

Objective Assessment of Quality of Services for (QoS) for Cellular Mobile (Wireless) Service Providers – NE 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 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 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 NE 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	Airtel	October 2011
Operator 8	BSNL	October 2011
Operator 9	Loop	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 NE 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	619	29	0.01%	8	1.29%	98.61%	0.60%	0.95%	0.92%	35	1857	1.88%	99.04%	0	14	40000	16130	NA
Tata Indicom (CDMA)	20:00 - 21:00	178	185	0.14%	0	0.00%	98.33%	0.00%	0.17%	0.48%	1	582	0.17%	99.19%	0	30	NA	NA	55548
Aircel	19:00 - 20:00	1479	5684	0.52%	27	1.83%	97.26%	0.67%	1.72%	1.84%	191	4314	4.43%	95.39%	0	34	67593	52197	1600931
Vodafone	20:00 - 21:00	1088	4795	0.59%	8	0.74%	98.21%	0.27%	0.89%	0.88%	146	3349	4.36%	97.43%	0	30	25491	21361	712995
Idea	20:00 - 21:00	404	2670	0.89%	8	1.98%	98.36%	0.38%	1.40%	0.57%	34	1212	2.81%	95.57%	0	26	10154	6833	171322
S Tel	19:00 - 20:00	107	715	0.90%	6	5.61%	99.46%	0.00%	0.01%	0.40%	7	318	2.20%	98.53%	0	23	2423	226	7302
Airtel	19:00 - 20:00	1434	7622	0.71%	27	1.88%	95.60%	0.80%	1.73%	1.38%	116	4257	2.72%	98.70%	0	16	81985	60601	1871846
BSNL	19:00 - 20:00	1121	19922	2.39%	164	14.63%	95.47%	1.81%	2.49%	2.00%	246	3304	7.45%	96.09%	3	57	24000	21160	79174
Loop	11:00 - 12:00	13	79	0.82%	0	0.00%	100.00%	0.00%	0.00%	0.00%	0	40	0.00%	100.00%	0	11	61	2	7

*Details pertaining to these are obtained through operator done drive tests. Results of the operator assisted drive tests are explained in detail in critical findings

** Methodology not in line with QoS

Figures provided on All India basis

Not meeting the benchmark

B*mark = TRAI Benchmark, DNA = Details not available, NA: Not Applicable

Critical findings: Cellular Mobile Services

The audit for cellular mobile service providers were conducted at their respective MSCs in the NE 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)	20:00 - 21:00	20:00 - 21:00
Aircel	19:00 - 20:00	19:00 - 20:00
Vodafone	20:00 - 21:00	20:00 - 21:00
Idea	20:00 - 21:00	20:00 - 21:00
S Tel	19:00 - 20:00	19:00 - 20:00
Airtel	19:00 - 20:00	19:00 - 20:00
BSNL	19:00 - 20:00	19:00 - 20:00
Loop	11:00 - 12:00	11:00 - 12:00

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

BTSs Accumulated Downtime:

In the NE 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. 164 BTS of BSNL had more than 24 hours of accumulated downtime. BSNL (2.39%) was not able to meet the TRAI specified benchmark of $\leq 2\%$ for BTS 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 100% 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 except BSNL are meeting the TRAI specified benchmarks on the network congestion parameters. BSNL does not meet the TRAI specified benchmark with SDCCH / Paging Channel Congestion of 1.81% and Traffic Channel congestion of 2.49% which was found during the one month data collected for the month of audit. Loop leads the way in network congestion parameters with zero SDCCH/paging as well as traffic channel congestion. The calculation methodology of these parameters was found to be in complete accordance with what has been specified by TRAI. Both RCOM CDMA and Tata Teleservices measure paging channel utilization. When the value of this parameter is less than 100%, it is counted as 0% congestion. There were almost no POIs with congestion more than the benchmark ($\leq 0.5\%$) except for 3 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 Loop at 0% while the highest was for BSNL at 2%.

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 meeting the TRAI specified benchmark and were measuring this parameter as per their guidelines.

Customer Care / Helpline Assessment

For the accessibility of customer care aspect all the service providers except Vodafone(77.29%) were meeting the TRAI benchmark. Aircel(82.60%), Reliance(80.40%) and Vodafone(80.83%) were not meeting TRAI benchmark for percentage of calls answered by operators 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 within 1 week, all the service providers were meeting the TRAI specified benchmark of 100%.

Inter operator calls assessment

Inter operator call Assessment To↓ From →	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Airtel	BSNL	Loop
Reliance GSM	NA	100%	100%	100%	84%	95%	100%	95%	97%
Tata Indicom (CDMA)	100%	NA	100%	100%	100%	100%	100%	96%	99%
Aircel	89%	100%	NA	100%	100%	100%	100%	88%	97%
Vodafone	100%	100%	100%	NA	100%	97%	100%	97%	98%
Idea	100%	100%	100%	100%	NA	100%	100%	92%	98%
S Tel	100%	100%	100%	100%	86%	NA	100%	100%	96%
Airtel	100%	100%	100%	100%	97%	97%	NA	96%	99%
BSNL	76%	100%	100%	100%	100%	97%	100%	NA	100%
Loop	95%	100%	100%	100%	100%	95%	100%	91%	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. Idea and S-Tel found tough connecting to a Reliance number with only 84% and 95% of the calls getting connected. BSNL had difficulty in connecting to an Aircel number with 88% of their calls getting completed. Loop had difficulty in connecting to an S-Tel number with 96% of their calls getting completed. Reliance had difficulty in connecting to a BSNL number with 76% of their calls getting completed. S-Tel had difficulty in connecting to a Loop number with 95% of their calls getting completed.

Details of inter-operator calling are as followed:

Operator	Date	Location
Reliance GSM	16 th Nov 11	Guwahati
Tata Indicom (CDMA)	8 th Dec 11	Guwahati
Aircel	3 rd Dec 11	Guwahati
Vodafone	16 th Nov 11	Guwahati
Idea	23 rd Nov 11	Guwahati
S Tel	22 nd Dec 11	Shillong
Airtel	15 th Nov 11	Guwahati
BSNL	7 th Dec 11	Dimapur
Loop	12 th Jan 11	Shillong

Results of Operator assisted Drive test

The drive test was conducted simultaneously for all the operators present in the NE circle. There was in total of three drive tests conducted in the circle. These tests were conducted in the cities of Shillong, Kohima and Lunglei. 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 NE 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 NE circle were conducted in the cities of Shillong, Kohima and Lunglei along the following route:

	Type of location	Shillong	Kohima	Lunglei
Outdoor	Periphery of the city	Golf Course, Mawlein, Merry Convent, North East Hill University, Shillong Poly Technic, Phudumari Mawlein, Kharjan, G S Road, Mowlein Sumo Stand, Anjali Pump, Rhino Point.	New Secretariat, High school Junction,HS Road,Pezineth Road, Kezieke, D Block,TCP Gate, Phulbari(Midland),War Cemetry, Citychurah, Kohima Cultural Hall, Nagaland Police Head Quarter, South Point Market,Near IOC,Mohankhola,Lirie,Lirie Chazao Colony, Police Colony. Nagaland Poloce Head quarter, Lerie Colony, Police Camp.	Three Gate ,Lunglei,. Old Patrol Pump, Tata Motors, Ranther, Farm Veng, Chanmari, Church, Sabji BAZAR, Electric Veng, Venglai, Police Point, Tlubung Veng Stadium, Bazar Veng, Old SSB Qtr, PHE Complex, Police Point.
	Congested area	Rhino Point, Anjali Pump, Police Bazar, Kasari, BSNL Office, Malki, Dhankheti, Agriculture Office, Jowai Road, Bethany Hospital, Fire Brigade, Nonggrim, SBI (road left turn), Rynjhah, Nongsten, Pokseh, Nongthymai, Rani Motors, Laimukhra, Beat House.	War Cemetry, Naga Hospital Road, Naga Hospital,Peramedical College, Jail Colony,Near Fira Hotel, BSNL Exchange,CM Quarter, Old Minister Hill,Monichula,New Minister Hill,Chathedral Church,South Police Station.Near IOC,Nagaland Police Head Quarter,Rajbhaban,TCP Gate, NST,Kezieke,Varabasti,Donbosco,Kohima College,New Secretariat	Police Point, Stadium, Bazar Veng, Kikwan, Sabji Bazar, Chanmari III, Farm Veng, Target Bazar, Agriculture College, DC Court, DTO Office,
	Across the city	, Beat House, St. Anthony College, Lachumere Point, IGP point, Police Bazar,Meghaloya co-op Erative Apex Bank, Shillong GPO, Pine Wood Hotel, Okland, Hotel Polo Town, Polo Bazar, Polo Ground, Golf Link.	IOC,NP Head Quarter,Kuki Baptish Church, SP Office, Bye pass, Officer Hill,New Market Colony, Dead line, Govt Ruby Primary School, Tinpati,Pezielietsei, Tinpati Junction, Kezieke North Block, Mission Road, Razhu Point,D Block Road, AR Campus, Opposite MLA Hostel, Local Texi Stand, Nagaland State Transport.	Zotlung, Sercon Hospital, Bazar Veng, BSNL Office, Police Station, Venglai, High Court, Chanmari, Distric Urban Dev Office, Target Bazar, Higher Technical Education Hatim College, AOC, Ranther, Southern Gas Service, Salem Bank, Lung lown, Three Gate
Indoor	Office complex	S I B office complex , Bishnupur	Transport Office(NST)	DTO Office
	Shopping complex	Laimukra Shopping Complex	New Secretariat	Bazar Veng

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

***Loop had not participated in any DT in NE for no coverage in selected towns**

Drive Test – Shillong

	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%	99.48%	96.85%	96.80%	94.42%	99.77%	97.55%	98.24%	96.19%	98.00%	95.73%	97.44%	87.21%	95.12%	95.46%	NA	92.72%
CSSR	≥ 95%	100.00%	98.71%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	66.01%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls		0.00%	1.29%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	33.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	1.31%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.61%	6.15%	0.00%	5.22%	0.00%	1.69%
Hands off success rate		100.00%	97.94%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.69%


***S-Tel didn't took part in Kohima(Nagaland) & Lunglei(Mizoram) due to no network coverage**

Drive Test – Kohima

	B'mark	Reliance GSM		Tata Indicom (CDMA)		Aircel		Vodafone		Idea		Airtel		BSNL	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	≥ 95%	98.34%	95.65%	96.55%	94.57%	99.77%	95.81%	93.19%	90.59%	99.16%	91.96%	95.57%	95.51%	94.59%	92.65%
CSSR	≥ 95%	100.00%	99.39%	100.00%	100.00%	100.00%	100.00%	100.00%	95.30%	100.00%	100.00%	100.00%	100.00%	100.00%	99.30%
%age Blocked calls		0.00%	0.61%	0.00%	0.00%	0.00%	0.00%	0.00%	4.70%	0.00%	0.00%	0.00%	0.00%	0.00%	0.70%
Call drop rate	≤ 2%	0.00%	0.61%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.69%	0.00%	0.70%
Hands off success rate		100.00%	98.45%	100.00%	100.00%	100.00%	100.00%	100.00%	99.19%	0.00%	100.00%	100.00%	100.00%	100.00%	85.94%

Drive Test – Lunglei

	B'mark	Reliance GSM		Tata Indicom (CDMA)		Aircel		Vodafone		Idea		Airtel		BSNL	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	≥ 95%	98.83%	95.74%	96.60%	96.14%	97.69%	95.05%	99.17%	98.43%	97.12%	95.06%	96.20%	95.43%	94.10%	88.36%
CSSR	≥ 95%	100.00%	98.51%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	72.13%	84.80%
%age Blocked calls		0.00%	1.49%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	27.87%	15.20%
Call drop rate	≤ 2%	0.00%	0.50%	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%	99.51%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	0.00%	100.00%	100.00%	100.00%	95.45%	90.43%

 Not meeting the benchmark

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

ALL SERVICE PROVIDERS

Shillong: There was interference and low signal strength recorded for all operators in the outdoor areas near Dhankheti, Golf Links, Rynjhah, Jowai Road while in the indoor areas inadequate coverage was not found in any of the areas.

Kohima: There was interference and low signal strength recorded for all the operators in the outdoor areas of Lerie colony, monichula, Varabasti, Bye pass while in the indoor areas there was no inadequate coverage or interference recorded.

Lunglei: There was interference and low signal strength recorded for all operators in the outdoor areas of Venglai, PHE Complex, Kikwan 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. Tata Indicom did not meet the TRAI benchmark for voice quality in the outdoor areas of Shillong and Kohima.
2. Vodafone did not meet the TRAI benchmark for voice quality both in indoor and outdoor areas of Kohima.
3. Idea did not meet the TRAI benchmark for CSSR and voice quality in the outdoor areas of Shillong and Kohima.
4. S-Tel did not meet the TRAI benchmark for voice quality and call drop in the outdoor areas of Shillong.
5. Airtel did not meet the TRAI benchmark for call drop in the outdoor areas of Shillong.
6. BSNL did not meet the TRAI benchmark for voice quality in the outdoor areas of Shillong and both in indoor and outdoor areas of Kohima and Lunglei.
7. BSNL also did not meet the TRAI benchmark for CSSR both in indoor and outdoor areas of Lunglei

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	0.05%	0.00%	98.57%	0.04%	0.53%	0.68%	0.37%	96.52%
Tata Indicom (CDMA)	0.01%	0.00%	99.48%	0.00%	0.02%	0.59%	0.17%	95.43%
Aircel	0.12%	0.00%	98.00%	0.47%	1.40%	1.63%	4.82%	96.51%
Vodafone	0.04%	0.00%	98.63%	0.02%	0.19%	1.01%	4.25%	96.26%
Idea	0.08%	0.00%	97.98%	1.59%	1.71%	1.30%	2.40%	94.94%
S Tel	0.11%	7.48%	99.59%	0.05%	0.00%	0.38%	2.49%	90.29%
Airtel	0.01%	0.28%	95.51%	0.16%	0.49%	1.63%	2.57%	95.46%
BSNL	2.31%	17.75%	96.79%	1.01%	1.62%	1.93%	5.21%	90.52%
Loop	0.02%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	NA

 Not meeting the benchmark

-

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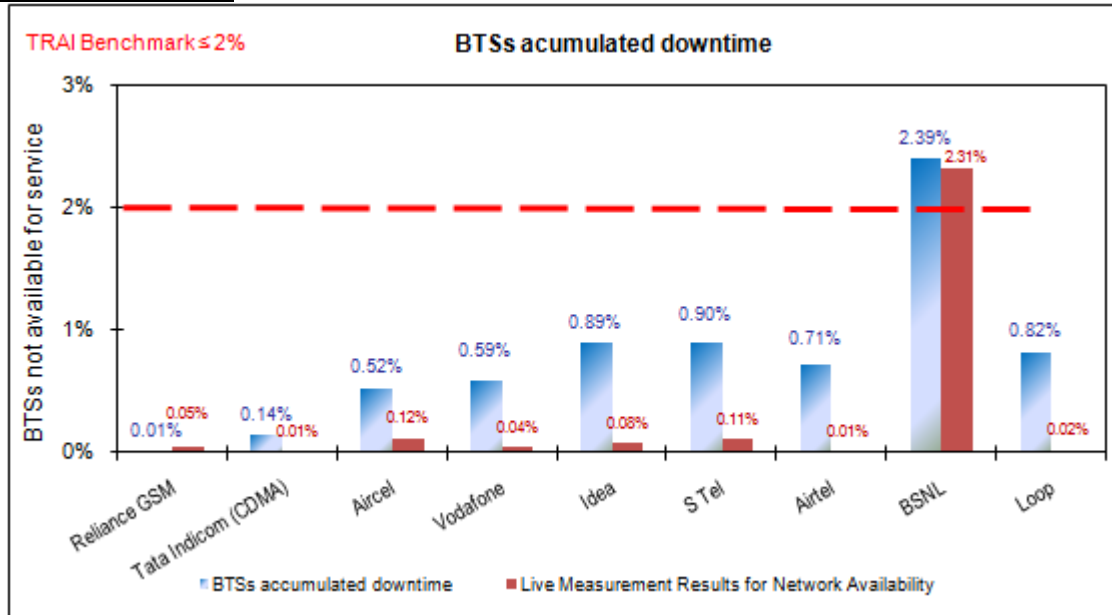
During the three day live measurement, it was found that:

- BSNL(2.31%) is not meeting the TRAI specified benchmark of $\leq 2\%$ for Worst affected BTS due to downtime.
- S-Tel(7.48%) and BSNL(17.75%) is not meeting the TRAI specified benchmark of $\leq 2\%$ for Worst affected BTSs due to downtime
- Idea(1.59%) and BSNL(1.01%) is not meeting the TRAI specified benchmark of $\leq 1\%$ for SDCCH/ Paging Chl. Congestion.
- BSNL(5.21%) is not meeting the TRAI specified benchmark for Worst affected cells having more than 3% TCH drop
- S-Tel(90.29%), Idea(94.94%) and BSNL(90.52%) are not meeting the TRAI specified benchmark of $\geq 95\%$ for voice quality parameter.
- Reliance(90%), Vodafone(80%), Aircel(83%) and Airtel(84%) are not meeting the TRAI specified benchmark for metering and billing. BSNL NE-II didn't provide us their calling dump in spite of repeated requests and regular follow ups.
- Tata Indicom(63%), Idea(44%), Airtel(88%) and BSNL(49.5%) 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

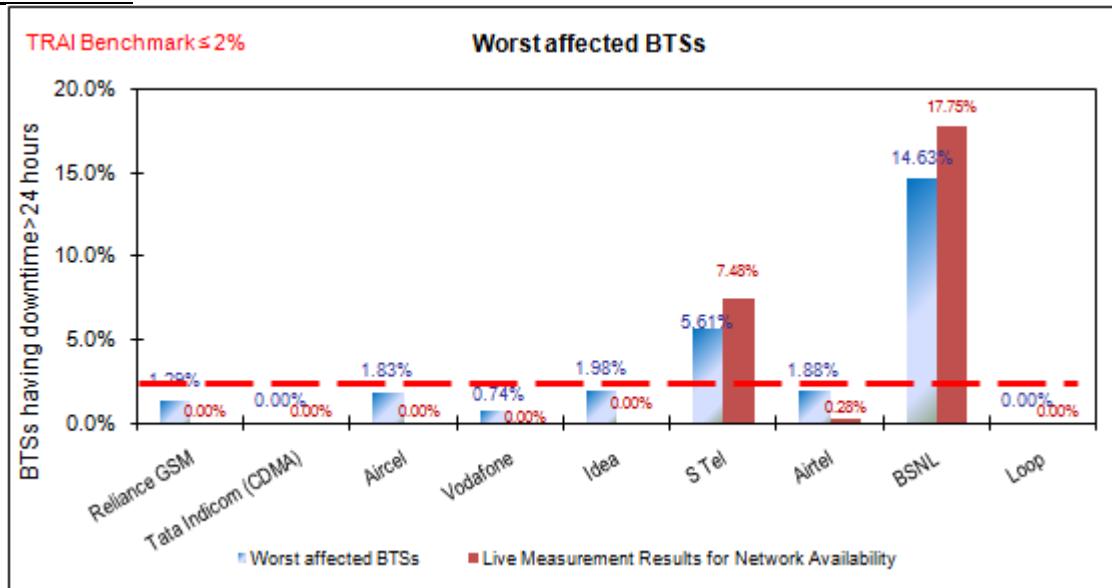
6.1 Graphical/Tabular Representations for Cellular Mobile Services

BTSs Accumulated Downtime



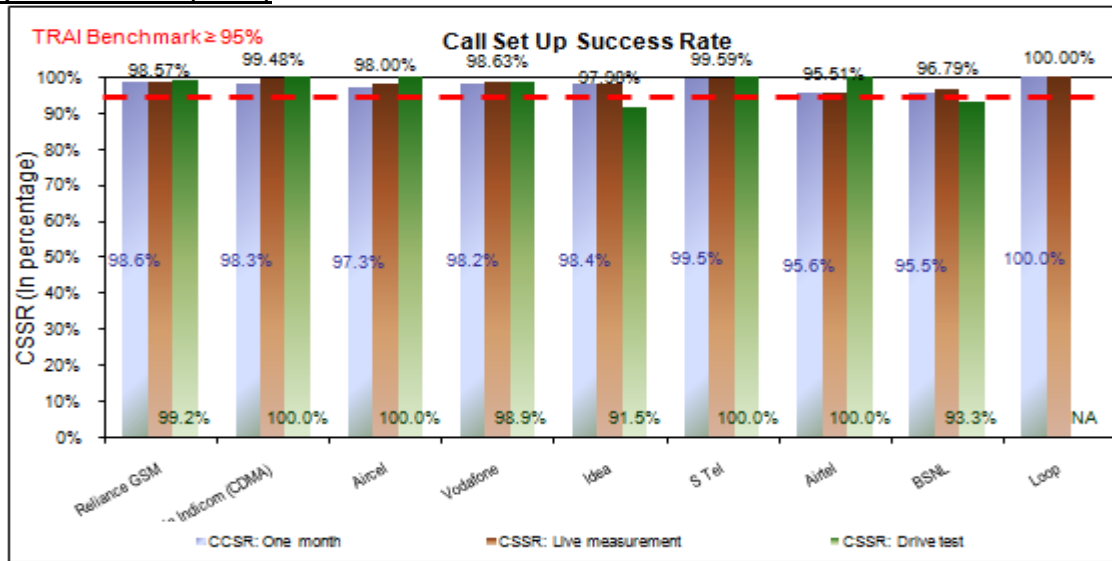
Operator(s) meeting benchmark: Reliance GSM, Tata Indicom (CDMA), Aircel, Vodafone, Idea, S Tel, Airtel, Loop
 Operator(s) not meeting the benchmark: BSNL

Worst Affected BTSs



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

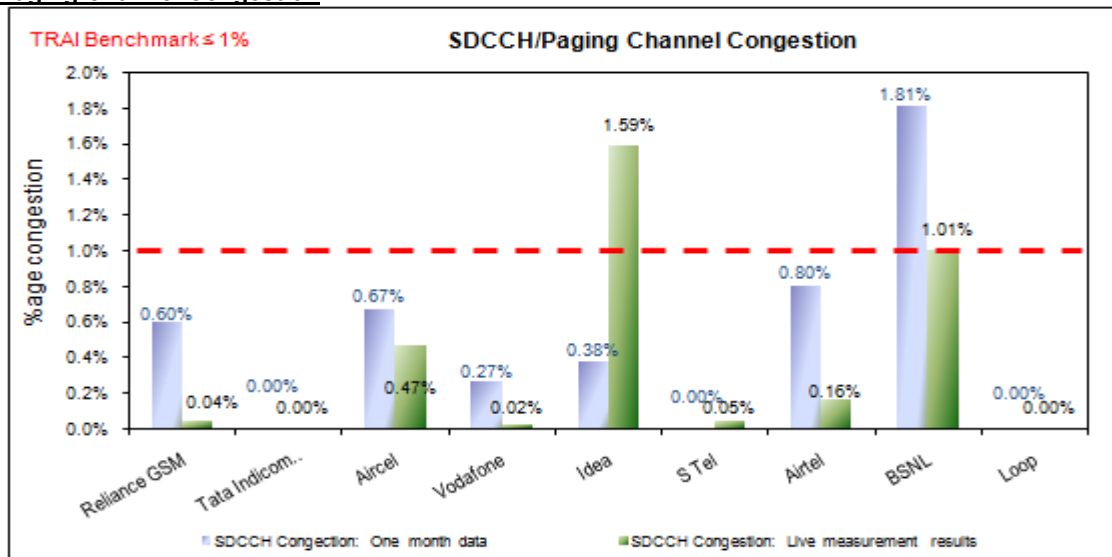
All the operators meet the benchmark

Drive test

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

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

SDCCH / Paging Channel Congestion



One month

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

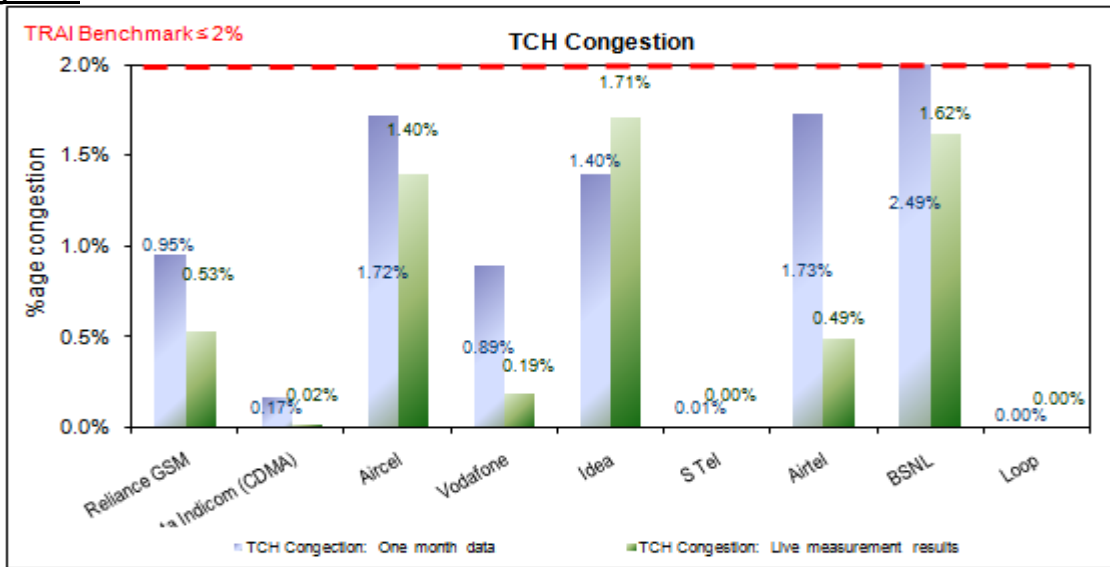
Operator(s) not meeting the benchmark: BSNL

Live measurement

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

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

TCH Congestion



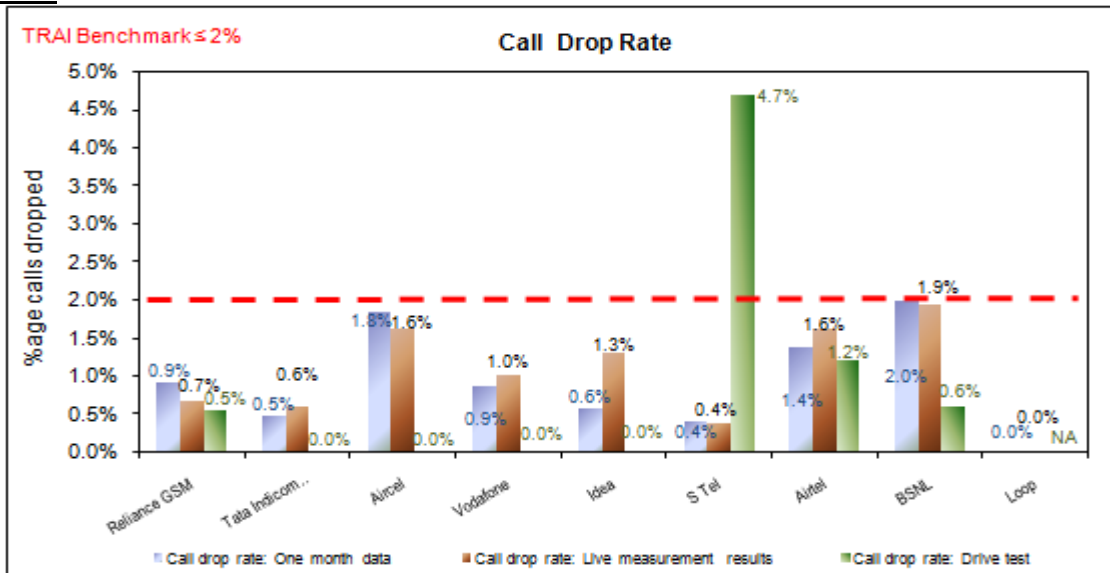
One month

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

Live measurement

All the operators meet the benchmark

Call Drop Rate



One month

All the operators meet the benchmark

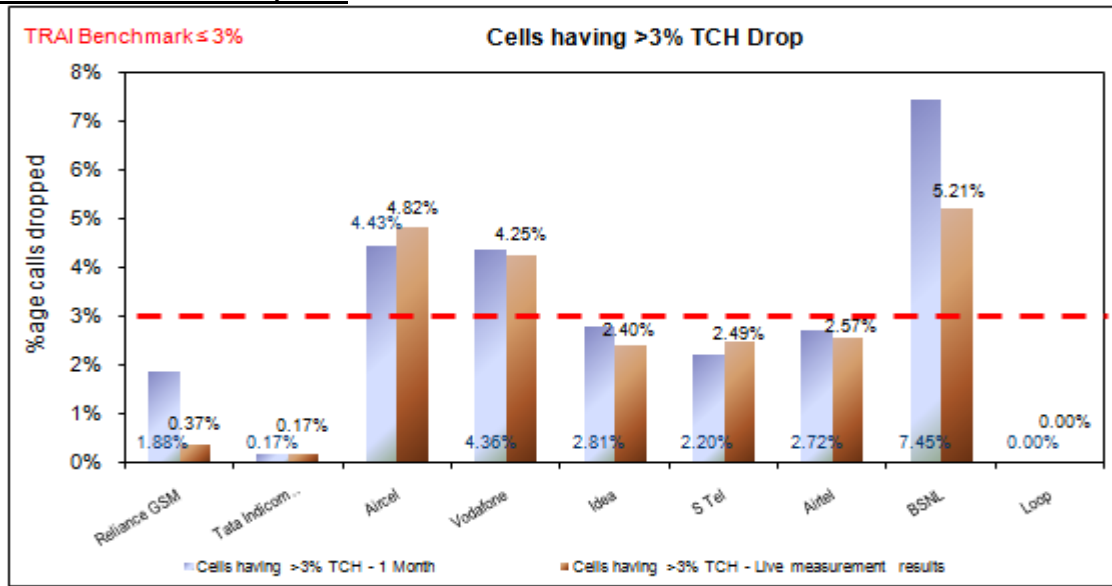
Live measurement

All the operators meet the benchmark

Drive test

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

Cells with more than 3% TCH Drop Rate



One month

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

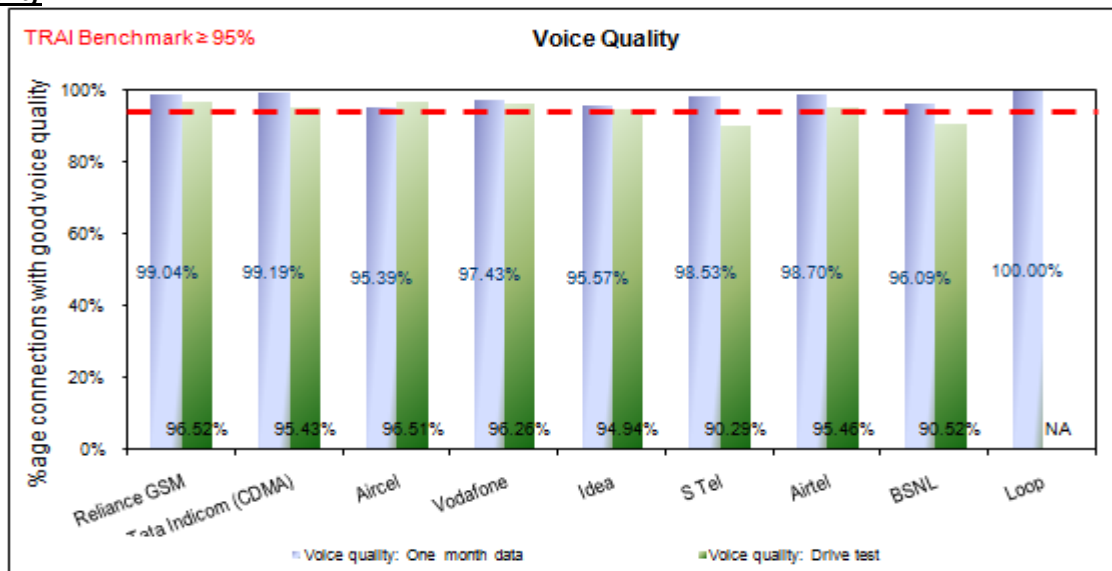
Operator(s) not meeting the benchmark: Aircel, Vodafone, BSNL

Live measurement

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

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

Voice quality



One month

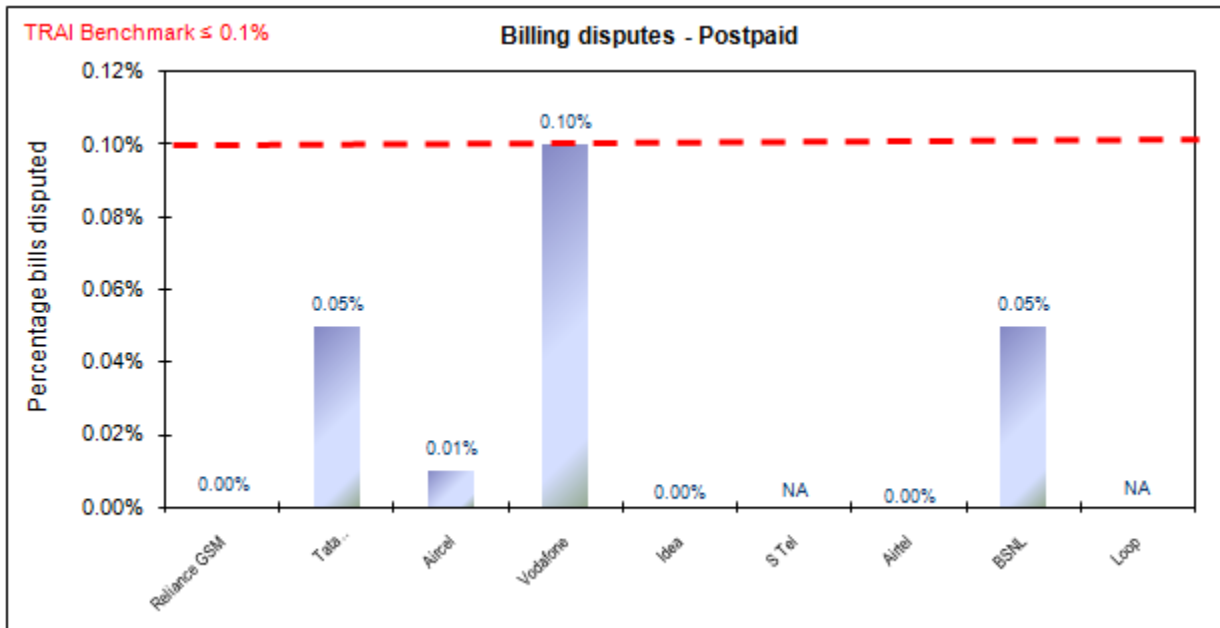
All the operators meet the benchmark

Live measurement (Drive test)

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

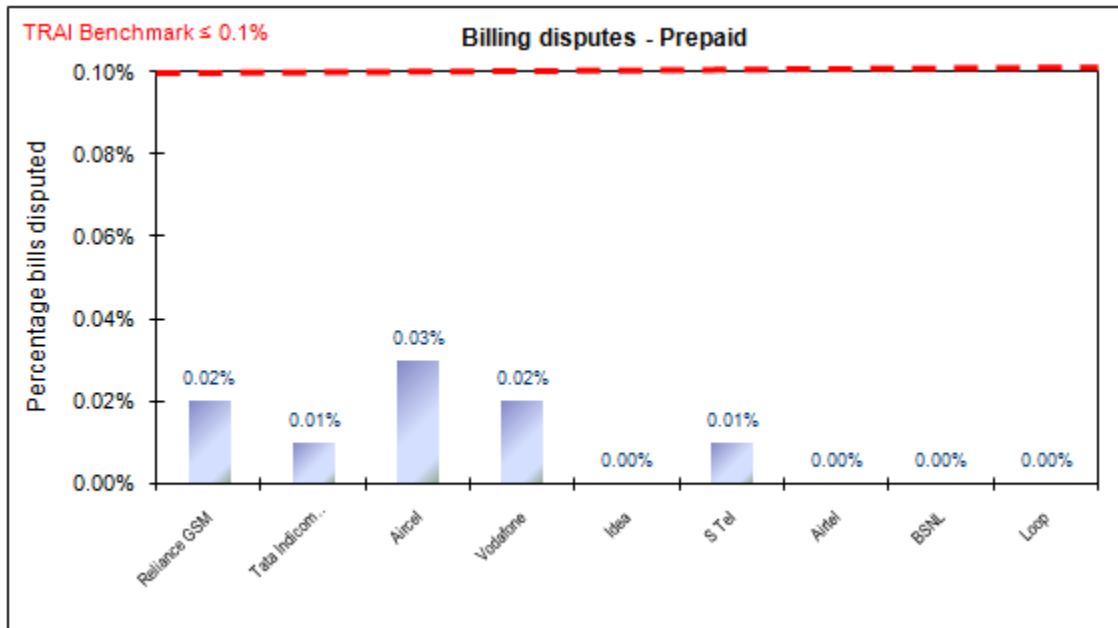
Operator(s) not meeting the benchmark: Idea, S Tel, BSNL

Billing Disputes - Postpaid



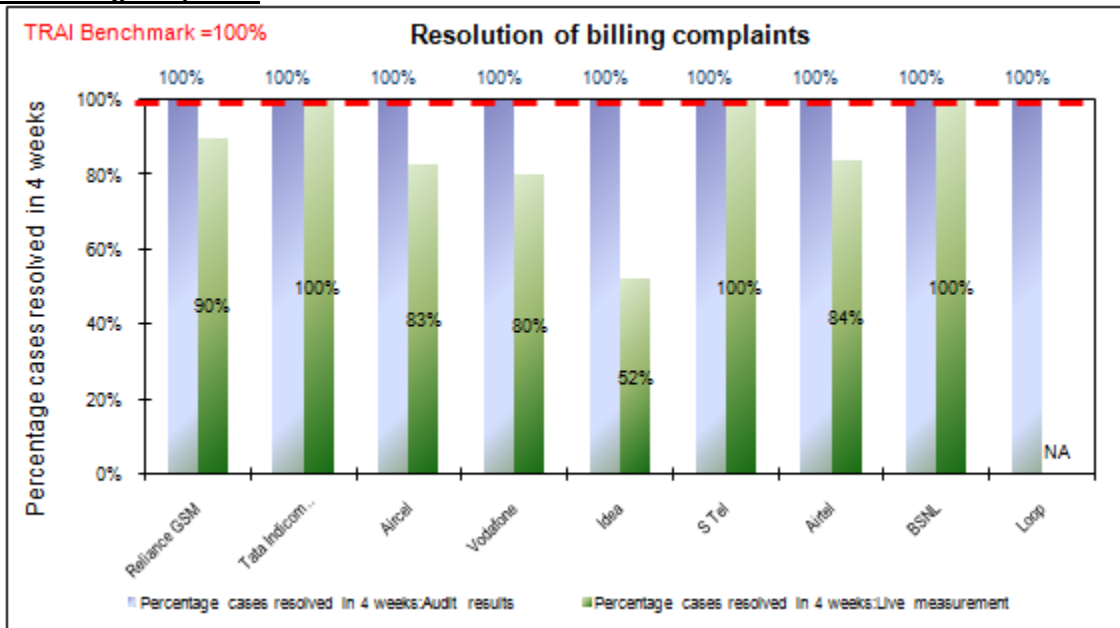
All the operators meet the benchmark

Complaints - Prepaid



All the operators meet the benchmark

Resolution of billing complaints



One month

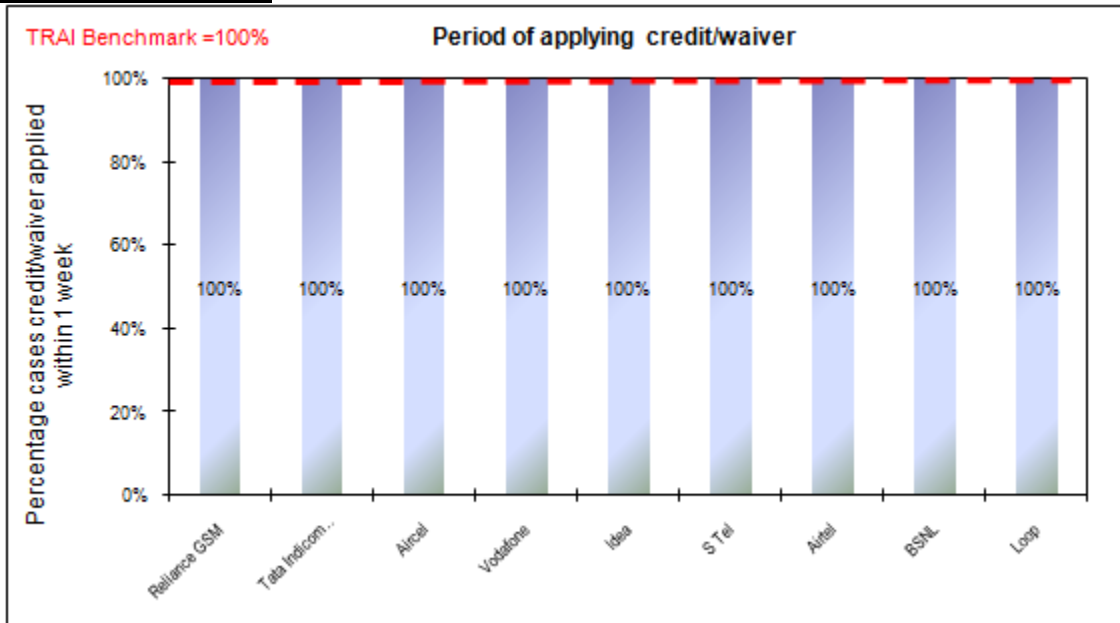
All the operators meet the benchmark

Live calling

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

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

Period of applying credit / waiver

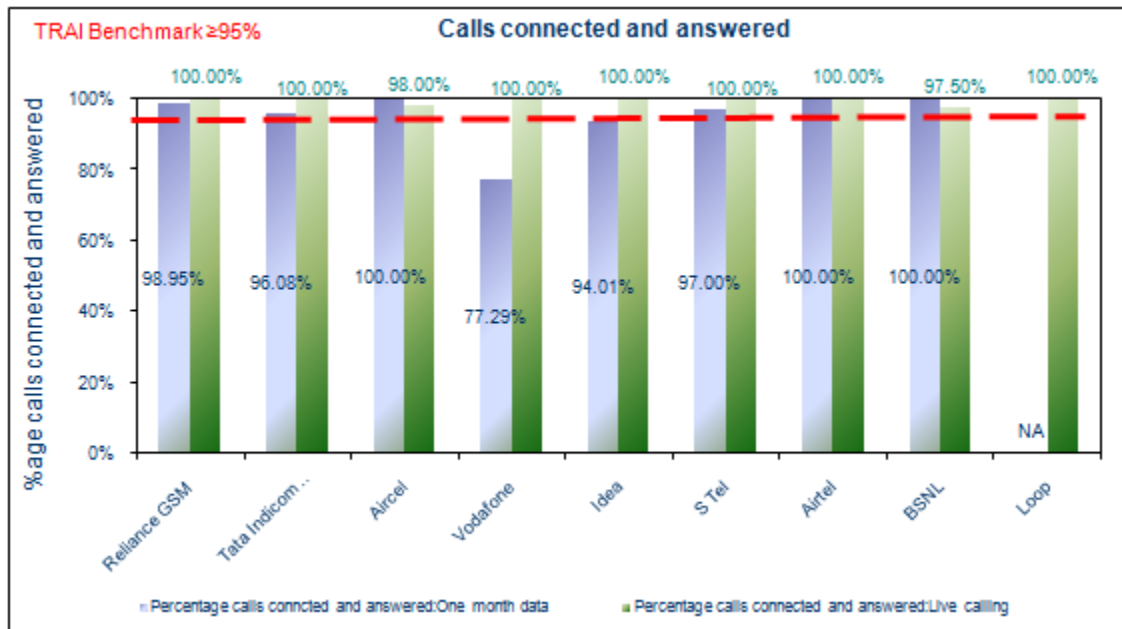


All the operators meet the benchmark

Live calling for billing Complaints

Resolution of billing complaints	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Airtel	BSNL	Loop
Total Number of calls made		100	8	100	100	21	2	100	44	NA
Number of cases resolved in 4 weeks		90	8	83	80	11	2	84	44	NA
Percentage cases resolved in four weeks	100%	90%	100%	83%	80%	52%	100%	84%	100%	NA

Customer Care / Helpline: Calls answered



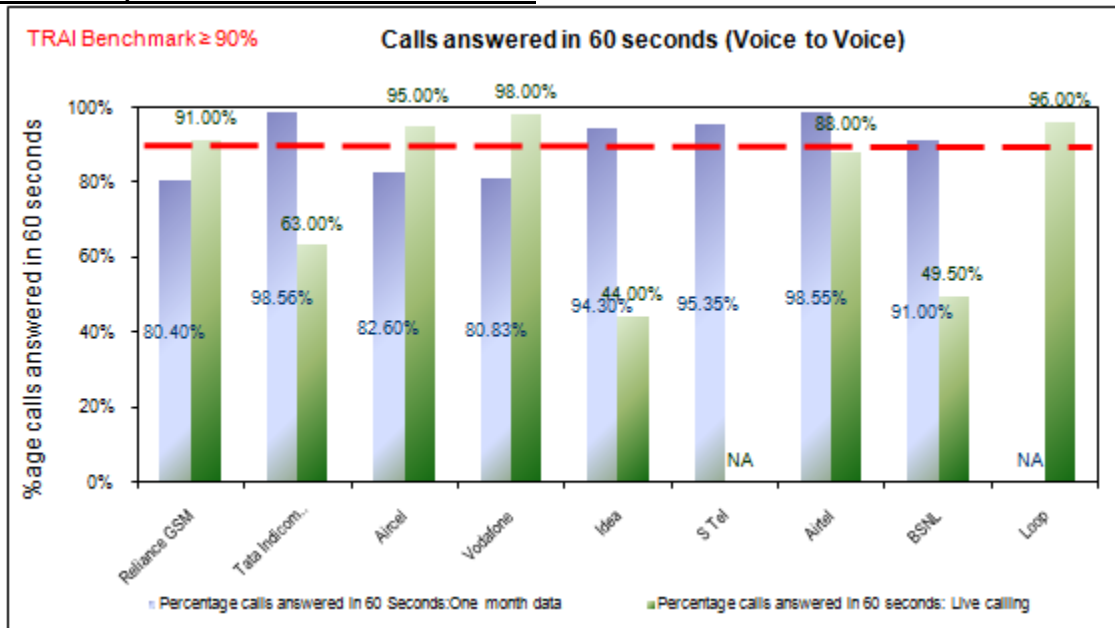
One month

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

Live calling

All the operators meet the benchmark

Customer Care / Helpline: Calls answered voice to voice



One month

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

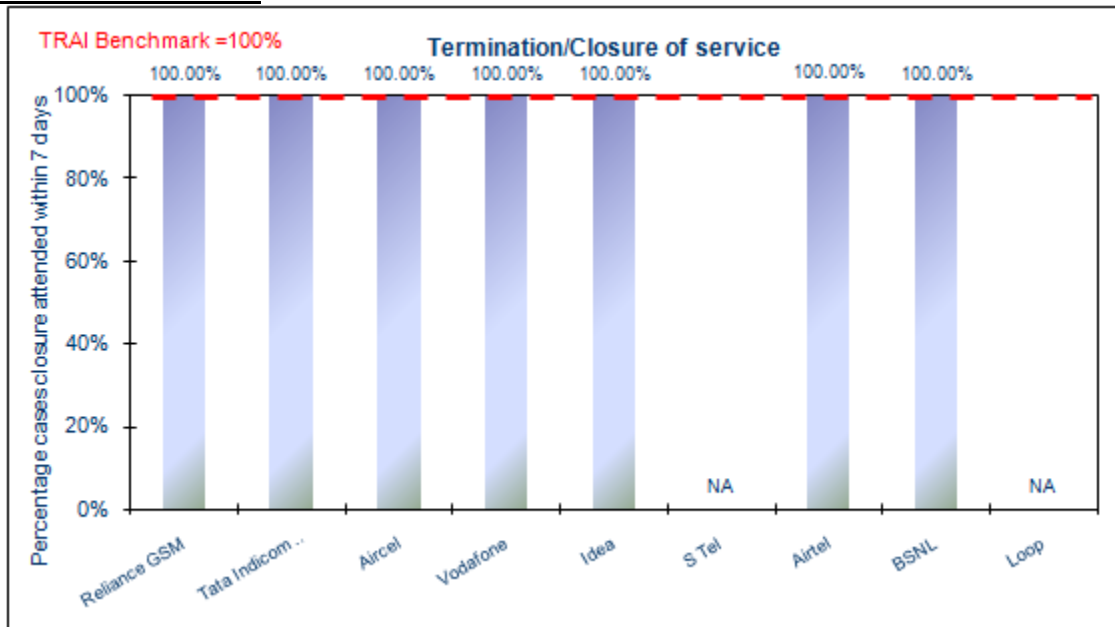
Operator(s) not meeting the benchmark: Reliance GSM, Aircel, Vodafone

Live calling

Operator(s) meeting benchmark: Reliance GSM, Aircel, Vodafone, Loop

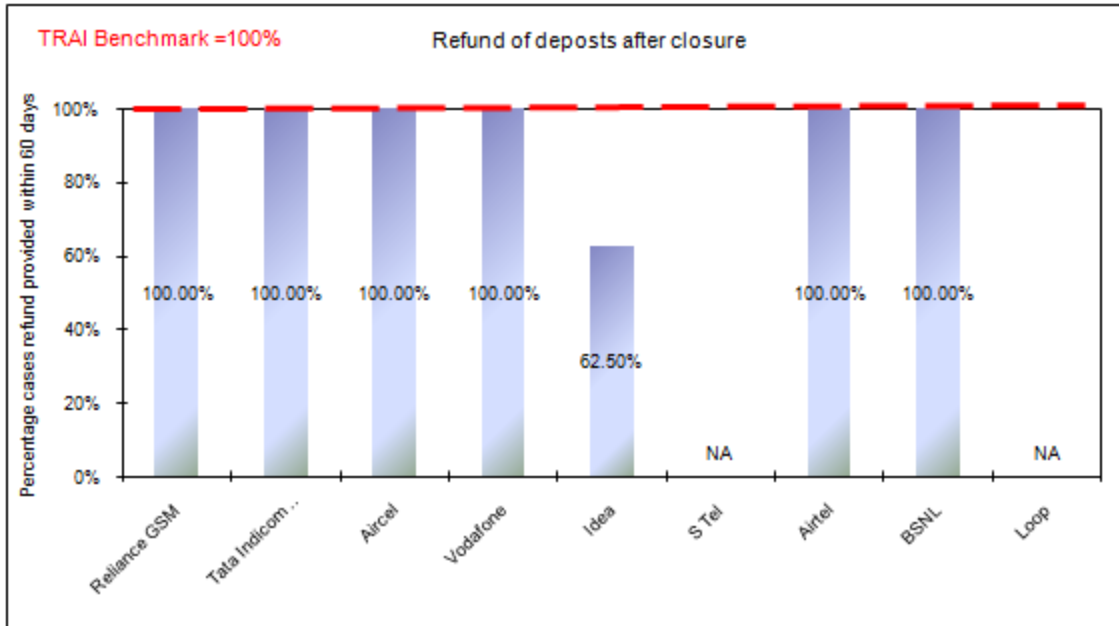
Operator(s) not meeting the benchmark: Tata Indicom (CDMA), Idea, Airtel, BSNL

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	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 ch. 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	549	390	0.10%	3	0.55%	98.02%	0.73%	1.11%	1.26%	13	1647	0.79%	98.53%	0	DNP	40000	15176	NA
	IMRB	549	390	0.10%	3	0.55%	98.02%	0.73%	1.11%	1.26%	13	1647	0.79%	98.53%	0	14	40000	15176	NA
Tata Indicom (CDMA)	PMR	171	809	0.66%	2	1.17%	99.47%	0.00%	0.03%	0.38%	2	523	0.38%	99.65%	0	DNP	33743	6600	42249
	IMRB	171	809	0.03%	2	1.17%	99.47%	0.00%	0.03%	0.38%	2	523	0.38%	98.82%	0	29	21443	6475	42249
Aircel	PMR	1460	15114	1.44%	198	13.60%	87.59%	10.86%	11.28%	2.13%	784	4196	18.68%	91.28%	0	DNP	102668	54698	1477557
	IMRB	1460	15113	1.44%	198	13.60%	87.59%	10.86%	11.28%	2.13%	784	4196	18.68%	91.28%	0	36	67593	54698	1477557
Vodafone	PMR	913	2544	0.39%	8	0.88%	97.49%	0.71%	1.48%	1.23%	83	2768	3.00%	97.17%	0	DNP	21558	19000	591927
	IMRB	913	2544	0.39%	8	0.88%	97.49%	0.71%	1.48%	1.23%	121	2768	4.37%	97.00%	0	29	25868	19000	591927
Idea	PMR	363	2707	1.04%	0	0.00%	95.26%	0.64%	1.70%	1.76%	33	1089	2.98%	96.48%	0	DNP	7209	4974	152331
	IMRB	363	2707	1.04%	0	0.00%	95.00%	0.64%	1.70%	1.75%	33	1089	2.98%	96.47%	0	25	7209	4974	152331
S Tel	PMR	106	507	0.64%	0	0.00%	99.10%	0.01%	0.02%	0.39%	11	318	3.46%	98.60%	0	0	0	0	0
	IMRB	106	507	0.64%	0	9.49%	99.00%	0.00%	0.01%	0.40%	6	318	1.88%	98.61%	0	18	2367	237	9031
Airtel	PMR	1365	8411	0.85%	42	3.08%	95.28%	0.91%	1.97%	1.68%	120	4050	2.96%	96.71%	0	DNP	76995	58350	1733776
	IMRB	1365	8411	0.83%	42	3.08%	95.00%	0.91%	1.97%	1.68%	120	4050	2.96%	98.71%	0	42	76994	58350	1830153
BSNL	PMR	1059	15717	2.08%	114	7.11%	96.00%	2.05%	2.85%	2.53%	242	3136	7.89%	97.00%	0	54	120000	44412	874134
	IMRB	494	10892	3.04%	61	12.34%	95.71%	3.11%	3.67%	3.06%	161	1474	10.92%	95.85%	0	0	48000	29402	498832
Loop	PMR	13	142	1.47%	0	0.00%	97.35%	0.24%	0.00%	0.03%	0	40	0.00%	100.00%	0	DNP	296	0	2
	IMRB	13	142	1.47%	0	0.00%	97.00%	0.24%	0.00%	0.03%	0	40	0.00%	100.00%	0	11	296	0	2

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 (%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 TCH B 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	549	365	0.09%	2	0.36%	98.26%	0.69%	1.04%	1.11%	11	1647	0.67%	98.71%	0	DNP	40000	14052	0
	IMRB	549	365	0.09%	2	0.36%	98.26%	0.69%	1.04%	1.11%	11	1647	0.67%	98.71%	0	14	40000	14052	0
Tata Indicom (CDMA)	PMR	173	910	0.71%	8	4.62%	99.38%	0.00%	0.05%	0.40%	5	536	0.93%	99.53%	0	DNP	35137	7448	44910
	IMRB	173	910	0.03%	8	4.62%	99.35%	0.00%	0.05%	0.40%	5	536	0.93%	98.78%	0	29	21976	5759	44910
Aircel	PMR	1474	15671	1.43%	209	14.18%	87.39%	10.30%	11.33%	2.20%	853	4238	20.12%	91.00%	0	DNP	103910	55196	1497940
	IMRB	1474	15671	1.43%	209	14.18%	87.39%	10.30%	11.33%	2.20%	853	4238	20.12%	91.28%	0	36	67593	55195	1497940
Vodafone	PMR	913	2544	0.39%	8	0.88%	97.49%	0.71%	1.48%	1.23%	83	2768	3.00%	97.17%	0	DNP	21558	19000	591927
	IMRB	976	5359	0.74%	12	1.23%	97.63%	0.31%	1.67%	1.25%	129	2982	4.33%	97.11%	0	29	21589	19382	619505
Idea	PMR	364	2537	0.97%	7	1.92%	97.01%	0.84%	1.85%	1.98%	31	1092	2.84%	96.57%	0	DNP	7229	4704	168170
	IMRB	364	2637	0.97%	7	1.92%	97.00%	0.84%	1.84%	1.97%	31	1092	2.84%	96.57%	0	25	7229	4704	168170
S Tel	PMR	106	574	0.73%	2	1.88%	99.23%	0.00%	0.20%	0.56%	14	318	4.40%	98.55%	0	DNP	2367	231	12161
	IMRB	106	593	0.75%	3	3.90%	99.56%	0.00%	0.01%	0.39%	11	318	3.45%	98.54%	0	18	2367	197	8742
Airtel	PMR	1377	9929	1.00%	27	1.96%	95.50%	0.90%	1.90%	1.60%	118	4086	2.90%	99.0-%	0	DNP	78672	56435	1812553
	IMRB	1377	9929	0.97%	43	3.12%	95.45%	0.93%	1.91%	1.62%	118	4086	2.89%	98.71%	0	40	78671	56434	1812553
BSNL	PMR	1077	15983	2.04%	115	7.22%	95.00%	2.19%	2.80%	2.48%	268	3187	8.47%	97.00%	0	DNP	128000	45123	880932
	IMRB	505	10944	2.91%	63	12.47%	95.48%	3.45%	3.73%	2.98%	185	1504	11.95%	96.18%	0	0	48000	29906	500504
Loop	PMR	13	92.39	0.96%	0	0.00%	97.50%	0.00%	0.00%	0.60%	0	40	0.00%	100.00%	0	DNP	296	0	4
	IMRB	13	92.65	0.96%	0	0.00%	97.50%	0.00%	0.00%	0.60%	0	40	0.00%	100.00%	0	11	162	0	4

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	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 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	584	237	0.06%	10	1.71%	98.28%	0.76%	1.09%	1.12%	41	1752	2.34%	98.78%	0	DNP	40000	14263	0
	IMRB	584	237	0.06%	10	1.71%	98.28%	0.76%	1.09%	1.12%	41	1752	2.34%	98.78%	0	14	40000	14263	0
Tata Indicom (CDMA)	PMR	171	918	0.75%	10	5.85%	99.42%	0.00%	0.03%	0.40%	1	541	0.18%	99.59%	0	DNP	36777	7587	58867
	IMRB	171	918	0.03%	10	5.85%	99.42%	0.00%	0.03%	0.40%	1	541	0.18%	98.07%	0	29	22181	7587	58867
Aircel	PMR	1475	12113	1.10%	129	8.75%	88.87%	8.07%	9.87%	2.00%	655	4244	15.43%	92.54%	0	DNP	104218	55437	1534996
	IMRB	1475	12113	1.10%	129	8.75%	88.87%	8.07%	9.87%	2.05%	655	4244	15.43%	92.54%	0	36	67593	55436	1534996
Vodafone	PMR	1016	4125	0.58%	10	0.98%	97.36%	0.47%	1.73%	1.41%	92	3118	2.95%	97.06%	0	DNP	23013	20783	639728
	IMRB	1016	4125	0.58%	10	0.98%	97.36%	0.47%	1.73%	1.41%	129	3118	4.14%	97.06%	0	29	23013	20783	639728
Idea	PMR	372	2596	0.97%	6	1.61%	95.00%	0.95%	0.95%	1.94%	30	1116	2.69%	96.24%	0	DNP	7388	4773	180434
	IMRB	372	2596	0.97%	6	1.61%	95.00%	0.95%	0.95%	1.94%	30	1116	2.68%	96.24%	0	25	7388	4772	180434
S Tel	PMR	106	605	0.76%	2	1.88%	99.26%	0.00%	0.02%	0.43%	15	318	4.70%	98.46%	0	DNP	2367	242	13339
	IMRB	106	800	1.05%	3	19.61%	99.53%	0.00%	0.01%	0.42%	11	318	3.45%	98.47%	0	18	2367	198	8506
Airtel	PMR	1385	10768	1.10%	23	1.70%	95.50%	0.90%	1.86%	1.40%	95	4110	2.30%	99.40%	0	DNP	79745	59591	1743918
	IMRB	1385	10768	1.05%	23	1.66%	95.46%	0.88%	1.86%	1.39%	95	4110	2.31%	99.36%	0	41	79745	59591	1743918
BSNL	PMR	1084	15837	2.10%	125	7.15%	96.00%	2.05%	2.75%	2.45%	295	3208	8.50%	97.00%	0	DNP	144000	54249	930750
	IMRB	509	10510	2.86%	63	12.96%	95.63%	3.08%	3.65%	2.89%	211	1516	11.88%	96.22%	0	0	48000	38843	545612
Loop	PMR	13	128	1.37%	0	0.00%	100.00%	0.00%	0.00%	0.00%	0	40	0.00%	100.00%	0	DNP	162	0	5
	IMRB	13	128	1.37%	0	0.00%	100.00%	0.00%	0.00%	0.00%	0	40	0.00%	100.00%	0	11	162	0	5

Name of Service Provider		Metering and Billing											Response time to the customer for assistance				Termination/ closure of service				
		Metering and billing credibility - post paid	No. of bills issued during the period	No. of bills disputed including billing complaints during the period	Metering and billing credibility - pre paid	No. of charging / credit / validity complaints during the quarter	Total no. of pre-paid customers at the end of the quarter	Resolution of billing/charging complaints	No. of billing/ (post-paid) and charging, credit / validity (pre-paid) complaints resolved within 4 weeks during the quarter	No. of billing/ (post-paid) and charging, credit / validity (pre-paid) complaints received during the quarter	and charging, credit / validity complaints (pre paid) resolved in favour of the customer during the quarter	No. of complaints disposed on account of not considered as valid complaints during the quarter	100% or applying credit waiver / adjustment to customer/s account from the date of resolution of complaints	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	0.10%	54682	54	0.04%	298.67	690660	100%	950	950	55	895	DNP	49.00%	251377	115118	97.00%	100%	36	36	100%
	IMRB	0.10%	54682	54	0.04%	299	690660	100%	950	950	55	895	100%	49.00%	251377	115118	97.00%	100%	36	36	100%
Tata Indicom (CDMA)	PMR	0.02%	19412	4	0.01%	17	193817	100%	29	29	20	9	DNP	99.00%	23343	23113	95.00%	100%	517	517	100%
	IMRB	0.02%	19412	4	0.01%	17	65148	100%	29	29	20	9	100%	99.00%	23343	23113	95.00%	100%	517	517	100%
Aircel	PMR	0.00%	70877	3	0.02%	522	2174732	100%	525	525	515	10	100%	100.00%	138579	123883	91.68%	100%	156	156	100%
	IMRB	0.01%	69701	5	0.03%	650	2174732	100%	655	655	651	4	100%	100.00%	180725	123178	67.77%	100%	205	205	100%
Vodafone	PMR	0.13%	38936	52	0.03%	852	848950	100%	904	904	878	26	100%	100.00%	112021	70982	73.00%	100%	248	248	100%
	IMRB	0.13%	38936	52	0.03%	852	848950	100%	904	904	878	26	100%	100.00%	112021	70982	73.00%	100%	248	248	100%
Idea	PMR	0.00%	2520	0	0.00%	16	627256	100%	658	658	18	640	100%	83.00%	75235	62285	89.00%	100%	68	68	100%
	IMRB	0.00%	2520	0	0.00%	16	624328	100%	658	658	16	642	100%	83.00%	75235	62285	88.00%	100%	82	68	100%
S Tel	PMR	NA	NA	NA	0.07%	28	41121	100%	28	28	21	7	100%	99.00%	15415	14967	97.00%	0%	0	0	0%
	IMRB	NA	NA	NA	0.07%	28	41121	100%	28	28	21	7	100%	99.00%	15415	14967	97.00%	0%	0	0	0%
Airtel	PMR	0.00%	125109	3	0.00%	DNP	6729170	100%	3	4030	3	4027	100%	100.00%	20126194	20126194	74.00%	100%	767	767	100%
	IMRB	0.00%	125109	3	0.00%	0	6729170	100%	3	3	3	4027	100%	100.00%	13032010	1570684	80.00%	100%	767	767	100%
BSNL	PMR	0.91%	251931	94	0.05%	552	1208525	100%	558	670	456	38	100%	98.00%	3747	3084	88.00%	100%	21699	21699	100%
	IMRB	0.00%	85154	57	0.00%	552	710816	100%	448	560	448	0	0%	99.00%	2024	1470	81.00%	100%	20687	20687	100%
Loop	PMR	NA	NA	NA	NA	NA	20	NA	NA	NA	NA	NA	NA	100.00%	2	2	100.00%	NA	NA	NA	NA
	IMRB	NA	NA	NA	NA	NA	20	0%	0	0	0	0	NA	NA	2	2	100.00%	NA	NA	NA	NA

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. BSNL does not meet the TRAI specified benchmark for BTSs Accumulated downtime.
2. Aircel, S-Tel, Airtel and BSNL did not meet the TRAI specified benchmark for worst affected BTSs due to downtime.
3. Aircel did not meet the TRAI specified benchmark for CSSR
4. Aircel and BSNL did not meet the TRAI specified benchmark for SDCCH/Paging channel congestion
5. Aircel and BSNL did not meet the TRAI specified benchmark for TCH
6. Aircel and BSNL did not meet the TRAI specified benchmark for Call drop
7. Aircel and BSNL did not meet the TRAI specified benchmark for Worst affected cells having more than 3% TCH drop rate
8. Aircel does not meet the TRAI specified benchmark for voice quality
9. Vodafone and BSNL did not meet the TRAI specified benchmark for Metering and billing credibility (post paid).
10. Reliance and Idea did not meet the TRAI specified benchmark for accessibility of call centre/ customer care
11. Aircel, Airtel, Vodafone, Idea and BSNL did not meet the TRAI specified benchmark for percentage of calls answered by the operators (voice to voice) within 60 seconds

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	0.01%	1.29%	98.61%	0.60%	0.95%	0.92%	1.88%	99.04%	0.00%	0.02%	100.00%	100.00%	98.95%	80.40%	100.00%	100.00%
Tata Indicom (CDMA)	0.14%	0.00%	98.33%	0.00%	0.17%	0.48%	0.17%	99.19%	0.05%	0.01%	100.00%	100.00%	96.08%	98.56%	100.00%	100.00%
Aircel	0.52%	1.83%	97.26%	0.67%	1.72%	1.84%	4.43%	95.39%	0.01%	0.03%	100.00%	100.00%	100.00%	82.60%	100.00%	100.00%
Vodafone	0.59%	0.74%	98.21%	0.27%	0.89%	0.88%	4.36%	97.43%	0.10%	0.02%	100.00%	100.00%	77.29%	80.83%	100.00%	100.00%
Idea	0.89%	1.98%	98.36%	0.38%	1.40%	0.57%	2.81%	95.57%	0.00%	0.00%	100.00%	100.00%	94.01%	94.30%	100.00%	62.50%
S Tel	0.90%	5.61%	99.46%	0.00%	0.01%	0.40%	2.20%	98.53%	NA	0.01%	100.00%	100.00%	97.00%	95.35%	NA	NA
Airtel	0.71%	1.88%	95.60%	0.80%	1.73%	1.38%	2.72%	98.70%	0.00%	0.00%	100.00%	100.00%	100.00%	98.55%	100.00%	100.00%
BSNL	2.39%	14.63%	95.47%	1.81%	2.49%	2.00%	7.45%	96.09%	0.05%	0.00%	100.00%	100.00%	100.00%	91.00%	100.00%	100.00%
Loop	0.82%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	100.00%	NA	0.00%	100.00%	100.00%	NA	NA	NA	NA

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					
Airtel	All POI's meeting TRAI specified benchmark					
BSNL	NE	Idea MSG	307	31484	270.92	Applied for 10 E1s
	NE	Airtel OG	1949	310713	1943.92	Applied for 10 E1s
	NE	Vodafone	1083	120549	1066.51	Feasibility given for 10 E1s
Loop	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	Airtel	BSNL	Loop
Number of BTSs in the licensed service area		619	178	1479	1088	404	107	1434	1121	13
Sum of downtime of BTSs in a month (in hours)		29	185	5684	4795	2670	715	7622	19922	79
BTSs accumulated downtime (not available for service)	≤ 2%	0.01%	0.14%	0.52%	0.59%	0.89%	0.90%	0.71%	2.39%	0.82%
Number of BTSs having accumulated downtime >24 hours		8	0	27	8	8	6	27	164	0
Worst affected BTSs due to downtime	≤ 2%	1.29%	0.00%	1.83%	0.74%	1.98%	5.61%	1.88%	14.63%	0.00%

2. Connection Establishment (Accessibility)

Audit Results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Airtel	BSNL	Loop
CSSR	≥ 95%	98.61%	98.33%	97.26%	98.21%	98.36%	99.46%	95.60%	95.47%	100.00%

SDCCH congestion	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Airtel	BSNL	Loop
SDCCH/Paging channel congestion	≤ 1%	0.60%	0.00%	0.67%	0.27%	0.38%	0.00%	0.80%	1.81%	0.00%

TCH congestion	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Airtel	BSNL	Loop
TCH congestion	≤ 2%	0.95%	0.17%	1.72%	0.89%	1.40%	0.01%	1.73%	2.49%	0.00%

Live measurement results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Airtel	BSNL	Loop
CSSR	≥ 95%	98.57%	99.48%	98.00%	98.63%	97.98%	99.59%	95.51%	96.79%	100.00%

SDCCH congestion	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Airtel	BSNL	Loop
SDCCH/Paging channel congestion	≤ 1%	0.04%	0.00%	0.47%	0.02%	1.59%	0.05%	0.16%	1.01%	0.00%

TCH congestion	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Airtel	BSNL	Loop
TCH congestion	≤ 2%	0.53%	0.02%	1.40%	0.19%	1.71%	0.00%	0.49%	1.62%	0.00%

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	Airtel	BSNL	Loop
Total number of call attempts		719	1176	608	659	611	192	595	549	NA
Total number of successful calls established		713	1176	608	652	559	192	595	512	NA
CSSR	≥ 95%	99.17%	100.00%	100.00%	98.94%	91.49%	100.00%	100.00%	93.26%	NA

Blocked calls	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Airtel	BSNL	Loop
%age blocked calls		0.83%	0.00%	0.00%	1.06%	8.51%	0.00%	0.00%	6.74%	NA

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	Airtel	BSNL	Loop
Total number of calls established		18088044	12521348	138365602	12921341	7635428	436817	132425103	432477520	116
Total number of calls dropped		166960	59674	2541543	114038	135953	1740	1827466	8668839	0
Call drop rate	≤ 2%	0.92%	0.48%	1.84%	0.88%	0.57%	0.40%	1.38%	2.00%	0.00%

Cells having more than 3% TCH	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Airtel	BSNL	Loop
Total number of cells in the network		1857	582	4314	3349	1212	318	4257	3304	40
Total number of cells having more than 3% TCH		35	1	191	146	34	7	116	246	0
Worst affected cells having more than 3% TCH	≤ 3%	1.88%	0.17%	4.43%	4.36%	2.81%	2.20%	2.72%	7.45%	0.00%

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	Airtel	BSNL	Loop
Total number of calls established		26048025	72393	157265710	13199448	7534974	407161	8124156	14155161	58
Total number of calls dropped		176638	424	2564693	132845	97718	1527	132517	273791	0
Call drop rate	≤ 2%	0.68%	0.59%	1.63%	1.01%	1.30%	0.38%	1.63%	1.93%	0.00%

Cells having more than 3% TCH	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Airtel	BSNL	Loop
Total number of cells in the network		1875	582	12936	3366	87264	321	4286	2052	40
Total number of cells having more than 3% TCH		7	1	624	143	2095	8	110	107	0
Worst affected cells having more than 3% TCH	≤ 3%	0.37%	0.17%	4.82%	4.25%	2.40%	2.49%	2.57%	5.21%	0.00%

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	Airtel	BSNL	Loop
Total number of calls established		744	1174	608	652	609	192	579	512	NA
Total number of calls dropped		4	0	0	0	0	9	7	3	NA
Call drop rate	≤ 2%	0.54%	0.00%	0.00%	0.00%	0.00%	4.69%	1.21%	0.59%	NA

4. Voice quality

Audit Results for Voice quality

Voice quality	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Airtel	BSNL	Loop
Total number of sample calls		3208754982	1842	12190965924	1986299475	905920871	23771593	22824340912	281	116
Total number of calls with good voice quality		3177954483	1827	11629496322	1935303762	865819759	23423013	22528486904	270	116
%age calls with good voice quality	≥ 95%	99.04%	99.19%	95.39%	97.43%	95.57%	98.53%	98.70%	96.09%	100.00%

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

Voice quality	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Airtel	BSNL	Loop
Total number of sample calls		484174	33057	527696	786256	544796	298990	680555	154784	NA
Total number of calls with good voice quality		467336	31547	509284	756848	517233	269948	649634	140110	NA
%age calls with good voice quality	≥ 95%	96.52%	95.43%	96.51%	96.26%	94.94%	90.29%	95.46%	90.52%	NA

5. POI Congestion


Audit Results for POI Congestion

POI congestion	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Airtel	BSNL	Loop
Total number of working POIs		14	30	34	30	26	23	16	57	11
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	3	0
Total Capacity of all POIs (A) - in erlangs		201602	3043	34302	14371104	6971	1072	44023	35000	247
Traffic served for all POIs (B)- in erlangs		130144	613	24713	3889772	2800	211	26481	34908	4.39
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	Airtel	BSNL	Loop
Reliance GSM	NA	100%	100%	100%	84%	95%	100%	95%	97%
Tata Indicom (CDMA)	100%	NA	100%	100%	100%	100%	100%	96%	99%
Aircel	89%	100%	NA	100%	100%	100%	100%	88%	97%
Vodafone	100%	100%	100%	NA	100%	97%	100%	97%	98%
Idea	100%	100%	100%	100%	NA	100%	100%	92%	98%
S Tel	100%	100%	100%	100%	86%	NA	100%	100%	96%
Airtel	100%	100%	100%	100%	97%	97%	NA	96%	99%
BSNL	76%	100%	100%	100%	100%	97%	100%	NA	100%
Loop	95%	100%	100%	100%	100%	95%	100%	91%	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	Airtel	BSNL	Loop
Billing disputes - Postpaid										
Total bills generated during the period		17444	15904	69701	13647	940	NA	43408	34114	0
Total number of bills disputed		0	8	5	13	0	NA	1	16	0
Percentage bills disputed	≤ 0.1%	0.00%	0.05%	0.01%	0.10%	0.00%	NA	0.00%	0.05%	NA
Billing disputes - Prepaid										
Number of complaints related to charging, credit & validity		135	3	650	163	0	3	4	28	0
Total number of prepaid customers in that period		811700	57949	2157576	891090	204654	42242	2287890	139031	41
Percentage of complaints	≤ 0.1%	0.02%	0.01%	0.03%	0.02%	0.00%	0.01%	0.00%	0.00%	0.00%
Resolution of billing complaints										
Total number of billing/charging complaints		135	11	655	175	50	3	5	16	0
Total complaints considered invalid		77	11	4	11	50	1	339	0	0
Number of complaints resolved in 4 weeks from date of receipt for complaints listed in 5.3.1		135	11	655	175	50	3	5	16	0
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		58	0	651	156	0	2	5	9	0
Percentage cases in which credit/waiver was received within 1 week	100%	100%	100%	100%	100%	100%	100%	100%	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	Airtel	BSNL	Loop
Total Number of calls made		100	8	100	100	21	2	100	44	NA
Number of cases resolved in 4 weeks		90	8	83	80	11	2	84	44	NA
Percentage cases resolved in four weeks	100%	90%	100%	83%	80%	52%	100%	84%	100%	NA

8. Customer Care

Audit results for customer care

Customer Care Assessment	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Airtel	BSNL	Loop
Total number of call attempts to customer care for assistance		1013817	6428	6153820	779939	17438	16114	3197392	263646	0
Number of calls getting connected and answered (electronically)		1003123	6176	6153820	602845	16393	15630	3197392	263646	0
Percentage calls getting connected and answered	≥ 95%	98.95%	96.08%	100.00%	77.29%	94.01%	97.00%	100.00%	100.00%	NA
Number of calls getting transferred to the operator (voice to voice)		209710	8807	1539172	181696	49675	3309	514259	99924	0

Number of calls answered by operator (voice to voice) within 60 seconds		168603	8680	1271380	146857	46843	3155	506785	90930	0
Percentage calls answered within 60 seconds (V2V)	≥ 90%	80.40%	98.56%	82.60%	80.83%	94.30%	95.35%	98.55%	91.00%	NA

Live calling results for customer care

Customer Care Assessment	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Airtel	BSNL	Loop
Total Number of calls made		100	100	100	100	100	100	100	200	100
Total Number of calls getting connected and answered		100	100	98	100	100	100	100	195	100
Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	98.00%	100.00%	100.00%	100.00%	100.00%	97.50%	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	Airtel	BSNL	Loop
Total Number of calls made		100	100	100	100	100	NA	100	200	100
Total Number of calls answered within 60 seconds		91	63	95	98	44	NA	88	99	96
Percentage calls answered within 60 seconds	≥ 90%	91.00%	63.00%	95.00%	98.00%	44.00%	NA	88.00%	49.50%	96.00%

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	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Airtel	BSNL	Loop
Total number of closure request		11	203	205	52	20	NA	126	104	0
Number of requests attended within 7 days		11	203	205	52	20	NA	126	104	0
Percentage cases in which termination done within 7 days	100%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	NA

Audit results for refund of deposits

Refund	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Airtel	BSNL	Loop
Total number of cases requiring refund of deposits		10	82	288	98	8	NA	63	16	0
Total number of cases where refund was made within 60 days		10	82	288	98	5	NA	63	16	0
Percentage cases in which refund was receive within 60 days	100%	100.00%	100.00%	100.00%	100.00%	62.50%	NA	100.00%	100.00%	NA

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

Traffic in Erlang	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Airtel	BSNL	Loop
Equipped capacity of the network		40000	NA	67593	25491	10154	2423	81985	24000	61.44
Total traffic handled in erlang during TCBH		16130	NA	52197	21361	6833	226	60601	21160	1.57

Total number of customers as per VLR

	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Airtel	BSNL	Loop
Total no. of customers served (as per VLR)		NA	55548	1600931	712995	171322	7302	1871846	79174	7

Live calling for level 1 services

Level 1 services	Benchmark	Reliance GSM	Tata Indicom (CDMA)	Aircel	Vodafone	Idea	S Tel	Airtel	BSNL	Loop
Total no. of calls made		150	150	150	150	150	150	150	300	150
Calls answered in 60 sec		0	150	150	50	150	0	50	300	125

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