Objective Assessment of Quality of Services for (QoS) for Cellular Mobile (Wireless) Service Providers – Assam Circle

Report: April–May - June - 2011

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

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A specialist unit of IMRB International

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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 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.

The Audit module for various circles within the Zones, due the sheer scale of data collection, has been distributed across various quarterly periods. IMRB International Auditors carried out Audits across Orissa, Bihar & Jharkhand, West Bengal, North-East, Assam and Kolkata circles in the second quarter of 2011. **This report details the performance of various service providers in Assam circle against Quality of Services benchmarks for various parameters laid down by TRAI in respective regulations for Cellular (Mobile) services.**

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1.0 **Background**

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

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

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

This report highlights the findings for the Audit module for Assam circle that was covered in period of April-June 2011. The verification of records maintained by various operators of Cellular Mobile (Wireless) service was undertaken by the auditors of IMRB International during the period Oct-Dec 2010.

This report highlights the Audit Module findings for "Assam" circle for Cellular Mobile services

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2.0 Objectives and Methodology

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

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

1. **Verification of the data submitted by service providers:** This involved verification of the quarterly Performance Monitoring Reports (PMR's) and monthly Point of Interconnect (POI) Congestion reports being submitted by various service providers. The raw data in the records maintained by service providers was audited to assess the book keeping methodology.

2. **Live measurement for three days:** Network performance of service providers was assessed for three days in the month in which the Audit was carried out. Live figures from the server/ NMS software were recorded for various network related parameters.

3. **Data verification for the month in which Audits were carried out:** Subsequent to the visits for Audit during the live measurement at various Exchanges/ISP Nodes/Exchanges, data for all the network and Non network related parameters was collected from various service providers for the complete month in which the Audit was carried out. Raw data/records pertaining to these were also verified on sample basis to check the veracity of data provided by the operators.

4. **Drive tests:** Operator assisted 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 various parameters

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

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3.0 Sampling methodology

3.1 Sampling for Cellular Mobile (Wireless) service providers

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

	Name of Operator	Month of Audit
Operator 1	BSNL	April, 2011
Operator 2	Aircel	April, 2011
Operator 3	Airtel	April, 2011
Operator 4	Idea	April, 2011
Operator 5	Loop	April, 2011
Operator 6	Reliance	April, 2011
Operator 7	S Tel	April, 2011
Operator 8	Tata Indicom	April, 2011
Operator 9	Vodafone	April, 2011

4.0 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		

5.0 Executive Summary

The objective assessment of Quality of Services (QoS) was carried out by IMRB International for all the Cellular mobile service providers during the period starting from April 2011 to June 2011 in Assam circle. The executive summary encapsulates the key findings of the Audit by providing: -

- *"Service provider performance report"* for Cellular mobile service , which gives a glimpse of the performance of various operators against the benchmark specified by TRAI, during the month in which the Audit was carried out by IMRB Auditors

- *"Parameter wise critical findings"* for Cellular mobile services: This indicates key observations and findings from different activities carried out during the Audit process

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

Name of Service Provider	Time Consistent Busy Hour (TCBH)	Network Availability					Connection Establishment (Accessibility)			Connection Maintenance (Retainability)					POI	Network Traffic Capacity and Utilization			
		Total no. of BTSs in the licensed service area	Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month	BTSs Accumulated downtime (not available for service) (%age)	No. of BTSs having accumulated downtime of >24 hours in a month	Worst affected BTSs due to downtime (%age)	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Total No. of cells exceeding 3% TCH drop (call drop)	Total no. of cells in the network	Worst affected cells having more than 3% TCH drop (call drop) rate (%age)	%age of connection with good voice quality	POI Congestion (No. of POIs not meeting the benchmark) Note :2)	Total number of working POI Service Area wise	Equipped Capacity of Network in respect of Traffic in erlang	Total traffic handled in TCBH in erlang	Total no. of customers served (as per VLR) on last day of the month
Benchmark				≤ 2%		≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%			≤ 5%	≥ 95%	≤ 0.5%				
BSNL	19:00 - 20:00	1302	14235	1.47%	187	14.36%	97.00%	1.00%	1.98%	1.95%	292	3869	7.55%	95.91%	0	20	129575	15709	907218
Aircel	19:00 - 20:00	2231	10004	0.60%	88	3.94%	98.08%	0.84%	1.11%	1.04%	373	6672	5.59%	90.90%	0	56	195556	95141	2508344
Airtel	20:00 - 21:00	2527	6795	0.36%	21	0.83%	97.30%	0.39%	1.17%	1.62%	119	7573	1.57%	99.14%	0	68	134852	105319	2592667
Idea	19:00 - 20:00	591	498	0.11%	0	0.00%	99.07%	0.83%	0.49%	1.46%	1521	53190	2.86%	96.28%	0	26	13120	6999	226954
Loop	19:00 - 20:00	4	11	0.35%	0	0.00%	99.98%	0.50%	0.00%	0.12%	0	15	0.00%	99,99%	0	10	111	14	13
Reliance	19:00 - 20:00	1274	242	0.03%	0	0.00%	99.35%	0.69%	0.80%	0.53%	3	3822	0.08%	98.62%	0	14	109000	68028	1493457
S Tel	20:00 - 21:00	391	1563	0.54%	5	1.28%	98.83%	0.35%	0.20%	0.59%	55	1171	4.70%	98.40%	0	21	7238	804	39760
Tata Indicom	20:00 - 21:00	271	499	0.25%	0	0.00%	99.49%	0.00%	0.04%	0.50%	3	843	0.36%	99.19%	0	30	34563	4393	64530
Vodafone	19:00 - 20:00	2120	9678	0.61%	39	1.84%	98.00%	0.49%	0.99%	0.84%	189	6360	2.97%	97.64%	0	30	49611	42112	1256332

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

** Methodology not in line with QoS

Figures provided on All India basis

Not meeting the benchmark

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

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Critical findings: Cellular Mobile Services

The audit for cellular mobile service providers were conducted at their respective MSCs in the Assam circle apart from Reliance Communication whose audit was conducted at their central NOC at Mumbai.

The audit involved a three stage verification process which consisted of auditing the records of the service providers and verifying the data submitted to TRAI. The second step involved a three day live measurement of all the network parameters. Finally basis the three day live measurement the auditors needed to find out the busy hour for the service provider and collect the hourly data for this busy hour for the month in which the audit was conducted.

Busy Hour of Various Service Providers

Service Provider	Reported Time Consistent Busy Hour	Network Busy Hour found in 3 day live measurement
BSNL	19:00 - 20:00	19:00 - 20:00
Aircel	19:00 - 20:00	19:00 - 20:00
Airtel	20:00 - 21:00	20:00 - 21:00
Idea	19:00 - 20:00	19:00 - 20:00
Loop	19:00 - 20:00	19:00 - 20:00
Reliance	19:00 - 20:00	19:00 - 20:00
S Tel	20:00 - 21:00	20:00 - 21:00
Tata Indicom	20:00 - 21:00	20:00 - 21:00
Vodafone	19:00 - 20:00	19:00 - 20:00

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

BTSs Accumulated Downtime:
In the Assam circle, BSNL experienced the highest outage in the month of audit.and also the highest no. of BTS (187) having accumulated downtime of >24 hours in a month.

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 LOOP with 99.98% 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. Loop and TATA Indicom lead the way in network congestion parameters with almost negligible paging as well as traffic channel congestion. The calculation methodology of these parameters was found to be in complete accordance with what has been specified by TRAI. Both RCOM CDMA and Tata Teleservices measure paging channel utilization. When the value of this parameter is less than 100%, it is counted as 0% congestion. There were no POIs with congestion more than the benchmark (≤0.5%).

Call Drop Rate:
During the audit it was found that all the service providers were measuring this parameter as per the TRAI guidelines. The call drop rate was measured as the ratio of total calls dropped to the total number of call attempts for all operators. Also, all of service providers were found to be meeting the TRAI specified benchmark. The lowest call drop rate was of LOOP at 0.12% while the highest was for BSNL at 1.95%.

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Connections with good voice quality:
All the operators are measuring this parameter via their periodic drive tests. However, for some operators these parameters can be obtained at their switch as well. During the audit it was found that all the service providers were measuring this parameter as per the TRAI guidelines. It was found that Aircel was not meeting the voice quality benchmark.

Customer Care / Helpline Assessment
For the accessibility of customer care aspect all the service providers meet the TRAI benchmark. BSNL, Aircel, Airtel, Idea, S-Tel and Vodafone do not meet the benchmark for the month of audit for the percentage of calls answered by the operators (voice to voice) within 60 seconds.
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Billing performance
Except Airtel (metering and billing credibility(postpaid) and (prepaid)) and Vodafone(metering and billing credibility(postpaid)) all the operators were found to be meeting the benchmark of ≤ 0.1% complaints registered per 100 bills issued. In all cases where customers were due for refund, all the service providers were meeting the TRAI benchmark of 100% within 1 week.

Inter operator calls assessment

Inter operator call Assessment To↓ From→	BSNL	Aircel	Airtel	Idea	Loop	Reliance	S Tel	Tata Indicom	Vodafone
BSNL	NA	92%	100%	97%	98%	98%	100%	100%	100%
Aircel	100%	NA	98%	93%	96%	100%	100%	100%	93%
Airtel	100%	99%	NA	98%	60%	100%	97%	84%	80%
Idea	100%	93%	87%	NA	100%	100%	100%	98%	100%
Loop	100%	90%	100%	97%	NA	100%	100%	100%	100%
Reliance	100%	99%	100%	96%	98%	NA	100%	100%	100%
S Tel	100%	96%	100%	87%	100%	100%	NA	100%	100%
Tata Indicom	100%	100%	100%	99%	98%	59%	98%	NA	100%
Vodafone	100%	100%	100%	100%	96%	97%	100%	100%	NA

The problems 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. Almost all service providers except BSNL had difficulty in connecting to the number of one or the other service provider. For most of the service providers it was difficult connecting to an Aircel and Airtel number.

Results of Operator assisted Drive test

The drive test was conducted simultaneously for all the operators present in the Assam circle. There was in total of three drive tests conducted in the circle. These tests were conducted in the cities of Guwahati, Tezpur and Nagaon. 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 Assam telecom 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 dms for in-vehile and > -95 dbm outdoor routes.

The drive tests in the Assam circle were conducted in the cities of Guwahati, Tezpur and Nagaon was conducted along the following route:

	Type of location	Guwahati	Tezpur	Nagaon
Outdoor	Peiphery of the city	Bharalu, MAligaon, Adabari, JAlukbari, Guwahati University, Airport, JAlukbari, Sarighat, Amingaon, Indira Gandhi Indoor Stadium, Jalukbari, NH-37, Khanapara, Sixmile, VIP Road, Satgaon, Narengi, Noon mati	Mission Chariali, Keteki Bari, Majgaon, Baruah Chariali, Nilkamal Chariali, NH-37, Dolabari No. 1, Barika Chubuli Ex. Police Line, Tribeni, NT Road, Kamar Chuburi	Lakhinagar, no2 amolapatty, sani mandir road, sms road, dhing road, hoiborgaon railway station, tarun lhukan road, 1.k road, M.D road, ADP road, Chistianbasti. Doboka Road, Poraj Bora Nath, Ranigaon, 2 no panigaon, Masjid Road, Paniali Kesa ali, Balibhau, Nortam Panigaon, Nagaon Polytechnic, Nagaon Kendriya Bidyalaya, Difalu, Poly Road, Chayali Amolapatty
	Congested area	Panbazar, Donbosco Main gate, Panbazar Flyover, Paltan BAzar, Ulubari Flyover, DGP office, Sarabbhati Nepali Mandir, Vishal Megamart, MLN Road, H.B.Road, Fancy Bazar, LOG Hindi H.S, Athgaon, Bharalu	Head Post Office, Neheru Bali Stadium, ASTC, Swahid Chariali New Amolapatty Hospital Road, Polo Field, NAtunpara, Lachit Chowk, JB Road, Jyotish Road, Sc Road	Natun bazaar, North Hoiborgaon, Laokhowa Road, M Dev Road, AT road, M.D Road, Masjid Road, Dhakapatty, GNB road, LNB road, Bhuyanpatty, AJB Road, Khutikotia, A.R.B road, R.R.B road, RKK Road, Kasalukhava Railway Gate, Motiram Bora Road, K Ahmed Road
	Across the city	Noonmati, Chanmari, R.G.Baruah, Ganeshguri, Hatigaon, Bhetapara, Beltola, Tiniali, Dispur Last Gate, Super Market, Ganeshguri, Bhangagarh, GMC	Dadhara Bamum Chuburi, Majgaon, Nabapur, Rubber Bagan, Darrang College Road, Mhabhairab, LDS Road, Baroholia, LDS Road, Borohia, GNB Road	Sensowa Khutikatiya, AT Road, Haiborgaon, Nagaon Head Post Office, Nagaon College, Stadium Market, Natun Bazaar, Panigaon, Dimoruguri, Tinali, Pratap Ch Road, BM Road, Police Reserve, Lakhinagar Chariali
Indoor	Office complex	Guwahati Medical College	Head Post Office	ASTC Nagaon office
	Shopping complex	Big Bazar	Vishal Mega Mart	Stadium Market Complex

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

Drive Test – Guwahati

	B'mark	BSNL		Aircel		Airtel		Idea		Reliance		S Tel		Tata Indicom		Vodafone	
		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%	94.39%	91.64%	98.33%	95.71%	98.93%	97.67%	95.60%	95.84%	99.39%	96.52%	94.54%	89.77%	92.09%	92.78%	96.81%	95.63%
CSSR	≥ 95%	96.55%	98.80%	98.59%	100.00%	100.00%	100.00%	100.00%	97.94%	100.00%	99.05%	95.24%	87.69%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls		3.45%	1.20%	1.41%	0.00%	0.00%	0.00%	0.00%	2.06%	0.00%	0.95%	4.76%	12.31%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	2.47%	0.00%	0.00%	0.00%	0.00%	0.00%	1.05%	0.00%	0.00%	0.00%	2.34%	0.00%	0.28%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	96.83%	100.00%	97.46%	100.00%	98.32%	100.00%	100.00%	100.00%	100.00%

Drive Test – Tezpur

	B'mark	BSNL		Aircel		Airtel		Idea		Reliance		S Tel		Tata Indicom		Vodafone	
		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%	92.69%	92.39%	94.46%	96.53%	99.25%	98.49%	98.96%	97.92%	97.01%	96.29%	99.25%	98.49%	93.22%	94.33%	96.10%	95.85%
CSSR	≥ 95%	90.00%	89.50%	95.31%	99.28%	100.00%	100.00%	100.00%	99.42%	100.00%	99.52%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls		10.00%	10.50%	4.69%	0.72%	0.00%	0.00%	0.00%	0.58%	0.00%	0.48%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	23.61%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	0.00%	100.00%	100.00%	98.25%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Drive Test – Nagaon

	B'mark	BSNL		Aircel		Airtel		Idea		Reliance		S Tel		Tata Indicom		Vodafone	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	≥ 95%	97.10%	93.89%	98.33%	98.66%	98.10%	97.67%	99.21%	96.52%	97.47%	96.40%	98.79%	97.03%	94.40%	94.33%	95.80%	96.26%
CSSR	≥ 95%	100.00%	96.07%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.06%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls		0.00%	3.93%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.94%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.48%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	0.00%	100.00%	100.00%	99.26%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Not meeting the benchmark

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

ALL SERVICE PROVIDERS

Guwahati: There was interference and low signal strength recorded for all operators in the outdoor areas of Bharalu, Big Bazaar, Paltan Bazar, Maligaon, Nepal Mandir, GMCH, Amingaon, HB Road while in the indoor areas inadequate coverage was not found in any of the areas.

Tezpur: There was interference and low signal strength recorded for all the operators in the outdoor areas of New Amulapatty, Natunpara, LDS Road, Head Post Office while in the indoor areas there was no inadequate coverage or interference recorded.

Nagaon: There was interference and low signal strength recorded for all operators in the outdoor areas of Dhing Road, Bhuyan Patti, ADP Road, Natun Bazar, LNB Road, Doboka Road while in the indoor areas no interference and inadequate coverage was recorded.

Conclusions:
Drive test was conducted by IMRB with the help of service providers to measure this parameter. In the drive test it was found that:
1. BSNL and Tata Indicom do not meet the TRAI benchmark for voice quality in all the 3 cities were drive test was conducted. Moreover, S-Tel did not meet the voice quality benchmark in Guwahati and Aircel did not meet the voice quality benchmark in Tezpur.
2. BSNL in Tezpur and S-Tel in Guwahati did not meet the TRAI benchmark for CSSR.
3. BSNL did not meet the TRAI benchmark for Call Drop Rate in Tezpur and Guwahati while S-Tel did not meet the TRAI benchmark for Call Drop Rate in Guwahati.

Summary of Live Measurement Results – Cellular Mobile Services

Name of Service Provider	Connection Establishment (Accessibility)			Connection Maintenance (Retainability)			Metering and Billing	Response time to customer for assistance	
	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality	%age complaints resolved within 4 weeks	Accessibility of call centre/ customer care	Percentage of calls answered by the operators (voice to voice) within 60 seconds
Benchmark	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 5%	≥ 95%	100%	≥ 95%	≥ 90%
BSNL	97.66%	1.06%	1.42%	3.08%	23.55%	93.04%	NA	100.00%	54.00%
Aircel	98.76%	1.03%	0.58%	0.88%	7.10%	96.85%	100.00%	100.00%	92.00%
Airtel	99.66%	0.18%	1.25%	0.99%	3.49%	98.20%	68.00%	100.00%	90.00%
Idea	99.41%	0.48%	0.20%	1.48%	2.64%	96.66%	100.00%	100.00%	98.00%
Loop	100.00%	0.43%	0.00%	0.00%	0.00%	NA	NA	100.00%	94.00%
Reliance	99.42%	0.00%	0.48%	0.89%	0.89%	97.10%	66.00%	100.00%	92.00%
S Tel	99.31%	0.00%	0.00%	0.53%	3.76%	94.72%	NA	98.00%	88.00%
Tata Indicom	99.58%	0.00%	0.03%	0.47%	0.55%	93.46%	100.00%	100.00%	60.00%
Vodafone	97.96%	0.32%	1.16%	1.14%	2.23%	96.04%	92.86%	100.00%	98.00%

▢ Not meeting the benchmark

* Based on operator assisted drive tests conducted by IMRB

During the three day live measurement, it was found that:

1. BSNL and Aircel are not meeting the TRAI benchmark for Paging Channel Congestion.
2. BSNL is the only service provider not meeting the call drop TRAI benchmark.
3. BSNL and Aircel are not meeting the TRAI benchmark for worst affected cells having more than 3% TCH drop.
4. BSNL. S-Tel and Tata Indicom are not meeting the TRAI benchmark for voice quality.
5. Airtel, Reliance and Vodafone are not meeting the TRAI benchmark 100% for complaints resolved within 4 weeks.
6. BSNL, S-Tel and Tata Indicom do not meet the benchmark for the month of audit for the percentage of calls answered by the operators (voice to voice) within 60 seconds.

6.0 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
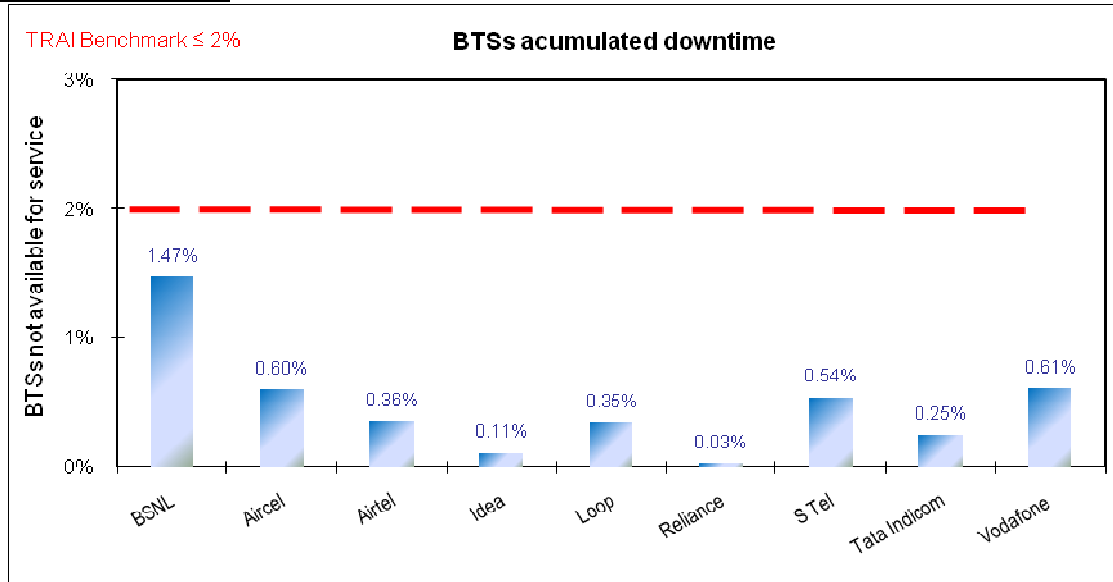
All the operators meet the benchmark

Worst Affected BTSs
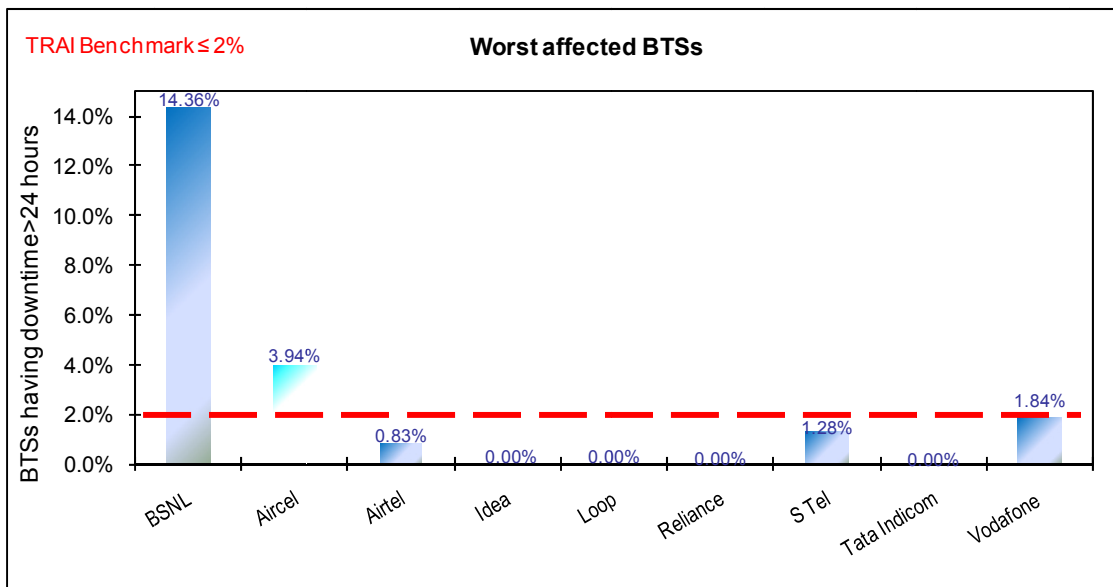
Operator(s) meeting benchmark: Airtel, Idea, Loop, Reliance, S Tel, Tata Indicom, Vodafone
Operator(s) not meeting the benchmark: BSNL, Aircel

Call Set-up Success Rate (CSSR)

One month
All the operators meet the benchmark

Live measurement
All the operators meet the benchmark

Drive test
Operator(s) meeting benchmark: Aircel, Airtel, Idea, Loop, Reliance, S Tel, Tata Indicom, Vodafone
Operator(s) not meeting the benchmark: BSNL

SDCCH / Paging Channel Congestion
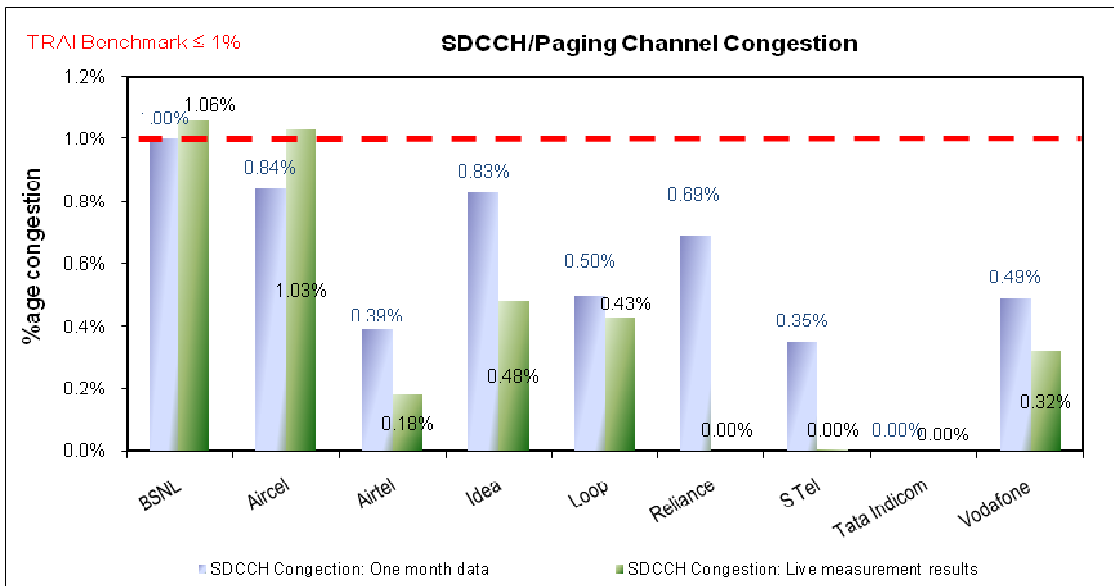
One month
All the operators meet the benchmark

Live measurement
Operator(s) meeting benchmark: Airtel, Idea, Loop, Reliance, S Tel, Tata Indicom, Vodafone
Operator(s) not meeting the benchmark: BSNL, Aircel

TCH Congestion

One month
All the operators meet the benchmark

Live measurement
All the operators meet the benchmark

Call Drop Rate
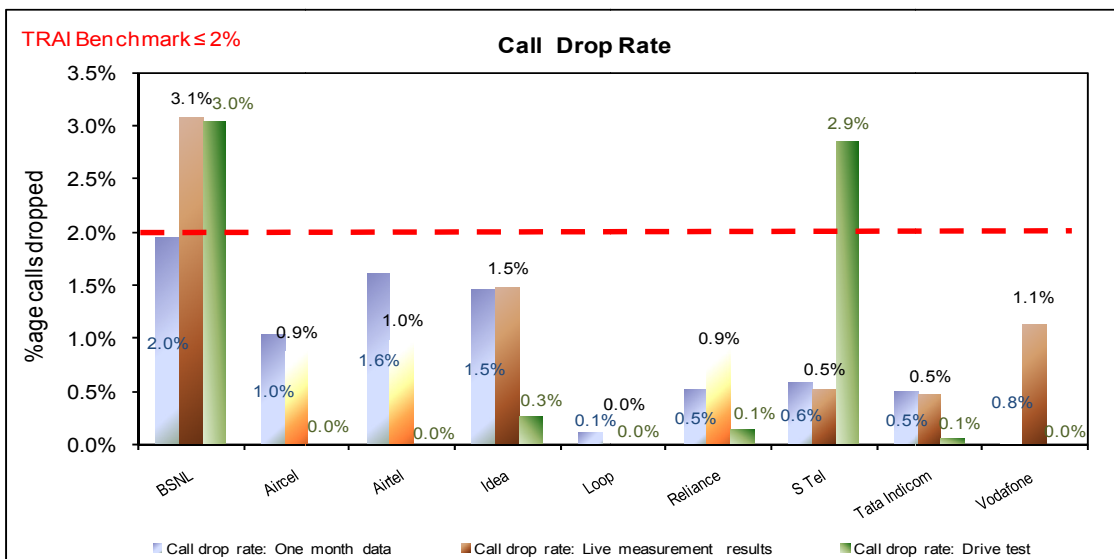
One month
All the operators meet the benchmark

Live measurement
Operator(s) meeting benchmark: Aircel, Airtel, Idea, Reliance, S Tel, Tata Indicom, Vodafone
Operator(s) not meeting the benchmark: BSNL

Drive test
Operator(s) meeting benchmark: Aircel, Airtel, Idea, Reliance, Tata Indicom, Vodafone
Operator(s) not meeting the benchmark: BSNL, S Tel

Cells with more than 3% TCH Drop Rate

One month
Operator(s) meeting benchmark: Airtel, Idea, Loop, Reliance, S Tel, Tata Indicom, Vodafone
Operator(s) not meeting the benchmark: BSNL, Aircel

Live measurement
Operator(s) meeting benchmark: Airtel, Idea, Loop, Reliance, S Tel, Tata Indicom, Vodafone
Operator(s) not meeting the benchmark: BSNL, Aircel

Voice quality
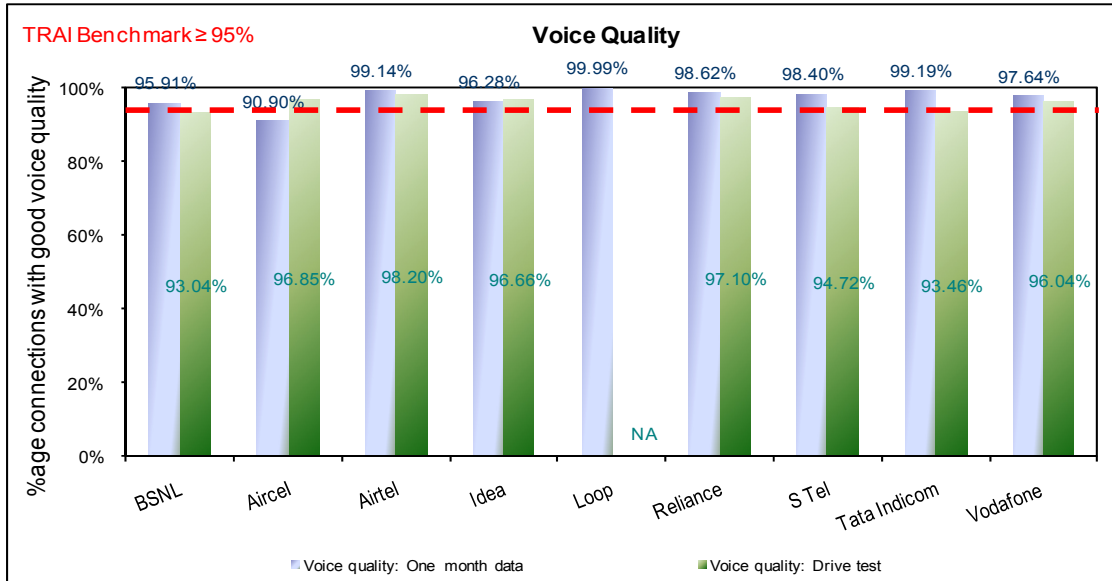
TRAI Benchmark ≥ 95%

Voice Quality

%age connections with good voice quality

Operator	One month data	Drive test
BSNL	95.91%	93.04%
Aircel	90.90%	96.85%
Airtel	99.14%	98.20%
Idea	96.28%	96.66%
Loop	99.99%	NA
Reliance	98.62%	97.10%
S Tel	98.40%	94.72%
Tata Indicom	99.19%	93.46%
Vodafone	97.64%	96.04%

■ Voice quality: One month data   ■ Voice quality: Drive test

One month
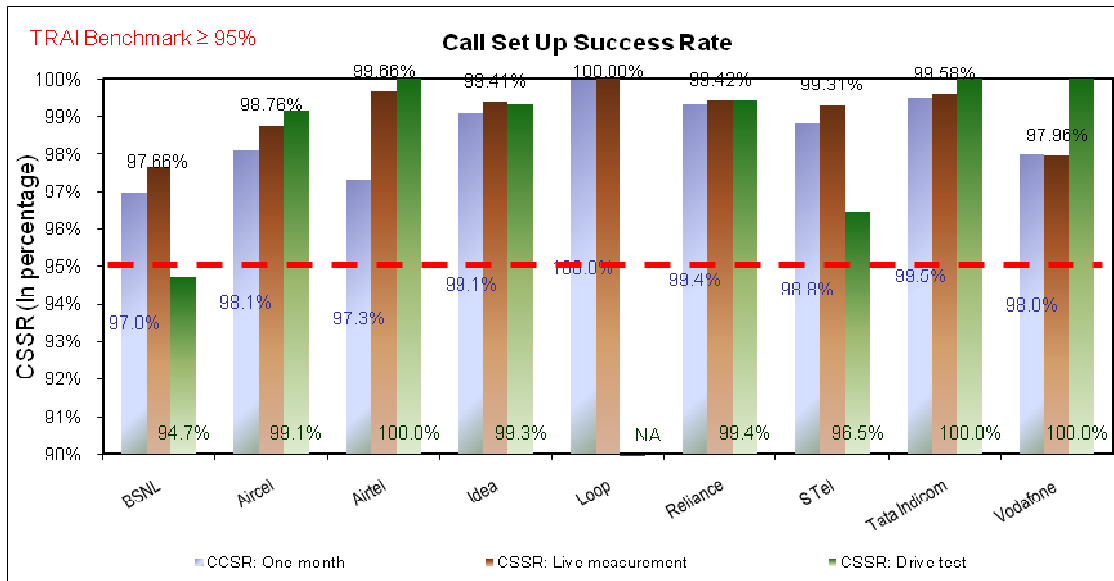Operator(s) meeting benchmark: Airtel, Idea, Loop, Reliance, S Tel, Tata Indicom, Vodafone
Operator(s) not meeting the benchmark: Aircel

Live measurement (Drive test)
Operator(s) meeting benchmark: Aircel, Airtel, Idea, Reliance, Vodafone
Operator(s) not meeting the benchmark: BSNL, S Tel, Tata Indicom

Billing Disputes - Postpaid

TRAI Benchmark =100%

Termination/Closure of service

Percentage cases closure attended within 7 days

Operator	Value
BSNL	100.00%
Aircel	100.00%
Airtel	100.00%
Idea	100.00%
Loop	NA
Reliance	100.00%
S Tel	NA
Tata Indicom	100.00%
Vodafone	100.00%
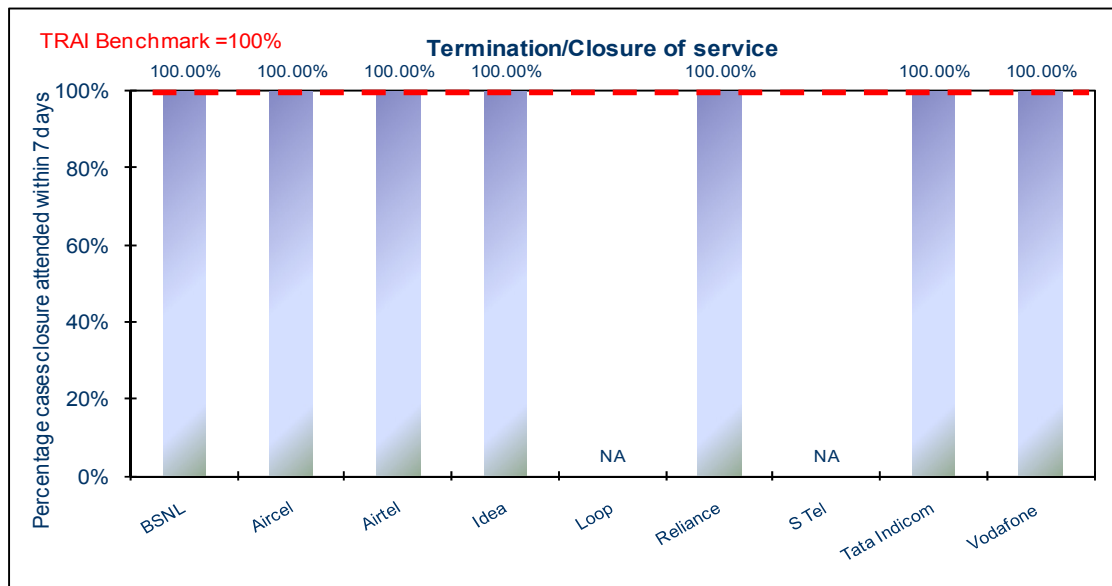
All the operators meet the benchmark

Complaints - Prepaid

TRAI Benchmark ≤ 0.1%

Billing disputes - Prepaid
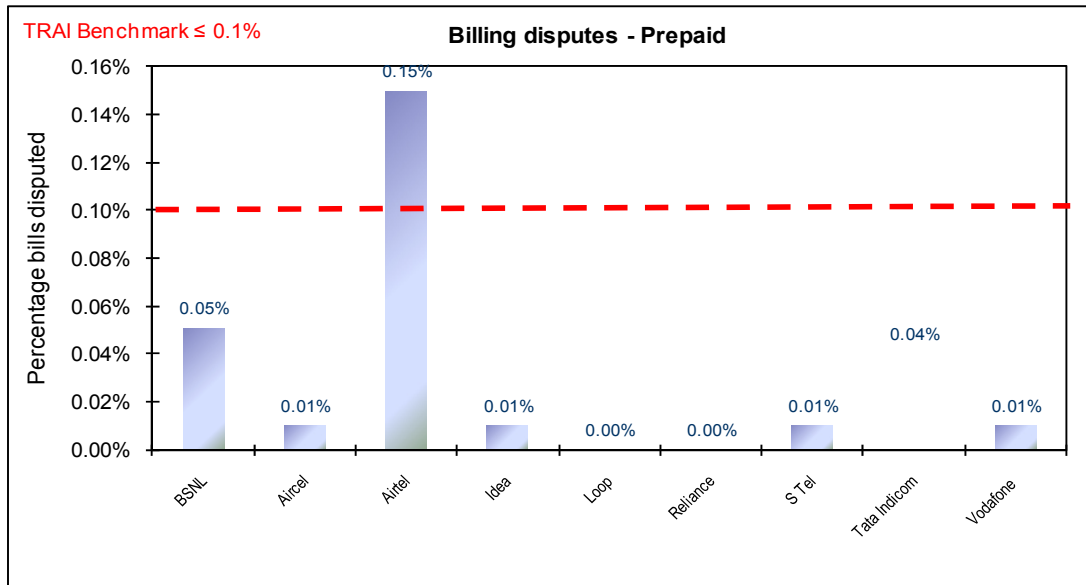
Operator(s) meeting benchmark: Aircel, Idea, Loop, Reliance, S Tel, Tata Indicom, Vodafone
Operator(s) not meeting the benchmark: Airtel

Resolution of billing complaints
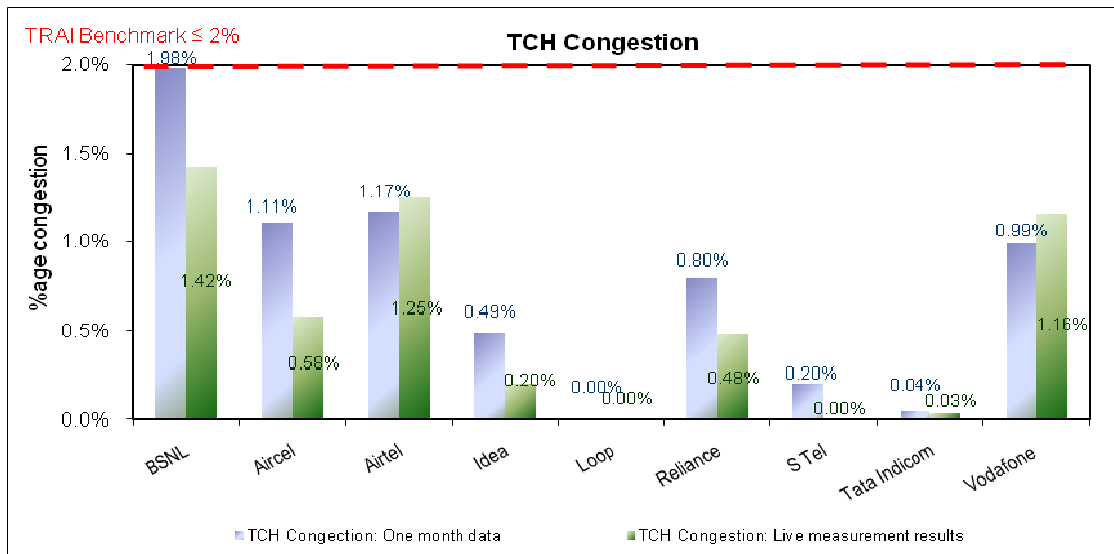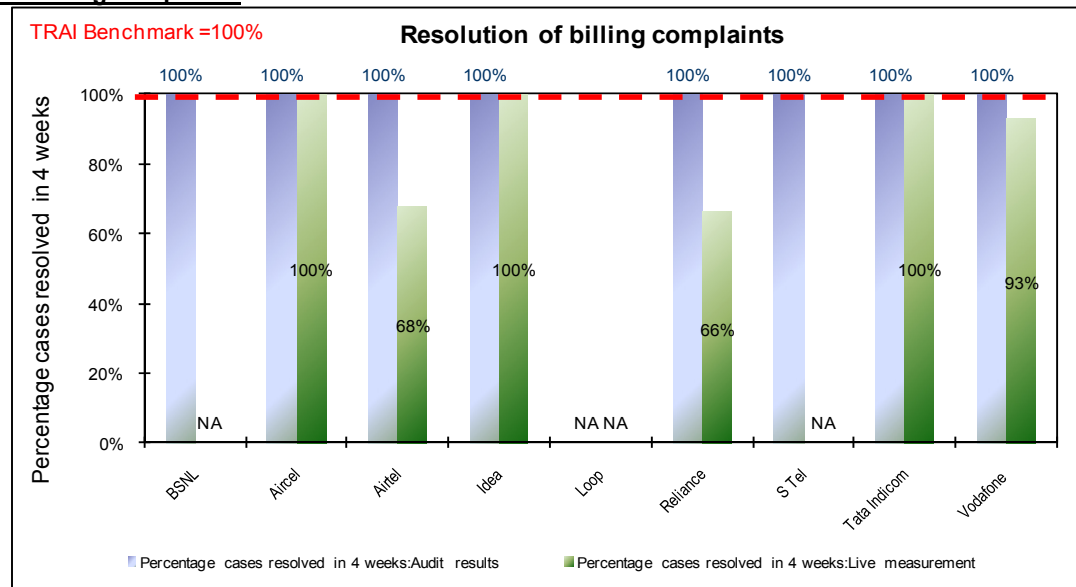

TRAI Benchmark =100%

Resolution of billing complaints

One month
All the operators meet the benchmark

Live measurement
Operator(s) meeting benchmark: Aircel, Idea, Tata Indicom
Operator(s) not meeting the benchmark: Airtel, Reliance, Vodafone

Period of applying credit / waiver
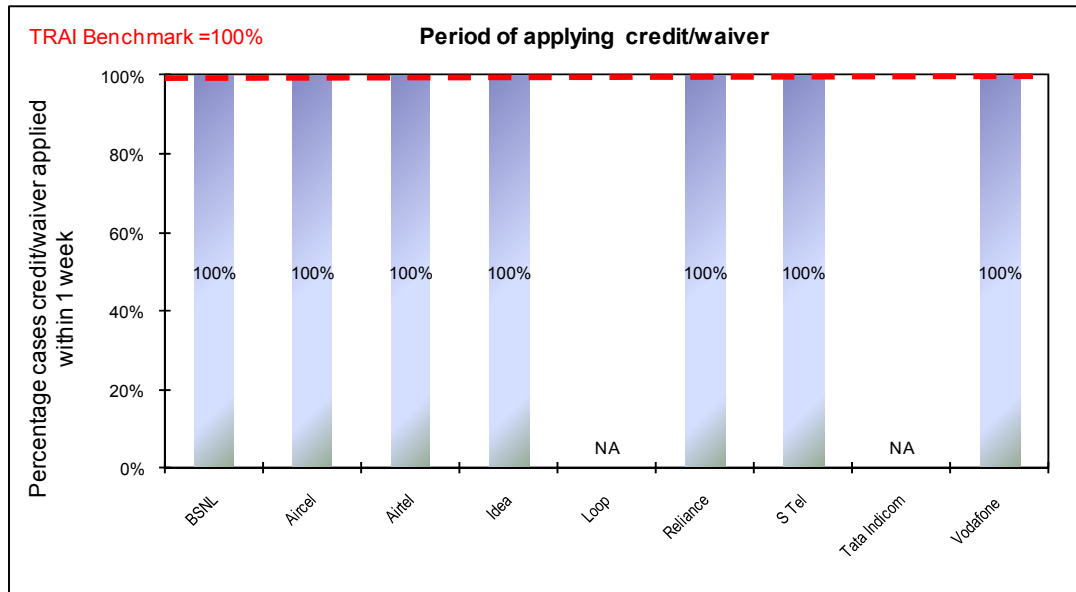
All the operators meet the benchmark

Live calling for billing Complaints

Resolution of billing complaints	Benchmark	BSNL	Aircel	Airtel	Idea	Loop	Reliance	S Tel	Tata Indicom	Vodafone
Total Number of calls made		0	38	25	50	0	50	0	12	28
Number of cases resolved in 4 weeks		0	38	17	50	0	33	0	12	26
Percentage cases resolved in four weeks	100%	NA	100%	68%	100%	NA	66%	NA	100%	93%

Customer Care / Helpline: Calls answered
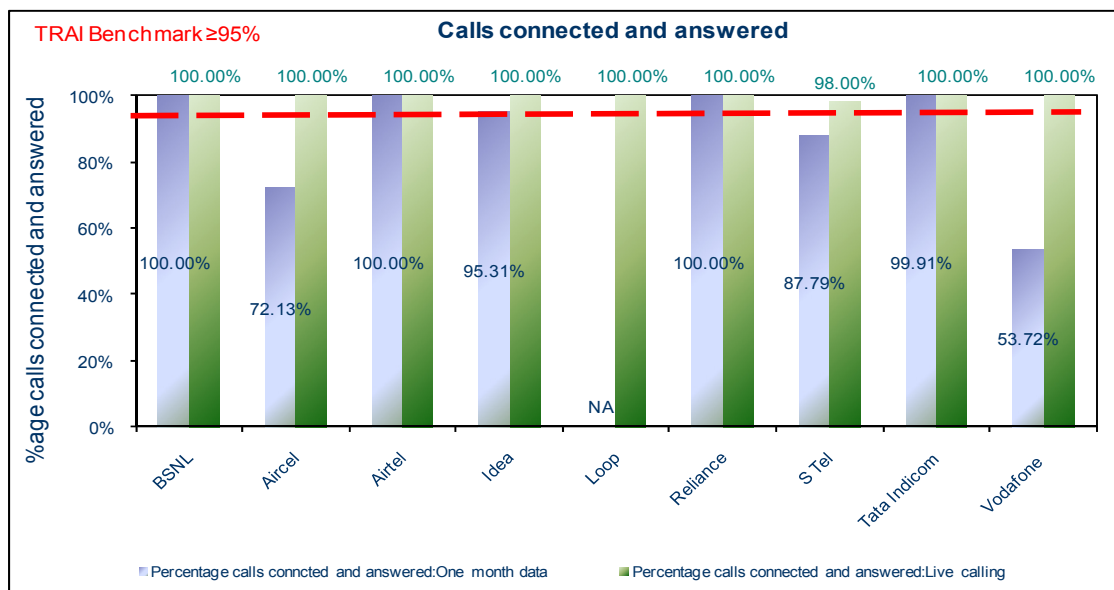
One month
Operator(s) meeting benchmark: BSNL, Airtel, Idea, Reliance, Tata Indicom
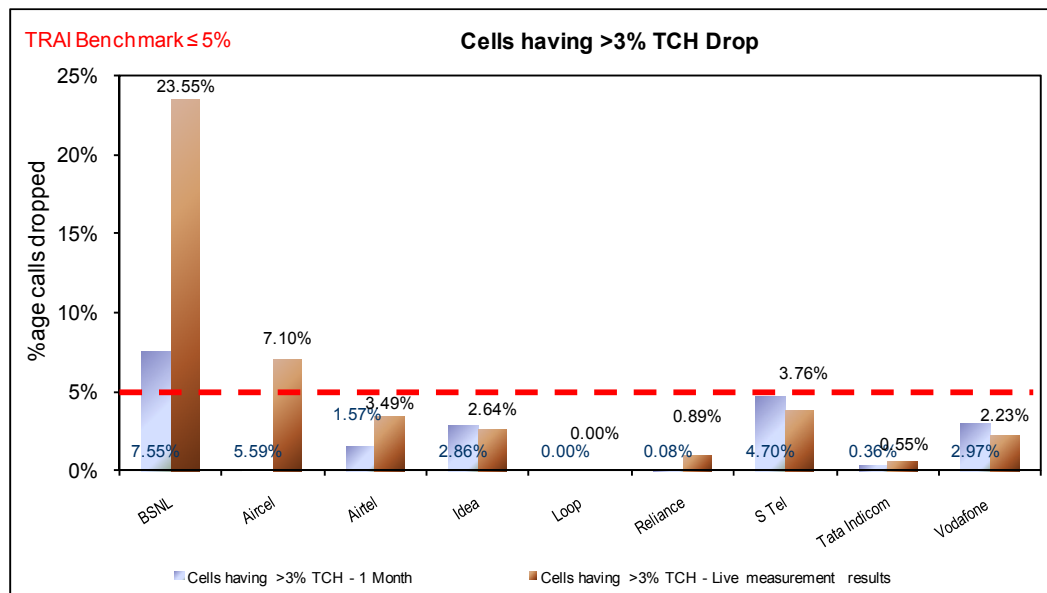Operator(s) not meeting the benchmark: Aircel, S Tel, Vodafone

Live measurement
All the operators meet the benchmark

Customer Care / Helpline: Calls answered voice to voice

TRAI Benchmark ≥ 90%   **Calls answered in 60 seconds (Voice to Voice)**

Legend:
- Percentage calls answered in 60 Seconds:One month data
- Percentage calls answered in 60 seconds: Live calling

Operator	One month data	Live calling
BSNL	57.79%	54.00%
Aircel	82.49%	92.00%
Airtel	71.19%	90.00%
Idea	83.42%	98.00%
Loop	NA	94.00%
Reliance	97.40%	92.00%
S Tel	82.03%	88.00%
Tata Indicom	94.06%	60.00%
Vodafone	46.40%	98.00%
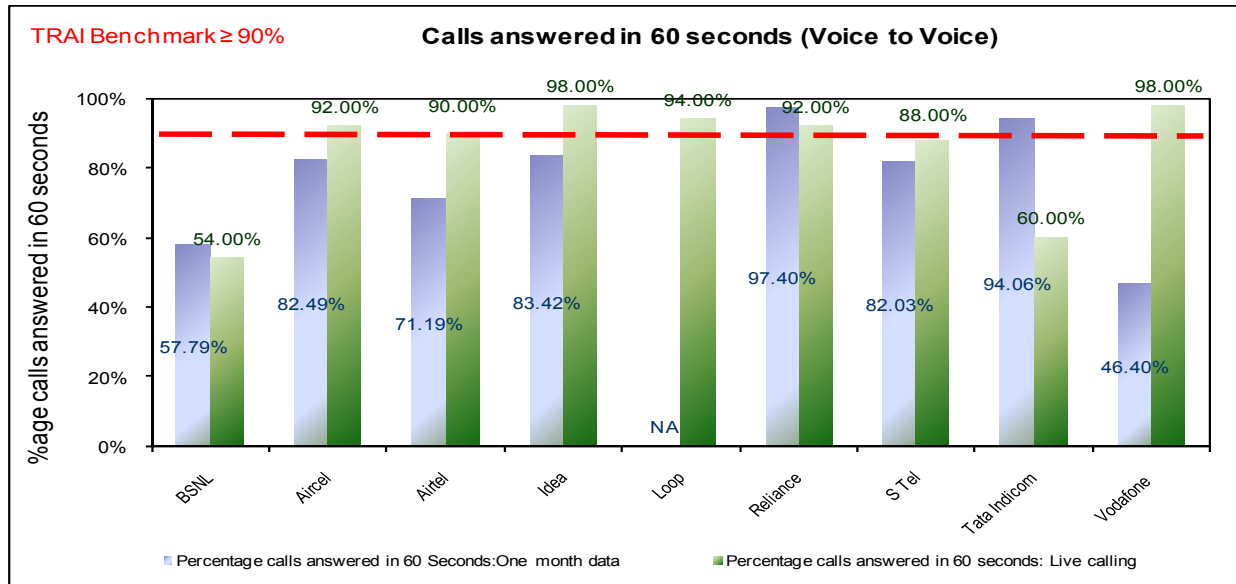
One month
Operator(s) meeting benchmark: Reliance, Tata Indicom
Operator(s) not meeting the benchmark: BSNL, Aircel, Airtel, Idea, S Tel, Vodafone

Live measurement
Operator(s) meeting benchmark: Aircel, Airtel, Idea, Loop, Reliance, Vodafone
Operator(s) not meeting the benchmark: BSNL, S Tel, Tata Indicom

Termination / Closure of service
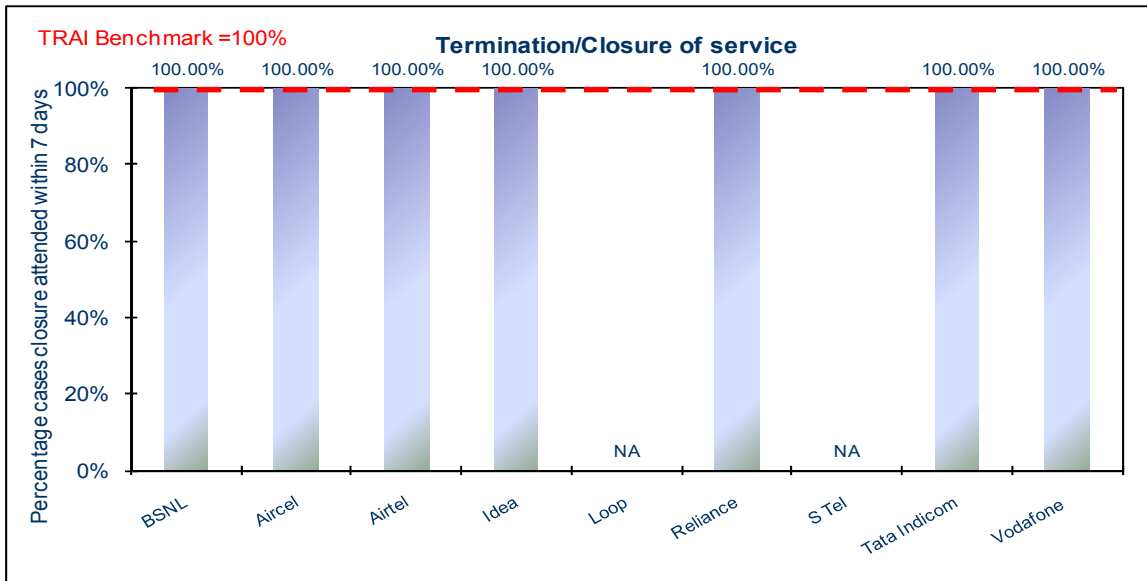
All the operators meet the benchmark

Refund of deposits
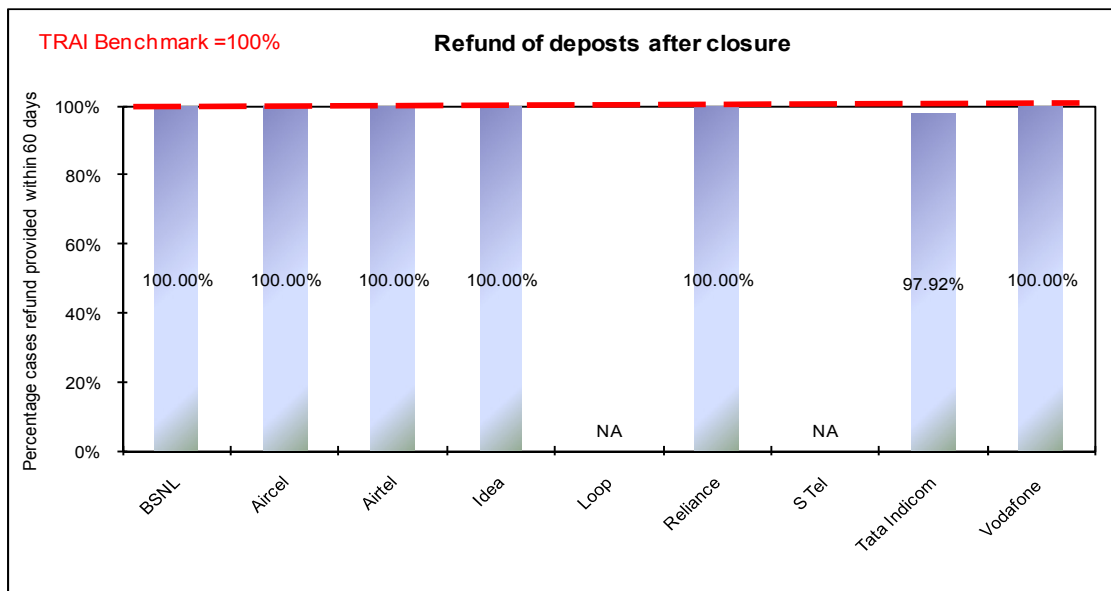
Operator(s) meeting benchmark: Aircel, Airtel, Idea, Reliance, Vodafone
Operator(s) not meeting the benchmark: Tata Indicom

Inter operator calls assessment

Inter operator call Assessment To↓ From →	BSNL	Aircel	Airtel	Idea	Loop	Reliance	S Tel	Tata Indicom	Vodafone
BSNL	NA	92%	100%	97%	98%	98%	100%	100%	100%
Aircel	100%	NA	98%	93%	96%	100%	100%	100%	93%
Airtel	100%	99%	NA	98%	60%	100%	97%	84%	80%
Idea	100%	93%	87%	NA	100%	100%	100%	98%	100%
Loop	100%	90%	100%	97%	NA	100%	100%	100%	100%
Reliance	100%	99%	100%	96%	98%	NA	100%	100%	100%
S Tel	100%	96%	100%	87%	100%	100%	NA	100%	100%
Tata Indicom	100%	100%	100%	99%	98%	59%	98%	NA	100%
Vodafone	100%	100%	100%	100%	96%	97%	100%	100%	NA

The problems 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. Almost all service providers except BSNL had difficulty in connecting to the number of one or the other service provider. For most of the service providers it was difficult connecting to an Aircel and Airtel number.

7.0 Compliance reports: Results of Verification of PMR

7.1 Cellular Mobile services

Name of Service Provider		Network Availability					Connection Establishment			Connection Maintenance (Retainability)					POI	
		Total no. of BTSs in the licensed service area	Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month	BTSs Accumulated downtime (not available for service) (%age)	No. of BTSs having accumulated downtime of >24 hours in a month	Worst affected BTSs due to downtime (%age)	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging chl. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Total No. of cells exceeding 3% TCH drop (call drop)	Total no. of cells in the network	Worst affected cells having more than 3% TCH drop (call drop) rate (%age)	%age connection with good voice quality	Point of interconnection (POI) Congestion	Total number of working POI Service Area wise
Benchmark				≤ 2%		≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%			≤ 5%	≥ 95%		
BSNL	PMR	1285	16344	1.67%	139	10.70%	96.00%	0.87%	1.55%	2.00%	190	3816	4.98%	97.33%	0	55
	IMRB	1285	16344	1.67%	139	10.70%	96.00%	0.87%	1.55%	2.00%	190	3816	4.98%	97.33%	0	55
Aircel	PMR	2199	8377	0.52%	73	3.30%	97.14%	0.99%	1.31%	1.31%	636	6576	9.67%	90.30%	1	51
	IMRB	2199	8377	0.52%	73	3.30%	97.14%	0.99%	1.31%	1.31%	636	6576	9.67%	90.30%	1	51
Airtel	PMR	2424	6191	0.35%	17	0.70%	98.08%	0.33%	1.30%	1.69%	126	7240	1.74%	99.13%	0	16
	IMRB	2424	6191	0.35%	17	0.70%	98.08%	0.33%	1.30%	1.69%	126	7240	1.74%	99.13%	0	16
Idea	PMR	519	661	0.18%	0	0.00%	98.78%	0.40%	0.78%	1.50%	122	1556	7.86%	96.98%	0	25
	IMRB	519	661	0.18%	0	0.00%	98.78%	0.40%	0.78%	1.50%	11019	140679	7.83%	96.98%	0	25
Loop	PMR	NA	NA	0.13%	NA	0.00%	99.59%	0.21%	0.00%	0.32%	NA	NA	0.00%	99.96%	0	NA
	IMRB	5	7.52	0.21%	NA	0.00%	99.53%	0.21%	0.00%	0.32%	0	15	0.00%	99.96%	0	8
Reliance	PMR	1064	579.33	0.08%	2	0.19%	96.21%	0.90%	1.32%	1.03%	149	3192	4.67%	95.64%	0	14
	IMRB	1064	579	0.08%	2	0.00%	96.22%	0.89%	1.32%	1.03%	149	3192	4.67%	95.63%	0	14
S Tel	PMR	318	1714	0.72%	6	1.88%	97.87%	0.23%	0.36%	0.54%	48	954	5.00%	96.55%	0	NA
	IMRB	318	1714	0.72%	6	1.88%	97.87%	0.23%	0.36%	0.54%	48	954	5.00%	96.55%	0	17
Tata Indicom	PMR	268	198	0.10%	0	0.00%	99.62%	0.00%	0.01%	0.36%	1	810	0.08%	100.00%	0	28
	IMRB	268	198	0.10%	0	0.00%	99.62%	0.00%	0.01%	0.36%	1	810	0.08%	99.86%	0	28
Vodafone	PMR	1799	2451	0.18%	20	1.14%	98.91%	0.05%	0.17%	0.95%	169	5398	3.14%	97.74%	0	29
	IMRB	1799	2451	0.18%	20	1.14%	98.91%	0.05%	0.17%	0.95%	169	5398	3.14%	97.74%	0	29

Name of Service Provider		Metering and billing credibility - post paid	No. of bills issued during the period	No. of bills disputed including billing complaints during the period	Metering and billing credibility - pre paid	No. of charging / credit / validity complaints during the quarter	Total no. of pre-paid customers at the end of the quarter	Resolution of billing/charging complaints	No. of billing/ (post-paid) and charging, credit / validity (pre-paid) complaints resolved within 4 weeks during the quarter	Total no. of billing (post-paid) and charging, credit / validity (pre-paid) complaints received	paid) and charging, credit / validity complaints (pre paid) resolved in favour of the	No. of complaints disposed on account of not considered as valid complaints during the quarter	waiver / adjustment to customer/s account from the	Accessibility of call centre/ customer care	Total no. of call attempts to call centre / customer care nos. during TCBH (Note)	No. of calls connected and answered successfully to call centre / customer care nos. during TCBH (Note)	Percentage of calls answered by the operators (voice to voice) within 60 seconds	%age request for Termination / Clouse of service complied within 7 days	Total No. of request for Termination / Cloure of service received during the quarter	No. of requests for Termination / Closure of service complied within 7 days during the quarter	Time taken for refund of deposits after closure
Benchmark		≤ 0.1%			≤ 0.1%			100% within 4 weeks					100% Within 1 week	≥ 95%			≥ 90%	100% within 7 days			100% within 60 days
BSNL	PMR	0.01%	717243	73	0.00%	87	1003063	100%	147	147	42	105	100%	100%	2150	2044	96.0%	100%	1793	1793	100%
	IMRB	0.01%	717243	73	0.00%	87	1003063	100%	147	147	42	105	100%	100%	2150	2044	96.0%	100%	1793	1793	100%
Aircel	PMR	0.18%	28226	50	0.06%	991	1703001	100%	1041	1041	455	586	100%	100%	116896	111957	91.5%	100%	451	451	100%
	IMRB	0.18%	28226	50	0.06%	991	1703001	100%	1041	1041	455	586	100%	100%	116896	111957	91.5%	100%	451	451	100%
Airtel	PMR	0.10%	119544	150	0.05%	15166	2837744	100%	150	150	8	142	100%	100%	27724387	27724334	49.6%	100%	877	877	100%
	IMRB	0.10%	119544	150	0.05%	15166	2837744	100%	150	150	8	142	100%	100%	27724387	27724334	49.6%	100%	877	877	100%
Idea	PMR	0.00%	10110	0	0.02%	92	554962	100%	264	264	92	172	100%	96%	104148	99851	93.0%	98%	58	57	100%
	IMRB	0.00%	10110	0	0.02%	92	554962	100%	264	264	92	172	100%	96%	506690	487723	93.0%	98%	58	57	100%
Loop	PMR	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	IMRB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Reliance	PMR	0.04%	328425	278	0.04%	1869	1915853	100%	5886	5886	2497	3389	100%	73%	352837	265711	91.0%	100%	794	794	100%
	IMRB	0.04%	328425	278	0.04%	793	1915853	100%	5886	5886	2497	3389	100%	75%	352837	265711	91.0%	100%	794	794	100%
S Tel	PMR	NA	NA	NA	0.03%	15	48979	100%	45	45	10	35	100%	99%	41447	40946	99.0%	NA	NA	NA	NA
	IMRB	NA	NA	NA	0.10%	13	15383	100%	17	17	4	13	100%	89%	87027	77617	99.0%	NA	NA	NA	NA
Tata Indicom	PMR	0.01%	43235	4	0.06%	43	75019	99%	63	64	47	17	100%	98%	45414	44504	94.0%	100%	776	776	100%
	IMRB	0.01%	43235	4	0.06%	43	75019	99%	63	64	47	17	100%	98%	45414	44504	90.8%	100%	776	776	100%
Vodafone	PMR	0.09%	70838	70	0.03%	1084	1127710	100%	1154	1154	38	1116	100%	98%	989442	968070	98.0%	100%	450	450	100%
	IMRB	0.09%	70838	70	0.03%	1084	1127710	100%	1154	1154	38	1116	100%	98%	989442	968070	98.0%	100%	450	450	100%

Figures do not match with those reported in PMR

Figures verified on all India basis

Not meeting benchmark

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

IMRB international

8.0 Conclusions

8.1 Cellular Mobile services

1. In case of BSNL, worst affected BTS due to downtime is not meeting the benchmarks defined by TRAI.
2. In case of Aircel, worst affected BTS due to downtime, worst affected cells having more than 3% TCH Drop, voice quality and metering and billing credibility (postpaid) are not meeting the benchmarks defined by TRAI.
3. In case of Idea, worst affected cells having more than 3% TCH Drop and %age request for Termination / Clouse of service complied within 7 days is not meeting the benchmarks defined by TRAI.
4. In case of Airtel, percentage of calls answered by the operators (voice to voice) within 60 seconds is not meeting the benchmarks defined by TRAI.
5. In case of S-Tel, Accessibility of call centre/ customer care parameter is not meeting the benchmark defined by TRAI.
6. In case of Tata Indicom, the Resolution of billing/charging complaints within 4 weeks is not 100%.
7. The figures reported by Loop for BTS Accumulated Downtime and CSSR do not match the figures obtained on verification.
8. The figures reported by Reliance for worst affected BTS due to downtime, CSSR, SDCCH/Paging Channel Congestion and voice quality does not match the figures obtained on verification.
9. The figures reported by Idea for total no. of call attempts to call centre / customer care nos. during TCBH and No. of calls connected and answered successfully to call centre / customer care nos. during TCBH does not match the figures obtained on verification.
10. The figures reported by S-Tel for Metering and billing credibility - pre paid, No. of charging / credit / validity complaints during the quarter, Total no. of pre-paid customers at the end of the quarter, No. of billing/ (post-paid) and charging, credit / validity (pre-paid) complaints resolved within 4 weeks during the quarter, Total no. of billing (post-paid) and charging, credit / validity (pre-paid) complaints received during the quart, No. of billing complaints (post paid) and charging, credit / validity complaints (pre paid) resolved in favour of the customer during the quarter, No. of complaints disposed on account of not considered as valid complaints during the quarter, Total no. of call attempts to call centre / customer care nos. during TCBH (Note), No. of calls connected and answered successfully to call centre / customer care nos. during TCBH and Percentage of calls answered by the operators (voice to voice) within 60 seconds does not match the figures obtained on verification
11. The figures reported by Tata Indicom for voice quality and Percentage of calls answered by the operators (voice to voice) within 60 seconds does not match the figures obtained on verification

9.0 Annexure - I

9.1 Service provider performance report based on one month data

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)			Metering and Billing				Response time to customer for assistance		Termination / closure of service	
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality	Metering and billing credibility (Postpaid)	Metering and billing credibility (Prepaid)	%age complaints resolved within 4 weeks	Period of applying credit/waiver less than 1 week	Accessibility of call centre/ customer care	Percentage of calls answered by operators within 60 sec	%age requests for Termination complied within 7 days	Refund of deposits after closure within 60 days
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 5%	≥ 95%	≤ 0.1%	≤ 0.1%	100%	100%	≥ 95%	≥ 90%	100%	100%
BSNL	1.47%	14.36%	97.00%	1.00%	1.98%	1.95%	7.55%	95.91%	0.00%	0.05%	100.00%	100.00%	100.00%	57.79%	100%	100%
Aircel	0.60%	3.94%	98.08%	0.84%	1.11%	1.04%	5.59%	90.90%	0.01%	0.01%	100.00%	100.00%	72.13%	82.49%	100.00%	100.00%
Airtel	0.36%	0.83%	97.30%	0.39%	1.17%	1.62%	1.57%	99.14%	0.16%	0.15%	100.00%	100.00%	100.00%	71.19%	100.00%	100.00%
Idea	0.11%	0.00%	99.07%	0.83%	0.49%	1.46%	2.86%	96.28%	0.00%	0.01%	100.00%	100.00%	95.31%	83.42%	100.00%	100.00%
Loop	0.35%	0.00%	99.98%	0.50%	0.00%	0.12%	0.00%	99,99%	NA	0.00%	NA	NA	NA	NA	NA	NA
Reliance	0.03%	0.00%	99.35%	0.69%	0.80%	0.53%	0.08%	98.62%	0.01%	0.00%	100.00%	100.00%	100.00%	97.40%	100.00%	100.00%
S Tel	0.54%	1.28%	98.83%	0.35%	0.20%	0.59%	4.70%	98.40%	NA	0.01%	100.00%	100.00%	87.79%	82.03%	NA	NA
Tata Indicom	0.25%	0.00%	99.49%	0.00%	0.04%	0.50%	0.36%	99.19%	0.06%	0.04%	100.00%	NA	99.91%	94.06%	100.00%	97.92%
Vodafone	0.61%	1.84%	98.00%	0.49%	0.99%	0.84%	2.97%	97.64%	0.15%	0.01%	100.00%	100.00%	53.72%	46.40%	100.00%	100.00%

9.2 Monthly Point of Interconnection (POI) Congestion Report

Name of the Service Provider	Name of POI not meeting the benchmark	Total No. of circuits on POI	Total No. of call attempts on POI	Total traffic served on POI (Erlang)	% of Congestion POI	Action already taken/ action plan for meeting the benchmark
BSNL	All POI's meeting TRAI specified benchmark					
Aircel	All POI's meeting TRAI specified benchmark					
Airtel	All POI's meeting TRAI specified benchmark					
Idea	All POI's meeting TRAI specified benchmark					
Loop	All POI's meeting TRAI specified benchmark					
Reliance	All POI's meeting TRAI specified benchmark					
S Tel	All POI's meeting TRAI specified benchmark					
Tata Indicom	All POI's meeting TRAI specified benchmark					
Vodafone	All POI's meeting TRAI specified benchmark					

9.3 Parameter wise performance reports for Cellular Mobile services

1. Network Availability

Audit Results for Network Availability

	Benchmark	BSNL	Aircel	Airtel	Idea	Loop	Reliance	S Tel	Tata Indicom	Vodafone
Number of BTSs in the licensed service area		1302	2231	2527	591	4	1274	391	271	2120
Sum of downtime of BTSs in a month (in hours)		14235	10004.20	6795	498	11	242	1563	499	9678
BTSs accumulated downtime (not available for service)	≤ 2%	1.47%	0.60%	0.36%	0.11%	0.35%	0.03%	0.54%	0.25%	0.61%
Number of BTSs having accumulated downtime >24 hours		187	88	21	0	0	0	5	0	39
Worst affected BTSs due to downtime	≤ 2%	14.36%	3.94%	0.83%	0.00%	0.00%	0.00%	1.28%	0.00%	1.84%

2. Connection Establishment (Accessibility)

Audit Results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	BSNL	Aircel	Airtel	Idea	Loop	Reliance	S Tel	Tata Indicom	Vodafone
CSSR	≥ 95%	97.00%	98.08%	97.30%	99.07%	99.98%	99.35%	98.83%	99.49%	98.00%

SDCCH congestion	Benchmark	BSNL	Aircel	Airtel	Idea	Loop	Reliance	S Tel	Tata Indicom	Vodafone
SDCCH/Paging channel congestion	≤ 1%	1.00%	0.84%	0.39%	0.83%	0.50%	0.69%	0.35%	0.00%	0.49%

TCH congestion	Benchmark	BSNL	Aircel	Airtel	Idea	Loop	Reliance	S Tel	Tata Indicom	Vodafone
TCH congestion	≤ 2%	1.98%	1.11%	1.17%	0.49%	0.00%	0.80%	0.20%	0.04%	0.99%

Live measurement results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	BSNL	Aircel	Airtel	Idea	Loop	Reliance	S Tel	Tata Indicom	Vodafone
CSSR	≥ 95%	97.66%	98.76%	99.66%	99.41%	100.00%	99.42%	99.31%	99.58%	97.96%

SDCCH congestion	Benchmark	BSNL	Aircel	Airtel	Idea	Loop	Reliance	S Tel	Tata Indicom	Vodafone
SDCCH/Paging channel congestion	≤ 1%	1.06%	1.03%	0.18%	0.48%	0.43%	0.00%	0.00%	0.00%	0.32%

TCH congestion	Benchmark	BSNL	Aircel	Airtel	Idea	Loop	Reliance	S Tel	Tata Indicom	Vodafone
TCH congestion	≤ 2%	1.42%	0.58%	1.25%	0.20%	0.00%	0.48%	0.00%	0.03%	1.16%

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

CSSR	Benchmark	BSNL	Aircel	Airtel	Idea	Loop	Reliance	S Tel	Tata Indicom	Vodafone
Total number of call attempts		739	575	654	745	NA	712	765	1489	670
Total number of successful calls established		700	570	654	740	NA	708	738	1489	670
CSSR	≥ 95%	94.72%	99.13%	100.00%	99.33%	NA	99.44%	96.47%	100.00%	100.00%
Blocked calls	**Benchmark**	**BSNL**	**Aircel**	**Airtel**	**Idea**	**Loop**	**Reliance**	**S Tel**	**Tata Indicom**	**Vodafone**
%age blocked calls		5.28%	0.87%	0.00%	0.67%	NA	0.56%	3.53%	0.00%	0.00%

3. Connection Maintenance (Retainability)

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

Call drop rate	Benchmark	BSNL	Aircel	Airtel	Idea	Loop	Reliance	S Tel	Tata Indicom	Vodafone
Total number of calls established		494531614	226784497	160598802	9428087	DNA	25924926	1535044	1203343	2176510
Total number of calls dropped		9643366	2358269	2601701	137673	DNA	138124	9048	6029	18240
Call drop rate	≤ 2%	1.95%	1.04%	1.62%	1.46%	0.12%	0.53%	0.59%	0.50%	0.84%

Cells having more than 3% TCH	Benchmark	BSNL	Aircel	Airtel	Idea	Loop	Reliance	S Tel	Tata Indicom	Vodafone
Total number of cells in the network		3869	6672	7573	53190	15	3822	1171	843	6360
Total number of cells having more than 3% TCH		292	373	119	1521	0	3	55	3	189
Worst affected cells having more than 3% TCH	≤ 5%	7.55%	5.59%	1.57%	2.86%	0.00%	0.08%	4.70%	0.36%	2.97%

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

Call drop rate	Benchmark	BSNL	Aircel	Airtel	Idea	Loop	Reliance	S Tel	Tata Indicom	Vodafone
Total number of calls established		4485944	259312502	191897795	8280005	DNA	590995	1726179	163530	2264255
Total number of calls dropped		138167	2292246	1905788	122321	DNA	5259	9119	776	25819
Call drop rate	≤ 2%	3.08%	0.88%	0.99%	1.48%	0.00%	0.89%	0.53%	0.47%	1.14%

Cells having more than 3% TCH	Benchmark	BSNL	Aircel	Airtel	Idea	Loop	Reliance	S Tel	Tata Indicom	Vodafone
Total number of cells in the network		3869	20046	7573	127656	12	590995	1171	2532	6515
Total number of cells having more than 3% TCH		911	1423	264	3374	0	5259	44	14	145
Worst affected cells having more than 3% TCH	≤ 5%	23.55%	7.10%	3.49%	2.64%	0.00%	0.89%	3.76%	0.55%	2.23%

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

Call drop rate	Benchmark	BSNL	Aircel	Airtel	Idea	Loop	Reliance	S Tel	Tata Indicom	Vodafone
Total number of calls established		690	571	654	740	NA	707	736	1529	670
Total number of calls dropped		21	0	0	2	NA	1	21	1	0
Call drop rate	≤ 2%	3.04%	0.00%	0.00%	0.27%	NA	0.14%	2.85%	0.07%	0.00%

4. Voice quality

Audit Results for Voice quality

Voice quality	Benchmark	BSNL	Aircel	Airtel	Idea	Loop	Reliance	S Tel	Tata Indicom	Vodafone
Total number of sample calls		49679	14649104398	16479047572	1000295972	DNA	26961936	69601519	8776	297788303
Total number of calls with good voice quality		47649	13315341249	16337327763	963132579	DNA	26589861	68484837	8705	290751392
%age calls with good voice quality	≥ 95%	95.91	90.90%	99.14%	96.28%	99,99%	98.62%	98.40%	99.19%	97.64%

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

Voice quality	Benchmark	BSNL	Aircel	Airtel	Idea	Loop	Reliance	S Tel	Tata Indicom	Vodafone
Total number of sample calls		799732	686377	796983	724328	NA	501532	1099547	45645	671384
Total number of calls with good voice quality		744058	664771	782649	700147	NA	486996	1041538	42658	644793
%age calls with good voice quality	≥ 95%	93.04%	96.85%	98.20%	96.66%	NA	97.10%	94.72%	93.46%	96.04%

5. POI Congestion

Audit Results for POI Congestion

POI congestion	Benchmark	BSNL	Aircel	Airtel	Idea	Loop	Reliance	S Tel	Tata Indicom	Vodafone
Total number of working POIs		20	56	68	26	10	14	21	30	30
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		15000	1912377	1535408	292496	287	109	1906	44876.55	23009252.9
Traffic served for all POIs (B)- in erlangs		17501	1313849.78	1533896	160579	286.6	62	458	1133.98	6957794.3
POI congestion	≤ 0.5%	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Live measurement results for POI congestion

6. Inter Operator Call Assessment

Inter operator call Assessment To ↓ From →	BSNL	Aircel	Airtel	Idea	Loop	Reliance	S Tel	Tata Indicom	Vodafone
BSNL	NA	92%	100%	97%	98%	98%	100%	100%	100%
Aircel	100%	NA	98%	93%	96%	100%	100%	100%	93%
Airtel	100%	99%	NA	98%	60%	100%	97%	84%	80%
Idea	100%	93%	87%	NA	100%	100%	100%	98%	100%
Loop	100%	90%	100%	97%	NA	100%	100%	100%	100%
Reliance	100%	99%	100%	96%	98%	NA	100%	100%	100%
S Tel	100%	96%	100%	87%	100%	100%	NA	100%	100%
Tata Indicom	100%	100%	100%	99%	98%	59%	98%	NA	100%
Vodafone	100%	100%	100%	100%	96%	97%	100%	100%	NA

The problems faced by the calling operator to other operators

7. Metering and Billing credibility

Audit Results for Billing performance

Billing Performance	Benchmark	BSNL	Aircel	Airtel	Idea	Loop	Reliance	S Tel	Tata Indicom	Vodafone
Billing diputes - Postpaid										
Total bills generated during the period		243992	45298	41445	2999	0	140660	0	41507	27176
Total number of bills disputed		12	4	67	0	0	14	0	25	42
Percentage bills disputed	≤ 0.1%	0.00%	0.01%	0.16%	0.00%	NA	0.01%	NA	0.06%	0.15%
Billing diputes - Prepaid										

Number of complaints related to charging, credit & validity		590	171	4671	30	0	40	3	24	139
Total number of prepaid customers in that period		1148408	3046104	3171895	268416	78	2035257	27250	68273	1442872
Percentage of complaints	≤ 0.1%	0.05%	0.01%	0.15%	0.01%	0.00%	0.00%	0.01%	0.04%	0.01%
Resolution of billing complaints										
Total number of billing/charging complaints		26	181	67	790	0	251	3	51	66
Total complaints considered invalid		5	6	47	677	0	32	0	39	0
Number of complaints resolved in 4 weeks from date of receipt for complaints listed in 5.3.1		26	181	67	790	0	219	3	51	66
Percentage complaints resolved within 4 weeks of date of receipt	100%	100%	100%	100%	100%	NA	100%	100%	100%	100%
Period of applying credit / waiver										
Total number of complaints where credit/waiver is required		21	175	20	113	0	219	3	12	54
Percentage cases in which credit/waiver was received within 1 week	100%	100%	100%	100%	100%	NA	100%	100%	NA	100%

Live calling results for resolution of billing complaints

Resolution of billing complaints	Benchmark	BSNL	Aircel	Airtel	Idea	Loop	Reliance	S Tel	Tata Indicom	Vodafone
Total Number of calls made		0	38	25	50	0	50	0	12	28
Number of cases resolved in 4 weeks		0	38	17	50	0	33	0	12	26
Percentage cases resolved in four weeks	100%	NA	100%	68%	100%	NA	66%	NA	100%	93%

8. Customer Care

Audit results for customer care

Customer Care Assessment	Benchmark	BSNL	Aircel	Airtel	Idea	Loop	Reliance	S Tel	Tata Indicom	Vodafone
Total number of call attempts to customer care for assistance		551110	119219	28278875	524829	0	1337197	104615	77616	499239
Number of calls getting connected and answered (electronically)		551110	85995	28277833	500234	0	1337197	91841	77545	268193
Percentage calls getting connected and answered	≥ 95%	100.00%	72.13%	100.00%	95.31%	NA	100.00%	87.79%	99.91%	53.72%
Number of calls getting transferred to the operator (voice to voice)		201873	1296810	1274062	124691	0	657432	37481	41235	268193
Number of calls answered by operator (voice to voice) within 60 seconds		116672	1069761	907023	104019	0	640353	30747	38784	124446
Percentage calls answered within 60 seconds (V2V)	≥ 90%	57.79%	82.49%	71.19%	83.42%	NA	97.40%	82.03%	94.06%	46.40%

Live calling results for customer care

Customer Care Assessment	Benchmark	BSNL	Aircel	Airtel	Idea	Loop	Reliance	S Tel	Tata Indicom	Vodafone
Total Number of calls received		50	50	50	50	50	50	50	50	50
Total Number of calls getting connected and answered		50	50	50	50	50	50	49	50	50
Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	98.00%	100.00%	100.00%

Live calling results for customer care (Voice to Voice)

Customer Care Assessment	Benchmark	BSNL	Aircel	Airtel	Idea	Loop	Reliance	S Tel	Tata Indicom	Vodafone
Total Number of calls received		50	50	50	50	50	50	50	50	50
Total Number of calls answered within 60 seconds		27	46	45	49	47	46	44	30	49
Percentage calls answered within 60 seconds	≥ 90%	54.00%	92.00%	90.00%	98.00%	94.00%	92.00%	88.00%	60.00%	98.00%

9. Termination / closure of service

Audit results for termination / closure of service

Termination	Benchmark	BSNL	Aircel	Airtel	Idea	Loop	Reliance	S Tel	Tata Indicom	Vodafone
Total number of closure request		461	126	258	53	0	252	0	253	107
Number of requests attended within 7 days		461	126	258	53	0	252	0	253	107
Percentage cases in which termination done within 7 days	100%	100%	100.00%	100.00%	100.00%	NA	100.00%	NA	100.00%	100.00%

Audit results for refund of deposits

Refund	Benchmark	BSNL	Aircel	Airtel	Idea	Loop	Reliance	S Tel	Tata Indicom	Vodafone
Total number of cases requiring refund of deposits		450	126	85	15	0	270	0	96	171
Total number of cases where refund was made within 60 days		450	126	85	15	0	270	0	94	171
Percentage cases in which refund was receive within 60 days	100%	100%	100.00%	100.00%	100.00%	NA	100.00%	NA	97.92%	100.00%

11. Additional Network Related parameters										
Audit Results for Total Traffic Handled in Erlang										
Traffic in Erlang		BSNL	Aircel	Airtel	Idea	Loop	Reliance	S Tel	Tata Indicom	Vodafone
Eqipped capacity of the network		129575	195555.7	134852	13120.2	111.03	109000	7238	34563	49611
Total taffic handled in erlang during TCBH		15709	95140.7	105319	6999.28	13.61	68028.21	804	4393.13	42112

Total number of customers as per VLR										
		BSNL	Aircel	Airtel	Idea	Loop	Reliance	S Tel	Tata Indicom	Vodafone
Total no. of customers served (as per VLR)		907218	2508344	2592667	226954	13	1493457	39760	64530	1256332

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