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

Chennai 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 Chennai 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

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

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

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

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

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

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

This report highlights the findings for the Audit module for Chennai 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.

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 Chennai 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 Basic Wireline operators covered in Chennai circle:

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

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 Chennai 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 Chennai circle:- BSNL and Ortel

Following are the various Broadband operators covered in Chennai circle:

	Name of Operator
Operator 1	BSNL
Operator 2	Airtel
Operator 3	You Telecom
Operator 4	VSNL
Operator 5	Sify
Operator 6	RCOM

4. Audit methodology

4.1 Cellular Mobile Services

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

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

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 Note to International Gateway (IGSP/NIXI)*	YES	YES	YES	
-	*User reference point at ISP Gateway Node to International nearest NAP port abroad (Satellite)*	YES	YES	YES	
-	*User reference point at ISP Gateway Node to International nearest NAP port abroad (Satellite)*	YES	YES	YES	

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

5. Executive Summary

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

- *"Service provider performance report"* for all three services , 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 all three services: This indicates key observations and findings from different activities carried out during the Audit process

5.1 Cellular Mobile Services

Service provider performance report based on one month data verification:

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	1845	1803	0.14	14	0.76	98.15%	0.26%	0.13%	1.09%	194	4586	4.23%	95.13%	0	53	148129.9	87069	2210162
Vodafone	19:00	1822	585.9	0.04	0	0.00	99.54%	0.17%	0.08%	0.53%	66	4949	1.33%	98.89%	0	25	83166.24	48977	1414908
BSNL	20:00	1001	1115	0.15	7	0.70	96.19%	0.09%	0.73%	0.96%	86	2850	3.02%	98.29%	0	91	5847	4500	927489
Tata	19:00	218	45	0.03	0	0.00	98.28%	0.00%	0.04%	0.32%	0	667	0.00%	99.43%	0	36	35217.6	8838.66	267477
RCOM CDMA	19:00	420	24.3	0.01	0	0.00	99.61%	0.00%	0.10%	0.57%	2	420	0.48%	98.55%	0	9	6000	70306	3111619
RCOM GSM	19:00	724	790	0.15	4	0.55	98.95%	0.02%	0.07%	0.24%	27	2184	1.24%	99.12%					
Aircel	19:00	1600	7833	0.68	47	2.94	98.87%	3.48%	0.24%	2.33%	645	4341	14.86%	97.11%	0	59	290032.3	210695	5336739
Idea	20:00	1818	580	0.04	0	0.00	98.64%	0.14%	0.14%	1.02%	544	5113	10.64%	98.67%	0	61	14247.34	3063	265643
MTS	19:00	469	875.53	0.26	0	0.00	99.24%	0.10%	0.76%	0.28%	1342	42210	3.18%	98.18%	1	17	5796	1692.22	155350

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 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.	2000 – 2100 hrs.
RCOM CDMA	1900 – 2000 hrs.	1900 – 2000 hrs.
Idea Cellular	2000 – 2100 hrs.	2000 – 2100 hrs.
TATA	1900 – 2000 hrs.	1900 – 2000 hrs.
Vodafone	1900 – 2000 hrs.	1900 – 2000 hrs.
RCOM GSM	1900 – 2000 hrs.	1900 – 2000 hrs.
Aircel	1900 – 2000 hrs.	1900 – 2000 hrs.
MTS	1900 – 2000 hrs.	1900 – 2000 hrs.

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

BTS Accumulated Downtime:
In Chennai circle, all the operators are meeting benchmark on the parameter BTS accumulated downtime comfortably. Aircel is having high number of BTSs with downtime >24 hrs and is not meeting the benchmark with 2.94% worst affected BTSs.

Call Set-up Success Rate (CSSR):
All the operators were comfortably meeting the benchmark on this parameter. During the audits the maximum CSSR was observed for RCOM CDMA with 99.61% 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 Aircel for SDCCH congestion with 3.48% congestion. TATA and RCOM CDMA lead the way in network congestion parameters with almost negligible paging as well as traffic

channel congestion. The calculation methodology of these parameters was found to be in complete accordance with what has been specified by TRAI. Both RCOM CDMA and Tata Teleservices measure paging channel utilization. When the value of this parameter is less than 100%, it is counted as 0% congestion. There was almost 0% POI congestion on almost all individual POI links between a service provider vis-à-vis other service providers. 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 was measured as the ratio of total calls dropped (unexpected seizure) to the total number of call attempts for all operators. Also, all of service providers except Aircel with 2.33% call drop were found to be meeting the TRAI specified benchmark. Both Aircel and Idea are way ahead the benchmark of 5% worst affected cells with more than 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 BSNL, Airtel, Aircel and RCOM GSM did not met the TRAI benchmark for voice quality.

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. In case of calls answered by operators, BSNL, TATA and RCOM (for percentage calls answered within 60 seconds) do not meet the benchmark for the month of audit.

Billing performance

All the operators except BSNL, Idea and Aircel 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 From ↓ To →	Airtel	Vodafone	BSNL	Tata	RCOM CDMA	Aircel	Idea	MTS	RCOM GSM
Airtel	-	97.50%	100%	100%	100%	100%	98%	99%	98%
Vodafone	100%	-	100%	100%	100%	100%	98%	99%	97%
BSNL	99.50%	100%	-	100%	97%	100%	99%	99%	99%
Tata	100%	100%	100%	-	100%	100%	99%	99%	98%
RCOM CDMA	100%	100%	100%	100%	-	100%	100%	97%	97%
Aircel	98%	98.5%	98%	99%	97%	-	98%	100%	99%
Idea	100%	100%	97%	99.5%	99%	99%	-	98%	98%
MTS	100%	97%	99%	99%	100%	96%	100%	-	97%
RCOM GSM	100%	100%	100%	100%	98%	100%	99%	98%	-

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. Vodafone and MTS found it tough connecting to a RCOM GSM with 97 out of 100 calls getting connected. Similarly RCOM CDMA had difficulty in connecting to MTS number with 97% of their calls getting completed.

Results of Operator assisted Drive test

The drive test was conducted simultaneously for all the operators present in the Delhi circle. 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 in the circle were covered.

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

The drive tests in the Chennai circle was conducted along the following route:

	Type of location	Chennai
Outdoor	Periphery of the city	Madipakkam, Tambaram, Tambaram bye pass road, Saveetha Dental Collage
	Congested area	Parrys & Purusavakkam
	Across the city	Beach road, Triplicane , Royepetta , Mylapore, Mandaveli, Adayar, Tidel park, Velchery & PH road
Indoor	Office complex	IMRB office complex
	Shopping complex	Prince plaza

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

Drive Test (Chennai)

	Benchmark	Airtel		Vodafone		BSNL		Tata		RCOM CDMA		Aircel		Idea		MTS		RCOM GSM	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	≥ 95%	96.38%	87.62%	99.20%	94.61%	63.41%	94.39%	99.72%	98.73%	100.00%	98.60%	98.26%	90.73%	98.94%	95.48%	99.18%	99.16%	100.00%	93.79%
CSSR	≥ 95%	100%	94.93%	100.00%	98.76%	100.00%	96.53%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	95.45%	97.01%	100%	100%	100.00%	94.87%
%age Blocked calls		0%	5.07%	0.00%	1.24%	0%	3.47%	0%	0%	0%	0%	0%	0%	5%	3%	0%	0%	0.00%	5.13%
Call drop rate	≤ 2%	0%	2.67%	0%	0%	5.00%	5.04%	0.00%	0.34%	0.00%	0.00%	0.00%	0.72%	0%	1.49%	0%	0.35%	0.00%	0.54%
Hands off success rate		100%	98.55%	100%	100%	100%	100%	100%	100%	100%	100%	100%	99.83%	98.33%	93.52%	100%	99.94%	100%	100%

Not meeting the benchmark

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

There was interference and low signal strength recorded in outdoor areas for Airtel, BSNL, Vodafone and RCOM GSM.
Interference was recorded in small patches near Tambaram bye pass road near Maduravoyal and near Medavakkam. Also interference was recorded near Beach road, Fort station, Near Madhya kailash and Anna Nagar arch.

Inadequate coverage was recorded at Beach road near PWD office, Gangadeeswarar koil road and Chennai port trust

Conclusions – Cellular Mobile Service:

1. Airtel, BSNL, Aircel and RCOM GSM do not meet the TRAI benchmark on voice quality in Chennai in outdoor areas.
2. BSNL and Airtel do not meet the benchmark for call drop rate in outdoor and indoor areas in Chennai
3. RCOM GSM and Airtel does not meet the TRAI benchmark on blocked call rate in Chennai

Summary of Live Measurement Results – Cellular Mobile Services

Name of Service Provider	Connection Establishment (Accessibility)			Connection Maintenance (Retainability)			POI	Metering and Billing	Response time to customer for assistance	
	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	Connection with good voice quality	Point of Interconnection (POI) Congestion	%age complaints resolved within 4 weeks	Accessibility of call centre/ customer care	Percentage of calls answered by the operators (voice to voice) within 60 seconds
B'mark	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 5%	≥ 95%	≤ 0.5%	100%	≥ 95%	≥ 90%
Airtel	98.02%	0.00%	0.29%	1.12%	3.67%	89.39%	0.00%	60.00%	96.00%	93.00%
Vodafone	99.74%	0.05%	0.03%	0.53%	1.11%	95.22%	0.00%	93.00%	97.00%	98.00%
BSNL	98.58%	0.60%	0.46%	0.88%	6.39%	90.65%	0.00%	32.00%	100.00%	68.00%
Tata	98.43%	0.00%	0.01%	0.37%	1.05%	99.00%	0.00%	20.83%	100.00%	90.00%
RCOM CDMA	99.48%	0.00%	0.14%	0.65%	0.71%	99.13%	0.00%	61.00%	90.00%	87.00%
Aircel	98.92%	4.62%	0.23%	2.15%	16.67%	91.72%	0.00%	64.00%	100.00%	95.00%
Idea	98.86%	0.02%	6.09%	0.87%	9.10%	96.18%	0.00%	86.00%	100.00%	94.00%
MTS	99.32%	0.09%	0.68%	0.15%	0.00%	93.66%	0.00%	71.08%	100.00%	98.00%
RCOM GSM	99.29%	0.01%	0.00%	0.40%	1.60%	93.80%	0.00%	61.00%	90.00%	87.00%

Not meeting the benchmark

During the three day live measurement and live calling, none of the operator was meeting the TRAI benchmark for resolution of complaints within 4 weeks. Aircel, BSNL and Idea are very high on the worst affected cells parameter benchmark with 16.67%, 6.39% and 9.10% respectively.

5.2 Basic (Wireline) Services

Service provider performance report based on one month data verification:

Parameters	Benchmarks	BSNL	Airtel	TTSL	RCOM
Percentage connections completed within 7 days	100%	59.66%	100.00%	100.00%	100.00%
Faults incidences (No. of faults/100 Subs./month)	≤5	1.45	5.24	0.58	0.5
% of faults repaired by next working day	≥ 90%	71.71%	96.06%	68.66%	100.00%
% of faults repaired within 3 days	100%	99.93%	98.26%	88.02%	100.00%
Faults pending for> 3days and ≤7 days	Rent rebate of 7 days	NA	100.00%	100.00%	NA
Faults pending for > 7 days and ≤15 days	Rent rebate of 15 days	NA	100.00%	100.00%	NA
Faults pending for > 15 days	Rent rebate of 1 month	NA	100.00%	100.00%	100.00%
Mean Time to Repair (MTTR)	≤ 8 Hrs	4.12	3.95	11.77	4
Call Completion Rate (CCR)	≥ 55%	82.23%	90.06%	98.02%	NA
Answer to Seizure ratio (ASR)	≥ 75%	80.40%	NA	NA	84.83%
POI Congestion	≤0.5	0.26	0.00	NA	0.00
Metering and billing credibility - Number of bills disputed during over a billing cycle	≤ 0.1%	0.44%	0.03%	0.00%	0.08%
Resolution of billing complaints within 4 weeks	100%	100.00%	100.00%	100.00%	100.00%
Period of applying credit / waiver	≤ 1 week	18.52%	NA	NA	NA
Customer care/helpline promptness					
Percentage shift requests attended within 3 days	≥ 95%	72.34%	96.97%	NA	100.00%
Closure within 7 days	100%	90.77%	100.00%	NA	100.00%
Response time to customer for assistance					
% age calls getting connected and answered	≥ 95%	27.69%	100.00%	100.00%	25.93%
% age call answered by operator in 60 seconds	≥ 90%	66.13%	96.69%	99.61%	68.15%
Time taken for refund of deposits after closures within 60 days	100%	100.00%	NA	NA	NA

{*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}

** Methodology not in line with QoS

Figures provided on All India basis

Not meeting the benchmark

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

Summary of Live Measurement Results – Wireline Services

Parameters	Benchmarks	BSNL	Airtel	TTSL	RCOM
Percentage connections completed within 7 days	100%	37.08%	90.00%	0.00%	19.00%
% of faults repaired by next working day	≥ 90%	27.08%	80.00%	20.00%	66.67%
% of faults repaired within 3 days	100%	27.43%	100.00%	33.33%	76.67%
Call Completion Rate (CCR)	≥ 55%	95.65%	91.41%	92.78%	NA
Answer to Seizure ratio (ASR)	≥ 75%	78.49%	NA	NA	77.32%
POI Congestion	≤0.5	0.00	0.00	NA	0.00
Resolution of billing complaints within 4 weeks	100%	16.67%	32.32%	33.33%	54.55%
Customer care/helpline promptness					
Percentage shift requests attended within 3 days	≥ 95%	41.07%	20.00%	NA	71.43%
Response time to customer for assistance					
% age calls getting connected and answered	≥ 95%	49.00%	50.00%	50.00%	50.00%
% age call answered by operator in 60 seconds	≥ 90%	45.50%	48.50%	48.00%	49.00%

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

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

During the Audit, it was found that BSNL, Airtel, TTSL and RCOM are the only operators providing Basic (Wireline) Services to retail customers in Chennai circle. During the audit process it was observed that BSNL could not meet the TRAI specified benchmark on most of the parameters specified by TRAI.

The live calling/measurement 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) and/or Answer to Seizure Ratio (ASR) it was found that all the service providers comfortably meet the TRAI specified benchmark

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 and Time taken to attend shift requests except for Airtel.

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

Provision of telephone after registration of demand

- In Chennai circle, BSNL was found to be the only service provider falling short of TRAI specified benchmark with a score of less than 60%.
- In Live calling all the operators were found to be falling short of the TRAI benchmark with BSNL, TTSL and RCOM scoring way below the benchmark.

Fault incidence / clearance statistics

- For fault repair by next working day, only Airtel and RCOM were found to be meeting the TRAI benchmark for the month of audit
- For fault repair within 3 days, only RCOM was found to be meeting the TRAI specified benchmark
- During the live calling, none of the operators meet the benchmark for fault repair by next working day and only Airtel meets the benchmark for faults repaired within 3 days.

Traffic statistics (CCR)/Answer to Seizure Ratio (ASR)

- All the operators comfortably meet the benchmark on CCR and/or ASR.
- BSNL was found to be the only operator providing both CCR and ASR

Metering and billing credibility

- All the operators except Airtel were found to be meeting the TRAI benchmark for this parameter

Customer care/helpline promptness

- All the operators except BSNL comfortable met the TRAI benchmark for both shift requests as well as closure requests
- TTSL did not receive any shift or closure request during the month of audit.
- In case of BSNL, customer care details provided are of Tamilnadu as a whole (including Chennai). It is because of the reason that the data is recorded centrally for both Chennai and rest of Tamilnadu.

Response time to customer for assistance

- Airtel and TTSL comfortable met the TRAI benchmark for calls answered electronically as well as by the operator
- BSNL and RCOM were found to be way below the benchmark score for both calls answered electronically as well as by the operator

Time taken for refund of deposits after closure

- BSNL was found to be meeting the benchmark with refund of deposit after closure being made within 60 days in all the cases
- There were no cases of refunds for Airtel, TTSL and RCOM

Level 1 service

Live calling for level 1 services					
Level 1 services	**Benchmark**	**BSNL**	**Airtel**	**TTSL**	**RCOM**
Total no. of calls made		70	15	4	3
Calls answered in 60 sec		42	15	4	3
Calls answered after 60 sec		28	0	0	0

To test the efficiency of level 1 services (Trunk booking, Child helpline, Women helpline, Airline booking, Fire, Police, Railways) offered by various service providers. For all the operators except BSNL, 100% of the calls made were answered within 60 seconds.

5.3 Broadband Services

Service provider performance report based on one month data Verification:

Parameters	Benchmarks	BSNL	Airtel	You Telecom	VSNL	Sify	RCOM
Service provisioning uptime							
Percentage connections provided within 15 days	100%	100.00%	100.00%	100.00%	100.00%	100.00%	99.54%
Fault repair restoration time							
Percentage faults repaired by next working day	> 90%	93.00%	97.89%	90.41%	88.00%	92.29%	99.97%
Percentage faults repaired within three working days	> 99%	100.00%	99.33%	98.91%	98.00%	100.00%	99.97%
Billing performance							
Billing complaints per 100 bills issued	< 2%	0.00%	0.02%	0.63%	1.10%	NA	0.29%
%age of billing complaints resolved in 4 weeks	100%	NA	100.00%	100.00%	100.00%	NA	100.00%
%age cases in which refund of deposits after closure was made in 60 days	100%	NA	NA	97.62%	100.00%	NA	NA
Customer care/helpline assessment (Voice to Voice)							
Percentage calls answered within 60 seconds	> 60%	94.60%	94.26%	92.59%	79.11%	98.92%	91.36%
Percentage calls answered within 90 seconds	> 80%	100.00%	96.39%	94.93%	82.64%	100.00%	94.60%
Bandwidth utilization/Throughput							
Intra network links (POP to ISP Node)		213	740	NA	19	400	21
Total number of intra network links > 90%		0	0	NA	0	0	0
Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)		280	1	2	5	20	18
Percentage bandwidth utilized on upstream links	< 80%	70.01%	89.03%	78.95%	44.88%	83.22%	34.95%
Broadband download speed	> 80%	91.70%	100.00%	85.00%	90.30%	87.50%	90.50%
Service availability/uptime	> 98%	99.98%	99.99%	88.78%	98.25%	100.00%	99.79%
Packet loss	< 1%	0.04%	0.00%	0.80%	0.00%	<1%	0.47%
Network Latency							
POP/ISP Node to NIXI	< 120 msec	12	50	31	<80	<45	Complied
ISP node to NAP port (Terrestrial)	< 350 msec	232	172.5	293	<250	<300	Complied

{*Note: For BSNL data pertains to the sample 5% of exchanges audited during the period of August to September 2009. For VSNL data pertains to the South 1 region as submitted in their PMR, whereas for rest of the operators figures pertain to all the exchanges present in the circle}

Figures provided on All India basis

Not meeting the benchmark

B'mark = TRAI Benchmark, **DNP** = Details not provided, **NA:** Not Applicable

Critical findings and Key take outs: Broadband services

Before concluding the Audit findings for Broadband services we would like to accentuate the fact that some service providers claimed that they were submitting the PMR basis their inference of the QoS parameters. Also, there were differences observed in level of reporting for e.g. Sify, and BSNL (for network related parameters) consider all India as one circle and VSNL has been reporting PMR on the regional basis where 1 region would cover multiple circles. In fact the findings reported herewith for some of the parameters for these operators are on an all India basis.

Airtel and You Telecom provide combined details for Chennai and Tamil Nadu circle on all the TRAI specified benchmark for broadband audit. Also Hathway has recently closed its operations in both Chennai and Tamil Nadu circle.

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

Service provisioning/Activation time

- RCOM (99.54%) fall marginally short of TRAI benchmark of 100% connections to be provided within 15 days.
- None of the service provider was found to meet TRAI benchmark for service provisioning within 15 days during live calling

Fault Repair/Restoration time

- VSNL (88%) is falling below the benchmark for fault repair within next working day.
- For fault repair within three working days all operators except You telecom and VSNL are meeting the TRAI specified benchmark of 99%
- TRAI can consider including Mean Time to Repair (MTTR) for faults as one of the parameters for measuring Quality of Services (QoS) in future for Broadband services as well.
- During live calling conducted by IMRB auditors no operator was found to be meeting benchmark for fault repair by next working day.

Billing performance

- All the service providers were found to be meeting the benchmark of percentage billings complaints received and time taken for resolution of billing complaints for the month in which data was collected. Sify however claim that all its retail broadband customers are prepaid and hence there are no billing complaints for Sify.
- It should also be noted that the definition of billing complaints/disputes can be considered as lenient as service providers namely Bharti and Reliance include only those complaints where an internal ticket is opened and refund is made to the customer. Hence there is a need felt to have some clarity on the definition of billing complaints.

Customer Care/Helpline Assessment

- All the operators meet the TRAI specified benchmark for calls answered by the operator in 60 and 90 seconds for the month in which audit was carried out
- During live calling all the 100 sample calls made to BSNL customer care centre were picked up after 2 minutes and hence falls short of TRAI specified benchmark for calls answered by the operator in 60 seconds and 90 seconds.

Bandwidth Utilization:

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

from 11.00AM in the morning to 4.00 PM in the evening owing to high corporate usage during the period. Also, it was observed that there are multiple links and busy hour may vary for each link.

- All the service providers were found to be reporting combined bandwidth utilization for corporate and household customers as there is no mechanism available to provide it separately for different users.
- For Intra network link, data for Sify, BSNL and VSNL (TATA Communications) was obtained on all India basis. None of the links tested for these operators was found to be having above 90% bandwidth utilization for the month in which audit was carried out
- Also It was observed that all the links (tested during three day live measurement) in the access segment for most of the service providers were found be below 80%.
- For Bandwidth utilization on upstream links (From ISP Node to IGSP/NIXI), all the operators except Airtel and Sify 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:

- All the service providers (except You Telecom) are meeting the benchmark on service availability/uptime for the month in which audit was carried out.

Packet Loss and Network Latency

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

5.3.1 Summary of Live Measurement Results – Broadband Services

Parameters	Benchmarks	BSNL	Airtel	You Telecom	VSNL	Sify	RCOM
Service provisioning uptime							
Percentage connections provided within 15 days	100%	86.00%	98.00%	50.00%	89.00%	97.00%	54.32%
Fault repair restoration time							
Percentage faults repaired by next working days	> 90%	23.33%	76.67%	73.33%	16.67%	36.67%	83.33%
Percentage faults repaired within three working days	> 99%	50.00%	96.67%	90.00%	40.00%	66.67%	90.00%
Billing performance							
%age of billing complaints resolved in 4 weeks	100%	NA	80.00%	66.67%	54.00%	NA	13.33%
Customer care/helpline assessment (Voice to Voice)							
Percentage calls answered within 60 seconds	> 60%	0.00%	95.00%	100.00%	100.00%	100.00%	100.00%
Percentage calls answered within 90 seconds	> 80%	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Bandwidth utilization/Throughput							
Intra network links (POP to ISP Node)		143	751	NA	19	394	21
Total number of intra network links > 90%		0	1	NA	0	0	0
Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)		280	1	2	5	20	18
Percentage bandwidth utilized on upstream links	< 80%	77.60%	89.03%	71.67%	54.97%	83.04%	34.95%
Broadband download speed	> 80%	91.70%	100.00%	85.00%	90.30%	87.50%	90.50%
Service availability/uptime	> 98%	99.98%	99.99%	100.00%	98.70%	100.00%	98.00%
Packet loss	< 1%	0.01%	0.00%	0.80%	0.00%	0.00%	0.47%
Network Latency							
POP/ISP Node to NIXI	< 120 msec	18	59	35	56	44	12
ISP node to NAP port (Terres trial)	< 350 msec	224	192	273	105	228	147

Figures provided on All India basis

Not meeting the benchmark

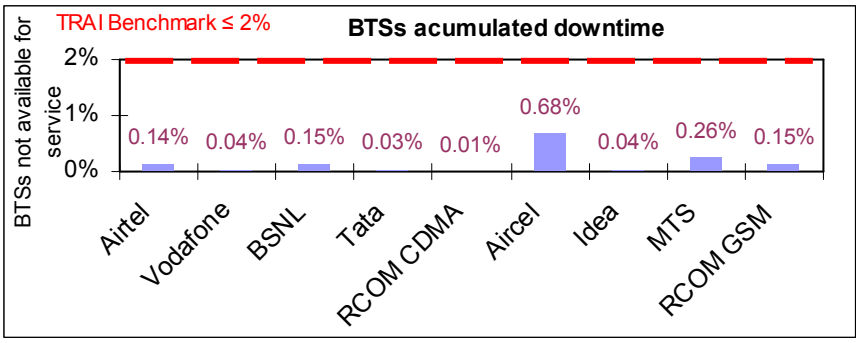
B'mark = TRAI Benchmark, **DNP** = Details not provided, **NA:** Not Applicable

- All the service providers except Reliance 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. Airtel was the only exception where 1 intra network links from POP to ISP Node were found to be > 90%, but the service provider claimed that the Bandwidth can be increased, whenever required.
- For Bandwidth utilization on upstream links, all the service providers except Airtel and Sify are meeting the benchmark during the three day live measurement and have excess capacities available on their upstream links.
- For network latency all the service providers comfortably meet the TRAI specified benchmark for ping tests carried out during live measurements.

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

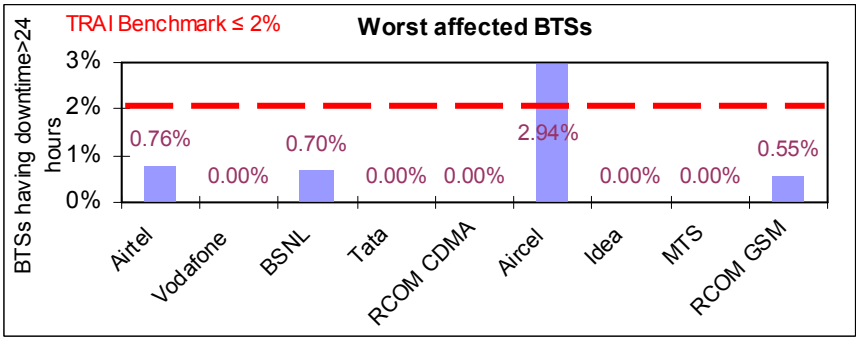
6.1 Graphical/Tabular Representations for Cellular Mobile Services

BTSs Accumulated Downtime



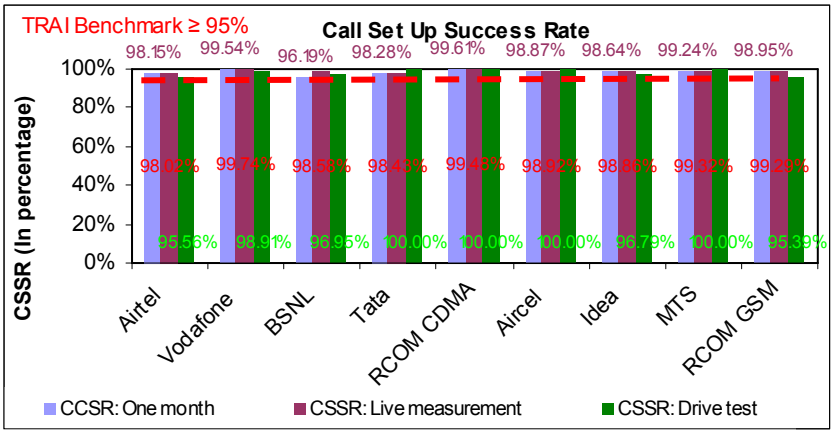
All operators are meeting the benchmark

Worst Affected BTSs



Operator meeting benchmark: Airtel, Vodafone, BSNL, Tata, RCOM CDMA, Idea, MTS, RCOM GSM
Operator not meeting benchmark: Aircel

Call Set-up Success Rate (CSSR)



One month

All operators are meeting the benchmark

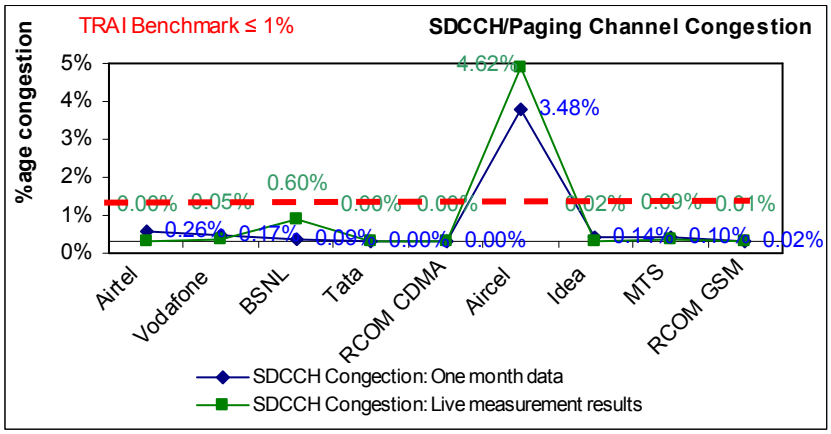
Live measurement

All operators are meeting the benchmark

Drive test

All operators are meeting the benchmark

SDCCH / Paging Channel Congestion



One month

Operator meeting benchmark: Airtel, Vodafone, BSNL, Tata, RCOM CDMA, Idea, MTS, RCOM GSM

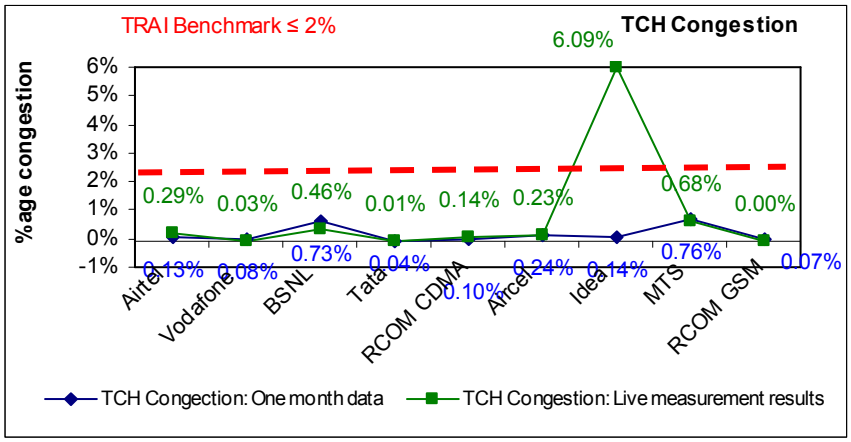
Operator not meeting benchmark: Aircel

Live measurement

Operator meeting benchmark: Airtel, Vodafone, BSNL, Tata, RCOM CDMA, Idea, MTS, RCOM GSM

Operator not meeting benchmark: Aircel

TCH Congestion



One month

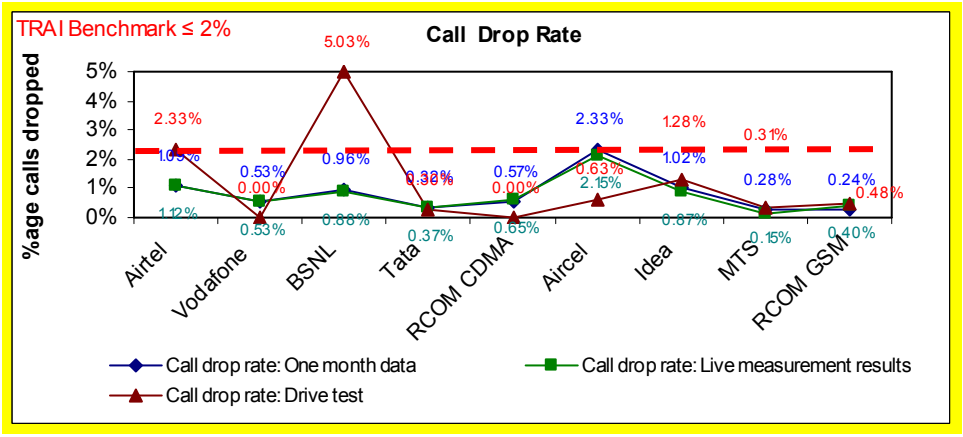
All operators are meeting the benchmark

Live measurement

Operator meeting benchmark: Airtel, Vodafone, BSNL, Tata, RCOM CDMA, Aircel, MTS, RCOM GSM

Operator not meeting benchmark: Idea

Call Drop Rate



One month

Operator meeting benchmark: Airtel, Vodafone, BSNL, Tata, RCOM CDMA, Idea, MTS, RCOM GSM

Operator not meeting benchmark: Aircel

Live measurement

Operator meeting benchmark: Airtel, Vodafone, BSNL, Tata, RCOM CDMA, Idea, MTS, RCOM GSM

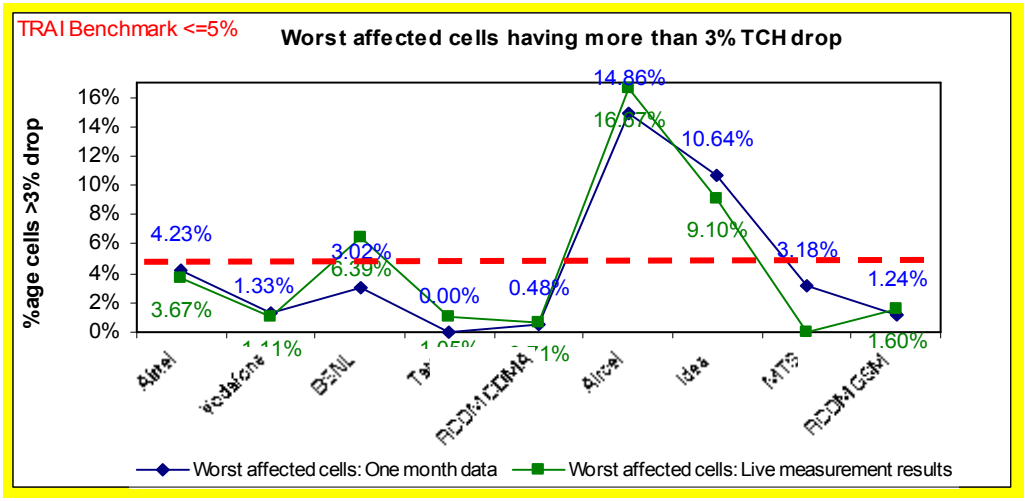
Operator not meeting benchmark: Aircel

Drive test

Operator meeting benchmark: Vodafone, Tata, RCOM CDMA, Aircel, Idea, MTS, RCOM GSM

Operator not meeting benchmark: Airtel, BSNL

Worst affected cells having more than 3% TCH



One month

Operator meeting benchmark: Airtel, Vodafone, BSNL, Tata, RCOM CDMA, MTS, RCOM GSM

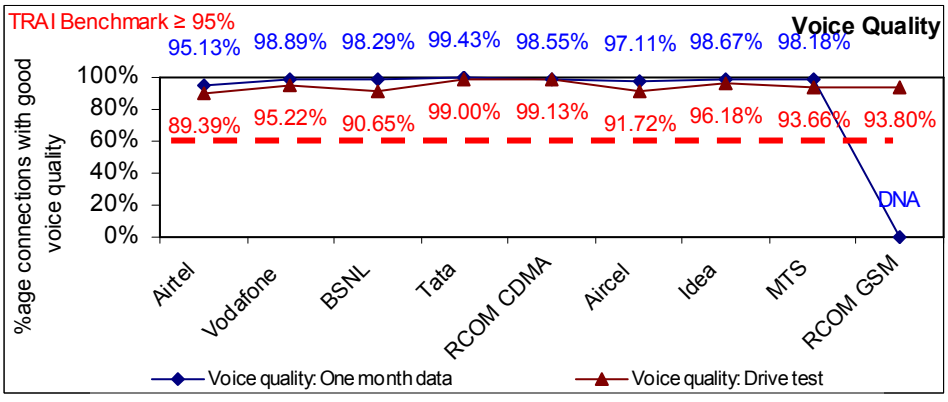
Operator not meeting benchmark: Aircel, Idea

Live measurement

Operator meeting benchmark: Airtel, Vodafone, Tata, RCOM CDMA, MTS, RCOM GSM

Operator not meeting benchmark: Aircel, BSNL, Idea

Voice quality

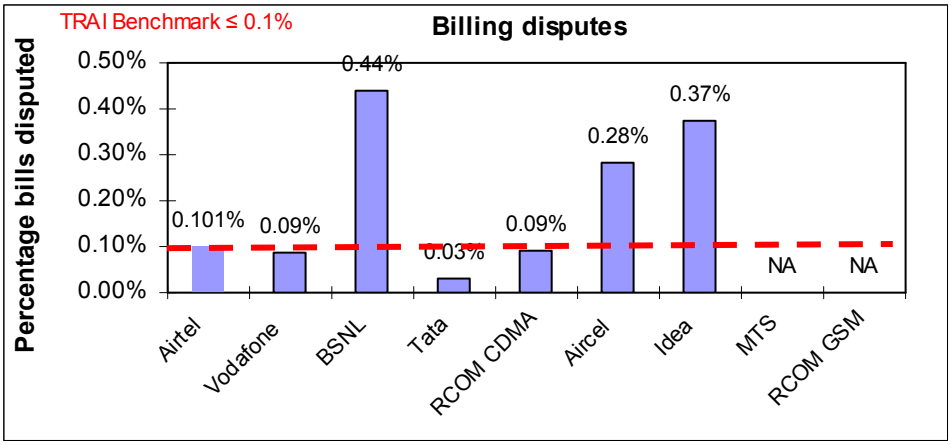


DNA: Details not available

One month
All operators are meeting the benchmark

Drive test
Operator meeting benchmark: Vodafone, Tata, RCOM CDMA, Idea
Operator not meeting benchmark: Airtel, BSNL, Aircel, MTS, RCOM GSM

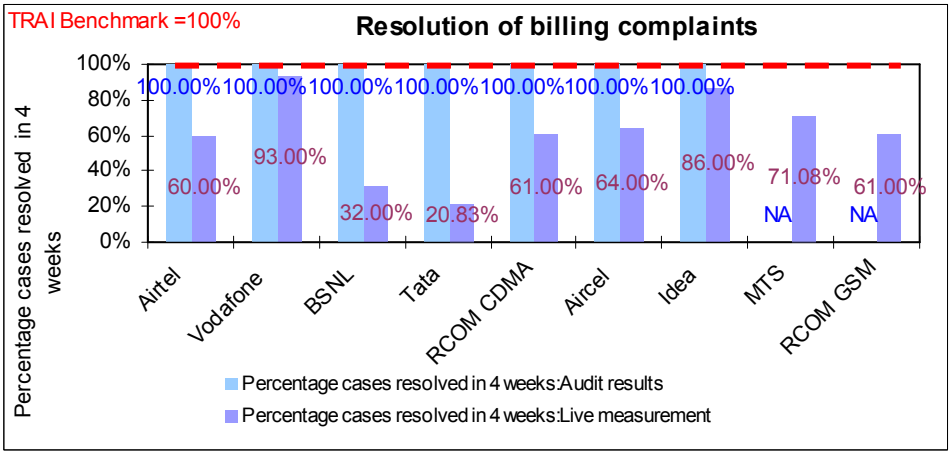
Billing Disputes



NA: Not Applicable

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

Resolution of billing complaints

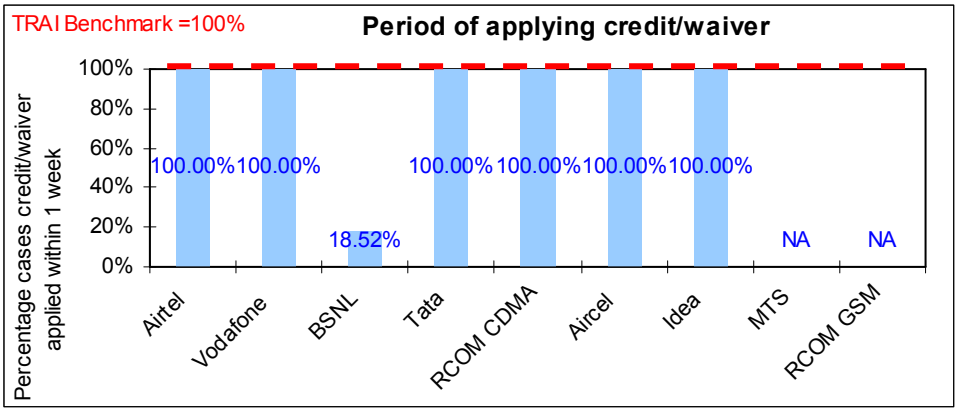


NA: Not Applicable

One month
All operators are meeting the benchmark

Live calling
No operator is meeting the benchmark

Period of applying credit / waiver



NA: Not Applicable

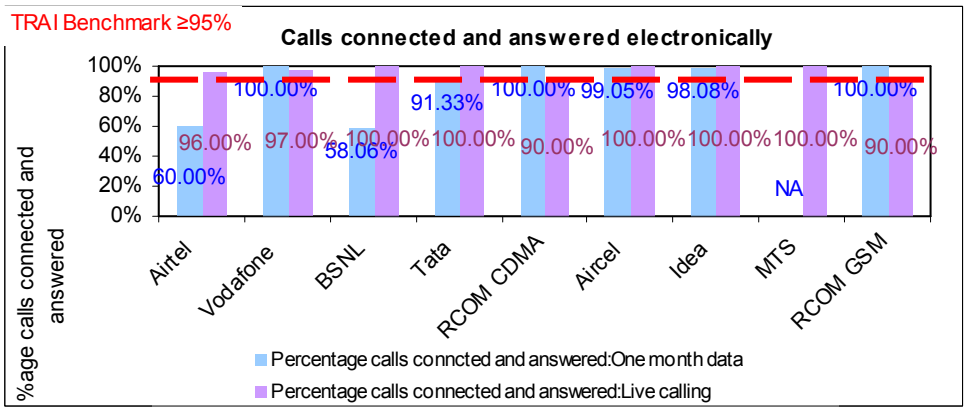
Operator meeting benchmark: Airtel, Vodafone, Tata, RCOM CDMA, Aircel, Idea
Operator not meeting benchmark: BSNL

Live calling for billing Complaints

Resolution of billing complaints	Benchmark	Airtel	Vodafone	BSNL	Tata	RCOM CDMA	Aircel	Idea	MTS	RCOM GSM
Total Number of calls made		100	100	50	24	100	100	100	83	100
Number of cases resolved in 4 weeks		60	93	16	5	61	64	86	59	61
Percentage cases resolved in four weeks	100%	60.00%	93.00%	32.00%	20.83%	61.00%	64.00%	86.00%	71.08%	61.00%

Operators not meeting the benchmark

Customer Care / Helpline: Calls answered electronically



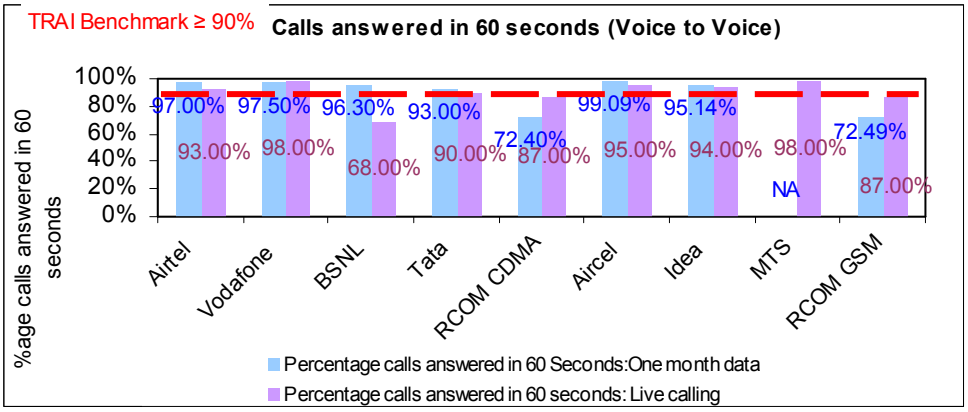
One month

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

Live calling

Operator meeting benchmark: Airtel, Vodafone, BSNL, Tata, Aircel, Idea, MTS
Operator not meeting benchmark: RCOM CDMA, RCOM GSM

Customer Care / Helpline: Calls answered voice to voice



DNA: Details not available

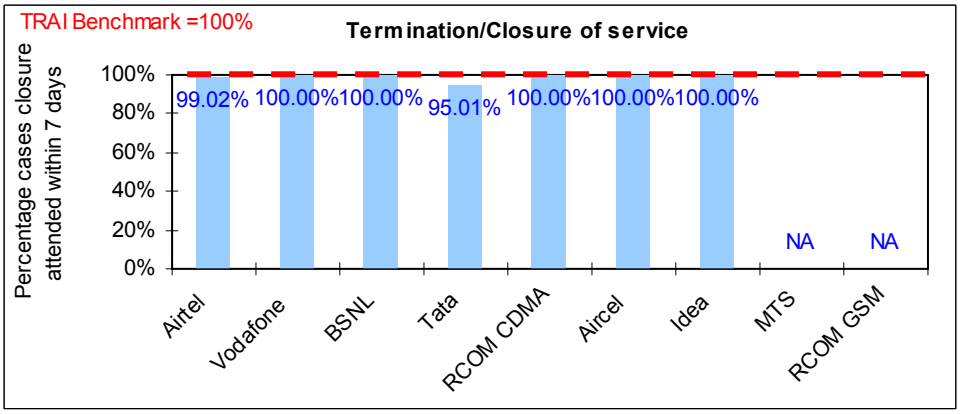
One month

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

Live calling

Operator meeting benchmark: Airtel, Vodafone, Tata, Aircel, Idea, MTS
Operator not meeting benchmark: BSNL, RCOM CDMA, RCOM GSM

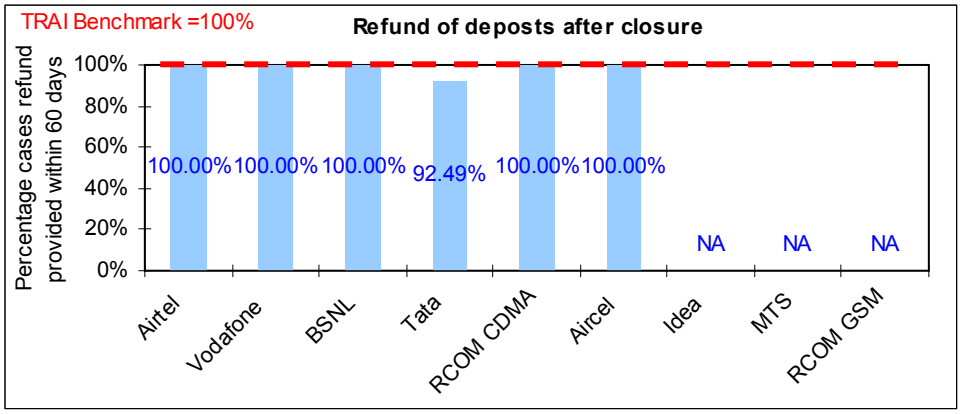
Termination / Closure of service



NA: Not Applicable

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

Refund of deposits



NA: Not Applicable

Operator meeting benchmark: Airtel, Vodafone, BSNL, RCOM CDMA, Aircel
Operator not meeting benchmark: Tata

Inter operator calls assessment

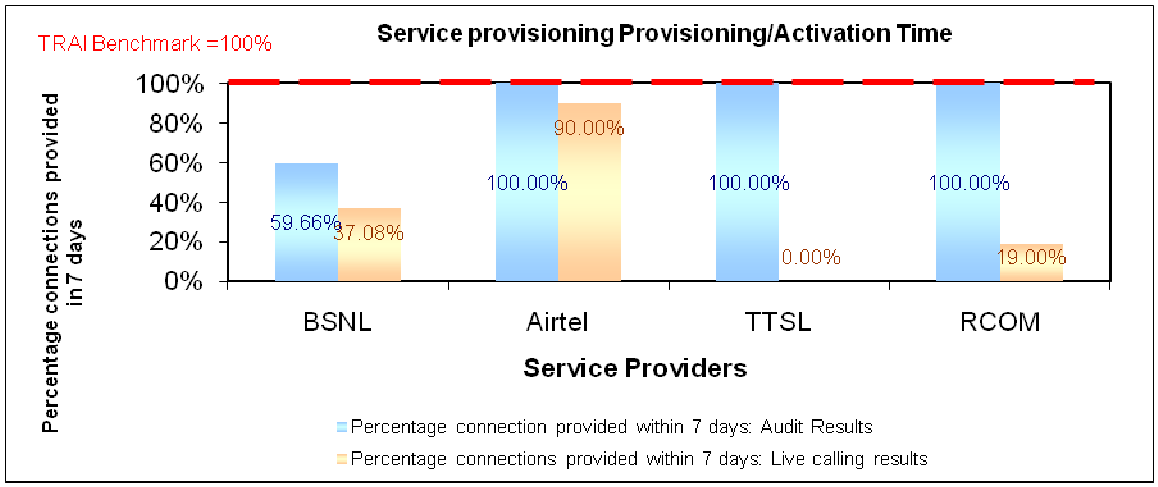
Inter operator call Assessment From ↓ To →	Airtel	Vodafone	BSNL	Tata	RCOM CDMA	Aircel	Idea	MTS	RCOM GSM
Airtel	-	97.50%	100%	100%	100%	100%	98%	99%	98%
Vodafone	100%	-	100%	100%	100%	100%	98%	99%	97%
BSNL	99.50%	100%	-	100%	97%	100%	99%	99%	99%
Tata	100%	100%	100%	-	100%	100%	99%	99%	98%
RCOM CDMA	100%	100%	100%	100%	-	100%	100%	97%	97%
Aircel	98%	98.5%	98%	99%	97%	-	98%	100%	99%
Idea	100%	100%	97%	99.5%	99%	99%	-	98%	98%
MTS	100%	97%	99%	99%	100%	96%	100%	-	97%
RCOM GSM	100%	100%	100%	100%	98%	100%	99%	98%	-

The maximum problem faced by the calling operator to other operators

In the inter-operator call assessment, calls were made from the test SIMs of service provider, whose audit was being conducted, to all the other service providers. Aircel and MTS found it tough connecting to majority of the operators. Also almost all the operators found it difficult to connect to a MTS or RCOM GSM number.

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

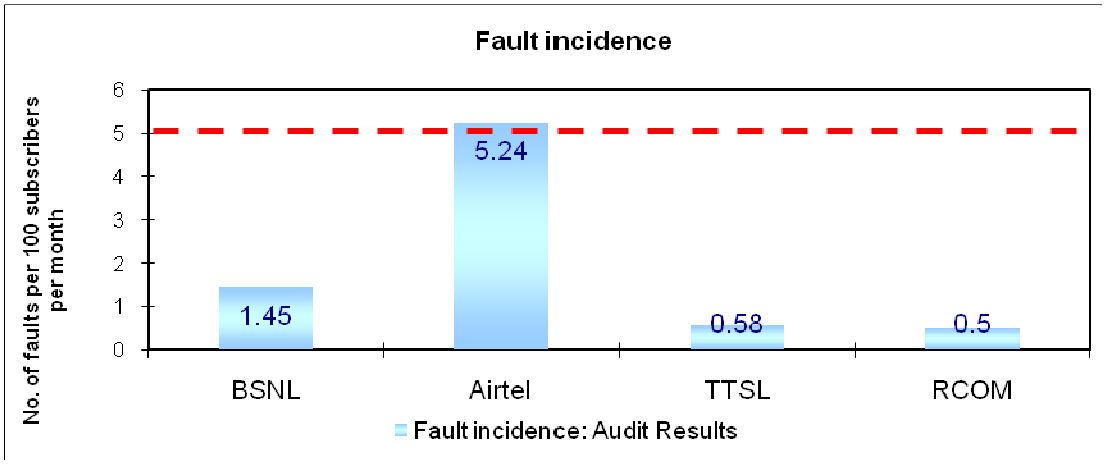
Operator meeting benchmark: Airtel, TTSL, RCOM

Operator not meeting benchmark: BSNL

Live calling

No operator is meeting the benchmark

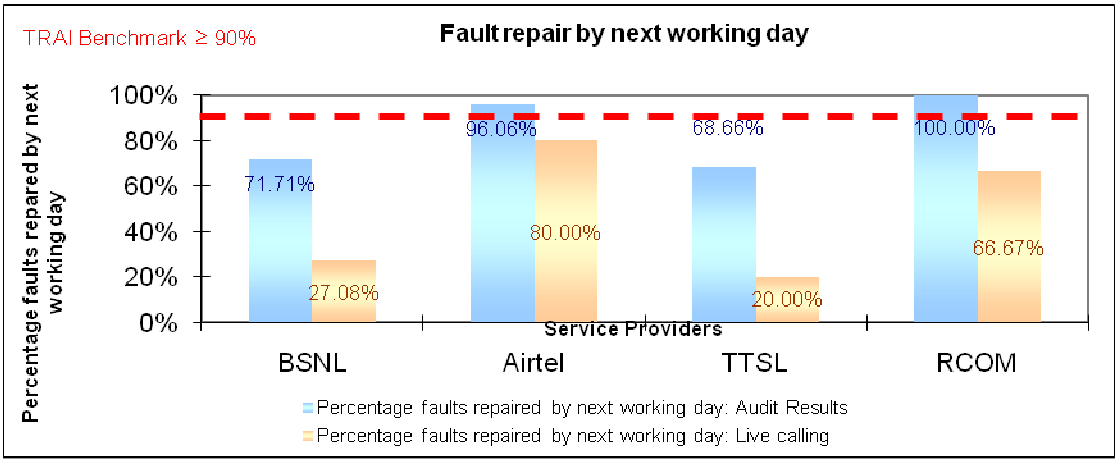
Fault incidence



Operator meeting benchmark: BSNL, TTSL, RCOM

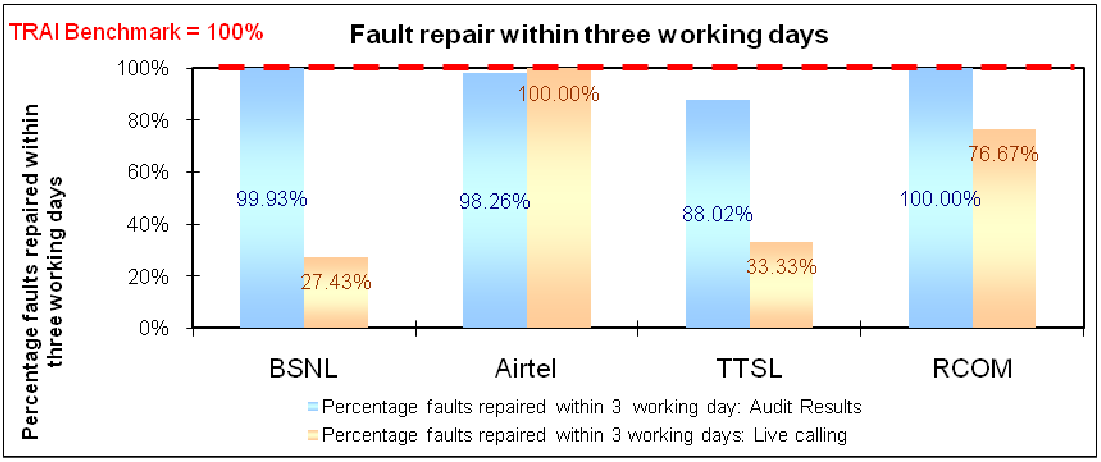
Operator not meeting benchmark: Airtel

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



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

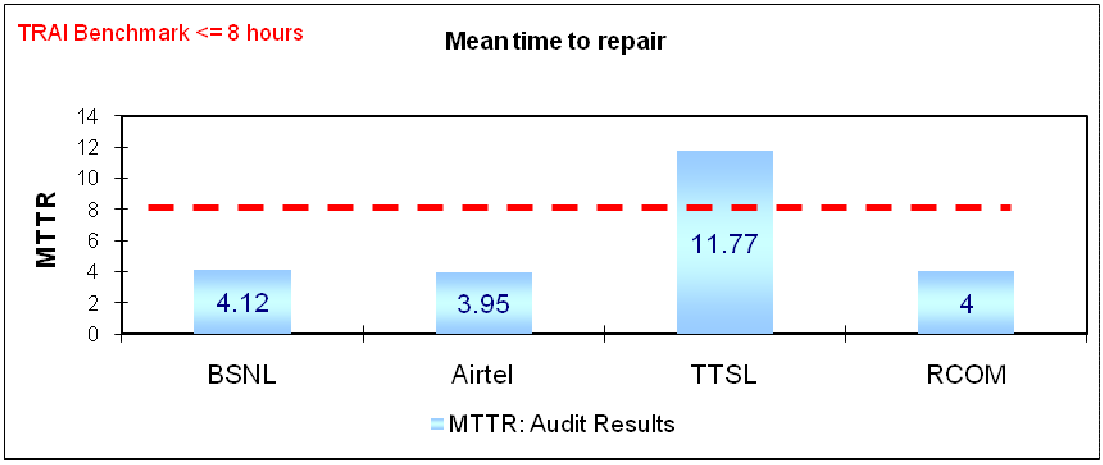
Live calling
No operator is meeting the benchmark



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

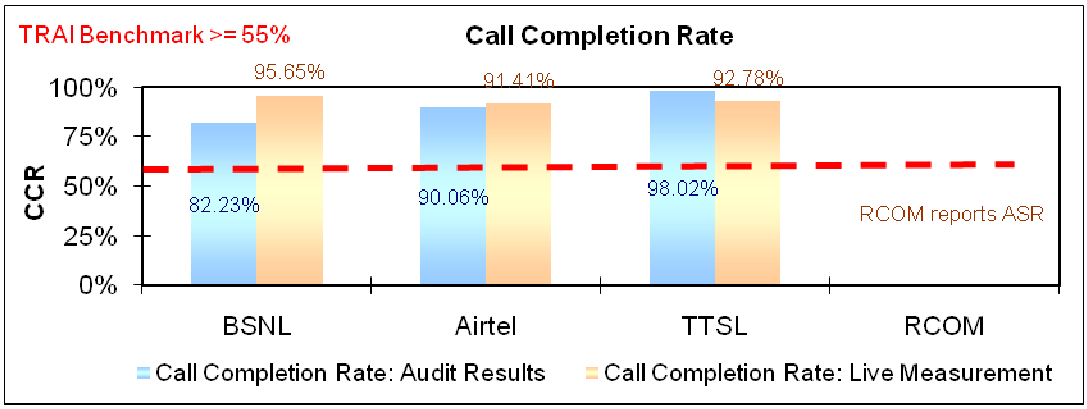
Live calling
Operator meeting benchmark: Airtel
Operator not meeting benchmark: BSNL, TTSL, RCOM

Mean time to repair



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

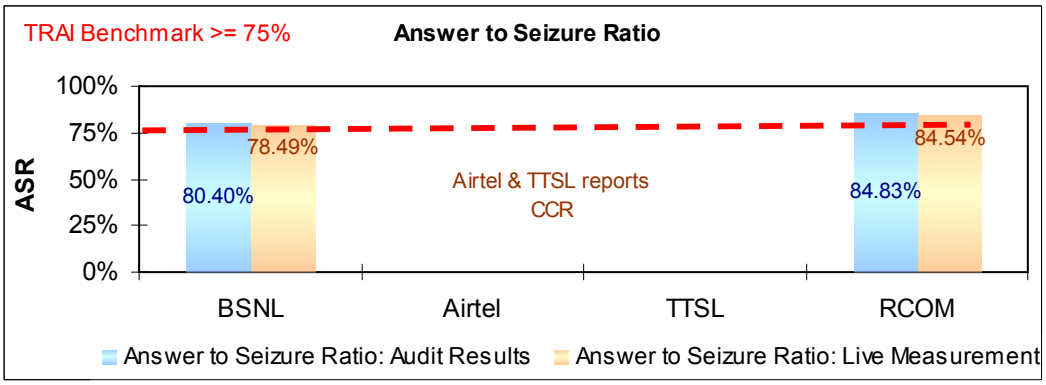
Call completion rate (Comparison between one month audit results and three day live measurement)



One month
All operators are meeting the benchmark

Live measurement
All operators are meeting the benchmark

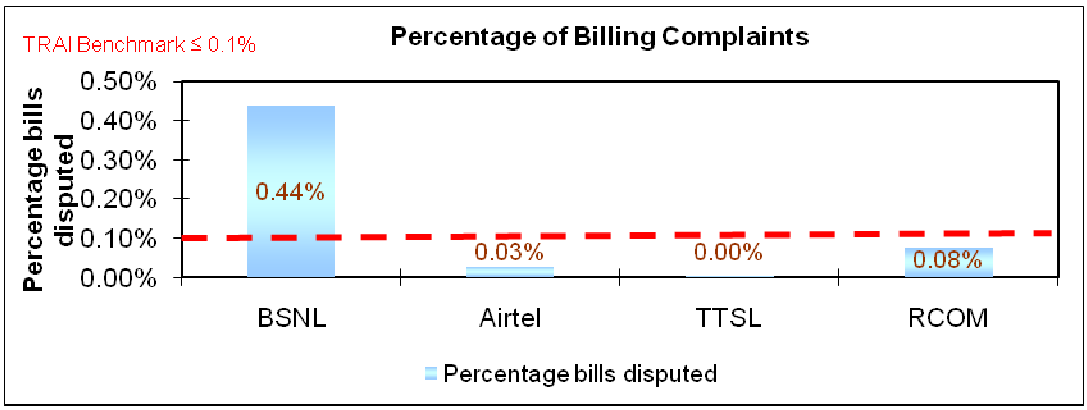
Answer to Seizure Ratio (Comparison between one month audit results and three day live measurement)



One month
All operators are meeting the benchmark

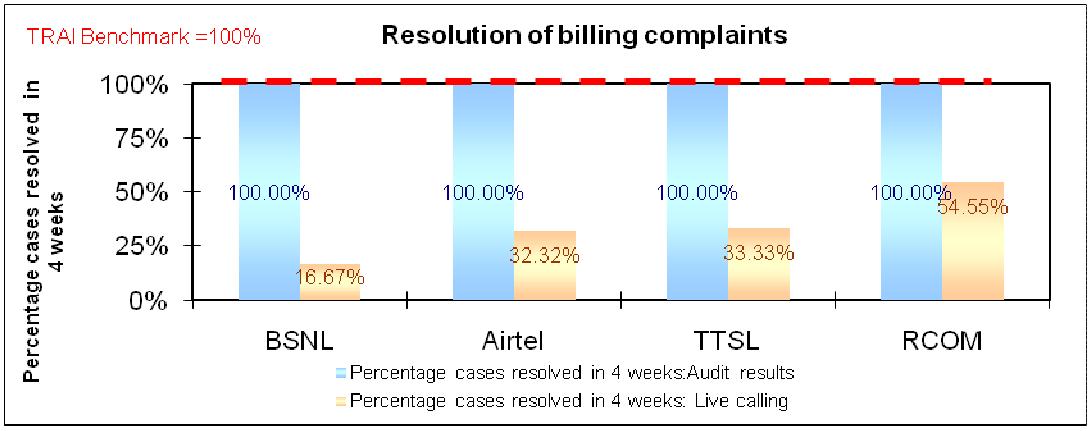
Live measurement
All operators are meeting the benchmark

Percentage bills disputed



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

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



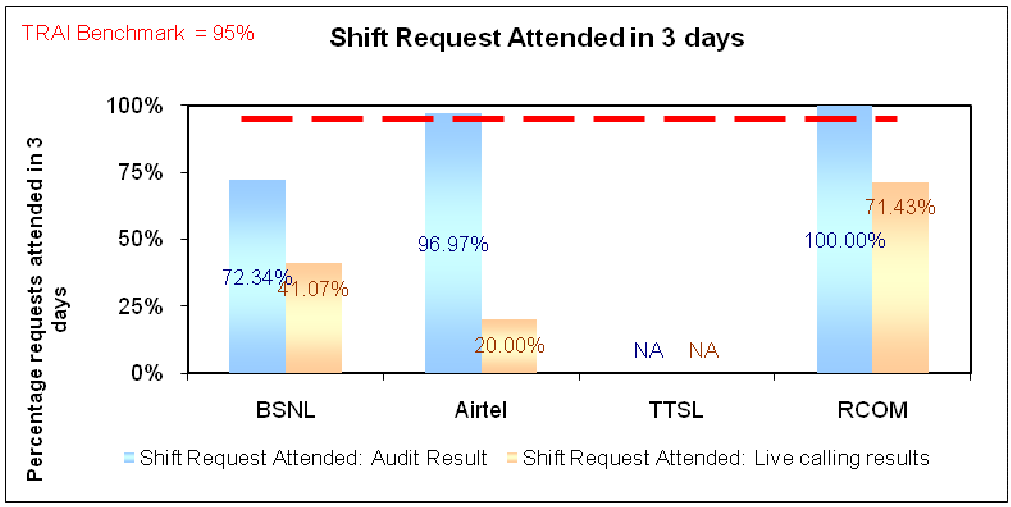
One month

All operators are meeting the benchmark

Live calling

No operator is meeting the benchmark

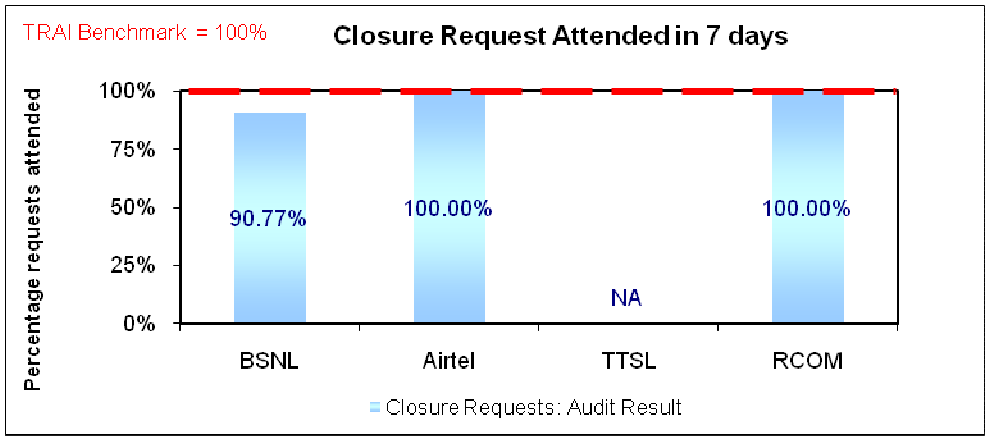
Shift requests attended (Comparison between one month audit results and live calling results)



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

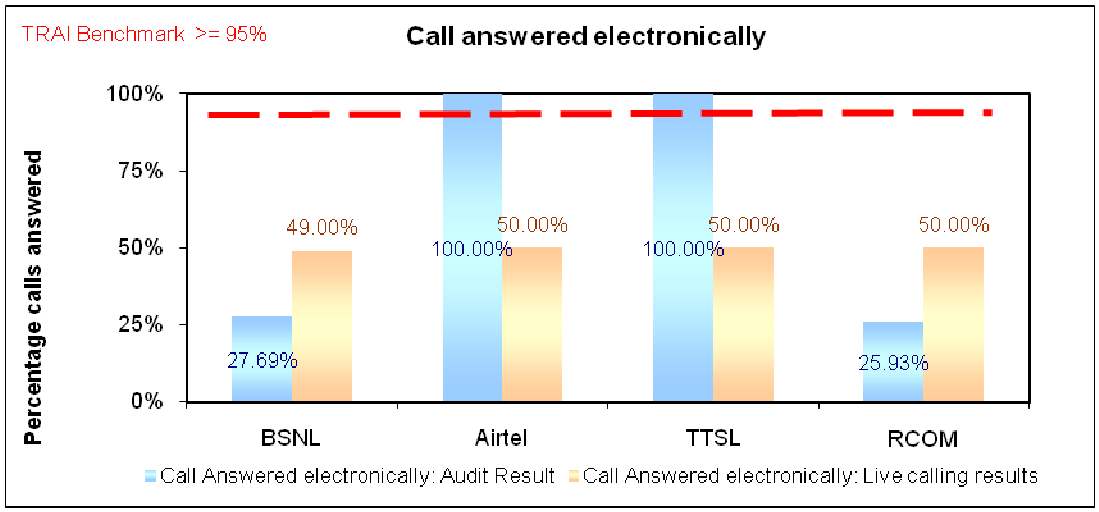
Live calling
No operator is meeting the benchmark

Closure requests attended within 7 days



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

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

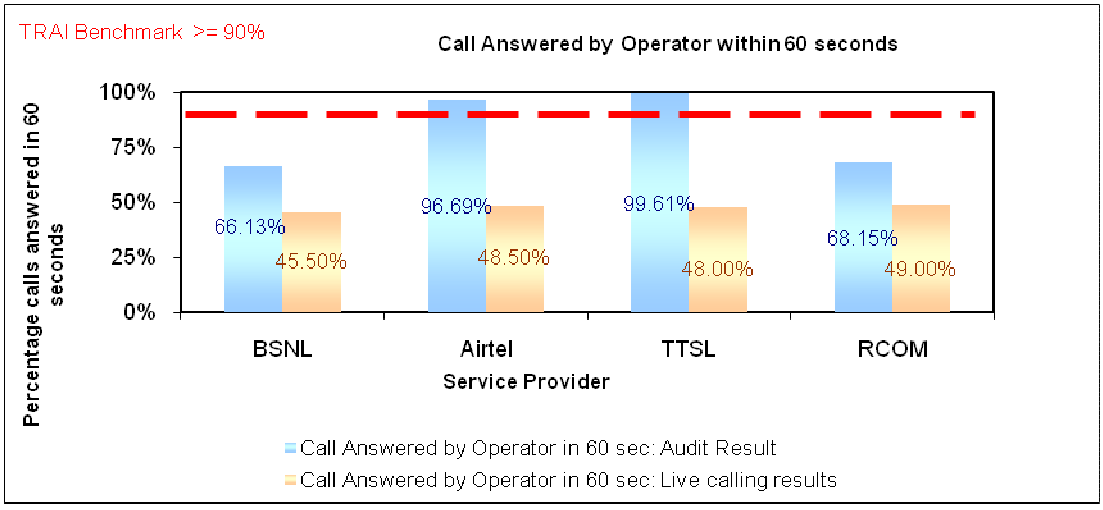


One month
Operator meeting benchmark: Airtel, TTSL

Operator not meeting benchmark: BSNL, RCOM

Live calling
No operator is meeting the benchmark

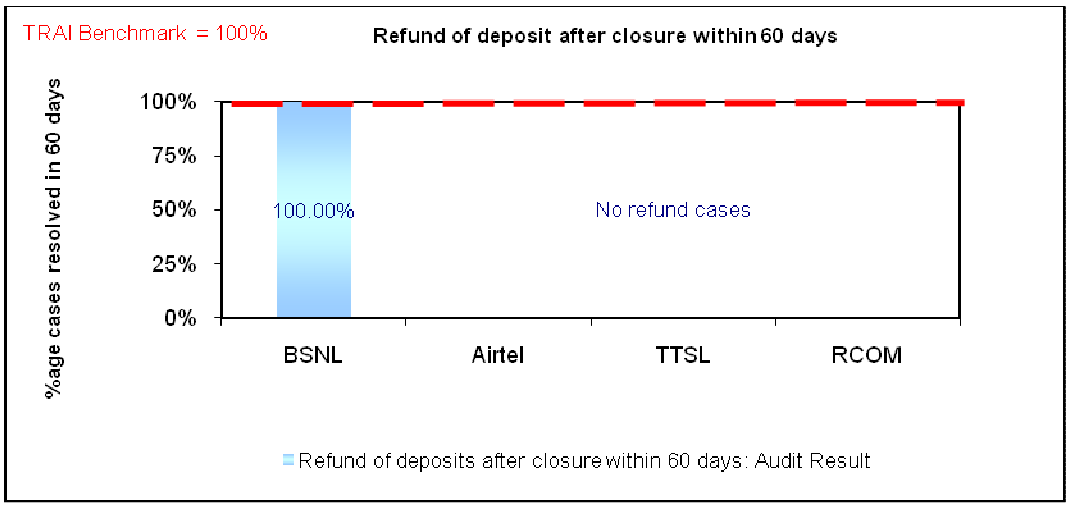
Response time to customer for assistance - Calls answered by the operator within 60 seconds (Comparison between one month audit results and live calling results)



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

Live calling
No operator is meeting the benchmark

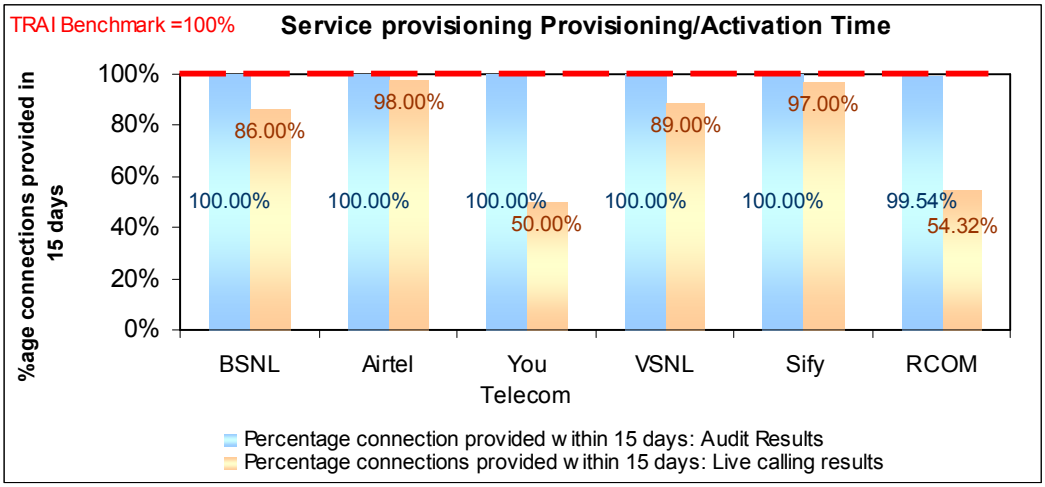
Time taken to refund of deposits after closure



All operators are meeting the benchmark

6.3 Graphical/Tabular Representations for Broadband services

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



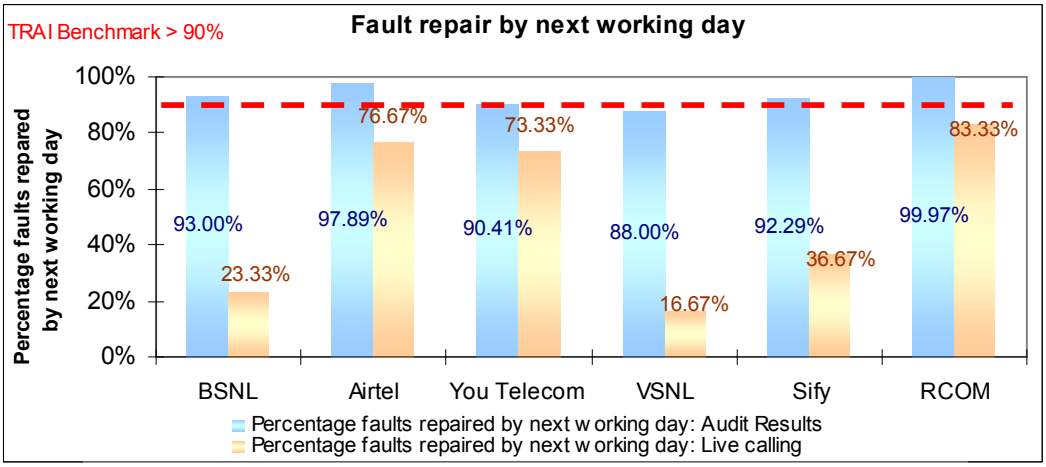
One month

Operator meeting benchmark: BSNL, Airtel, You Telecom, VSNL, Sify
Operator not meeting benchmark: RCOM

Live calling

No operator is meeting the benchmark

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



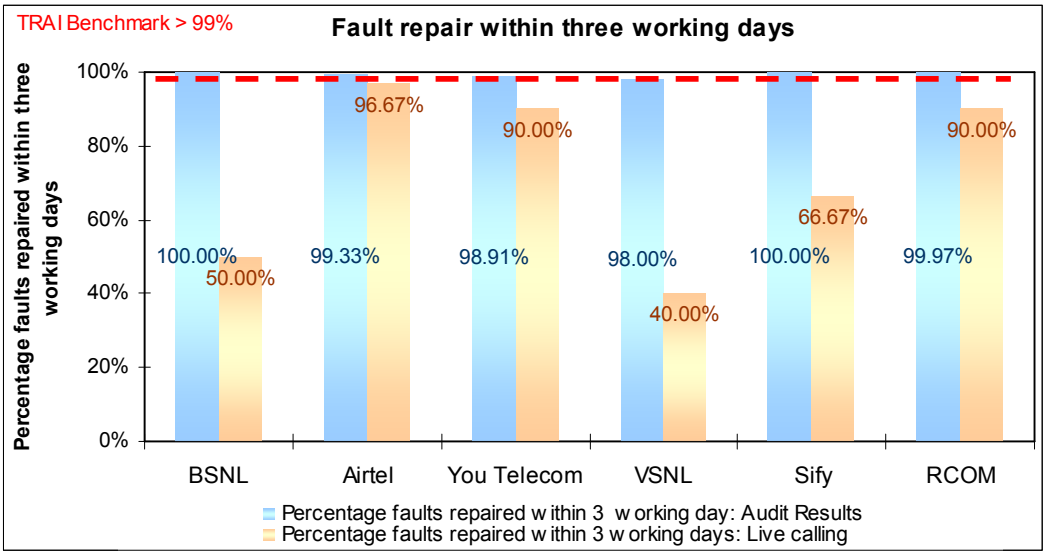
One month

Operator meeting benchmark: BSNL, Airtel, You Telecom, Sify, RCOM
Operator not meeting benchmark: VSNL

Live calling

No operator is meeting the benchmark

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



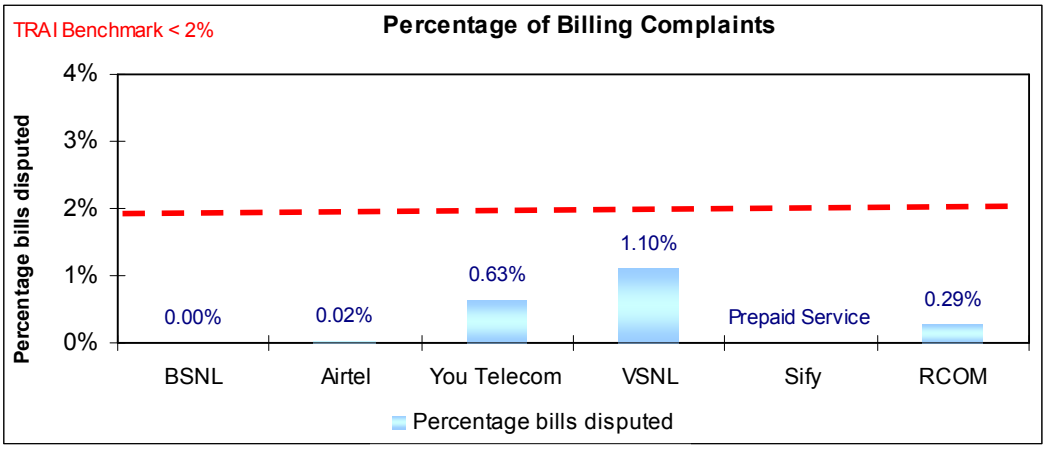
One month

Operator meeting benchmark: BSNL, Airtel, Sify, RCOM
Operator not meeting benchmark: You Telecom, VSNL

Live calling

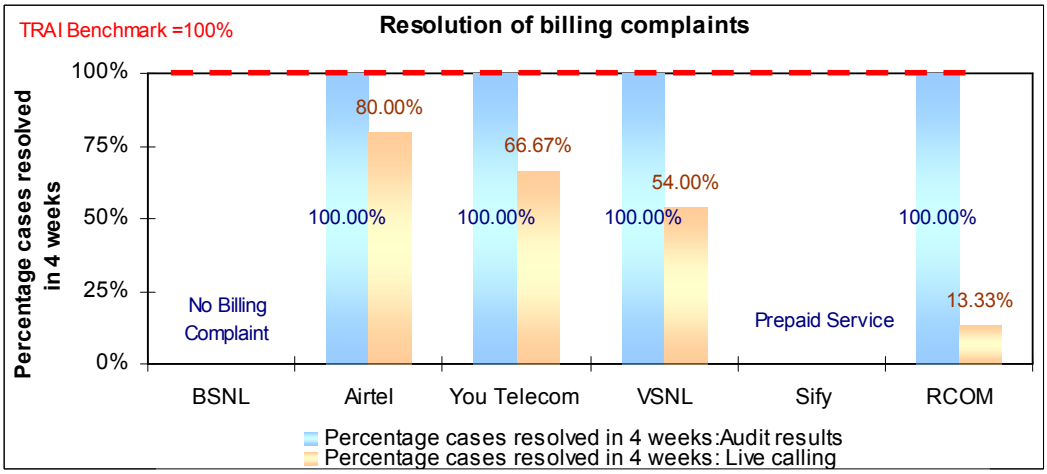
No operator is meeting the benchmark

Percentage bills disputed



All operators are meeting the benchmark

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



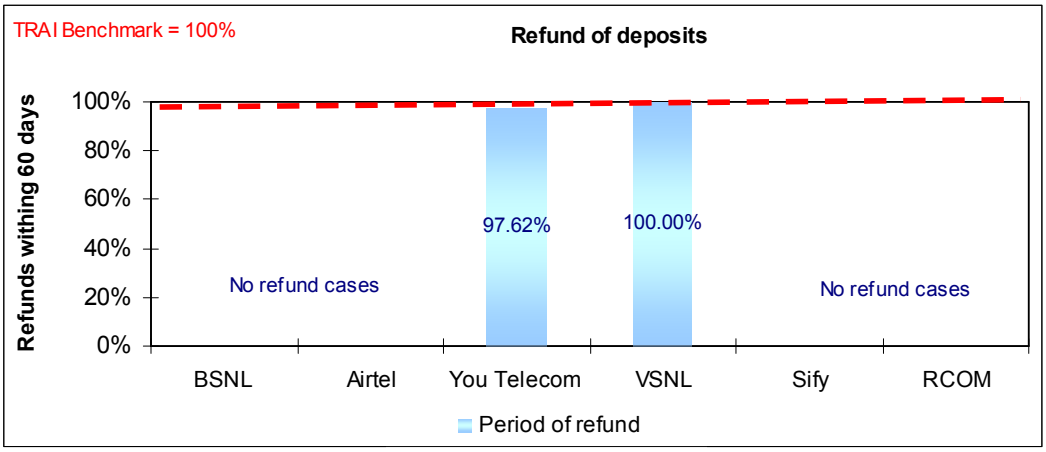
One month

All operators are meeting the benchmark

Live calling

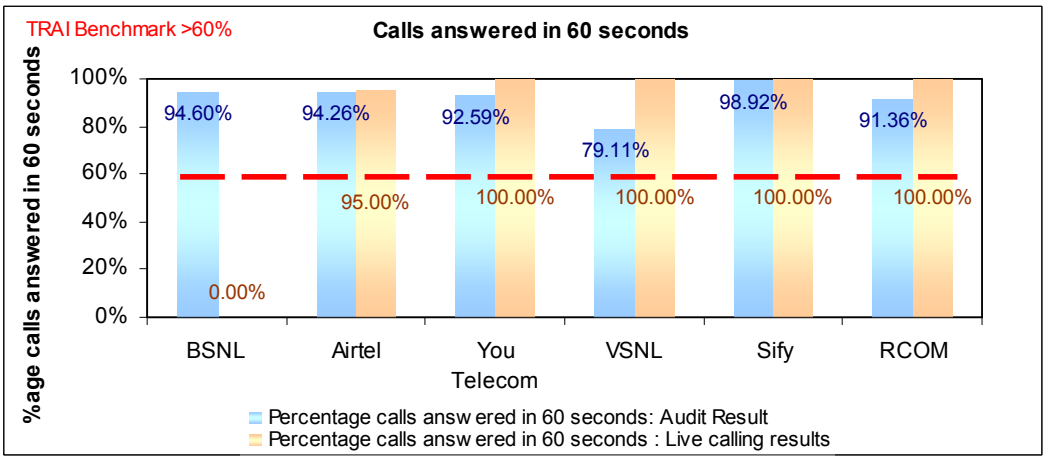
No operator is meeting the benchmark

Refund of deposits after closure



Operator meeting benchmark: VSNL
Operator not meeting benchmark: You Telecom

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



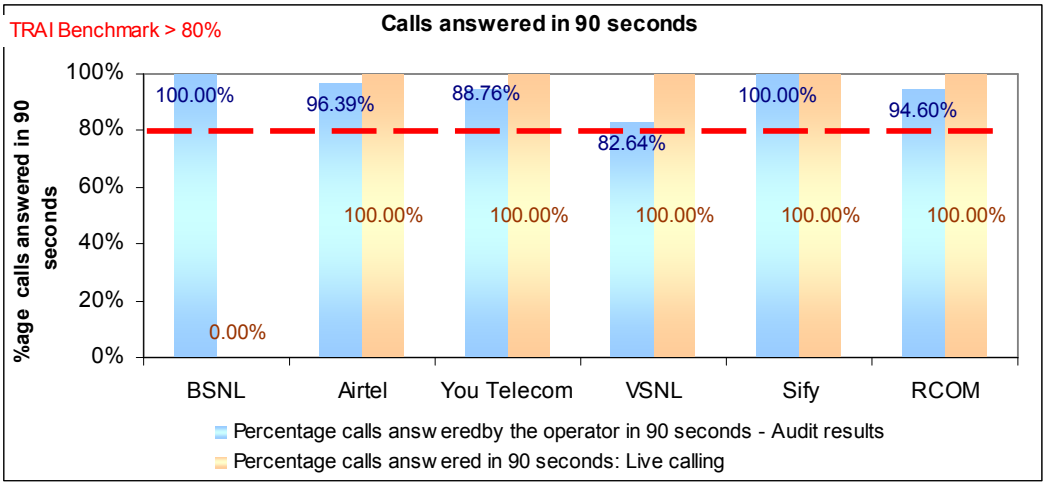
One month

All operators are meeting the benchmark

Live calling

Operator meeting benchmark: Airtel, You Telecom, VSNL, Sify, RCOM
Operator not meeting benchmark: BSNL

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



One month

All operators are meeting the benchmark

Live calling

Operator meeting benchmark: Airtel, You Telecom, VSNL, Sify, RCOM
Operator not meeting benchmark: BSNL

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

Bandwidth Utilization	B'mark	BSNL	Airtel	You Telecom	VSNL	Sify	RCOM
Total number of intra network links		213	740	NA	19	400	21
No of Intra network found to be above 90%		0	0	NA	0	0	0

Bandwidth Utilization	B'mark	BSNL	Airtel	You Telecom	VSNL	Sify	RCOM
Total number of intra network links		143	751	NA	19	394	21
No of Intra network found to be above 90%		0	1	NA	0	0	0

Broadband download speed	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify	RCOM
Total committed download speed to the sample subscribers (In mpbs) (A)		25600	512	2	12800	12800	12800
Total average download speed observed during TCBH (In Mpbs) (B)		23474	512	1.7	11558	11200	11584
%age subscribed speed available to the subscriber during TCBH (B/A)*100	>80%	91.70%	100.00%	85.00%	90.30%	87.50%	90.50%

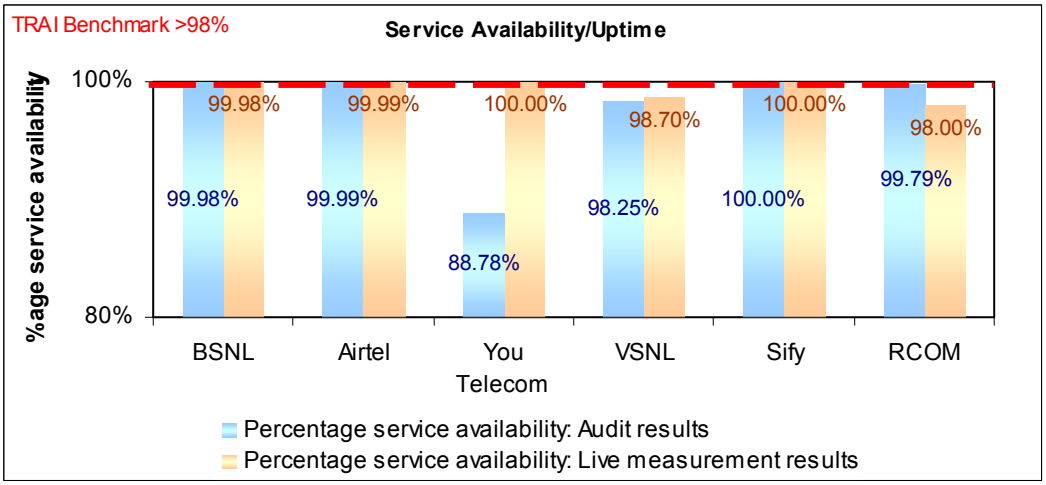
As far as bandwidth utilization on the intra network links is concerned all the operators seem to performing well as all the sample intra network links (Access segment) tested during live

measurement were found to be below 90%. 1 intra network link for Airtel was found to be above 90% utilized.

However, the level from which the bandwidth utilization at Intra network links is being reported varied because of the difference in networks. For e.g. Bharti was found to be reporting Bandwidth from links running from each RSU (Collection of DSLAM's) to the main node in a circle. Whereas VSNL (TATA Communications) considers the links between core distribution routers (lo9cated at 8 locations in India) and Routers being used for National long distance connectivity (Located at Chennai, Ernakkulam and Mumbai)

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

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



One month

Operator meeting benchmark: BSNL, Airtel, VSNL, Sify, RCOM
Operator not meeting benchmark: You Telecom

Live calling

Operator meeting benchmark: BSNL, Airtel, You Telecom, VSNL, Sify
Operator not meeting benchmark: RCOM

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
Benchmark*		**≤24**	**≥95%**	**≤1%**	**≤2%**	**≤3%**	**≥95%**	**≤0.5%**	**≤0.1%**	**100%**	**≤4 weeks**	**≥ 80%**	**≥ 95%**	**≥ 80%**	**≥ 95%**
Airtel	**PMR**	Complied	96.98%	0.62%	0.64%	1.15%	96.48%	DNA	0.00%	100.00%	< 4 weeks	Complied	Complied	88.54%	Complied
	IMRB		97.57%	0.34%	0.31%	1.16%	95.46%	0.00%	0.04%	100.00%	< 4 weeks			88.54%	
Vodafone	**PMR**	Complied	99.58%	0.11%	0.28%	0.23%	98.77%	DNA	0.01%	100.00%	16 days	Complied	Complied	99.00%	Complied
	IMRB		99.58%	0.29%	0.28%	0.23%	98.77%	0.00%	0.01%	100.00%	< 4 weeks			98.77%	
BSNL	**PMR**	Complied	99.00%	0.10%	0.70%	1.10%	100.00%	0.00%	0.00%	100.00%	< 4 weeks	Complied	Complied	70.00%	Complied
	IMRB		99.00%	0.10%	0.70%	1.10%	100.00%	0.00%	0.00%	100.00%	< 4 weeks			70.00%	
TATA	**PMR**	Complied	99.40%	0.00%	0.00%	0.33%	99.35%	0.01%	0.02%	100.00%	< 4 weeks	Complied	Complied	95.00%	Complied
	IMRB		99.40%	0.00%	0.01%	0.33%	99.35%	0.00%	0.02%	100.00%	< 4 weeks			98.00%	
RCOM CDMA	**PMR**	Complied	99.29%	0.00%	0.37%	0.64%	98.55%	0.00%	0.09%	100.00%	< 4 weeks	Complied	Complied	60.77%	Complied
	IMRB		99.29%	0.00%	0.37%	0.64%	98.55%	0.00%	0.09%	100.00%	< 4 weeks			60.77%	
Aircel	**PMR**	Complied	96.29%	0.94%	0.56%	2.09%	96.74%	2.20%	0.00%	100.00%	< 4 weeks	Complied	Complied	90.00%	Complied
	IMRB		96.29%	0.94%	0.56%	2.09%	96.74%	2.20%	0.10%	100.00%	< 4 weeks			90.00%	

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

* 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 on a regular basis.

7.1.1 Conclusions – Cellular Mobile Services

Cellular Mobile services

1. The figures reported by Airtel for CSSR, SDCCH congestion, TCH congestion, call drop rate, voice quality and billing related parameters does not match the figures obtained on verification by IMRB auditors
2. For Tata and Vodafone, values reported in PMR does not match with the values found during the audit for calls answered by the operator in 60 seconds
3. BSNL and RCOM CDMA fails to meet the benchmark for percentage calls answered by the operator in 60 seconds
4. Aircel also fails to meet the benchmark for billing complaints and POI congestion.

7.2 Basic (Wireline) services

Parameters	Benchmarks	BSNL		Airtel		TTSL		RCOM	
		PMR	IMRB	PMR	IMRB	PMR	IMRB	PMR	IMRB
Percentage connections completed within 7 days	100%	99.67%	69.98%	100.00%	100.00%	100.00%	100.00%	45.68%	46.00%
Faults incidences (No. of faults/100 Subs./month)	≤5	0.03	0.03	0.05	0.05	0.00	0.00	0.01	0.01
% of faults repaired by next working day	≥ 90%	92.42%	66.00%	95.00%	95.00%	66.67%	88.00%	98.33%	98.00%
Faults pending for> 3days and ≤7 days	Rent rebate of 7 days	0	0	406	406	0	0	2	2
Faults pending for > 7 days and ≤15 days	Rent rebate of 15 days	1313	1313	85	85	0	0	0	0
Faults pending for > 15 days	Rent rebate of 1 month	141	141	0	0	0	0	0	0
Mean Time to Repair (MTTR)	≤ 8 Hrs	8.67	8.12	4.60	4.60	7.00	7.35	2.53	2.53
Call Completion Rate (CCR)	≥ 55%	80.00%	71.00%	91.00%	91.00%	98.00%	98.00%	NA	NA
Metering and billing credibility - Number of bills disputed during over a billing cycle	< 0.1%	0.01%	0.01%	0.02%	0.02%	0.00%	0.00%	0.02%	0.02%
Resolution of billing complaints within 4 weeks	100%	88.49%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Customer care/helpline promptness									
Shift requests									
Percentage shift requests attended within 3 days	>95%	99.59%	26.00%	97.00%	97.00%	93.00%	93.00%	97.50%	98.00%
Closure request attended									
Closure within 24 hours	>95%	100.00%	99.00%	100.00%	100.00%	100.00%	55.00%	98.28%	100.00%
Supplementary (additional) service requests attended)									
Additional facility provided within 24 hours	>95%	Complied		Complied		Complied		Complied	
Response time to customer for assistance									
% age call answered through IVR in 20 seconds	>80%	Complied		Complied		Complied		Complied	
% age call answered through IVR in 40 seconds	100%	Complied		Complied		Complied		Complied	
% age call answered by operator in 60 seconds	>80%	97.00%	0.00%	98.00%	98.00%	93.00%	93.00%	94.00%	97.00%
% age call answered by operator in 90 seconds	>95%	Complied		Complied		Complied		Complied	
Time taken for refund of deposits after closures within 60 days	100%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

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

Figures do not match with those reported in PMR

Figures verified on all India basis

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

7.2.1 Conclusions – Basic (Wireline) Services

Basic Wireline Services

1. Significant variation is observed in figures reported in PMR and those verified in sample exchanges for shifts and new connections for all the operators except Airtel
2. For BSNL the difference is owing to the fact that only 5% of the total exchanges were audited for the operator whereas the data provided in the PMR is basis all the exchanges in the circle

7.3 Broadband services

Parameters	Benchmarks	BSNL		Airtel		You Telecom		VSNL		Sify		RCOM	
		PMR	IMRB	PMR	IMRB	PMR	IMRB	PMR	IMRB	PMR	IMRB	PMR	IMRB
Service provisioning uptime													
Percentage connections provided within 15 days	100%	100.00%	100.00%	100.00%	97.00%	95.00%	94.00%	97.00%	97.00%	100.00%	100.00%	99.00%	99.00%
Fault repair restoration time													
Percentage faults repaired by next working days	> 90%	92.00%	92.00%	94.00%	94.00%	87.00%	87.00%	94.00%	94.00%	92.00%	91.00%	100.00%	100.00%
Percentage faults repaired within three working days	> 99%	100.00%	100.00%	97.00%	97.40%	98.00%	98.00%	99.00%	99.00%	99.00%	100.00%	100.00%	100.00%
Billing performance													
Billing complaints per 100 bills issued	< 2%	0.00%	0.00%	0.00%	0.00%	0.66%	0.66%	0.67%	0.67%	0.00%	0.00%	0.23%	0.00%
%age of billing complaints resolved in 4 weeks	100%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	NA
%age cases in which refund of deposits after closure was made in 60 days	100%	100.00%	100.00%	100.00%	100.00%	39.00%	39.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Customer care/helpline assessment (Voice to Voice)													
Percentage calls answered within 60 seconds	> 60%	97.00%	97.00%	93.00%	93.56%	83.00%	83.00%	98.00%	98.00%	98.00%	98.00%	83.00%	83.00%
Percentage calls answered within 90 seconds	> 80%	100.00%	100.00%	96.00%	96.59%	88.00%	88.00%	99.00%	99.00%	99.00%	100.00%	91.00%	91.00%
Bandwidth utilization/Throughput													
Intra network links (POP to ISP Node)		DNP	186	2251	2251	NA	NA	0	0	432	432	129	129
Total number of intra network links > 90%		DNP	0	0	0	NA	NA	0	0	0	0	0	0
Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)		DNP	26557	3	3	2	2	0	0	27	27	18	54
Percentage bandwidth utilized on upstream links	< 80%	NA	77.00%	96.00%	96.00%	78.00%	78.00%	53.00%	53.00%	79.00%	79.00%	41.00%	41.00%
Broadband download speed	> 80%	92.00%	92.00%	105.00%	105.00%	85.00%	85.00%	>80%	>80%	95.00%	85.00%	90.00%	90.00%
Service availability/uptime	> 98%	99.00%	99.99%	100.00%	100.00%	99.00%	99.00%	98.75%	98.75%	100.00%	100.00%	100.00%	100.00%
Packet loss	< 1%	NA	0.05%	0.00%	0.00%	< 1 %	0.80%	0.00%	0.00%	< 1 %	< 1%	< 1 %	0.76%
Network Latency													
POP/ISP Node to NIXI (in msec)	< 120 msec	DNP	59	0	30	40	30	<80 ms	<80 ms	< 45 ms	45	31.63	36
ISP node to NAP port (Terrestrial) (in msec)	< 350 msec	DNP	276	NA	62	300	285	<250 ms	<250 ms	< 300 ms	300	102.27	228

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

7.3.1 Conclusions

Broadband services

1. Complete data for Sify was verified on an all India level
2. For BSNL there is slight variation observed in for some parameters when compared to the figures reported in PMR. But the reason is largely the fact that data was obtained for sample 5% of exchanges whereas reporting is done for 100% of exchanges.
3. Historic data for Broadband download speed and Ping test conducted to check the latency and packet loss was not available for verification for all the service providers.
4. Although all the service providers claimed that they conduct random ping tests and latency to check the packet loss but there is no book keeping at their end. Records of old ping tests were found to be nonexistent.
5. There were some discrepancies reported for Sify and Reliance for fault repair and billing complaints respectively

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	RCOM CDMA	Aircel	Idea	MTS	RCOM GSM
Number of BTSs in the licensed service area		1845	1822	1001	218	420	1600	1818	469	724
Sum of downtime of BTSs in a month (in hours)		1803	585.9	1115	45	24.3	7883	580	875.53	790
BTSs accumulated downtime (not available for service)	≤ 2%	0.14%	0.04%	0.15%	0.03%	0.01%	0.68%	0.04%	0.26%	0.15%
Number of BTSs having accumulated downtime >24 hours		14	0	7	0	0	47	0	0	4
Worst affected BTSs due to downtime	≤ 2%	0.76%	0.00%	0.70%	0.00%	0.00%	2.94%	0.00%	0.00%	0.55%

2. Connection Establishment (Accessibility)

Audit Results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Airtel	Vodafone	BSNL	Tata	RCOM CDMA	Aircel	Idea	MTS	RCOM GSM
Total number of call attempts		DNA	249456588	DNA	10868565	24946148	61118900	230293	3649135	4135555
Total number of successful calls established		DNA	248310027	DNA	10681217	24848858	60425836	227162	3621344	4091971
CSSR	≥ 95%	98.15%	99.54%	96.19%	98.28%	99.61%	98.87%	98.64%	99.24%	98.95%

SDCCH congestion	Benchmark	Airtel	Vodafone	BSNL	Tata	RCOM CDMA	Aircel	Idea	MTS	RCOM GSM
Total number of SDCCH/Paging channel attempts		11639185	195307717	DNA	DNA	DNA	189451777	869366	2287930	DNA
Number of successful SDCCH/Paging channel attempts		11608923	194971255	DNA	DNA	DNA	182850194	868176	2068271	DNA
SDCCH/Paging channel congestion	≤ 1%	0.26%	0.17%	0.09%	0.00%	0.00%	3.48%	0.14%	0.10%	0.02%

TCH congestion	Benchmark	Airtel	Vodafone	BSNL	Tata	RCOM CDMA	Aircel	Idea	MTS	RCOM GSM
TCH attempts		10404618	62149491	DNA	626415	DNA	324179531	489283	3649135	DNA
Number of successful TCH attempts		10390943	62099102	DNA	626158	DNA	243689606	488580	3621344	DNA
TCH congestion	≤ 2%	0.13%	0.08%	0.73%	0.04%	0.10%	0.24%	0.14%	0.76%	0.07%

Operators not meeting the benchmark

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

Live measurement results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Airtel	Vodafone	BSNL	Tata	RCOM CDMA	Aircel	Idea	MTS	RCOM GSM
Total number of call attempts		DNA	254521185	DNA	3718791	2525444	6527040	295449	6670089	273870
Total number of successful calls established		DNA	253861427	DNA	3660281	2512434	6456539	292077	6624669	271919
CSSR	≥ 95%	98.02%	99.74%	98.58%	98.43%	99.48%	98.92%	98.86%	99.32%	99.29%

SDCCH congestion	Benchmark	Airtel	Vodafone	BSNL	Tata	Reliance CDMA	Aircel	Idea	MTS	Reliance GSM
Total number of SDCCH/Paging channel attempts		12402735	19767975	DNA	DNA	DNA	18872429	1092045	2763965	DNA
Number of successful SDCCH/Paging channel attempts		12360465	19758741	DNA	DNA	DNA	18001273	1091800	2513553	DNA
SDCCH/Paging channel congestion	≤ 1%	0.00%	0.05%	0.60%	0.00%	0.00%	4.62%	0.02%	0.09%	0.01%

TCH congestion	Benchmark	Airtel	Vodafone	BSNL	Tata	RCOM CDMA	Aircel	Idea	MTS	RCOM GSM
TCH attempts		10188414	6213579	DNA	23281414	DNA	31,609,194	314594	6670089	DNA
Number of successful TCH attempts		10172113	6211918	DNA	23279086	DNA	24,317,878	295449	6624669	DNA
TCH congestion	≤ 2%	0.29%	0.03%	0.46%	0.01%	0.14%	0.23%	6.09%	0.68%	0.00%

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

CSSR	Benchmark	Airtel	Vodafone	BSNL	Tata	RCOM CDMA	Aircel	Idea	MTS	RCOM GSM
Total number of call attempts		180	184	164	335	146	159	156	173	217
Total number of successful calls established		172	182	159	335	146	159	151	173	207
CSSR	≥ 95%	95.56%	98.91%	96.95%	100.00%	100.00%	100.00%	96.79%	100.00%	95.39%

Blocked calls	Benchmark	Airtel	Vodafone	BSNL	Tata	RCOM CDMA	Aircel	Idea	MTS	RCOM GSM
%age blocked calls		4.44%	1.09%	3.05%	0.00%	0.00%	0.00%	3.21%	0.00%	4.61%

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	RCOM CDMA	Aircel	Idea	MTS	RCOM GSM
Total number of calls established		3558141	61195804	DNA	27244346	DNA	61118900	227111	3499058	DNA
Total number of calls dropped		38666	322428	DNA	88423	DNA	1423094	2315	9750	DNA
Call drop rate	≤ 2%	1.09%	0.53%	0.96%	0.32%	0.57%	2.33%	1.02%	0.28%	0.24%

Operators not meeting the benchmark

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

Cells having more than 3% TCH	Benchmark	Airtel	Vodafone	BSNL	Tata	RCOM CDMA	Aircel	Idea	MTS	RCOM GSM
Total number of cells in the network		4586	4949	2850	667	420	4341.3	5113	42210	2184
Total number of cells having more than 3% TCH		194	66	86	0	2	645	544	1342	27
Worst affected cells having more than 3% TCH	≤ 5%	4.23%	1.33%	3.02%	0.00%	0.48%	14.86%	10.64%	3.18%	1.24%

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	RCOM CDMA	Aircel	Idea	MTS	RCOM GSM
Total number of calls established		3673150	6126203	DNA	23148818	DNA	6527040	293563	6624669	DNA
Total number of calls dropped		40998	32593	DNA	85650.63	DNA	140162	2554	10053	DNA
Call drop rate	≤ 2%	1.12%	0.53%	0.88%	0.37%	0.65%	2.15%	0.87%	0.15%	0.40%

Cells having more than 3% TCH	Benchmark	Airtel	Vodafone	BSNL	Tata	RCOM CDMA	Aircel	Idea	MTS	RCOM GSM
Total number of cells in the network		4665	4964	2862	667	420	4440	5515	88344	2184
Total number of cells having more than 3% TCH		171	55	183	7	3	740	502	2.375	35
Worst affected cells having more than 3% TCH	≤ 5%	3.67%	1.11%	6.39%	1.05%	0.71%	16.67%	9.10%	0.00%	1.60%

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

Call drop rate	Benchmark	Airtel	Vodafone	BSNL	Tata	RCOM CDMA	Aircel	Idea	MTS	RCOM GSM
Total number of calls established		172	182	159	335	146	159	156	324	207
Total number of calls dropped		4	0	8	1	0	1	2	1	1
Call drop rate	≤ 2%	2.33%	0.00%	5.03%	0.30%	0.00%	0.63%	1.28%	0.31%	0.48%

4. Voice quality

Audit Results for Voice quality

Voice quality	Benchmark	Airtel	Vodafone	BSNL	Tata	RCOM CDMA	Aircel	Idea	MTS	RCOM GSM
Total number of sample calls		87877	10703752767	94954	32707	DNA	8206458968	29365372	110	DNA
Total number of calls with good voice quality		83598	10584652415	93332	32519	DNA	7969095931	28975404	108	DNA
%age calls with good voice quality	≥ 95%	95.13%	98.89%	98.29%	99.43%	98.55%	97.11%	98.67%	98.18%	99.12%

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

Voice quality	Benchmark	Airtel	Vodafone	BSNL	Tata	RCOM CDMA	Aircel	Idea	MTS	RCOM GSM
Total number of sample calls		271758	246179	129725	6609	3225	224858	522315	5438	5030
Total number of calls with good voice quality		242931	234413	117591	6543	3197	206229	502382	5093	4718
%age calls with good voice quality	≥ 95%	89.39%	95.22%	90.65%	99.00%	99.13%	91.72%	96.18%	93.66%	93.80%

Operators not meeting the benchmark

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

5. POI Congestion

Audit Results for POI Congestion

POI congestion	Benchmark	Airtel	Vodafone	BSNL	Tata	RCOM CDMA	Aircel	Idea	MTS	RCOM GSM
POI traffic offered on all individual POI's		DNA	63803	69320	17141	6742	1498923	9640	84	6742
Served traffic for all POI's		DNA	36306	39594	8560	6742	891051	3078	33	6742
Traffic failed on all POI's	≤ 0.5%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Live measurement results for POI congestion

POI congestion	Benchmark	Airtel	Vodafone	BSNL	Tata	RCOM CDMA	Aircel	Idea	MTS	RCOM GSM
POI traffic offered on all individual POI's		DNA	64240	DNA	427492	6775.8	3658060	3125	260	6776
Served traffic for all POI's		DNA	39106	DNA	95610	6775.8	1161664	564	48	6776
Traffic failed on all POI's	≤ 0.5%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

6. Inter Operator Call Assessment

Inter operator call Assessment From↓ To→	Airtel	Vodafone	BSNL	Tata	RCOM CDMA	Aircel	Idea	MTS	RCOM GSM
Airtel	-	97.50%	100%	100%	100%	100%	98%	99%	98%
Vodafone	100%	-	100%	100%	100%	100%	98%	99%	97%
BSNL	99.50%	100%	-	100%	97%	100%	99%	99%	99%
Tata	100%	100%	100%	-	100%	100%	99%	99%	98%
RCOM CDMA	100%	100%	100%	100%	-	100%	100%	97%	97%
Aircel	98%	98.5%	98%	99%	97%	-	98%	100%	99%
Idea	100%	100%	97%	99.5%	99%	99%	-	98%	98%
MTS	100%	97%	99%	99%	100%	96%	100%	-	97%
RCOM GSM	100%	100%	100%	100%	98%	100%	99%	98%	-

7. Metering and Billing credibility

Audit Results for Billing performance

Billing Performance	Benchmark	Airtel	Vodafone	BSNL	Tata	RCOM CDMA	Aircel	Idea	MTS	RCOM GSM
Billing diputes – Postpaid										
Total bills generated during the period		712951	214336	46791	89942	113861	243047	5913	NA	113861
Total number of bills disputed		719	183	205	26	103	688	22	NA	10
Percentage bills disputed	≤ 0.1%	0.10%	0.09%	0.44%	0.03%	0.09%	0.28%	0.37%	NA	0.00%
Billing diputes – Prepaid										
Total number of prepaid customers in that period		2102039	1491768	975192	250647	1271834	2400138	515294	NA	NA
Number of complaints related to charging, credit & validity		3	4304	1940	26	168	422	1146	NA	NA

NA: Not applicable

Operators not meeting the benchmark

Percentage of complaints	≤ 0.1%	<0.1%	0.09%	0.00%	0.01%	0.01%	0.02%	0.22%	NA	NA
Resolution of billing complaints										
Total complaints resolved in 4 weeks from date of receipt		719	183	205	26	449	110	1168	NA	102
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%	NA	100.00%
Period of applying credit / waiver										
Total number of cases requiring credit/waiver		3	183	27	26	103	623	19	NA	12
Total number of cases where credit/waiver was made within 1 week		3	183	5	26	103	623	19	NA	12
Percentage cases in which credit/waiver was received within 1 week	100%	100.00%	100.00%	18.52%	100.00%	100.00%	100.00%	100.00%	NA	100.00%

Live calling results for resolution of billing complaints

Resolution of billing complaints	Benchmark	Airtel	Vodafone	BSNL	Tata	RCOM CDMA	Aircel	Idea	MTS	RCOM GSM
Total Number of calls made		100	100	50	24	100	100	100	83	100
Number of cases resolved in 4 weeks		60	93	16	5	61	64	86	59	61
Percentage cases resolved in four weeks	100%	60.00%	93.00%	32.00%	20.83%	61.00%	64.00%	86.00%	71.08%	61.00%

8. Customer Care

Audit results for customer care (Electronically)

Customer Care Assessment	Benchmark	Airtel	Vodafone	BSNL	Tata	RCOM CDMA	Aircel	Idea	MTS	RCOM GSM
Total Number of calls received		295138	1939506	446766	45566	DNA	1387308	197168	DNA	DNA
Total Number of calls getting connected and answered		177082	1939506	259395	41616	19239314	1374077	193391	DNA	19239314
Percentage calls getting connected and answered	≥ 95%	60.00%	100.00%	58.06%	91.33%	100.00%	99.05%	98.08%	NA	100.00%

Live calling results for customer care (Electronically)

Customer Care Assessment	Benchmark	Airtel	Vodafone	BSNL	Tata	RCOM CDMA	Aircel	Idea	MTS	RCOM GSM
Total Number of calls received		100	100	100	100	100	100	100	50	100
Total Number of calls getting connected and answered		96	97	100	100	90	100	100	50	90
Percentage calls getting connected and answered	≥ 95%	96.00%	97.00%	100.00%	100.00%	90.00%	100.00%	100.00%	100.00%	90.00%

Operators not meeting the benchmark

NA: Not applicable

Audit results for customer care (Voice to Voice)

Customer Care Assessment	Benchmark	Airtel	Vodafone	BSNL	Tata	RCOM CDMA	Aircel	Idea	MTS	RCOM GSM
Total Number of calls answered within 60 seconds		274434	473515	183284	36679	106777	755342	197589	DNA	106777
Percentage calls answered within 60 seconds	≥ 90%	97.00%	97.50%	96.30%	93.00%	72.40%	99.09%	95.14%	NA	72.40%

Live calling results for customer care (Voice to Voice)

Customer Care Assessment	Benchmark	Airtel	Vodafone	BSNL	Tata	RCOM CDMA	Aircel	Idea	MTS	RCOM GSM
Total Number of calls received		100	100	100	100	100	100	100	50	100
Total Number of calls answered within 60 seconds		93	98	68	90	87	95	94	49	87
Percentage calls answered within 60 seconds	≥ 90%	93.00%	98.00%	68.00%	90.00%	87.00%	95.00%	94.00%	98.00%	87.00%

9. Termination / closure of service

Audit results for termination / closure of service

Termination	Benchmark	Airtel	Vodafone	BSNL	Tata	RCOM CDMA	Aircel	Idea	MTS	RCOM GSM
Total number of closure request		3670	4480	1360	2526	1733	4472	50	NA	NA
Number of requests attended within 7 days		3634	4480	1360	2400	1733	4472	50	NA	NA
Percentage cases in which termination done within 7 days	100%	99.02%	100.00%	100.00%	95.01%	100.00%	100.00%	100.00%	NA	NA

10. Time taken for refund of deposits after closure

Audit results for refund of deposits

Refund	Benchmark	Airtel	Vodafone	BSNL	Tata	RCOM CDMA	Aircel	Idea	MTS	RCOM GSM
Total number of cases requiring refund of deposits		1069	235	634	519	850%	704	NA	NA	NA
Total number of cases where refund was made within 60 days		1069	235	634	480	850%	704	NA	NA	NA
Percentage cases in which refund was receive within 60 days	100%	100.00%	100.00%	100.00%	92.49%	100.00%	100.00%	NA	NA	NA

Operators not meeting the benchmark

NA: Not applicable

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

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)			POI	Metering and Billing			Response time to customer for assistance		Termination / closure of service	
	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	0.14%	0.76%	98.15%	0.26%	0.13%	1.09%	4.23%	95.13%	0.00%	0.10	100.00%	100.00%	60.00%	97.00%	99.02%	100.00%
Vodafone	0.04%	0.00%	99.54%	0.17%	0.08%	0.53%	1.33%	98.89%	0.00%	0.09%	100.00%	100.00%	100.00%	97.50%	100.00%	100.00%
BSNL	0.15%	0.70%	96.19%	0.09%	0.73%	0.96%	3.02%	98.29%	0.00%	0.44%	100.00%	18.52%	58.06%	96.30%	100.00%	100.00%
Tata	0.03%	0.00%	98.28%	0.00%	0.04%	0.32%	0.00%	99.43%	0.00%	0.03%	100.00%	100.00%	91.33%	93.00%	95.01%	92.49%
RCOM CDMA	0.01%	0.00%	99.61%	0.00%	0.10%	0.57%	0.48%	98.55%	0.00%	0.09%	100.00%	100.00%	100.00%	72.40%	100.00%	100.00%
Aircel	0.68%	2.94%	98.87%	3.48%	0.24%	2.33%	14.86%	97.11%	0.00%	0.28%	100.00%	100.00%	99.05%	99.09%	100.00%	100.00%
Idea	0.04%	0.00%	98.64%	0.14%	0.14%	1.02%	10.64%	98.67%	0.00%	0.37%	100.00%	100.00%	98.08%	95.14%	100.00%	100.00%
MTS	0.26%	0.00%	99.24%	0.10%	0.76%	0.28%	3.18%	98.18%	0.00%	Combined results for Chennai and Tamil Nadu						
RCOM GSM	0.15%	0.55%	98.95%	0.02%	0.07%	0.24%	1.24%	99.12%	0.00%	0.00%	100.00%	100.00%	100.00%	72.40%	NA	NA

** 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

Monthly Point of Interconnection (POI) Congestion Report – Cellular Mobile services

Name of the Service Provider	Name of POI	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					
RCOM CDMA	All POIs meeting benchmark					
Aircel	All POIs meeting benchmark					
MTS	AIRTEL CHENNAI	154	4665	126.54	85.39	Requested for Augmentation with Airtel
Idea	All POIs meeting benchmark					
RCOM GSM	All POIs meeting benchmark					

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

8.2 Parameter wise performance reports for Basic Wireline services

1.1 Audit Results for Service provisioning

	Benchmark	BSNL	Airtel	TTSL	RCOM
Total registrations / OB note issued in General category		476	9814	9	105
Number of connections provided within 7 days		284	9814	9	105
Percentage of connections provided within 7 days	100%	59.66%	100.00%	100.00%	100.00%
Connections completed after 7 days including pending connections		170	0	0	0

1.2 Live calling for Service provisioning

	Benchmark	BSNL	Airtel	TTSL	RCOM
Total registrations / OB note issued in General category		267	100	7	100
Number of connections provided within 7 days		99	90	0	19
Percentage of connections provided within 7 days	100%	37.08%	90.00%	0.00%	19.00%
Connections completed after 7 days including pending connections		35	10	1	8

2.1 Audit Results for Fault repair

Fault incidences	Benchmark	BSNL	Airtel	TTSL	RCOM
Faults incidences (No. of faults/100 Subs./month)	≤ 5	1.45	5.24	0.58	0.5

Fault repair (Urban areas)	Benchmark	BSNL	Airtel	TTSL	RCOM
Total No. of faults registered during the month		2856	22425	217	461
No. of faults repaired by next working day during the month		2048	21542	149	461
Percentage of faults repaired by next working day during the month	≥ 90%	71.71%	96.06%	68.66%	100.00%
No. of faults repaired within 3 days during the month		2854	22035	191	461
Percentage of faults repaired within 3 days during the month	100%	99.93%	98.26%	88.02%	100.00%

Rent rebate	Benchmark	BSNL	Airtel	TTSL	RCOM
No. of cases with faults pending for >3 days and ≤7 days		0	225	17	0
Out of these number of cases where rent rebate for 7 days was given		0	225	17	0
Percentage of cases where rent rebate for 7 days was given	100%	NA	100.00%	100.00%	NA
No. of cases with faults pending for >7 days and ≤15 days		0	59	7	0
Out of these number of cases where rent rebate for 15 days was given		0	59	7	0
Percentage of cases where rent rebate for 15 days was given	100%	NA	100.00%	100.00%	NA
No. of cases with faults pending for ≥15 days		0	15	2	1
Out of these number of cases where rent rebate for 30 days was given		0	15	2	1
Percentage of cases where rent rebate for 30 days was given	100%	NA	100.00%	100.00%	100.00%

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

MTTR	Benchmark	BSNL	Airtel	TTSL	RCOM
Mean time taken to repair the fault in hours	≤ 8	4.12	3.95	11.77	4

2.2 Live calling for fault repair					
Urban area	**Benchmark**	**BSNL**	**Airtel**	**TTSL**	**RCOM**
Total Number of calls made		288	30	30	30
Number of cases where faults were repaired by next working day		78	24	6	20
Percentage cases where faults were repaired by next working day	≥ 90%	27.08%	80.00%	20.00%	66.67%
Number of cases where faults were repaired within 3 days		79	30	10	23
Percentage cases where faults were repaired within 3 days	100%	27.43%	100.00%	33.33%	76.67%

3.1 Audit Results for Call Completion Rate (CCR)					
Traffic statistics - Call Completion Rate	**Benchmark**	**BSNL**	**Airtel**	**TTSL**	**RCOM**
Total local call attempts		25422	19471449	1147273	NA
Total number of successful local calls		20904	17535475	1124576	NA
Call Completion Rate (CCR) in the local network	≥ 55%	82.23%	90.06%	98.02%	NA

Traffic statistics - Answer to Seizure Ratio	Benchmark	BSNL	Airtel	TTSL	RCOM
Total number of calls processed by the switch		443224	NA	NA	195667
Total number of calls answered		356336	NA	NA	165983
Answer to Seizure Ratio (ASR)	≥ 75%	80.40%	NA	NA	84.83%

3.2 Live measurement results for Call Completion Rate (CCR)					
Traffic statistics - Call Completion Rate	**Benchmark**	**BSNL**	**Airtel**	**TTSL**	**RCOM**
Total local call attempts		22733	735386	NA	NA
Total number of successful local calls		21743	672249	NA	NA
Call Completion Rate (CCR) in the local network	≥ 55%	95.65%	91.41%	92.78%	NA

Traffic statistics - Answer to Seizure Ratio	Benchmark	BSNL	Airtel	TTSL	RCOM
Total number of calls processed by the switch		461039	NA	NA	73451
Total number of calls answered		361878	NA	NA	62093
Answer to Seizure Ratio (ASR)	≥ 75%	78.49%	NA	NA	84.54%

4.1 Audit Results for POI Congestion					
POI congestion	**Benchmark**	**BSNL**	**Airtel**	**TTSL**	**RCOM**
POI traffic offered on all individual POI's		296498	DNA	NA	1018
Served traffic for all POI's		218441	DNA	NA	1018
Traffic failed on all POI's	≤ 0.5%	0.26	0.00%	NA	0.00%

4.2 Live measurement results for POI congestion					
POI congestion	**Benchmark**	**BSNL**	**Airtel**	**TTSL**	**RCOM**
POI traffic offered on all individual POI's		DNA	DNA	NA	987
Served traffic for all POI's		DNA	DNA	NA	987
Traffic failed on all POI's	≤ 0.5%	0.00%	0.00%	NA	0.00%

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

5.1 Audit Results for Billing performance

Billing Performance	Benchmark	BSNL	Airtel	TTSL	RCOM
Billing disputes - Postpaid					
Total bills generated during the period		46791	141544	37329	15728
Total number of bills disputed		205	39	1	12
Percentage bills disputed	≤ 0.1%	0.44%	0.03%	0.00%	0.08%
Resolution of billing complaints					
Total complaints resolved in 4 weeks from date of receipt		205	39	1	12
Percentage complaints resolved within 4 weeks of date of receipt	100%	100.00%	100.00%	100.00%	100.00%
Period of applying credit / waiver					
Total number of cases requiring credit/waiver		27	0	0	0
Total number of cases where credit/waiver was made within 1 week		5	0	0	0
Percentage cases in which credit/waiver was received within 1 week	100%	18.52%	NA	NA	NA

5.2 Live calling results for resolution of billing complaints

Resolution of billing complaints	Benchmark	BSNL	Airtel	TTSL	RCOM
Total Number of calls made		12	99	6	11
Number of cases resolved in 4 weeks		2	32	2	6
Percentage cases resolved in 4 weeks	100%	16.67%	32.32%	33.33%	54.55%

6.1 Audit Results for Requests

Shift Requests	Benchmark	BSNL	Airtel	TTSL	RCOM
Total no. of requests received for Shifts		94	1944	0	11
Total no. of requests for shifts attended within 3 days		68	1885	0	11
Percentage of requests for shifts attended within 3 days	≥ 95%	72.34%	96.97%	NA	100.00%
Total no. of requests for shifts not attended or attended beyond 3 days		26	59	0	0

Closure Requests	Benchmark	BSNL	Airtel	TTSL	RCOM
Total no. of requests received for Closures		130	6298	0	498
Total no. of requests for closures attended within 7 days		118	6298	0	498
Percentage of requests for closures attended within 7 days	100%	90.77%	100.00%	NA	100.00%
Total no. of requests for closures not attended or attended beyond 7 days		12	0	0	0

6.2 Live calling for Requests

Shift Requests	Benchmark	BSNL	Airtel	TTSL	RCOM
Total no. of requests received for Shifts		56	100	0	7
Total no. of requests for shifts attended within 3 days		23	20	0	5
Percentage of requests for shifts attended within 3 days	≥ 95%	41.07%	20.00%	NA	71.43%
Total no. of requests for shifts not attended or attended beyond 3 days		33	29	0	0

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

7.1 Audit results for customer care (Electronically)

Customer Care Assessment	Benchmark	BSNL	Airtel	TTSL	RCOM
Total Number of calls received		266637	414689	3310	183069
Total Number of calls getting connected and answered		73830	414689	3310	47462
Percentage calls getting connected and answered	≥ 95%	27.69%	100.00%	100.00%	25.93%

7.2 Live calling results for customer care (Electronically)

Customer Care Assessment	Benchmark	BSNL	Airtel	TTSL	RCOM
Total Number of calls received		600	200	200	200
Total Number of calls getting connected and answered		294	100	100	100
Percentage calls getting connected and answered	≥ 95%	49.00%	50.00%	50.00%	50.00%

7.3 Audit results for customer care (Voice to Voice)

Customer Care Assessment	Benchmark	BSNL	Airtel	TTSL	RCOM
Total Number of calls received		266637	414689	3310	183069
Total Number of calls answered within 60 seconds		176340	400963	3297	124758
Percentage calls answered within 60 seconds	≥ 90%	66.13%	96.69%	99.61%	68.15%

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

Customer Care Assessment	Benchmark	BSNL	Airtel	TTSL	RCOM
Total Number of calls received		600	200	200	200
Total Number of calls answered within 60 seconds		273	97	96	98
Percentage calls answered within 60 seconds	≥ 90%	45.50%	48.50%	48.00%	49.00%

8.1 Audit results for refund of deposits

Refund	Benchmark	BSNL	Airtel	TTSL	RCOM
Total number of cases requiring refund of deposits		55	0	0	0
Total number of cases where refund was made within 60 days		55	0	0	0
Percentage cases in which refund was receive within 60 days	100%	100.00%	NA	NA	NA

9.1 Live calling for level 1 services

Level 1 services	Benchmark	BSNL	Airtel	TTSL	RCOM
Total no. of calls made		70	15	4	3
Calls answered in 60 sec		42	15	4	3
Calls answered after 60 sec		28	0	0	0

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

8.3 Parameter wise performance reports for Broadband services

1. Service Provisioning

1.1 Audit Results for Service provisioning

	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify	RCOM
Total connections registered during the period		11158	9787	104	913	267	1954
Number of connections provided within 15 days		11158	9787	104	913	267	1945
Percentage of connections provided within 15 days	100%	100.00%	100.00%	100.00%	100.00%	100.00%	99.54%
Number of connections provided after 15 days of registration of demand		0	0	0	0	0	9
Number of customers to whom credit is given for delayed connections		0	0	0	0	0	0
Percentage of customers to whom credit is given for delayed connections	100%	NA	NA	NA	NA	NA	NA

1.2 Live calling for Service provisioning

	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify	RCOM
Total connections registered during the period		100	100	100	100	100	81
Number of connections provided within 15 days		86	98	50	89	97	44
Percentage of connections provided within 15 days	100%	86.00%	98.00%	50.00%	89.00%	97.00%	54.32%

2. Fault Incidence / Clearance Statistics

2.1 Audit Results for Fault repair

Fault repair	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify	RCOM
Total No. of faults registered during the month		7767	9519	1011	16098	584	3054
No. of faults repaired by next working day during the month		7223	9318	914	14166	539	3053
Percentage of faults repaired by next working day during the month	> 90%	93.00%	97.89%	90.41%	88.00%	92.29%	99.97%
No. of faults repaired within 3 days during the month		7767	9455	1000	15776	584	0
Percentage of faults repaired within 3 days during the month	>99%	100.00%	99.33%	98.91%	98.00%	100.00%	99.97%

Rent rebate	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify	RCOM
No. of cases with faults pending for >3 days and ≤7 days		0	95	11	3238	NA	1
Out of these number of cases where rent rebate for 7 days was given		0	95	11	3238	NA	1
Percentage of cases where rent rebate for 7 days was given	100%	NA	100.00%	100.00%	100.00%	NA	100.00%
No. of cases with faults pending for >7 days and ≤15 days		0	11	1	302	NA	0
Out of these number of cases where rent rebate for 15 days was given		0	11	1	302	NA	0
Percentage of cases where rent rebate for 15 days was given	100%	NA	100.00%	100.00%	100.00%	NA	NA
No. of cases with faults pending for ≥15 days		0	2	0	80	NA	0
Out of these number of cases where rent rebate for 30 days was given		0	2	0	80	NA	0
Percentage of cases where rent rebate for 30 days was given	100%	NA	100.00%	NA	100.00%	NA	NA

Figures provided on All India basis – Not meeting the benchmark

B'mark = TRAI Benchmark, **DNP** = Details not provided, **NA:** Not Applicable

2.2 Live calling for fault repair

Fault repair	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify	RCOM
Total Number of calls made		30	30	30	30	30	30
Number of cases where faults were repaired by next working day		7	23	22	5	11	25
Percentage cases where faults were repaired by next working day	> 90%	23.33%	76.67%	73.33%	16.67%	36.67%	83.33%
Number of cases where faults were repaired within 3 days		15	29	27	12	20	27
Percentage cases where faults were repaired within 3 days	>99%	50.00%	96.67%	90.00%	40.00%	66.67%	90.00%

3. Billing performance

3.1 Audit Results for Billing performance

Billing Performance	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify	RCOM
Billing disputes							
Total bills generated during the period		265617	211439	1753	14439	NA	4485
Total number of bills disputed		0	36	11	159	NA	13
Percentage bills disputed	< 2%	0.00%	0.02%	0.63%	1.10%	NA	0.29%
Resolution of billing complaints							
Total complaints resolved in 4 weeks from date of receipt		0	36	11	159	NA	13
Percentage complaints resolved within 4 weeks of date of receipt	100%	NA	100.00%	100.00%	100.00%	NA	100.00%
Period of refund							
Total number of cases requiring refund		0	0	42	186	NA	0
Total number of cases where credit/waiver was made within 60 days		0	0	41	186	NA	0
Percentage cases in which credit/waiver was received within 60 days	100%	NA	NA	97.62%	100.00%	NA	NA

3.2 Live calling results for resolution of billing complaints

Resolution of billing complaints	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify	RCOM
Total Number of calls made		0	5	9	50	NA	15
Number of cases resolved in 4 weeks		0	4	6	27	NA	2
Percentage cases resolved in 4 weeks	100%	NA	80.00%	66.67%	54.00%	NA	13.33%

4. Response time to the customer for assistance

4.1 Audit results for customer care (Voice to Voice)

Customer Care Assessment	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify	RCOM
Total Number of calls received		152065	88768	4752	447054	1021	288022
Total Number of calls answered within 60 seconds		143853	83677	4400	353664	1010	263137
Percentage calls answered within 60 seconds	> 60%	94.60%	94.26%	92.59%	79.11%	98.92%	91.36%

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

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

Customer Care Assessment	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify	RCOM
Total Number of calls received		100	100	100	100	100	100
Total Number of calls answered within 60 seconds		0	95	100	100	100	100
Percentage calls answered within 60 seconds	> 60%	0.00%	95.00%	100.00%	100.00%	100.00%	100.00%

* All calls for BSNL were picked up after 2 minutes

4.3 Audit results for customer care (Voice to Voice)

Customer Care Assessment	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify	RCOM
Total Number of calls received		152065	88768	4752	447054	112	288022
Total Number of calls answered within 90 seconds		152065	85563	4511	369445	112	272469
Percentage calls answered within 90 seconds	> 80%	100.00%	96.39%	94.93%	82.64%	100.00%	94.60%

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

Customer Care Assessment	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify	RCOM
Total Number of calls received		100	100	100	100	1021	100
Total Number of calls answered within 90 seconds		0	100	100	100	1021	100
Percentage calls answered within 90 seconds	> 80%	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%

* All calls for BSNL were picked up after 2 minutes

5. Bandwidth utilization

5.1 Audit results for Bandwidth Utilization

Bandwidth utilization	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify	RCOM
Intra-network links (POP to ISP Node)							
Total number of intra network links		213	740	NA	19	400	21
Total Bandwidth Available at the links (in Mbps)		213000	539692	NA	11826	14614	29928
Total Bandwidth utilized at all the links during TCBH (In Mbps)		34784	389021	NA	7908	4620	9630
Percentage Bandwidth utilized	<80%	16.33%	72.08%	NA	66.87%	31.61%	32.18%
No of Intra network found to be above 90%		0	0	NA	0	0	0
International Bandwidth							
Total number of upstream links		280	1	2	5	20	18
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In mpbs)		43400	5349	19	59142	2830	22482
Total International Bandwidth utilized during peak hours		30386	4762	15	26545	2355	7857
Percentage Bandwidth utilization during peak hours (In mpbs)	<80%	70.01%	89.03%	78.95%	44.88%	83.22%	34.95%
No of Intra network found to be above 90%		0	0	0	0	0	0

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

5.2 Live measurement results for Bandwidth Utilization

Bandwidth utilization	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify	RCOM
Intra-network links (POP to ISP Node)							
Total number of intra network links		143	751	NA	19	394	21
Total Bandwidth Available at the links (in Mbps)		143000	541673	NA	DNA	15813	29928
Total Bandwidth utilized at all the links during TCBH (In Mbps)		19765	389021	NA	DNA	4550	9630
Percentage Bandwidth utilized	<80%	13.82%	71.82%	NA	<80%	28.77%	32.18%
No of Intra network found to be above 90%		0	1	NA	0	0	0
International Bandwidth							
Total number of upstream links		280	1	2	5	20	18
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In mpbs)		43400	5349	18	10240	2730	22482
Total International Bandwidth utilized during peak hours		33677	4762	12.9	5629.13	2267	7857
Percentage Bandwidth utilization during peak hours (In mpbs)	<80%	77.60%	89.03%	71.67%	54.97%	83.04%	34.95%
No of Intra network found to be above 90%		0	1	0	0	0	0

6. Broadband download speed

6.1 Live calling results for broadband download speed

Broadband download speed	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify	RCOM
Total committed download speed to the sample subscribers (In mpbs) (A)		25600	512	2	12800	12800	12800
Total average download speed observed during TCBH (In Mpbs) (B)		23474	512	1.7	11558	11200	11584
%age subscribed speed available to the subscriber during TCBH (B/A)*100	>80%	91.70%	100.00%	85.00%	90.30%	87.50%	90.50%

7. Service availability / uptime

7.1 Audit results for service availability

Service Availability	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify	RCOM
Total Operational Hours		126000	720	2993280	1628640	744	744
Total Downtime		23	0.1	35782	28421	0	1.55
Total time when the service was available		125977	719.9	2657498	1600219	744	742.45
Service Availability Uptime in Percentage	>98%	99.98%	99.99%	88.78%	98.25%	100.00%	99.79%

7.2 Live measurement results for service availability

Service Availability	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify	RCOM
Total Operational Hours		7416	720	252336	81432	72	25
Total Downtime		1.4	0.1	0	1056	0	0.5
Total time when the service was available		7414.6	719.9	252336	80376	72	24.5
Service Availability Uptime in Percentage	>98%	99.98%	99.99%	100.00%	98.70%	100.00%	98.00%

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

8. Network latency / Packet loss

8.1 Audit results for Latency and packet loss

Network Latency and Packet Loss	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify	RCOM
Packet Loss (Percentage)	< 1%	0.04%	0.00%	0.80%	0.00%	<1%	0.47%
Network Latency							
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	12	50	31	<80	<45	Complied
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	232	172.5	293	<250	<300	Complied

8.2 Live measurement results for Latency and packet loss

Network Latency and Packet Loss	Benchmark	BSNL	Airtel	You Telecom	VSNL	Sify	RCOM
Packet Loss (Percentage)	< 1%	0.01%	0.00%	0.80%	0.00%	0.00%	0.47%
Network Latency							
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	18	59	35	56	44	12
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	224	192	273	105	228	147

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	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. **Computational Methodology:** • BTSs Accumulated downtime = Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month X 100 --- 24 X No. of days in the month X No. of BTSs in the network in the licensed service area • Worst affected BTSs due to downtime = No. of BTSs having accumulated downtime >24 hours in a month X 100 --- Total No. of BTSs in the network in the licensed service area
Benchmark	• BTSs Accumulated downtime (not available for service) ≤ 2% • Worst affected BTSs due to downtime ≤ 2%
Audit Procedure	**IMRB** auditors collected and verified data pertaining to: The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) used for arriving at the benchmark reported to TRAI were audit

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

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

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

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

6. Service Coverage	
Computational Methodology as per QoS definition	Definition: ➢ The level of signal available in a particular part of a city is known as signal strength. **Computational Methodology:** ➢ Service Coverage for route type x = [(N1 x CSS1) + (N2 x CSS2) + …..+ (Nn x CSSn)] / (N1 + N2 +…….+Nn) ➢ Where:-N1 = Number of calls on type of route x made in drive test 1 ➢ CSS1 = Average coverage signal strength on type of route x in drive test 1 (in dBm) ➢ N2 = Number of calls on type of route x made in drive test 2 ➢ CSS2 = Average coverage signal strength on type of route x in drive test 2 (in dBm) ➢ Nn = Number of calls on type of route x made in drive test n ➢ CSSn = Average coverage signal strength on type of route x in drive test n (in dBm)
Benchmark	**Indoor >= -75 dBm** **In-vehicle >= -85 dBm** **Outdoor – in city >= -95 dBm**
Audit Procedure	**IMRB Auditors collected and verified call centre records pertaining to**: ➢ Audit was conducted based on the details of periodic drive tests conducted at different part of the network during Time consistent busy hour (TCBH) which were used to arrive at the benchmarks reported to TRAI. ➢ Procedures were verified that were to be followed by operator for obtaining relevant details for computing this parameter:- ➢ Operator to conduct at least one drive test using standard drive test equipment* every week during Time consistent busy hour (TCBH). ➢ Each drive test should evenly cover the following 5 types of locations: – ➢ 3 Outdoor (Periphery of the city, Congested Area, Across the City), and ➢ 2 Indoor (Office Complex and Shopping Complex) ➢ *Measurements using Engineering handsets were not acceptable*

7. Response time to customer (Electronically and Voice to Voice)	
Computational Methodology	**To connect to IVR:** The time taken to connect a person (as soon as he presses call) to the IVR of the service provider **To connect to operator:** The time taken to connect a person (as soon as he presses 9) to the customer care executive **Computational Methodology:** • % age of calls getting connected (electronically) = number of calls getting connected electronically X 100 / Total number of calls made • % age of calls answered within 60 sec (voice to voice) = Total number of calls answered within 60 seconds X 100 / Total number of calls made
Benchmark	➢ % age of calls getting connected and answered (electronically) ≥ 95% ➢ % age of calls answered by operator (voice to voice) within 60 seconds ≥ 90%

Audit Procedure	-IMRB auditors made test calls from the exchanges to the operator's customer care / helpline / toll free numbers. They will record the time taken to connect a customer's call both to the IVR as well as to a customer care executive. - All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services. - Time to answer the call by the operator should be taken from the time auditor has pressed the requisite button for being assisted by the operator. **Live calling: -** - Overall sample size is 2*50 calls per service provider per circle at different points of time, evenly distributed across the selected exchanges – 50 calls between 1000 HRS to 1300 HRS and 50 calls between 1500 HRS to 1700 HRS - Time to answer the call by the operator was assessed from the time interviewer pressed the requisite button for being assisted by the operator. - All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.

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

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

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

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

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

5. Response time to customer (Electronically and Voice to Voice)	
Computational Methodology	Percentage of calls answered in a specified time = (Total no. of calls answered within that specified time / Total no. of calls dialed for a particular service)*100
Benchmark	(i) % age of calls answered (electronically): In 95% of the cases or more (ii) % age of calls answered by operator / voice to voice) within 60 seconds: In 90% of the cases or more

Audit Procedure	-IMRB auditors made test calls from the exchanges to the operator's customer care / helpline / toll free numbers. They will record the time taken to connect a customer's call both to the IVR as well as to a customer care executive. - All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services. - Time to answer the call by the operator should be taken from the time auditor has pressed the requisite button for being assisted by the operator. **Live calling: -** - Overall sample size is 2*50 calls per service provider per circle at different points of time, evenly distributed across the selected exchanges – 50 calls between 1000 HRS to 1300 HRS and 50 calls between 1500 HRS to 1700 HRS - Time to answer the call by the operator was assessed from the time interviewer pressed the requisite button for being assisted by the operator. - All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.

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

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

9.3 Broadband services

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

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

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

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

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

4. Response time to customer for assistance	
Computational Methodology as per QoS definition	**%age of calls answered by operator (voice to voice) within n seconds** = (Number of calls where time taken for operator to respond* >= n sec / Total number of calls where an attempt to route to the operator was made) x 100 Time taken for operator to respond = Time when an operator responds to a call – Time when the relevant code to reach the operator is 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	**Live calling : -** -Details of live customers were obtained from the service providers -Overall **50 number** of live calls at were made during peak hours in a licensed service area/circle for each service provider to assess the download speed available to subscribers. Tool provided by the on the service providers website was used for the same -Details of total committed download speed and speed available to the users were recorded for each of the subscriber - Percentage download speed available was calculated as = Sum of total speed available for 50 customers/Total committed download speed for 50 customers*100

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

Packet loss	
Computational Methodology as per QoS definition	Packet loss is the percentage of packets lost to total packets transmitted between two designated Customer Premises Equipments/Router ports. It is the measurement of packet lost from the broadband customer (User) configuration/User reference point at POP/ISP Node to IGSP/NIXI Gateway and to the nearest NAP port abroad The packet loss is measured by computing the percent packet loss of **1000 pings of 64 byte packet each**. Service provider needs to carry out such tests daily during Time Consistent Busy Hour(TCBH) and report the average results for the month in the performance monitoring report to TRAI Minimum sample reference points for each service area shall be three in number or multiple reference points if required **Hence Packet loss is computed by the formula - (Total number of ping packets lost during the period/Total number of ping packets transmitted)* 100**
Benchmark	<1 %
Audit Procedure	**IMRB Auditors collected and verified call centre records pertaining to** - Records maintained for ping tests conducted during the period of July to September 2007 - Smoked ping test (wherever available) results for the period of July to September 2007 - Results of live ping tests conducted during three day live measurement and month of Audit (During peak hours) - Live ping tests were conducting by selecting a minimum of three user reference test points at POP/ISP Node in each circle

Network Latency	
Computational Methodology as per QoS definition	Latency is the measure of duration of a round trip for a data packet between specific source and destination Router Port/Customer Premises Equipment (CPE). The round trip delay for the ping packets from ISP premises to the IGSP premises to the IGSP/NIXI gateway and to the nearest NAP port abroad are measured by computing delay for **1000 pings of 64 bytes each** (Pings are to be sent subsequent to acknowledgement received for the same for previous ping) Service provider needs to carry out such tests daily during Time Consistent Busy Hour(TCBH) and report the average results for the month in the performance monitoring report to TRAI Minimum sample reference points for each service area shall be three in number or multiple reference points if required **Hence the formula for network latency would be Network latency for X days= Total round trip time for all the ping packets transmitted in X days /No of days during the period**
Benchmark	< 120 msec from user reference point at POP/ISP Node to International Gateway < 350 msec from User reference point at ISP Gateway Node to International nearest NAP port (Terrestrial) < 800 msec from User reference point at ISP Gateway Node to International nearest Nap port (Satellite)
Audit Procedure	**IMRB Auditors collected and verified call centre records pertaining to** - Records maintained for ping tests conducted during the period of July to September 2007 - Smoked ping test (wherever available) results for the period of July to September 2007 - Results of live ping tests conducted during three day live measurement and month of Audit (During peak hours) - Live ping tests were conducting by selecting a minimum of three user reference test points at POP/ISP Node in each circle

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