

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

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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. **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 Oct-Dec 2011. The verification of records maintained by various operators of Cellular Mobile (Wireless) service was undertaken by the auditors of IMRB International during the period Oct-Dec 2011.

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	Reliance GSM	October 2011
Operator 2	Tata Indicom (CDMA)	October 2011
Operator 3	Aircel	October 2011
Operator 4	Vodafone	October 2011
Operator 5	Idea	October 2011
Operator 6	S Tel	October 2011
Operator 7	Loop	October 2011
Operator 8	Airtel	October 2011
Operator 9	BSNL	October 2011

4.0 Audit methodology

4.1 Cellular Mobile Services

In a nutshell the following activities were done while auditing for various parameters for Cellular Mobile Services:

S.no	Parameter	AS REPORTED IN PMR	AS FOUND IN ACTUAL RECORDS AFTER VERIFICATION	AS FOUND IN VERIFICATION FOR THE MONTH OF AUDIT	AS FOUND IN 3 DAY LIVE MEASUREMENT DATA	LIVE CALLING	OPERATOR 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 October 2011 to December 2011 in Assam circle. The executive summary encapsulates the key findings of the Audit by providing: -

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

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

Name of Service Provider	Time Consistent Busy Hour (TCBH)	Network Availability					Connection Establishment (Accessibility)			Connection Maintenance (Retainability)				POI		Network Traffic Capacity and Utilization			
		Total no. of BTSs in the licensed service area	Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month	BTSs Accumulated downtime (not available for service) (%)	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) Note :2)	Total number of working POI Service Area wise	Equipped Capacity of Network in respect of Traffic in erlang	Total traffic handled in TCBH in erlang	Total no. of customers served (as per VLR) on last day of the month
Benchmark				≤ 2%		≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%			≤ 3%	≥ 95%	≤ 0.5%				
Reliance GSM	19:00 - 20:00	1494	45	0.00%	2	0.13%	99.27%	0.75%	0.75%	0.49%	15	4482	0.33%	98.95%	0	14	109000	68176	1778470
Tata Indicom (CDMA)	19:00 - 20:00	286	224	0.11%	0	0.00%	99.60%	0.00%	0.01%	0.49%	4	901	0.44%	99.94%	0	36	60106	11152	88911
Aircel	19:00 - 20:00	2252	4187	0.25%	42	1.87%	96.90%	0.76%	1.41%	1.63%	290	6726	4.31%	95.35%	0	60	108036	93168	2776999
Vodafone	19:00 - 20:00	2320	16186	0.94%	44	1.90%	98.10%	0.36%	0.96%	0.82%	191	6972	2.74%	97.25%	0	32	60925	53625	1561377
Idea	19:00 - 20:00	666	764	0.15%	12	1.80%	99.41%	0.37%	0.26%	0.57%	58	1998	2.90%	96.00%	0	26	15244	8058	257101
S Tel	19:00 - 20:00	390	2225	0.77%	19	4.87%	99.44%	0.00%	0.00%	0.48%	26	1168	2.23%	98.51%	0	23	7221	592	19305
Loop	20:00 - 21:00	4	25	0.84%	0	0.00%	99.90%	0.00%	0.00%	0.39%	0	12	0.00%	100.00%	0	8	111	0	80
Airtel	20:00 - 21:00	2568	7418	0.39%	15	0.58%	98.01%	0.15%	0.58%	1.32%	150	7704	1.95%	99.58%	0	69	141413	95384	3171539
BSNL	19:00 - 20:00	1319	10569	1.08%	120	9.10%	98.10%	1.00%	1.98%	2.00%	169	3896	4.34%	DNP	0	21	115564	58842	955830

** 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
Reliance GSM	19:00 - 20:00	19:00 - 20:00
Tata Indicom (CDMA)	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
Idea	19:00 - 20:00	19:00 - 20:00
S Tel	19:00 - 20:00	19:00 - 20:00
Loop	20:00 - 21:00	20:00 - 21:00
Airtel	20:00 - 21:00	20:00 - 21:00
BSNL	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 for all the operators except Loop and TATA Indicom. BSNL experienced the highest outage hours in the month of audit. Also, 120 BTS of BSNL had more than 24 hours of accumulated downtime.

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 99.90% of their calls getting completed. All the operators were found to be calculating the parameter as per the norm specified by TRAI. CSSR was established as the ratio of total number of successful call attempts (establishment) to the total number of call attempts made.

Network Congestion parameters:

SDCCH / Paging Channel Congestion, TCH and POI are part of the network congestion parameters. All the operators are meeting the TRAI specified benchmarks on SDCCH/Paging Channel Congestion, TCH and POI. S-Tel and Loop lead the way with zero SDCCH / Paging Channel Congestion, TCH and POI. The calculation methodology of these parameters was found to be in complete accordance with what has been specified by TRAI. Both RCOM CDMA and Tata Teleservices measure paging channel utilization. When the value of this parameter is less than 100%, it is counted as 0% congestion. There were no POIs with congestion more than the benchmark ($\leq 0.5\%$).

Call Drop Rate:

During the audit it was found that all the service providers were measuring this parameter as per the TRAI guidelines. The call drop rate was measured as the ratio of total calls dropped to the total number of call attempts for all operators. Also, all of service providers were found to be meeting the TRAI specified benchmark. The lowest call drop rate was of Loop at 0.39% 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. However, BSNL didn't provide us their voice quality data for audit month in spite of repeated requests and regular follow ups.

Customer Care / Helpline Assessment

For the percentage of calls answered by operator in 60 seconds aspect all the service providers meet the TRAI benchmark except for Aircel, Reliance, Idea and Vodafone and BSNL with Reliance being the lowest at 66.76%. Aircel and S-Tel were not meeting TRAI benchmark for the accessibility parameter.

Billing performance

All the operators were found to be meeting the benchmark of $\leq 0.1\%$ complaints registered per 100 bills issued and the benchmark of 100% billing complaints being resolved within 4 weeks. In all cases where customers were due for refund, all the service providers except Idea were meet the TRAI benchmark of 100% with 1 week. In case of Idea, out of 12 cases requiring refund of deposits only in one case refund was made within 60 days.

Inter operator calls assessment

Inter operator call Assessment To↓ From →	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel	BSNL
Reliance GSM	NA	100%	100%	100%	100%	95%	97%	100%	69%
Tata Indicom (CDMA)	100%	NA	100%	100%	100%	100%	100%	100%	79%
Aircel	100%	100%	NA	85%	97%	100%	100%	85%	81%
Vodafone	100%	100%	100%	NA	100%	100%	100%	100%	79%
Idea	100%	100%	100%	100%	NA	100%	100%	100%	76%
S Tel	100%	100%	100%	100%	100%	NA	96%	100%	82%
Loop	100%	100%	90%	100%	100%	95%	NA	100%	62%
Airtel	100%	100%	100%	100%	100%	100%	100%	NA	78%
BSNL	100%	98%	98%	100%	100%	98%	97%	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.

- BSNL and S-Tel found it tough connecting to a Reliance number with only 69 and 95 out of 100 calls getting connected
- Airtel, Vodafone and Idea had difficulty in to a Aircel number with only 85, 85 and 97 out of 100 calls getting connected
- BSNL found it tough connecting to an Idea number with only 76 out of 100 calls getting connected
- Loop found it little tough connecting to an S-Tel number with 96 out of 100 calls getting connected
- BSNL, Airtel and S-Tel had difficulty in connecting to a Loop number with only 62, 90 and 95 out of 100 calls getting connected
- Tata Indicom(CDMA) found it little tough connecting to an BSNL number with 98 out of 100 calls getting connected

Details of inter-operator calling are as followed:

Operator	Date	Location
Reliance GSM	16 th Nov 11	Guwahati
Tata Indicom (CDMA)	30 th Nov 11	Guwahati
Aircel	2 nd Dec 11	Guwahati
Vodafone	25 th Nov 11	Guwahati
Idea	23 rd Nov 11	Guwahati
S Tel	5 th Dec 11	Guwahati
Loop	27 th Dec 11	Guwahati
Airtel	15 th Nov 11	Guwahati
BSNL	28 th Dec 11	Guwahati

Results of Operator assisted Drive test

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

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

The drive tests in the Assam circle were conducted in the cities of Guwahati, Bongaigaon and Jorhat along the following route:

	Type of location	Guwahati	Bongaigaon	Jorhat
Outdoor	Periphery of the city	Bharalu, Maligaon, Adabari, Jalukbari,Guwahati University, Airport, Jalukbari, NH 37, Boragaon, ISBT, Lokhora, Beltola, Kainadhora Hill, Khanapara, Sixmile, Sixmile, VIP Road, Narengi, Noonmati	New Bongaigaon, paglastan, chapraguri rd, BOC Gate, Bus stand, NH way 31c, Dhaligaon(BRPL), Ganesh mandir campus, Bhaolaguri, Taripara Bazar, New Bongaigaon.	Lichubari, Assam Agriculture University, Police Reserve, Jail Road Crossing, Assam Riffel Dog Traning Centre, Cheoni Gaon, AT Road, Bypass, Baligaon Charali (Bypass), Kalia Chawk, Bypass Chariali (Kunduguri), R Baruah Public School, Chanli Gaon, Bhogdoi Bridge, Natun Bazar, Gar Ali, Towards ONGC Colony, Comissionar Office (Upper Assam), Chinamara Tiniali
	Congested area	Panbazar, Donbosco Main gate, Panbazar Fly over, Paltan Bazar, Ulubari Fly over (above), Bhangagarh Fly Over (below) , Rajgarh Road, Guwahati Commerce, Chanmari Fly Over , Silpukhuri, Guwahati Club, Stadium , BB Boruah College, Ulubari Flyover (Below) , DGP office, Sarabhbhati Nepali Mandir , Vishal Megamart, MLN Road, H.B.Road, Fancy Bazar, LOG Hindi H.S, Athgaon, Bharalu	Natun Para, Mahabir Stan, RLY Fly over, AOC Rd, Station Rd, T R Phukan Rd , Kaniska Hotel, B T Rd, BSNL GM Office, Bongaigoan B-ed college, Main Rd, M G Rd, Bus stand, Gandhi Maidan, DC Office Rd, Ram Mandir Rd, Bhakrivitha.	ASTC, Baruah Charali, Gitasee Point, Club Road, Assam Vally English School, Sadar, Garali, TOKLAI research Centre, Assam Satra Mahasabha, Rajabari DTO Office, Vishal Market, KB Road, Nirmal Charali, Marwari Patty, Raja maidan Road, Max Mart, JB Road, Raja Maidan, Malwali, JB Road Crossing, Jogen Saikia Rd, ASTC
	Across the city	Chanmari, R.G. Baruah, Ganeshguri, Hatigaon, Bhetapara, Beltola Tiniali, Last Gate, Ganeshmandir, DPI, Forensic Laboratory, Kahilipara, Lala Ganesh, Sarabhbhati, Ulubari, Ulubari Electricity Board, Rupnagar, GMC Bhangarh	Natun Para, Mahabir Stan, RLY Fly over, AOC Rd, Station Rd, T R Phukan Rd , Kaniska Hotel, B T Rd, BSNL GM Office, Bongaigoan B-ed college, Main Rd, M G Rd, Bus stand, Gandhi Maidan, DC Office Rd, Ram Mandir Rd, Bhakrivitha.	Baruah Charali, Jail Road, Niramay Hospital, Medical Collage, Mission Hospital, Rhino Hall, Jail, Borbheta, Airport Road, DCB Road, Tarajan, Tiniali, AT Road (Tarajan), ISBT (Katakibari Pukhuri), Bypass, Baligaon
Indoor	Office complex	Cotton College , Panbazar	New Bongaigaon railway station office	Transport Office (ASTC)
	Shopping complex	Big Bazar	Bus stand market	Vishal megamart

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**

Drive Test – Guwahati

	B'mark	Reliance GSM		Tata Indicom (CDMA)		Aircel		Vodafone		Idea		S Tel		Airtel		BSNL	
		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%	98.46%	96.54%	98.99%	96.92%	100.00%	100.00%	98.70%	95.00%	96.71%	95.73%	91.42%	85.10%	98.55%	96.15%	98.10%	91.38%
CSSR	≥ 95%	100.00%	98.75%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	97.30%	99.29%	100.00%	100.00%	100.00%	97.06%
%age Blocked calls		0.00%	1.25%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.70%	0.71%	0.00%	0.00%	0.00%	2.94%
Call drop rate	≤ 2%	0.00%	0.63%	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%	2.27%
Hands off success rate		99.38%	98.18%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	98.97%	100.00%	99.60%	100.00%	100.00%	100.00%	100.00%

Drive Test – Bongaigaon

	B'mark	Reliance GSM		Tata Indicom (CDMA)		Aircel		Vodafone		Idea		S Tel		Airtel		BSNL	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	≥ 95%	97.53%	95.12%	99.84%	99.02%	100.00%	100.00%	97.10%	95.65%	99.65%	98.30%	98.97%	99.67%	98.11%	96.41%	96.56%	96.12%
CSSR	≥ 95%	100.00%	98.78%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.22%	100.00%	100.00%	100.00%	98.33%	98.08%
%age Blocked calls		0.00%	1.22%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.78%	0.00%	0.00%	0.00%	1.67%	1.92%
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%	100.00%	100.00%	100.00%

Drive Test – Jorhat

	B'mark	Reliance GSM		Tata Indicom (CDMA)		Aircel		Vodafone		Idea		S Tel		Airtel		BSNL	
		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%	98.08%	96.04%	98.10%	99.15%	100.00%	100.00%	95.35%	96.08%	99.37%	97.54%	94.49%	91.94%	98.22%	95.77%	96.67%	88.80%
CSSR	≥ 95%	100.00%	98.77%	100.00%	100.00%	100.00%	99.34%	100.00%	100.00%	100.00%	100.00%	100.00%	99.25%	100.00%	100.00%	100.00%	99.17%
%age Blocked calls		0.00%	1.23%	0.00%	0.00%	0.00%	0.66%	0.00%	0.00%	0.00%	0.00%	0.00%	0.75%	0.00%	0.00%	0.00%	0.83%
Call drop rate	≤ 2%	0.00%	0.62%	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%	99.24%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	0.00%	100.00%

Not meeting the benchmark

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

ALL SERVICE PROVIDERS

Guwahati: There was interference and low signal strength recorded for all operators in the outdoor areas near Noonmati, Nepali Mandir, Athgaon, Chanmari Fly Over, Rajgarh Road, Maligaon Rly Gate while in the indoor areas there was no inadequate coverage or interference recorded..

Bongaigaon: There was interference and low signal strength recorded for all the operators in the outdoor areas near Ganesh mandir campus, new Bongaigaon railway station road, DC residence while in the indoor areas there was no inadequate coverage or interference recorded.

Jorhat: There was interference and low signal strength recorded for all operators in the outdoor areas near IOC, Baruah Chariali, Cheoni Gaon while in the indoor areas no interference and inadequate coverage was recorded.



Conclusions:

Drive test was conducted by IMRB with the help of service providers to measure this parameter. In the drive test it was found that:

1. S-Tel did not meet the TRAI benchmark for voice quality both in indoor and outdoor areas of Guwahati and Jorhat.
2. BSNL did not meet the TRAI benchmark for voice quality both in outdoor areas of Guwahati and Jorhat.
3. BSNL did not meet the TRAI benchmark for call drop in outdoor areas of Guwahati.

Summary of Live Measurement Results – Cellular Mobile Services

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/Paging Chl. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Reliance GSM	0.04%	0.00%	99.05%	0.02%	0.13%	0.61%	0.07%	96.78%
Tata Indicom (CDMA)	0.01%	0.00%	99.64%	0.00%	0.01%	0.50%	0.77%	98.26%
Aircel	0.02%	0.00%	97.90%	0.60%	0.97%	1.16%	4.72%	100.00%
Vodafone	0.08%	1.94%	98.86%	0.18%	0.64%	0.75%	2.79%	95.83%
Idea	0.02%	0.00%	99.65%	0.40%	0.08%	0.82%	2.87%	97.02%
S Tel	0.14%	11.54%	99.58%	0.00%	0.00%	0.48%	3.00%	91.97%
Loop	0.00%	0.00%	99.00%	0.00%	0.00%	0.00%	0.00%	NA
Airtel	0.00%	0.12%	97.28%	0.10%	0.44%	1.55%	2.20%	96.77%
BSNL	0.61%	6.90%	98.28%	0.21%	0.31%	2.36%	19.30%	93.72%

 Not meeting the benchmark
 Meeting the benchmark

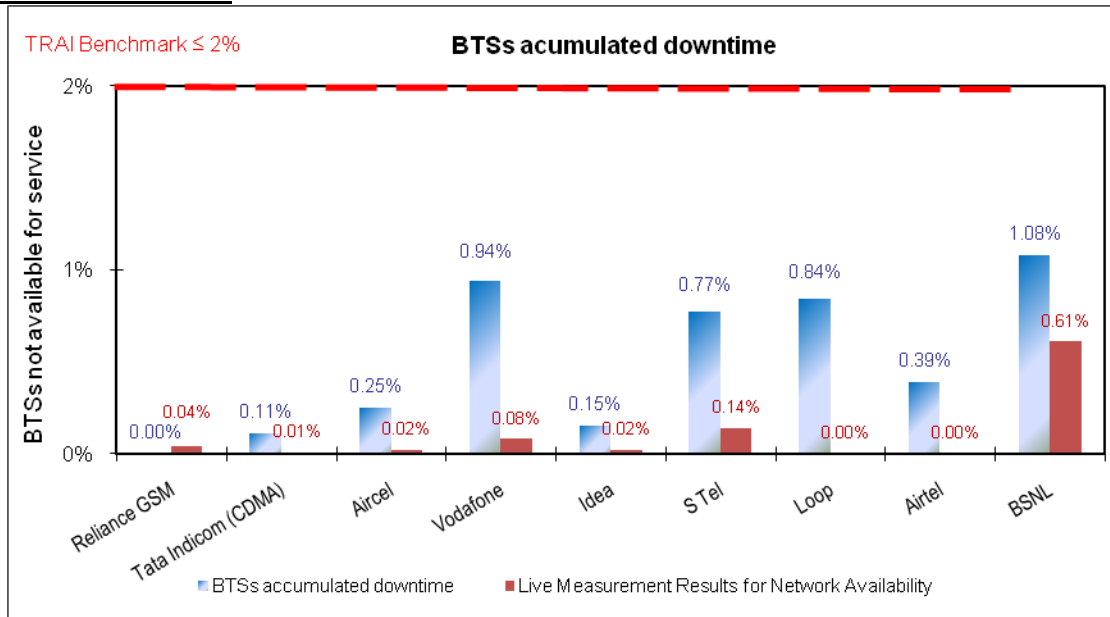
During the three day live measurement, it was found that:

- S-Tel(11.54%) and BSNL(6.90%) are not meeting the TRAI specified benchmark of $\leq 2\%$ for Worst affected BTS due to downtime.
- BSNL is not meeting the TRAI specified benchmark for call drop rate and Worst affected cells having more than 3% TCH drop
- S-Tel(91.97%) and BSNL(93.72%) are not meeting the TRAI specified benchmark of $\geq 95\%$ for voice quality parameter.
- Reliance(83.00%), Vodafone(88.00%), Aircel(77.00%) and Airtel(68.00%) are not meeting the TRAI specified benchmark for metering and billing. BSNL didn't provide us their calling dump in spite of repeated requests and regular follow ups.
- Reliance(89.00%), Idea(53.00%) and Loop(72.00%) are not meeting the TRAI specified benchmark of $\geq 90\%$ for percentage of calls answered by the operators (voice to voice) within 60 seconds.

6.0 Detailed findings – Includes comparison between Live calling/Live measurements and One month data collection

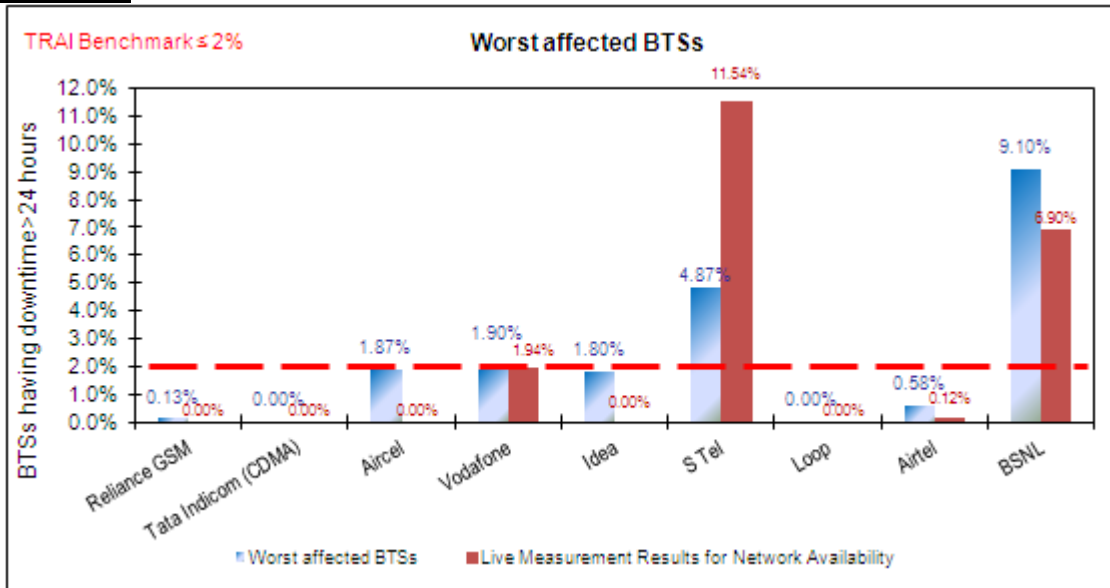
6.1 Graphical/Tabular Representations for Cellular Mobile Services

BTSs Accumulated Downtime



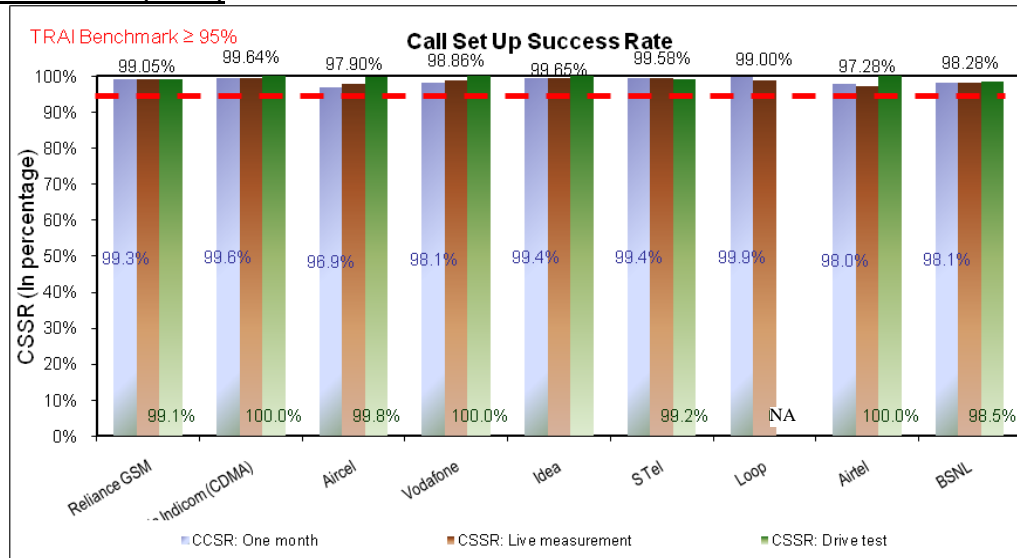
All the operators meet the benchmark

Worst Affected BTSs



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

Call Set-up Success Rate (CSSR)



One month

All the operators meet the benchmark

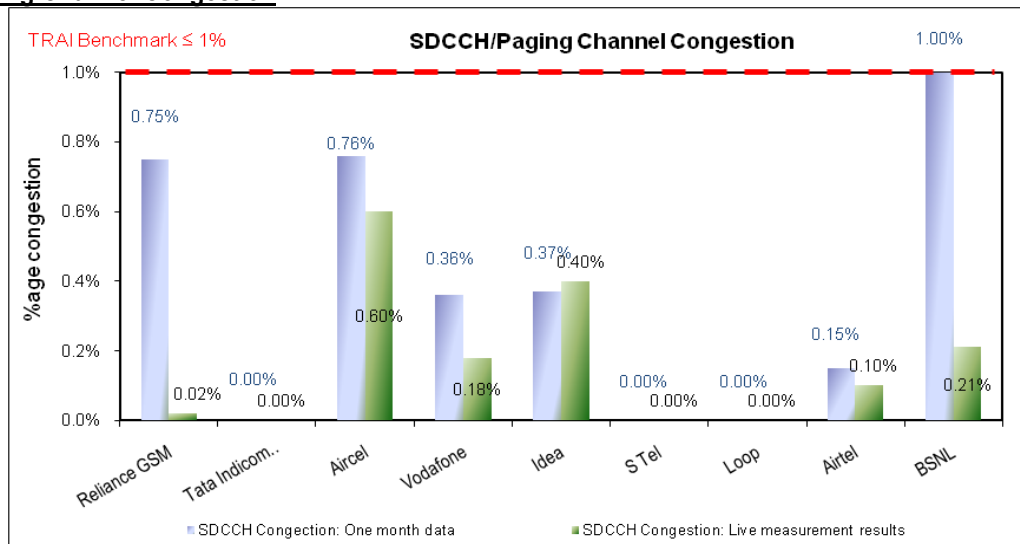
Live measurement

All the operators meet the benchmark

Drive test

All the operators meet the benchmark

SDCCH / Paging Channel Congestion



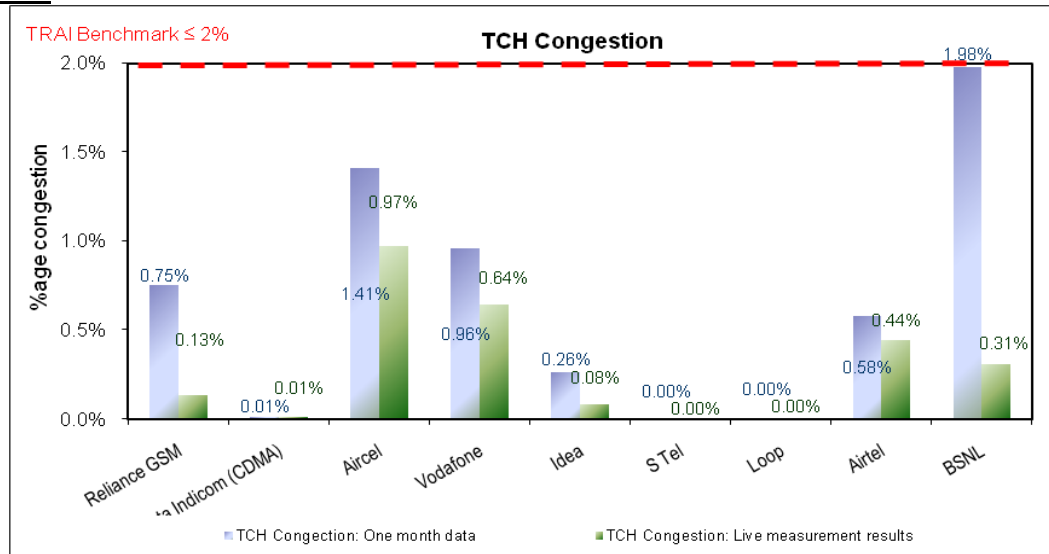
One month

All the operators meet the benchmark

Live measurement

All the operators meet the benchmark

TCH Congestion



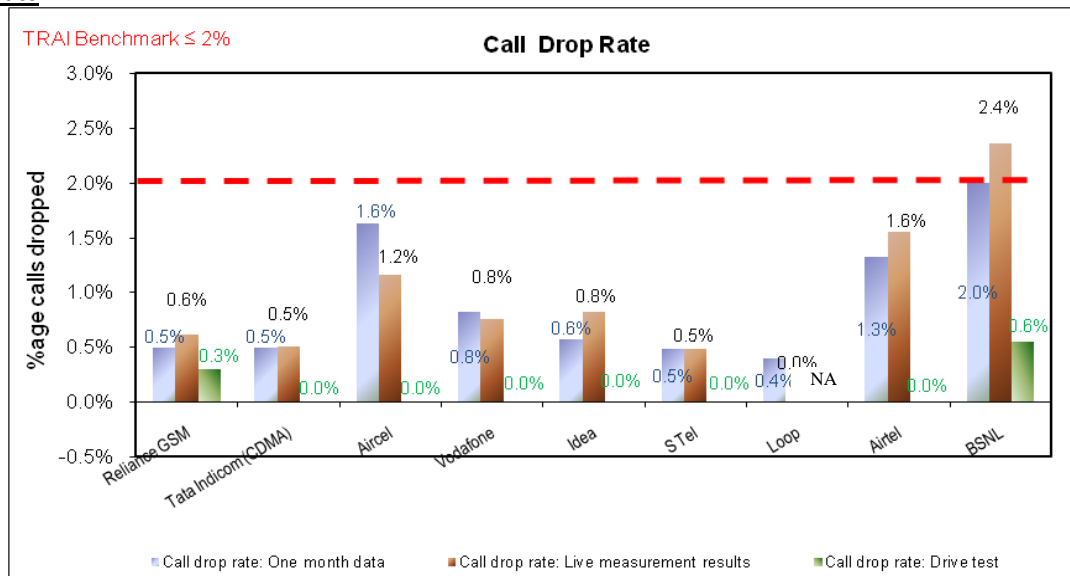
One month

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

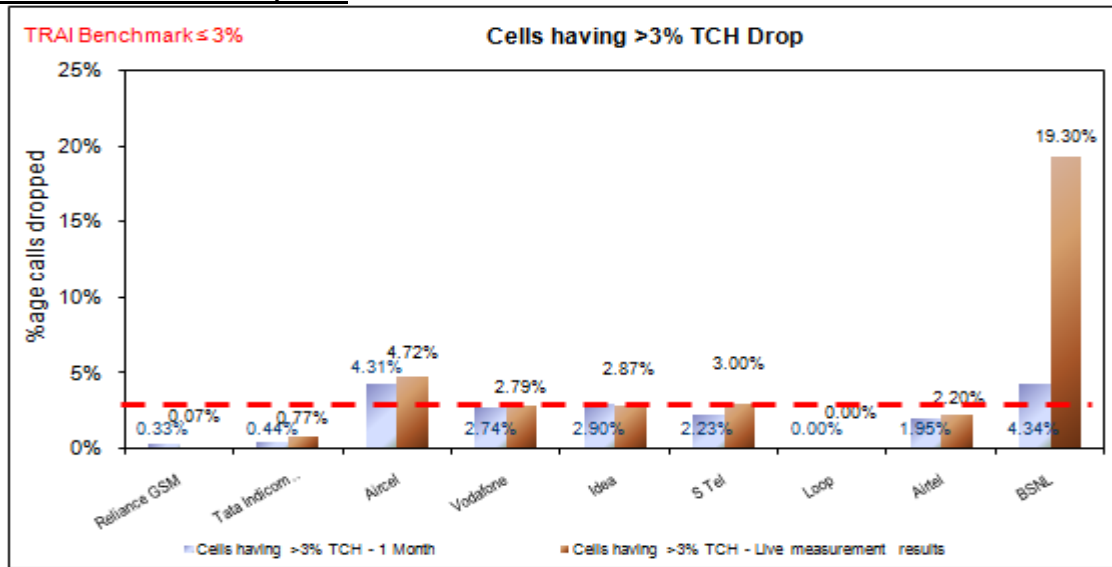
Operator(s) meeting benchmark: Reliance GSM, Tata Indicom (CDMA), Aircel, Vodafone, Idea, S Tel, Loop, Airtel

Operator(s) not meeting the benchmark: BSNL

Drive test

All the operators meet the benchmark

Cells with more than 3% TCH Drop Rate



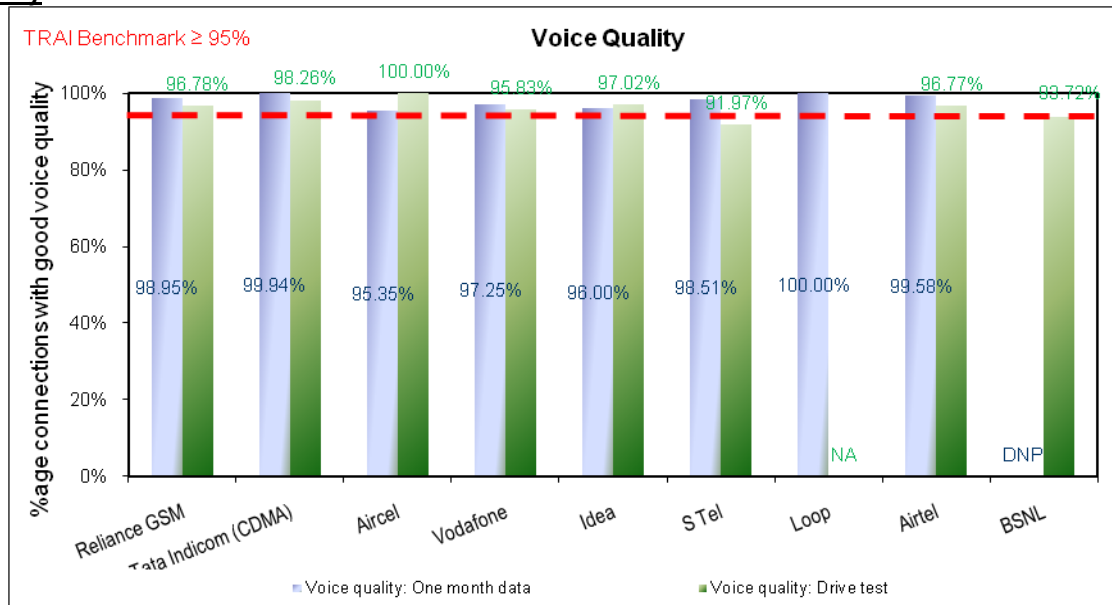
One month

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

Live measurement

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

Voice quality



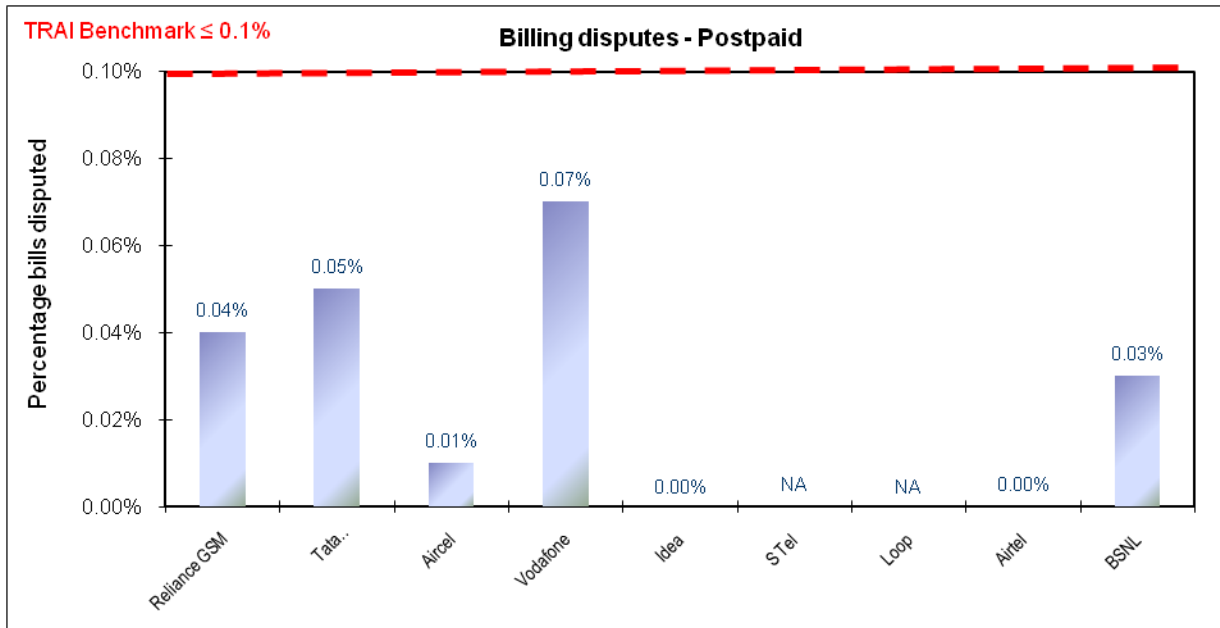
One month

All the operators meet the benchmark

Live measurement (Drive test)

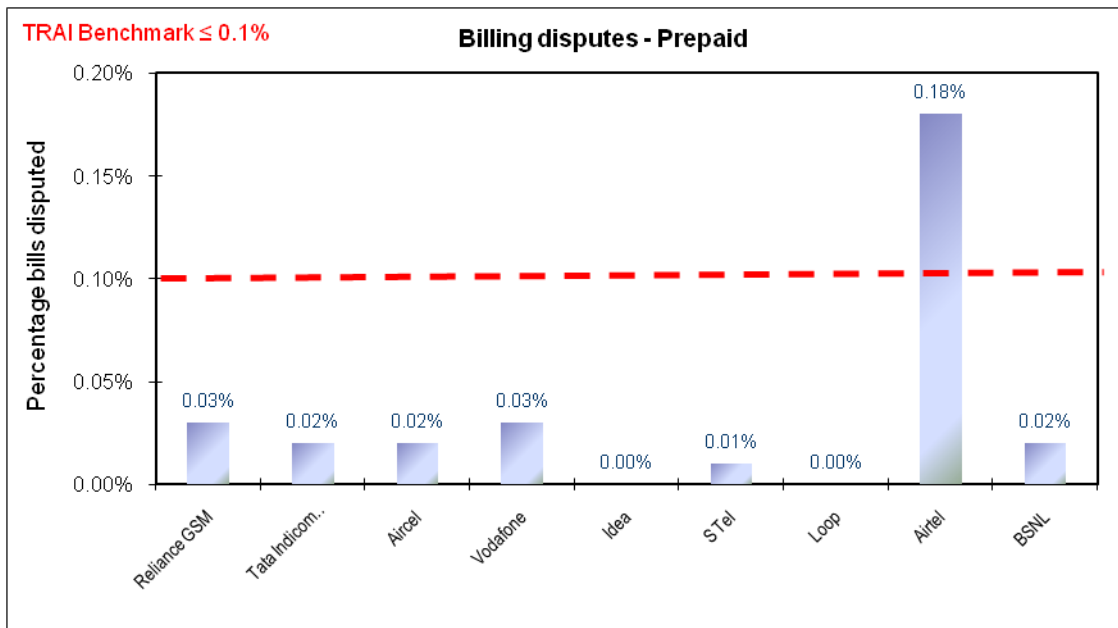
Operator(s) meeting benchmark: Reliance GSM, Tata Indicom (CDMA), Aircel, Vodafone, Idea, Airtel
 Operator(s) not meeting the benchmark: S Tel, BSNL

Billing Disputes – Postpaid



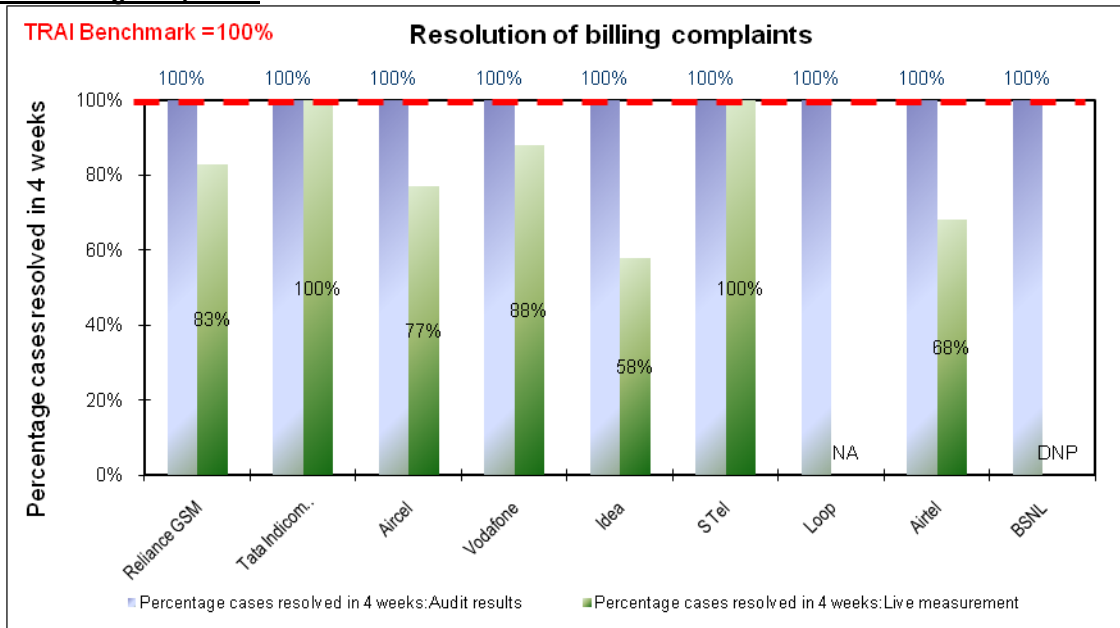
All the operators meet the benchmark

Complaints - Prepaid



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

Resolution of billing complaints



One month

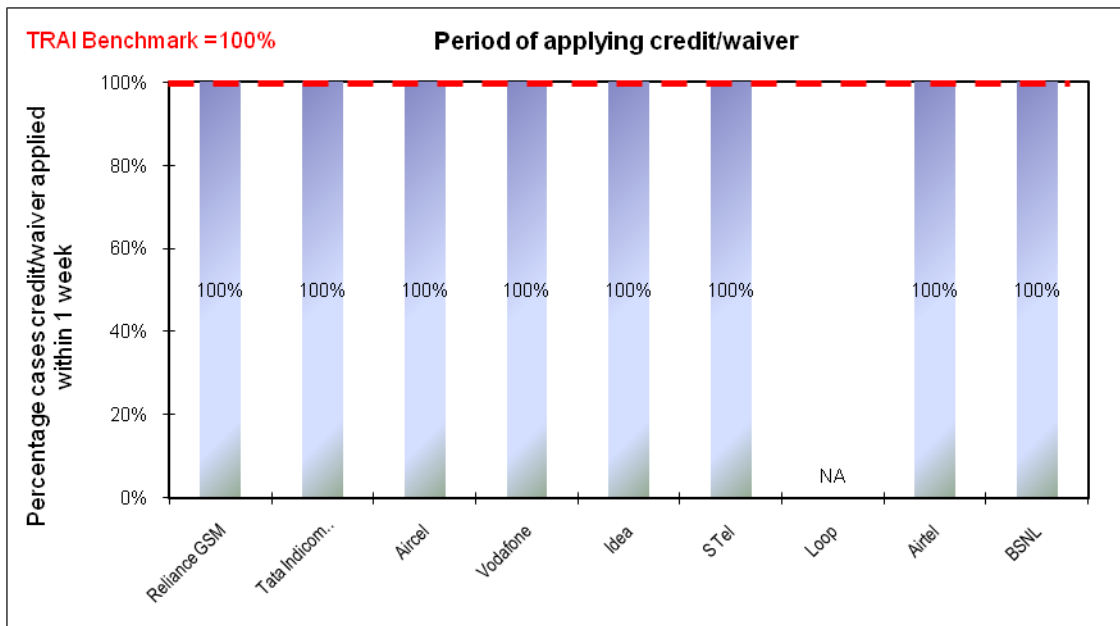
All the operators meet the benchmark

Live calling

Operator(s) meeting benchmark: Tata Indicom (CDMA), S Tel

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

Period of applying credit / waiver



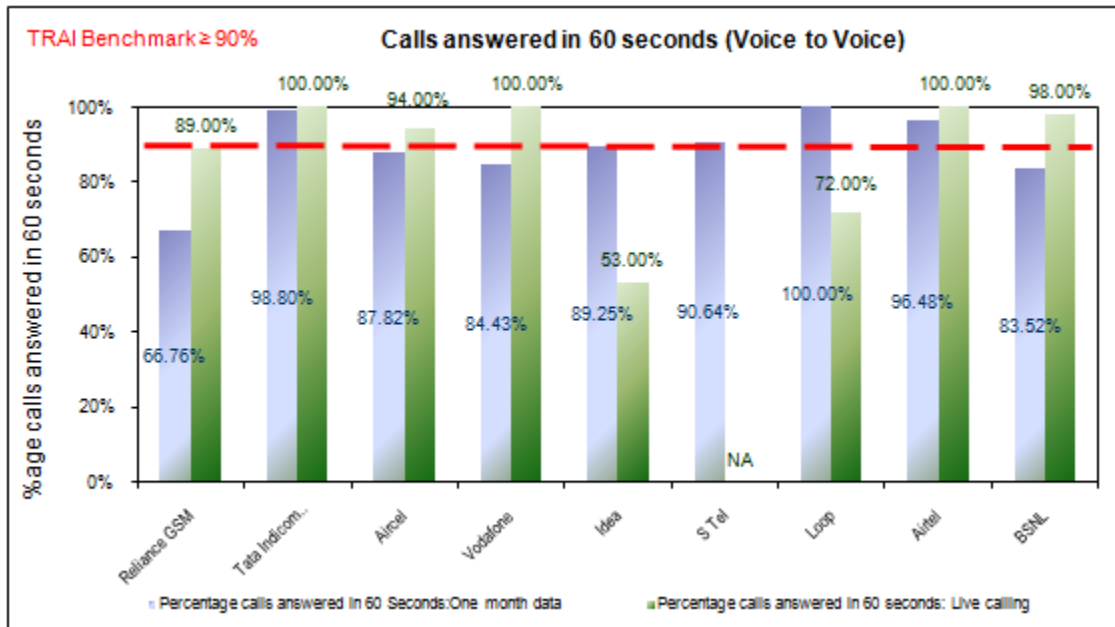
All the operators meet the benchmark

Live calling for billing Complaints

Resolution of billing complaints	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel
Total Number of calls made		100	23	100	100	50	16	0	100
Number of cases resolved in 4 weeks		83	23	77	88	29	16	0	68
Percentage cases resolved in four weeks	100%	83%	100%	77%	88%	58%	100%	NA	68%

*BSNL did not provide database dump for live calling to be performed on billing complaints despite regular follow up

Customer Care / Helpline: Calls answered



One month

Operator(s) meeting benchmark: Tata Indicom (CDMA), S Tel, Loop, Airtel

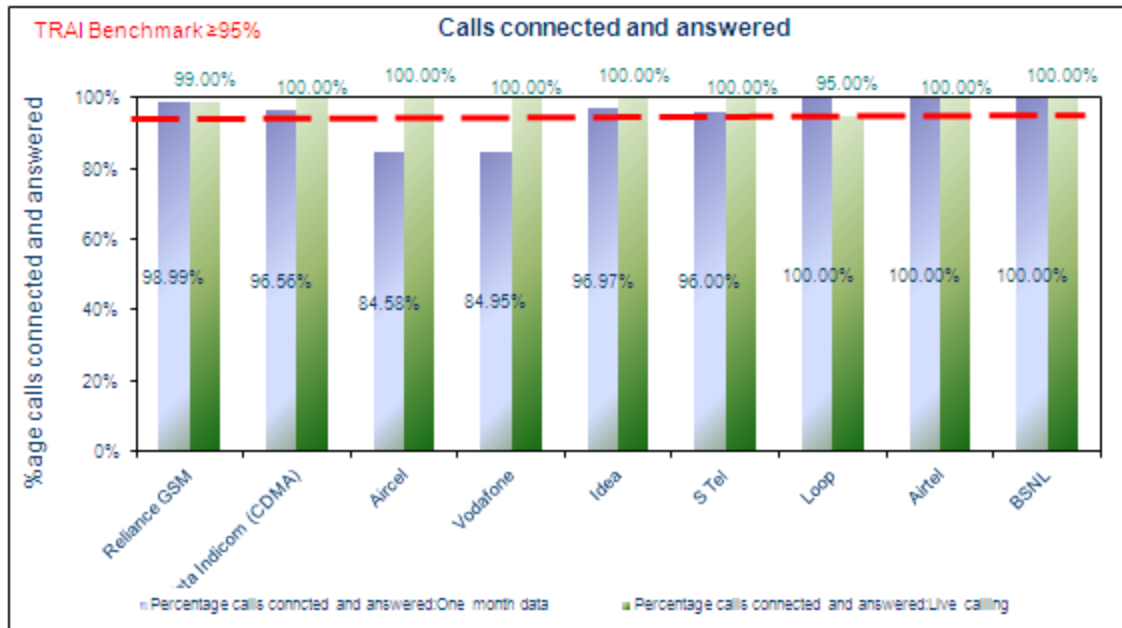
Operator(s) not meeting the benchmark: Aircel, Vodafone, Reliance GSM, Idea, BSNL

Live calling

Operator(s) meeting benchmark: Tata Indicom (CDMA), S Tel, Loop, Airtel, Aircel, BSNL, Vodafone

Operator(s) not meeting the benchmark: Reliance GSM, Idea, Loop

Customer Care / Helpline: Calls answered voice to voice



One month

Operator(s) meeting benchmark: Tata Indicom (CDMA), S Tel, Loop, Airtel

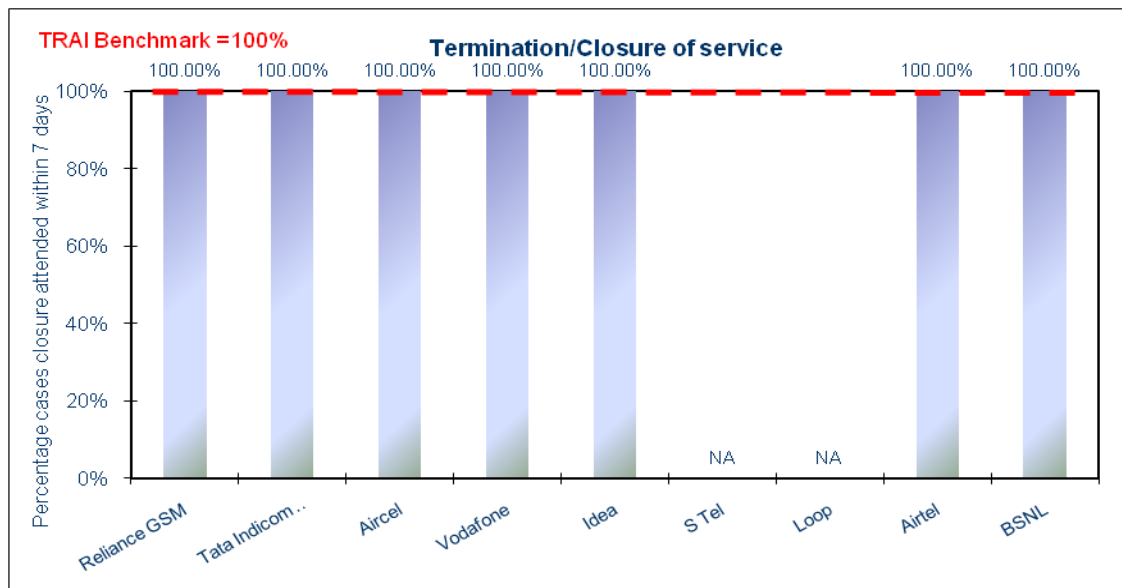
Operator(s) not meeting the benchmark: Reliance GSM, Aircel, Vodafone, Idea, BSNL

Live calling

Operator(s) meeting benchmark: Tata Indicom (CDMA), Aircel, Vodafone, Airtel, BSNL

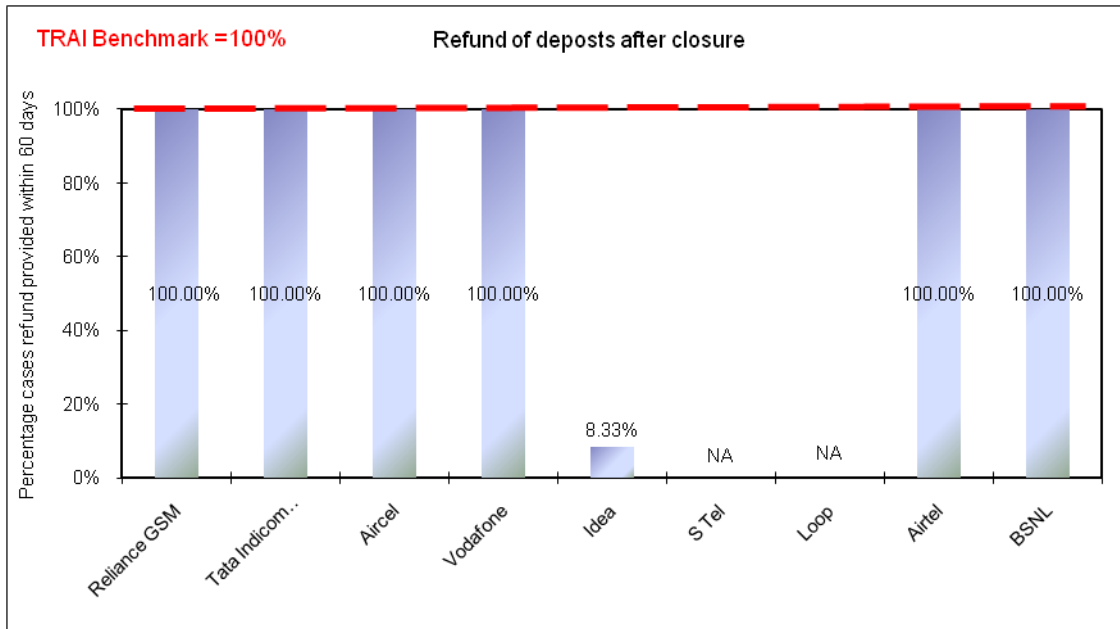
Operator(s) not meeting the benchmark: Reliance GSM, Idea, Loop

Termination / Closure of service



All the operators meet the benchmark

Refund of deposits



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

7.0 Compliance reports: Results of Verification of PMR

7.1 Cellular Mobile services

Month April, 2011

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	Total number of working POI Service Area wise	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%			≤ 3%	≥ 95%						
Reliance GSM	PMR	1274	242	0.03%	0	0.00%	99.35%	0.69%	0.80%	0.53%	3	3822	0.08%	98.62%	0	DNP	109000	68028	NA
	IMRB	1274	242	0.03%	0	0.00%	99.35%	0.69%	0.80%	0.53%	3	3822	0.08%	98.62%	0	14	109000	68028	NA
Tata Indicom (CDMA)	PMR	271	498	0.26%	0	0.00%	99.49%	0.00%	0.04%	0.50%	3	843	0.36%	99.27%	0	DNP	52480	9580	61651
	IMRB	271	498	0.26%	0	0.00%	99.49%	0.00%	0.04%	0.50%	3	843	0.36%	99.28%	0	30	52480	9580	61651
Aircel	PMR	2231	10004	0.62%	88	3.90%	98.08%	0.84%	1.12%	1.04%	373	6672	5.60%	90.90%	1	DNP	195555	95140	2508344
	IMRB	2231	10004	0.62%	88	3.94%	98.08%	0.84%	1.12%	1.04%	373	6672	5.60%	90.90%	0	56	108036	95140	2508344
Vodafone	PMR	2120	9678	0.61%	39	1.84%	98.32%	0.71%	1.48%	0.84%	189	6350	2.98%	97.64%	0	DNP	49611	42112	1145223
	IMRB	2120	9678	0.63%	39	1.84%	98.32%	0.07%	0.37%	0.84%	237	6360	3.73%	97.64%	0	32	49611	42112	1145223
Idea	PMR	591	498	0.12%	0	0.00%	99.07%	0.83%	0.49%	1.46%	51	1773	2.86%	96.28%	0	DNP	13120	6999	226317
	IMRB	591	497	0.12%	0	0.00%	99.00%	0.83%	0.49%	1.46%	51	1773	1.46%	96.00%	0	26	13120	6999	226317
S Tel	PMR	391	1563	0.54%	5	1.08%	98.83%	0.35%	0.20%	0.59%	55	1171	4.70%	98.34%	0	0	0	0	0
	IMRB	391	1563	0.56%	9	2.30%	99.00%	0.00%	0.00%	0.59%	50	1171	4.26%	98.40%	0	23	7238	804	28355
Loop	PMR	4	11	0.36%	0	0.00%	99.98%	0.50%	0.00%	0.12%	0	15	0.00%	99.99%	0	DNP	111	13.6	13
	IMRB	4	11	0.36%	0	0.00%	99.98%	0.50%	0.00%	0.12%	0	12	0.00%	99.99%	0	8	111	13.6	13
Airtel	PMR	2527	6795	0.37%	21	0.83%	97.30%	0.39%	1.17%	1.62%	119	7573	1.57%	99.14%	0	DNP	134851.8	105319.2	2947179
	IMRB	2527	6795	0.36%	21	0.83%	97.00%	0.39%	1.17%	1.62%	119	7573	1.57%	99.00%	0	68	134852	105319	3081775
BSNL	PMR	1302	14235	1.40%	187	14.30%	97.00%	1.00%	1.98%	1.95%	196	3869	5.00%	97.00%	0	60	115564	114841	907218
	IMRB	1302	14235	1.40%	187	14.30%	97.00%	1.00%	1.98%	1.95%	196	3869	5.00%	97.00%	0	18	115564	114841	907218

Month May, 2011

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	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 (%age)	%age connection with good voice quality	Point of interconnection (POI) Congestion	Total number of working POI Service Area wise	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%			≤ 3%	≥ 95%						
Reliance GSM	PMR	1296	61	0.01%	0	0.00%	99%	0.67%	0.73%	0.40%	4	3888	0.10%	98.86%	0	DNP	109000	67123	0
	IMRB	1296	61	0.01%	0	0.00%	99%	0.67%	0.73%	0.40%	4	3888	0.10%	98.86%	0	14	109000	67123	0
Tata Indicom (CDMA)	PMR	273	472	0.23%	0	0.00%	99.45%	0.00%	0.05%	0.50%	7	847	0.83%	99.20%	0	DNP	52972	10187	73284
	IMRB	273	472	0.23%	0	0.00%	99.45%	0.00%	0.05%	0.50%	7	847	0.83%	99.20%	0	34	52972	10187	73284
Aircel	PMR	2231	12202	0.74%	116	5.20%	97.65%	1.08%	1.33%	1.25%	542	6675	8.11%	91.00%	1	DNP	196483	97622	2596445
	IMRB	2231	12202	0.74%	116	5.20%	97.65%	1.08%	1.33%	1.25%	542	6675	8.11%	90.80%	0	56	108036	97621	2596445
Vodafone	PMR	2120	9678	0.61%	39	1.84%	98.32%	0.71%	1.48%	0.84%	189	6350	2.98%	97.64%	0	DNP	49611	42112	1145223
	IMRB	2160	7882	0.49%	33	1.53%	98.27%	0.33%	0.98%	1.05%	180	6470	2.78%	97.50%	0	32	53433	45643	1263904
Idea	PMR	591	363	0.08%	3	0.51%	99.11%	0.49%	0.47%	1.45%	49	1773	2.76%	96.74%	0	DNP	12529	6441	243748
	IMRB	591	363	0.08%	3	0.51%	99.00%	0.49%	0.47%	1.45%	49	1773	2.76%	96.74%	0	26	12529	6440	243748
S Tel	PMR	391	2650	0.91%	7	1.79%	98.92%	0.07%	0.01%	0.64%	55	1171	4.70%	98.40%	0	DNP	7306	779	45496
	IMRB	391	3111	1.11%	31	7.93%	99.00%	0.00%	0.00%	0.50%	35	1171	2.99%	98.00%	0	23	7306	693	26071
Loop	PMR	4	48	1.62%	0	0.00%	99.96%	0.00%	0.00%	0.00%	0	15	0.00%	100.0%	0	DNP	111	0.01	12
	IMRB	4	48	1.62%	0	0.00%	99.96%	0.00%	0.00%	0.00%	0	12	0.00%	100.0%	0	8	111	0.01	12
Airtel	PMR	2530	6681.1	0.40%	18	0.70%	98.00%	0.20%	1.20%	1.50%	141	7582	1.90%	99.30%	0	DNP	134586.2	104503.9	3121970
	IMRB	2530	6681	0.35%	18	0.71%	97.96%	0.23%	1.18%	1.50%	141	7582	1.86%	99.00%	0	68	134586	104504	3121970
BSNL	PMR	1302	12398	1.30%	172	13.20%	97.00%	0.90%	1.98%	2.00%	191	3869	4.90%	98.00%	0	DNP	115564	56039	926010
	IMRB	1302	12398	1.30%	172	13.20%	96.50%	0.90%	1.98%	2.00%	191	3869	4.90%	98.00%	0	20	115564	56039	926010

Month June, 2011

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 (%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	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 rate (%age)	%age connection with good voice quality	Point of interconnection (POI) Congestion	Total number of working POI Service Area wise	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%			≤ 3%	≥ 95%					
Reliance GSM	PMR	1380	27	0.00%	12	0.87%	99%	0.62%	0.71%	0.41%	94	4140	2.27%	99.01%	0	DNP	109000	57646	0
	IMRB	1380	27	0.00%	12	0.87%	99%	0.62%	0.71%	0.41%	94	4140	2.27%	99.01%	0	14	109000	57646	0
Tata Indicom (CDMA)	PMR	271	379	0.19%	0	0.00%	99.56%	0.00%	0.02%	0.39%	8	849	0.94%	99.99%	0	DNP	54489	11623	88802
	IMRB	271	379	0.19%	0	0.00%	99.56%	0.00%	0.02%	0.39%	8	849	0.94%	99.99%	0	34	54489	11623	88802
Aircel	PMR	2242	9217	0.6%	57	2.54%	97.33%	1.00%	1.84%	1.37%	496	6705	7.39%	93.00%	1	DNP	198977	98756	2637177
	IMRB	2242	9217	0.6%	57	2.54%	97.33%	1.02%	1.84%	1.37%	496	6705	7.39%	92.83%	0	56	108036	98755	2637177
Vodafone	PMR	2165	11736	0.75%	40	1.85%	98.58%	0.27%	0.76%	1.12%	189	6495	2.91%	97.58%	0	DNP	56432	48537	1327312
	IMRB	2165	11736	0.75%	40	1.85%	98.58%	0.27%	0.76%	1.12%	189	6495	2.91%	97.58%	0	32	56432	48537	1327312
Idea	PMR	606	327	0.08%	1	0.17%	99.26%	0.42%	0.36%	1.39%	50	1818	2.75%	96.50%	0	DNP	13041	6164	254541
	IMRB	606	327	0.08%	1	0.17%	99.26%	0.42%	0.36%	1.39%	50	1818	2.75%	96.50%	0	26	13041	6164	254541
S Tel	PMR	391	2650	0.91%	7	1.79%	98.92%	0.07%	0.01%	0.64%	55	1171	4.70%	98.40%	0	DNP	7306	779	45496
	IMRB	391	4436	1.58%	33	8.44%	99.00%	0.00%	0.00%	0.48%	55	1171	4.70%	98.00%	0	23	7202	708	26165
Loop	PMR	4	38	1.32%	0	0.00%	99.98%	0.00%	0.00%	0.00%	0	12	0.00%	100.00%	0	DNP	111	0.04	8
	IMRB	4	38	1.30%	0	0.00%	99.98%	0.00%	0.00%	0.00%	0	12	0.00%	100.00%	0	8	111	0.04	8
Airtel	PMR	2545	7388	0.40%	19	0.70%	96.10%	0.30%	1.80%	1.60%	152	7621	2.00%	99.70%	0	DNP	135389	105235	3002716
	IMRB	2545	7388	0.39%	19	0.75%	96.08%	0.26%	1.83%	1.64%	152	7621	1.99%	99.68%	0	66	135389	105235	3002716
BSNL	PMR	1303	13223	1.40%	171	13.10%	97.60%	1.00%	1.97%	1.99%	264	3872	4.90%	98.00%	0	DNP	115564	57161	931918
	IMRB	1303	13223	1.40%	157	12.00%	97.60%	1.00%	1.97%	1.99%	190	3872	4.90%	98.00%	0	20	115564	57161	931918

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 charging / credit / validity (pre-paid) complaints resolved within 4 weeks during the quarter	charging, credit / validity (pre-paid) complaints received during	paid) and charging, credit / validity complaints (pre paid) resolved in favour of the	account of not considered as valid complaints during the	/ adjustment to customer/s account from the date 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	
Reliance GSM	PMR	0.04%	360958	144	0.08%	1652	2111868	100%	5101	5101	462	4639	DNP	67.00%	521864	357785	95%	100%	414	414	100%
	IMRB	0.04%	360958	144	0.08%	1652	2111868	100%	5101	5101	462	4639	100%	67.00%	521864	357785	95%	100%	414	414	100%
Tata Indicom (CDMA)	PMR	0.01%	54023	8	0.02%	44	225968	100%	86	86	52	34	DNP	99%	38695	38186	94%	100%	1314	1314	100%
	IMRB	0.01%	54023	8	0.02%	44	72138	100%	86	86	52	34	100%	99%	38695	38186	94%	100%	1314	1314	100%
Aircel	PMR	0.01%	134028	13	0.02%	716	3377496	100%	781	781	729	52	100%	100%	339316	286979	88%	100%	477	477	100%
	IMRB	0.01%	134028	13	0.02%	716	3198908	100%	781	781	729	52	100%	100%	339316	286979	88%	100%	477	477	100%
Vodafone	PMR	0.14%	83951	116	0.02%	1001	1620638	100%	1117	1117	1076	41	100%	100%	138274	85237	59%	100%	353	353	100%
	IMRB	0.14%	83951	116	0.06%	1001	1620638	100%	1117	1117	1076	41	100%	100%	138274	85237	59%	100%	353	353	100%
Idea	PMR	0.00%	7533	0	0.01%	70	868050	100%	1742	1742	70	1672	100%	96%	113782	109150	33%	100%	159	159	100%
	IMRB	0.00%	7533	0	0.01%	70	859926	100%	1742	1742	70	1672	100%	96%	113782	109150	93%	100%	268	159	100%
S Tel	PMR	NA	NA	NA	0.10%	87	85015	100%	87	87	58	29	100%	99%	120138	115334	96%	0%	0	0	NA
	IMRB	NA	NA	NA	0.10%	87	85015	100%	87	87	58	29	100%	99%	120138	115334	96%	0%	0	0	NA
Loop	PMR	NA	NA	NA	0.00%	0	86	NA	0	0	0	0	NA	100%	12	12	100%	0%	0	0	NA
	IMRB	NA	NA	NA	0.00%	0	86	NA	0	0	0	0	NA	100%	12	12	100%	0%	0	0	NA
Airtel	PMR	0.01%	140415	11	0.00%	5	11052764	100%	16	11458	16	11442	100%	100%	41567175	41567175	70%	100%	778	778	100%
	IMRB	0.01%	140415	11	0.00%	5	11052764	100%	16	16	16	11442	100%	100%	29869116	3472783	76%	100%	778	778	100%
BSNL	PMR	0.01%	690826	44	0.00%	44	1162036	100%	57	64	43	14	100%	100%	17950	16482	95%	100%	1758	1758	100%
	IMRB	0.01%	690826	44	0.00%	44	1162036	100%	64	64	43	14	100%	100%	17950	16482	96%	100%	1758	1758	100%

Figures do not match with those reported in PMR

Figures verified on all India basis

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

DNP – Data not provided

Not meeting benchmark

8.0 Conclusions

8.1 Cellular Mobile services

1. Aircel, S-Tel and BSNL are not meeting the TRAI specified benchmark for worst affected BTSs due to downtime
2. Aircel does not meet the TRAI specified benchmark for SDCCH/Paging channel congestion, worst affected cells having more than 3% TCH drop rate and connection with good voice quality.
3. Vodafone did not meet the TRAI specified benchmark for Metering and billing credibility (post paid).
4. Reliance did not meet the TRAI specified benchmark for Accessibility of call centre/ customer care.
5. Aircel, Vodafone, Idea and Airtel did not meet the TRAI specified benchmark for percentage of calls answered by the operators (voice to voice) within 60 seconds

There were some minor variations found for some operators in their PMR submitted which may be due to rounding off error

9.0 Annexure - I

9.1 Service provider performance report based on one month data

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)			Metering and Billing				Response time to customer for assistance		Termination / closure of service	
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%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%	≤ 3%	≥ 95%	≤ 0.1%	≤ 0.1%	100%	100%	≥ 95%	≥ 90%	100%	100%
Reliance GSM	0.00%	0.13%	99.27%	0.75%	0.75%	0.49%	0.33%	98.95%	0.04%	0.03%	100.00%	100.00%	98.99%	66.76%	100.00%	100.00%
Tata Indicom (CDMA)	0.11%	0.00%	99.60%	0.00%	0.01%	0.49%	0.44%	99.94%	0.05%	0.02%	100.00%	100.00%	96.56%	98.80%	100.00%	100.00%
Aircel	0.25%	1.87%	96.90%	0.76%	1.41%	1.63%	4.31%	95.35%	0.01%	0.02%	100.00%	100.00%	84.58%	87.82%	100.00%	100.00%
Vodafone	0.94%	1.90%	98.10%	0.36%	0.96%	0.82%	2.74%	97.25%	0.07%	0.03%	100.00%	100.00%	84.95%	84.43%	100.00%	100.00%
Idea	0.15%	1.80%	99.41%	0.37%	0.26%	0.57%	2.90%	96.00%	0.00%	0.00%	100.00%	100.00%	96.97%	89.25%	100.00%	8.33%
S Tel	0.77%	4.87%	99.44%	0.00%	0.00%	0.48%	2.23%	98.51%	NA	0.01%	100.00%	100.00%	96.00%	90.64%	NA	NA
Loop	0.84%	0.00%	99.90%	0.00%	0.00%	0.39%	0.00%	100.00%	NA	0.00%	100.00%	NA	100.00%	100.00%	NA	NA
Airtel	0.39%	0.58%	98.01%	0.15%	0.58%	1.32%	1.95%	99.58%	0.00%	0.18%	100.00%	100.00%	100.00%	96.48%	100.00%	100.00%
BSNL	1.08%	9.10%	98.10%	1.00%	1.98%	2.00%	4.34%	DNP	0.03%	0.02%	100.00%	100.00%	100.00%	83.52%	100.00%	100.00%

9.2 Monthly Point of Interconnection (POI) Congestion Report

Name of the Service Provider	Name of POI not meeting the benchmark	Total No. of circuits on POI	Total No. of call attempts on POI	Total traffic served on POI (Erlang)	% of Congestion POI	Action already taken/ action plan for meeting the benchmark
Reliance GSM						All POI's meeting TRAI specified benchmark
Tata Indicom (CDMA)						All POI's meeting TRAI specified benchmark
Aircel						All POI's meeting TRAI specified benchmark
Vodafone						All POI's meeting TRAI specified benchmark
Idea						All POI's meeting TRAI specified benchmark
S Tel						All POI's meeting TRAI specified benchmark
Loop						All POI's meeting TRAI specified benchmark
Airtel						All POI's meeting TRAI specified benchmark
BSNL						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	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel	BSNL
Number of BTSs in the licensed service area		1494	286	2252	2320	666	390	4	2568	1319
Sum of downtime of BTSs in a month (in hours)		45	224	4187	16186	764	2225	25	7418	10569
BTSs accumulated downtime (not available for service)	≤ 2%	0.00%	0.11%	0.25%	0.94%	0.15%	0.77%	0.84%	0.39%	1.08%
Number of BTSs having accumulated downtime >24 hours		2	0	42	44	12	19	0	15	120
Worst affected BTSs due to downtime	≤ 2%	0.13%	0.00%	1.87%	1.90%	1.80%	4.87%	0.00%	0.58%	9.10%

2. Connection Establishment (Accessibility)

Audit Results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel	BSNL
CSSR	≥ 95%	99.27%	99.60%	96.90%	98.10%	99.41%	99.44%	99.90%	98.01%	98.10%

SDCCH congestion	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel	BSNL
SDCCH/Paging channel congestion	≤ 1%	0.75%	0.00%	0.76%	0.36%	0.37%	0.00%	0.00%	0.15%	1.00%

TCH congestion	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel	BSNL
TCH congestion	≤ 2%	0.75%	0.01%	1.41%	0.96%	0.26%	0.00%	0.00%	0.58%	1.98%

Live measurement results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel	BSNL
CSSR	≥ 95%	99.05%	99.64%	97.90%	98.86%	99.65%	99.58%	99.00%	97.28%	98.28%

SDCCH congestion	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel	BSNL
SDCCH/Paging channel congestion	≤ 1%	0.02%	0.00%	0.60%	0.18%	0.40%	0.00%	0.00%	0.10%	0.21%

TCH congestion	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel	BSNL
TCH congestion	≤ 2%	0.13%	0.01%	0.97%	0.64%	0.08%	0.00%	0.00%	0.44%	0.31%

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

CSSR	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel	BSNL
Total number of call attempts		681	1174	614	678	582	600	NA	637	549
Total number of successful calls established		675	1174	613	678	582	595	NA	637	541
CSSR	≥ 95%	99.12%	100.00%	99.84%	100.00%	100.00%	99.17%	NA	100.00%	98.54%

Blocked calls	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel	BSNL
%age blocked calls		0.88%	0.00%	0.16%	0.00%	0.00%	0.83%	NA	0.00%	1.46%

3. Connection Maintenance (Retainability)**Audit Results for Call drop rate and for number of cells having more than 3% TCH**

Call drop rate	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel	BSNL
Total number of calls established		96275507	1421318	239953928	2778752	10227523	1201758	1014	165561895	642274498
Total number of calls dropped		474643	7031	3922866	22789	102348	5727	4	2185417	12845490
Call drop rate	≤ 2%	0.49%	0.49%	1.63%	0.82%	0.57%	0.48%	0.39%	1.32%	2.00%

Cells having more than 3% TCH	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel	BSNL
Total number of cells in the network		4482	901	6726	6972	1998	1168	12	7704	3896
Total number of cells having more than 3% TCH		15	4	290	191	58	26	0	150	169
Worst affected cells having more than 3% TCH	≤ 3%	0.33%	0.44%	4.31%	2.74%	2.90%	2.23%	0.00%	1.95%	4.34%

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

Call drop rate	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel	BSNL
Total number of calls established		115267403	128897	257826945	4047855	11268484	1307774	115	18937091	65356921
Total number of calls dropped		701711	641	3000521	30499	92506	6229	0	294256	1542423
Call drop rate	≤ 2%	0.61%	0.50%	1.16%	0.75%	0.82%	0.48%	0.00%	1.55%	2.36%

Cells having more than 3% TCH	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel	BSNL
Total number of cells in the network		4557	909	20196	20979	143856	1168	12	7717	3891
Total number of cells having more than 3% TCH		3	7	953	585	4127	35	0	170	751
Worst affected cells having more than 3% TCH	≤ 3%	0.07%	0.77%	4.72%	2.79%	2.87%	3.00%	0.00%	2.20%	19.30%

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

Call drop rate	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel	BSNL
Total number of calls established		675	1174	613	678	582	595	NA	637	541
Total number of calls dropped		2	0	0	0	0	0	NA	0	3
Call drop rate	≤ 2%	0.30%	0.00%	0.00%	0.00%	0.00%	0.00%	NA	0.00%	0.55%

4. Voice quality

Audit Results for Voice quality

Voice quality	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel	BSNL
Total number of sample calls		14477632234	3633	23072830932	372152597	1137832894	59511979	15176	45736196569	DNP
Total number of calls with good voice quality		14325638642	3631	21999772693	361925992	1092361817	58625733	15176	45545052842	DNP
%age calls with good voice quality	≥ 95%	98.95%	99.94%	95.35%	97.25%	96.00%	98.51%	100.00%	99.58%	DNP

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

Voice quality	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel	BSNL
Total number of sample calls		566301	177361	822414	739080	562340	936901	NA	610018	620861
Total number of calls with good voice quality		548070	174276	822414	708242	545604	861644	NA	590328	581872
%age calls with good voice quality	≥ 95%	96.78%	98.26%	100.00%	95.83%	97.02%	91.97%	NA	96.77%	93.72%

5. POI Congestion

Audit Results for POI Congestion

POI congestion	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel	BSNL
Total number of working POIs		14	36	60	32	26	23	8	69	21
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		875807	4466	72389	28483744.08	10533	2465	286	79212	17690
Traffic served for all POIs (B)- in erlangs		604794	1064	44075	8626243	4779	666	0.13	49723	19689
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

6. Inter Operator Call Assessment

Inter operator call Assessment To↓ From →	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel	BSNL
Reliance GSM	NA	100%	100%	100%	100%	95%	97%	100%	69%
Tata Indicom (CDMA)	100%	NA	100%	100%	100%	100%	100%	100%	79%
Aircel	100%	100%	NA	85%	97%	100%	100%	85%	81%
Vodafone	100%	100%	100%	NA	100%	100%	100%	100%	79%
Idea	100%	100%	100%	100%	NA	100%	100%	100%	76%
S Tel	100%	100%	100%	100%	100%	NA	96%	100%	82%
Loop	100%	100%	90%	100%	100%	95%	NA	100%	62%
Airtel	100%	100%	100%	100%	100%	100%	100%	NA	78%
BSNL	100%	98%	98%	100%	100%	98%	97%	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	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel	BSNL
Billing diputes - Postpaid										
Total bills generated during the period		107808	46112	134028	33394	2369	NA	NA	48023	248634
Total number of bills disputed		40	23	13	23	0	NA	NA	1	85
Percentage bills disputed	≤ 0.1%	0.04%	0.05%	0.01%	0.07%	0.00%	NA	NA	0.00%	0.03%
Billing diputes - Prepaid										
Number of complaints related to charging, credit & validity		847	15	716	563	1	16	0	7183	194
Total number of prepaid customers in that period		2435439	67766	3198908	1817224	291699	124144	271	3903918	1181571
Percentage of complaints	≤ 0.1%	0.03%	0.02%	0.02%	0.03%	0.00%	0.01%	0.00%	0.18%	0.02%
Resolution of billing complaints										
Total number of billing/charging complaints		887	38	781	586	139	16	0	7184	27
Total complaints considered invalid		637	38	52	19	138	14	0	1912	8
Number of complaints resolved in 4 weeks from date of receipt for complaints listed in 5.3.1		887	38	781	586	139	16	0	7184	27
Percentage complaints resolved within 4 weeks of date of receipt	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Period of applying credit / waiver										
Total number of complaints where credit/waiver is required		250	0	729	511	1	2	NA	7184	13
Percentage cases in which credit/waiver was received within 1 week	100%	100%	100%	100%	100%	100%	100%	NA	100%	100%

Live calling results for resolution of billing complaints

Resolution of billing complaints	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel	BSNL
Total Number of calls made		100	23	100	100	50	16	0	100	DNP
Number of cases resolved in 4 weeks		83	23	77	88	29	16	0	68	DNP
Percentage cases resolved in four weeks	100%	83%	100%	77%	88%	58%	100%	NA	68%	DNP

8. Customer Care

Audit results for customer care

Customer Care Assessment	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel	BSNL
Total number of call attempts to customer care for assistance		5111260	11555	339316	3667228	19376	124798	14	6410904	588968
Number of calls getting connected and answered (electronically)		5059760	11157	286979	3115424	18789	119806	14	6410904	588968
Percentage calls getting connected and answered	≥ 95%	98.99%	96.56%	84.58%	84.95%	96.97%	96.00%	100.00%	100.00%	100.00%
Number of calls getting transferred to the operator (voice to voice)		984536	17371	4026521	614057	124258	25139	14	1070389	196103
Number of calls answered by operator (voice to voice) within 60 seconds		657279	17162	3536145	518455	110906	22787	14	1032671	163785

Percentage calls answered within 60 seconds (V2V)	≥ 90%	66.76%	98.80%	87.82%	84.43%	89.25%	90.64%	100.00%	96.48%	83.52%
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Live calling results for customer care

Customer Care Assessment	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel	BSNL
Total Number of calls made		100	50	100	50	100	100	100	100	100
Total Number of calls getting connected and answered		99	50	100	50	100	100	95	100	100
Percentage calls getting connected and answered	≥ 95%	99.00%	100.00%	100.00%	100.00%	100.00%	100.00%	95.00%	100.00%	100.00%

Live calling results for customer care (Voice to Voice)

Customer Care Assessment	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel	BSNL
Total Number of calls made		100	50	100	50	100	NA	100	100	100
Total Number of calls answered within 60 seconds		89	50	94	50	53	NA	72	100	98
Percentage calls answered within 60 seconds	≥ 90%	89.00%	100.00%	94.00%	100.00%	53.00%	NA	72.00%	100.00%	98.00%

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

9. Termination / closure of service**Audit results for termination / closure of service**

Termination	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel	BSNL
Total number of closure request		78	547	477	113	24	NA	NA	236	1928
Number of requests attended within 7 days		78	547	477	113	24	NA	NA	236	1928
Percentage cases in which termination done within 7 days	100%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	NA	100.00%	100.00%

Audit results for refund of deposits

Refund	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel	BSNL
Total number of cases requiring refund of deposits		88	228	477	263	12	NA	NA	116	1928
Total number of cases where refund was made within 60 days		88	228	477	263	1	NA	NA	116	1928

Percentage cases in which refund was receive within 60 days	100%	100.00%	100.00%	100.00%	100.00%	8.33%	NA	NA	100.00%	100.00%
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11. Additional Network Related parameters										
Audit Results for Total Traffic Handled in Erlang										
Traffic in Erlang		Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel	BSNL
Equipped capacity of the network		109000	60106	108036	60925	15244	7221	111	141413	115564
Total traffic handled in erlang during TCBH		68176	11152	93168	53625	8058	592	0.24	95384	58842

Total number of customers as per VLR										
		Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel	BSNL
Total no. of customers served (as per VLR)		1778470	88911	2776999	1561377	257101	19305	80	3171539	955830

Live calling for level 1 services										
Level 1 services	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Loop	Airtel	BSNL
Total no. of calls made		150	150	150	150	150	150	150	150	150
Calls answered in 60 sec		150	137	116	86	134	110	110	70	134

L1 services calling was done for each operator on these numbers: 100,101,104 and 108
