

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

Report: January – February – March, 2012



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

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Preface

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

The 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 2010. **This report details the performance of various service providers in North East 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 North East 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
“North East” 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 North East circle

	Name of Operator	Month of Audit
Operator 1	Aircel	January, 2012
Operator 2	Airtel	January, 2012
Operator 3	Tata Tele (CDMA)	January, 2012
Operator 4	Reliance (GSM)	January, 2012
Operator 5	Sistema (MTS)	January, 2012
Operator 6	Vodafone	January, 2012
Operator 7	BSNL	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 North East 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%				
Aircel	19:00 - 20:00	1486	3110	0.28%	29	1.95%	97.41%	0.78%	1.65%	1.87%	207	4341	4.77%	95.47%	0	37	107060	50410	1622743
Airtel	19:00 - 20:00	1445	6590	0.61%	22	1.52%	96.38%	0.57%	1.13%	1.23%	100	4315	2.32%	99.71%	0	55	81072	74960	2056078
Tata Tele (CDMA)	19:00 - 20:00	189	59	0.04%	0	0.00%	99.15%	0.00%	0.24%	0.32%	5	603	0.83%	99.12%	0	28	42394	7163	58345
Reliance (GSM)	19:00 - 20:00	645	1994	0.42%	7	1.09%	97.97%	0.09%	0.92%	0.71%	30	1935	1.55%	98.38%	0	14	40000	20006	534944
Sistema (MTS)	19:00 - 20:00	63	800	1.71%	0	0.00%	100.00%	0.00%	0.00%	0.00%	0	189	0.00%	100.00%	0	14	4200	1	157
Vodafone	19:00 - 20:00	1118	6292	0.76%	15	1.34%	98.50%	0.27%	0.75%	0.84%	94	3415	2.75%	97.25%	0	30	24432	21345	751404
BSNL	19:00 - 20:00	1207	43490	4.84%	89	7.37%	95.75%	2.47%	2.02%	1.97%	141	2088	6.75%	94.32%	2	57	36000	27299	165095
Loop	19:00 - 20:00	13	58	0.60%	0	0.00%	100.00%	0.00%	0.00%	0.00%	0	40	0.00%	100%	0	11	61	1	2
Idea	19:00 - 20:00	412	2734	0.89%	7	1.70%	97.20%	0.58%	1.97%	1.65%	33	1236	2.67%	95.53%	0	26	10681	5230	170525

** 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 North East 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
Aircel	1900 - 2000 hrs	1900 - 2000 hrs
Airtel	1900 - 2000 hrs	1900 - 2000 hrs
Tata Tele (CDMA)	20:00-21:00 hrs	2100 - 2200 hrs
Reliance (GSM)	19:00-20:00 hrs	19:00-20:00 hrs
Sistema (MTS)	19:00-20:00 hrs	19:00-20:00 hrs
Vodafone	1900 - 2000 hrs	1900 - 2000 hrs
BSNL	20:00-21:00 hrs	20:00-21:00 hrs
Loop	1200 - 1300 hrs	1200 - 1300 hrs
Idea	20:00-21:00 hrs	20:00-21:00 hrs

The TCBH reported by all the service providers matched the network busy hour calculated by IMRB auditors for the North East circle except Tata CDMA

BTSS Accumulated Downtime:

In the North East circle, BSNL experienced the highest outage (more than 43490) hours in the month of audit. Also BSNL was observed to not meet the benchmark for BTSS Accumulated Downtime and Worst Affected BTSS

Call Set-up Success Rate (CSSR):

All the operators were comfortably meeting the benchmark on this parameter. 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 except BSNL for Traffic channel congestion are meeting the TRAI specified benchmarks on the congestion parameters. BSNL does not meet the TRAI specified benchmark with a Traffic Channel congestion of 2.02% which was found during the one month data collected for the month of audit. MTS and Loop lead the way in network congestion parameters with no 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 for most of the service providers except for 2 POIs for BSNL

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 and Loop at 0.00% while the highest was for BSNL at 1.97%.

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 for BSNL and Vodafone. (for percentage calls answered by the operator within 60 seconds)

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 met the TRAI benchmark of 100% with 1 week.

Inter operator calls assessment

Inter operator call Assessment To↓ From→	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
Aircel	NA	89%	85%	93%	94%	95%	87%	94%	95%
Airtel	91%	NA	87%	93%	94%	94%	87%	94%	93%
Tata CDMA	96%	91%	NA	91%	91%	93%	87%	91%	93%
Reliance GSM	89%	90%	89%	NA	92%	92%	85%	92%	92%
Sistema	92%	92%	88%	93%	NA	91%	91%	94%	97%
Vodafone	89%	93%	93%	92%	95%	NA	87%	95%	93%
BSNL	87%	88%	85%	87%	93%	92%	NA	93%	92%
Loop	100%	98%	95%	95%	95%	97%	96%	NA	99%
Idea	97%	95%	94%	95%	97%	95%	88%	100%	NA



The maximum problem faced by the calling operator to other operators

The above test calls were made in Shillong. 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 numbers had a difficulty connecting to an Aircel number with only 85% of the calls getting connected, BSNL faced difficulty in connecting to most of the operators except Loop. Additionally operators like Aircel, Airtel, Tata CDMA, and Reliance GSM faced difficulties in connecting with BSNL number with only 87%, 88%, 85%, and 87% of the calls getting connected

Results of Operator assisted Drive test

The drive test was conducted simultaneously for all the operators present in the North East circle. There was in total of three drive tests conducted in the circle. These tests were conducted in the cities of Itanagar, Dharmanagar, Williamnagar. 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 North East 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 North East circle were conducted in the cities of Itanagar, Dharmanagar, Williamnagar was conducted along the following route:

	Type of location	Itanagar	Dharmanagar	Williamnagar
Outdoor	Peiphery of the city	C Sector Chariali, Bank Tinali, VIP Road, Moub 2, Nitimarg, Lower Niti Bihar, E Sector, Doordarshan sector, MLA Cottage Road, ESS sector, State Circuit House	Kalibari Road, YMAC Purba Bazaar, Hospital Road, Vetenary Hospital, Chandrapur Gov. HS School, Netaji Para, Dighalband Power Station, Silchar, Agartala National HW, TRTC Road, Rajabari HS School, Rajabari Market, DK Road, Office Tilla, RK Mission Road, Kalibari	HDFC Bank, Simsanger Water Project, Priest Hood Mission School, Sacred Heart Church, SH Nursery school, Fire station, Mandir, Saran Academy, Warina, Williamnagar Bazar, NRL Petrol Pump, Williamnagar Girl High School, Civil Hospital, Meghalaya Rural Devp Society, Kusimkolgre Govt LP School
	Congested area	Jully Road, SP Office, E Sector, Abotany Colony, Lower Niti Bihar, TT Marg, VIP Road, Ganga Market	Sakuntala Road, MB Unit Road, Astt. Director Silk office, South Noya Para, Indian Oil Quarter, DNV Road, BSNL Office, Kalibari Road, SI Office, Bir Vikram Institute, Fire Brigade Office, Dhamanagar PS, Thana Road, Kadamtala Auto Stand, Dharmanagar Public Library, Post Office Road, Netaji Subhash Bose Road, Dharmanagar Bus Stand	Rongrenggiri Gov HS School, HDFC Bank, MNREDA Dist Project Office, CDPO Office, MRD Office, Indoor Stadium, Central Nursery, Senetary Part, Dist Culture Office, FCI, Green Yard School, EXE Eng PHE, Nehru Juba Kendra, Police reserve, Inspector Legal Meteorology, Dist School Educational Officer
	Across the city	R K Mission Road, H sector, Vivek Bihar, Main Road, Chandra Nagar, Gohpur Tianiali, Dera Natung, Govt college, F Sector 131 Battelian Head Quarter, Mithun Gate, O Point Tinali, Rajya Mission	Bus Stand, Rajabari Bazar Road, DNV Road, MS Road, Old Bus Stand Road, College Road	Ramsang College, HDFC Bank, Soil Bazar, Dist Agriculture Office, Divisional Mining Office, NRL Rubber Board Field Station, Meghalaya energy corp Ltd., Supt. Eng (PWD) Office, Meghalaya Co-op Apex Bank, SBI, DC Office, Dist Horticulture office, Police station, Forest office, Dept of Agri, WN Gov College
Indoor	Office complex	Arunachal Pradesh secretariat	Dharmanagar Railway Station Office	HDFC Bank Complex
	Shopping complex	Ganga Market Complex	Kalibari Area Market Complex	Soil Bazar

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

***Loop and MTS has not participated in any of the 3 drive test locations in North East due to non presence of its network in any of these cities.**

Drive Test – Itanagar

	Benchmark	Aircel		Airtel		Tata Tele (CDMA)		Reliance (GSM)		Vodafone		BSNL		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%	99.39%	95.27%	96.86%	95.49%	98.00%	95.51%	98.28%	96.33%	98.85%	97.03%	89.00%	74.00%	98.39%	97.04%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.43%	100.00%	100.00%	96.67%	92.70%	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%	0.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.57%	0.00%	0.00%	0.00%	3.15%	100.00%	100.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	98.90%	100.00%	100.00%	100.00%	98.34%	100.00%	100.00%

Drive Test – Dharamnagar

	Benchmark	Aircel		Airtel		Tata Tele (CDMA)		Reliance (GSM)		Vodafone		Idea	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	≥ 95%	99.53%	97.59%	98.02%	95.15%	99.39%	99.48%	99.51%	96.23%	99.43%	97.99%	97.97%	96.50%
CSSR	≥ 95%	100.00%	99.26%	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%
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%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Drive Test – Williamnagar

	Benchmark	Aircel		Airtel		Tata Tele (CDMA)		Reliance (GSM)		BSNL		Loop	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	≥ 95%	97.16%	96.31%	96.27%	95.16%	99.71%	99.69%	98.11%	97.70%	87.90%	58.52%	99.50%	99.13%
CSSR	≥ 95%	100.00%	99.28%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.24%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.72%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.76%
Hands off success rate		0.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	98.63%	100.00%	100.00%	100.00%	NA

Not meeting the benchmark

Drive Test Conclusions:

Drive test was conducted by IMRB with the help of service providers to measure this parameter.

1. BSNL does not meet the TRAI benchmark on voice quality in indoor and outdoor routes in Itanagar and Willamnagar
2. Tata CDMA did not meet the voice quality benchmark in outdoor route in Dharmanagar

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%
Aircel	1.18%	0.00%	97.50%	0.61%	1.44%	1.52%	4.70%	95.61%
Airtel	0.18%	0.00%	98.14%	0.32%	0.46%	0.46%	2.12%	95.93%
Tata Tele (CDMA)	0.10%	0.00%	99.32%	0.00%	0.02%	0.49%	0.83%	99.12%
Reliance (GSM)	0.49%	0.00%	99.07%	0.02%	0.22%	0.58%	0.00%	98.35%
Sistema (MTS)	0.26%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Vodafone	0.85%	0.00%	99.23%	0.07%	0.40%	0.86%	2.77%	97.08%
BSNL	4.12%	6.93%	95.57%	7.94%	2.52%	2.05%	6.80%	97.00%
Loop	0.64%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	DNA
Idea	0.86%	0.00%	95.99%	0.56%	0.48%	0.60%	0.53%	95.79%

 Not meeting the benchmark

During the three day live measurement, all operators except BSNL (for most of the parameters) were meeting TRAI benchmark on all the parameters.

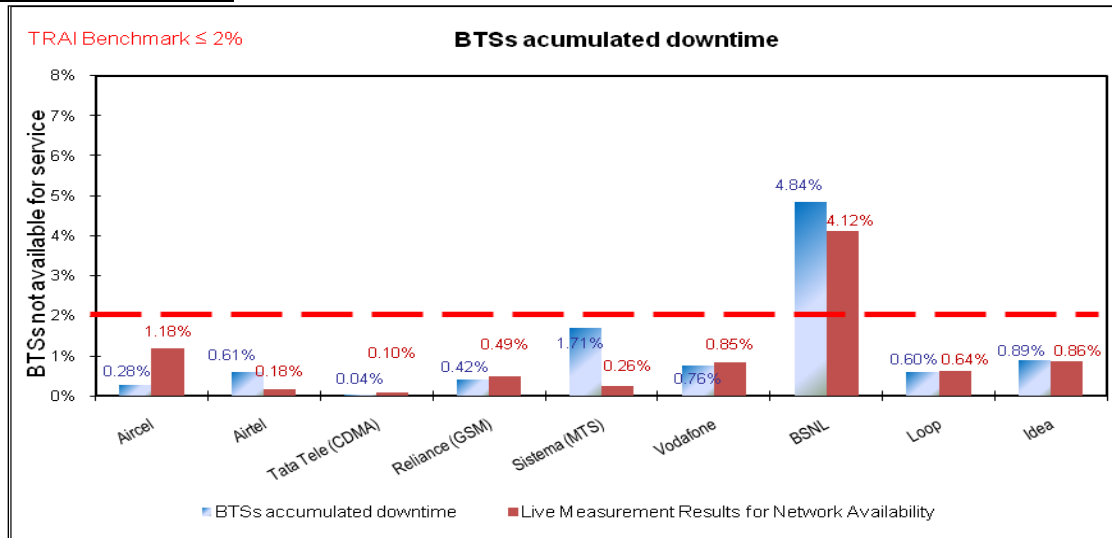
Summary of Live Calling Results – Cellular Mobile Services

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%
Aircel	91.00%	100.00%	100.00%
Airtel	89.00%	100.00%	100.00%
Tata Tele (CDMA)	100.00%	100.00%	69.00%
Reliance (GSM)	84.00%	100.00%	91.00%
Sistema (MTS)	NA	100.00%	100.00%
Vodafone	91.00%	100.00%	100.00%
BSNL	79.00%	100.00%	31.00%
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



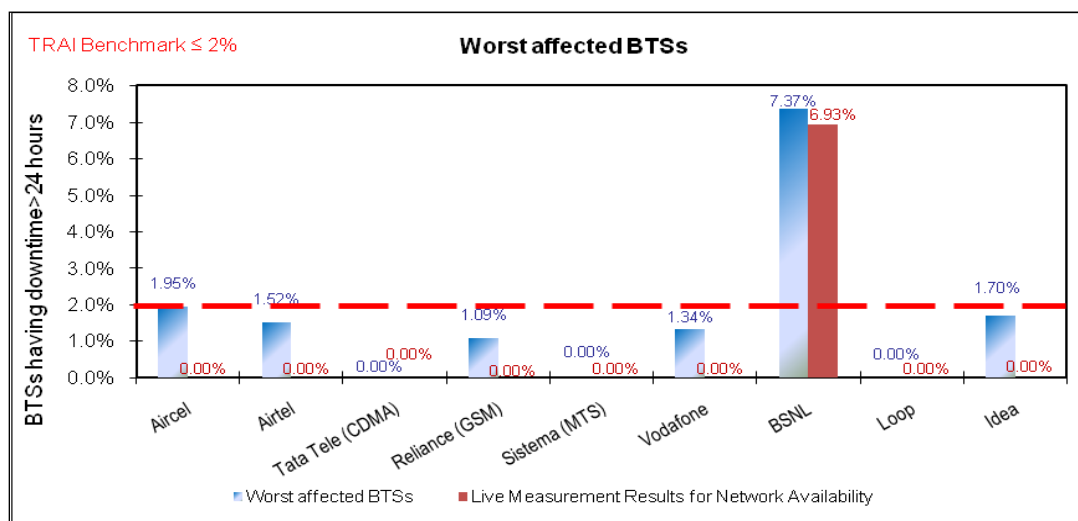
One month

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

Live measurement

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

Worst Affected BTSs



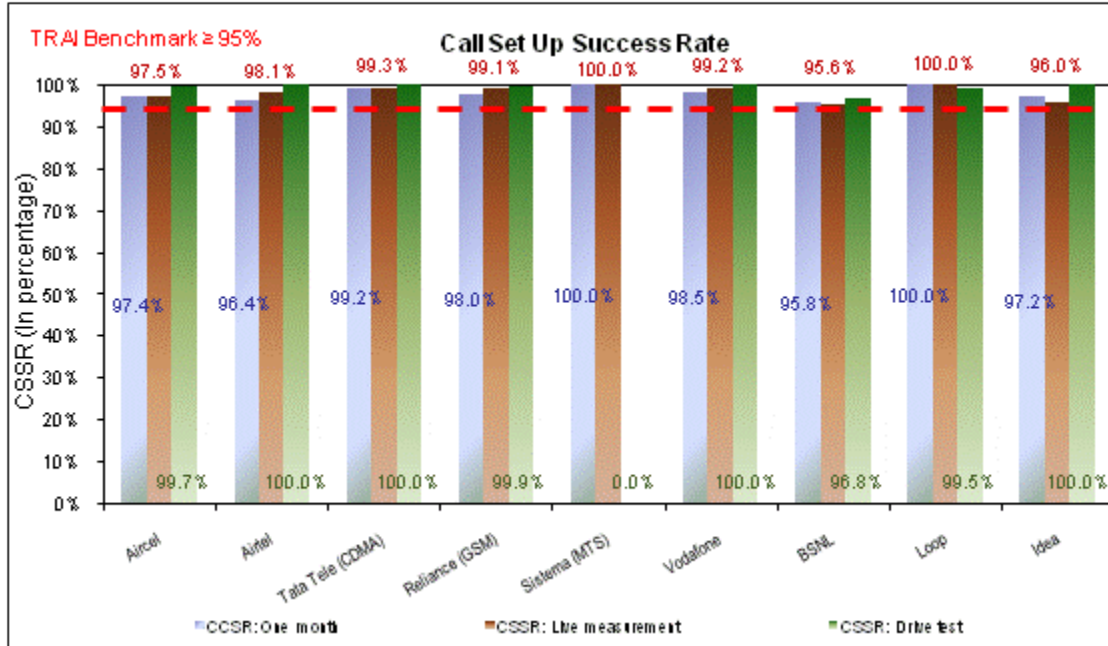
One month

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

Live measurement

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

Call Set-up Success Rate (CSSR)



One month

All the operators meet the benchmark

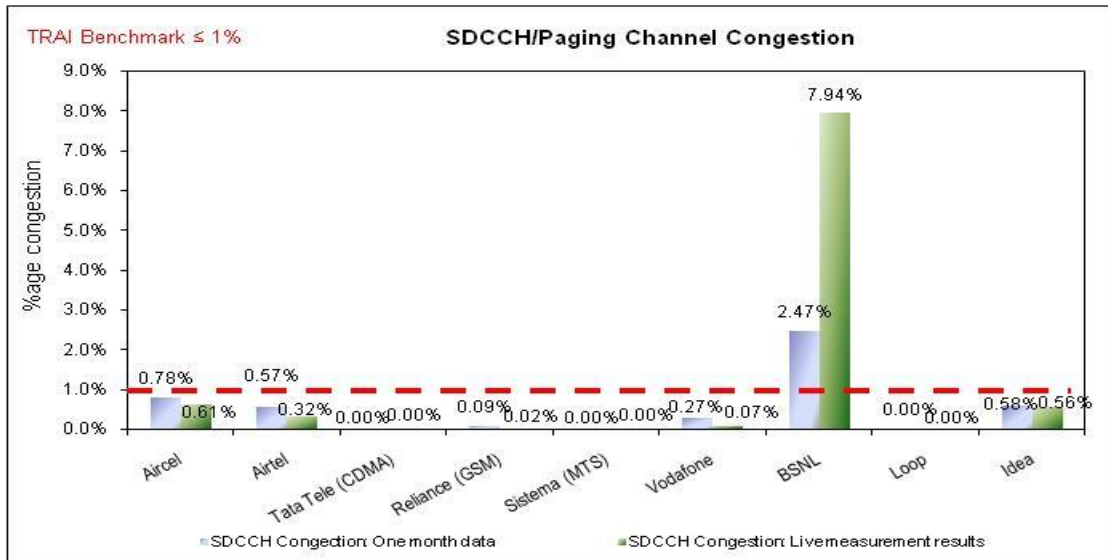
Live measurement

All the operators meet the benchmark

Drive test

All the operators meet the benchmark

SDCCH / Paging Channel Congestion



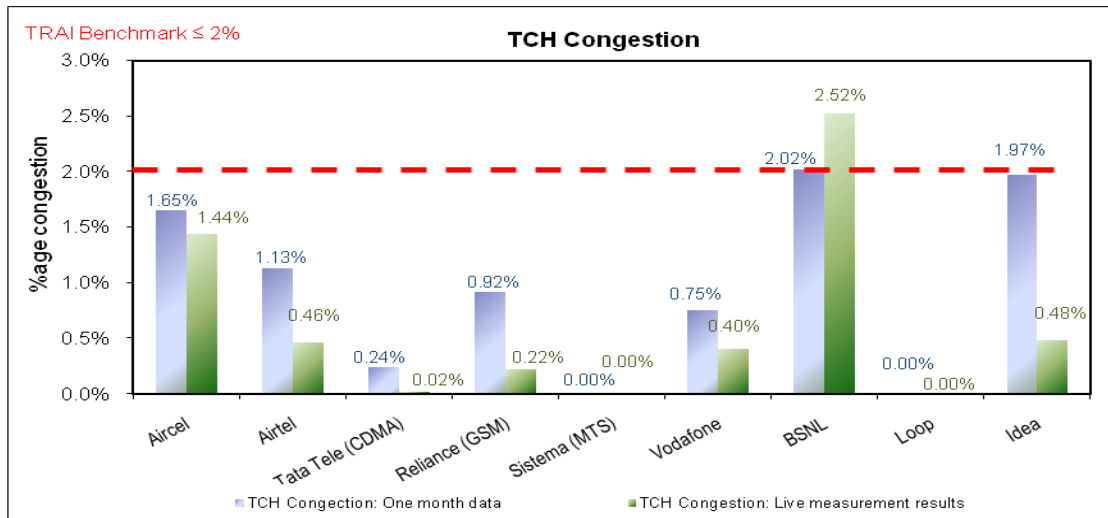
One month

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

Live measurement

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

TCH Congestion



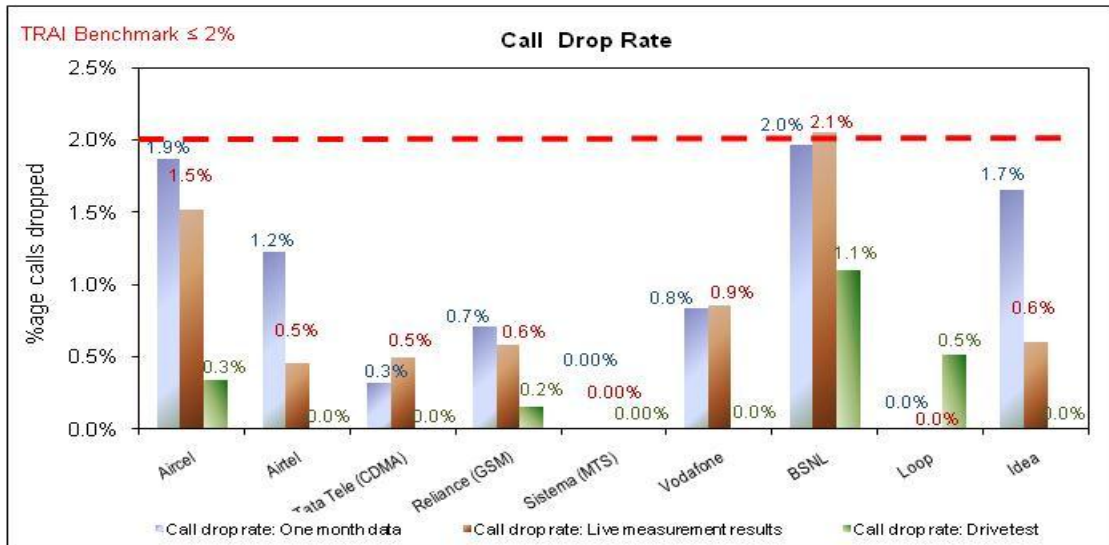
One month

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

Live measurement

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

Call Drop Rate



One month

All the operators meet the benchmark

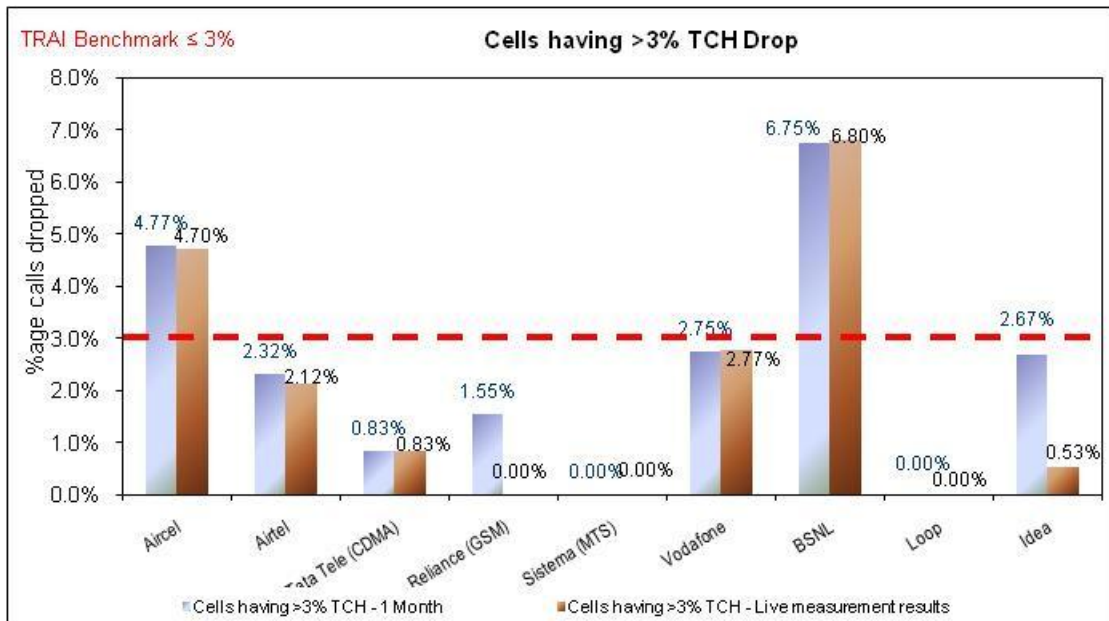
Live measurement

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

Drive test

All the operators meet the benchmark

Cells with more than 3% TCH Drop Rate



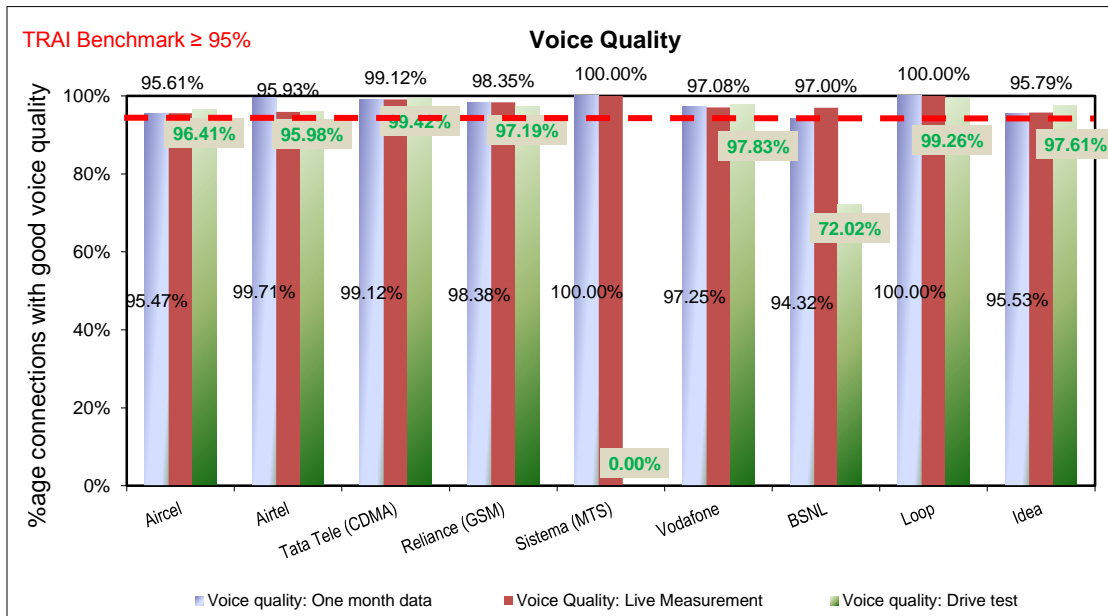
One month

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

Live measurement

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

Voice quality



One month

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

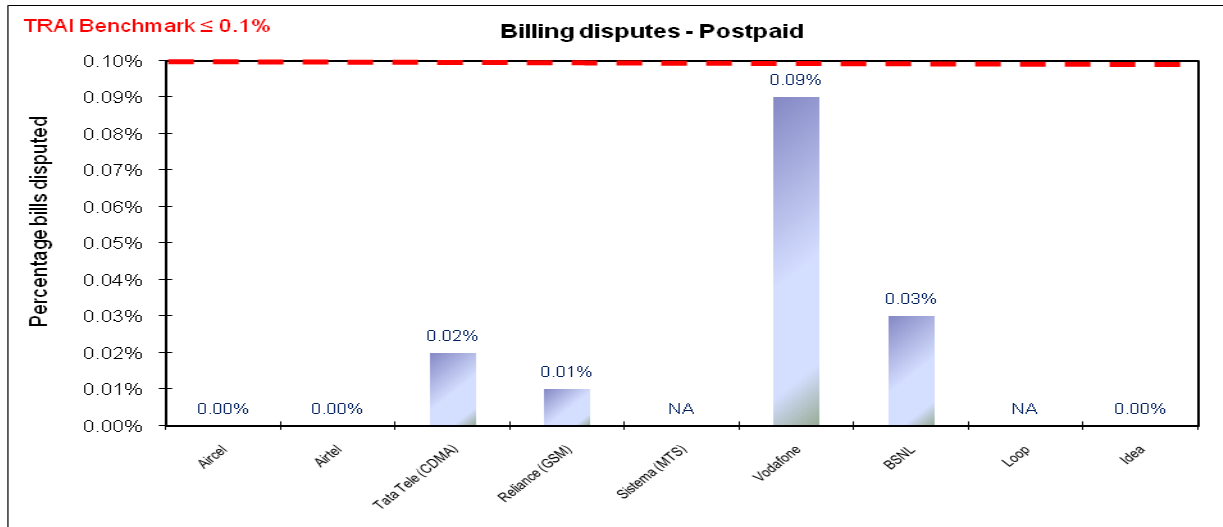
Live measurement

All the operators meet the benchmark

Drive test

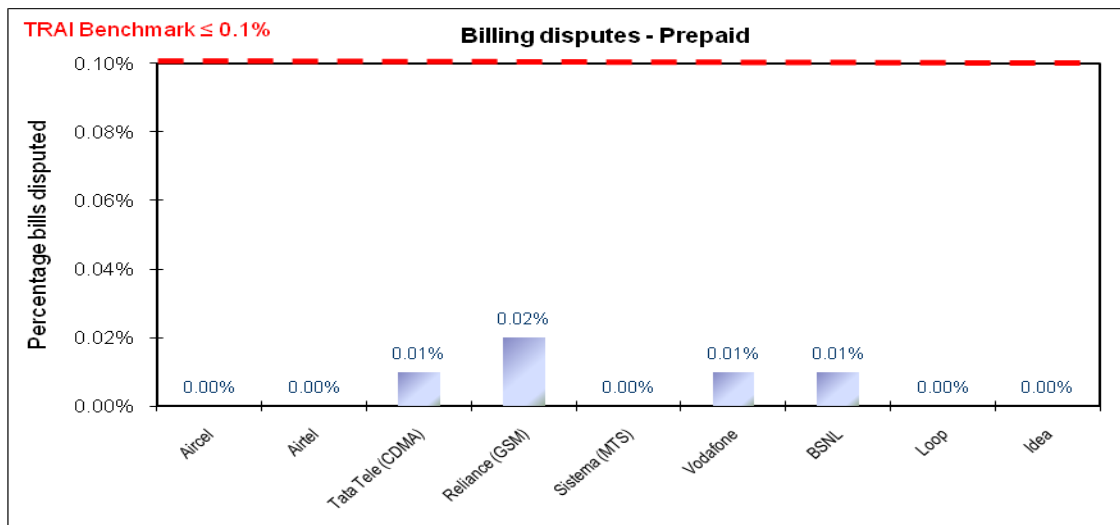
Operator(s) meeting benchmark: Aircel, Airtel, Tata Tele (CDMA), Reliance (GSM), Vodafone, Loop, Idea
 Operator(s) not meeting the benchmark: BSNL

Billing Disputes - Postpaid



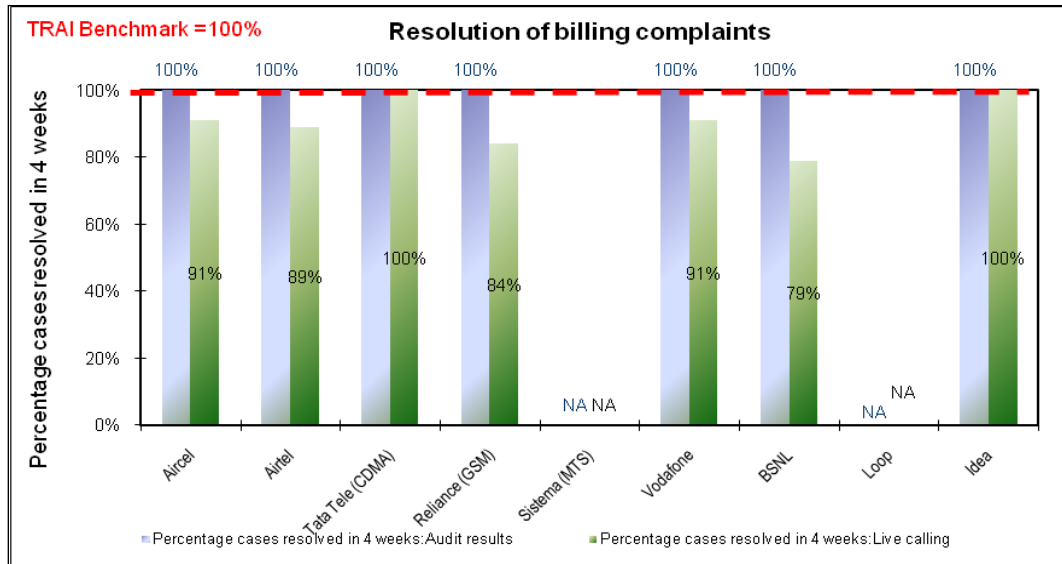
All the operators meet the benchmark

Complaints – Prepaid



All the operators meet the benchmark

Resolution of billing complaints



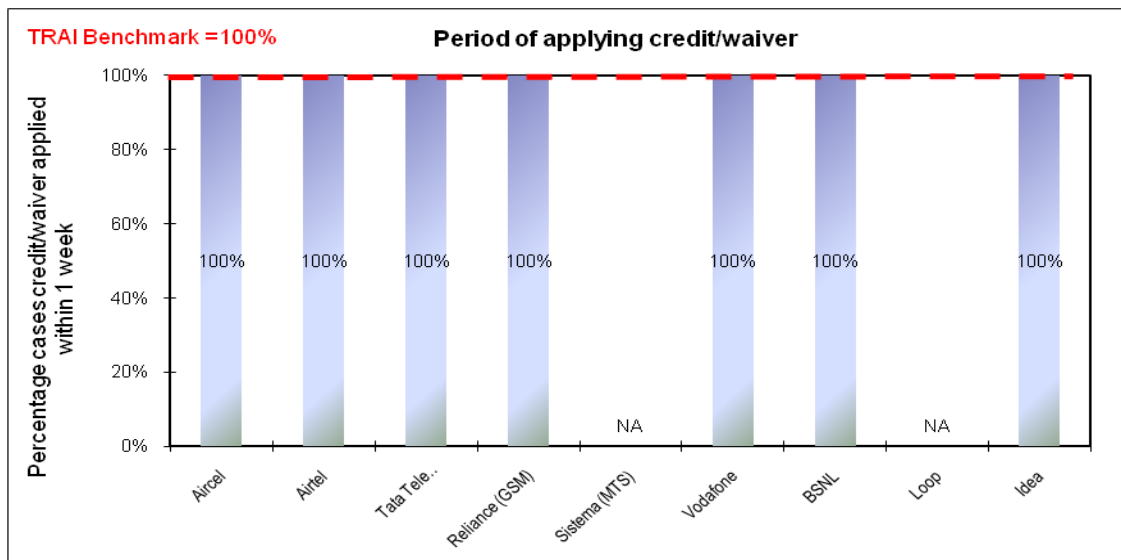
One month

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

Live calling

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

Period of applying credit / waiver

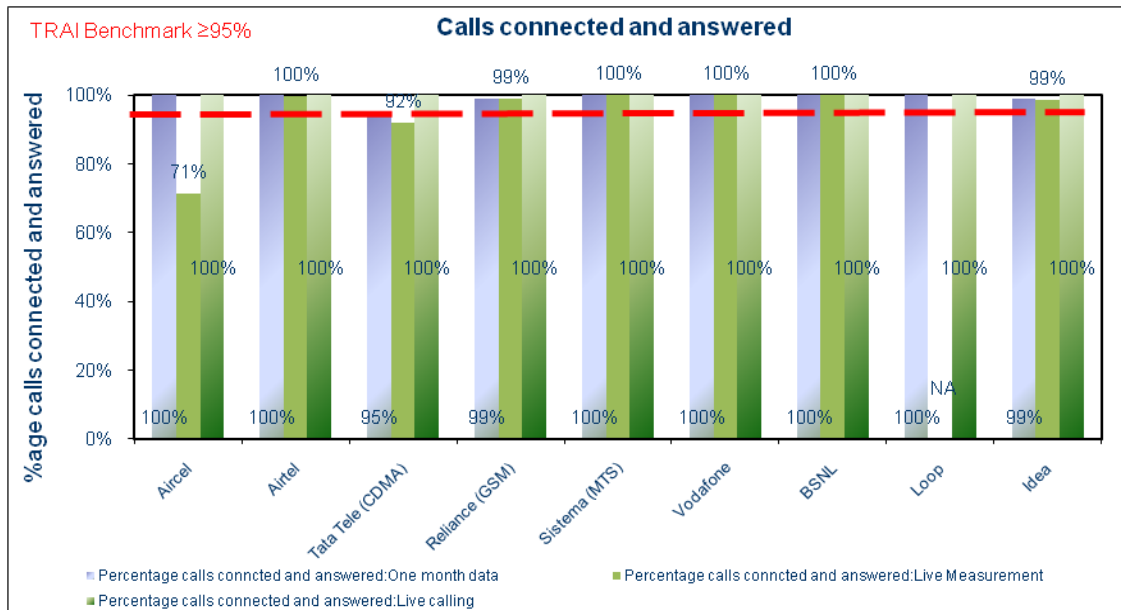


All the operators meet the benchmark

Live calling for billing Complaints

Resolution of billing complaints	Benchmark	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
Total Number of calls made		100	100	100	100	0	100	100	0	100
Number of cases resolved in 4 weeks		91	89	100	84	0	91	79	0	100
Percentage cases resolved in four weeks	100%	91%	89%	100%	84%	NA	91%	79%	NA	100%

Customer Care / Helpline: Calls answered



One month

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

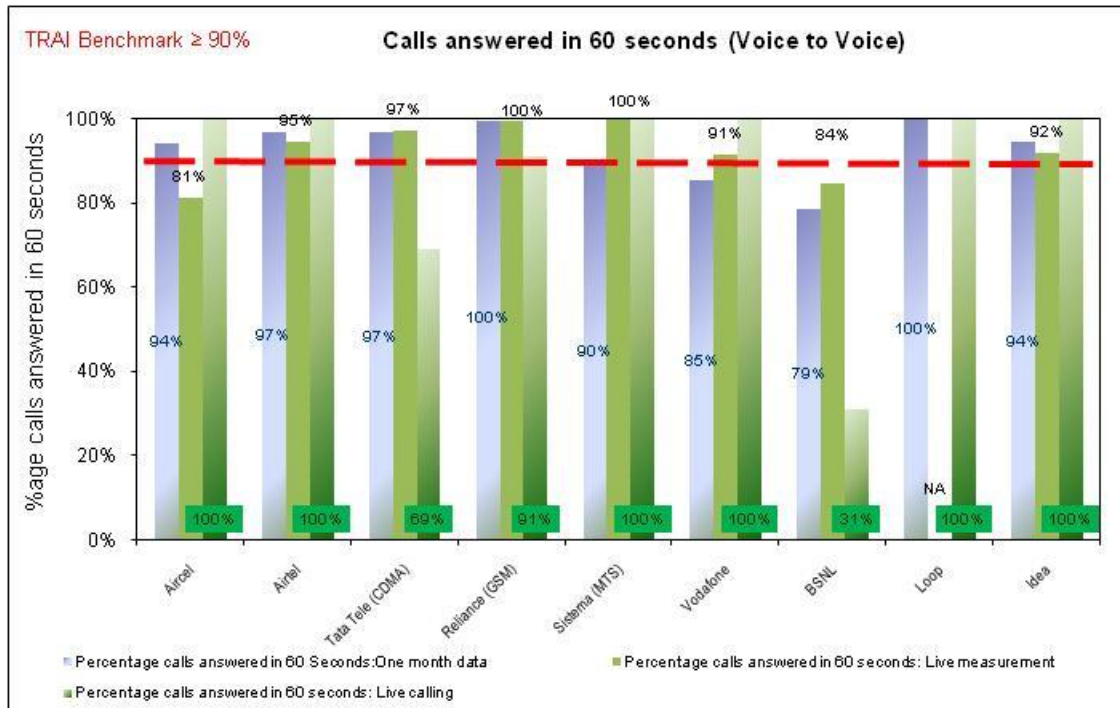
Live measurement

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

Live calling

All the operators meet the benchmark

Customer Care / Helpline: Calls answered voice to voice



One month

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

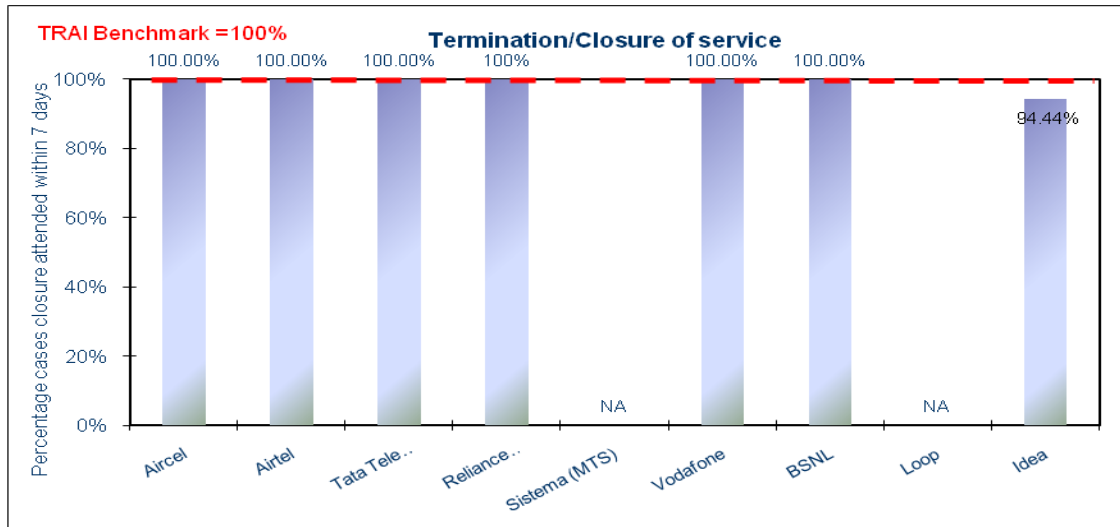
Live measurement

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

Live calling

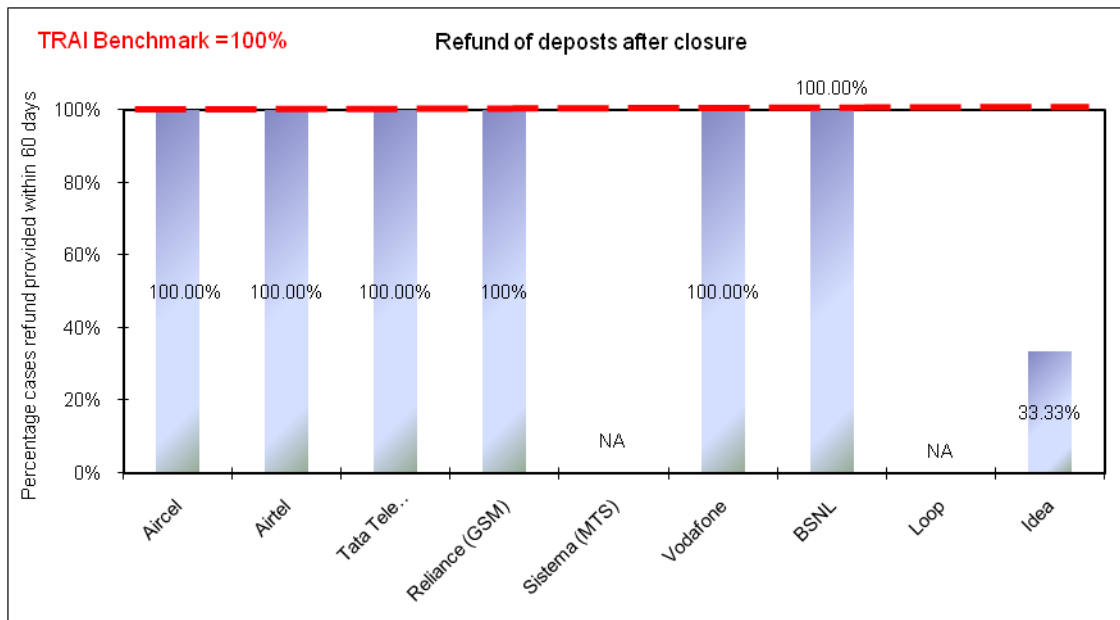
Operator(s) meeting benchmark: Aircel, Airtel, Reliance (GSM), Sistema (MTS), Vodafone, Loop, Idea
 Operator(s) not meeting the benchmark: Tata Tele (CDMA), BSNL

Termination / Closure of service



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

Refund of deposits



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

Inter operator calls assessment

Inter operator call Assessment To↓ From→	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
Aircel	NA	89%	85%	93%	94%	95%	87%	94%	95%
Airtel	91%	NA	87%	93%	94%	94%	87%	94%	93%
Tata CDMA	96%	91%	NA	91%	91%	93%	87%	91%	93%
Reliance GSM	89%	90%	89%	NA	92%	92%	85%	92%	92%
Sistema	92%	92%	88%	93%	NA	91%	91%	94%	97%
Vodafone	89%	93%	93%	92%	95%	NA	87%	95%	93%
BSNL	87%	88%	85%	87%	93%	92%	NA	93%	92%
Loop	100%	98%	95%	95%	95%	97%	96%	NA	99%
Idea	97%	95%	94%	95%	97%	95%	88%	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 numbers had a difficulty connecting to an Aircel number with only 85% of the calls getting connected BSNL faced difficulty in connecting to most of the operators except Loop. Additionally operators like Aircel, Airtel, Tata CDMA, and Reliance GSM faced difficulties in connecting with BSNL number with only 87%, 88%, 85%, and 87% of the calls getting connected


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%					
Aircel	PMR	1476	7116	0.65%	49	3.30%	93.64%	3.93%	4.85%	1.93%	358	4274	8.40%	94.84%	0	105086	53429.1	1571203
	IMRB	1476	7116	0.65%	49	3.30%	93.64%	3.93%	4.85%	1.94%	358	4274	8.40%	94.75%	0	105085	53429.0	1571203
Airtel	PMR	1406	8108	0.80%	23	1.60%	95.77%	0.90%	1.83%	1.33%	114	4174	2.77%	99.37%	0	81153	58635.4	1808381
	IMRB	1406	8108	0.77%	23	1.64%	95.75%	0.89%	1.83%	1.40%	114	4174	2.74%	98.95%	0	81153	58635.7	1712628
Tata Tele (CDMA)	PMR	177	645	0.49%	6	3.60%	99.23%	0.00%	0.02%	0.35%	4	563	0.71%	99.07%	0	39442	7543.3	57739
	IMRB	177	645	0.49%	6	3.60%	99.23%	0.00%	0.02%	0.35%	4	563	0.71%	99.07%	0	39442	7543.3	57739
Reliance (GSM)	PMR	614	6	0.00%	0	0.00%	98.55%	0.65%	0.96%	0.91%	32	1771	1.79%	99.05%	0	40000	15036.0	DNA
	IMRB	614	6	0.00%	0	0.00%	98.55%	0.65%	0.93%	0.91%	32	1771	1.78%	99.05%	0	40000	15036.0	455280
Sistema (MTS)	PMR	28	176	0.72%	0	0.00%	100.00%	0.00%	0.00%	0.00%	0	85	0.00%	100.00%	0	295	0.8	32
	IMRB	28	176	0.70%	0	0.00%	100.00%	0.00%	0.00%	0.00%	0	85	0.00%	100.00%	0	1587	0.7	32
Vodafone	PMR	1066	4846	0.63%	10	0.91%	98.33%	0.27%	0.97%	1.04%	96	3272	3.03%	97.12%	0	24986	21392.0	671972
	IMRB	1066	4846	0.63%	10	0.91%	98.33%	0.29%	0.97%	1.04%	136	3272	4.15%	97.12%	0	24986	21392.0	683619
BSNL	PMR	1097	17866	2.23%	136	6.37%	95.50%	2.05%	2.53%	2.27%	243	3244	7.53%	97.00%	0	140200	79387.0	4421655
	IMRB	1097	17866	2.23%	136	6.37%	95.50%	2.05%	2.53%	2.27%	243	3244	7.53%	97.00%	0	140200	79387.0	4421655
Loop	PMR	13	136	1.41%	0	0.00%	100.00%	0.00%	0.00%	0.00%	0	40	0.00%	100.00%	0	139	0.8	5
	IMRB	13	136	1.41%	0	0.00%	100.00%	0.00%	0.00%	0.00%	0	40	0.00%	100.00%	0	139	0.8	5
Idea	PMR	394	2614	0.90%	7	1.77%	97.42%	0.69%	1.35%	1.84%	36	1183	2.67%	95.91%	0	8728	4923.0	173694
	IMRB	394	2614	0.90%	7	1.77%	97.42%	0.70%	1.35%	1.84%	35	1183	2.97%	96.18%	0	8728	4922.3	173694

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-pay and energy 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	
Aircel	PMR	0.01%	69701	5	0.03%	650	2321932	100%	655	655	651	4	100%	100.00%	180725	123278	67.77%	100%	205	205	100%
	IMRB	0.01%	69701	5	0.03%	650	2157576	100%	655	655	651	4	100%	100.00%	180725	123178	67.77%	100%	205	205	100%
Airtel	PMR	0.00%	127,958	4	0.00%	1	6835659	100%	5	3698	5	3693	100%	100.00%	725703	725701	91.00%	100%	605	605	100%
	IMRB	0.00%	127,958	4	0.00%	1	6835659	100%	5	3698	5	3693	100%	100.00%	725703	725701	91.00%	100%	605	605	100%
Tata Tele (CDMA)	PMR	0.00%	25733	0	0.01%	11	75958	100%	28	28	11	17	100%	99.00%	22733	22504	95.00%	100%	641	641	100%
	IMRB	0.00%	25733	0	0.01%	11	75958	100%	28	28	11	17	100%	99.00%	22733	22504	95.00%	100%	641	641	100%
Reliance (GSM)	PMR	0.02%	52012	13	0.03%	208	783145	100%	637	637	45	592	100%	99.00%	2819590	2790278	84.00%	100%	43	43	100%
	IMRB	0.01%	51962	4	0.02%	169	857939	100%	510	510	173	337	100%	98.95%	2499501	2526067	91.73%	100%	29	29	100%
Sistema (MTS)	PMR	0.00%	0	0	0.00%	0	129	100%	0	0	0	0	NA	100.00%	1	1	90.00%	100%	0	0	DNA
	IMRB	0.00%	0	0	0.00%	0	129	100%	0	0	0	0	NA	100.00%	1	1	90.00%	100%	0	0	DNA
Vodafone	PMR	0.06%	39651	24	0.02%	627	866485	100%	651	651	631	20	100%	100.00%	47935	31275	77.00%	100%	195	195	100%
	IMRB	0.06%	39651	24	0.02%	627	866485	100%	651	651	631	20	100%	100.00%	47935	31275	77.00%	100%	195	195	100%
BSNL	PMR	0.05%	345727	42	0.05%	111	1283058	100%	178	63	194	35	100%	99.00%	2753	2629	95.00%	100%	1136	1136	100%
	IMRB	0.05%	345727	42	0.05%	111	1283058	100%	178	63	194	35	100%	99.00%	2753	2629	95.00%	100%	1136	1136	100%
Loop	PMR	DNA	DNA	DNA	0.00%	0	29	100%	0	0	0	0	NA	100.00%	0	0	100.00%	DNA	DNA	DNA	DNA
	IMRB	DNA	DNA	DNA	0.00%	0	29	100%	0	0	0	0	NA	100.00%	0	0	100.00%	DNA	DNA	DNA	DNA
Idea	PMR	0.00%	2.59	0	0.00%	1	646358	100%	491	491	1	490	100%	90.00%	64928	58382	95.00%	100%	10	10	100%
	IMRB	0.00%	2.596	0	0.00%	1	646553	100%	491	491	1	490	100%	90.00%	64928	58382	95.00%	100%	10	10	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. Aircel does not meet the benchmark for multiple parameters including Worst affected BTSs due to downtime (%age), Call Set-up Success Rate (within licensee's own network, and SDCCH/ Paging chl. Congestion (%age),
2. Percentage of calls answered by the operators (voice to voice) within 60 seconds benchmark is not met by Aircel, Reliance, and Vodafone

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%
Aircel	0.28%	1.95%	97.41%	0.78%	1.65%	1.87%	4.77%	95.47%	0.00%	0.00%	100.00%	100.00%	100.00%	94.33%	100.00%	100.00%
Airtel	0.61%	1.52%	96.38%	0.57%	1.13%	1.23%	2.32%	99.71%	0.00%	0.00%	100.00%	100.00%	100.00%	96.93%	100.00%	100.00%
Tata Tele (CDMA)	0.04%	0.00%	99.15%	0.00%	0.24%	0.32%	0.83%	99.12%	0.02%	0.01%	100.00%	100.00%	94.83%	96.86%	100.00%	100.00%
Reliance (GSM)	0.42%	1.09%	97.97%	0.09%	0.92%	0.71%	1.55%	98.38%	0.01%	0.02%	100.00%	100.00%	98.95%	99.52%	100.00%	100.00%
Sistema (MTS)	1.71%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	100.00%	NA	0.00%	NA	NA	100.00%	90.00%	NA	NA
Vodafone	0.76%	1.34%	98.50%	0.27%	0.75%	0.84%	2.75%	97.25%	0.09%	0.01%	100.00%	100.00%	100.00%	85.42%	100.00%	100.00%
BSNL	4.84%	7.37%	95.75%	2.47%	2.02%	1.97%	6.75%	94.32%	0.03%	0.01%	66.50%	100.00%	100.00%	78.76%	100.00%	100.00%
Loop	0.60%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	100%	NA	0.00%	NA	NA	100.00%	100.00%	NA	NA
Idea	0.89%	1.70%	97.20%	0.58%	1.97%	1.65%	2.67%	95.53%	0.00%	0.00%	100.00%	100.00%	99.05%	94.37%	94.44%	33.33%

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
Aircel	All POI's meeting TRAI specified benchmark					
Airtel	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					
Sistema (MTS)	All POI's meeting TRAI specified benchmark					
Vodafone	All POI's meeting TRAI specified benchmark					
BSNL	Airtel O/G	1949	238505	1945.62	44	Augmentation is in pipeline
	Vodafone NE	1425	129162	1178.3	7	Augmentation is in pipeline
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	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
Number of BTSs in the licensed service area		1486	1445	189	645	63	1118	1207	13	412
Sum of downtime of BTSs in a month (in hours)		3110	6590	58.58	1994	800	6292	43490	58	2734
BTSs accumulated downtime (not available for service)	≤ 2%	0.28%	0.61%	0.04%	0.42%	1.71%	0.76%	4.84%	0.60%	0.89%
Number of BTSs having accumulated downtime >24 hours		29	22	0	7	0	15	89	0	7
Worst affected BTSs due to downtime	≤ 2%	1.95%	1.52%	0.00%	1.09%	0.00%	1.34%	7.37%	0.00%	1.70%

	Benchmark	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
Number of BTSs in the licensed service area		1488	1454	189	650	63	1118	1212	13	412
Sum of downtime of BTSs in 3 days (in hours)		1261	190	13.49	231	11.6	681	3598	6	255
BTSs accumulated downtime (not available for service)	≤ 2%	1.18%	0.18%	0.10%	0.49%	0.26%	0.85%	4.12%	0.64%	0.86%
Number of BTSs having accumulated downtime >24 hours		0	0	0	0	0	0	84	0	0
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	6.93%	0.00%	0.00%

2. Connection Establishment (Accessibility)

Audit Results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
CSSR	≥ 95%	97.41%	96.38%	99.15%	97.97%	100.00%	98.50%	95.75%	100.00%	97.20%

SDCCH congestion	Benchmark	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
SDCCH/Paging channel congestion	≤ 1%	0.78%	0.57%	0.00%	0.09%	0.00%	0.27%	2.47%	0.00%	0.58%

TCH congestion	Benchmark	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
TCH congestion	≤ 2%	1.65%	1.13%	0.24%	0.92%	0.00%	0.75%	2.02%	0.00%	1.97%

Live measurement results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
CSSR	≥ 95%	97.50%	98.14%	99.32%	99.07%	100.00%	99.23%	95.57%	100.00%	95.99%

SDCCH congestion	Benchmark	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
SDCCH/Paging channel congestion	≤ 1%	0.61%	0.32%	0.00%	0.02%	0.00%	0.07%	7.94%	0.00%	0.56%

TCH congestion	Benchmark	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
TCH congestion	≤ 2%	1.44%	0.46%	0.02%	0.22%	0.00%	0.40%	2.52%	0.00%	0.48%

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

CSSR	Benchmark	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
Total number of call attempts		593	502	1126	668	NA	408	375	196	556
Total number of successful calls established		591	502	1126	667	NA	408	363	195	556
CSSR	≥ 95%	99.66%	100.00%	100.00%	99.85%	NA	100.00%	96.80%	99.49%	100.00%

Blocked calls	Benchmark	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
%age blocked calls		0.34%	0.00%	0.00%	0.15%	NA	0.00%	3.20%	0.51%	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	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
Total number of calls established		137319386	94948861	792021	19574670	50	962987	416853056	51	9610424
Total number of calls dropped		2564956	1169401	2538	138272	0	8057	8212541	0	158478
Call drop rate	≤ 2%	1.87%	1.23%	0.32%	0.71%	0.00%	0.84%	1.97%	0.00%	1.65%

Cells having more than 3% TCH	Benchmark	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
Total number of cells in the network		4341	4315	603	1935	189	3415	2088	40	1236
Total number of cells having more than 3% TCH		207	100	5	30	0	94	141	0	33
Worst affected cells having more than 3% TCH	≤ 3%	4.77%	2.32%	0.83%	1.55%	0.00%	2.75%	6.75%	0.00%	2.67%

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

Call drop rate	Benchmark	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
Total number of calls established		157329362	9566335	1186396	25089708	283	1004886	16721191	6	17627913
Total number of calls dropped		2383592	43984	5764	145746	0	8611	342324	0	105200
Call drop rate	≤ 2%	1.52%	0.46%	0.49%	0.58%	0.00%	0.86%	2.05%	0.00%	0.60%

Cells having more than 3% TCH	Benchmark	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
Total number of cells in the network		13032	4395	603	1950	189	3425	2088	40	88992
Total number of cells having more than 3% TCH		612	93	5	0	0	95	142	0	476
Worst affected cells having more than 3% TCH	≤ 3%	4.70%	2.12%	0.83%	0.00%	0.00%	2.77%	6.80%	0.00%	0.53%

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

Call drop rate	Benchmark	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
Total number of calls established		591	502	1124	661	NA	408	363	195	556
Total number of calls dropped		2	0	0	1	NA	0	4	1	0
Call drop rate	≤ 2%	0.34%	0.00%	0.00%	0.15%	NA	0.00%	1.10%	0.51%	0.00%

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

Voice quality	Benchmark	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
Total number of sample calls		8213732703	22124340912	4324	3633497467	50	157666397	40092	51	1732490730
Total number of calls with good voice quality		7841254894	22060936827	4286	3574723502	50	153329937	37814	51	1655026346
%age calls with good voice quality	≥ 95%	95.47%	99.71%	99.12%	98.38%	100.00%	97.25%	94.32%	100%	95.53%

Voice quality	Benchmark	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
Total number of sample calls		8452524492	22124340912	4324	4728084091	283	149263944	100	6	1036100012
Total number of calls with good voice quality		8081756864	21223880237	4286	4650240448	283	144907425	97	6	992486011
%age calls with good voice quality	≥ 95%	95.61%	95.93%	99.12%	98.35%	100.00%	97.08%	97.00%	100%	95.79%

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

Voice quality	Benchmark	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
Total number of sample calls		495607	412254	32115	574579	NA	568932	311375	154736	484926
Total number of calls with good voice quality		477800	395667	31930	558440	NA	556580	224247	153584	473352
%age calls with good voice quality	≥ 95%	96.41%	95.98%	99.42%	97.19%	NA	97.83%	72.02%	99.26%	97.61%

5. POI Congestion

Audit Results for POI Congestion

POI congestion	Benchmark	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
Total number of working POIs		37	58	28	14	14	30	57	11	26
No. of POIs not meeting benchmark		0	0	0	0	0	0	2	0	0
Total Capacity of all POIs (A) - in erlangs		35522	55176	2998	217776	393.295	15158214	35000	247	6945
Traffic served for all POIs (B) - in erlangs		23783	32209	647	146577	1.08	4174762	32834	5.15	3074
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	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
Total number of working POIs		37	55	28	14	14	30	57	11	26
No. of POIs not meeting benchmark		0	0	0	0	0	0	1	0	0
Total Capacity of all POIs (A) - in erlangs		115395.09	54799	2998.0	25849	393.29	489198	35000	247	6999
Traffic served for all POIs (B) - in erlangs		67258	33888	655.0	17525	2.24	145593	26357.67	0.42	4252
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→	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
Aircel	NA	89%	85%	93%	94%	95%	87%	94%	95%
Airtel	91%	NA	87%	93%	94%	94%	87%	94%	93%
Tata CDMA	96%	91%	NA	91%	91%	93%	87%	91%	93%
Reliance GSM	89%	90%	89%	NA	92%	92%	85%	92%	92%
Sistema	92%	92%	88%	93%	NA	91%	91%	94%	97%
Vodafone	89%	93%	93%	92%	95%	NA	87%	95%	93%
BSNL	87%	88%	85%	87%	93%	92%	NA	93%	92%
Loop	100%	98%	95%	95%	95%	97%	96%	NA	99%
Idea	97%	95%	94%	95%	97%	95%	88%	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	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
Billing disputes - Postpaid										
Total bills generated during the period		22087	42914	15107	17182	0	13710	106277	0	931
Total number of bills disputed		1	0	3	2	0	13	33	0	0
Percentage bills disputed	≤ 0.1%	0.00%	0.00%	0.02%	0.01%	NA	0.09%	0.03%	NA	0.00%
Billing disputes - Prepaid										

Number of complaints related to charging, credit & validity		33	0	3	150	0	80	51	0	1
Total number of prepaid customers in that period		2184078	2408757	58131	889988	115	902597	802903	41	190978
Percentage of complaints	≤ 0.1%	0.00%	0.00%	0.01%	0.02%	0.00%	0.01%	0.01%	0.00%	0.00%
Resolution of billing complaints										
Total number of billing/charging complaints		34	255	6	152	0	93	59	0	78
Total complaints considered invalid		1	0	5	111	0	11	56	0	1
Number of complaints resolved in 4 weeks from date of receipt for complaints listed in 5.3.1		34	0	6	152	0	93	26	0	1
Percentage complaints resolved within 4 weeks of date of receipt	100%	100%	100%	100%	100%	NA	100%	67%	NA	100%
Period of applying credit / waiver										
Total number of complaints where credit/waiver is required		33	0	1	41	0	69	1	0	1
Percentage cases in which credit/waiver was received within 1 week	100%	100%	100%	100%	100%	NA	100%	100%	NA	100%

Live calling results for resolution of billing complaints

Resolution of billing complaints	Benchmark	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
Total Number of calls made		100	100	100	100	0	100	100	0	100
Number of cases resolved in 4 weeks		91	89	100	84	0	91	79	0	100
Percentage cases resolved in four weeks	100%	91%	89%	100%	84%	NA	91%	79%	NA	100%

8. Customer Care

Audit results for customer care

Customer Care Assessment	Benchmark	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
Total number of call attempts to customer care for assistance		1508876	4339181	54704	818878	13	694346	268401	1	10650
Number of calls getting connected and answered (electronically)		1508876	4339181	51877	810312	13	694342	268401	1	10549
Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	94.83%	99.0%	100.00%	100.00%	100.00%	100.00%	99.05%
Number of calls getting transferred to the operator (voice to voice)		393973	463532	6557	113929	10	213682	97127	1	56346
Number of calls answered by operator (voice to voice) within 60 seconds		371642	449305	6351	113387	9	182533	76498	1	53175
Percentage calls answered within 60 seconds (V2V)	≥ 90%	94.33%	96.93%	96.86%	99.52%	90.00%	85.42%	78.76%	100.00%	94.37%

Live measurement results for customer care

Customer Care Assessment	Benchmark	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
Total number of call attempts to customer care for assistance		17394	136718	6096	76048	2	73338	25706	0	21212

Number of calls getting connected and answered (electronically)		12390	136435	5601	75252	2	73338	25706	0	20922
Percentage calls getting connected and answered	≥ 95%	71.23%	99.79%	91.88%	99%	100.00%	100.00%	100.00%	NA	98.63%
Number of calls getting transferred to the operator (voice to voice)		153706	14132	502	10948	1	22057	8149	0	4724
Number of calls answered by operator (voice to voice) within 60 seconds		125098	13364	487	10908	1	20157	6885	0	4333
Percentage calls answered within 60 seconds (V2V)	≥ 90%	81.39%	94.57%	97.01%	100%	100%	91.39%	84.49%	NA	91.72%

Live calling results for customer care

Customer Care Assessment	Benchmark	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
Total Number of calls made		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	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
Total Number of calls made		100	100	100	100	100	100	100	100	100
Total Number of calls answered within 60 seconds		100	100	69	91	100	100	31	100	100
Percentage calls answered within 60 seconds	≥ 90%	100.00%	100.00%	69.00%	91.00%	100.00%	100.00%	31.00%	100.00%	100.00%

Operator	Customer Care No.
Reliance GSM	9864098640, 333
Tata Indicom (CDMA)	121
Aircel	9854012345
Vodafone	111, 9706097060
Idea	12345
S Tel	1212
Airtel	198
BSNL	1503
Loop	121

9. Termination / closure of service

Audit results for termination / closure of service

Termination	Benchmark	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
Total number of closure request		48	152	108	27	0	38	211	0	18
Number of requests attended within 7 days		48	152	108	27	0	38	211	0	17
Percentage cases in which termination done within 7 days	100%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	NA	94.44%

Audit results for refund of deposits

Refund	Benchmark	Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
Total number of cases requiring refund of deposits		180	43	7	43	0	146	87	0	12
Total number of cases where refund was made within 60 days		180	43	7	43	0	146	87	0	4
Percentage cases in which refund was receive within 60 days	100%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	NA	33.33%

11. Additional Network Related parameters**Audit Results for Total Traffic Handled in Erlang**

Traffic in Erlang		Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
Equipped capacity of the network		107060	81072	42394	40000	4200	24432	36000	61	10681
Total traffic handled in erlang during TCBH		50410	74960	7163	20006	1.15	21345	27299	1.4	5230

Total number of customers as per VLR

		Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
Total no. of customers served (as per VLR)		1622743	2056078	58345	534944	157	751404	165095	2	170525

Level 1 services		Aircel	Airtel	Tata Tele (CDMA)	Reliance (GSM)	Sistema (MTS)	Vodafone	BSNL	Loop	Idea
Total no. of calls made		150	150	150	150	150	150	300	150	150
Calls answered in 60 sec		150	150	150	150	150	150	300	150	150
Calls answered after 60 sec		0	0	0	0	0	0	0	0	0
