences	Benchmark	BSNL
Faults incidences (No. of faults/100 Subs./month)	≤ 5	6.9

Fault repair (Urban areas)		
	Benchmark	BSNL
Total No. of faults registered during the month		4705
No. of faults repaired by next working day during the month		1340
Percentage of faults repaired by next working day during the month	≥ 90%	28.48%
No. of faults repaired within 3 days during the month		3540
Percentage of faults repaired within 3 days during the month	100%	75.24%

Fault repair (Rural & Hilly areas)		
	Benchmark	BSNL
Total No. of faults registered during the month		1116
No. of faults repaired by next working day during the month		1013
Percentage of faults repaired by next working day during the month	≥ 90%	90.77%
No. of faults repaired within 5 days during the month		1105
Percentage of faults repaired within 5 days during the month	100%	99.01%

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

Rent rebate	Benchmark	BSNL
No. of cases with faults pending for >3 days and ≤7 days		470
Out of these number of cases where rent rebate for 7 days was given		0
Percentage of cases where rent rebate for 7 days was given	100%	0.00%
No. of cases with faults pending for >7 days and ≤15 days		103
Out of these number of cases where rent rebate for 15 days was given		0
Percentage of cases where rent rebate for 15 days was given	100%	0.00%
No. of cases with faults pending for ≥15 days		3
Out of these number of cases where rent rebate for 30 days was given		0
Percentage of cases where rent rebate for 30 days was given	100%	0.00%

MTTR	Benchmark	BSNL
Mean time taken to repair the fault in hours	≤ 8	18.8

2.2 Live calling for fault repair		
Urban area	Benchmark	BSNL
Total Number of calls made		358
Number of cases where faults were repaired by next working day		235
Percentage cases where faults were repaired by next working day	≥ 90%	65.64%
Number of cases where faults were repaired within 3 days		305
Percentage cases where faults were repaired within 3 days	100%	85.20%

Rural & Hilly area	Benchmark	BSNL
Total Number of calls made		820
Number of cases where faults were repaired by next working day		724
Percentage cases where faults were repaired by next working day	≥ 90%	88.29%
Number of cases where faults were repaired within 5 days		803
Percentage cases where faults were repaired within 5 days	100%	97.93%

3.1 Audit Results for Call Completion Rate (CCR)		
Traffic statistics - Call Completion Rate	Benchmark	BSNL
Total local call attempts		1635633
Total number of successful local calls		1430264
Call Completion Rate (CCR) in the local network	≥ 55%	87.44%

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

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

3.2 Live measurement results for Call Completion Rate (CCR)		
Traffic statistics - Call Completion Rate	Benchmark	BSNL
Total local call attempts		204545
Total number of successful local calls		144180
Call Completion Rate (CCR) in the local network	≥ 55%	70.49%

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

4.1 Audit Results for POI Congestion		
POI congestion	Benchmark	BSNL
POI traffic offered on all individual POI's		92184
Served traffic for all POI's		70346
Traffic failed on all POI's	≤ 0.5%	0.24

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

5.1 Audit Results for Billing performance		
Billing Performance	Benchmark	BSNL
Billing disputes - Postpaid		
Total bills generated during the period		49645
Total number of bills disputed		0
Percentage bills disputed	< 0.1%	0.00%
Resolution of billing complaints		
Total complaints resolved in 4 weeks from date of receipt		NA
Percentage complaints resolved within 4 weeks of date of receipt	100%	NA
Period of applying credit / waiver		
Total number of cases requiring credit/waiver		NA
Total number of cases where credit/waiver was made within 1 week		NA
Percentage cases in which credit/waiver was received within 1 week	100%	NA

5.2 Live calling results for resolution of billing complaints		
Resolution of billing complaints	Benchmark	BSNL
Total Number of calls made		7
Number of cases resolved in 4 weeks		7
Percentage cases resolved in 4 weeks	100%	100.00%

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

6.1 Audit Results for Requests		
Shift Requests	Benchmark	BSNL
Total no. of requests received for Shifts		86
Total no. of requests for shifts attended within 3 days		40
Percentage of requests for shifts attended within 3 days	≥ 95%	46.51%
Total no. of requests for shifts not attended or attended beyond 3 days		46

Closure Requests	Benchmark	BSNL
Total no. of requests received for Closures		251
Total no. of requests for closures attended within 7 days		197
Percentage of requests for closures attended within 7 days	100%	78.49%
Total no. of requests for closures not attended or attended beyond 7 days		54

6.2 Live calling for Requests		
Shift Requests	Benchmark	BSNL
Total no. of requests received for Shifts		86
Total no. of requests for shifts attended within 3 days		26
Percentage of requests for shifts attended within 3 days	≥ 95%	30.23%
Total no. of requests for shifts not attended or attended beyond 3 days		60

7.1 Audit results for customer care (Electronically)		
Customer Care Assessment	Benchmark	BSNL
Total Number of calls received		144537
Total Number of calls getting connected and answered		144537
Percentage calls getting connected and answered	≥ 95%	100.00%

7.2 Live calling results for customer care (Electronically)		
Customer Care Assessment	Benchmark	BSNL
Total Number of calls received		1200
Total Number of calls getting connected and answered		1199
Percentage calls getting connected and answered	≥ 95%	99.92%

7.3 Audit results for customer care (Voice to Voice)		
Customer Care Assessment	Benchmark	BSNL
Total Number of calls received		144537
Total Number of calls answered within 60 seconds		43744
Percentage calls answered within 60 seconds	≥ 90%	30.26%

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

7.4 Live calling results for customer care (Voice to Voice)		
Customer Care Assessment	Benchmark	BSNL
Total Number of calls received		1200
Total Number of calls answered within 60 seconds		1129
Percentage calls answered within 60 seconds	≥ 90%	94.08%

8.1 Audit results for refund of deposits		
Refund	Benchmark	BSNL
Total number of cases requiring refund of deposits		108
Total number of cases where refund was made within 60 days		47
Percentage cases in which refund was receive within 60 days	100%	43.52%

9.1 Live calling for level 1 services		
Level 1 services	Benchmark	BSNL
Total no. of calls made		360
Calls answered in 60 sec		280
Calls answered after 60 sec		70

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	Ortel
Total connections registered during the period		1268	831
Number of connections provided within 15 days		1185	831
Percentage of connections provided within 15 days	100%	93.45%	100.00%
Number of connections provided after 15 days of registration of demand		83	0
Number of customers to whom credit is given for delayed connections		11	0
Percentage of customers to whom credit is given for delayed connections	100%	13.25%	NA

1.2 Live calling for Service provisioning			
	Benchmark	BSNL	Ortel
Total connections registered during the period		300	400
Number of connections provided within 15 days		282	400
Percentage of connections provided within 15 days	100%	94.00%	100.00%

2. Fault Incidence / Clearance Statistics

2.1 Audit Results for Fault repair			
Fault repair	Benchmark	BSNL	Ortel
Total No. of faults registered during the month		3327	13325
No. of faults repaired by next working day during the month		1323	12109
Percentage of faults repaired by next working day during the month	> 90%	39.77%	90.87%
No. of faults repaired within 3 days during the month		2504	13210
Percentage of faults repaired within 3 days during the month	>99%	75.26%	99.14%

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

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

2.2 Live calling for fault repair			
Fault repair	Benchmark	BSNL	Ortel
Total Number of calls made		90	90
Number of cases where faults were repaired by next working day		19	90
Percentage cases where faults were repaired by next working day	> 90%	21.11%	100.00%
Number of cases where faults were repaired within 3 days		60	90
Percentage cases where faults were repaired within 3 days	>99%	66.67%	100.00%

3. Billing performance

3.1 Audit Results for Billing performance			
Billing Performance	Benchmark	BSNL	Ortel
Billing disputes			
Total bills generated during the period		33401	21503
Total number of bills disputed		41	312
Percentage bills disputed	< 2%	0.12%	1.45%
Resolution of billing complaints			
Total complaints resolved in 4 weeks from date of receipt		8	312
Percentage complaints resolved within 4 weeks of date of receipt	100%	19.51%	100.00%
Period of refund			
Total number of cases requiring refund		39	105
Total number of cases where credit/waiver was made within 60 days		39	105
Percentage cases in which credit/waiver was received within 60 days	100%	100.00%	100.00%

3.2 Live calling results for resolution of billing complaints			
Resolution of billing complaints	Benchmark	BSNL	Ortel
Total Number of calls made		56	150
Number of cases resolved in 4 weeks		55	150
Percentage cases resolved in 4 weeks	100%	98.21%	100.00%

4. Response time to the customer for assistance

4.1 Audit results for customer care (Voice to Voice)			
Customer Care Assessment	Benchmark	BSNL	Ortel
Total Number of calls received		43744	99529
Total Number of calls answered within 60 seconds		43744	99529
Percentage calls answered within 60 seconds	> 60%	100.00%	100.00%

4.2 Live calling results for customer care (Voice to Voice)			
Customer Care Assessment	Benchmark	BSNL	Ortel
Total Number of calls received		300	400
Total Number of calls answered within 60 seconds		274	330
Percentage calls answered within 60 seconds	> 60%	91.33%	82.50%

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

4.3 Audit results for customer care (Voice to Voice)			
Customer Care Assessment	Benchmark	BSNL	Ortel
Total Number of calls received		43744	99529
Total Number of calls answered within 90 seconds		43744	99529
Percentage calls answered within 90 seconds	> 80%	100.00%	100.00%

4.4 Live calling results for customer care (Voice to Voice)			
Customer Care Assessment	Benchmark	BSNL	Ortel
Total Number of calls received		300	400
Total Number of calls answered within 90 seconds		293	280
Percentage calls answered within 90 seconds	> 80%	97.67%	70.00%

5. Bandwidth utilization

5.1 Audit results for Bandwidth Utilization			
Bandwidth utilization	Benchmark	BSNL	Ortel
Intra-network links (POP to ISP Node)			
Total number of intra network links		213	5
Total Bandwidth Available at the links (in Mbps)		213000	461
Total Bandwidth utilized at all the links during TCBH (In Mbps)		34784	238
Percentage Bandwidth utilized	<80%	16.33%	51.63%
No of Intra network found to be above 90%		0	0
International Bandwidth			
Total number of upstream links		280	2
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In mpbs)		43400	216
Total International Bandwidth utilized during peak hours		30386	150
Percentage Bandwidth utilization during peak hours (In mpbs)	<80%	70.01%	69.44%
No of Intra network found to be above 90%		0	0

5.2 Live measurement results for Bandwidth Utilization			
Bandwidth utilization	Benchmark	BSNL	Ortel
Intra-network links (POP to ISP Node)			
Total number of intra network links		143	5
Total Bandwidth Available at the links (in Mbps)		143000	581
Total Bandwidth utilized at all the links during TCBH (In Mbps)		19765	301
Percentage Bandwidth utilized	<80%	13.82%	51.81%
No of Intra network found to be above 90%		0	0
International Bandwidth			
Total number of upstream links		280	2
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In mpbs)		43400	294
Total International Bandwidth utilized during peak hours		33677	175
Percentage Bandwidth utilization during peak hours (In mpbs)	<80%	77.60%	59.52%
No of Intra network found to be above 90%		0	0

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

6. Broadband download speed

6.1 Live calling results for broadband download speed			
Broadband download speed	Benchmark	BSNL	Ortel
Total committed download speed to the sample subscribers (In mpbs) (A)		25600	12800
Total average download speed observed during TCBH (In Mpbs) (B)		23474	11451
%age subscribed speed available to the subscriber during TCBH (B/A)*100	>80%	91.70%	89.46%

7. Service availability/uptime

7.1 Audit results for service availability			
Service Availability	Benchmark	BSNL	Ortel
Total Operational Hours		126000	2880
Total Downtime		23	55.83
Total time when the service was available		125977	2824
Service Availability Uptime in Percentage	>98%	99.98%	98.06%

7.2 Live measurement results for service availability			
Service Availability	Benchmark	BSNL	Ortel
Total Operational Hours		7416	288
Total Downtime		1.4	0
Total time when the service was available		7414.6	288
Service Availability Uptime in Percentage	>98%	99.98%	100.00%

8. Network latency / Packet loss

8.1 Audit results for Latency and packet loss			
Network Latency and Packet Loss	Benchmark	BSNL	Ortel
Packet Loss (Percentage)	< 1%	0.04%	0.00%
Network Latency			
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	12	40
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	232	76

8.2 Live measurement results for Latency and packet loss			
Network Latency and Packet Loss	Benchmark	BSNL	Ortel
Packet Loss (Percentage)	< 1%	0.01%	1.65%
Network Latency			
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	18	26
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	224	28

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 = $\frac{\text{Sum of downtime of BTSSs in a month in hours}}{24 \times \text{No. of days in the month} \times \text{No. of BTSSs in the network in the licensed service area}} \times 100$ Worst affected BTSSs due to downtime = $\frac{\text{No. of BTSSs having accumulated downtime >24 hours in a month}}{\text{Total No. of BTSSs in the network in the licensed service area}} \times 100$
Benchmark	<ul style="list-style-type: none"> BTSS Accumulated downtime (not available for service) $\leq 2\%$ Worst affected BTSSs due to downtime $\leq 2\%$
Audit Procedure	<p>IMRB auditors collected and verified data pertaining to:</p> <p>The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) used for arriving at the benchmark reported to TRAI were audit</p>

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

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

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

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

6. Service Coverage	
Computational Methodology as per QoS definition	<p>Definition:</p> <ul style="list-style-type: none"> ↪ The level of signal available in a particular part of a city is known as signal strength. <p>Computational Methodology:</p> <ul style="list-style-type: none"> ↪ Service Coverage for route type x = $[(N1 \times CSS1) + (N2 \times CSS2) + \dots + (Nn \times CSSn)] / (N1 + N2 + \dots + Nn)$ ↪ 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)
Benchmark	<p>Indoor >= -75 dBm In-vehicle >= -85 dBm Outdoor – in city >= -95 dBm</p>
Audit Procedure	<p>IMRB Auditors collected and verified call centre records pertaining to:</p> <ul style="list-style-type: none"> ↪ Audit was conducted based on the details of periodic drive tests conducted at different part of the network during Time consistent busy hour (TCBH) which were used to arrive at the benchmarks reported to TRAI. ↪ Procedures were verified that were to be followed by operator for obtaining relevant details for computing this parameter:- <ul style="list-style-type: none"> ↪ Operator to conduct at least one drive test using standard drive test equipment* every week during Time consistent busy hour (TCBH). ↪ Each drive test should evenly cover the following 5 types of locations: – <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) ↪ <i>Measurements using Engineering handsets were not acceptable</i>

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) = $\frac{\text{Total no of calls getting connected electronically}}{\text{Total number of calls made}} \times 100$ • % 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	<ul style="list-style-type: none"> ↪ % age of calls getting connected and answered (electronically) ≥ 95% ↪ % age of calls answered by operator (voice to voice) within 60 seconds ≥ 90%

<p>Audit Procedure</p>	<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>
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<p>8.1 Billing complaints per 100 bills issued</p>	
<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

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

8.3 Period of refunds / payments due to customers	
Computational Methodology as per QoS definition	<p>Period of all refunds = Maximum value of 'Time taken to refund' where:-Time taken to refund = Date of refund – date of resolution of complaint</p>
Benchmark	100% cases in less than 1 weeks
Audit Procedure	<p>Audit of refund details and complaints (only those resulting in refunds) resolution details used for arriving at the figures reported to TRAI to be conducted.</p> <p>Operator to provide details of:-</p> <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 <p>Also random live checks of all subscribers entitled for refund were conducted</p>

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 were request is still pending Live calling :- - Interviewers ensured that operator should provide list of all new numbers added in one month prior to IMRB staff visit. - Live calling team called up at least 10% of the customers who applied for new connections during the month prior to Audit - Checked and Recorded whether the connection was provided within 7 days of registration on demand

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

3. Metering and billing credibility – billing complaints	
Computational Methodology	<p>Percentage incidence of billing complaints = (No. of billing complaints reported by the customer per month/ Total Number of Subscribers for that particular month)*100</p> <p>Percentage resolution of billing complaints = (No. of billing complaints resolved over a particular period of time/Total No. of billing complaints of that period of time)*100</p>
Benchmark	<p>Percentage incidence of billing complaints: Not more than 0.1% of the bills issued</p> <p>Percentage resolution of billing complaints: 100% within a period of 4 weeks</p> <p>Period of applying credit/waiver/adjustment : In 100% of the cases within 1 week of resolution of complaint</p>
Audit Procedure	<p>IMRB Auditors to verify and collect data pertaining to</p> <ul style="list-style-type: none"> - Number of Billing complaints received at the service provider's level - Last billing cycle stated should be such that due date for payment of bills must be beyond the date when this form is filled. - 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. <p>Live calling : -</p> <ul style="list-style-type: none"> - IMRB Auditors collected the list of all the subscribers who have made billing complaints in the month prior to the Audit. -100 such subscribers per service provider were called to check the time taken to resolve the billing complaint. However, in some cases where number of billing complaints were less the sample size could not be achieved

4. Customer care promptness (Shifts and Closures)	
Computational Methodology	Shifts and closure requests
Benchmark	<p>Shifting of telephone line : Less than 3 days</p> <p>Processing of closure request: Less than 7 days</p>
Audit procedure	<p>IMRB Auditors collected and verified data pertaining to</p> <p>Shifting Request: (Following key points were taken care of while verifying the data)</p> <ul style="list-style-type: none"> - Date of filing form should be at least 3 working days after the date of month appraised. - All the holidays are excluded and only working days are considered - The number of shift requests per month does not include the pending connections of the previous months. <p>Processing of closure request (Following key points were taken care of while verifying the data)</p> <ul style="list-style-type: none"> - The operator includes all Requests for volunteer Permanent Closure and External (shifts to other exchanges) Shift requests received at their exchange. - 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	<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>

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

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

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	
Computational Methodology as per QoS definition	<p>Billing complaints includes any of the following complaints related to billing from the point of view of customer:</p> <ul style="list-style-type: none"> • Wrongly charged extra for some service • Cheque submitted on time but charged penalty for paying beyond due date • Payment made but not reflected (may be wrongly adjusted to another customer etc.) <p>Billing complaints per 100 bills issued = Total billing complaints** received during the relevant quarter / Total bills generated* during the relevant quarter</p> <p>* All types of bills generated for customers i.e. printed bills, online bills and any other forms of bills generated are to be included</p> <p>** <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>
Benchmark	< 2% billing complaints per 100 bills
Audit Procedure	<p>IMRB auditors collected and verified data pertaining to</p> <ul style="list-style-type: none"> - Number of bills generated - Number of billing complaints received - %age complaints per 100 bills

3.1. Resolution of billing complaints	
Computational Methodology as per QoS definition	<p>%age of billing complaints resolved within 4 weeks=(Complaints resolved*** in 4 weeks from date of receipt / Total billing complaints** received during the period) 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>
Benchmark	100% cases to be resolved within 4 weeks
Audit Procedure	<p>IMRB Auditors collected and verified data pertaining to</p> <ul style="list-style-type: none"> - Total number of billing complaints/bills disputed - Number of complaints resolved in 4 weeks <p>Live calling :-</p> <p>-Overall 100 number of live calls are to be made in a licensed service area/circle for each service provider. However in certain cases the sample could not be achieved as bills disputed (prior to the month of Audit) were found to be less than 100</p>

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

4. Response time to customer for assistance	
Computational Methodology as per QoS definition	%age of calls answered by operator (voice to voice) within n seconds = (Number of calls where <u>time taken for operator to respond</u> * >= n sec / Total number of calls where an attempt to route to the operator was made) x 100 <u>Time taken for operator to respond</u> = Time when an operator responds to a call – Time when the relevant code to reach the operator is 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)

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

Service availability/Uptime	
Computational Methodology as per QoS definition	<p>Service availability/uptime is the measure of the degree to which the broadband access network including ISP Node is operable and not in a state of failure or outage at any point of time for all users</p> <p>Service availability/Uptime = $(\text{Total operational hours} - \text{Total Downtime hrs}) * 100 / \text{Total operational hours}$</p> <p>Total downtime for all users, including the LAN switches, Routers, Servers, Etc at ISP Node and connectivity to upstream service provider are to be included</p> <p>Planned outages for routine maintenance of the system are excluded from the calculation of service availability/uptime</p>
Benchmark	<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>

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

Network Latency	
Computational Methodology as per QoS definition	<p>Latency is the measure of duration of a round trip for a data packet between specific source and destination Router Port/Customer Premises Equipment (CPE). The round trip delay for the ping packets from ISP premises to the IGSP premises to the IGSP/NIXI gateway and to the nearest NAP port abroad are measured by computing delay for 1000 pings of 64 bytes each (Pings are to be sent subsequent to acknowledgement received for the same for previous ping)</p> <p>Service provider needs to carry out such tests daily during Time Consistent Busy Hour(TCBH) and report the average results for the month in the performance monitoring report to TRAI</p> <p>Minimum sample reference points for each service area shall be three in number or multiple reference points if required</p> <p>Hence the formula for network latency would be Network latency for X days= Total round trip time for all the ping packets transmitted in X days /No of days during the period</p>
Benchmark	<p>< 120 msec from user reference point at POP/ISP Node to International Gateway</p> <p>< 350 msec from User reference point at ISP Gateway Node to International nearest NAP port (Terrestrial)</p> <p>< 800 msec from User reference point at ISP Gateway Node to International nearest Nap port (Satellite)</p>
Audit Procedure	<p>IMRB Auditors collected and verified call centre records pertaining to</p> <ul style="list-style-type: none"> - Records maintained for ping tests conducted 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
