

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

Assam Circle

Report: April – May - June, 2012



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

By: **eTech Group@IMRB**

A specialist unit of IMRB International

Preface

TRAI, the regulatory watch dog for the Quality of Service for the telecom services – Basic (Wireline), Cellular Mobile (Wireless) and Broadband has commissioned this study with the objective of measuring Quality of Services under the parameters as per the published notifications.

The 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 2012. **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.**

Table of contents

1.0 Background.....	4
2.0 Objectives and Methodology	5
3.0 Sampling methodology	6
4.0 Audit methodology	7
4.1 Cellular Mobile Services	7
5.0 Executive Summary.....	8
5.1 Service provider performance report based on one month data verification: Cellular Mobile Services 9	9
6.0 Detailed findings – Includes comparison between Live calling/Live measurements and One month data collection	17
6.1 Graphical/Tabular Representations for Cellular Mobile Services	17
7.0 Compliance reports: Results of Verification of PMR.....	28
7.1 Cellular Mobile services	28
8.0 Conclusions	31
9.0 Annexure - I.....	32
9.1 Service provider performance report based on one month data.....	32
9.2 Monthly Point of Interconnection (POI) Congestion Report	32
9.3 Parameter wise performance reports for Cellular Mobile services	33

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

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 2012. The verification of records maintained by various operators of Cellular Mobile (Wireless) service was undertaken by the auditors of IMRB International during the period April - June 2012.



***This report
highlights the Audit
Module findings for
“Assam” circle for
Cellular Mobile
services***

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

- 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.

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 Centre's (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	Idea	May, 2012
Operator 2	BSNL	May, 2012
Operator 3	Reliance GSM	May, 2012
Operator 4	MTS	May, 2012
Operator 5	Airtel	May, 2012
Operator 6	Uninor	May, 2012
Operator 7	Vodafone	May, 2012
Operator 8	Tata Tele - CDMA	May, 2012
Operator 9	Aircel	May, 2012

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

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 to June 2012 in Assam circle. The executive summary encapsulates the key findings of the Audit by providing.

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%			≤ 3%	≥ 95%	≤ 0.5%				
Idea	20:00 to 21:00 hrs	763	3620	0.64%	15	1.97%	97.79%	0.54%	1.87%	0.94%	57	2289	2.49%	96.27%	0	25	19575	7305	271923
BSNL	19:00 to 20:00 hrs	1323	9674	0.98%	120	9.07%	96.58%	0.92%	1.92%	1.96%	148	3903	3.79%	95.21%	0	19	115564	52793	983801
Reliance GSM	19:00 to 20:00 hrs	1561	2508	0.22%	7	0.45%	98.93%	0.03%	0.20%	0.45%	2	4683	0.04%	98.71%	0	14	109000	76894	200502
MTS	18:00 to 19:00 hrs	27	340	1.69%	0	0.00%	99.60%	0.00%	0.09%	0.43%	2	81	2.47%	97.20%	0	17	4200	10	1053
Airtel	19:00 to 20:00 hrs	2598	2193	0.11%	7	0.27%	98.98%	0.07%	0.21%	1.27%	108	7795	1.39%	99.79%	0	69	141324	115607	3618054
Uninor	20:00 to 21:00 hrs	86	718	1.12%	0	0.00%	99.05%	0.00%	0.00%	1.66%	6	254	2.36%	98.48%	0	22	1591	2	220
Vodafone	20:00 to 21:00 hrs	2422	18546	1.03%	48	1.98%	98.24%	0.45%	0.81%	0.08%	172	7303	2.36%	97.31%	0	31	77183	66071	1900600
Tata Tele - CDMA	20:00 to 21:00 hrs	292	337	0.16%	0	0.00%	99.32%	0.00%	0.06%	0.47%	9	928	0.97%	99.65%	0	35	62730	11230	90832
Aircel	19:00 to 20:00 hrs	2349	5462	0.31%	46	1.96%	97.36%	0.77%	1.35%	1.44%	345	7024	4.91%	95.31%	0	68	202621	99874	2954019

*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, NA: Not Applicable

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
Idea	20:00 to 21:00 hrs	20:00 to 21:00 hrs
BSNL	19:00 to 20:00 hrs	19:00 to 20:00 hrs
Reliance GSM	19:00 to 20:00 hrs	19:00 to 20:00 hrs
MTS	18:00 to 19:00 hrs	18:00 to 19:00 hrs
Airtel	19:00 to 20:00 hrs	19:00 to 20:00 hrs
Uninor	20:00 to 21:00 hrs	20:00 to 21:00 hrs
Vodafone	20:00 to 21:00 hrs	20:00 to 21:00 hrs
Tata Tele - CDMA	20:00 to 21:00 hrs	20:00 to 21:00 hrs
Aircel	19:00 to 20:00 hrs	19:00 to 20:00 hrs

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

BTSs Accumulated Downtime:

All operators met this benchmark

Call Set-up Success Rate (CSSR):

All the operators were comfortably meeting the benchmark on this parameter. During the audits the maximum CSSR was observed for Reliance GSM with 99.6% 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 were meeting the TRAI specified benchmarks on the congestion parameters. TATA leads the way in network congestion parameters with almost negligible paging as well as traffic channel congestion. The calculation methodology of these parameters was found to be in complete accordance with what has been specified by TRAI. Both 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 ($\leq 0.5\%$)

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.

Connections with good voice quality:

All the operators are measuring this parameter via their periodic drive tests. However, for some operators these parameters can be obtained at their switch as well. During the audit it was found that all the service providers were measuring this parameter as per the TRAI guidelines.

Customer Care / Helpline Assessment

For the accessibility of customer care IVR aspect all the service providers meet the TRAI benchmark. However for Voice to Voice aspect across Assam circle a majority of the operators seem to be performing poorly on this parameter.

Billing performance

All the operators were found to be meeting the benchmark of $\leq 0.1\%$ 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 were meeting the TRAI benchmark of 100% with 1 week.

Inter operator calls assessment

Inter operator call Assessment To↓ From→	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
Idea	NA	98%	95%	99%	95%	98%	97%	98%	98%
BSNL	97%	NA	91%	97%	93%	97%	94%	92%	99%
Reliance GSM	93%	96%	NA	97%	93%	96%	95%	94%	100%
MTS	100%	100%	93%	NA	90%	100%	100%	95%	87%
Airtel	94%	97%	98%	98%	NA	97%	95%	95%	82%
Vodafone	99%	98%	97%	99%	95%	98%	NA	100%	100%
Tata Tele - CDMA	96%	99%	96%	98%	93%	97%	98%	NA	100%
Uninor	97%	96%	95%	95%	94%	NA	95%	95%	95%
Aircel	93%	96%	93%	99%	95%	98%	95%	96%	NA



The maximum problem faced by the calling operator to other operators

In the inter-operator call assessment, calls were made from the test SIMs of service provider whose audit was being conducted to all the other service providers. Vodafone and TATA CDMA found tough connecting to a BSNL number with only 94 and 92 out of 100 calls getting connected. RCOM had difficulty in connecting to a BSNL number with 91% of their calls getting completed.

Operator	Date	Location
Idea	14 th May, 2012	Guwahati
BSNL	15 th May, 2012	Guwahati
Reliance GSM	16 th May, 2012	Guwahati
MTS	17 th May, 2012	Guwahati
Airtel	17 th May, 2012	Guwahati
Uninor	22 nd May, 2012	Guwahati
Vodafone	22 nd May, 2012	Guwahati
Tata Tele - CDMA	22 nd May, 2012	Guwahati
Aircel	27 th May, 2012	Guwahati

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, Karimganj, Sivsagar. 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 Assam telecom circles were covered.

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

The drive tests in the Assam circle were conducted in the cities of Guwahati, Karimganj, Sivsagar was conducted along the following route:

	Type of location	Guwahati	Karimganj	Sivsagar
Outdoor	Peiphery of the city	Bharalu, Maligaon, Adabari, Jalukbari, Jalukbari, NH 37, Boragaon, ISBT, Lokhora, Beltola, Kainadhora Hill, Khanapara, Sixmile, Right downwords Flyover, VIP Road, Narengi, Noonmati, Infront of Refinery, Sector 1, Joypur, Kharaghuli, Uzan Bazar	1.AT Rd, ASTC, Town Balika Vidyaloya, KPM Chariali, M G Rd, Mel Chakar, Shankar Dev Sishu Vidya Niketon, Income Tax Office, Mela Chakar Namghar Chariali, Sivsagar Junior College, Sivsagar Natya Samaj, J P Agarwal Path, Khijnur Ali Path, Strand Rd, Babu Patti, Dolmukh Chariali, Tample Rd, Shivdol, Gouri Sagar, Distt. Agriculture Office, Circuit House, Divisonal Forest Office, Jail Gate, Sivsagar Commerce College.	1. District Fisheries Off, Public Health Eng Office, Play Ground, Church Rd, Presbyterian Church, MTO Office, Thana Rd, SP Residence, Civil Hospital, Hospital Rd, Public HS School, Main Rd, GIC Office, Fire Brigade Office, HDFC Bank, Sambhusagar Park, Rabindra Nath Girls College, Vivekananda College, Red Cross Society Off, Dist Auditorium, Traffic Br Head Office.
	Congested area	Infront of Ganesh Mandir(Guwahati High Court), DC Office, Panbazar, Donbosco , SP Office , Panbazar Fly over, Paltan Bazar, Ulubari Fly over (Taking left to downwords), Turn To DGP Office, Serab bhathi to Arya College, Rup Nagar, Medical college (Bhangagarh), Fly Over (below) , Rajgarh Road, Guwahati Commerce, Chanmari Fly Over , Silpukhuri, Guwahati Club, Ambari , Reserve Bank, Office Don Bosco , Panbazar to Fancy Bazar, Sani Mandir, Rly Crossing to Athgaon, Bharalumukh.	2. Darika Par, Highway, Namtial Pathar, Piyoli Phukan Nagar, Bir Lachit Borphukan College, Sivsagar Jail, Gourav Nagar Rd, Ponajan Chariali, MI Bora Rd, SP Office, Astt. Exe Eng(PWD) office, Jengni kotia, Social Welfare Office, Dhai Ali, Dorbar Hall, Sapakhoa, Purana Chowk Bazar, Sivsagar Water Supply Tank, Baba Bhutnath Mandir, Bansidhar Barkakti Rd, Sankar Dev Nagar, L K Baruah Rd, H C B Rd, Amolapatty, Kalibari Path, Phukan Nagar, Madhab Dev Namghar, Municipality Water Supply Project, ONGC Qtr, B G Rd, ONGC Workshop,	2. Arvind Hospital, Neheru Yuba Kendra, Sattlement Rd, Office of Sattlement Officer, Sattlement Sub PO, Lakshmicharan Rd, Tax Superintendent Off, Assam State Agriculture Devp. Bank, Main Rd, Foreigner Tribunal, DC Off, Dist Computer Centre, Centenary Gate, SBI, Rabindra Sadan Girls College, Institute of Distance Open Learning, Fire Brigade Office, Joint Director Health, Civil Hospital, Hospital Rd.
	Across the city	Chanmari, R G Baruah, Ganeshguri, Hatigaon, Bhetapara, Saokushi, Adaagodown, Lal Ganesh, DPI, Forensic Laboratory, Kahilipara,	3. Batia Tinali, AT Rd, Joysagar,-Jumma Maszid, Kareng Tinali, Rangghar Park, Civil Hospital, Post Office, Rangghar Chariali,	3. Konishail, Patharkandi Rd, Railway Gate, Station Rd, Exicutive Water Resource Off, Civil Hospital, GNM School,

		Ganeshmandir, Beltola Tiniali, Last Gate over (Below), G S Road, Bhagagarh, ABC, Wallfort, Ganesguri Fly over above, Super Market, Pantaloon	FCl, Na Ali, Lions Club, Sankar Mandir Tiniali, Rangpur, Old Amolapati Girls LP School, ASTC Tiniali, Brahmin Patti, Station Chariali, Gurudwara, Shyam Mandir, Bye Pass Tiniali.	Hospital Rd, SP Office, Kanthia Baba Kunja, Office of the Assam Police Radio Organisation, MG Road, Main Rd, Municipality Office, DC Residence, Circle Office, Satlement Rd, Dist Fisheries Development Office.
Indoor	Office complex	Guwahati High Court	4. Assitant Labor Commission Office	4. MUNICIPALITY OFFICE COMPLEX
	Shopping complex	Pantaloon	5. Ranghar Market Complex	5. CIVIL HOSPITAL MARKET

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

Drive Test – Guwahati


	B'mark	Idea		BSNL		Reliance GSM		Airtel		Vodafone		Tata Tele - CDMA		Aircel	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	≥ 95%	99.13%	97.43%	86.97%	86.19%	97.64%	95.21%	97.62%	95.29%	97.75%	95.93%	99.35%	99.17%	97.52%	96.07%
CSSR	≥ 95%	100.00%	99.38%	100.00%	97.62%	100.00%	99.51%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	0.98%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	3.05%	0.00%	0.98%	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%	99.63%	100.00%	98.48%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Drive Test – Karimganj

	B'mark	BSNL		Reliance GSM		Airtel		Vodafone		Tata Tele - CDMA		Aircel	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	≥ 95%	97.25%	92.65%	99.09%	97.92%	97.03%	95.45%	99.00%	96.21%	99.53%	99.43%	95.22%	95.69%
CSSR	≥ 95%	98.41%	98.17%	100.00%	98.77%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.39%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	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%	0.00%	0.00%	0.61%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Drive Test – Sivsagar

	B'mark	Idea		BSNL		Reliance GSM		Airtel		Vodafone		Tata Tele - CDMA		Aircel	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	≥ 95%	99.31	97.32	90.35%	89.71%	98.61%	98.48%	96.99%	95.46%	98.54%	95.46%	99.70%	99.42%	98.63%	96.59%
CSSR	≥ 95%	100.00%	100.00%	100.00%	96.91%	99.36%	100.00%	100.00%	99.40%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	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%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

 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 in Sector-1, Joypur, Adaagodown.

Karimganj: Fire Brigade Office, Executive Water Resource Off recorded inadequate coverage

Sivsagar: Madhab Dev Namghar, and Tample Rd. locations recorded inadequate coverage


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 does not meet the TRAI benchmark on voice quality across all three cities. Also, BSNL does meet the call drop rate benchmark in Guwahati for outdoor route

Summary of Live Measurement Results – Cellular Mobile Services

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	3ted BTSs due to downtime	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
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Idea	0.95%	0.52%	98.38%	0.25%	0.91%	0.95%	0.22%	95.73%
BSNL	3.43%	0.38%	98.20%	0.37%	0.68%	4.14%	18.54%	96.32%
Reliance GSM	0.40%	0.00%	98.90%	0.02%	0.11%	0.61%	0.00%	98.32%
MTS	0.99%	0.00%	99.52%	0.00%	0.03%	0.75%	1.23%	96.24%
Airtel	1.93%	0.11%	99.01%	0.05%	0.44%	1.19%	1.41%	95.42%
Uninor	1.09%	0.00%	99.22%	0.16%	0.19%	1.90%	0.00%	98.55%
Vodafone	0.83%	0.00%	98.79%	0.15%	0.54%	0.82%	2.39%	97.19%
Tata Tele - CDMA	0.07%	0.00%	99.51%	0.00%	0.02%	0.50%	1.08%	99.79%
Aircel	1.72%	0.00%	97.12%	0.59%	1.66%	1.44%	4.88%	95.21%


 Not meeting the benchmark

* Based on operator assisted drive tests conducted by IMRB

During the three day live measurement, all operators except BSNL for BTS accumulated downtime, Call Drop and for Traffic Channel congestion were found to be meeting the TRAI benchmark on all the parameters.

Summary of Live Calling Results – Cellular Mobile Services

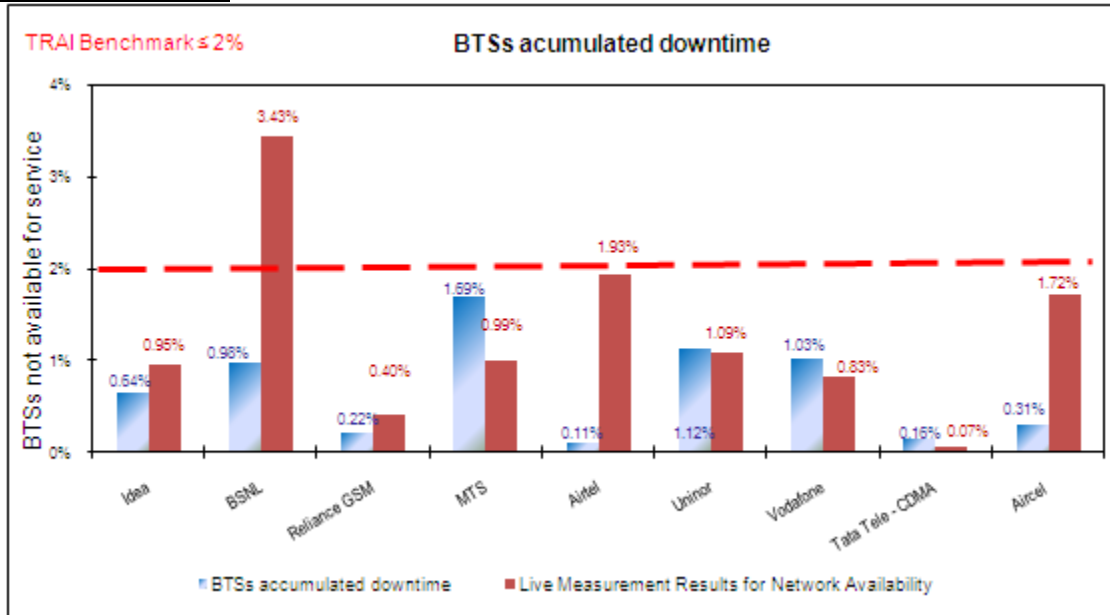
Name of Service Provider	Metering and Billing	Response time to customer for assistance	
	%age complaints resolved within 4 weeks	Accessibility of call centre/ customer care	Percentage of calls answered by the operators (voice to voice) within 60 seconds
Benchmark	100%	≥ 95%	≥ 90%
Idea	92.00%	100.00%	92.00%
BSNL	78.00%	100.00%	91.00%
Reliance GSM	74.00%	100.00%	89.00%
MTS	NA	100.00%	99.00%
Airtel	69.00%	100.00%	95.00%
Uninor	NA	100.00%	97.00%
Vodafone	93.00%	100.00%	97.00%
Tata Tele - CDMA	96.00%	100.00%	90.00%
Aircel	90.00%	88.00%	12.00%

 Not meeting the benchmark

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



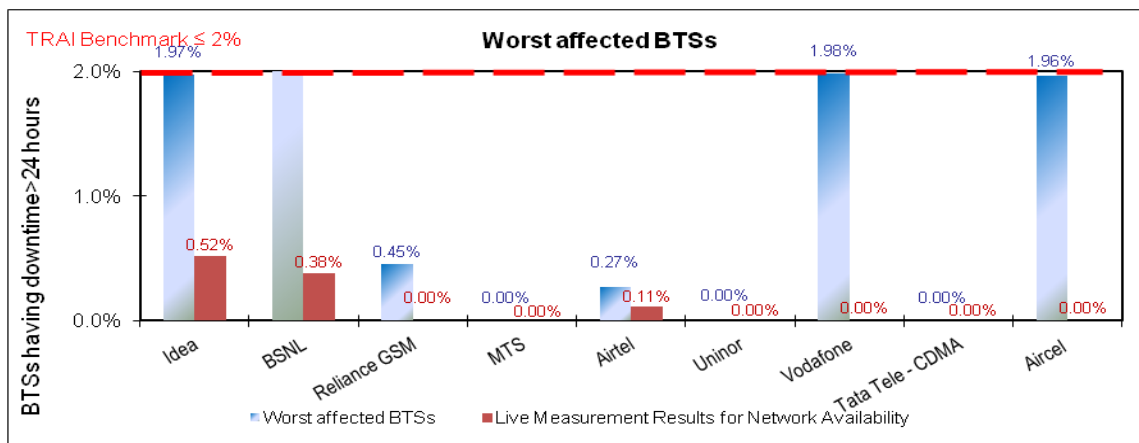
One month

All the operators meet the benchmark

Live measurement

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

Worst Affected BTSs



One month

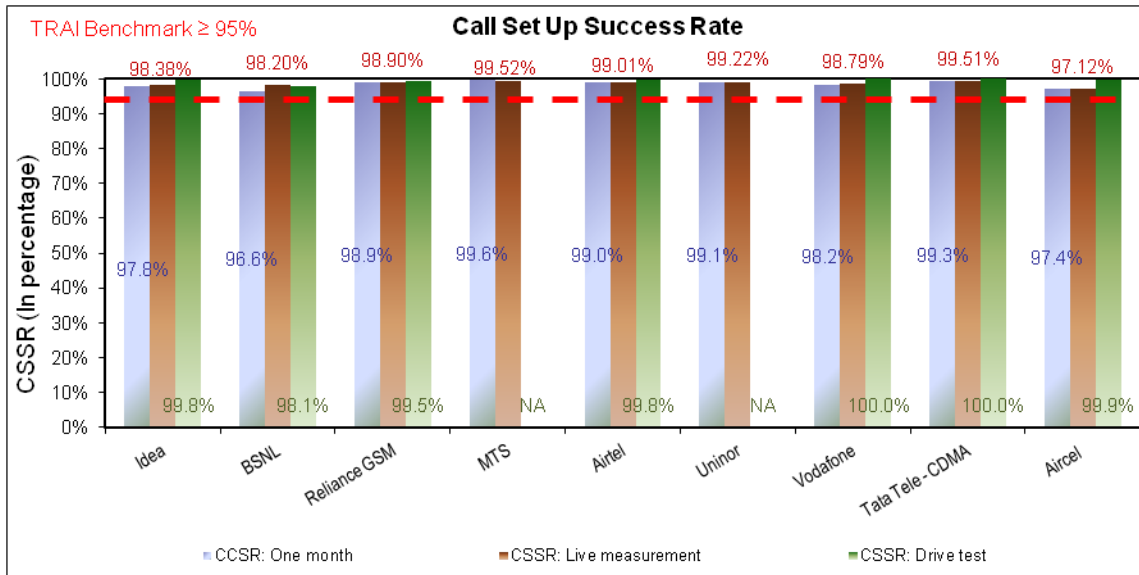
Operator(s) meeting benchmark: Idea, Reliance GSM, MTS, Airtel, Uninor, Vodafone, Tata Tele - CDMA, Aircel

Operator(s) not meeting the benchmark: BSNL

Live measurement

All the operators meet the benchmark

Call Set-up Success Rate (CSSR)



One month

All the operators meet the benchmark

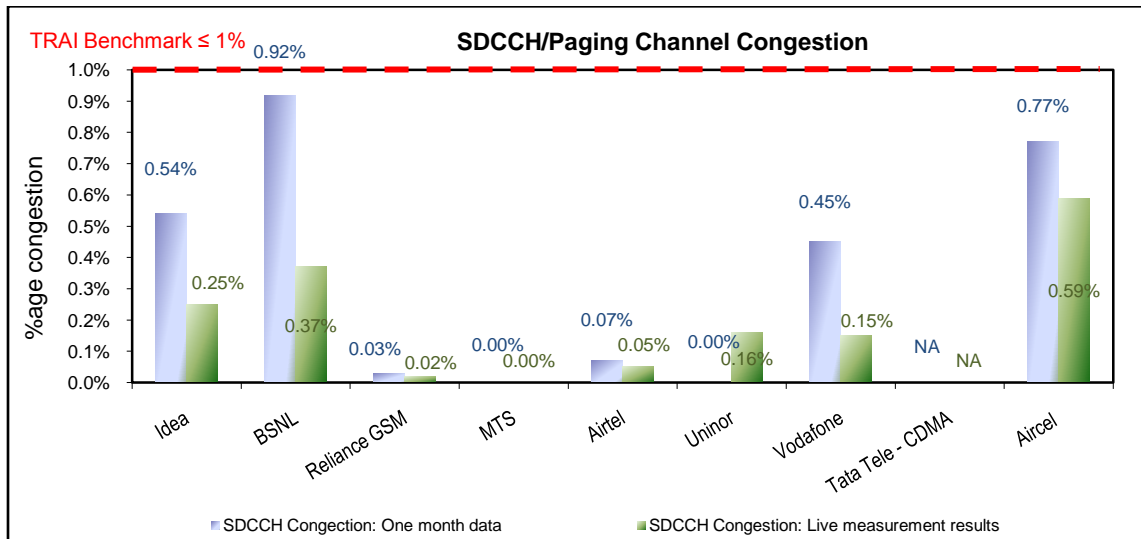
Live measurement

All the operators meet the benchmark

Drive test

All the operators meet the benchmark

SDCCH / Paging Channel Congestion



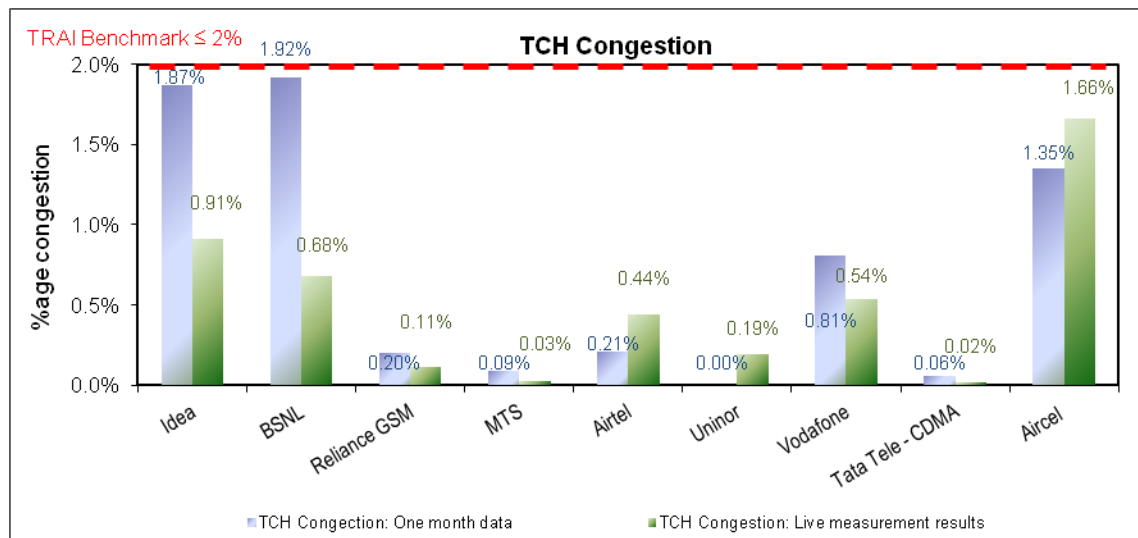
One month

All the operators meet the benchmark

Live measurement

All the operators meet the benchmark

TCH Congestion



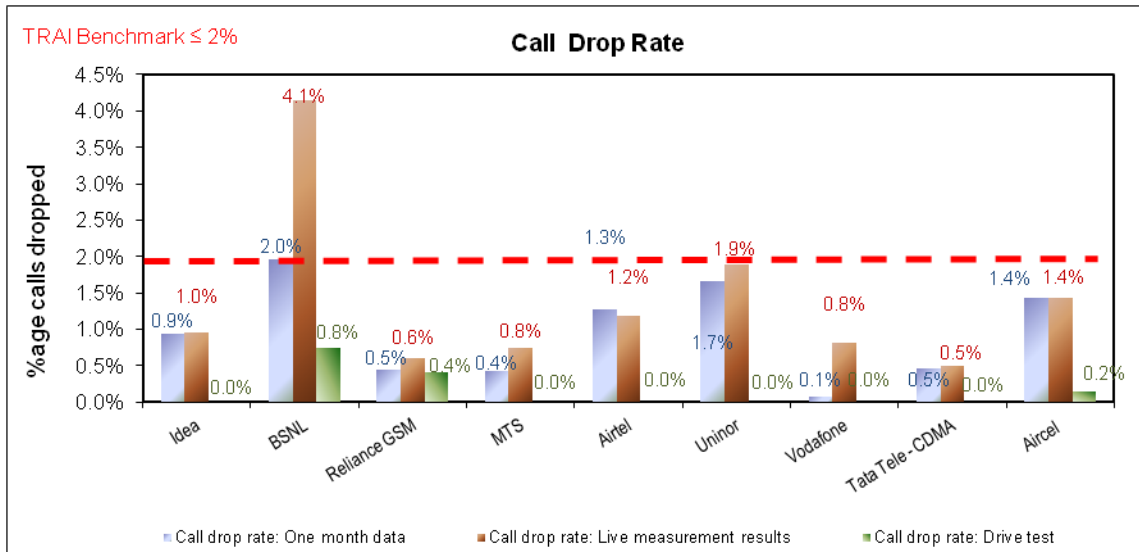
One month

All the operators meet the benchmark

Live measurement

All the operators meet the benchmark

Call Drop Rate



One month

All the operators meet the benchmark

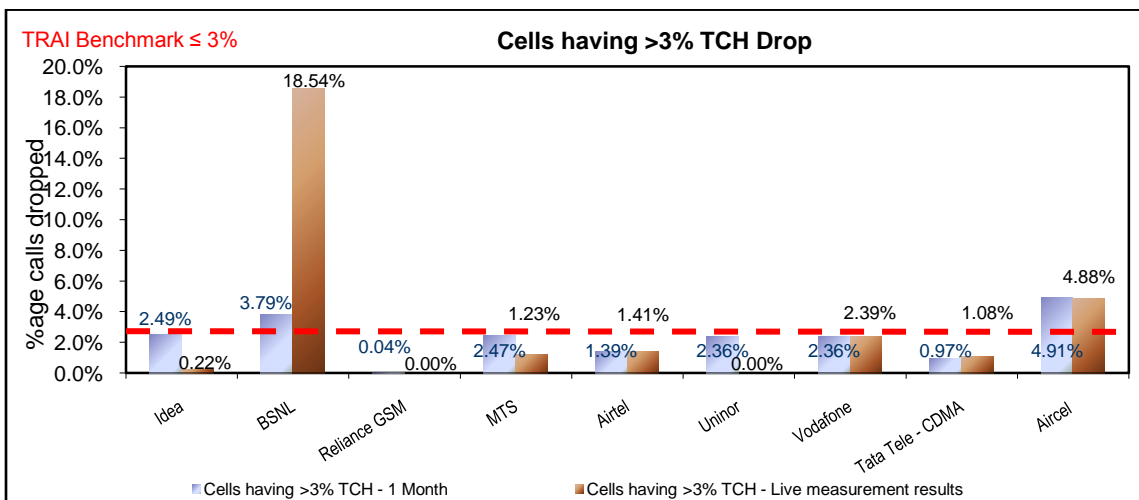
Live measurement

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

Drive test

All the operators meet the benchmark

Cells with more than 3% TCH Drop Rate



One month

Operator(s) meeting benchmark: Idea, Reliance GSM, MTS, Airtel, Uninor, Vodafone, Tata Tele - CDMA

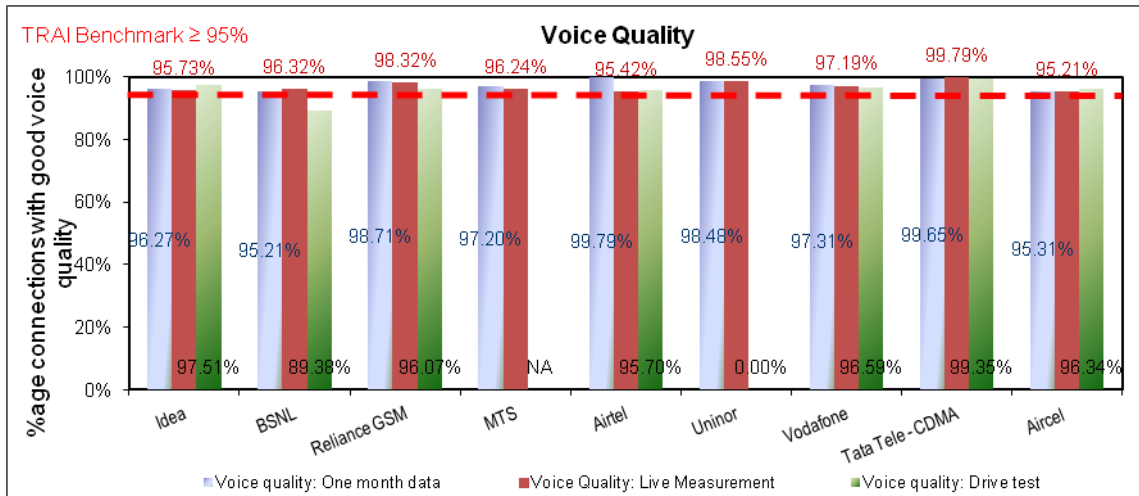
Operator(s) not meeting the benchmark: BSNL, Aircel

Live measurement

Operator(s) meeting benchmark: Idea, Reliance GSM, MTS, Airtel, Uninor, Vodafone, Tata Tele - CDMA

Operator(s) not meeting the benchmark: BSNL, Aircel

Voice quality



One month

All the operators meet the benchmark

Live measurement

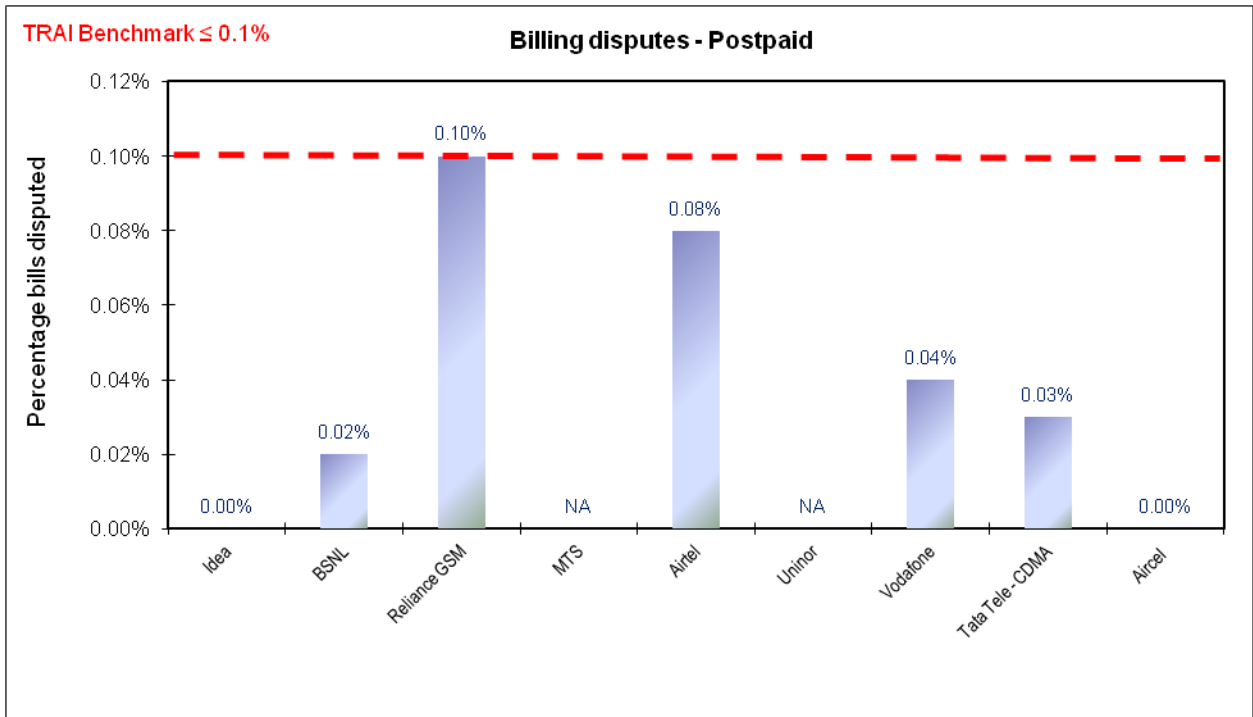
All the operators meet the benchmark

Drive test

Operator(s) meeting benchmark: Idea, Reliance GSM, Airtel, Vodafone, Tata Tele - CDMA, Aircel

Operator(s) not meeting the benchmark: BSNL

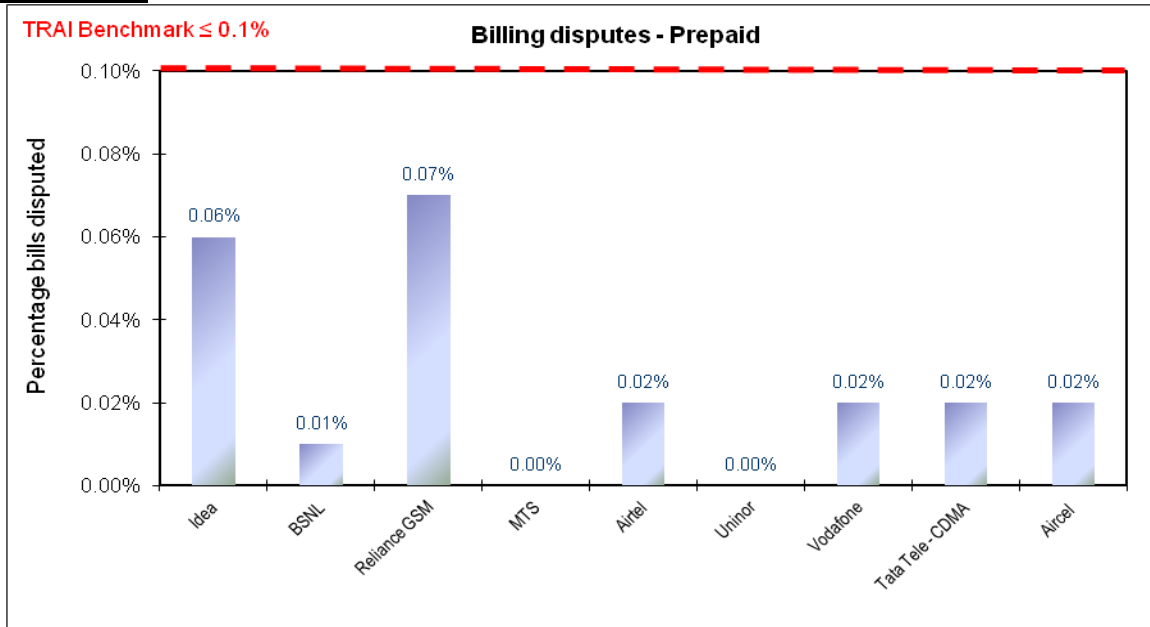
Billing Disputes - Postpaid



NA: Not Applicable

All the operators meet the benchmark

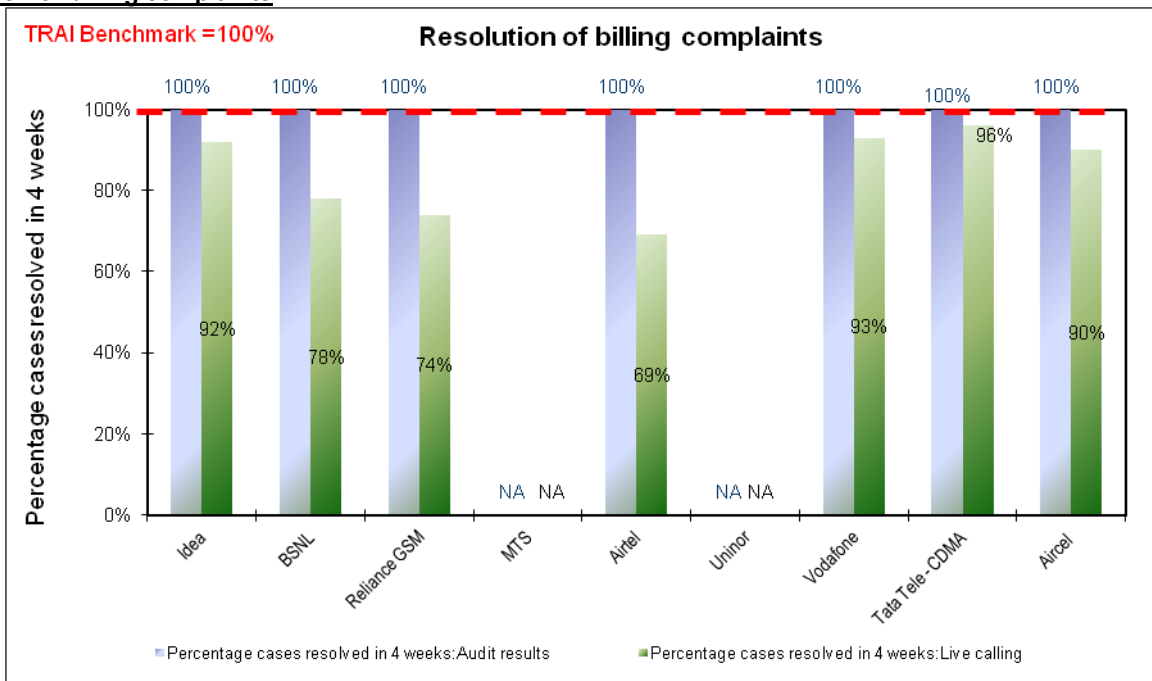
Complaints - Prepaid



NA: Not Applicable

All the operators meet the benchmark

Resolution of billing complaints



NA: Not Applicable

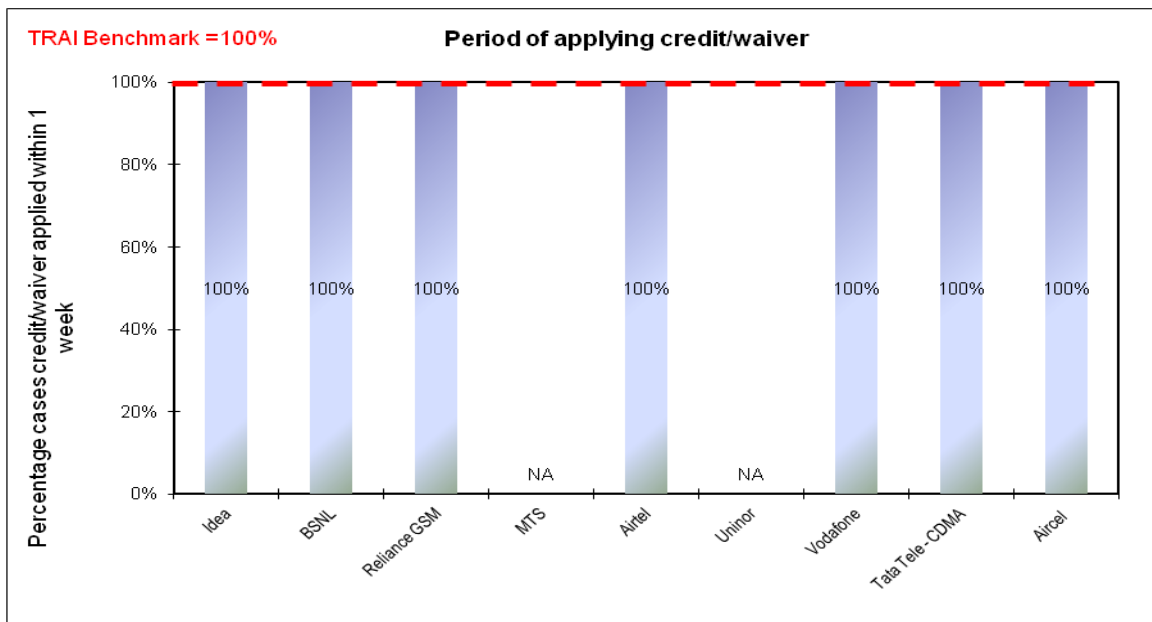
One month

All the operators meet the benchmark

Live calling

None of the operator meets the benchmark

Period of applying credit / waiver



NA: Not Applicable

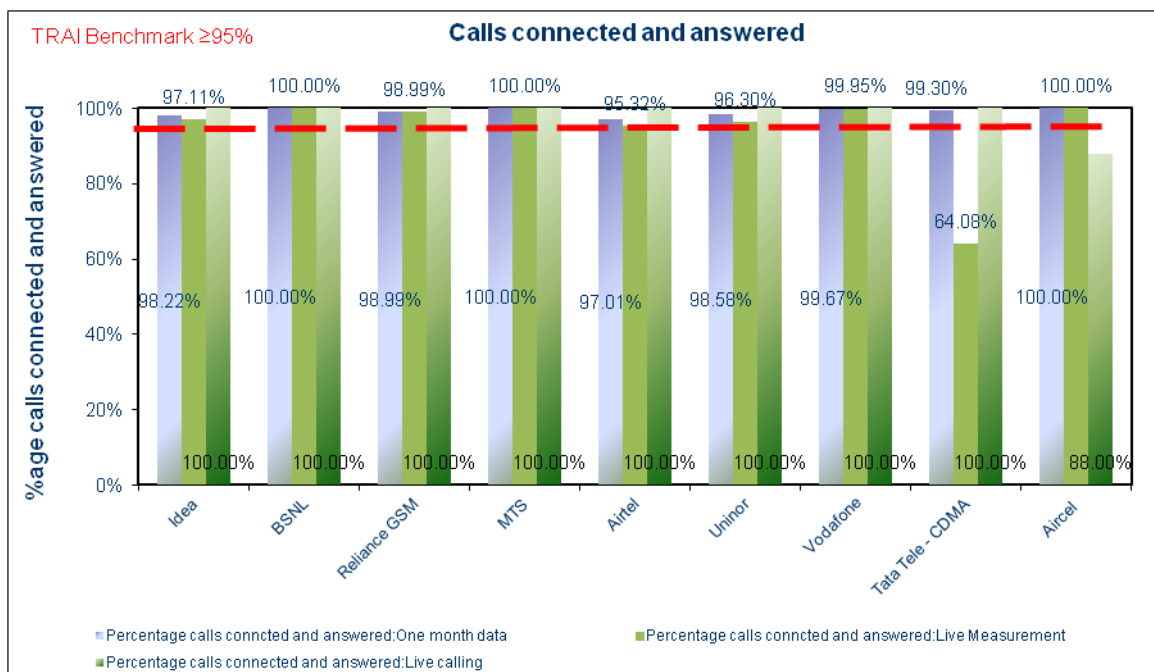
All the operators meet the benchmark

Live calling for billing Complaints

Resolution of billing complaints	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
Total Number of calls made		100	100	100	NA	100	NA	100	25	100
Number of cases resolved in 4 weeks		92	78	74	NA	69	NA	93	24	90
Percentage cases resolved in four weeks	100%	92%	78%	74%	NA	69%	NA	93%	96%	90%

NA: Not Applicable

Customer Care / Helpline: Calls answered



One month

All the operators meet the benchmark

Live measurement

Operator(s) meeting benchmark: Idea, BSNL, Reliance GSM, MTS, Airtel, Uninor, Vodafone, Aircel

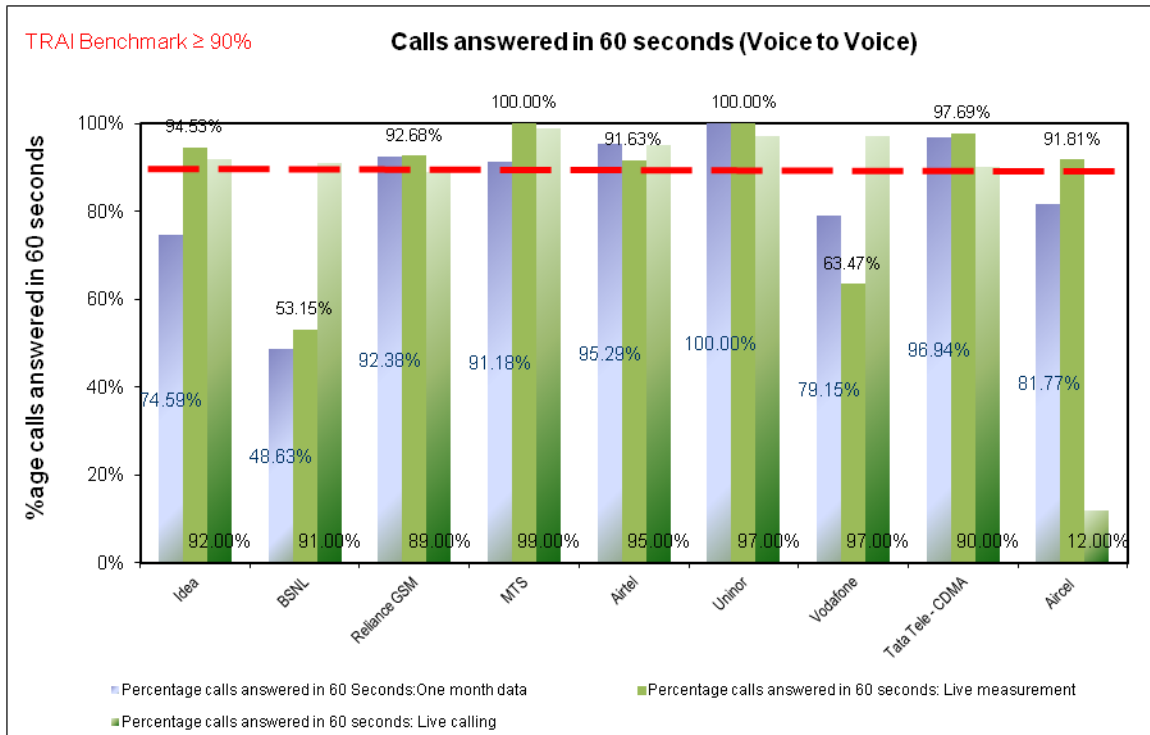
Operator(s) not meeting the benchmark: Tata Tele - CDMA

Live calling

Operator(s) meeting benchmark: Idea, BSNL, Reliance GSM, MTS, Airtel, Uninor, Vodafone, Tata Tele - CDMA

Operator(s) not meeting the benchmark: Aircel

Customer Care / Helpline: Calls answered voice to voice



One month

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

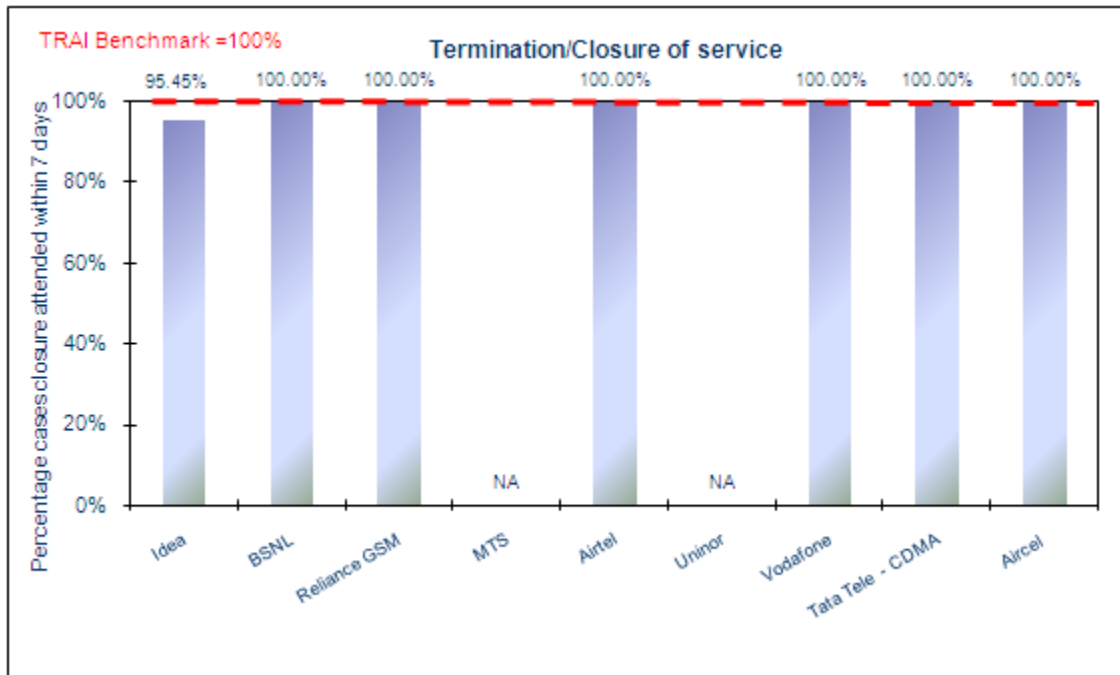
Live measurement

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

Live calling

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

Termination / Closure of service

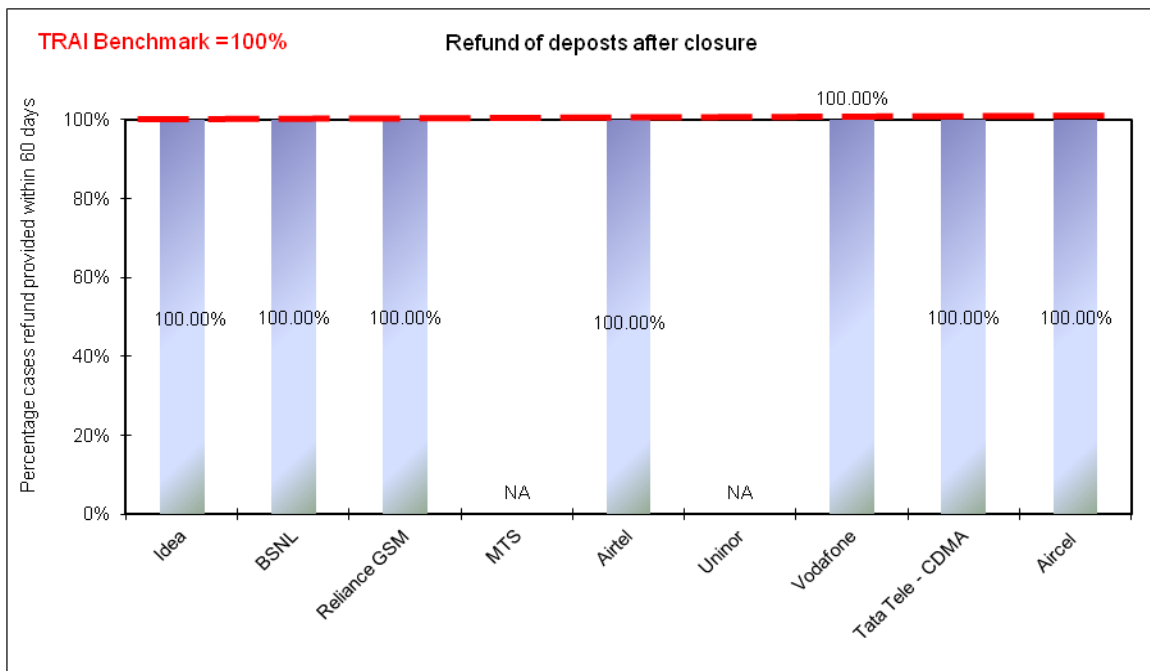


NA: Not Applicable

Operator(s) meeting benchmark: BSNL, Reliance GSM, Airtel, Vodafone, Tata Tele - CDMA, Aircel

Operator(s) not meeting the benchmark: Idea

Refund of deposits




NA: Not Applicable

All the operators meet the benchmark

Inter operator calls assessment

Inter operator call Assessment To↓ From→	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
Idea	NA	98%	95%	99%	95%	98%	97%	98%	98%
BSNL	97%	NA	91%	97%	93%	97%	94%	92%	99%
Reliance GSM	93%	96%	NA	97%	93%	96%	95%	94%	100%
MTS	100%	100%	93%	NA	90%	100%	100%	95%	87%
Airtel	94%	97%	98%	98%	NA	97%	95%	95%	82%
Vodafone	99%	98%	97%	99%	95%	98%	NA	100%	100%
Tata Tele - CDMA	96%	99%	96%	98%	93%	97%	98%	NA	100%
Uninor	97%	96%	95%	95%	94%	NA	95%	95%	95%
Aircel	93%	96%	93%	99%	95%	98%	95%	96%	NA

 The maximum problem faced by the calling operator to other operators

In the inter-operator call assessment, calls were made from the test SIMs of service provider whose audit was being conducted to all the other service providers. Vodafone and TATA CDMA found tough connecting to a BSNL number with only 94 and 92 out of 100 calls getting connected. RCOM had difficulty in connecting to a BSNL number with 91% of their calls getting completed.

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	Network Traffic Capacity				
	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	Equippe d Capacity of Network in respect of Traffic in erlang	Total traffic handled in TCHB in erlang	Total no. of customer serves (as per VLR) on last day of the month	
Benchmark			≤ 2%		≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%			≤ 3%	≥ 95%					
Idea	PMR	666	546.07	0.11%	9	1.40%	99.41%	0.39%	0.26%	0.97%	50	1998	2.50%	96.37%	0	15280	7644.5	269033
	IMR B	666	546.07	0.11%	9	1.40%	99.41%	0.39%	0.26%	0.97%	50	1998	2.50%	96.37%	0	15280	7644.3	267366
BSNL	PMR	1319	10096	1.03%	120	9.07%	98.00%	1.00%	2.00%	2.00%	172	3893	4.40%	97.67%	0	115564	59050.3	977979
	IMR B	1319	10096	1.04%	120	9.07%	97.93%	0.99%	1.98%	1.99%	172	3893	4.41%	97.50%	0	115564	59050.3	977979
Reliance GSM	PMR	1516	2510	0.22%	13	0.85%	98.74%	0.27%	0.59%	0.61%	50	4549	1.09%	98.55%	0	109000	71204.7	#DIV/0!
	IMR B	1516	2510	0.36%	13	0.85%	98.74%	0.36%	0.60%	0.62%	50	4549	1.09%	98.56%	0	109000	71204.7	#DIV/0!
MTS	PMR	27	137	0.68%	0	0.00%	100.00%	0.00%	0.00%	0.00%	0	81	0.00%	100.00%	0	2963	10.4	725
	IMR B	27	137	0.68%	0	0.00%	100.00%	0.00%	0.00%	0.00%	0	81	0.00%	100.00%	0	2963	10.4	725
Airtel	PMR	2570	6693	0.37%	15	0.60%	98.17%	0.17%	0.50%	1.43%	158	7712	2.03%	99.23%	0	141232	97959.2	3135483
	IMR B	2570	6693	0.37%	15	0.59%	98.18%	0.18%	0.49%	1.44%	158	7712	2.05%	99.23%	0	141231	97958.7	3135483
Uninor	PMR	86	507	0.79%	0	0.00%	99.64%	0.46%	0.00%	0.05%	0	254	0.00%	98.87%	0	1148	2.3	60
	IMR B	86	507	0.79%	0	0.00%	99.64%	0.46%	0.00%	0.05%	0	254	0.00%	98.87%	0	1148	2.3	60
Vodafone	PMR	2343	14230	0.82%	44	1.89%	98.26%	0.33%	0.84%	0.80%	184	7032	2.62%	97.28%	0	63163	55291.2	1632013
	IMR B	2343	14230	0.82%	44	1.89%	98.26%	0.33%	0.84%	0.80%	184	7032	2.62%	97.28%	0	63163	55291.2	1632231
Tata Tele - CDMA	PMR	288	187	0.09%	0	0.00%	99.58%	0.00%	0.01%	0.48%	6	905	0.62%	99.54%	0	60666	11127.3	90359
	IMR B	288	187	0.09%	0	0.00%	99.58%	0.00%	0.01%	0.48%	6	905	0.62%	99.54%	0	60666	11127.0	90359

Quality of Service – Audit module report for “Assam” Circle- Cellular Mobile (Wireless) Service Providers

Aircel	PMR	2253	5547	0.34%	42	1.88%	96.86%	0.74%	1.34%	1.48%	282	6732	4.19%	95.40%	0	194983	92378.3	2797727
	IMR B	2253	5547	0.34%	42	1.88%	96.86%	0.74%	1.34%	1.48%	282	6732	4.19%	95.40%	0	194983	92378.3	2797727

DNP: Data not provided by operator


Not meeting benchmark

Name of Service Provider		Metering and Billing											Response time to the customer for assistance				Termination/ closure of service				
		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 during the quarter	No. of complaints resolved in favour of the customer during the quarter	No. of complaints disposed on account of not considered as valid complaints during the quarter	adjustment to customer/s account from the date of resolution of	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 / Closure of service complied within 7 days	Total No. of request for Termination/ Closure 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			
Idea	PMR	0.00%	6,899	0	0.00%	3	9,03,318	100.00%	1280	1280	3	1277	100.00%	96.46%	99,652	96,121	90.72%	100.00%	90	10	33.33%
	IMRB	0.00%	6,899	0	0.00%	3	896609	100.00%	1280	1280	3	1277	100.00%	96.46%	101828	98151	90.72%	100.00%	0	6899	0.00%
BSNL	PMR	0.01%	707473	52	0.00%	18	1212722	100.00%	70	70	60	10	100.00%	100.00%	16961	16864	90.67%	100.00%	1928	1928	100.00%
	IMRB	0.01%	707473	52	0.00%	18	1212722	100.00%	70	70	60	10	100.00%	100.00%	16961	16864	90.67%	100.00%	1928	1928	100.00%
Reliance GSM	PMR	0.05%	320818	155	0.03%	846	2539662	100.00%	2692	2692	806	1886	100.00%	99.00%	13614851	13753501	87.00%	100.00%	192	192	100.00%
	IMRB	0.05%	320818	155	0.03%	846	2539662	100.00%	2692	2692	806	1886	100.00%	99.00%	13614851	13753501	87.00%	100.00%	192	192	100.00%
MTS	PMR	NA	NA	NA	0.00%	NA	930	NA	NA	NA	NA	NA	NA	100.00%	1	1	90.00%	NA	NA	NA	NA
	IMRB	NA	NA	NA	0.00%	NA	930	NA	NA	NA	NA	NA	NA	100.00%	1	1	91.18%	NA	NA	NA	NA
Airtel	PMR	0.00%	144660	3	0.06%	7191	12148977	100.00%	7194	10129	7194	2935	100.00%	100.00%	15,06,787	15,02,187	98.00%	100.00%	786	786	100.00%
	IMRB	0.00%	144660	111	0.06%	10030	12148977	100.00%	10141	7194	7194	2947	100.00%	99.73%	3102026	3044504	96.11%	100.00%	803	803	100.00%
Uninor	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
Vodafone	PMR	0.07%	100738	70	0.05%	2967	1889891	100.00%	3037	3037	2908	129	100.00%	99.85%	190569	141042	84.85%	100.00%	408	408	100.00%
	IMRB	0.09%	909179	70	0.05%	2967	1889891	100.00%	3037	3037	2908	129	100.00%	100.00%	765806	676953	85.00%	100.00%	362	362	100.00%


Quality of Service – Audit module report for “Assam” Circle- Cellular Mobile (Wireless) Service Providers

Tata Tele - CDMA	PMR	0.00%	138538	78	0.01%	44	69549	100.00%	122	122	122	111	100.00%	97.00%	33804	32679	98.00%	100.00%	1802	1802	100.00%
	IMRB	0.00%	138538	78	0.01%	44	69549	100.00%	122	122	122	111	100.00%	97.00%	33804	32679	98.00%	100.00%	1802	1802	100.00%
Aircel	PMR	0.01%	111658	8	0.02%	806	3651742	100.00%	1293	1293	814	479	100.00%	100.00%	391715	274049	62.10%	100.00%	571	571	100.00%
	IMRB	0.01%	111658	8	0.02%	806	3541649	100%	1293	1293	814	479	100.00%	100.00%	385825	269908	61.78%	100%	571	571	100%

 Figures do not match with those reported in PMR

 Figures verified on all India basis

B'mark = TRAI Benchmark, NA = Not Applicable

 Not meeting benchmark

8.0 Conclusions

8.1 Cellular Mobile services

1. The figures reported by all the operators on all parameters completely match the figures obtained on verification except for Idea in some places.
2. BSNL and Aircel did not meet the benchmark for Worst affected cells having more than 3% TCH drop

In some places there is a slight mismatch in PMR and IMRB reported figured due to rounding off error

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 (%)	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%	≤ 3%	≥ 95%	≤ 0.1%	≤ 0.1%	100%	100%	≥ 95%	≥ 90%	100%	100%
Idea	0.64%	1.97%	97.79%	0.54%	1.87%	0.94%	2.49%	96.27%	0.00%	0.06%	100.00%	100.00%	98.22%	74.59%	95.45%	100.00%
BSNL	0.98%	9.07%	96.58%	0.92%	1.92%	1.96%	3.79%	95.21%	0.02%	0.01%	100.00%	100.00%	100.00%	48.63%	100.00%	100.00%
Reliance GSM	0.22%	0.45%	98.93%	0.03%	0.20%	0.45%	0.04%	98.71%	0.10%	0.07%	100.00%	100.00%	98.99%	92.38%	100.00%	100.00%
MTS	1.69%	0.00%	99.60%	0.00%	0.09%	0.43%	2.47%	97.20%	NA	0.00%	NA	NA	100.00%	91.18%	NA	NA
Airtel	0.11%	0.27%	98.98%	0.07%	0.21%	1.27%	1.39%	99.79%	0.08%	0.02%	100.00%	100.00%	97.01%	95.29%	100.00%	100.00%
Uninor	1.12%	0.00%	99.05%	0.00%	0.00%	1.66%	2.36%	98.48%	NA	0.00%	NA	NA	98.58%	100.00%	NA	NA
Vodafone	1.03%	1.98%	98.24%	0.45%	0.81%	0.08%	2.36%	97.31%	0.04%	0.02%	100.00%	100.00%	99.67%	79.15%	100.00%	100.00%
Tata Tele - CDMA	0.16%	0.00%	99.32%	0.00%	0.06%	0.47%	0.97%	99.65%	0.03%	0.02%	100.00%	100.00%	99.30%	96.94%	100.00%	100.00%
Aircel	0.31%	1.96%	97.36%	0.77%	1.35%	1.44%	4.91%	95.31%	0.00%	0.02%	100.00%	100.00%	100.00%	81.77%	100.00%	100.00%

NA: Not Applicable

Not meeting benchmark

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
Idea	0	0	0	0	0	0
BSNL	0	0	0	0	0	0
Reliance GSM	0	0	0	0	0	0
MTS	0	0	0	0	0	0
Airtel	0	0	0	0	0	0
Uninor	0	0	0	0	0	0
Vodafone	0	0	0	0	0	0
Tata Tele - CDMA	0	0	0	0	0	0
Aircel	0	0	0	0	0	0

9.3 Parameter wise performance reports for Cellular Mobile services

1. Network Availability

Audit Results for Network Availability

	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
Number of BTSs in the licensed service area		763	1323	1561	27	2598	86	2422	292	2349
Sum of downtime of BTSs in a month (in hours)		3620	9674	2508	340	2193	718	18546	337	5462.43
BTSs accumulated downtime (not available for service)	≤ 2%	0.64%	0.98%	0.22%	1.69%	0.11%	1.12%	1.03%	0.16%	0.31%
Number of BTSs having accumulated downtime >24 hours		15	120	7	0	7	0	48	0	46
Worst affected BTSs due to downtime	≤ 2%	1.97%	9.07%	0.45%	0.00%	0.27%	0.00%	1.98%	0.00%	1.96%

	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
Number of BTSs in the licensed service area		765	1326	1561	27	1862	86	4096	292	2349
Sum of downtime of BTSs in a month (in hours)		524	3273	444	19	2589	67	2434	14	2903
BTSs accumulated downtime (not available for service)	≤ 2%	0.95%	3.43%	0.40%	0.99%	1.93%	1.09%	0.83%	0.07%	1.72%
Number of BTSs having accumulated downtime >24 hours		4	5	0	0	2	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.52%	0.38%	0.00%	0.00%	0.11%	0.00%	0.00%	0.00%	0.00%

2. Connection Establishment (Accessibility)

Audit Results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
CSSR	≥ 95%	97.79%	96.58%	98.93%	99.60%	98.98%	99.05%	98.24%	99.32%	97.36%

SDCCH congestion	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
SDCCH/Paging channel congestion	≤ 1%	0.54%	0.92%	0.03%	0.00%	0.07%	0.00%	0.45%	0.00%	0.77%

TCH congestion	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
TCH congestion	≤ 2%	1.87%	1.92%	0.20%	0.09%	0.21%	0.00%	0.81%	0.06%	1.35%

Live measurement results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
CSSR	≥ 95%	98.38%	98.20%	98.90%	99.52%	99.01%	99.22%	98.79%	99.51%	97.12%

SDCCH congestion	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
SDCCH/Paging channel congestion	≤ 1%	0.25%	0.37%	0.02%	0.00%	0.05%	0.16%	0.15%	0.00%	0.59%

TCH congestion	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
TCH congestion	≤ 2%	0.91%	0.68%	0.11%	0.03%	0.44%	0.19%	0.54%	0.02%	1.66%

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

CSSR	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
Total number of call attempts		443	683	727	NA	645	NA	670	1288	678
Total number of successful calls established		442	670	723	NA	644	NA	670	1288	677

CSSR	≥ 95%	99.77%	98.10%	99.45%	NA	99.84%	NA	100.00%	100.00%	99.85%
------	-------	--------	--------	--------	----	--------	----	---------	---------	--------

Blocked calls	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
%age blocked calls		0.23%	1.90%	0.55%	NA	0.16%	NA	0.00%	0.00%	0.15%

3. Connection Maintenance (Retainability)

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

Call drop rate	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
Total number of calls established		10515795	555056362	108245270	17973	185097611	945	33288338	1532883	273432367
Total number of calls dropped		98986	10879105	482773	77	2342761	16	27662	7257	3940313
Call drop rate	≤ 2%	0.94%	1.96%	0.45%	0.43%	1.27%	1.66%	0.08%	0.47%	1.44%

Cells having more than 3% TCH	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
Total number of cells in the network		2289	3903	4683	81	7795	254	7303	928	7024
Total number of cells having more than 3% TCH		57	148	2	2	108	6	172	9	345
Worst affected cells having more than 3% TCH	≤ 3%	2.49%	3.79%	0.04%	2.47%	1.39%	2.36%	2.36%	0.97%	4.91%

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

Call drop rate	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
Total number of calls established		13263846	58457132	115677387	20143	18124966	105	3057700	154797	26462188
Total number of calls dropped		125954	2420125	706152	152	214873	2	24972	774	380084
Call drop rate	≤ 2%	0.95%	4.14%	0.61%	0.75%	1.19%	1.90%	0.82%	0.50%	1.44%

Cells having more than 3% TCH	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
Total number of cells in the network		2295	3915	4683	81	7795	254	7323	928	21079
Total number of cells having more than 3% TCH		5	726	0	1	110	0	175	10	1028
Worst affected cells having more than 3% TCH	≤ 3%	0.22%	18.54%	0.00%	1.23%	1.41%	0.00%	2.39%	1.08%	4.88%

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

Call drop rate	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
Total number of calls established		442	670	724	NA	644	NA	670	1288	677
Total number of calls dropped		0	5	3	NA	0	NA	0	0	1
Call drop rate	≤ 2%	0.00%	0.75%	0.41%	NA	0.00%	NA	0.00%	0.00%	0.15%

4. Voice quality

Audit & Live measurement Results for Voice quality

Voice quality	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
Total number of sample calls		1296454204	58977	16847240195	17973	21235	151475	523947920	1424	14946977855
Total number of calls with good voice quality		1248157423	56152	16629185652	17470	21190	149178	509859550	1419	14246288642
%age calls with good voice quality	≥ 95%	96.27%	95.21%	98.71%	97.20%	99.79%	98.48%	97.31%	99.65%	95.31%

Voice quality	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
Total number of sample calls		1377393867	49139	NA	20143	271238	57990	453360088	2410	1402056200
Total number of calls with good voice quality		1318529575	47329	NA	19385	258822	57147	440604181	2405	1334848296
%age calls with good voice quality	≥ 95%	95.73%	96.32%	98.32%	96.24%	95.42%	98.55%	97.19%	99.79%	95.21%

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

Voice quality	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
Total number of sample calls		407078	825390	514678	NA	648496	NA	886295	40114	862884
Total number of calls with good voice quality		396923	737738	494455	NA	620632	NA	856071	39852	831294
%age calls with good voice quality	≥ 95%	97.51%	89.38%	96.07%	NA	95.70%	NA	96.59%	99.35%	96.34%

5. POI Congestion

Audit Results for POI Congestion

POI congestion	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
Total number of working POIs		25	19	14	17	66	22	31	35	68
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		11878.54	18318	1138652.0	434.77	79861	325.49	35230013.16	4475	77942.53
Traffic served for all POIs (B)- in erlangs		5699.5	19468	809821.5	9.88	51350	1.83	10049623.74	1606	47986.69
POI congestion	≤ 0.5%	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Live measurement results for POI congestion

POI congestion	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
Total number of working POIs		25	19	14	17	69	22	31	35	68
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		11284.06	18388.3	118158.37	434.77	88632	325.49	3455224.39	4475	205490.91
Traffic served for all POIs (B)- in erlangs		5903.14	16847	84884.54	7.77	56828	1.81	1017660.65	1227	143653.94
POI congestion	≤ 0.5%	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00

6. Inter Operator Call Assessment

Inter operator call Assessment To↓ From→	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
Idea	NA	98%	95%	99%	95%	98%	97%	98%	98%
BSNL	97%	NA	91%	97%	93%	97%	94%	92%	99%
Reliance GSM	93%	96%	NA	97%	93%	96%	95%	94%	100%
MTS	100%	100%	93%	NA	90%	100%	100%	95%	87%
Airtel	94%	97%	98%	98%	NA	97%	95%	95%	82%
Vodafone	99%	98%	97%	99%	95%	98%	NA	100%	100%
Tata Tele - CDMA	96%	99%	96%	98%	93%	97%	98%	NA	100%
Uninor	97%	96%	95%	95%	94%	NA	95%	95%	95%
Aircel	93%	96%	93%	99%	95%	98%	95%	96%	NA

 The maximum problem faced by the calling operator to other operators

7. Metering and Billing credibility
Audit Results for Billing performance

Billing Performance	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
Billing disputes – Postpaid										
Total bills generated during the period		2170	237309	107455	NA	48484	NA	36756	46494	36701
Total number of bills disputed		0	39	104	NA	37	NA	14	14	0
Percentage bills disputed	≤ 0.1%	0.00%	0.02%	0.10%	NA	0.08%	NA	0.04%	0.03%	0.00%
Billing disputes – Prepaid										
Number of complaints related to charging, credit & validity		186	88	1902	0	804	0	460	11	635
Total number of prepaid customers in that period		318003	913513	2775438	1163	4689208	94	2188229	68425	3653576
Percentage of complaints	≤ 0.1%	0.06%	0.01%	0.07%	0.00%	0.02%	0.00%	0.02%	0.02%	0.02%
Resolution of billing complaints										
Total number of billing/charging complaints		186	25	2006	NA	841	NA	474	25	1961
Total complaints considered invalid		184	2	815	NA	797	NA	16	23	635
Number of complaints resolved in 4 weeks from date of receipt for complaints listed in 5.3.1		186	25	2006	NA	841	NA	474	25	1961
Percentage complaints resolved within 4 weeks of date of receipt	100%	100%	100%	100%	NA	100%	NA	100%	100%	100%
Period of applying credit / waiver										
Total number of complaints where credit/waiver is required		2	10	1191	NA	44	NA	326	2	1961
Percentage cases in which credit/waiver was received within 1 week	100%	100%	100%	100%	NA	100%	NA	100%	100%	100%

Live calling results for resolution of billing complaints

Resolution of billing complaints	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
Total Number of calls made		100	100	100	NA	100	NA	100	25	100
Number of cases resolved in 4 weeks		92	78	74	NA	69	NA	93	24	90
Percentage cases resolved in four weeks	100%	92%	78%	74%	NA	69%	NA	93%	96%	90%

8. Customer Care
Audit results for customer care

Customer Care Assessment	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
Total number of call attempts to customer care for assistance		23215	940227	3689762	79	8473599	235	2997723	101467	4675602
Number of calls getting connected and answered (electronically)		22802	940227	3652521	79	8220394	230	2987731	100761	4675602
Percentage calls getting connected and answered	≥ 95%	98.22%	100.00%	98.99%	100.00%	97.01%	98.58%	99.67%	99.30%	100.00%
Number of calls getting transferred to the operator (voice to voice)		179711	307226	632553	68	948861	235	826252	12441	1605834
Number of calls answered by operator (voice to voice) within 60 seconds		134050	149418	584323	62	904207	235	653941	12060	1313113
Percentage calls answered within 60 seconds (V2V)	≥ 90%	74.59%	48.63%	92.38%	91.18%	95.29%	100.00%	79.15%	96.94%	81.77%

Live measurement results for customer care

Customer Care Assessment	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
Total number of call attempts to customer care for assistance		47397	94024	397067	4	828475	27	311985	9033	453680
Number of calls getting connected and answered (electronically)		46025	94024	393064	4	789736	26	311829	5788	453680
Percentage calls getting connected and answered	≥ 95%	97.11%	100.00%	98.99%	100.00%	95.32%	96.30%	99.95%	64.08%	100.00%
Number of calls getting transferred to the operator (voice to voice)		13626	30510	68999	3	108249	27	91882	2992	155902
Number of calls answered by operator (voice to voice) within 60 seconds		12881	16215	63945	3	99184	27	58313	2923	143136
Percentage calls answered within 60 seconds (V2V)	≥ 90%	94.53%	53.15%	92.68%	100.00%	91.63%	100.00%	63.47%	97.69%	91.81%

Live calling results for customer care

Customer Care Assessment	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
Total Number of calls received		100	100	100	100	100	100	100	100	100
Total Number of calls getting connected and answered		100	100	100	100	100	100	100	100	88
Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	88.00%

Live calling results for customer care (Voice to Voice)

Customer Care Assessment	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
Total Number of calls received		100	100	100	100	100	100	100	100	100
Total Number of calls answered within 60 seconds		92	91	89	99	95	97	97	90	12
Percentage calls answered within 60 seconds	≥ 90%	92.00%	91.00%	89.00%	99.00%	95.00%	97.00%	97.00%	90.00%	12.00%

Operator	Customer Care No.
Idea	12345
BSNL	1503
Reliance GSM	333, 9864098640
MTS	9134155155
Airtel	121
Uninor	9121091210
Vodafone	9706097060
Tata Tele - CDMA	121
Aircel	121

9. Termination / closure of service

Audit results for termination / closure of service

Termination	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
Total number of closure request		22	578	131	NA	213	NA	119	1114	185
Number of requests attended within 7 days		21	578	131	NA	213	NA	119	1114	185
Percentage cases in which termination done within 7 days	100%	95.45%	100.00%	100.00%	NA	100.00%	NA	100.00%	100.00%	100.00%

Audit results for refund of deposits

Refund	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
Total number of cases requiring refund of deposits		13	268	230	NA	79	NA	228	19	185
Total number of cases where refund was made within 60 days		13	268	230	NA	79	NA	228	19	185
Percentage cases in which refund was receive within 60 days	100%	100.00%	100.00%	100.00%	NA	100.00%	NA	100.00%	100.00%	100.00%

11. Additional Network Related parameters

Audit Results for Total Traffic Handled in Erlang

Traffic in Erlang	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
Equipped capacity of the network		19575	115564	109000	4200	141324	1591	77182.5	62730	202621.45
Total traffic handled in erlang during TCBH		7305	52792.75	76894	9.98	115607	1.81	66071.41	11230	99873.9

Total number of customers as per VLR

	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
Total no. of customers served (as per VLR)		271923	983801	200502	1053	3618054	220	1900600	90832	2954019

Level 1 services	Benchmark	Idea	BSNL	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Aircel
Total no. of calls made		150	150	150	150	150	150	150	150	150
Calls answered in 60 sec		150	150	150	150	150	150	150	150	150
Calls answered after 60 sec		0	0	0	0	0	0	0	0	0

A total of 150 calls were made including 50 each at these numbers respectively:

- o 100
- o 101
- o 102
