

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

Report: January – February – March, 2012



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Preface

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

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

The Audit module for various circles within the Zones, due the sheer scale of data collection, has been distributed across various quarterly periods. IMRB International Auditors carried out Audits across Assam, Bihar & Jharkhand, West Bengal, North-East, Assam and Kolkata circles in the months of January to March, 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.**

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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 Assam circle that was covered in period of January - March 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 Jan-Mar 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.
- Separate formats were designed each for Basic (Wireline), Cellular mobile (Wireless) and Broadband services to collect the information on various parameters

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 Centers (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	Audit Month
Operator 1	Airtel	January 2012
Operator 2	Aircel	January 2012
Operator 3	Vodafone	January 2012
Operator 4	Sistema (MTS)	January 2012
Operator 5	BSNL	January 2012
Operator 6	Tata Tele CDMA	January 2012
Operator 7	Reliance GSM	January 2012
Operator 8	Loop	January 2012
Operator 9	Idea	January 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 January 2012 to March 2012 in Assam circle. The executive summary encapsulates the key findings of the Audit by providing: -

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

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

Name of Service Provider	Time Consistent Busy Hour (TCBH)	Network Availability					Connection Establishment (Accessibility)			Connection Maintenance (Retainability)				POI		Network Traffic Capacity and Utilization			
		Total no. of BTSs in the licensed service area	Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month	BTSs Accumulated downtime (not available for service) (%)	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 of connection with good voice quality	POI Congestion (No. of POIs not meeting the benchmark)	Total number of working POI Service Area wise	Equipped Capacity of Network in respect of Traffic in erlang	Total traffic handled in TCBH in erlang	Total no. of customers served (as per VLR) on last day of the month
Benchmark				≤ 2%		≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%			≤ 5%	≥ 95%	≤ 0.5%				
Airtel	19:00 - 20:00	2576	4551	0.24%	12	0.47%	98.91%	0.12%	0.34%	1.42%	119	7729	1.54%	99.60%	0	69	140355	102454	3349072
Aircel	19:00 - 20:00	2253	3636	0.22%	44	1.95%	97.03%	0.74%	1.40%	1.42%	326	6729	4.84%	95.57%	0	64	193686	95762	2862280
Vodafone	19:00 - 20:00	2387	10516	0.59%	40	1.68%	98.64%	0.18%	0.68%	0.80%	115	7198	1.60%	97.40%	0	32	66521	60001	1768183
Sistema (MTS)	19:00 - 20:00	27	94	0.47%	0	0.00%	99.94%	0.00%	0.00%	0.16%	0	81	0.00%	100%	0	17	4200	13	971
BSNL	19:00 - 20:00	1319	11232	1.14%	115	8.72%	97.60%	0.97%	1.97%	2.00%	175	3899	4.49%	97.00%	0	20	115564	55292	987095
Tata Tele CDMA	19:00 - 20:00	292	104	0.05%	0	0.00%	99.00%	0.00%	0.01%	0.46%	1	928	0.11%	99.12%	0	35	62730	13586	90363
Reliance GSM	19:00 - 20:00	1543	3467	0.30%	19	1.23%	98.64%	0.04%	0.38%	0.67%	27	4629	0.58%	98.19%	0	14	109000	74385	NA
Loop	19:00 - 20:00	4	14	0.48%	0	0.00%	99.99%	0.00%	0.00%	1.30%	0	12	0.00%	97.86%	0	8	111	0	22
Idea	19:00 - 20:00	681	468	0.09%	5	0.73%	99.17%	0.30%	0.49%	0.97%	42	2043	2.06%	96.59%	0	26	15692	7481	271952

** 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 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
Bharti Airtel	19:00-20:00	19:00-20:00
Aircel	19:00-20:00	19:00-20:00
Vodafone	19:00-20:00	19:00-20:00
MTS	17:00-18:00	17:00-18:00
BSNL	19:00-20:00	19:00-20:00
TATA Tele CDMA	21:00-22:00	21:00-22:00
Reliance GSM	19:00-20:00	19:00-20:00
Loop	11:00-12:00	11:00-12:00
Idea Cellular	19:00-20:00	19:00-20:00

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

BTSs Accumulated Downtime:

In the Assam circle, there were outages that led to a community being isolated at a particular point in time. BSNL experienced the highest outage (more than 11232) hours in the month of audit.

Call Set-up Success Rate (CSSR):

All the operators were comfortably meeting the benchmark on this parameter. During the audits the maximum CSSR was observed for Loop with 99.99% 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. MTS and TATA Tele CDMA lead the way in network congestion parameters with almost negligible paging as well as traffic channel congestion. The calculation methodology of these parameters was found to be in complete accordance with what has been specified by TRAI. There were almost 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 MTS at 0.16% while the highest was for BSNL at 2.00%.

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. Airtel (for percentage calls getting connected and answered) and Airtel, Vodafone and BSNL for (for percentage calls answered by the operator within 60 seconds) do not meet the benchmark for the month of audit. For Loop, no detail of customer care parameters was available.

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→	Airtel	Airtel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
Airtel	NA	94%	95%	93%	89%	88%	93%	93%	96%
Airtel	94%	NA	95%	94%	89%	88%	93%	94%	95%
Vodafone	94%	89%	NA	95%	85%	88%	93%	95%	94%
MTS	98%	94%	92%	NA	92%	91%	88%	93%	97%
BSNL	89%	90%	92%	94%	89%	84%	89%	94%	93%
Tata Indicom	89%	91%	96%	95%	87%	NA	95%	95%	95%
Reliance	89%	92%	95%	96%	94%	85%	NA	96%	93%
Loop	97%	91%	97%	95%	94%	95%	97%	NA	95%
Idea	93%	91%	96%	94%	89%	92%	95%	94%	NA

 The maximum problem faced by the calling operator to other operators

The above calls were made in Guwahati. In the inter-operator call assessment, calls were made from the test SIMs of service provider whose audit was being conducted to all the other service providers. BSNL found tough connecting to Vodafone number with only 85 out of 100 calls getting connected. TATA had difficulty in connecting to a BSNL number with 85% of their calls getting completed. Airtel had a difficulty in connecting to a BSNL, TATA and Reliance number.

Results of Operator assisted Drive test

The drive test was conducted simultaneously for all the operators present in the Assam circle. There was in total of three drive tests conducted in the circle. These tests were conducted in the cities of Barpeta, Dhuburi, Nagaon. IMRB auditors were present in vehicles of every operator. A sample of 15 – 30 test calls were made along each of the routes. The holding period for all test calls was between 120 seconds to 180 seconds. The drive test vehicle across all routes plied at a speed of less than 20 km per hour. Taking into consideration the route that was taken for the drive test; most of the major areas 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 Barpeta, Dhuburi, Nagaon was conducted along the following route:

	Type of location	Barpeta	Dhuburi	Nagaon
Outdoor	Periphery of the city	SBI Office, BB Road, Barpeta Bazar, KK Rd, Joint Dir. Health off, Sadar Balok Majalia Vidyaloi, Brindaban Hati, 1 No. Galiyahati, Nawhati, Ichapurhati, Ganakkuchi, Madhavdevsatra	Vidyapara mor, Dr Jakir Husain Rd, D.K. Road, Railway crossing, Jagrar Par, Medical Chauk, CH Road, Aam Bagan, Power House, Khalilurpur, R K Mission Raod, FCI Godoun, RK Ashram, College Rd., District Agr Office, BN College, Kismat hajda, Naya Masjid, Pragati Nagar, Match Factory, AMCO Rd., Post Office, TB Hospital, Rail Gumti, Bishnu tockiz, BN boss Rd., UMC Rd., Kalibari Rd., Chermen Rd., Laboure commissioner office, GTB Road	Dimoruguri,Balibhuya Patty,Pali Masjid Rd,Poly Tech,Amola patty,Kalighat Mandir,Nagaon Dev Auth.,PS Rd,MD Rd,North Hoiborgaon,Lawkhowa rd,TP Rd,Hoiborgaon Railway Stn,Dhing Rd,Jhuria Bus stand,Srimant Shankardeve Rd,Sani Mandir Rd,2No. Amolapatty,Nagaon Nursing Home,Lakhinagar Charali,Assam Homeo College,Khutikotia, South Hoiborgaon,ARB Rd,Bhuyan Patty,SP office FRPO,LNB Rd,AT Rd, Nagaon Hut,MC Borah rd,Central Jail,JG Rd,Amin Patty,KhagriJan,Kasalukhowa,Morikollong Charali,PB rd,Mashjid Rd,Kacha Ali,Dimoroguri
	Congested area	Metukuchi, BB Road, 1 No. Galiyahati, Bhoktarkur, MC College Road, Rhino Club, Barpeta Bazar, BT Road, Barpeta Sadar, PS Post Office, Asstt. Excu. Engg (PWD) Office, Barpeta Govt. HS School, Billortarihati, BT LP School, Barpeta Health Center Ramrai stadium, Dakshinhati	Town Club Field, Asst Commisner oc Taxes, T.R. Phukan Rd., LIC Office, District Info. Center, S.P. Higher Secendory, Palpara, Rabindra sarini, DD Road, Terapanth Bawan, Nuniapatti, Vidyapara, New Market, MS Road, HN Road, CR Das Road, Dhubari PS	VIP Rd,Marwari Patty,AT Rd,Natun Bazar,PS Rd,Hotel Abhinandan,Nagaon Natya Mandir,B Baruah Rd,BM Rd,NRL Dipot.Nagaon Govt.HS School,Stadium,SI Office,RKB Rd,MK Deka Phukan Park,ADP Rd,MG Rd,Nagaon Bengali Girls School,Nagon Jr College,Dist Agri Office,SM Rd,Bhogeswari Phukanani Rd,Itachali AT Rd,Thakur Ramkrishna Rd, Bishnu Nagar,Morikallong,MD Rd,MB Rd,KA Rd,Jail Rd,GNB Rd,Police Hospital Rd,Police Reserve,Foujedari Patty,Kirtan Gharpath,M Azad Rd,Bara Bazar,Dhaka Patty,Nagaon College,New Mission Market,Dr. Huze Rd,ADP Rd,Natun Bazar,Itachali,Panigaon Chariali,Joyti Nagar,Dimaruguri
	Across the city	Sankar dev Shisuniketan, Madhyपालंग्दी Hati, KK Road, Jania Chowk, LIC Office, Barpeta Academy, Sanivani Hospital Zania Road, Fire Briged Office, Milan Nagar, MC College, Juroram Pathak Girls School, Naveen ch.das hall, LCN Road, Amolapatti, Dr.BK Road, BKK Road	Kali Mandir, GTB Road, BOC, DTO Office, D.K. Road Point, Bus Stand, Dhubri Girls Jr. College, Assam Sahitya Sabha, Executive Engg. Office(PWD), SBI, Satsang Kendra, Jila Parisad Office, SP Bunglow, Panchpir Dargah, DC Residence, Town Club	Dimoroguri,,Narttan Panigaon,Kopili Hospotal & Resharch Cntr,Panigaon,Kalibari,Sankardeb Eye Hos,Itachali,B Baruah Rd, Dosan High School,RK Rd,Dr KK Das Rd,MD Rd,Sdar Thana, Treasury Office,Hoiborgaon High School,SBI,AT Rd,Lakshmi Nagar,Khutikatia Rd and return,Sati radhika Rd,RRB Rd,MD Rd,Bengali Pujabari,Binapani Natya Mandir,Namghar,North Hoiborgaon,Saibaba Mandir,MCDG Rd,Marwari patty,Dist Library,ASTC..
Indoor	Office complex	Market Complex	Market Complex	A S T C
	Shopping complex	SBI Office complex	ASTC Office Complex	Stadium Market

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

***Loop has not participated in any of the 3 drive test locations in Assam due to non presence of its network in any of these cities. Also MTS did not have network presence in Barpeta and Nagaon**

Drive Test – Barpeta


	B'mark	Airtel		Aircel		Vodafone		BSNL		Tata Tele CDMA		Reliance GSM		Idea	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	≥ 95%	95.48%	95.33%	98.60%	96.26%	98.47%	97.65%	95.80%	94.83%	99.24%	99.73%	98.21%	97.75%	99.17%	98.38%
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%
%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%	5.04%	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%

Drive Test – Dhuburi

	B'mark	Airtel		Aircel		Vodafone		Sistema (MTS)		BSNL		Tata Tele CDMA		Reliance GSM		Idea	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	≥ 95%	96.55%	95.23%	98.81%	96.51%	98.93%	96.43%	98.57%	98.65%	95.33%	94.02%	99.50%	99.51%	99.09%	98.46%	98.06%	97.87%
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%
%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%
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%	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%	98.75%	100.00%	100.00%

Drive Test – Nagaon

	B'mark	Airtel		Aircel		Vodafone		BSNL		Tata Tele CDMA		Reliance GSM		Idea	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	≥ 95%	95.36%	95.57%	99.16%	93.91%	98.38%	96.09%	94.45%	89.23%	99.93%	99.65%	99.12%	96.64%	99.58%	97.92%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	96.92%	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%	98.94%	100.00%	100.00%

 Not meeting the benchmark


Drive Test 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 BSNL did not meet the TRAI benchmark on voice quality in all three cities.

1. BSNL did not meet the TRAI benchmark on voice quality in all three cities and Aircel did not meet the voice quality benchmark in Nagaon city
2. Reliance GSM did not meet the call drop rate benchmark in Barpeta city

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%	≤ 5%	≥ 95%
Airtel	0.15%	0.00%	99.26%	0.31%	0.36%	1.46%	1.50%	96.49%
Aircel	0.41%	0.00%	98.29%	0.59%	0.75%	1.08%	4.52%	95.52%
Vodafone	0.59%	0.00%	98.89%	0.27%	0.46%	0.65%	2.94%	NA
Sistema (MTS)	0.25%	0.00%	99.79%	0.00%	0.00%	0.31%	0.00%	100.00%
BSNL	7.92%	7.05%	98.09%	0.56%	1.03%	0.27%	19.06%	93.69%
Tata Tele CDMA	0.07%	0.00%	99.68%	0.00%	0.01%	0.47%	0.22%	99.12%
Reliance GSM	0.40%	0.00%	99.17%	0.02%	0.10%	0.57%	0.00%	98.16%
Loop	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	NA
Idea	0.14%	0.00%	99.53%	0.94%	0.18%	0.81%	0.35%	96.87%

 Not meeting the benchmark

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

Summary of Live Calling Results – Cellular Mobile Services

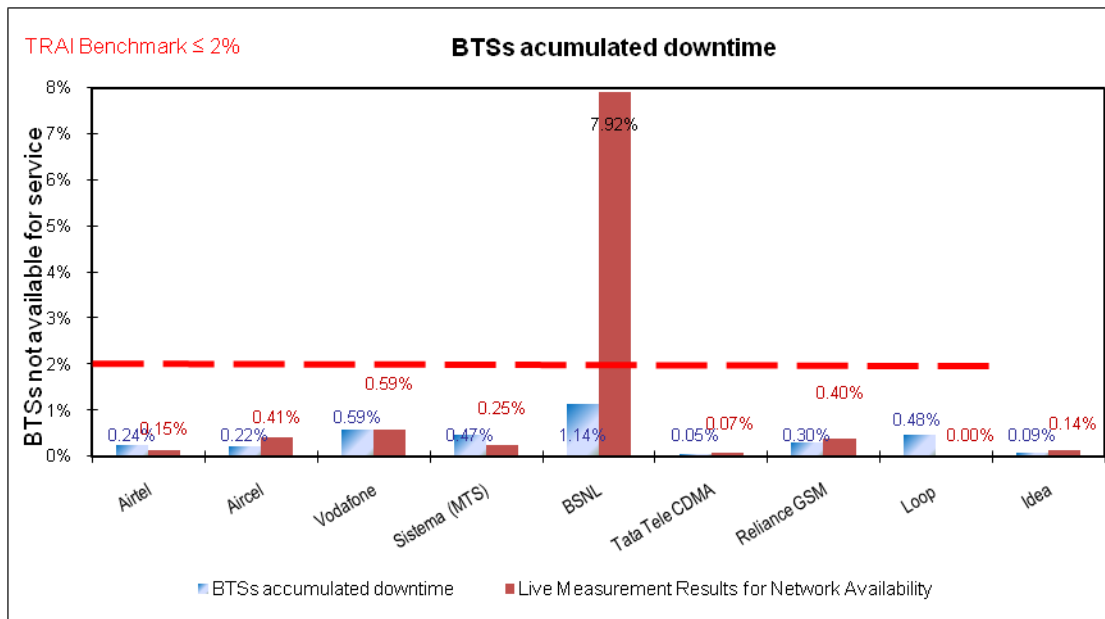
Name of Service Provider	Metering and Billing	Response time to customer for assistance	
	%age complaints resolved within 4 weeks	Accessibility of call centre/ customer care	Percentage of calls answered by the operators (voice to voice) within 60 seconds
Benchmark	100%	≥ 95%	≥ 90%
Airtel	81.00%	100.00%	100.00%
Aircel	87.30%	100.00%	100.00%
Vodafone	88.00%	100.00%	100.00%

Sistema (MTS)	NA	100.00%	100.00%
BSNL	NA	100.00%	31.00%
Tata Tele CDMA	92.86%	100.00%	77.00%
Reliance GSM	84.00%	100.00%	88.00%
Loop	NA	100.00%	100.00%
Idea	100.00%	100.00%	100.00%

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

BTSs Accumulated Downtime



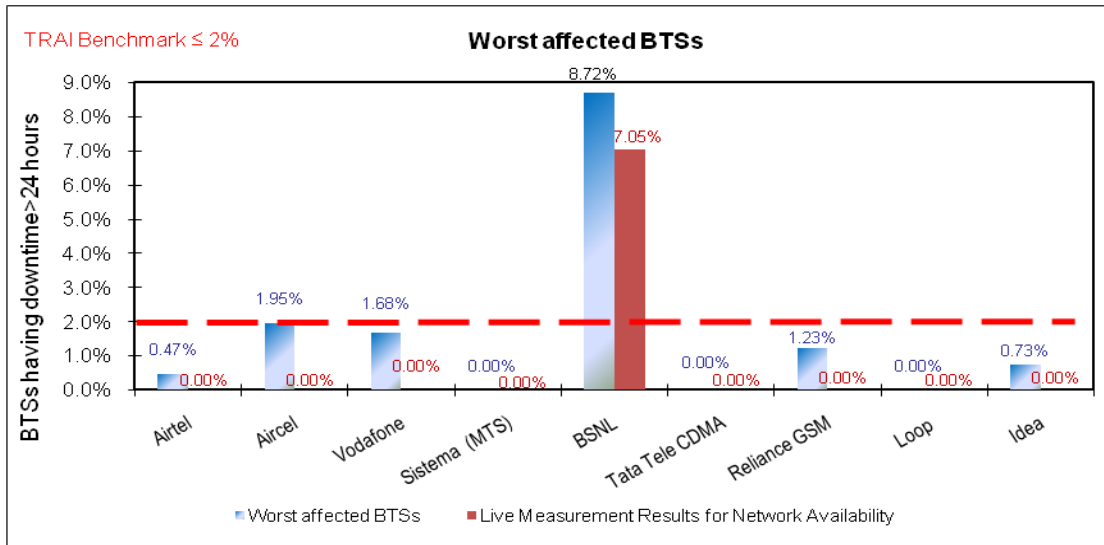
One month

All the operators meet the benchmark

Live measurement

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

Worst Affected BTSs



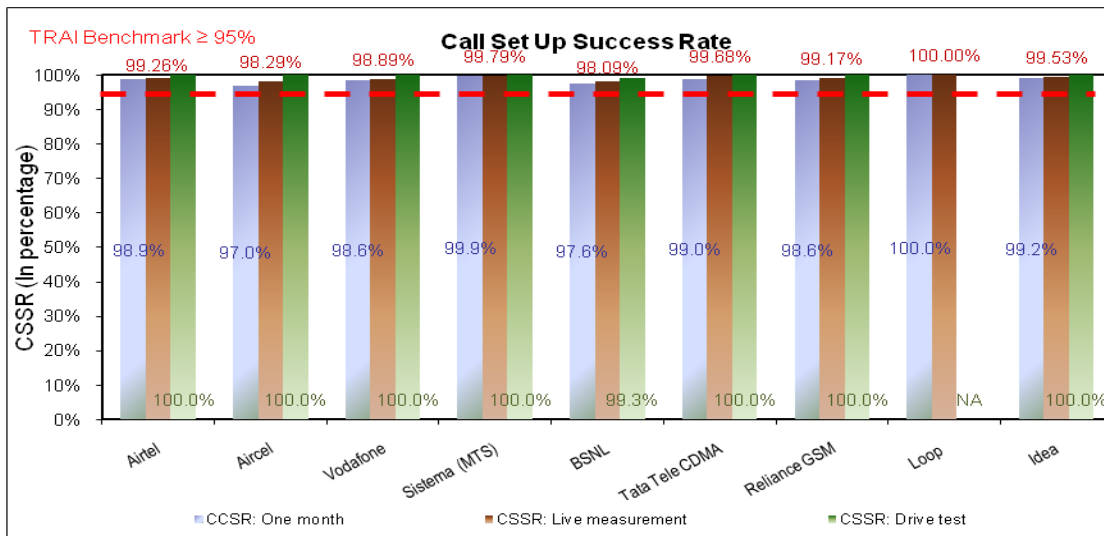
One month

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

Live measurement

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

Call Set-up Success Rate (CSSR)



One month

All the operators meet the benchmark

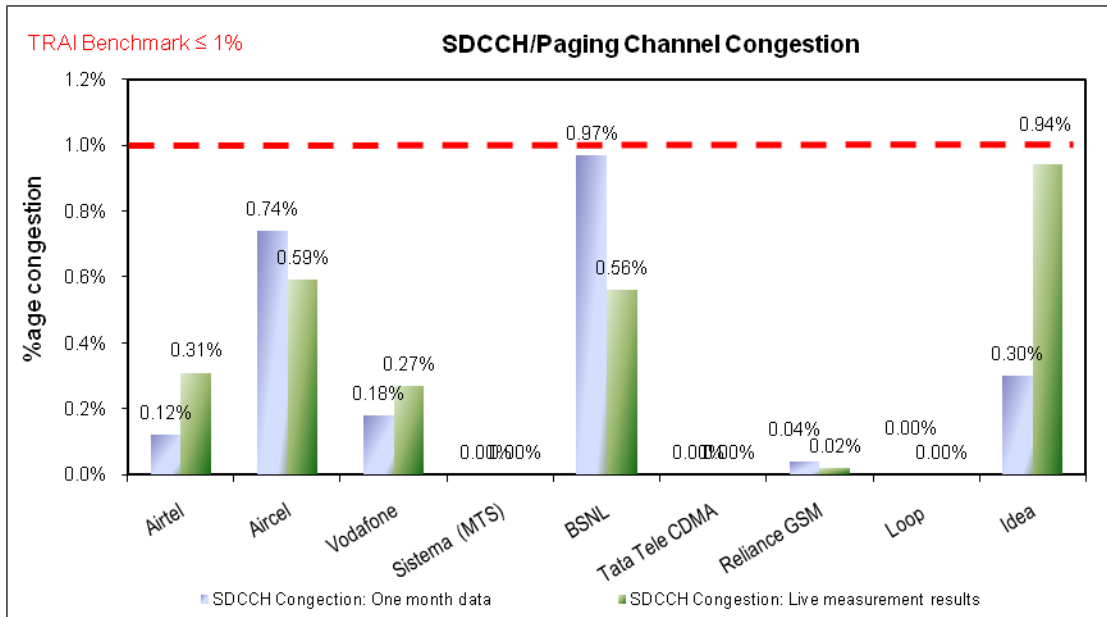
Live measurement

All the operators meet the benchmark

Drive test

All the operators meet the benchmark

SDCCH / Paging Channel Congestion



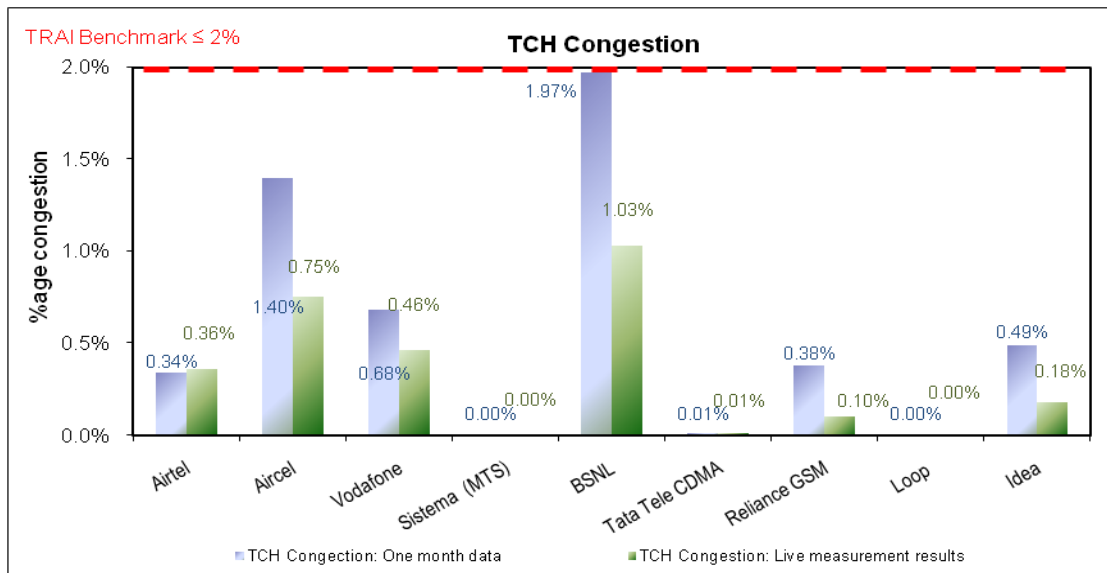
One month

All the operators meet the benchmark

Live measurement

All the operators meet the benchmark

TCH Congestion



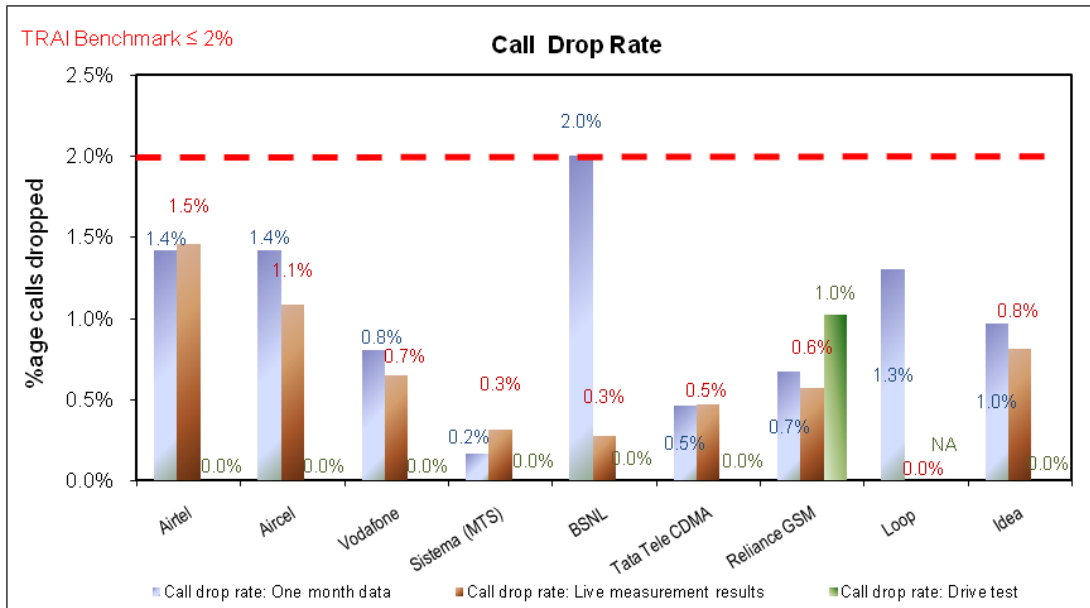
One month

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

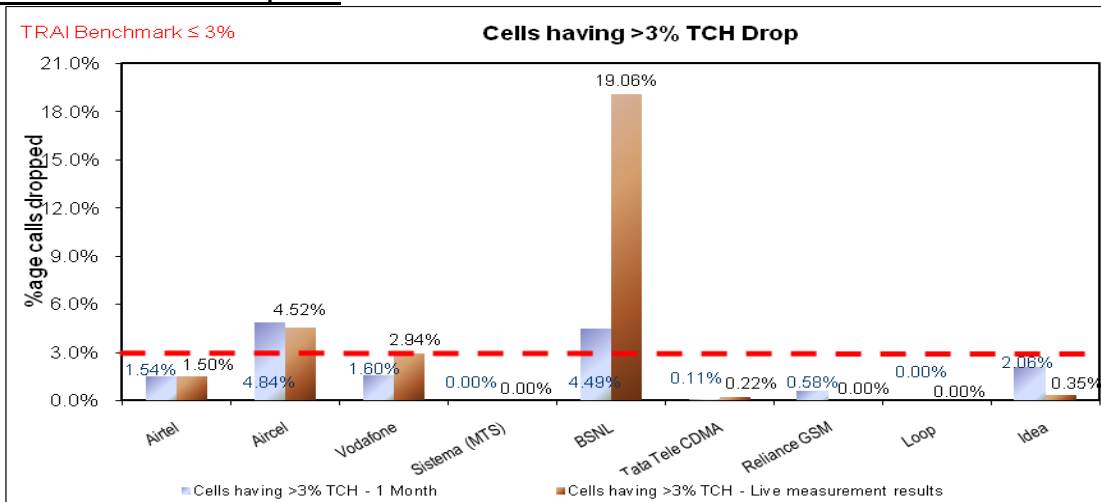
Live measurement

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: Airtel, Vodafone, Sistema (MTS), Tata Tele CDMA, Reliance GSM, Loop, Idea

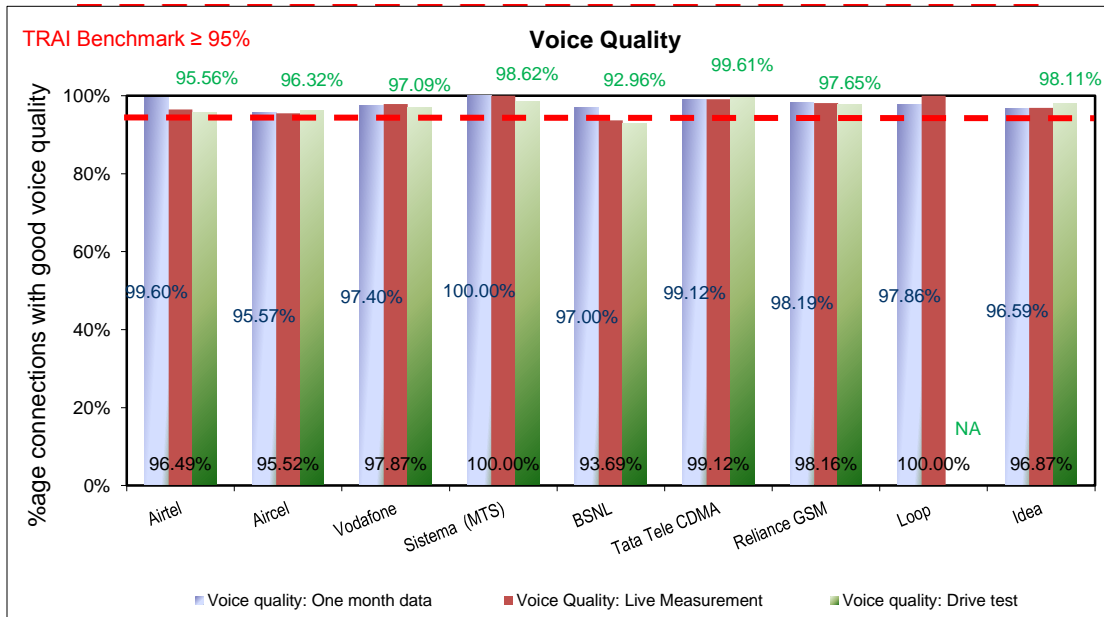
Operator(s) not meeting the benchmark: Aircel, BSNL

Live measurement

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

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

Voice quality



One month

All the operators meet the benchmark

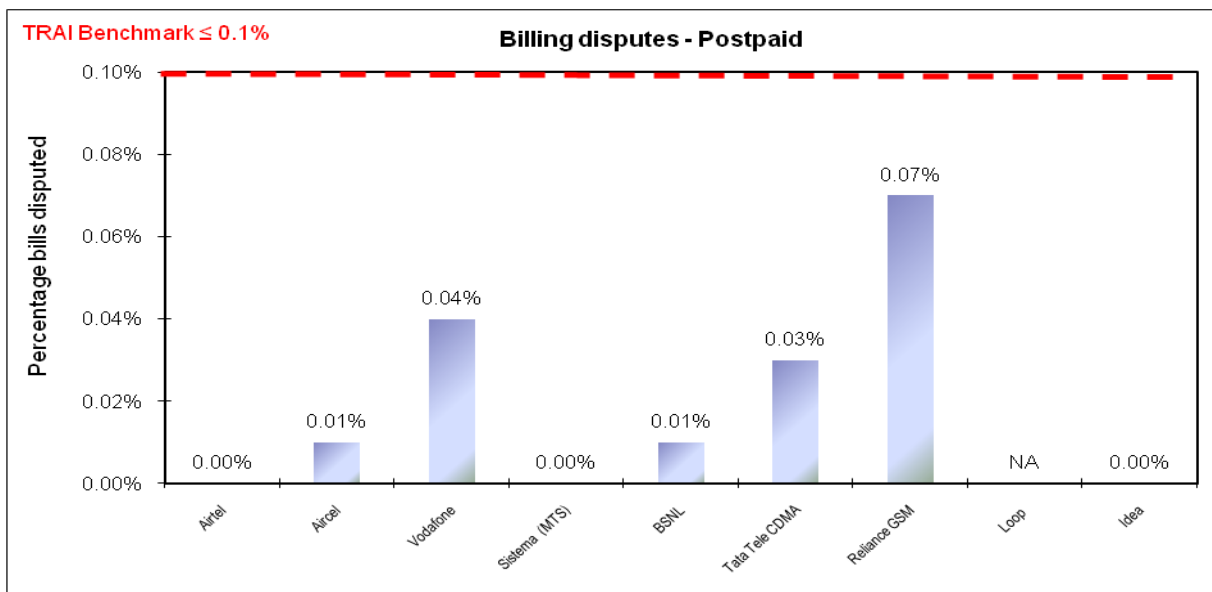
Live measurement

BSNL is not meeting the benchmark

Drive test

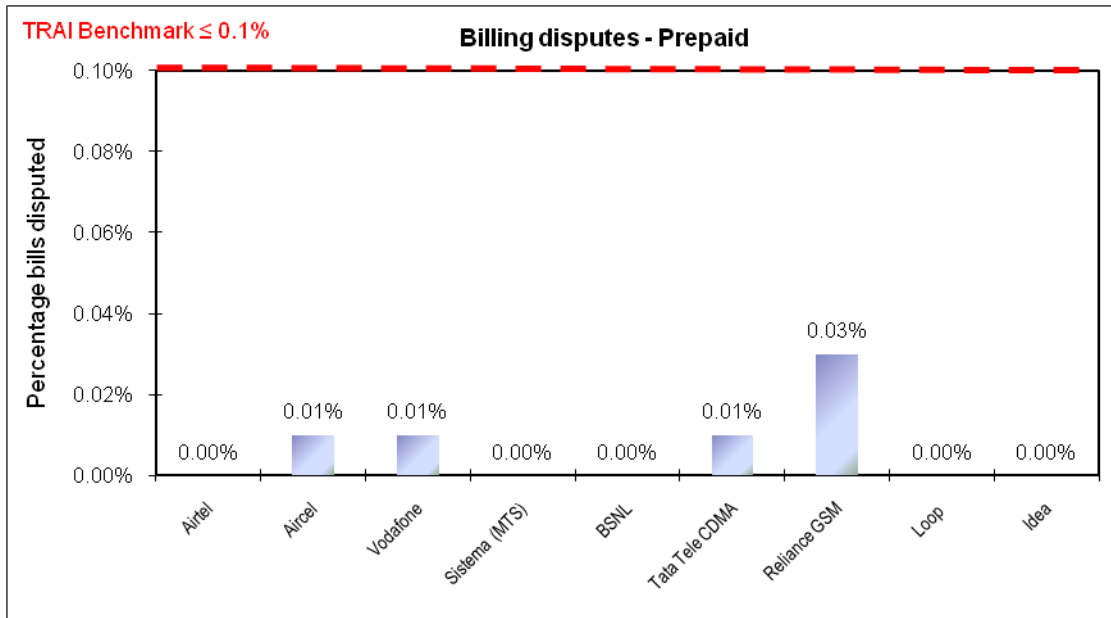
BSNL is not meeting the benchmark

Billing Disputes - Postpaid



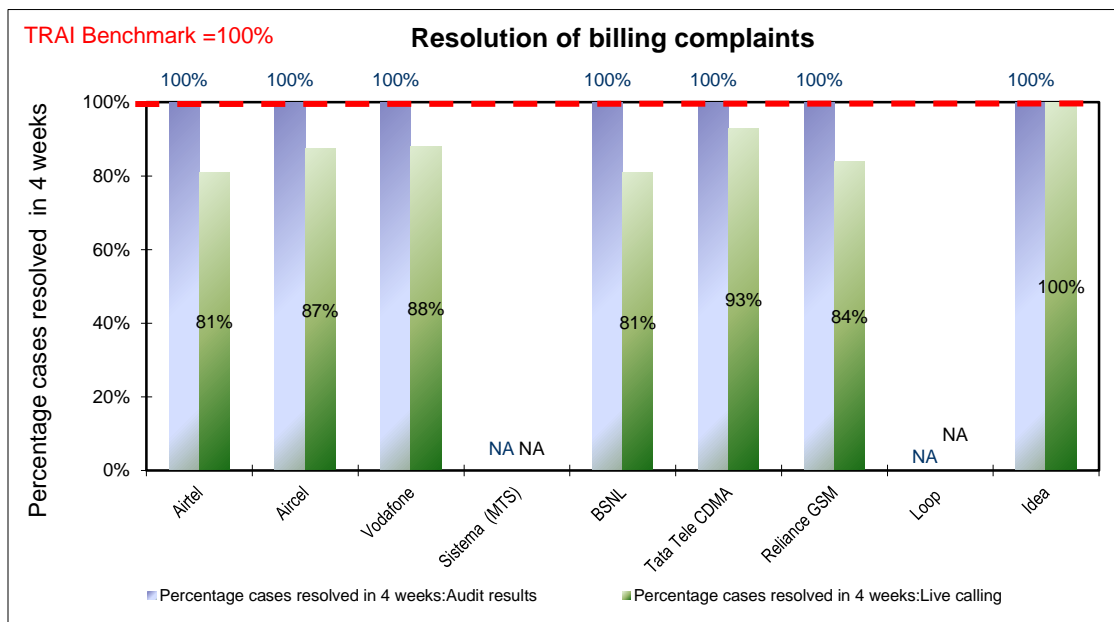
All the operators meet the benchmark

Complaints - Prepaid



All the operators meet the benchmark

Resolution of billing complaints



One month

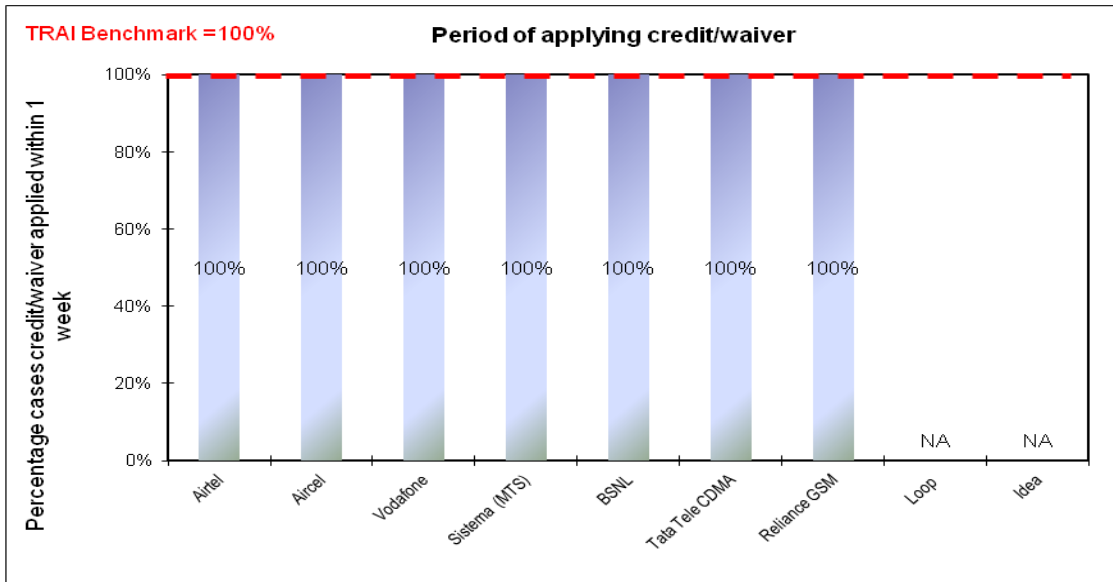
All the operators meet the benchmark

Live calling

Operator(s) meeting benchmark: Idea

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

Period of applying credit / waiver

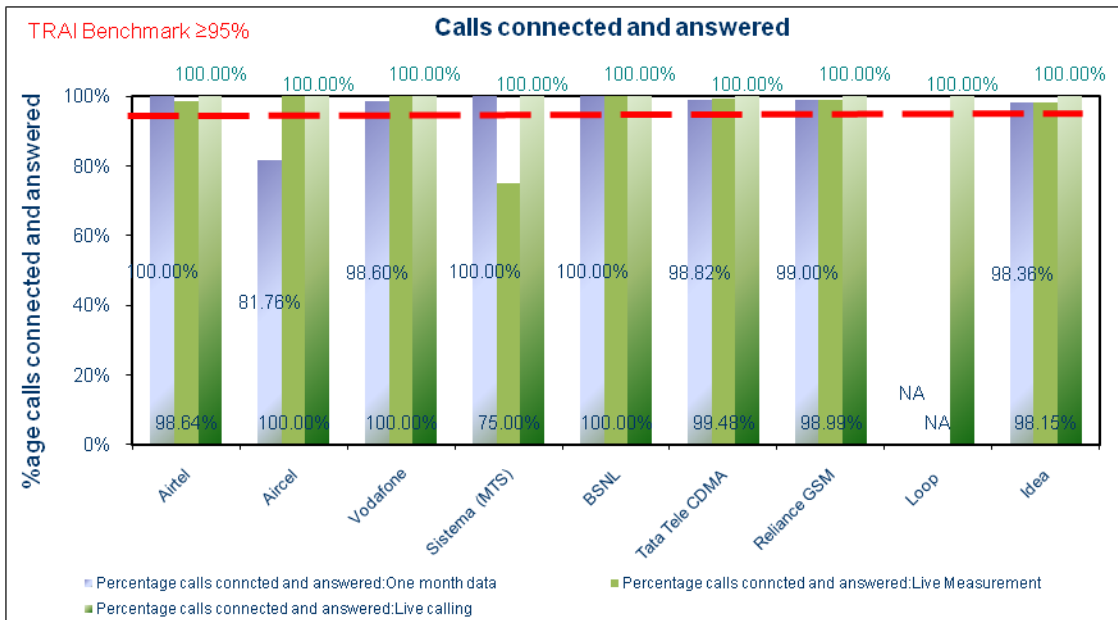


All the operators meet the benchmark

Live calling for billing Complaints

Resolution of billing complaints	Benchmark	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
Total Number of calls made		100	63	100	0	47	42	100	0	100
Number of cases resolved in 4 weeks		81	55	88	0	38	39	84	0	100
Percentage cases resolved in four weeks	100%	81%	87%	88%	NA	81%	93%	84%	NA	100%

Customer Care / Helpline: Calls answered



One month

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

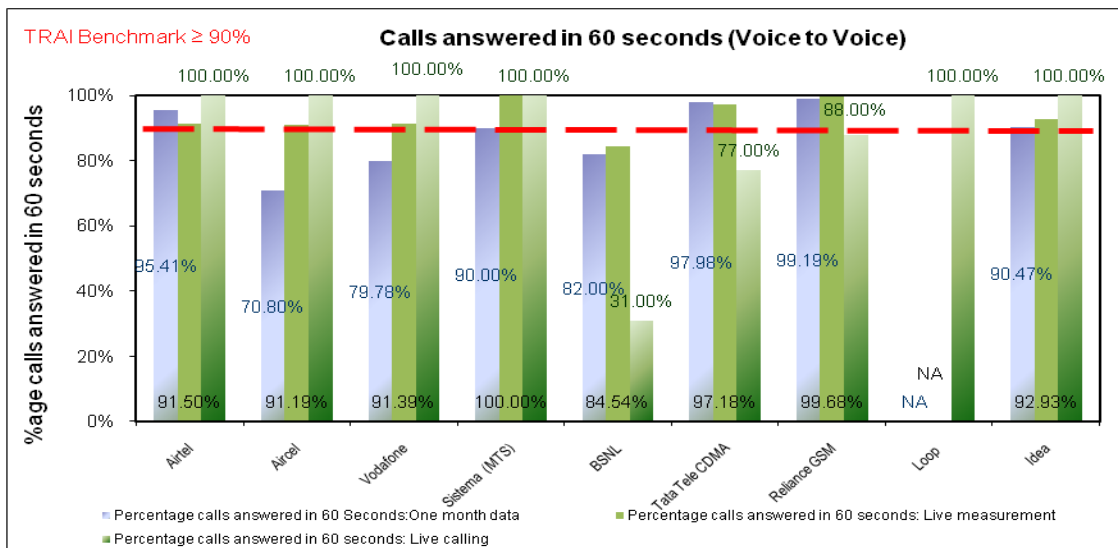
Live measurement

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

Live calling

All the operators meet the benchmark

Customer Care / Helpline: Calls answered voice to voice



One month

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

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

Live measurement

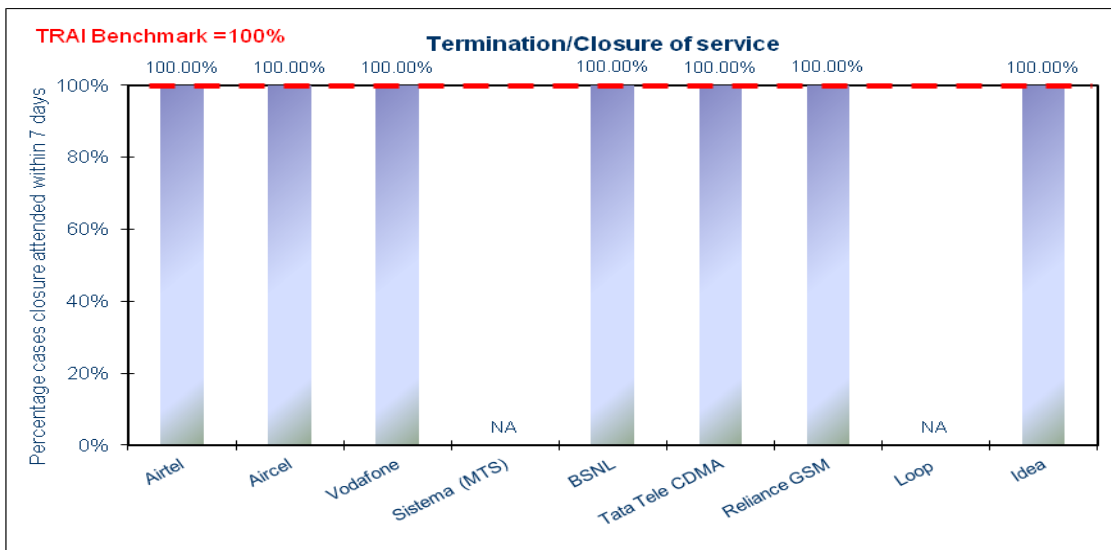
All the operators meet the benchmark

Live calling

Operator(s) meeting benchmark: Airtel, Aircel, Vodafone, Sistema (MTS), Loop, Idea

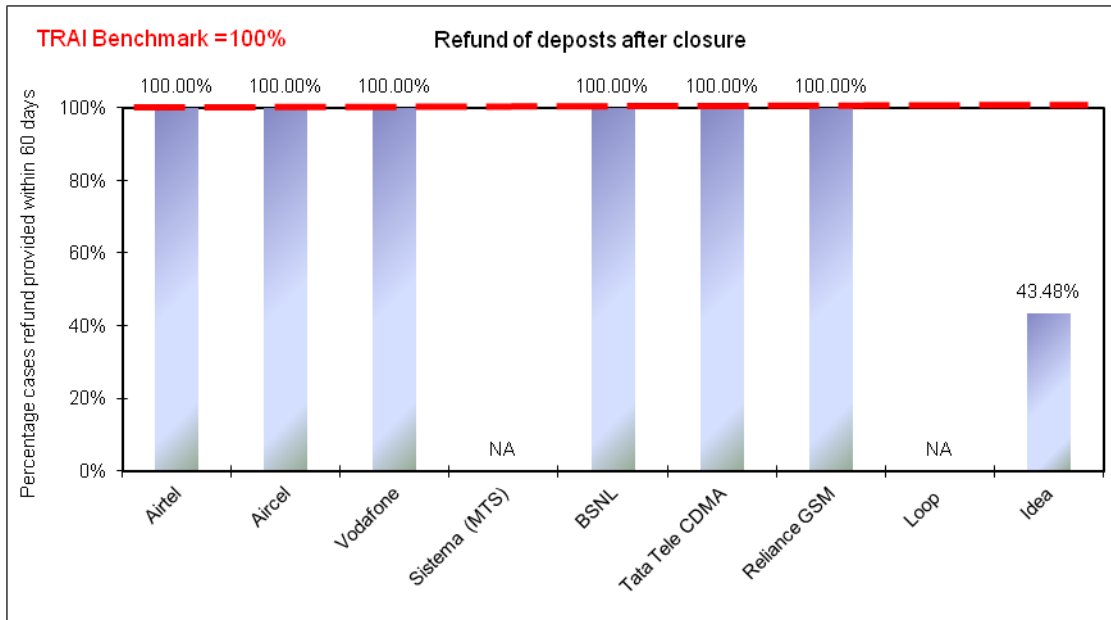
Operator(s) not meeting the benchmark: BSNL, Tata Tele CDMA, Reliance GSM

Termination / Closure of service



All the operators meet the benchmark

Refund of deposits



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

Inter operator calls assessment

Inter operator call Assessment To↓ From→	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
Airtel	NA	94%	95%	93%	89%	88%	93%	93%	96%
Aircel	94%	NA	95%	94%	89%	88%	93%	94%	95%
Vodafone	94%	89%	NA	95%	85%	88%	93%	95%	94%
MTS	98%	94%	92%	NA	92%	91%	88%	93%	97%
BSNL	89%	90%	92%	94%	89%	84%	89%	94%	93%
Tata Indicom	89%	91%	96%	95%	87%	NA	95%	95%	95%
Reliance	89%	92%	95%	96%	94%	85%	NA	96%	93%
Loop	97%	91%	97%	95%	94%	95%	97%	NA	95%
Idea	93%	91%	96%	94%	89%	92%	95%	94%	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. BSNL found tough connecting to Vodafone number with only 85 out of 100 calls

getting connected. TATA had difficulty in connecting to a BSNL number with 85% of their calls getting completed. Airtel had a difficulty in connecting to a BSNL, TATA and Reliance number.

7.0 Compliance reports: Results of Verification of PMR

7.1 Cellular Mobile services

Name of Service Provider	Network Availability					Connection Establishment			Connection Maintenance (Retainability)				POI	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	Equipped 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%			≤ 5%	≥ 95%					
Airtel	PMR	2559	6747	0.33%	16	0.60%	3335.50%	0.17%	1.00%	1.43%	133	7741	1.73%	99.50%	0	137153	100830.3	2150319
	IMRB	2559	6747	0.36%	16	0.61%	98.21%	0.19%	1.00%	1.45%	133	7675	1.74%	99.49%	0	137153	100163.7	2772797
Aircel	PMR	2246	7822	0.48%	44	1.87%	97.32%	0.76%	1.64%	1.45%	319	6716	4.68%	95.21%	0	198097	96340.6	2710943
	IMRB	2246	8022	0.48%	44	1.98%	97.32%	0.76%	1.53%	1.45%	319	6716	4.75%	95.15%	0	198096	96340.0	2710943
Vodafone	PMR	2257	9785	0.58%	42	1.88%	98.42%	0.34%	0.80%	0.83%	183	6596	2.77%	97.28%	0	60323	51170.7	1430214
	IMRB	2257	9785	0.59%	42	1.88%	98.42%	0.21%	0.80%	0.83%	183	6596	2.77%	97.28%	0	60323	51170.7	1430214
Sistema (MTS)	PMR	25	28	0.15%	0	0.00%	100.00%	0.00%	0.00%	0.00%	0	75	0.00%	100.00%	0	489	5.6	266
	IMRB	25	28	0.15%	0	0.00%	100.00%	0.00%	0.00%	0.00%	0	77	0.00%	100.00%	0	488	5.3	266
BSNL	PMR	1309	11819	1.20%	139	10.53%	97.27%	1.00%	1.96%	2.00%	177	3881	4.55%	97.93%	0	115564	56539.0	947503
	IMRB	1309	11819	1.20%	139	10.53%	97.20%	1.00%	1.96%	2.00%	177	3881	4.55%	97.93%	0	115564	56538.7	947503
Tata Tele CDMA	PMR	277	259	0.13%	0	0.00%	99.50%	0.00%	0.03%	0.53%	3	876	0.30%	99.80%	0	57537	11354.7	89632
	IMRB	277	259	0.12%	0	0.00%	99.38%	0.00%	0.02%	0.52%	3	876	0.30%	99.80%	0	57537	11354.7	89632
Reliance GSM	PMR	1425	32	0.00%	1	0.09%	99.37%	0.64%	0.64%	0.38%	57	4134	1.46%	99.13%	0	109000	67765.0	DNA
	IMRB	1425	32	0.00%	1	0.09%	99.37%	0.64%	0.64%	0.38%	57	4134	1.46%	99.11%	0	109000	67765.0	DNA
Loop	PMR	4	18	0.61%	0	0.00%	99.98%	0.00%	0.00%	0.07%	0	12	0.00%	100.00%	0	50	0.1	15
	IMRB	4	18	0.61%	0	0.00%	99.65%	0.00%	0.00%	0.07%	0	12	0.00%	100.00%	0	50	0.1	15
Idea	PMR	651	418	0.09%	3	0.51%	99.19%	0.32%	0.44%	1.16%	48	1324	2.46%	97.42%	0	14659	6816.7	252066
	IMRB	651	418	0.09%	3	0.51%	99.19%	0.34%	0.44%	1.16%	48	1952	2.45%	96.09%	0	14659	6823.3	252030

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 credit / 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	and charging, credit / validity complaints (pre paid) resolved in favor	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	
Airtel	PMR	0%	142083	11	0.00%	1	11538449	100%	12	10745	12	10733	100%	100%	2572446	2572309	86.00%	100%	874	874	100%
	IMRB	0%	142083	11	0.00%	1	11538449	100%	12	10745	12	10733	100%	100%	2572446	2572309	86.00%	100%	874	874	100%
Aircel	PMR	0%	119099	15	0.04%	1596	3586175	100%	2069	2069	1611	458	100%	100%	370564	246182	67.03%	100%	633	633	100%
	IMRB	0%	119099	15	0.05%	1596	3466945	100%	2069	2069	1611	458	100%	100%	370564	246182	67.03%	100%	633	633	100%
Vodafone	PMR	0.15%	94163	138	0.03%	1459	1747905	100%	1597	1597	1565	32	100%	100%	136398	114995	85%	100%	380	380	100%
	IMRB	0.15%	94163	138	0.03%	1459	1747905	100%	1597	1597	1565	32	100%	100%	136398	114995	85%	100%	380	380	100%
Sistema (MTS)	PMR	0%	0	0.00%	0%	0	633	100%	0	0	0	0	100%	100%	1	1	90%	NA	0	0	NA
	IMRB	0%	0	0.00%	0%	0	633	100%	0	0	0	0	100%	100%	1	1	90%	NA	0	0	NA
BSNL	PMR	0.010%	700698	55	0.00%	25	1182210	100%	80	80	57	23	100%	100%	1671	1671	91%	100%	2544	2544	100%
	IMRB	0.008%	700698	55	0.00%	25	1182110	100%	80	80	57	23	100%	100%	1671	1671	91%	100%	2544	2544	100%
Tata Tele CDMA	PMR	0.00%	58127	1	0.04%	31	87657	100%	98	98	32	66	100%	99%	42467	42148	94%	100%	1437	1437	100%
	IMRB	0.0020%	58127	1	0.04%	31	87657	100%	98	98	32	66	100%	99%	42467	42148	94%	100%	1437	1437	100%
Reliance GSM	PMR	0%	326910	196	0.07%	1559	2359469	100%	4872	4872	344	4528	100%	99%	13993516	81%	100%	100%	456	456	100%
	IMRB	0%	320818	155	0.03%	846	2539662	100%	2692	2692	806	1886	100%	99%	13614851	87%	100%	100%	192	192	100%
Loop	PMR	0%	0	0	0.00%	0	155	100%	0	0	0	0	100%	100%	0	0	NA	NA	0	0%	NA
	IMRB	0%	0	0	0.00%	0	155	100%	0	0	0	0	100%	100%	0	0	NA	NA	0	0	NA
Idea	PMR	0%	6823	6	0.02%	162	684980	100%	1177	1177	162	1015	100%	98%	72573	69989	95%	100%	34	34	100%
	IMRB	0%	6823	4	0.02%	162	884980	100%	1177	1177	162	1015	100%	98%	72573	69989	95%	100%	173	173	100%



Figures do not match with those reported in PMR



Figures verified on all India basis



Not meeting benchmark

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

8.0 Conclusions

8.1 Cellular Mobile services

1. BSNL does not meet the TRAI specified benchmark for worst affected BTSs due to downtime (%age)
2. Airtel, Aircel, and Vodafone did not meet percentage of calls answered by the operators (voice to voice) within 60 seconds benchmark
3. Vodafone did not meet metering and billing credibility benchmark for post paid connection.

9.0 Annexure - I

9.1 Service provider performance report based on one month data

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)			Metering and Billing				Response time to customer for assistance		Termination / closure of service	
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality	Metering and billing credibility (Postpaid)	Metering and billing credibility (Prepaid)	%age complaints resolved within 4 weeks	Period of applying credit/waiver less than 1 week	Accessibility of call centre/ customer care	Percentage of calls answered by operators within 60 sec	%age requests for Termination complied within 7 days	Refund of deposits after closure within 60 days
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 5%	≥ 95%	≤ 0.1%	≤ 0.1%	100%	100%	≥ 95%	≥ 90%	100%	100%
Airtel	0.24%	0.47%	98.91%	0.12%	0.34%	1.42%	1.54%	99.60%	0.00%	0.00%	100.00%	100.00%	100.00%	95.41%	100.00%	100.00%
Aircel	0.22%	1.95%	97.03%	0.74%	1.40%	1.42%	4.84%	95.57%	0.01%	0.01%	100.00%	100.00%	81.76%	70.80%	100.00%	100.00%
Vodafone	0.59%	1.68%	98.64%	0.18%	0.68%	0.80%	1.60%	97.40%	0.04%	0.01%	100.00%	100.00%	98.60%	79.78%	100.00%	100.00%
Sistema (MTS)	0.47%	0.00%	99.94%	0.00%	0.00%	0.16%	0.00%	100.00%	NA	0.00%	100.00%	100.00%	100.00%	90.00%	NA	NA
BSNL	1.14%	8.72%	97.60%	0.97%	1.97%	2.00%	4.49%	97.00%	0.01%	0.00%	NA	100.00%	100.00%	82.00%	100.00%	100.00%
Tata Tele CDMA	0.05%	0.00%	99.00%	0.00%	0.01%	0.46%	0.11%	99.12%	0.03%	0.01%	100.00%	100.00%	98.82%	97.98%	100.00%	100.00%
Reliance GSM	0.30%	1.23%	98.64%	0.04%	0.38%	0.67%	0.58%	98.19%	0.07%	0.03%	100.00%	100.00%	99.00%	99.19%	100.00%	100.00%
Loop	0.48%	0.00%	99.99%	0.00%	0.00%	1.30%	0.00%	97.86%	NA	0.00%	100.00%	NA	NA	NA	NA	NA
Idea	0.09%	0.73%	99.17%	0.30%	0.49%	0.97%	2.06%	96.59%	0.00%	0.00%	100.00%	NA	98.36%	90.47%	100.00%	43.48%

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
Airtel						All POI's meeting TRAI specified benchmark
Aircel						All POI's meeting TRAI specified benchmark
Vodafone						All POI's meeting TRAI specified benchmark
Sistema (MTS)						All POI's meeting TRAI specified benchmark
BSNL						All POI's meeting TRAI specified benchmark
Tata Tele CDMA						All POI's meeting TRAI specified benchmark
Reliance GSM						All POI's meeting TRAI specified benchmark
Loop						All POI's meeting TRAI specified benchmark
Idea						All POI's meeting TRAI specified benchmark

9.3 Parameter wise performance reports for Cellular Mobile services

1. Network Availability

Audit Results for Network Availability

	Benchmark	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
Number of BTSs in the licensed service area		2576	2253	2387	27	1319	292	1543	4	681
Sum of downtime of BTSs in a month (in hours)		4551	3635.83	10516	94	11232	104	3467	14	468
BTSs accumulated downtime (not available for service)	≤ 2%	0.24%	0.22%	0.59%	0.47%	1.14%	0.05%	0.30%	0.48%	0.09%
Number of BTSs having accumulated downtime >24 hours		12	44	40	0	115	0	19	0	5
Worst affected BTSs due to downtime	≤ 2%	0.47%	1.95%	1.68%	0.00%	8.72%	0.00%	1.23%	0.00%	0.73%

	Benchmark	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
Number of BTSs in the licensed service area		2574	2253	2392	27	1319	292	1554	4	681
Sum of downtime of BTSs in a month (in hours)		278	660	1011	5	7523	14	444	0	70
BTSs accumulated downtime (not available for service)	≤ 2%	0.15%	0.41%	0.59%	0.25%	7.92%	0.07%	0.40%	0.00%	0.14%
Number of BTSs having accumulated downtime >24 hours		0	0	0	0	93	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	0.00%	0.00%	7.05%	0.00%	0.00%	0.00%	0.00%

2. Connection Establishment (Accessibility)

Audit Results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
CSSR	≥ 95%	98.91%	97.03%	98.64%	99.94%	97.60%	99.00%	98.64%	99.99%	99.17%

SDCCH congestion	Benchmark	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
SDCCH/Paging channel congestion	≤ 1%	0.12%	0.74%	0.18%	0.00%	0.97%	0.00%	0.04%	0.00%	0.30%

TCH congestion	Benchmark	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
TCH congestion	≤ 2%	0.34%	1.40%	0.68%	0.00%	1.97%	0.01%	0.38%	0.00%	0.49%

Live measurement results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
CSSR	≥ 95%	99.26%	98.29%	98.89%	99.79%	98.09%	99.68%	99.17%	100.00%	99.53%

SDCCH congestion	Benchmark	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
SDCCH/Paging channel congestion	≤ 1%	0.31%	0.59%	0.27%	0.00%	0.56%	0.00%	0.02%	0.00%	0.94%

TCH congestion	Benchmark	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
TCH congestion	≤ 2%	0.36%	0.75%	0.46%	0.00%	1.03%	0.01%	0.10%	0.00%	0.18%

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

CSSR	Benchmark	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
Total number of call attempts		580	586	603	180	551	1080	589	NA	568
Total number of successful calls established		580	586	603	180	547	1080	589	NA	568
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	99.27%	100.00%	100.00%	NA	100.00%

Blocked calls	Benchmark	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
%age blocked calls		0.00%	0.00%	0.00%	0.00%	0.73%	0.00%	0.00%	NA	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	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
Total number of calls established		137616123	245753980	2788725	19063	623996822	1384892	97540139	230	15126581
Total number of calls dropped		1953781	3500831	22358	30	12479936	6431	657446	3	147080
Call drop rate	≤ 2%	1.42%	1.42%	0.80%	0.16%	2.00%	0.46%	0.67%	1.30%	0.97%

Cells having more than 3% TCH	Benchmark	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
Total number of cells in the network		7729	6729	7198	81	3899	928	4629	12	2043
Total number of cells having more than 3% TCH		119	326	115	0	175	1	27	0	42
Worst affected cells having more than 3% TCH	≤ 3%	1.54%	4.84%	1.60%	0.00%	4.49%	0.11%	0.58%	0.00%	2.06%

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

Call drop rate	Benchmark	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
Total number of calls established		63419884	267506800	4602195	19167	63689585	116197	128084721	56	9814838
Total number of calls dropped		925654	2879970	29756	60	170681	549	731966	0	79640
Call drop rate	≤ 2%	1.46%	1.08%	0.65%	0.31%	0.27%	0.47%	0.57%	0.00%	0.81%

Cells having more than 3% TCH	Benchmark	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
Total number of cells in the network		7744	20187	21612	81	3899	928	4662	12	147096
Total number of cells having more than 3% TCH		116	912	636	0	743	2	0	0	511
Worst affected cells having more than 3% TCH	≤ 3%	1.50%	4.52%	2.94%	0.00%	19.06%	0.22%	0.00%	0.00%	0.35%

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

Call drop rate	Benchmark	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
Total number of calls established		579	586	603	180	547	1080	589	NA	568
Total number of calls dropped		0	0	0	0	0	0	6	NA	0
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.02%	NA	0.00%

4. Voice quality**Audit & Live measurement Results for Voice quality**

Voice quality	Benchmark	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
Total number of sample calls		38837196569	14985385167	419537355	19063	142296	16649	16259177020	3433	2357713575
Total number of calls with good voice quality		38681847783	14321665132	408618874	19063	138027	16503	15964218152	3433	2277369243
%age calls with good voice quality	≥ 95%	99.60%	95.57%	97.40%	100.00%	97.00%	99.12%	98.19%	97.86%	96.59%

Voice quality	Benchmark	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
Total number of sample calls		2255098	15770039736	701385972	19167	144279	16649	20718487019	918	338114335
Total number of calls with good voice quality		2176053	15063315970	686457729	19167	135180	16503	20336641301	918	327545230
%age calls with good voice quality	≥ 95%	96.49%	95.52%	97.87%	100.00%	93.69%	99.12%	98.16%	100.00%	96.87%

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

Voice quality	Benchmark	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
Total number of sample calls		453902	783458	714215	5445	614473	30328	469893	NA	537616
Total number of calls with good voice quality		433739	754589	693441	5370	571198	30209	458832	NA	527467
%age calls with good voice quality	≥ 95%	95.56%	96.32%	97.09%	98.62%	92.96%	99.61%	97.65%	NA	98.11%

5. POI Congestion**Audit Results for POI Congestion**

POI congestion	Benchmark	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
Total number of working POIs		69	64	32	17	20	35	14	8	26
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		82375	71432	31041860	434.77	19555	4484	849434	286	12606
Traffic served for all POIs (B)- in erlangs		53310	46800.81	9557369	12.97	18434	1085	593465	0.052	4977
POI congestion	≤ 0.5%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Live measurement results for POI congestion

POI congestion	Benchmark	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
Total number of working POIs		69	64	32	17	20	35	14	8	26
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0

Total Capacity of all POIs (A) - in erlangs		82499	216029	2992590	434.77	18514	4484	119206	286	12606
Traffic served for all POIs (B)- in erlangs		55418	147644	995700	28.61	17474	1085	85400	0.217	5233
POI congestion	≤ 0.5%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

6. Inter Operator Call Assessment

Inter operator call Assessment To↓ From→	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
Airtel	NA	94%	95%	93%	89%	88%	93%	93%	96%
Aircel	94%	NA	95%	94%	89%	88%	93%	94%	95%
Vodafone	94%	89%	NA	95%	85%	88%	93%	95%	94%
MTS	98%	94%	92%	NA	92%	91%	88%	93%	97%
BSNL	89%	90%	92%	94%	89%	84%	89%	94%	93%
Tata Indicom	89%	91%	96%	95%	87%	NA	95%	95%	95%
Reliance	89%	92%	95%	96%	94%	85%	NA	96%	93%
Loop	97%	91%	97%	95%	94%	95%	97%	NA	95%
Idea	93%	91%	96%	94%	89%	92%	95%	94%	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	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
Billing disputes - Postpaid										
Total bills generated during the period		48722	37446	34345	0	248245	46996	106192	0	2267
Total number of bills disputed		2	2	15	0	18	14	72	0	0
Percentage bills disputed	≤ 0.1%	0.00%	0.01%	0.04%	NA	0.01%	0.03%	0.07%	NA	0.00%
Billing disputes - Prepaid										
Number of complaints related to charging, credit & validity		0	390	281	0	20	8	857	0	0
Total number of prepaid customers in that period		4234527	3544180	1918432	989	1244323	70089	2584561	324	284988
Percentage of complaints	≤ 0.1%	0.00%	0.01%	0.01%	0.00%	0.00%	0.01%	0.03%	0.00%	0.00%
Resolution of billing complaints										
Total number of billing/charging complaints		2	141	296	0	23	22	929	0	0
Total complaints considered invalid		953	251	6	NA	3	1	622	NA	168
Number of complaints resolved in 4 weeks from date of receipt for complaints listed in 5.3.1		2	141	296	NA	0.03	22	929	NA	0

Live calling results for resolution of billing complaints

Resolution of billing complaints	Benchmark	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
Total Number of calls made		100	63	100	0	47	42	100	0	100
Number of cases resolved in 4 weeks		81	55	88	0	38	39	84	0	100
Percentage cases resolved in four weeks	100%	81%	87%	88%	NA	81%	93%	84%	NA	100%

8. Customer Care**Audit results for customer care**

Customer Care Assessment	Benchmark	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
Total number of call attempts to customer care for assistance		6900371	123059	2722493	46	598894	105146	4048647	0	24625
Number of calls getting connected and answered (electronically)		6900371	100615	2684320	46	598894	103906	4007789	0	24220
Percentage calls getting connected and answered	≥ 95%	100.00%	81.76%	98.60%	100.00%	100.00%	98.82%	99.00%	NA	98.36%
Number of calls getting transferred to the operator (voice to voice)		947779	1394721	741386	40	230036	13928	607588	0	143845
Number of calls answered by operator (voice to voice) within 60 seconds		904269	987512	591473	36	188629	13647	602642	0	130132
Percentage calls answered within 60 seconds (V2V)	≥ 90%	95.41%	70.80%	79.78%	90.00%	82.00%	97.98%	99.19%	NA	90.47%

Live measurement results for customer care

Customer Care Assessment	Benchmark	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
Total number of call attempts to customer care for assistance		797030	175460	73338	4	122804	11114	385555	0	46916
Number of calls getting connected and answered (electronically)		786204	175460	73338	3	122804	11056	381664	0	46050
Percentage calls getting connected and answered	≥ 95%	98.64%	100.00%	100.00%	75.00%	100.00%	99.48%	98.99%	NA	98.15%
Number of calls getting transferred to the operator (voice to voice)		108046	37698	22057	3	34165	1207	65486	0	14074
Number of calls answered by operator (voice to voice) within 60 seconds		98859	34376	20157	3	28884	1173	65274	0	13079
Percentage calls answered within 60 seconds (V2V)	≥ 90%	91.50%	91.19%	91.39%	100.00%	84.54%	97.18%	99.68%	NA	92.93%

Live calling results for customer care

Customer Care Assessment	Benchmark	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
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	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%

Live calling results for customer care (Voice to Voice)

Customer Care Assessment	Benchmark	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
Total Number of calls received		100	100	100	100	100	100	100	100	100
Total Number of calls answered within 60 seconds		100	100	100	100	31	77	88	100	100
Percentage calls answered within 60 seconds	≥ 90%	100.00%	100.00%	100.00%	100.00%	31.00%	77.00%	88.00%	100.00%	100.00%

Operator	Customer Care No.	Operator	Customer Care No.
Reliance GSM	333, 9864098640	S Tel	1212
Tata Indicom (CDMA)	121	Loop	18002090888
Aircel	121	Airtel	121
Vodafone	9706097060	BSNL	1503
Idea	12345		

9. Termination / closure of service

Audit results for termination / closure of service

Termination	Benchmark	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
Total number of closure request		259	170	114	0	562	598	29	0	32
Number of requests attended within 7 days		259	170	114	0	562	598	29	0	32
Percentage cases in which termination done within 7 days	100%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	NA	100.00%

Audit results for refund of deposits

Refund	Benchmark	Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
Total number of cases requiring refund of deposits		89	170	380	0	391	7	393	0	23
Total number of cases where refund was made within 60 days		89	170	380	0	391	7	393	0	10
Percentage cases in which refund was receive within 60 days	100%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	NA	43.48%

11. Additional Network Related parameters

Audit Results for Total Traffic Handled in Erlang

Traffic in Erlang		Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
Equipped capacity of the network		140355	193686	66521	4200	115564	62730	109000	111	15692
Total traffic handled in erlang during TCBH		102454	95762	60001	13	55292	13586	74385	0.05	7481

Total number of customers as per VLR

		Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
Total no. of customers served (as per VLR)		3349072	2862280	1768183	971	987095	90363	NA	22	271952

Level 1 services		Airtel	Aircel	Vodafone	Sistema (MTS)	BSNL	Tata Tele CDMA	Reliance GSM	Loop	Idea
Total no. of calls made		150	150	150	150	150	150	150	150	150
Calls answered in 60 sec		70	139	150	150	120	150	150	150	150
Calls answered after 60 sec		80	11	0	0	30	0	0	0	0
