

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

Kolkata 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 Kolkata 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

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 Kolkata 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
Kolkata 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 Kolkata circle

	Name of Operator	Month of Audit
Operator 1	Idea	May, 2012
Operator 2	BSNL	May, 2012
Operator 3	Reliance CDMA	May, 2012
Operator 4	Reliance GSM	May, 2012
Operator 5	MTS	June, 2012
Operator 6	Airtel	May, 2012
Operator 7	Uninor	May, 2012
Operator 8	Vodafone	May, 2012
Operator 9	Tata Tele - CDMA	May, 2012
Operator 10	Tata Tele - GSM	May, 2012
Operator 11	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 2012 to June 2012 in Kolkata circle. The executive summary encapsulates the key findings of the Audit.

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	1675	1473	0.12%	11	0.66%	98.21%	0.31%	0.64%	0.91%	30	4925	0.61%	97.47%	0	64	33251	26767	926172
BSNL	21:00 to 22:00 hrs	1245	8104	0.87%	24	1.93%	98.56%	0.01%	0.01%	1.77%	149	3386	4.40%	99.86%	0	105	80000	50145	810931
Reliance CDMA	19:00 to 20:00 hrs	490	321	0.09%	0	0.00%	99.32%	NA	0.10%	0.25%	6	1470	0.41%	99.36%	0	9	84000	45937	1330566
Reliance GSM	19:00 to 20:00 hrs	1667	1502	0.12%	1	0.06%	99.30%	0.00%	0.08%	0.57%	6	5001	0.12%	98.97%	0	8	64000	45070	2438665
MTS	20:00 to 21:00 hrs	531	0	0.00%	0	0.00%	99.50%	0.00%	0.02%	0.57%	11	1710	0.64%	99.47%	0	44	50400	15284	416618
Airtel	20:00 to 21:00 hrs	2094	163	0.01%	0	0.00%	99.87%	0.02%	0.02%	0.50%	5	5818	0.09%	99.05%	0	38	119978	76494	3260551
Uninor	21:00 to 22:00 hrs	1125	4532	0.54%	21	1.87%	99.09%	0.18%	0.07%	1.34%	59	3379	1.75%	97.51%	0	79	36326	31034	658593
Vodafone	20:00 to 21:00 hrs	2369	3739	0.21%	28	1.18%	99.47%	0.32%	0.53%	0.70%	68	5889	1.15%	98.30%	0	39	127236	91558	3626966
Tata Tele - CDMA	20:00 to 21:00 hrs	584	178	0.04%	0	0.00%	98.84%	0.00%	0.07%	0.89%	15	1953	0.77%	97.82%	0	72	219514	63984	637907
Tata Tele - GSM	21:00 to 22:00 hrs	1649	411	0.03%	0	0.00%	98.31%	0.12%	0.15%	0.86%	45	4816	0.93%	97.97%	0	36	75815	32564	1410426
Aircel	21:00 to 22:00 hrs	2082	6794	0.44%	40	1.92%	97.56%	0.59%	0.11%	0.61%	97	5944	1.63%	97.62%	1	42	71755	24539	1066589

*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

Critical findings: Cellular Mobile Services

The audit for cellular mobile service providers were conducted at their respective MSCs in the Kolkata 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	21:00 to 22:00 hrs	21:00 to 22:00 hrs
Reliance CDMA	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	20:00 to 21:00 hrs	20:00 to 21:00 hrs
Airtel	20:00 to 21:00 hrs	20:00 to 21:00 hrs
Uninor	21:00 to 22:00 hrs	21:00 to 22:00 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
Tata Tele - GSM	21:00 to 22:00 hrs	21:00 to 22:00 hrs
Aircel	21:00 to 22:00 hrs	21:00 to 22:00 hrs

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

BTSs Accumulated Downtime:

In the Kolkata circle, all operators met the benchmark; however, BSNL experienced the highest outage with 8104 hours being the Sum of downtime of BTSs in a month (in hours).

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 Airtel with 99.87% 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 met the TRAI specified benchmarks on the congestion parameters with Idea having a higher TCH congestion of 0.64%. 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. The lowest call drop rate was of RCOM CDMA at 0.25% while the highest was for BSNL at 1.77%.

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 aspect all the service providers meet the TRAI benchmark except Tata Docomo GSM and Aircel for the month of audit

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 CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Aircel
Idea	NA	100%	100%	100%	100%	100%	100%	100%	100%	95%	100%
BSNL	100%	NA	100%	100%	100%	100%	100%	100%	100%	95%	100%
Reliance CDMA	100%	100%	NA	100%	100%	98%	100%	100%	99%	96%	100%
Reliance GSM	100%	100%	100%	NA	100%	100%	100%	100%	100%	92%	100%
MTS	100%	100%	100%	100%	NA	100%	100%	100%	99%	100%	100%
Airtel	100%	100%	100%	100%	100%	NA	100%	100%	74%	76%	100%
Uninor	100%	100%	100%	100%	100%	99%	NA	100%	100%	99%	100%
Vodafone	100%	100%	100%	100%	100%	99%	100%	NA	100%	99%	100%
Tata Tele - CDMA	100%	100%	100%	100%	100%	100%	100%	100%	NA	97%	100%
Tata Tele - GSM	100%	100%	100%	100%	100%	97%	100%	100%	100%	NA	100%
Aircel	100%	100%	100%	100%	100%	99%	100%	100%	99%	100%	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. Tata GSM and CDMA both found a great difficulty in connecting to an Airtel number on account of no (9831700002) of Airtel being forwarded to some other no. As a result calls were not maturing/answered

Operator	Date	Location
Idea	14 th May, 2012	Kolkata
BSNL	15 th May, 2012	Kolkata
Reliance CDMA	16 th May, 2012	Kolkata
Reliance GSM	17 th May, 2012	Kolkata
MTS	17 th May, 2012	Kolkata
Airtel	22 nd May, 2012	Kolkata
Uninor	23 rd May, 2012	Kolkata
Vodafone	24 th May, 2012	Kolkata
Tata Tele - CDMA	28 th May, 2012	Kolkata
Tata Tele - GSM	30 th May, 2012	Kolkata
Aircel	31 st May, 2012	Kolkata

Results of Operator assisted Drive test

The drive test was conducted simultaneously for all the operators present in the Kolkata circle. Only 1 drive test was conducted as Kolkata is a city and a circle both. 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 Kolkata telecom circle was covered.

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


The drive test in the Kolkata circle was conducted in the city of Kolkata along the following route:

	Type of location	Kolkata
Outdoor	Periphery of the city	1. Park Circus Connector to Garia via Bye pass 2. Forshore Road - Kona Expressway - NH6 - NH2-Belgharia Expressway - Dum Dum 1 No. Gate (
	Congested area	(1.) Sealdah - Manicktala - Girish Park - M G Road - Howrah Station - Howrah Maidan - Muallick Fatak - Shibpur - Forshore Road (2) Dum Dum 1 no. gate - Nager Bazar - Bangur Avenue - Belgachia - Shyambazar
	Across the city	i) MEHER ALI ROAD to Park Circus Connector on Bye pass ii) Garia - Jadavpur - Ballygaunge Phari - Park Circus - C I T Road - Sealdah
Indoor	Office complex	Avni Mall
	Shopping complex	Avni Mall

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

Drive Test – Kolkata

	B'mark	Idea		BSNL		Reliance CDMA		Reliance GSM		MTS		Airtel		Uninor		Vodafone		Tata Tele - CDMA		Tata Tele - GSM		Aircel	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	≥ 95%	95.50%	95.16%	98.50%	99.88%	98.55%	99.61%	95.60%	95.28%	99.01%	95.92%	97.90%	95.73%	99.47%	96.34%	97.62%	96.80%	95.70%	95.39%	96.81%	95.49%	97.50%	95.14%
CSSR	≥ 95%	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%	100.00%	100.00%	98.39%	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%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.67%	0.00%	0.00%	1.67%	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%	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%	99.18%	100.00%	100.00%	100.00%	98.67%	100.00%	100.00%	100.00%	100.00%	100.00%	99.51%	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


Areas were inadequate coverage and interference was recorded where primarily Avini Mall, Belghoria Express Way, Bangur Ave, Shibpur, CIT, Saldah

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 all the operators meet the TRAI benchmark on parameters of Voice quality, CSSR, and Call drop rate.

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)	Worst affected 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	0.06%	0.30%	99.28%	0.15%	0.17%	0.78%	0.28%	97.71%
BSNL	0.90%	0.08%	98.72%	0.03%	0.01%	1.58%	3.72%	99.28%
Reliance CDMA	0.05%	0.00%	99.32%	NA	0.00%	0.04%	0.14%	99.74%
Reliance GSM	0.18%	0.00%	99.40%	0.08%	0.02%	0.46%	0.06%	98.54%
MTS	0.00%	0.00%	99.83%	0.00%	0.00%	0.35%	0.47%	98.70%
Airtel	0.01%	0.00%	99.81%	0.03%	0.02%	0.53%	0.07%	99.01%
Uninor	0.32%	0.00%	99.11%	0.07%	0.04%	1.33%	1.39%	97.50%
Vodafone	0.04%	0.00%	99.67%	0.10%	0.33%	0.66%	1.66%	98.34%
Tata Tele - CDMA	0.01%	0.00%	98.91%	0.00%	0.00%	0.71%	2.49%	97.02%
Tata Tele - GSM	0.00%	0.00%	98.57%	0.06%	0.05%	0.91%	1.88%	97.97%
Aircel	0.77%	0.10%	98.06%	0.25%	0.02%	0.57%	1.55%	97.74%

 Not meeting the benchmark

* Based on operator assisted drive tests conducted by IMRB

During the three day live measurement, all operators were found to be meeting the TRAI benchmark on all the parameters.

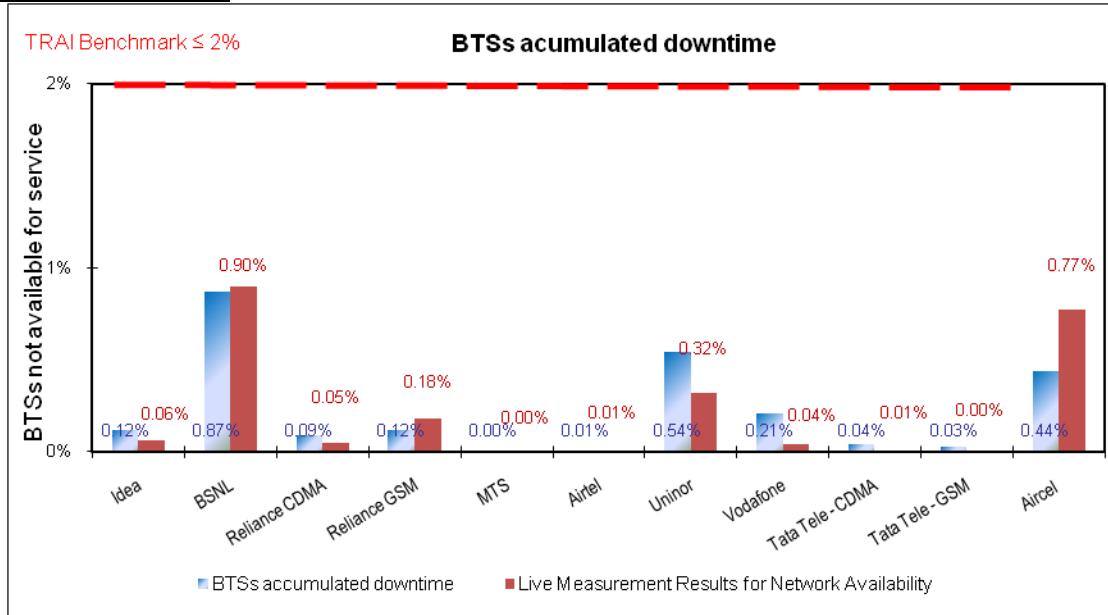
Summary of Live Calling Results – Cellular Mobile Services

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	94.00%	100.00%	91.00%
BSNL	96.00%	100.00%	100.00%
Reliance CDMA	94.00%	100.00%	98.00%
Reliance GSM	97.00%	100.00%	100.00%
MTS	NA	100.00%	100.00%
Airtel	75.00%	100.00%	97.00%
Uninor	92.00%	100.00%	100.00%
Vodafone	97.00%	100.00%	94.00%
Tata Tele - CDMA	36.67%	100.00%	68.00%
Tata Tele - GSM	NA	100.00%	77.00%
Aircel	95.00%	100.00%	99.00%

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

BTs Accumulated Downtime



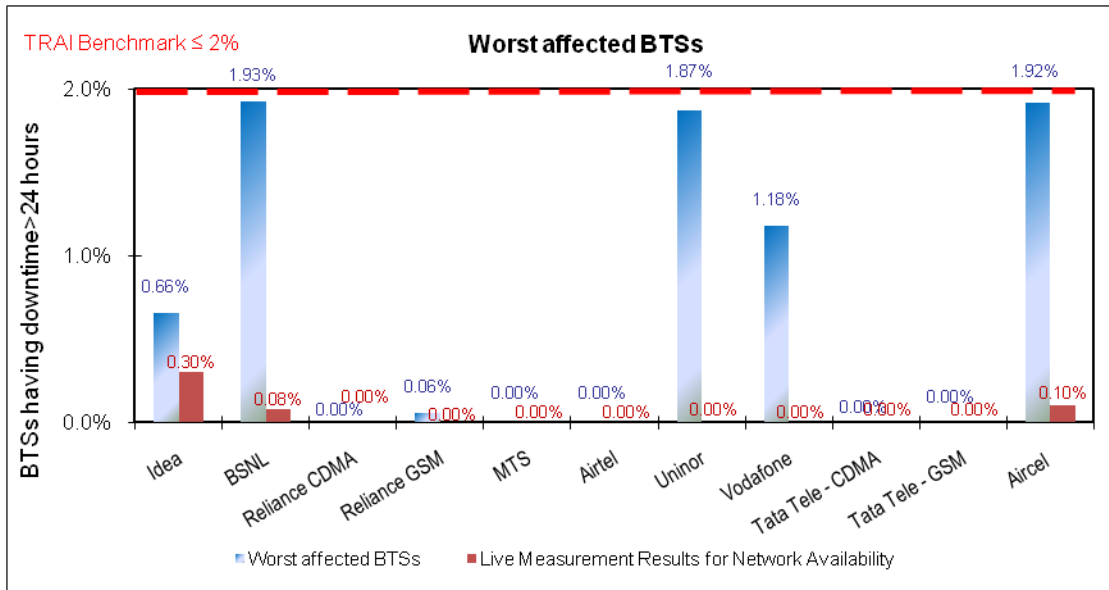
One month

All the operators meet the benchmark

Live measurement

All the operators meet the benchmark

Worst Affected BTSs



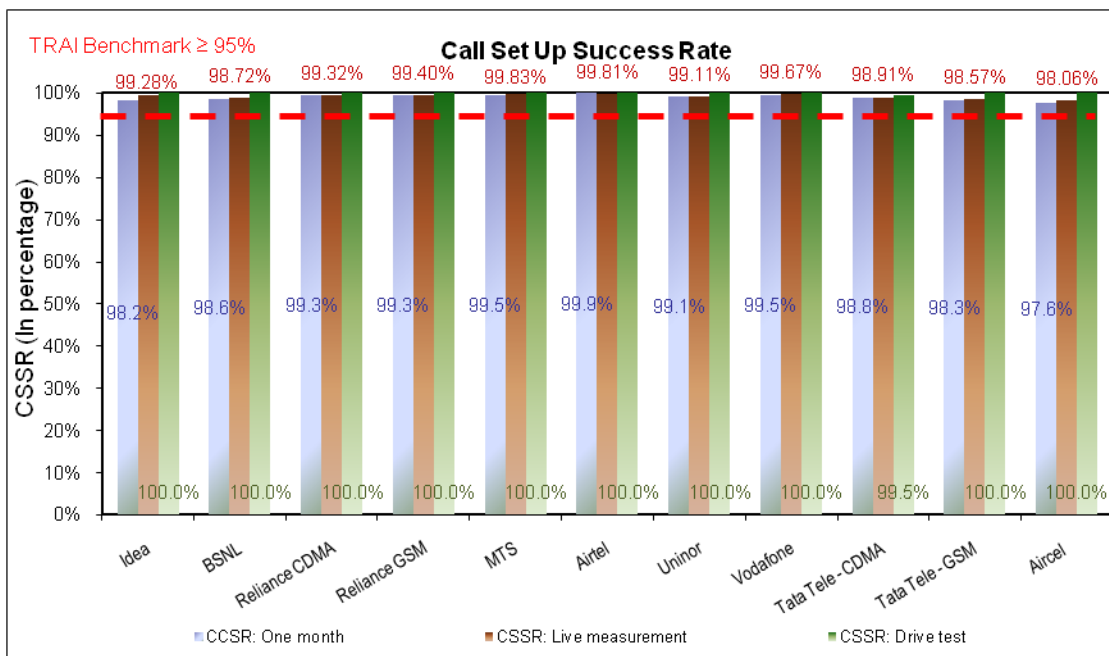
One month

All the operators meet the benchmark

Live measurement

All the operators meet the benchmark

Call Set-up Success Rate (CSSR)



One month

All the operators meet the benchmark

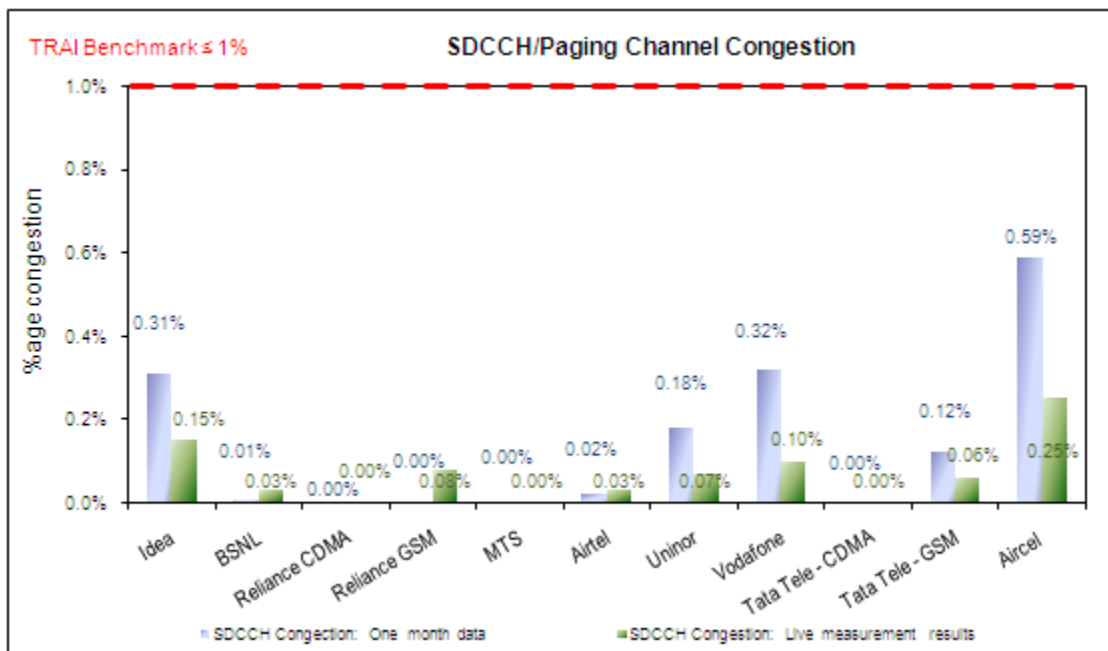
Live measurement

All the operators meet the benchmark

Drive test

All the operators meet the benchmark

SDCCH / Paging Channel Congestion



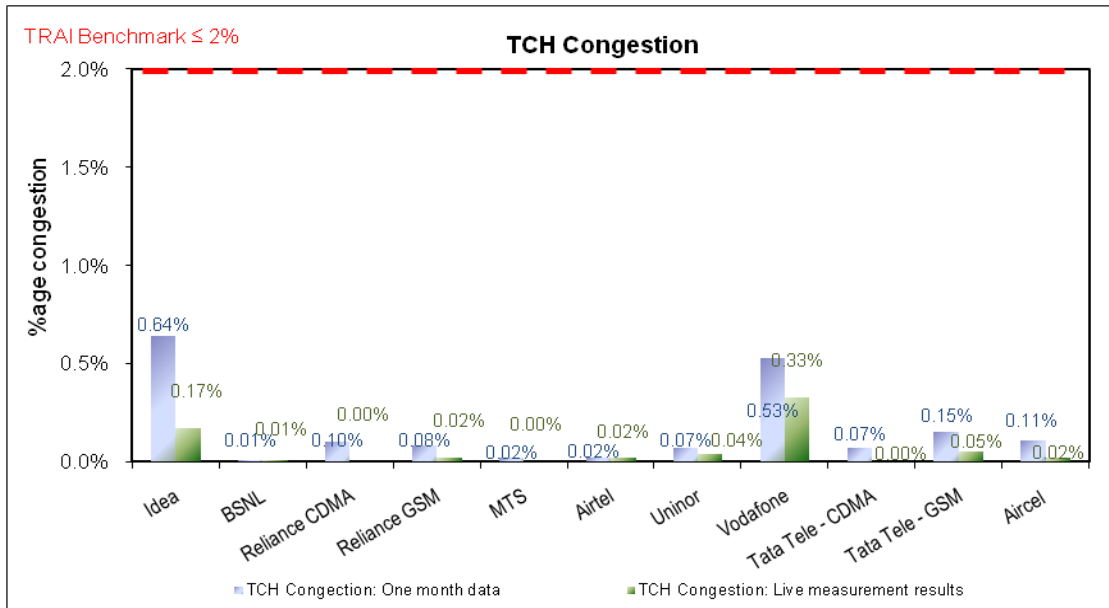
One month

All the operators meet the benchmark

Live measurement

All the operators meet the benchmark

TCH Congestion



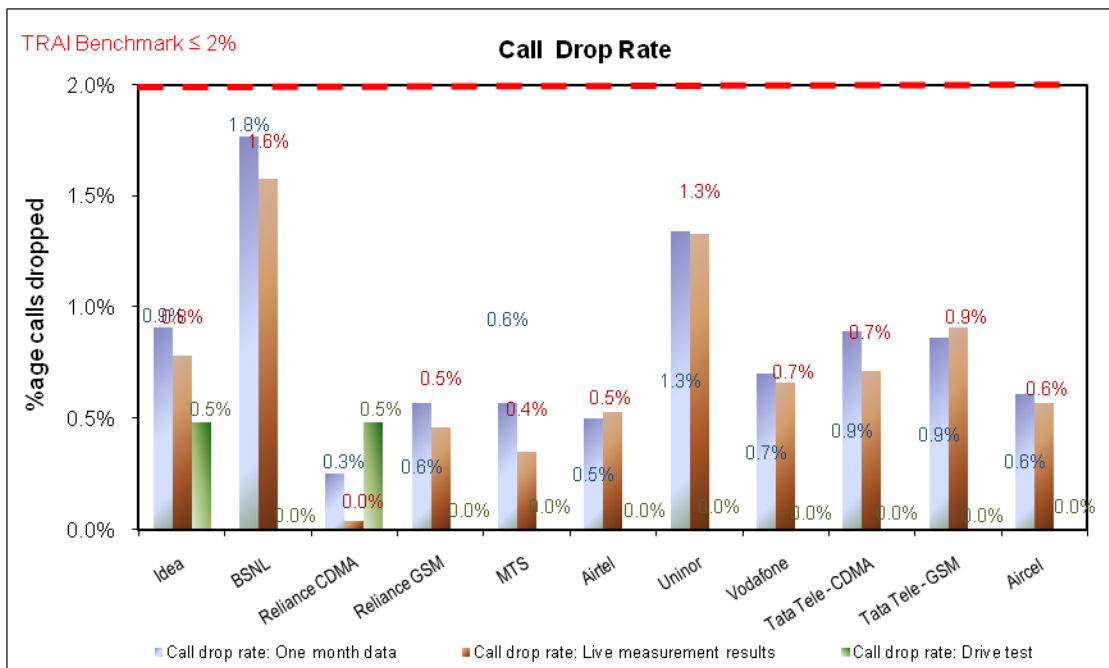
One month

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

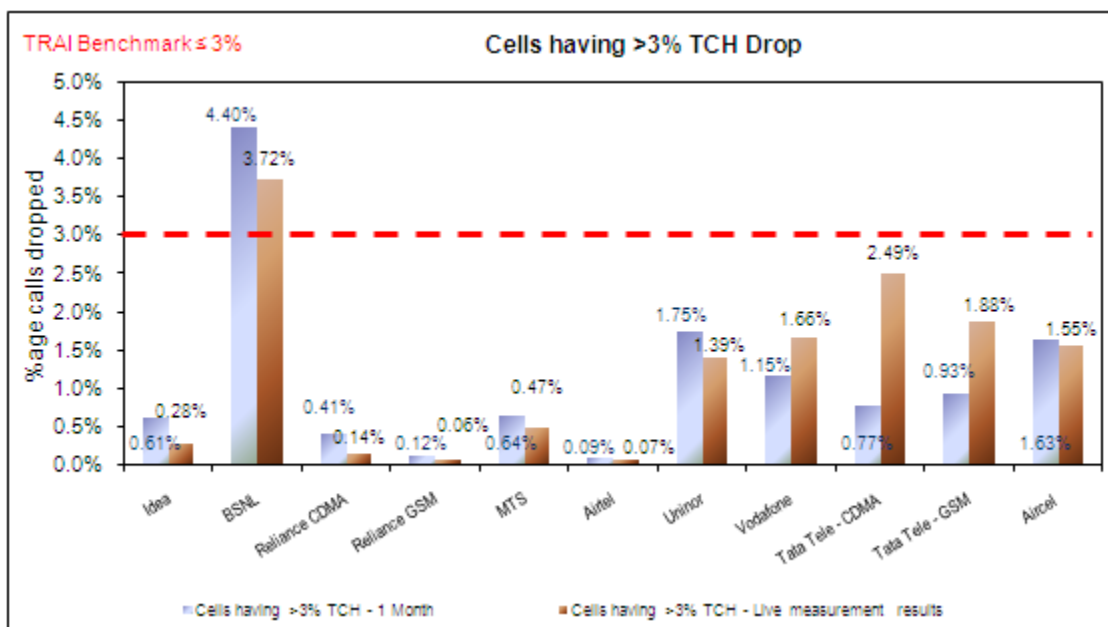
Live measurement

All the operators meet the benchmark

Drive test

All the operators meet the benchmark

Cells with more than 3% TCH Drop Rate



One month

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

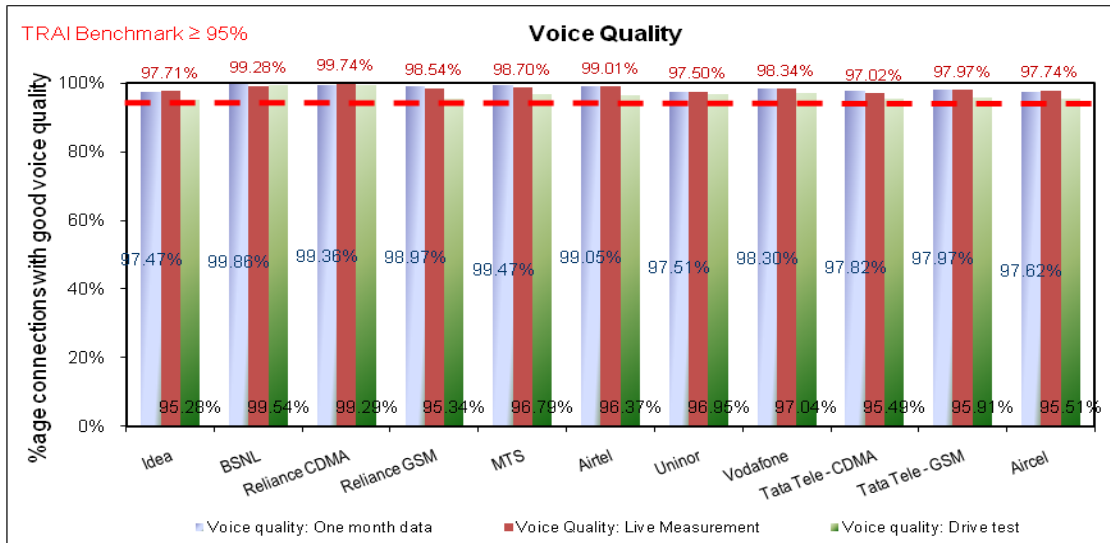
Operator(s) not meeting the benchmark: BSNL

Live measurement

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

Operator(s) not meeting the benchmark: BSNL

Voice quality



One month

All the operators meet the benchmark

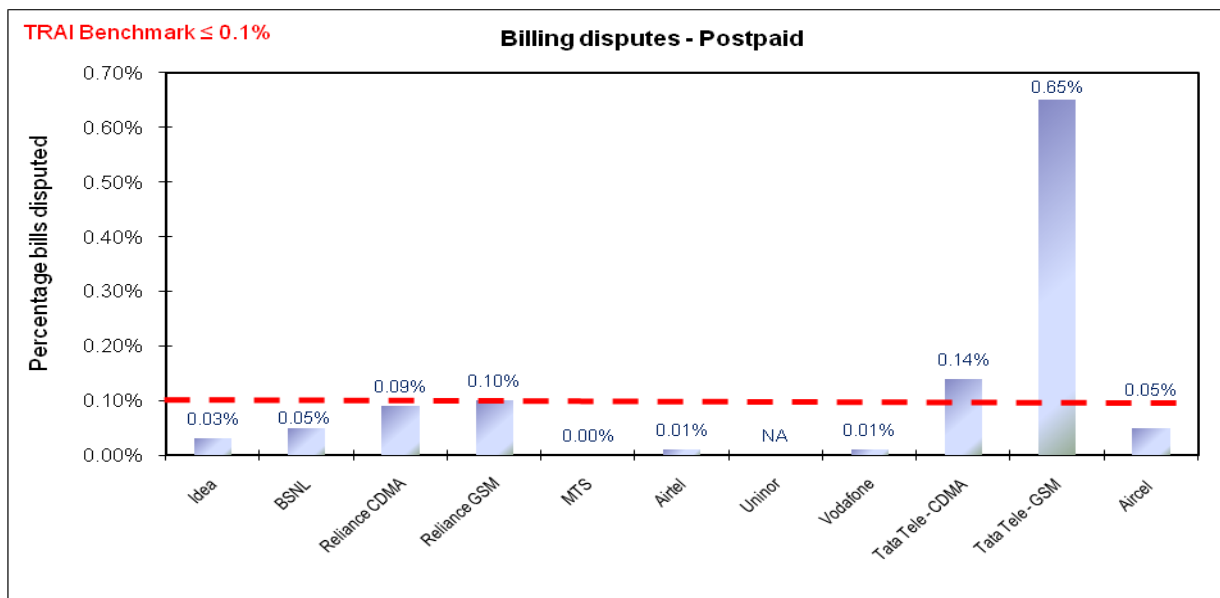
Live measurement

All the operators meet the benchmark

Drive test

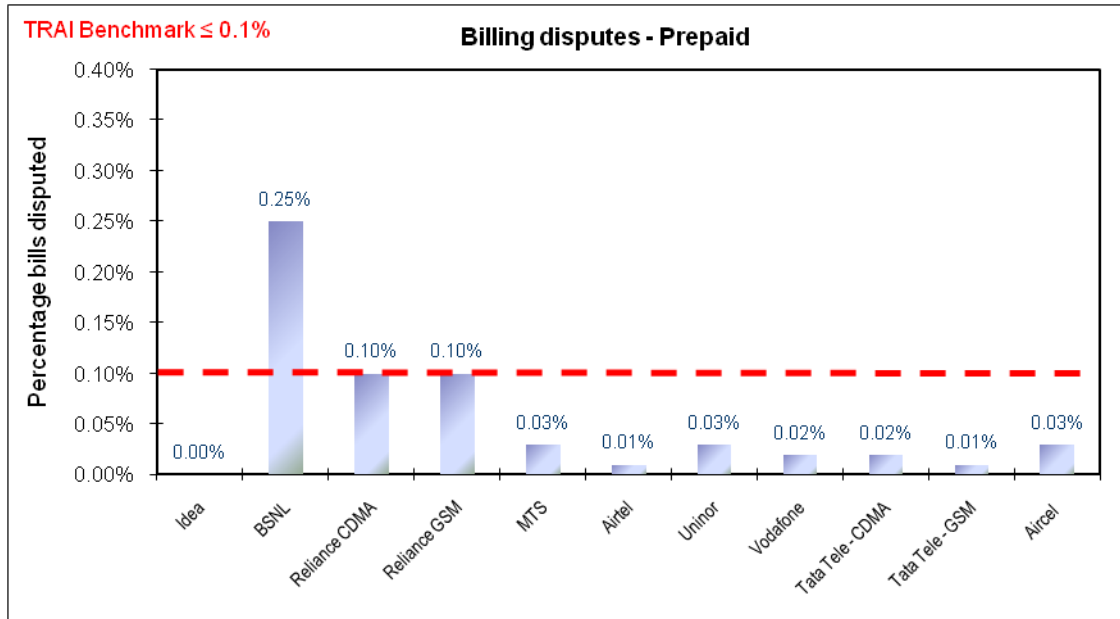
All the operators meet the benchmark

Billing Disputes - Postpaid



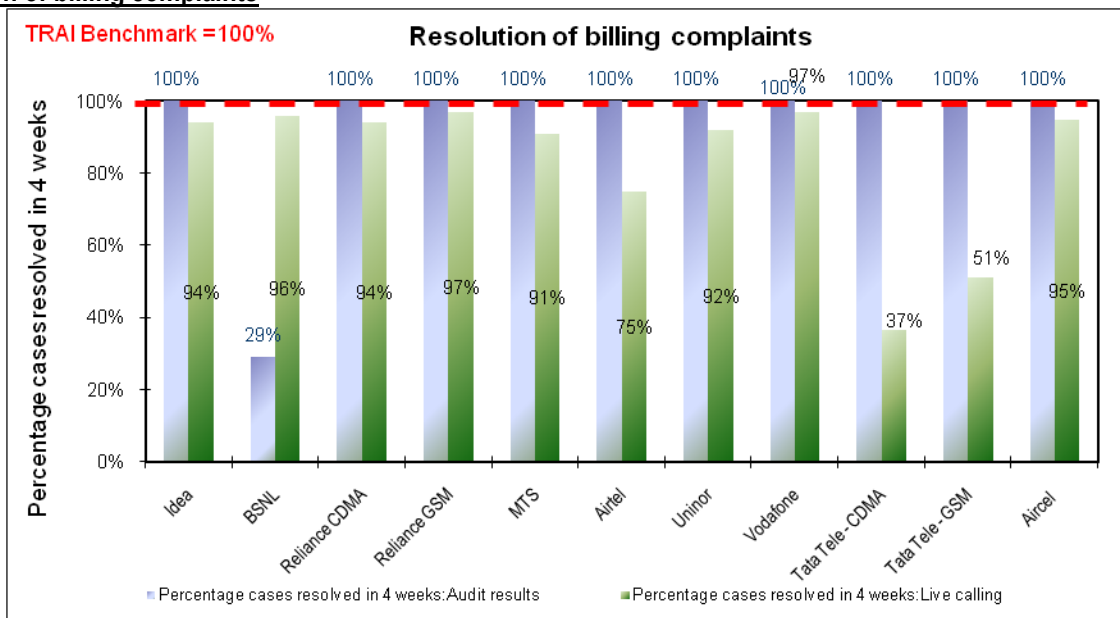
Operator(s) meeting benchmark: Idea, BSNL, Reliance CDMA, Reliance GSM, MTS, Airtel, Vodafone, Aircel
 Operator(s) not meeting the benchmark: Tata Tele - CDMA, Tata Tele - GSM

Complaints - Prepaid



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

Resolution of billing complaints



One month

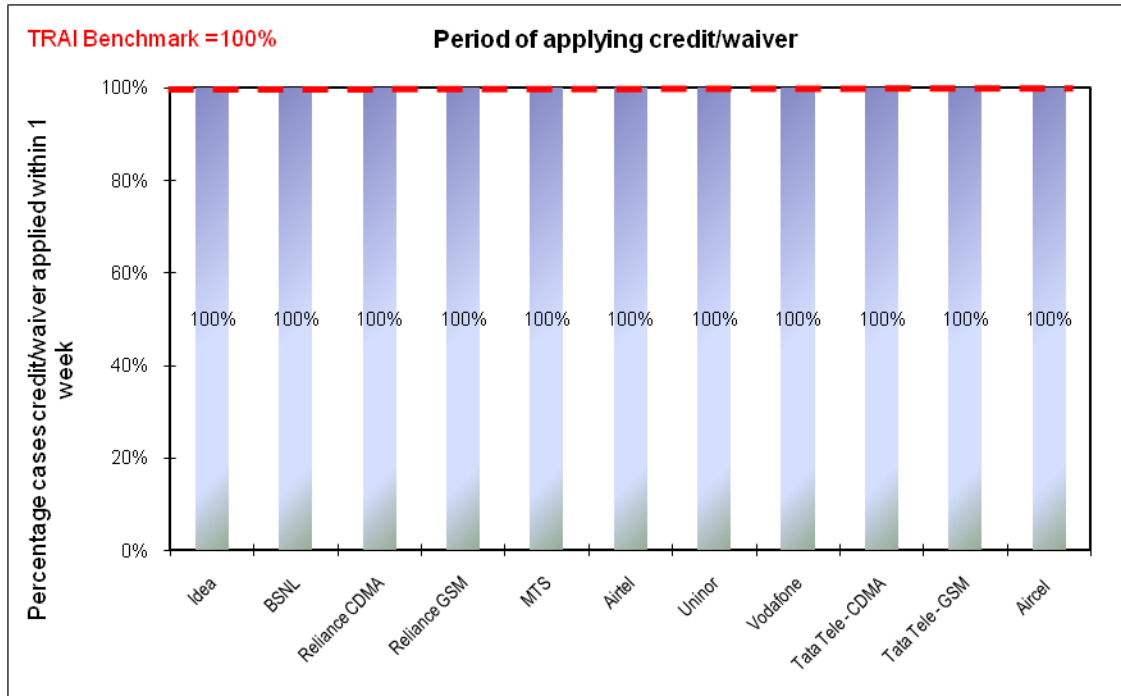
Operator(s) meeting benchmark: Idea, Reliance CDMA, Reliance GSM, MTS, Airtel, Uninor, Vodafone, Tata Tele - CDMA, Tata Tele - GSM, Aircel

Operator(s) not meeting the benchmark: BSNL

Live calling

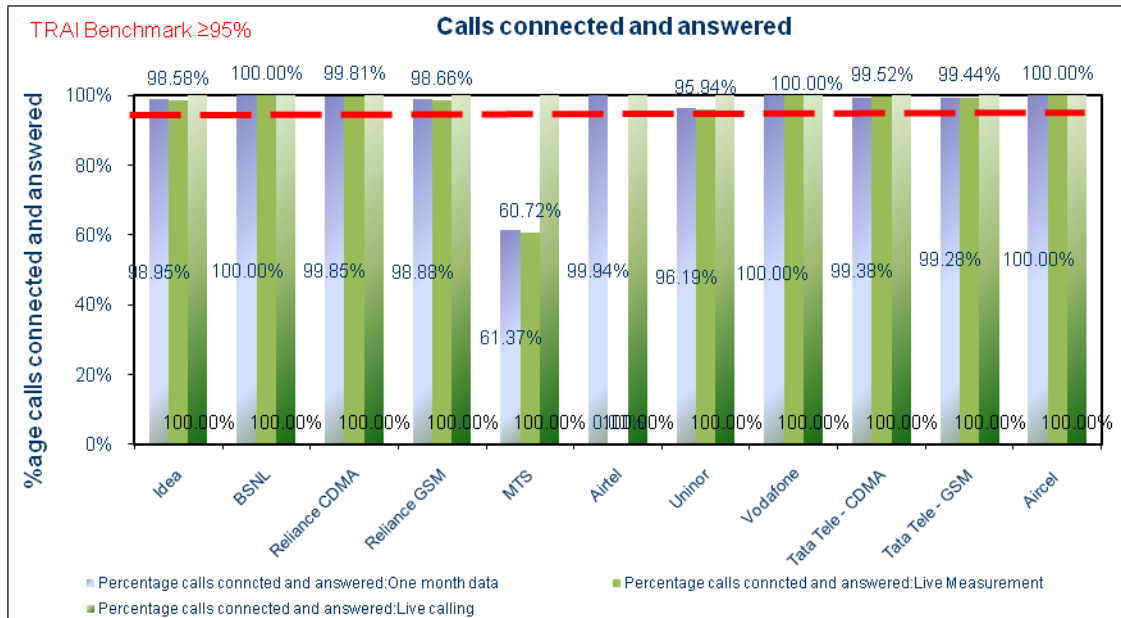
None of the operator meets the benchmark

Period of applying credit / waiver



All the operators meet the benchmark

Customer Care / Helpline: Calls answered



One month

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

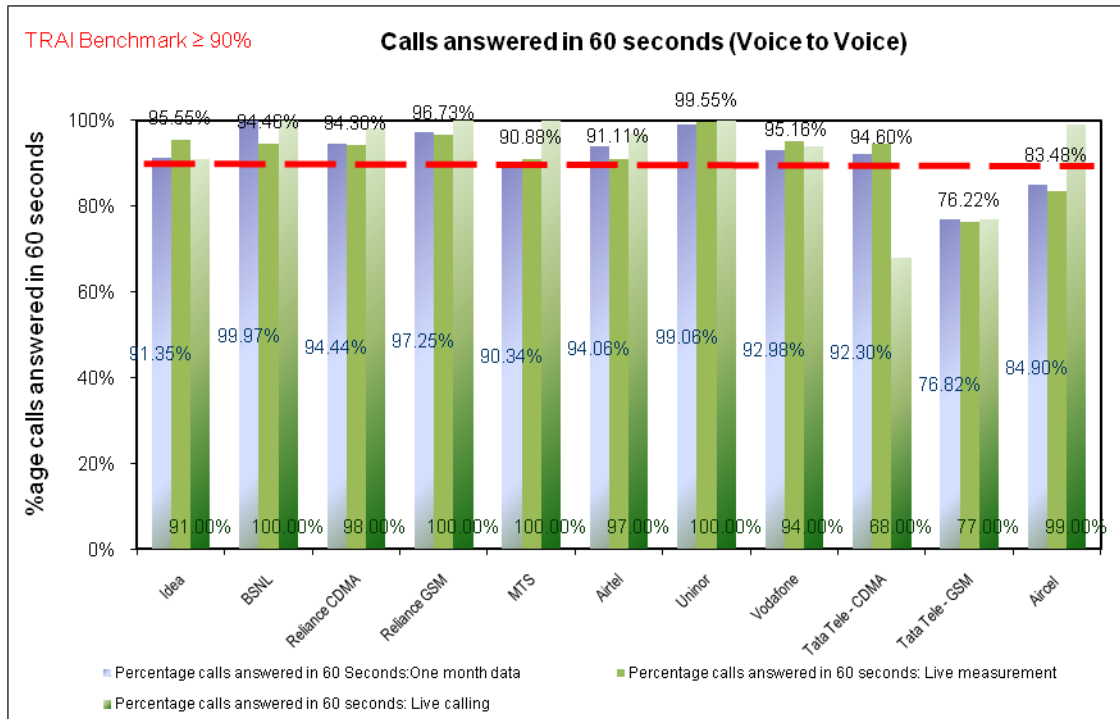
Live measurement

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

Live calling

All the operators meet the benchmark

Customer Care / Helpline: Calls answered voice to voice



One month

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

Operator(s) not meeting the benchmark: Tata Tele - GSM, Aircel

Live measurement

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

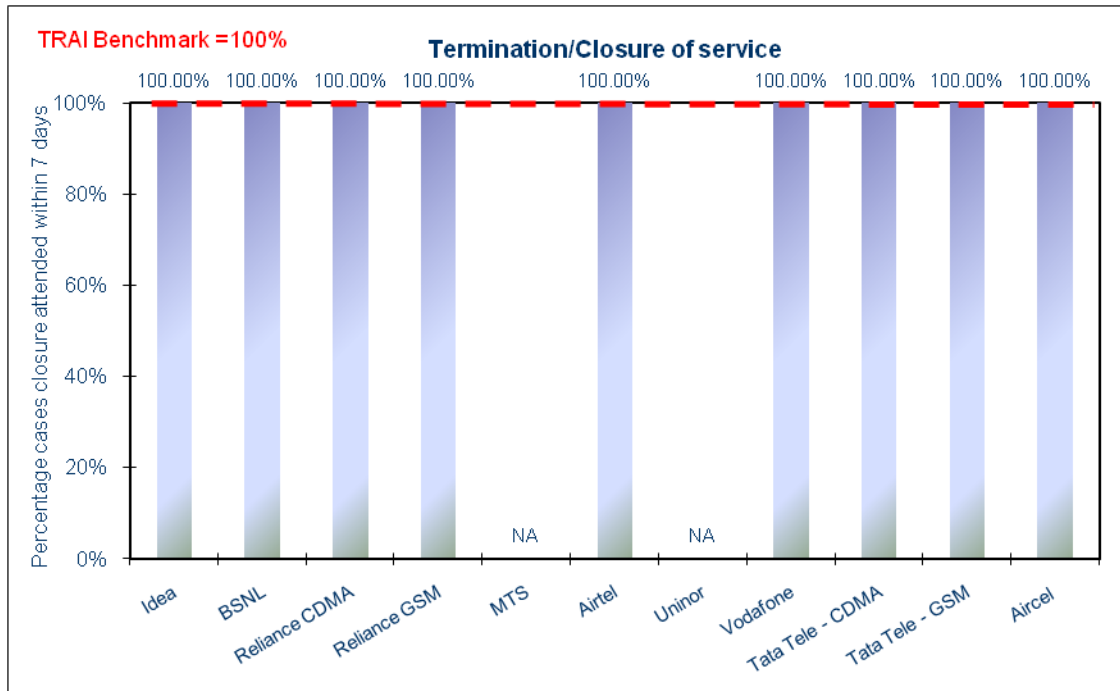
Operator(s) not meeting the benchmark: Tata Tele - GSM, Aircel

Live calling

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

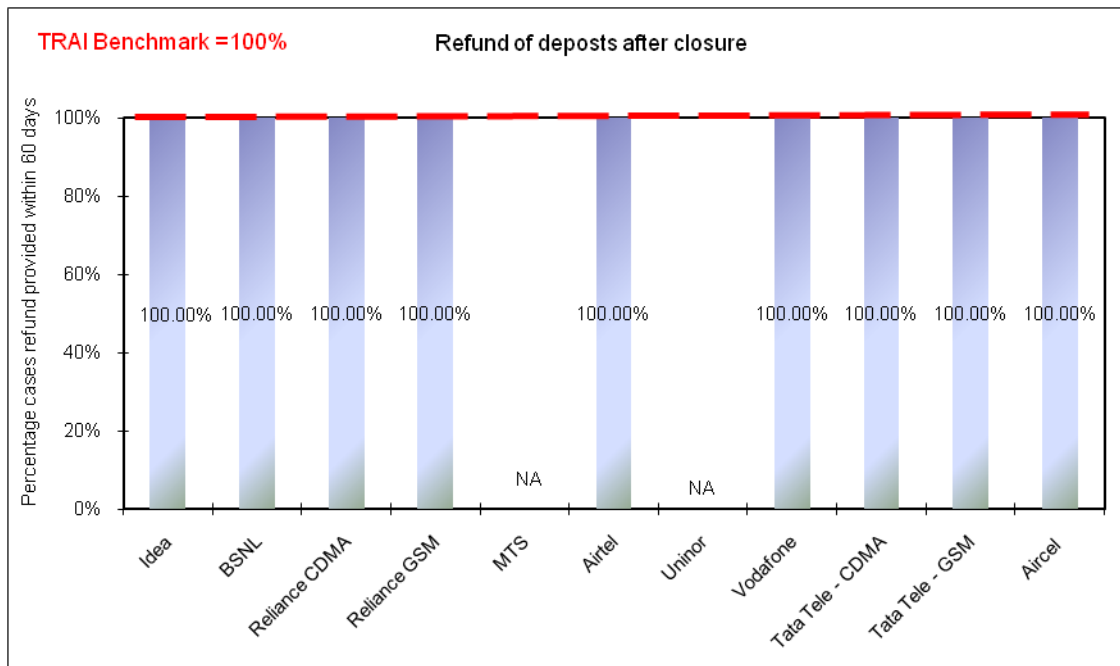
Operator(s) not meeting the benchmark: Tata Tele - CDMA, Tata Tele - GSM

Termination / Closure of service



All the operators meet the benchmark

Refund of deposits



All the operators meet the benchmark

Inter operator calls assessment

Inter operator call Assessment To↓ From→	Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Aircel
Idea	NA	100%	100%	100%	100%	100%	100%	100%	100%	95%	100%
BSNL	100%	NA	100%	100%	100%	100%	100%	100%	100%	95%	100%
Reliance CDMA	100%	100%	NA	100%	100%	98%	100%	100%	99%	96%	100%
Reliance GSM	100%	100%	100%	NA	100%	100%	100%	100%	100%	92%	100%
MTS	100%	100%	100%	100%	NA	100%	100%	100%	99%	100%	100%
Airtel	100%	100%	100%	100%	100%	NA	100%	100%	74%	76%	100%
Uninor	100%	100%	100%	100%	100%	99%	NA	100%	100%	99%	100%
Vodafone	100%	100%	100%	100%	100%	99%	100%	NA	100%	99%	100%
Tata Tele - CDMA	100%	100%	100%	100%	100%	100%	100%	100%	NA	97%	100%
Tata Tele - GSM	100%	100%	100%	100%	100%	97%	100%	100%	100%	NA	100%
Aircel	100%	100%	100%	100%	100%	99%	100%	100%	99%	100%	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. Tata GSM and CDMA both found a great difficulty in connecting to an Airtel number on account of no (9831700002) of Airtel being forwarded to some other no. As a result calls were not maturing/answered

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) (%)	No. of BTSs having accumulated downtime of >24 hours in a month	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 (%)	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 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	1674	1248.33333	0.10%	8	0.50%	98.58%	0.12%	0.36%	0.84%	42	4919	0.85%	98.29%	0	32372	18483.4	813144
	IMR B	1674	1248.33333	0.10%	8	0.50%	98.58%	0.12%	0.36%	0.84%	42	4919	0.85%	98.29%	0	32372	18483.7	813144
BSNL	PMR	1245	5185	0.55%	22	1.73%	99.23%	0.54%	0.79%	0.85%	171	3339	5.11%	99.80%	0	80000	56105.3	730247
	IMR B	1245	5185	0.56%	22	1.73%	98.51%	0.00%	0.01%	1.97%	171	3339	5.10%	99.82%	0	80000	56105.3	730247
Reliance CDMA	PMR	475	270	0.08%	0	0.07%	99.56%	0.00%	0.14%	0.53%	5	1426	0.33%	98.87%	0	84000	45028.2	#DIV/0!
	IMR B	475	270	0.08%	0	0.07%	99.56%	0.00%	0.14%	0.53%	5	1426	0.33%	98.87%	0	84000	45028.2	#DIV/0!
Reliance GSM	PMR	1619	874	0.07%	4	0.26%	99.46%	0.09%	0.18%	0.37%	14	4857	0.28%	98.67%	0	64000	39049.0	#DIV/0!
	IMR B	1619	874	0.11%	4	0.27%	99.47%	0.13%	0.18%	0.37%	14	4857	0.28%	98.67%	0	64000	39049.3	#DIV/0!
MTS	PMR	489	0	0.00%	0	0.00%	99.14%	0.00%	0.11%	0.69%	17	1553	1.09%	98.56%	0	50400	15082.4	419985
	IMR B	489	0	0.00%	0	0.00%	99.14%	0.00%	0.11%	0.69%	17	1553	1.09%	98.56%	0	50400	15082.3	419985
Airtel	PMR	2021	451	0.03%	3	0.17%	99.35%	0.04%	0.06%	0.82%	8	5568	0.14%	98.47%	0	117863	72725.8	3154124
	IMR B	2021	451	0.03%	3	0.17%	99.35%	0.04%	0.06%	0.82%	8	5568	0.14%	98.47%	0	117863	72725.8	3154124
Uninor	PMR	1035	542	0.07%	0	0.00%	98.91%	0.22%	0.17%	1.67%	80	3101	2.58%	97.25%	0	33232	32872.7	831862
	IMR B	1035	542	0.07%	0	0.00%	98.92%	0.22%	0.17%	1.67%	80	3101	2.58%	97.25%	0	33232	32872.7	831862
Vodafone	PMR	2370	733	0.04%	2	0.10%	99.63%	0.14%	0.37%	0.79%	89	5892	1.50%	98.32%	0	127668	85411.7	3529340
	IMR	2370	733	0.04%	2	0.10%	99.63%	0.14%	0.37%	0.79%	89	5892	1.50%	98.32%	0	127668	85411.7	3529340

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


	B																		
Tata Tele - CDMA	PMR	579	72	0.02%	0	0.00%	98.72%	0.00%	0.06%	0.80%	53	1905	2.78%	97.66%	0	214020	52047.1	693927	
	IMR B	579	72	0.02%	0	0.00%	98.72%	0.00%	0.06%	0.81%	53	1905	2.78%	97.68%	0	214020	52047.0	693927	
Tata Tele - GSM	PMR	1500	119	0.01%	0	0.00%	98.13%	0.05%	0.06%	0.96%	55	4361	1.26%	98.04%	0	67363	25323.5	1217243	
	IMR B	1500	119	0.01%	0	0.00%	98.13%	0.05%	0.06%	0.96%	55	4361	1.26%	98.04%	0	67363	25323.3	1217243	
Aircel	PMR	2082	218	0.02%	0	0.00%	97.96%	0.11%	0.03%	0.59%	64	5930	1.08%	97.81%	0	72895	19760.4	883235	
	IMR B	2082	218	0.02%	0	0.00%	97.96%	0.11%	0.03%	0.59%	64	5930	1.08%	97.81%	0	72894	19759.7	883235	

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	credit / validity (pre-paid) complaints resolved within 4 weeks during the	Total no. of billing (post-paid) and charging, credit / validity (pre-paid) complaints received during the quarter	and charging, credit / validity complaints (pre paid) resolved in favour of the customer during the	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	0.06%	21713	13	0.01%	423	3198906	100.00%	2236	2236	436	1800	100.00%	99.00%	588,416	585,161	94.00%	100.00%	721	42	100.00%
	IMRB	0.06%	21713	13	0.01%	423	3198906	100.00%	2236	2236	436	1800	100.00%	99.45%	588416	585161	93.55%	100.00%	679	679	100.00%
BSNL	PMR	0.00%	120062	129	0.00%	4011	2230933	100.00%	3378	4054	4054	0	100.00%	100.00%	20452	20135	98.00%	100.00%	5843	5843	100.00%
	IMRB	0.00%	344465	166	0.10%	3040	2271914	100.00%	2016	3095	3095	3238	100.00%	100.00%	19328	18860	90.00%	100.00%	1549	1549	100.00%
Reliance CDMA	PMR	0.10%	403783	387	0.10%	1966	1993176	100.00%	6284	6284	5914	370	100.00%	100.00%	1955597	1950776	97.00%	100.00%	403783	403783	100.00%
	IMRB	0.10%	403783	387	0.10%	1965.67	1993176	100.00%	6284	6284	5914	370	100.00%	100.00%	1955597	1950776	97.00%	100.00%	403783	403783	100.00%
Reliance GSM	PMR	0.09%	60686	54	0.09%	2913	3163719	100.00%	8794	8794	6417	2377	100.00%	99.00%	4861370	4932070	93.00%	100.00%	189	189	100.00%
	IMRB	0.09%	60686	54	0.09%	2913	3163719	100.00%	8794	8794	6417	2377	100.00%	99.00%	4861370	4932070	93.00%	100.00%	189	189	100.00%
MTS	PMR	0.00%	6843	0	0.04%	303	802124	100.00%	303	303	303	0	100.00%	100.00%	82498	76626	93.00%	NA	NA	NA	NA


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

	IMRB	0.00%	6843	0	0.04%	303	802124	100.00%	303	303	303	0	100.00%	100.00%	82498	76626	93.00%	NA	NA	NA	NA
Airtel	PMR	0.03%	724377	228	0.01%	671	12852145	100.00%	899	10566	899	9667	100.00%	99.92%	5188207	5184307	95.68%	100.00%	4962	4962	100.00%
	IMRB	0.03%	724377	228	0.01%	671	12852145	100.00%	899	10566	899	9667	100.00%	99.92%	5188207	5184307	95.68%	100.00%	4962	4962	100.00%
Uninor	PMR	NA	NA	NA	0.00%	231	1387354	100.00%	231	231	DNP	DNP	DNP	97.25%	550719	535586	89.00%	NA	NA	NA	NA
	IMRB	NA	NA	NA	0.07%	1061	1550799	100.00%	1061	1061	1061	0	100.00%	98.00%	498224	487529	97.00%	NA	NA	NA	NA
Vodafone	PMR	0.01%	1342416	83	0.02%	2753	4033655	100.00%	2836	2836	1960	876	100.00%	100.00%	280978	264315	96.00%	100.00%	11385	11385	100.00%
	IMRB	0.01%	1342416	83	0.02%	2753	4033655	100.00%	2836	2836	1960	876	100.00%	100.00%	10755945	10755945	93.00%	100.00%	3904	3904	100.00%
Tata Tele - CDMA	PMR	0.00%	35867	575	0.01%	964	1740721	100.00%	1922	1922	103	1817	100.00%	99.00%	245384	243815	96.00%	100.00%	6904	6904	100.00%
	IMRB	0.02%	427295	575	0.01%	1347	876441	100.00%	1922	1922	105	1817	100.00%	99.00%	245384	243815	99.00%	100.00%	6904	6904	99.28%
Tata Tele - GSM	PMR	0.00%	35867	0	0.01%	964	1740721	100.00%	964	964	103	861	100.00%	99.00%	804862	798668	96.00%	100.00%	0	0	100.00%
	IMRB	0.00%	35867	0	0.01%	964	1740721	100.00%	964	964	103	861	100.00%	99.00%	804862	798668	96.00%	100.00%	1183	1183	100.00%
Aircel	PMR	0.06%	46492	26	0.14%	2459	1718780	100.00%	2485	2485	366	2093	100.00%	100.00%	201457	191729	90.00%	100.00%	534	534	100.00%
	IMRB	0.06%	46492	26	0.14%	2459	1771393	100.00%	2485	2485	374	2111	100.00%	100.00%	327942	313412	89.93%	100%	534	534	100%

 Figures do not match with those reported in PMR

 Figures verified on all India basis

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

 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 Tata CDMA
2. BSNL does not meet the benchmark on worst affected cells having more than 3% TCH drop (call drop) rate.

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	0.12%	0.66%	98.21%	0.31%	0.64%	0.91%	0.61%	97.47%	0.03%	0.00%	100.00%	100.00%	98.95%	91.35%	100.00%	100.00%
BSNL	0.87%	1.93%	98.56%	0.01%	0.01%	1.77%	4.40%	99.86%	0.05%	0.25%	28.92%	100.00%	100.00%	99.97%	100.00%	100.00%
Reliance CDMA	0.09%	0.00%	99.32%	NA	0.10%	0.25%	0.41%	99.36%	0.09%	0.10%	100.00%	100.00%	99.85%	94.44%	100.00%	100.00%
Reliance GSM	0.12%	0.06%	99.30%	0.00%	0.08%	0.57%	0.12%	98.97%	0.10%	0.10%	100.00%	100.00%	98.88%	97.25%	100.00%	100.00%
MTS	0.00%	0.00%	99.50%	0.00%	0.02%	0.57%	0.64%	99.47%	0.00%	0.03%	100.00%	100.00%	61.37%	90.34%	NA	NA
Airtel	0.01%	0.00%	99.87%	0.02%	0.02%	0.50%	0.09%	99.05%	0.01%	0.01%	100.00%	100.00%	99.94%	94.06%	100.00%	100.00%
Uninor	0.54%	1.87%	99.09%	0.18%	0.07%	1.34%	1.75%	97.51%	NA	0.03%	100.00%	100.00%	96.19%	99.06%	NA	NA
Vodafone	0.21%	1.18%	99.47%	0.32%	0.53%	0.70%	1.15%	98.30%	0.01%	0.02%	100.00%	100.00%	100.00%	92.98%	100.00%	100.00%
Tata Tele - CDMA	0.04%	0.00%	98.84%	0.00%	0.07%	0.89%	0.77%	97.82%	0.14%	0.02%	100.00%	100.00%	99.38%	92.30%	100.00%	100.00%
Tata Tele - GSM	0.03%	0.00%	98.31%	0.12%	0.15%	0.86%	0.93%	97.97%	0.65%	0.01%	100.00%	100.00%	99.28%	76.82%	100.00%	100.00%
Aircel	0.44%	1.92%	97.56%	0.59%	0.11%	0.61%	1.63%	97.62%	0.05%	0.03%	100.00%	100.00%	100.00%	84.90%	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
Idea	0	0	0	0	0	0
BSNL	0	0	0	0	0	0
Reliance CDMA	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
Tata Tele - GSM	0	0	0	0	0	0
Aircel	Cell One ROB	153	3643	90.9	4.1	Issues in ROB BSNL side, rectification done

9.3 Parameter wise performance reports for Cellular Mobile services

1. Network Availability

Audit Results for Network Availability

	Benchmark	Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Aircel
Number of BTSs in the licensed service area		1675	1245	490	1667	531	2094	1125	2369	584	1649	2082
Sum of downtime of BTSs in a month (in hours)		1473	8104	321	1502	0	163	4532	3739	178	411	6793.82
BTSs accumulated downtime (not available for service)	≤ 2%	0.12%	0.87%	0.09%	0.12%	0.00%	0.01%	0.54%	0.21%	0.04%	0.03%	0.44%
Number of BTSs having accumulated downtime >24 hours		11	24	0	1	0	0	21	28	0	0	40
Worst affected BTSs due to downtime	≤ 2%	0.66%	1.93%	0.00%	0.06%	0.00%	0.00%	1.87%	1.18%	0.00%	0.00%	1.92%

	Benchmark	Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Aircel
Number of BTSs in the licensed service area		1675	1245	490	1667	531	2108	1150	2342	584	1650	2082
Sum of downtime of BTSs in a month (in hours)		76.87	805	16	222	0	19	269	64.25	5.75	0	1161.75
BTSs accumulated downtime (not available for service)	≤ 2%	0.06%	0.90%	0.05%	0.18%	0.00%	0.01%	0.32%	0.04%	0.01%	0.00%	0.77%
Number of BTSs having accumulated downtime >24 hours		5	1	0	0	0	0	0	0	0	0	2
Worst affected BTSs due to downtime	≤ 2%	0.30%	0.08%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.10%

2. Connection Establishment (Accessibility)

Audit Results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Aircel
CSSR	≥ 95%	98.21%	98.56%	99.32%	99.30%	99.50%	99.87%	99.09%	99.47%	98.84%	98.31%	97.56%

SDCCH congestion	Benchmark	Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Aircel
SDCCH/Paging channel congestion	≤ 1%	0.31%	0.01%	NA	0.00%	0.00%	0.02%	0.18%	0.32%	0.00%	0.12%	0.59%

TCH congestion	Benchmark	Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Aircel
TCH congestion	≤ 2%	0.64%	0.01%	0.10%	0.08%	0.02%	0.02%	0.07%	0.53%	0.07%	0.15%	0.11%

Live measurement results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Aircel
CSSR	≥ 95%	99.28%	98.72%	99.32%	99.40%	99.83%	99.81%	99.11%	99.67%	98.91%	98.57%	98.06%

SDCCH congestion	Benchmark	Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Aircel
SDCCH/Paging channel	≤ 1%	0.15%	0.03%	NA	0.08%	0.00%	0.03%	0.07%	0.10%	0.00%	0.06%	0.25%

congestion												
TCH congestion	Benchmark	Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Airtel
TCH congestion	≤ 2%	0.17%	0.01%	0.00%	0.02%	0.00%	0.02%	0.04%	0.33%	0.00%	0.05%	0.02%

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

CSSR	Benchmark	Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Airtel
Total number of call attempts		210	210	210	210	210	210	210	210	212	219	210
Total number of successful calls established		210	210	210	210	210	210	210	210	211	219	210
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.53%	100.00%	100.00%

Blocked calls	Benchmark	Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Airtel
%age blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.47%	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	Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Airtel
Total number of calls established		31066610	755945	34295799	25937593	20528028	104388247	28713195	119819403	15397865	39768932	28389861
Total number of calls dropped		283571	13367	87248	146704	117427	518834	385373	836704	136291	342856	173931
Call drop rate	≤ 2%	0.91%	1.77%	0.25%	0.57%	0.57%	0.50%	1.34%	0.70%	0.89%	0.86%	0.61%

Cells having more than 3% TCH	Benchmark	Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Airtel
Total number of cells in the network		4925	3386	1470	5001	1710	5818	3379	5889	1953	4816	5944
Total number of cells having more than 3% TCH		30	149	6	6	11	5	59	68	15	45	97
Worst affected cells having more than 3% TCH	≤ 3%	0.61%	4.40%	0.41%	0.12%	0.64%	0.09%	1.75%	1.15%	0.77%	0.93%	1.63%

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

Call drop rate	Benchmark	Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Airtel
Total number of calls established		39074456	754001	41425351	51299783	25798951	10292127	2915438	12472255	24481401	4189981	45079502
Total number of calls dropped		305449	11949	15384	236116	91214	54729	38855	82059	172818	37961	256611
Call drop rate	≤ 2%	0.78%	1.58%	0.04%	0.46%	0.35%	0.53%	1.33%	0.66%	0.71%	0.91%	0.57%

Cells having more than 3% TCH	Benchmark	Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Airtel
Total number of cells in the network		4925	3389	1470	5001	1715	17571	3454	17508	5859	4800	5944
Total number of cells having more than 3% TCH		14	126	2	3	8	13	48	291	146	90	92
Worst affected cells having more than 3% TCH	≤ 3%	0.28%	3.72%	0.14%	0.06%	0.47%	0.07%	1.39%	1.66%	2.49%	1.88%	1.55%

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

Call drop rate	Benchmark	Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Aircel
Total number of calls established		210	210	210	250	210	210	210	210	211	219	210
Total number of calls dropped		1	0	1	0	0	0	0	0	0	0	0
Call drop rate	≤ 2%	0.48%	0.00%	0.48%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

4. Voice quality

Audit & Live measurement Results for Voice quality

Voice quality	Benchmark	Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Aircel
Total number of sample calls		4481097433	7000	1192183168	169760042	20528028	23529922925	2413707061	15342180151	10585	5668918337	4651668073
Total number of calls with good voice quality		4367749159	6990	118454131	8085914050	20418347	23306181390	2353605768	15080892984	10354	5553876013	4541086811
%age calls with good voice quality	≥ 95%	97.47%	99.86%	99.36%	98.97%	99.47%	99.05%	97.51%	98.30%	97.82%	97.97%	97.62%

Voice quality	Benchmark	Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Aircel
Total number of sample calls		5409649545	693	143232373	NA	25798951	1925600777	243245434	1644100041	1039	654513799	6915693432
Total number of calls with good voice quality		5285673523	688	142859968	NA	25462556	1906482257	237158436	1616773829	1008	641229237	6759563704
%age calls with good voice quality	≥ 95%	97.71%	99.28%	99.74%	98.54%	98.70%	99.01%	97.50%	98.34%	97.02%	97.97%	97.74%

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

Voice quality	Benchmark	Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Aircel
Total number of sample calls		416901	337809	22414	18104	11812	50593	435167	54901	12541	55447	98216
Total number of calls with good voice quality		397209	336240	22254	17261	11433	48759	421909	53274	11975	53180	93809
%age calls with good voice quality	≥ 95%	95.28%	99.54%	99.29%	95.34%	96.79%	96.37%	96.95%	97.04%	95.49%	95.91%	95.51%

5. POI Congestion

Audit Results for POI Congestion

POI congestion	Benchmark	Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Aircel
Total number of working POIs		64	105	9	8	44	38	81	39	72	36	42
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		39807	737934	873269.6	428668.0	440240	69144	23520	76457	38212	14734	38288
Traffic served for all POIs (B)- in erlangs		22392	17242	372750.7	303949.9	217271	33322	12352	48591	16561	6006	17664
POI congestion	≤ 0.5%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Live measurement results for POI congestion

POI congestion	Benchmark	Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Aircel
Total number of working POIs		64	105	9	8	44	38	79	39	72	36	42
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		40368	714910	72115.6	43685.90	42975	203729	23893	229931	909067	44202	36736
Traffic served for all POIs (B)- in erlangs		21273.3	18162	31726.4	31714.86	19851	103683	12966	147565	21600	12633.8	18880
POI congestion	≤ 0.5%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

6. Inter Operator Call Assessment

Inter operator call Assessment To↓ From→	Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Aircel
Idea	NA	100%	100%	100%	100%	100%	100%	100%	100%	95%	100%
BSNL	100%	NA	100%	100%	100%	100%	100%	100%	100%	95%	100%
Reliance CDMA	100%	100%	NA	100%	100%	98%	100%	100%	99%	96%	100%
Reliance GSM	100%	100%	100%	NA	100%	100%	100%	100%	100%	92%	100%
MTS	100%	100%	100%	100%	NA	100%	100%	100%	99%	100%	100%
Airtel	100%	100%	100%	100%	100%	NA	100%	100%	74%	76%	100%
Uninor	100%	100%	100%	100%	100%	99%	NA	100%	100%	99%	100%
Vodafone	100%	100%	100%	100%	100%	99%	100%	NA	100%	99%	100%
Tata Tele - CDMA	100%	100%	100%	100%	100%	100%	100%	100%	NA	97%	100%
Tata Tele - GSM	100%	100%	100%	100%	100%	97%	100%	100%	100%	NA	100%
Aircel	100%	100%	100%	100%	100%	99%	100%	100%	99%	100%	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 CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Aircel
Billing disputes - Postpaid												
Total bills generated during the period		10528	112762	122364	24438	6255	285120	NA	489523	156405	15311	10977
Total number of bills disputed		3	54	108	24	0	42	NA	25	223	99	6
Percentage bills disputed	≤ 0.1%	0.03%	0.05%	0.09%	0.10%	0.00%	0.01%	NA	0.01%	0.14%	0.65%	0.05%
Billing disputes - Prepaid												
Number of complaints related to charging, credit & validity		40	5551	1979	3096	226	306	457	772	189	256	562
Total number of prepaid customers in that period		1318235	2177550	2032174	3095928	896964	4813531	1825889	3831070	803820	1982541	1974664
Percentage of complaints	≤ 0.1%	0.00%	0.25%	0.10%	0.10%	0.03%	0.01%	0.03%	0.02%	0.02%	0.01%	0.03%
Resolution of billing complaints												
Total number of billing/charging complaints		612	5605	2087	5748	226	348	457	797	412	355	568
Total complaints considered invalid		569	2	499	2	0	1811	0	633	368	308	302

Number of complaints resolved in 4 weeks from date of receipt for complaints listed in 5.3.1		612	1621	2087	5748	226	348	457	797	412	355	568
Percentage complaints resolved within 4 weeks of date of receipt	100%	100%	29%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Total number of complaints where credit/waiver is required		43	64	1588	5746	226	348	457	164	44	47	266
Percentage cases in which credit/waiver was received within 1 week	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Live calling results for resolution of billing complaints

Resolution of billing complaints	Benchmark	Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Aircel
Total Number of calls made		100	100	100	100	100	100	100	100	30	100	100
Number of cases resolved in 4 weeks		94	96	94	97	91	75	92	97	11	51	95
Percentage cases resolved in four weeks	100%	94%	96%	94%	97%	91%	75%	92%	97%	37%	51%	95%

8. Customer Care

Audit results for customer care

Customer Care Assessment	Benchmark	Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Aircel
Total number of call attempts to customer care for assistance		301396	556269	797476	2815478	1121380	2076126	172188	2871582	2793027	9632192	2531607
Number of calls getting connected and answered (electronically)		298221	556269	796252	2783824	688233	2074855	165621	2871582	2775670	9563194	2531607
Percentage calls getting connected and answered	≥ 95%	98.95%	100.00%	99.85%	98.88%	61.37%	99.94%	96.19%	100.00%	99.38%	99.28%	100.00%
Number of calls getting transferred to the operator (voice to voice)		437642	290668	295183	508507	433147	3372044	635796	888566	168639	847154	1010740
Number of calls answered by operator (voice to voice) within 60 seconds		399790	290593	278769	494502	391305	3171806	629815	826146	155662	650785	858084
Percentage calls answered within 60 seconds (V2V)	≥ 90%	91.35%	99.97%	94.44%	97.25%	90.34%	94.06%	99.06%	92.98%	92.30%	76.82%	84.90%

Live measurement results for customer care

Customer Care Assessment	Benchmark	Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Aircel
Total number of call attempts to customer care for assistance		27304	44170	81873	255132	126048	DNP	18428	292015	88620	597934	244309
Number of calls getting connected and answered (electronically)		26916	44170	81720	251717	76539	DNP	17680	292015	88198	594601	244309
Percentage calls getting connected and answered	≥ 95%	98.58%	100.00%	99.81%	98.66%	60.72%	DNP	95.94%	100.00%	99.52%	99.44%	100.00%
Number of calls getting transferred to the operator (voice to voice)		44003	28409	26343	48462	49509	341080	57323	89687	15865	89259	102198

Number of calls answered by operator (voice to voice) within 60 seconds		42045	26834	24842	46879	44993	310767	57063	85342	15008	68031	85316
Percentage calls answered within 60 seconds (V2V)	≥ 90%	95.55%	94.46%	94.30%	96.73%	90.88%	91.11%	99.55%	95.16%	94.60%	76.22%	83.48%

Live calling results for customer care

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

Live calling results for customer care (Voice to Voice)

Customer Care Assessment	Benchmark	Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Aircel
Total Number of calls received		100	100	100	100	100	100	100	100	100	100	100
Total Number of calls answered within 60 seconds		91	100	98	100	100	97	100	94	68	77	99
Percentage calls answered within 60 seconds	≥ 90%	91.00%	100.00%	98.00%	100.00%	100.00%	97.00%	100.00%	94.00%	68.00%	77.00%	99.00%

Operator	Kolkata
Aircel	121
Airtel	121
BSNL	9433024365
Idea	12345
MTS	91531555155
Reliance CDMA	*222/*333
Reliance GSM	*222/*333
Tata Indicom	9231012345
Tata Docomo	9038012345
Vodafone	111
Uninor	9062090620

9. Termination / closure of service

Audit results for termination / closure of service

Termination	Benchmark	Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Aircel
Total number of closure request		345	951	476	80	NA	1572	NA	11385	2742	362	114
Number of requests attended within 7 days		345	951	476	80	NA	1572	NA	11385	2742	362	114
Percentage cases in which termination done within 7 days	100%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	NA	100.00%	100.00%	100.00%	100.00%

Audit results for refund of deposits

Refund	Benchmark	Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Aircel
Total number of cases requiring refund of deposits		6	74	518	212	NA	244	NA	1403	45	5	0
Total number of cases where refund was made within 60 days		6	74	518	212	NA	244	NA	1403	45	5	0
Percentage cases in which refund was receive within 60 days	100%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	NA	100.00%	100.00%	100.00%	100.00%

11. Additional Network Related parameters

Audit Results for Total Traffic Handled in Erlang

Traffic in Erlang		Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Aircel
Equipped capacity of the network		33251	80000	84000	64000	50400	119978	36326	127236	219514	75814.6	71755
Total traffic handled in erlang during TCBH		26767	50145	45937	45070	15284	76494	31034	91558	63984	32564.27	24539

Total number of customers as per VLR

		Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Aircel
Total no. of customers served (as per VLR)		926172	810931	1330566	2438665	416618	3260551	658593	3626966	637907	1410426	1066589

Level 1 services		Idea	BSNL	Reliance CDMA	Reliance GSM	MTS	Airtel	Uninor	Vodafone	Tata Tele - CDMA	Tata Tele - GSM	Aircel
Total no. of calls made		150	150	150	150	150	150	150	150	150	150	150
Calls answered in 60 sec		150	150	150	150	150	149	150	150	150	150	150
Calls answered after 60 sec		0	0	0	0	0	1	0	0	0	0	0

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

- 100
- 101
- 108
