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

Kolkata Circle

Report: July–August - September - 2011

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

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A specialist unit of IMRB International

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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, have been distributed across various quarterly periods. IMRB International Auditors carried out Audits across Orissa, Bihar & Jharkhand, West Bengal, North-East, Assam and Kolkata circles in the third quarter of 2011. **This report details the performance of various service providers in Kolkata circle against Quality of Services benchmarks for various parameters laid down by TRAI in respective regulations for Cellular (Mobile) services.**

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1.0 <u>Background</u>

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

IMRB has been carrying out this exercise for TRAI since December 2007 to assess the quality of services being provided by Basic (Wireline), Cellular Mobile (Wireless) and Broadband service providers.

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 Audit Module findings for "Kolkata" circle for Cellular Mobile services

This report highlights the findings for the Audit module for Kolkata circle that was covered in period of July-Sep 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 Jan-Mar 2011.

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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 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 the customer care, inter operator call assessment, Back check calls for service provisioning and fault repair

- 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

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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 Centres (MSC's) of all the Cellular Mobile Service Providers or Unified Access Service Providers (UASP) was collected and verified in specified circles/service areas. Following are the various operators covered in Kolkata circle

	Name of Operator
Operator 1	Airtel
Operator 2	Aircel
Operator 3	Idea
Operator 4	Sistema Shyam
Operator 5	Tata Docomo
Operator 6	BSNL
Operator 7	Tata Tele-CDMA
Operator 8	Vodafone
Operator 9	Uninor
Operator 10	Reliance (GSM)
Operator 11	Reliance (CDMA)

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 ASSISSTED 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		

{Note: A more detailed explanation of parameter wise audit methodology for Cellular Mobile services is explained in Annexure II}

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 July 2011 to September 2011 in Kolkata 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

Name of Service Provider	Time Consistent Busy Hour (TCBH)	Network Availability					Connection Establishment (Accessibility)			Connection Maintenance (Retainability)					POI	Network Traffic Capacity and Utilization			
		Total no. of BTSs in the licensed service area	Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month	BTSs Accumulated downtime (not available for service) (%age)	No. of BTSs having accumulated downtime of >24 hours in a month	Worst affected BTSs due to downtime (%age)	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Total No. of cells exceeding 3% TCH drop (call drop)	Total no. of cells in the network	Worst affected cells having more than 3% TCH drop (call drop) rate (%age)	%age of connection with good voice quality	POI Congestion (No. of POIs not meeting the benchmark) Note :2)	Total number of working POI Service Area wise	Equipped Capacity of Network in respect of Traffic in erlang	Total traffic handled in TCBH in erlang	Total no. of customers served (as per VLR) on last day of the month
Benchmark				≤ 2%		≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%			≤ 5%	≥ 95%	≤ 0.5%				
Airtel	19:00 - 20:00	2010	547	0.04%	2	0.10%	99.30%	0.05%	0.08%	0.97%	5	5518	0.09%	98.31%	0	70	116731	79420	3103906
Aircel	19:00 - 20:00	2075	80	0.01%	0	0.00%	98.07%	0.18%	0.04%	0.63%	78	5890	1.32%	97.77%	0	39	73138	21486	835062
Idea	19:00 - 20:00	1624	1080	0.09%	7	0.43%	98.47%	0.15%	0.29%	0.81%	70	4767	1.47%	98.32%	0	57	32268	16125	625001
Sistema Shyam	19:00 - 20:00	459	0	0.00%	0	0.00%	98.06%	0.00%	0.20%	0.77%	17	1423	1.19%	98.21%	0	44	50400	13547	404159
Tata Docomo	19:00 - 20:00	1445	114	0.01%	0	0.00%	99.22%	0.10%	0.16%	0.63%	2436	129130	1.89%	97.77%	0	39	62370	24246	1064878
BSNL	19:00 - 20:00	1241	6940	0.75%	59	4.75%	98.84%	0.00%	0.01%	1.73%	165	3310	4.98%	99.71%	0	110	80000	52662	715025
Tata Tele-CDMA	20:00 - 21:00	579	184	0.04%	0	0.00%	99.62%	0.00%	0.03%	0.82%	30	1908	1.57%	97.74%	0	71	210084	56331	760044
Vodafone	20:00 - 21:00	2367	602	0.03%	1	0.04%	99.60%	0.15%	0.40%	0.97%	82	5886	1.39%	98.39%	0	40	126964	92107	3295936
Uninor	19:00 - 20:00	1031	441	0.06%	0	0.00%	98.83%	0.20%	0.24%	1.83%	98	3090	3.17%	96.83%	4	71	33139	30370	729567
Reliance (GSM)	19:00 - 20:00	1536	0	0.00%	0	0.00%	99.69%	0.28%	0.10%	0.03%	2	4539	0.04%	98.48%	0	9	64000	39300	1989853
Reliance (CDMA)	20:00 - 21:00	470	214	0.06%	0	0.00%	99.76%	0.00%	0.26%	0.65%	7	470	1.49%	99.44%	0	9	84000	44487	1233323

*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'mar**k = TRAI Benchmark, **DNA** = Details not available, **NA:** Not Applicable

Critical findings: Cellular Mobile Services

The audit for cellular mobile service providers were conducted at their respective MSCs in the Kolkata circle apart from Reliance Communication whose audit was conducted at their central NOC at Mumbai.

The audit involved a three stage verification process which consisted of auditing the records of the service providers and verifying the data submitted to TRAI. The second step involved a three day live measurement of all the network parameters. Finally basis the three day live measurement the auditors needed to find out the busy hour for the service provider and collect the hourly data for this busy hour for the month in which the audit was conducted.

Busy Hour of Various Service Providers

Service Provider	Reported Time Consistent Busy Hour	Network Busy Hour found in 3 day live measurement
Airtel	19:00 - 20:00	19:00 - 20:00
Aircel	21:00 - 22:00	21:00 - 22:00
Idea	20:00 - 21:00	20:00 - 21:00
Sistema Shyam	20:00 - 21:00	20:00 - 21:00
Tata Docomo	21:00 - 22:00	21:00 - 22:00
BSNL	21:00 - 22:00	21:00 - 22:00
Tata Tele-CDMA	20:00 - 21:00	20:00 - 21:00
Vodafone	21:00 - 22:00	21:00 - 22:00
Uninor	21:00 - 22:00	21:00 - 22:00
Reliance (GSM)	20:00 - 21:00	20:00 - 21:00
Reliance (CDMA)	20:00 - 21:00	20:00 - 21:00

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

BTSs Accumulated Downtime:
In the Kolkata circle, BSNL experienced the highest outage (59 BTS had more than 24 hours of accumulated downtime) hours in the month of audit

Call Set-up Success Rate (CSSR):
All the operators were comfortably meeting the benchmark on this parameter. During the audits the maximum CSSR was observed for Reliance CDMA with 99.76% 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 and TCH. BSNL leads the way in network congestion parameters with almost negligible paging as well as traffic channel congestion. The calculation methodology of these parameters was found to be in complete accordance with what has been specified by TRAI. 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 (≤0.5%) except for 4 POIs for Uninor.

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 Reliance (GSM) at 0.03% while the highest was for Uninor at 1.83%.

Connections with good voice quality:
All the operators are measuring this parameter via their periodic drive tests. However, for some operators these parameters can be obtained at their switch as well. During the audit it was found that all the service providers were measuring this parameter as per the TRAI guidelines.

Customer Care / Helpline Assessment
For the percentage of calls answered by operator aspect all the service providers meet the TRAI benchmark except for MTS and Uninor with MTS being the lowest at 48.28%. Airtel, Vodafone and Uninor were not meeting TRAI benchmark for the accessibility parameter.

Billing performance
All the operators with the exception of Idea and BSNL were found to be meeting the benchmark of ≤ 0.1% complaints registered per 100 bills issued. The benchmark of 100% billing complaints being resolved within 4 weeks was not resolved by BSNL as they had only resolved 29% of all the complaints. In all cases where customers were due for refund, all the service providers were meeting the TRAI benchmark of 100% with 1 week.

Inter operator calls assessment

Inter operator call Assessment To↓　　　From ⟶	Airtel	Aircel	Idea	Sistema Shyam	Tata Docomo	BSNL	Tata Tele-CDMA	Vodafone	Uninor	Reliance (GSM)	Reliance (CDMA)
Airtel	NA	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Aircel	100%	NA	100%	100%	100%	100%	100%	100%	100%	100%	100%
Idea	100%	100%	NA	100%	100%	100%	100%	100%	100%	100%	100%
Sistema Shyam	100%	100%	100%	NA	100%	100%	100%	100%	100%	100%	100%
Tata DoCoMo	100%	100%	100%	100%	NA	100%	100%	100%	100%	100%	100%
BSNL	98%	100%	100%	100%	100%	NA	100%	100%	100%	100%	100%
Tata Tele-CDMA	100%	100%	100%	100%	100%	100%	NA	100%	100%	100%	100%
Vodafone	99%	100%	100%	100%	100%	100%	100%	NA	100%	100%	100%
Uninor	100%	100%	100%	100%	100%	100%	100%	100%	NA	100%	100%
Reliance (GSM)	100%	100%	100%	100%	100%	100%	100%	100%	100%	NA	100%
Reliance (CDMA)	100%	100%	100%	100%	100%	100%	100%	100%	100%	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. Airtel found a little tough connecting to BSNL number with 98 out of 100 calls getting connected.

Results of Operator assisted Drive test

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

	Type of location	Kolkata
Outdoor	Periphery of the city	Science City to Garia to Sonarpur
	Congested area	Tollygunj to Sakar Bazar to Taratala tollygunj circular road
	Across the city	1. Park Circus to Science City, 2. Garia to Tollygunj and 3. Tollygung to Esplanade
Indoor	Office complex	Baric Bhavan
	Shopping complex	E. Mall

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

Drive Test – Kolkata

	B'mark	Airtel		Aircel		Idea		Sistema Shyam		Tata Docomo		BSNL		Tata Tele-CDMA		Vodafone		Uninor		Reliance (GSM)		Reliance (CDMA)	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	≥ 95%	98.52%	95.99%	98.68%	92.88%	98.53%	94.18%	68.49%	76.03%	98.74%	95.61%	99.95%	99.82%	92.08%	86.06%	99.29%	97.96%	99.42%	95.69%	99.65%	96.11%	93.63%	89.84%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	99.33%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	99.58%	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%	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%

☐ Not meeting the benchmark

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

ALL SERVICE PROVIDERS

Kolkata: There was interference and low signal strength recorded for all operators in the outdoor areas near Sakher Bazar and Park Street.

Conclusions:
Drive test was conducted by IMRB with the help of service providers to measure this parameter. In the drive test it was found that all the operators meet the TRAI benchmark on voice quality.

1. MTS, Tata Indicom, and Reliance CDMA do not meet the TRAI benchmark for Indoor areas for the city of Kolkata whereas Aircel, Idea, MTS, Tata Indicom, and Reliance CDMA does not meet the TRAI benchmark for voice quality in all the indoor and outdoor areas for the city of Kolkata
2. All the operators meet the TRAI benchmark for CSSR and call drop rate

Summary of Live Measurement Results – Cellular Mobile Services

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)			Metering and Billing	Response time to customer for assistance	
	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	* %age complaints resolved within 4 weeks	Accessibility of call centre/ customer care	Percentage of calls answered by the operators (voice to voice) within 60 seconds
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 5%	≥ 95%	100%	≥ 95%	≥ 90%
Airtel	0.01%	0.05%	99.23%	0.08%	0.12%	1.11%	0.15%	96.73%	100.00%	100.00%	99.00%
Aircel	0.01%	0.00%	98.09%	0.19%	0.02%	0.67%	0.85%	94.54%	100.00%	100.00%	74.00%
Idea	0.01%	0.00%	99.30%	0.08%	0.08%	0.72%	1.59%	94.61%	100.00%	100.00%	78.00%
Sistema Shyam	0.00%	0.00%	98.98%	0.00%	0.03%	0.01%	2.19%	73.88%	100.00%	100.00%	98.00%
Tata Docomo	0.01%	0.00%	99.00%	0.08%	0.07%	0.67%	2.67%	96.53%	NA	100.00%	92.00%
BSNL	0.05%	0.00%	98.70%	0.00%	0.00%	1.93%	0.03%	99.86%	100.00%	100.00%	97.00%
Tata Tele-CDMA	0.00%	0.00%	99.03%	0.00%	0.08%	0.66%	4.98%	87.38%	100.00%	100.00%	96.00%
Vodafone	0.00%	0.00%	99.58%	0.16%	0.42%	0.94%	4.09%	98.34%	100.00%	100.00%	100.00%
Uninor	0.01%	0.00%	98.93%	0.30%	0.20%	1.64%	2.52%	96.78%	100.00%	100.00%	96.00%
Reliance (GSM)	0.00%	0.00%	99.80%	0.20%	0.05%	0.02%	0.26%	96.34%	100.00%	100.00%	95.00%
Reliance (CDMA)	0.01%	0.00%	99.78%	0.00%	0.10%	0.66%	0.64%	90.02%	100.00%	100.00%	93.00%

▢ Not meeting the benchmark

* Based on operator assisted drive tests conducted by IMRB

During the three day live measurement, Idea, Reliance CDMA, Aircel, Tata Indicom and MTS were found to be not meeting the TRAI benchmark for voice quality with MTS having lowest voice quality at 73.88%. While, it was found that Aircel and Idea were not meeting the TRAI benchmark for percentage of calls answered by the operators within 60 sec.

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

6.1 Graphical/Tabular Representations for Cellular Mobile Services

BTSs Accumulated Downtime
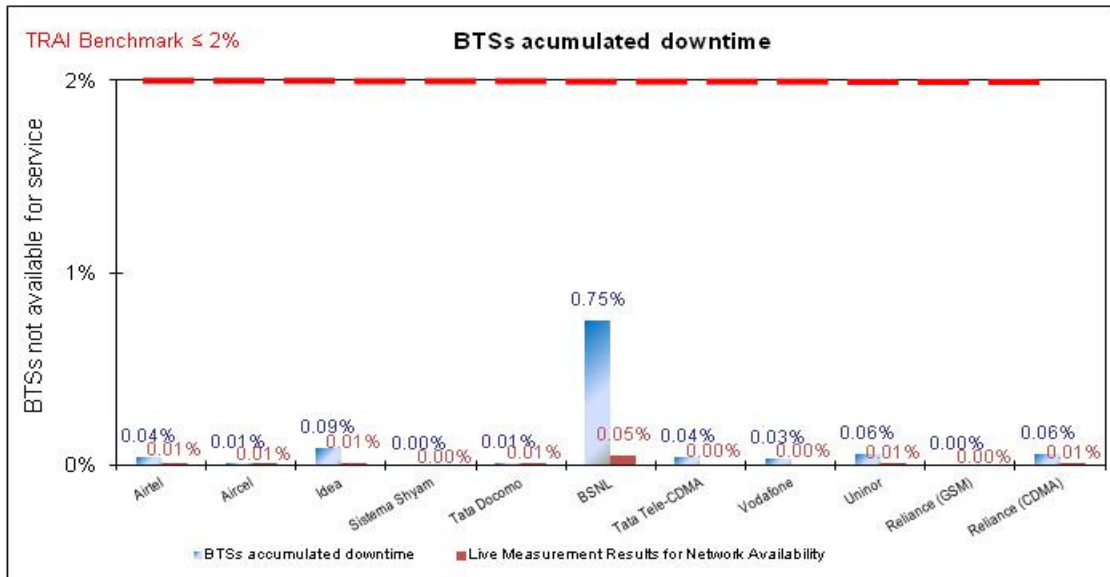
One month
All the operators meet the benchmark

Live measurement
All the operators meet the benchmark

Worst Affected BTSs
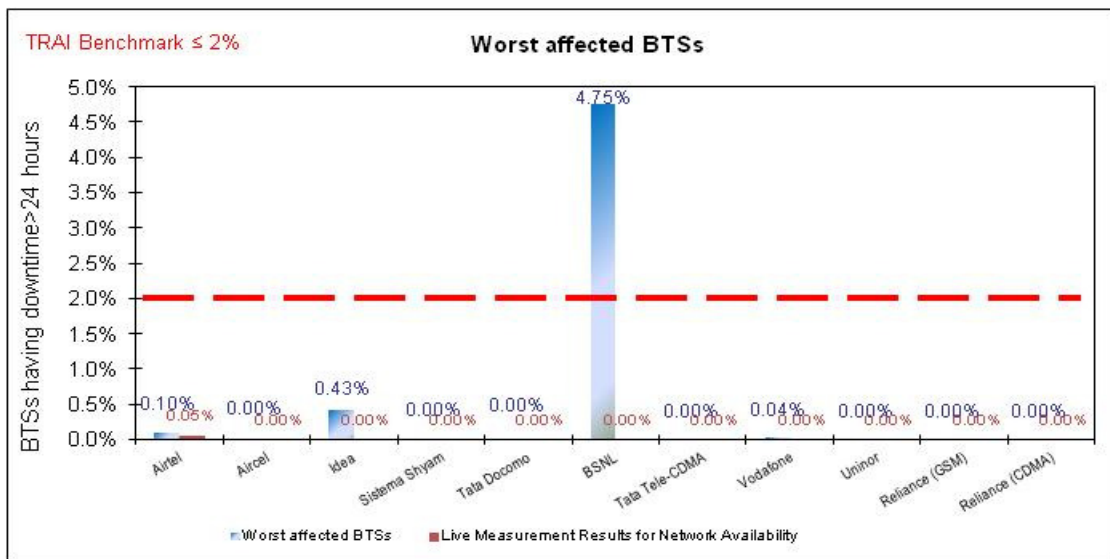
One month
Operator(s) meeting benchmark: Airtel, Aircel, Idea, Sistema Shyam, Tata Docomo, Tata Tele-CDMA, Vodafone, Uninor, Reliance (GSM), Reliance (CDMA)

Operator(s) not meeting the benchmark: BSNL

Live measurement
All the operators meet the benchmark

<u>Call Set-up Success Rate (CSSR)</u>
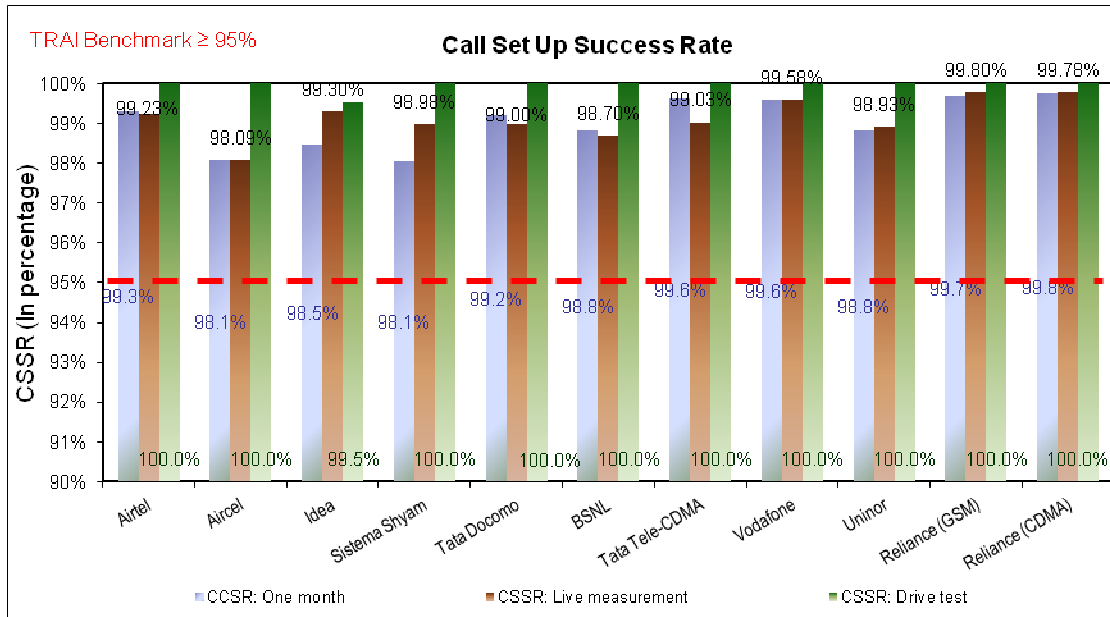
One month
All the operators meet the benchmark

Live measurement
All the operators meet the benchmark

Drive test
All the operators meet the benchmark

SDCCH / Paging Channel Congestion
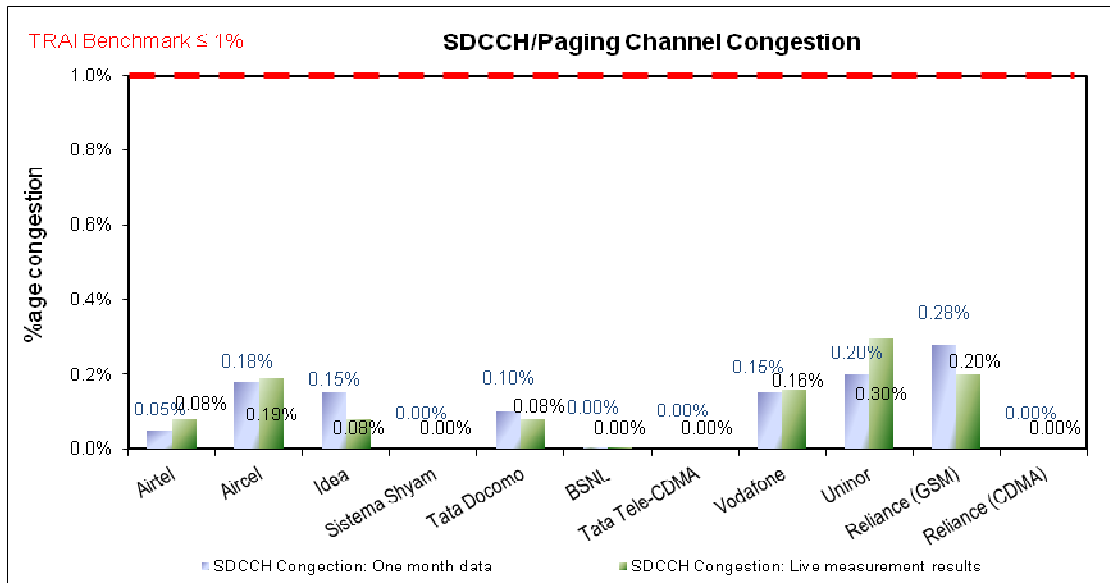
One month
All the operators meet the benchmark

Live measurement
All the operators meet the benchmark

TCH Congestion
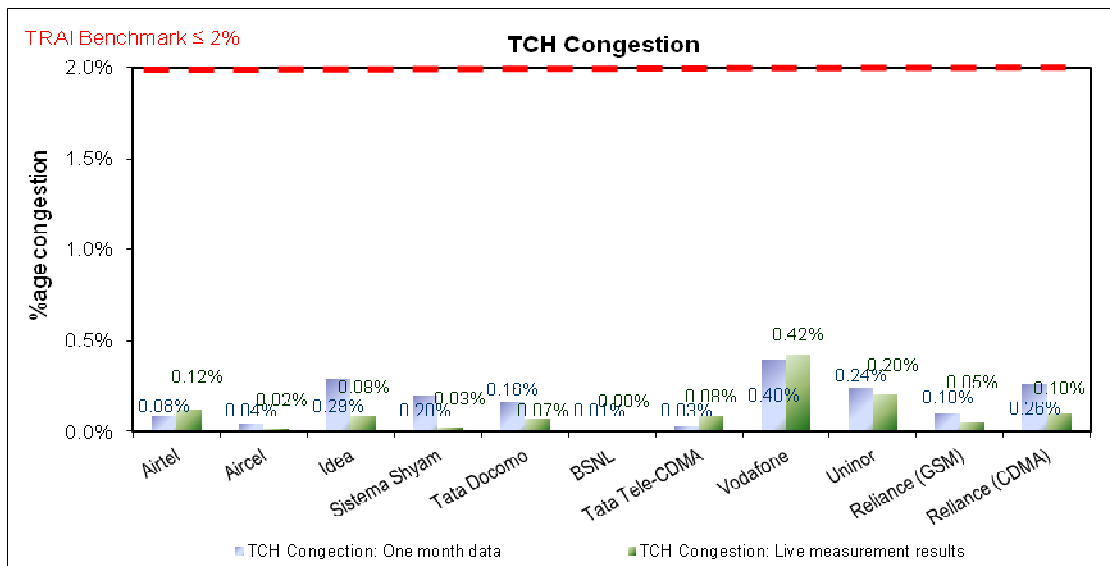
One month
All the operators meet the benchmark

Live measurement
All the operators meet the benchmark

Call Drop Rate
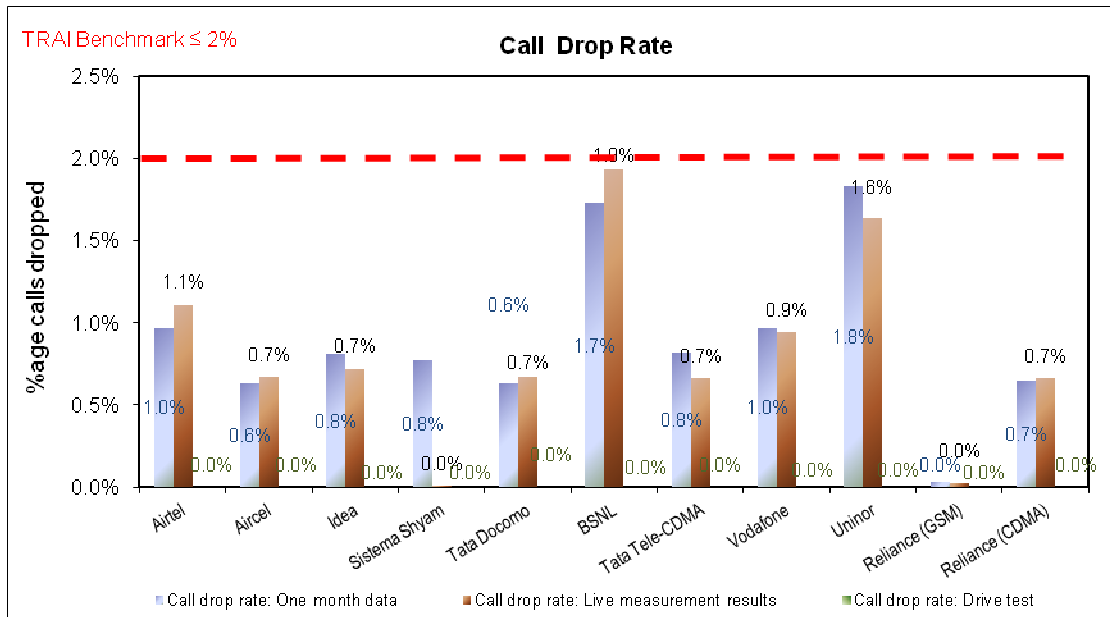
One month
All the operators meet the benchmark

Live measurement
All the operators meet the benchmark

Drive test
All the operators meet the benchmark

Cells with more than 3% TCH Drop Rate
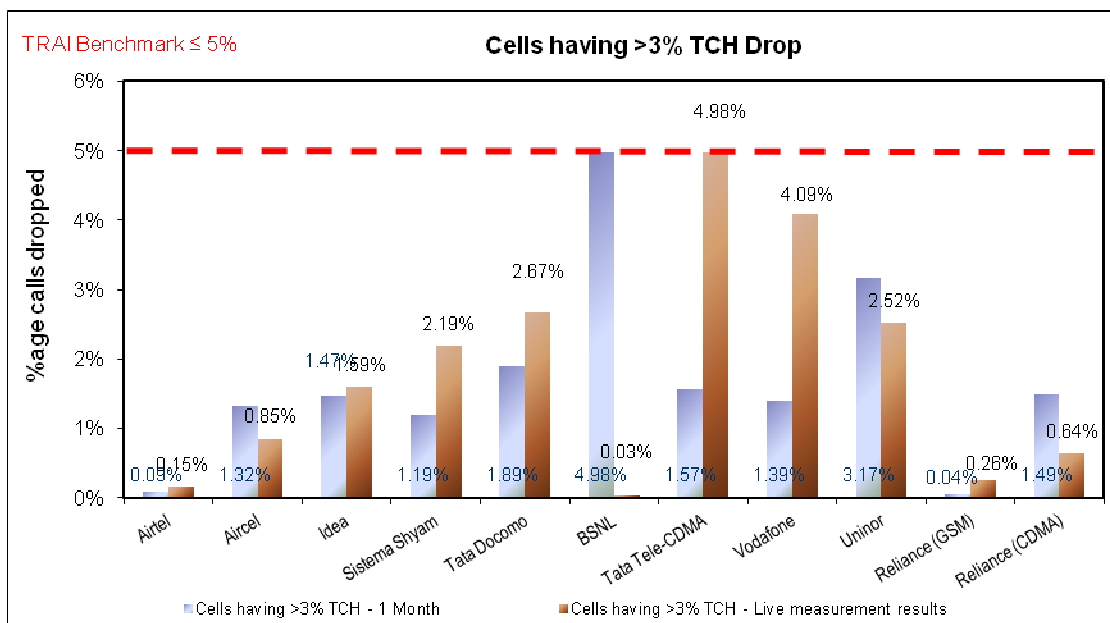
One month
All the operators meet the benchmark

Live measurement
All the operators meet the benchmark

<u>Voice quality</u>
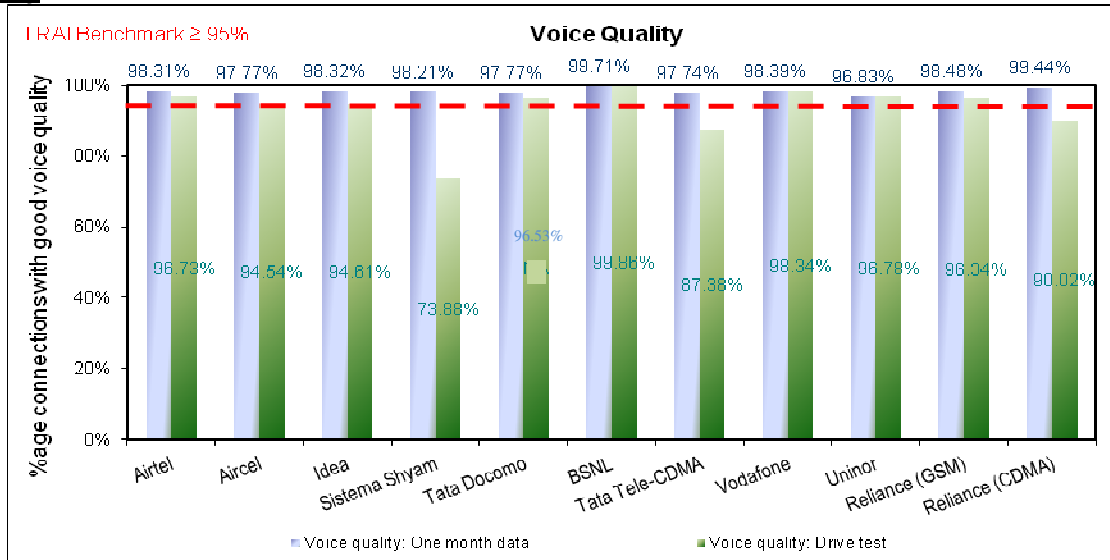
One month
All the operators meet the benchmark

Live measurement (Drive test)
Operator(s) meeting benchmark: Airtel, Tata Docomo, BSNL, Vodafone, Uninor, Reliance (GSM)
Operator(s) not meeting the benchmark: Aircel, Idea, Sistema Shyam, Tata Tele-CDMA, Reliance (CDMA)

<u>Billing Disputes - Postpaid</u>
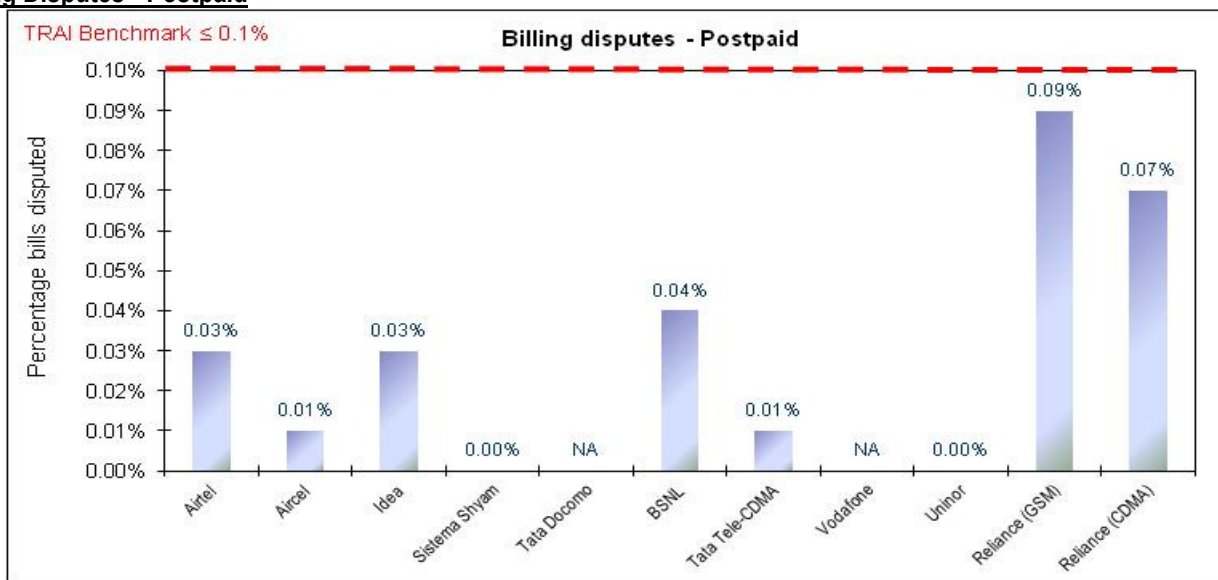
All the operators meet the benchmark

Complaints - Prepaid
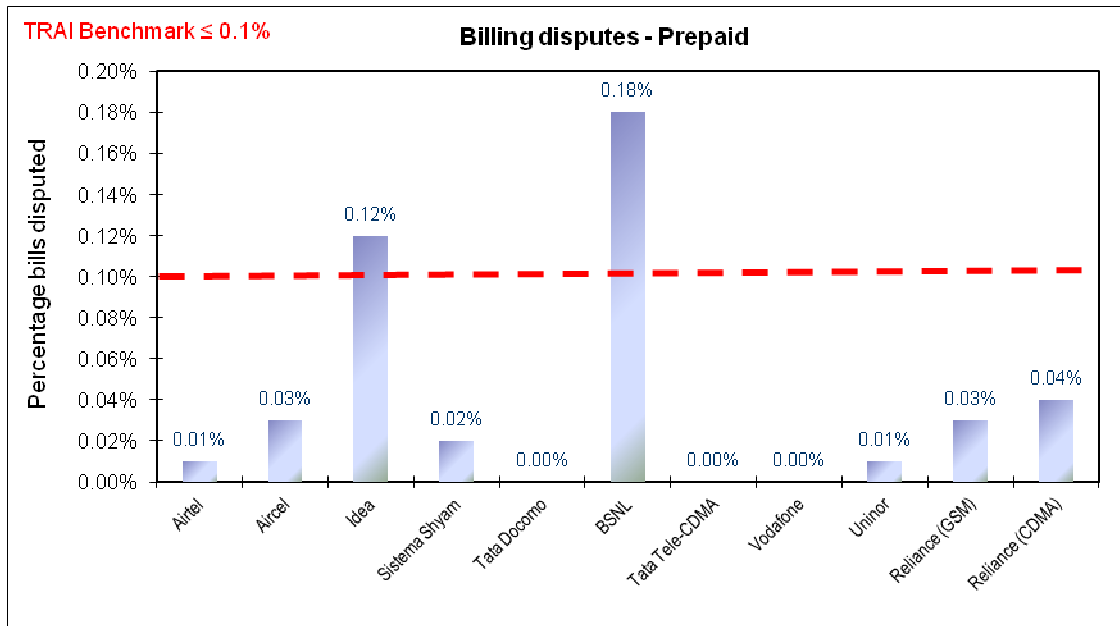
Operator(s) meeting benchmark: Airtel, Aircel, Sistema Shyam, Tata Docomo, Tata Tele-CDMA, Vodafone, Uninor, Reliance (GSM), Reliance (CDMA)

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

## Resolution of billing complaints
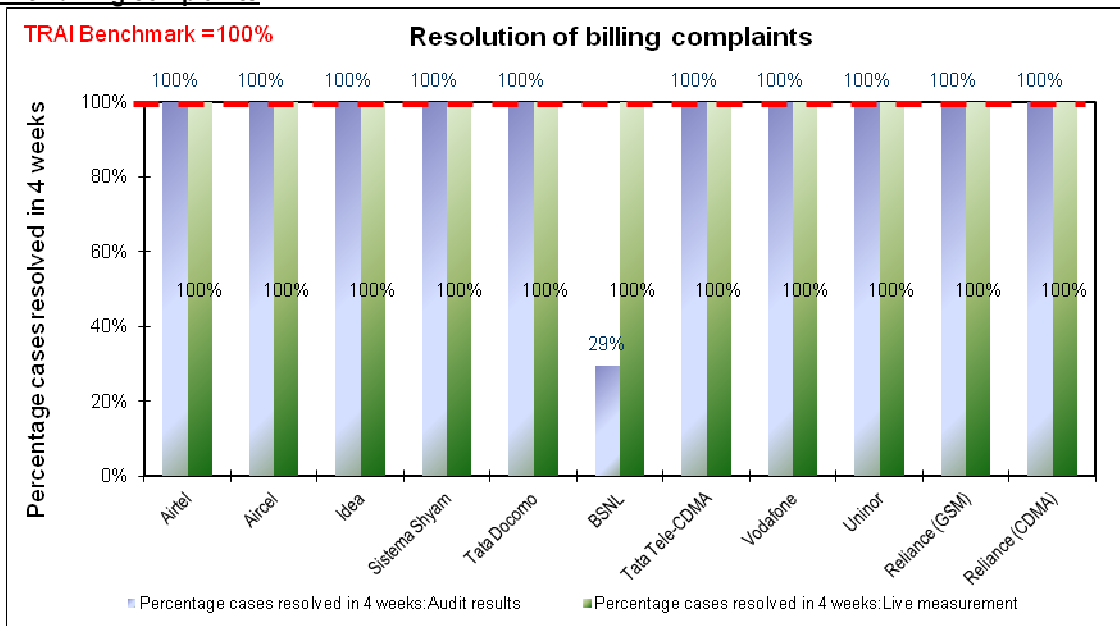
One month
Operator(s) meeting benchmark: Airtel, Aircel, Idea, Sistema Shyam, Tata Docomo, Tata Tele-CDMA, Vodafone, Uninor, Reliance (GSM), Reliance (CDMA)

Operator(s) not meeting the benchmark: BSNL

Live measurement
All the operators meet the benchmark

Period of applying credit / waiver
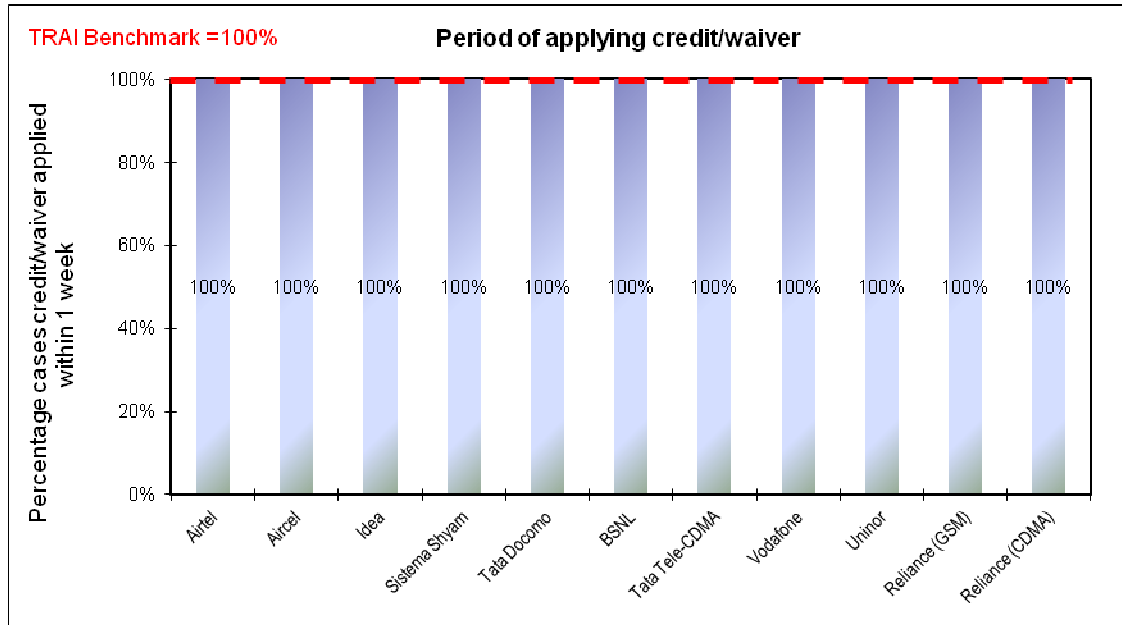
All the operators meet the benchmark
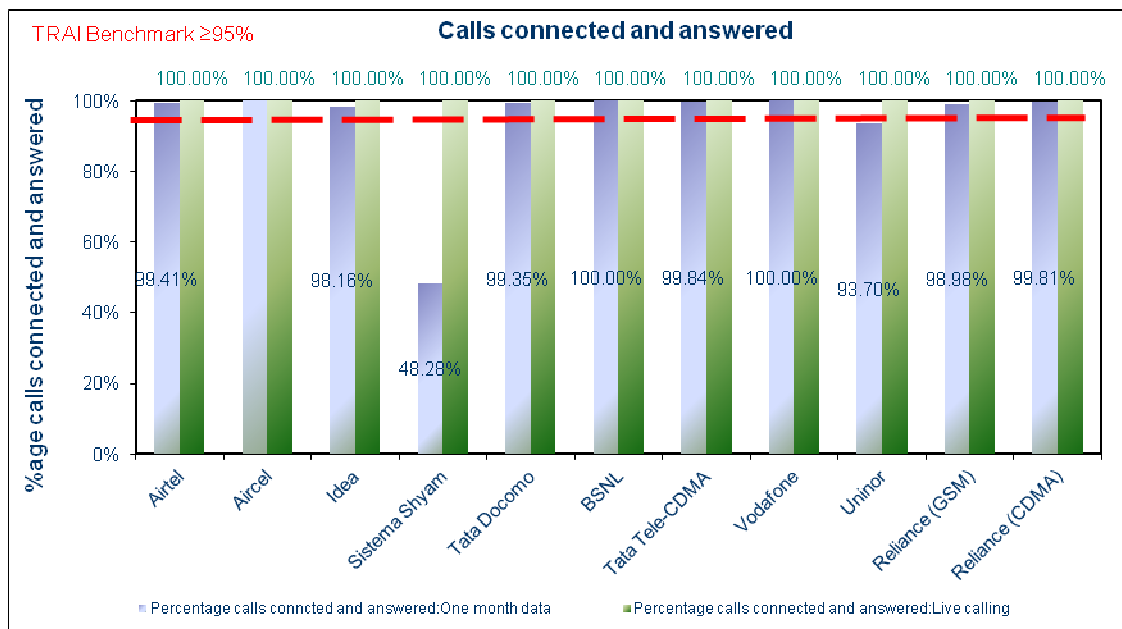
Customer Care / Helpline: Calls answered

One month
Operator(s) meeting benchmark: Airtel, Aircel, Idea, Tata Docomo, BSNL, Tata Tele-CDMA, Vodafone, Reliance (GSM), Reliance (CDMA)

Operator(s) not meeting the benchmark: Sistema Shyam, Uninor

Live measurement
All the operators meet the benchmark

<u>**Customer Care / Helpline: Calls answered voice to voice**</u>
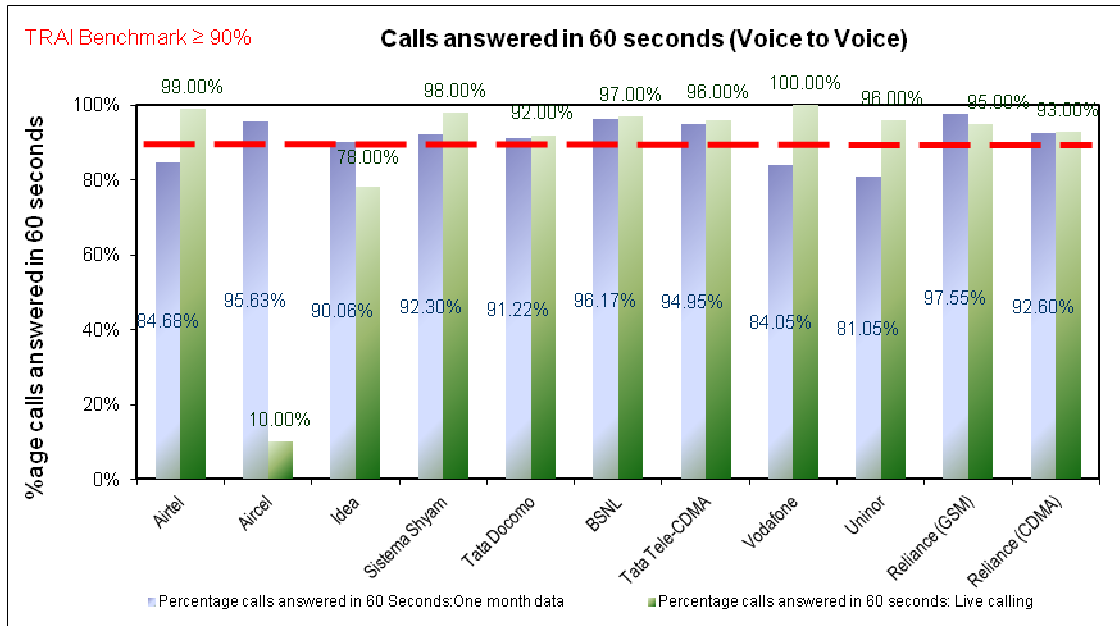
One month
Operator(s) meeting benchmark: Aircel, Idea, Sistema Shyam, Tata Docomo, BSNL, Tata Tele-CDMA, Reliance (GSM), Reliance (CDMA)

Operator(s) not meeting the benchmark: Airtel, Vodafone, Uninor

Live measurement
Operator(s) meeting benchmark: Airtel, Sistema Shyam, Tata Docomo, BSNL, Tata Tele-CDMA, Vodafone, Uninor, Reliance (GSM), Reliance (CDMA)

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

Termination / Closure of service
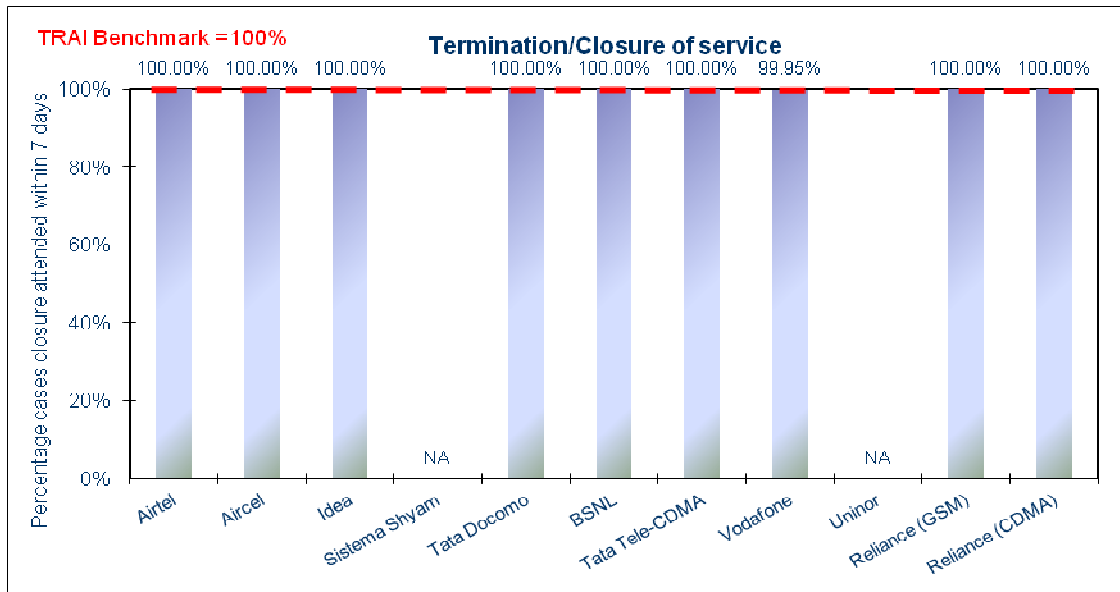
Operator(s) meeting benchmark: Airtel, Aircel, Idea, Tata Docomo, BSNL, Tata Tele-CDMA, Reliance (GSM), Reliance (CDMA)

Operator(s) not meeting the benchmark: Vodafone

Refund of deposits
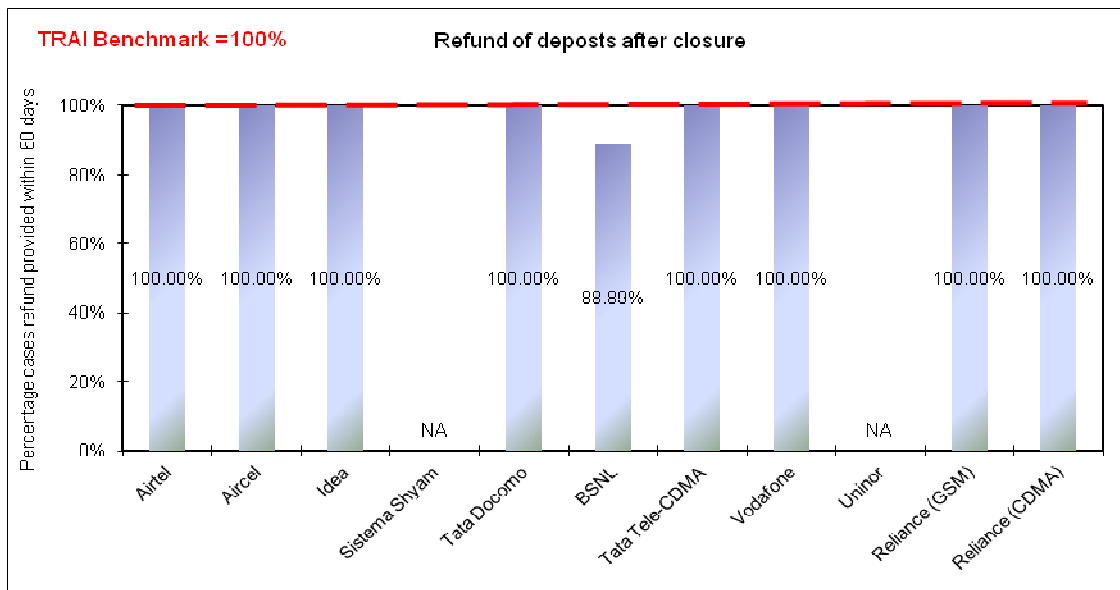
Operator(s) meeting benchmark: Airtel, Aircel, Idea, Tata Docomo, Tata Tele-CDMA, Vodafone, Reliance (GSM), Reliance (CDMA)

Operator(s) not meeting the benchmark: BSNL

Inter operator calls assessment

Inter operator call Assessment To↓ From →	Airtel	Aircel	Idea	Sistema Shyam	Tata Docomo	BSNL	Tata Tele-CDMA	Vodafone	Uninor	Reliance (GSM)	Reliance (CDMA)
Airtel	NA	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Aircel	100%	NA	100%	100%	100%	100%	100%	100%	100%	100%	100%
Idea	100%	100%	NA	100%	100%	100%	100%	100%	100%	100%	100%
Sistema Shyam	100%	100%	100%	NA	100%	100%	100%	100%	100%	100%	100%
Tata Docomo	100%	100%	100%	100%	NA	100%	100%	100%	100%	100%	100%
BSNL	98%	100%	100%	100%	100%	NA	100%	100%	100%	100%	100%
Tata Tele-CDMA	100%	100%	100%	100%	100%	100%	NA	100%	100%	100%	100%
Vodafone	99%	100%	100%	100%	100%	100%	100%	NA	100%	100%	100%
Uninor	100%	100%	100%	100%	100%	100%	100%	100%	NA	100%	100%
Reliance (GSM)	100%	100%	100%	100%	100%	100%	100%	100%	100%	NA	100%
Reliance (CDMA)	100%	100%	100%	100%	100%	100%	100%	100%	100%	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. Airtel found tough connecting to BSNL number with 98 out of 100 calls getting connected.

7.0 Compliance reports: Results of Verification of PMR
7.1 Compliance Report Month 1: January 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%			≤ 5%	≥ 95%					
Airtel	PMR	1970	284	0.02%	0	0.00%	99.53%	0.08%	0.07%	0.73%	4	5404	0.07%	98.50%	0	191	115335	74955	3050895
	IMRB	1970	284	0.02%	0	0.00%	99.53%	0.08%	0.07%	0.73%	4	5404	0.07%	98.50%	0	191	115335	74955	3050895
Aircel	PMR	2053	239	0.02%	0	0.00%	97.69%	0.23%	0.18%	0.79%	155	5851	2.65%	97.94%	0	38	80861	30707	891886
	IMRB	2053	239	0.02%	0	0.00%	97.69%	0.23%	0.18%	0.79%	155	5851	2.65%	97.94%	0	38	80861	30707	891886
Idea	PMR	1280	314	0.03%	4	0.31%	96.67%	0.09%	0.89%	0.51%	176	3729	4.72%	98.64%	0	47	25267	11199	459477
	IMRB	1280	314	0.03%	4	0.31%	96.67%	0.09%	0.89%	0.51%	176	3729	4.72%	98.64%	0	47	25267	11199	459477
Sistema Shyam	PMR	385	358	0.01%	0	0.00%	96.35%	0.00%	0.20%	0.84%	14	1177	1.17%	99.88%	0	39	50400	12255	343545
	IMRB	385	357	0.01%	0	0.00%	98.00%	0.00%	0.20%	0.84%	14	1177	1.17%	99.88%	0	39	50400	12255	343545
Tata Docomo	PMR	1430	98	0.01%	0	0.00%	98.96%	0.17%	0.03%	0.52%	48	4161	1.15%	96.17%	0	36	96159	20192	574558
	IMRB	1430	98	0.01%	0	0.00%	98.96%	0.17%	0.03%	0.52%	48	4161	1.15%	98.17%	0	36	56159	20192	874558
BSNL	PMR	1237	8758	0.95%	72	5.82%	99.00%	0.73%	1.06%	0.72%	144	3239	4.45%	100.00%	3	109	96000	77828	794066
	IMRB	1237	8758	0.95%	72	5.82%	98.17%	0.04%	0.08%	1.98%	144	3239	4.44%	99.78%	3	109	96000	77828	794066
Tata Tele-CDMA	PMR	531	70	0.01%	0	0.00%	99.81%	0.00%	0.00%	0.19%	0	1714	0.00%	99.86%	0	69	70274	39430	798343
	IMRB	531	70	0.01%	0	0.00%	99.81%	0.00%	0.00%	0.19%	0	1714	0.00%	99.86%	0	69	70274	39430	798343
Vodafone	PMR	2345	578	0.03%	2	0.09%	99.07%	0.11%	0.34%	0.68%	43	5833	0.74%	98.69%	0	40	124600	84079	3206599
	IMRB	2345	578	0.03%	2	0.09%	99.00%	0.11%	0.34%	0.68%	43	5833	0.74%	98.69%	0	40	124600	84079	3206599
Uninor	PMR	983	47.54	0.01%	0	0.00%	99.10%	0.08%	0.07%	0.82%	57	2920	1.95%	96.88%	2	42	29068	14400	424275
	IMRB	983	47	0.01%	0	0.00%	99.00%	0.08%	0.07%	0.80%	57	2920	1.90%	96.88%	2	42	29068	14400	424275
Reliance (GSM)	PMR	1185	12	0.01%	0	0.00%	99.59%	0.71%	0.03%	0.74%	6	3555	0.17%	97.59%	0	8	44000	41285	NA
	IMRB	1185	12	0.01%	0	0.00%	99.00%	0.71%	0.03%	0.74%	6	3555	0.17%	97.59%	0	8	44000	41285	NA
Reliance (CDMA)	PMR	469	364	0.11%	0	0.00%	99.78%	0.00%	0.13%	0.52%	3	469	0.64%	98.75%	0	9	84000	45968	NA
	IMRB	469	364	0.11%	0	0.00%	99.78%	0.00%	0.13%	0.52%	3	469	0.64%	98.75%	0	9	84000	45968	NA

7.2 Compliance Report Month 2: February 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%			≤ 5%	≥ 95%					
Airtel	PMR	1994	511	0.04%	2	0.10%	99.36%	0.08%	0.05%	0.72%	6	5432	0.11%	98.40%	0	196	116193	77781	3120723
	IMRB	1994	511	0.04%	2	0.10%	99.36%	0.08%	0.05%	0.72%	6	5432	0.11%	98.40%	0	196	116193	77781	3120723
Aircel	PMR	2053	670	0.05%	0	0.00%	97.47%	0.28%	0.15%	0.75%	152	5848	2.59%	97.87%	0	39	64922	28606	889314
	IMRB	2053	670	0.05%	0	0.00%	97.47%	0.28%	0.15%	0.75%	152	5848	2.59%	97.87%	0	39	64922	28606	889314
Idea	PMR	1424	320	0.03%	4	0.28%	96.88%	0.06%	0.34%	0.45%	205	4272	4.80%	98.61%	0	48	28193	12423	484594
	IMRB	1424	320	0.03%	4	0.28%	96.88%	0.06%	0.34%	0.45%	205	4272	4.80%	98.61%	0	48	28193	12423	484594
Sistema Shyam	PMR	411	626	0.03%	0	0.00%	98.45%	0.00%	0.40%	0.89%	21	1258	1.70%	99.36%	0	40	50400	12669	349927
	IMRB	411	626	0.03%	0	0.00%	98.00%	0.00%	0.40%	0.89%	21	1258	1.70%	99.00%	0	40	50400	12689	349927
Tata Docomo	PMR	1428	29	0.00%	0	0.00%	98.11%	0.06%	0.05%	0.84%	50	4160	1.20%	98.04%	0	32	57894	21535	903852
	IMRB	1428	29	0.00%	0	0.00%	98.00%	0.06%	0.05%	0.84%	50	4160	1.20%	98.00%	0	32	57894	21535	903852
BSNL	PMR	1243	8154	0.87%	88	7.07%	99.00%	0.58%	0.78%	0.71%	136	3251	4.24%	100.00%	4	121	96000	98306	785879
	IMRB	1243	8154	0.87%	83	7.00%	98.70%	0.03%	0.01%	1.58%	138	3251	4.24%	99.80%	4	121	96000	75018	785879
Tata Tele-CDMA	PMR	538	68.3	0.02%	0	0.00%	99.69%	0.00%	0.01%	0.27%	3	1800	0.17%	99.71%	0	69	73800	39238	803302
	IMRB	538	68	0.02%	0	0.00%	99.69%	0.00%	0.01%	0.27%	3	1800	0.17%	99.71%	0	69	73800	39238	803302
Vodafone	PMR	2349	582	0.03%	3	0.13%	99.09%	0.07%	0.33%	0.70%	52	5841	0.89%	98.62%	0	41	127048	87024	3675969
	IMRB	2349	582	0.03%	3	0.13%	99.00%	0.07%	0.33%	0.70%	52	5841	0.89%	98.62%	0	41	127048	87024	3675969
Uninor	PMR	1025	66	0.01%	0	0.00%	99.00%	0.09%	0.15%	0.80%	68	3046	2.20%	96.70%	2	58	29919	17296	489731
	IMRB	1025	66	0.01%	0	0.00%	99.00%	0.09%	0.15%	0.80%	68	3046	2.20%	96.70%	2	58	29919	17296	489731
Reliance (GSM)	PMR	1451	13	0.00%	0	0.00%	99.52%	0.25%	0.18%	0.97%	2	4353	0.05%	97.61%	0	8	44000	41240	NA
	IMRB	1451	13	0.00%	0	0.00%	99.00%	0.25%	0.18%	0.97%	2	4353	0.04%	97.61%	0	8	44000	41240	NA
Reliance (CDMA)	PMR	469	233	0.07%	0	0.00%	99.74%	0.00%	0.29%	0.50%	4	469	0.85%	98.78%	0	9	84000	45804	NA
	IMRB	469	233	0.07%	0	0.00%	99.74%	0.00%	0.29%	0.49%	4	469	0.85%	98.78%	0	9	84000	45804	NA

7.3 Compliance Report Month 3: March 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%			≤ 5%	≥ 95%					
Airtel	PMR	1994	296.8	0.00%	0	0.00%	99.40%	0.10%	0.10%	0.70%	4	5453	0.10%	98.40%	0	198	116360	73428	3068918
	IMRB	1994	296.8	0.02%	0	0.00%	99.40%	0.06%	0.06%	0.70%	4	5453	0.07%	98.40%	0	198	116360	73428	3068918
Aircel	PMR	2058	249	0.02%	0	0.00%	97.57%	0.19%	0.19%	0.69%	133	5859	2.27%	97.81%	0	39	81152	25167	814687
	IMRB	2058	249	0.02%	0	0.00%	97.58%	0.19%	0.69%	0.69%	133	5859	2.27%	97.81%	0	39	81152	25166	814687
Idea	PMR	1534	441	0.04%	2	0.13%	96.97%	0.11%	0.43%	0.45%	220	4487	4.90%	98.69%	0	52	30383	13359	509004
	IMRB	1534	441	0.04%	2	0.13%	96.97%	0.11%	0.43%	0.45%	220	4487	4.90%	98.69%	0	52	30383	13359	509004
Sistema Shyam	PMR	443	410	0.00%	0	0.00%	98.98%	0.00%	0.57%	0.85%	23	1365	1.68%	96.94%	0	40	50400	13184	356706
	IMRB	443	410	0.10%	0	0.00%	98.98%	0.00%	0.57%	0.85%	23	1365	1.68%	98.94%	0	40	50400	13183	356706
Tata Docomo	PMR	1430	86	0.01%	0	0.00%	98.19%	0.07%	0.06%	0.81%	38	4166	0.91%	97.91%	0	34	58553	22223	958792
	IMRB	1430	86	0.01%	0	0.00%	98.00%	0.07%	0.06%	0.81%	38	4166	0.91%	98.00%	0	34	58553	22223	958792
BSNL	PMR	1243	4916	0.53%	25	2.01%	99.00%	0.70%	0.83%	0.77%	161	3267	4.93%	100.00%	3	121	96000	73910	800435
	IMRB	1243	4916	0.53%	25	2.01%	98.60%	0.03%	0.01%	2.22%	161	3267	4.92%	99.74%	3	121	96000	73910	800435
Tata Tele-CDMA	PMR	552	80	0.02%	0	0.00%	99.72%	0.00%	0.02%	0.24%	1	1833	0.05%	99.82%	0	69	75153	38462	788949
	IMRB	552	80	0.02%	0	0.00%	99.72%	0.00%	0.02%	0.24%	1	1833	0.05%	99.82%	0	69	75153	38462	788949
Vodafone	PMR	2356	596	0.04%	3	0.10%	99.10%	0.10%	0.40%	0.70%	39	5857	0.70%	98.70%	0	41	126778	88178	3635254
	IMRB	2356	596	0.04%	3	0.10%	99.10%	0.10%	0.40%	0.70%	39	5857	0.70%	98.70%	0	41	126778	88178	3635254
Uninor	PMR	1031	212	0.03%	0	0.00%	98.78%	0.09%	0.20%	0.80%	58	3074	1.89%	96.59%	2	64	30390	19958	515249
	IMRB	1031	212	0.03%	0	0.00%	98.99%	0.09%	0.19%	0.79%	58	3074	1.80%	96.59%	2	64	30390	19958	515249
Reliance (GSM)	PMR	1491	35	0.00%	0	0.00%	99.56%	0.20%	0.00%	0.99%	2	4473	0.04%	97.77%	0	9	NA	NA	NA
	IMRB	1491	35	0.00%	0	0.00%	99.56%	0.20%	0.00%	0.99%	2	4473	0.04%	97.77%	0	9	NA	NA	NA
Reliance (CDMA)	PMR	469	256	0.07%	0	0.00%	99.75%	0.00%	0.16%	0.53%	5	469	1.06%	98.29%	0	9	NA	NA	NA
	IMRB	469	256	0.07%	0	0.00%	99.75%	0.00%	0.16%	0.53%	5	469	1.06%	98.29%	0	9	NA	NA	NA

7.4 Cellular Mobile services: Compliance Report January – March 2011

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	Total no. of billing (post-paid) and charging, credit / validity (pre-paid) complaints received during the quarter	No. of billing complaints (post paid) 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	Period of 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 / Clouse of service complied within 7 days	Total No. of request for Termination / Cloure of service received during the quarter	No. of requests for Termination / Closure of service complied within 7 days during the quarter	Time taken for refund of deposits after closure
Benchmark		< 0.1%			< 0.1%			100% within 4 weeks					100% Within 1 week	> 95%			> 90%	100% within 7 days			100% within 60 days
Airtel	PMR	0.02%	598461	127	0.01%	1576	12610748	100%	1703	22589	1703	20886	100%	94%	129430452	121023185	84.0%	100%	3476	3476	100%
	IMRB	0.02%	598461	127	0.01%	1576	12610748	100%	1703	22589	1703	20886	100%	94%	129430452	121023185	84.0%	100%	3476	3476	100%
Aircel	PMR	0.01%	22829	3	0.04%	766	1747673	100%	2208	2208	766	1442	100%	100%	207560	147472	54.1%	100%	307	307	100%
	IMRB	0.01%	22829	3	0.03%	2205	1859105	100%	2208	2208	766	1442	100%	100%	2820422	7538995	53.5%	100%	307	307	100%
Idea	PMR	0.40%	16515	66	0.15%	4048	2677989	100%	4415	4415	4114	301	100%	99%	302856	300557	69.0%	100%	798	798	99%
	IMRB	0.40%	16515	66	0.15%	1349	906840	100%	4415	4415	4114	301	100%	99%	302856	300557	69.2%	100%	798	798	99%
Sistema Shyam	PMR	DNA	DNA	0	0.09%	645	655430	100%	645	645	125	520	100%	100%	100308	96302	95.0%	DNA	DNA	DNA	DNA
	IMRB	NA	NA	0	0.09%	645	655430	100%	645	645	125	520	100%	100%	100308	96302	95.0%	NA	NA	NA	NA
Tata Docomo	PMR	0.00%	22629	215	0.00%	16168	1821420	100%	15383	15383	14	15369	100%	100%	1075622	707609	77.0%	100%	955	952	100%
	IMRB	0.00%	22629	215	0.00%	15168	1821420	100%	15383	15383	14	15369	100%	100%	1075622	707609	77.0%	100%	955	952	100%
BSNL	PMR	0.00%	399598	131	0.30%	7926	2319281	100%	8057	8057	3909	4148	100%	95%	3295	3116	96%	100%	5911	DNA	DNA
	IMRB	0.00%	399598	131	0.30%	7926	2319281	100%	8057	8057	3909	4148	100%	95%	3295	3116	96%	100%	5911	5911	100%
Tata Tele-CDMA	PMR	0.03%	190083	63	0.01%	151	1554357	100%	1101	1104	214	890	100%	97%	459994	446159	91%	100%	5051	5051	99%
	IMRB	0.03%	190083	63	0.01%	151	1554357	100%	1104	1104	214	890	100%	97%	459994	446159	91%	100%	5051	5051	99%
Vodafone	PMR	0.01%	1120108	83	0.01%	407	3910209	100%	490	490	238	252	100%	DNA	DNA	DNA	70.0%	97%	7646	DNA	DNA
	IMRB	0.01%	1120108	83	0.01%	407	3910209	100%	490	490	238	252	100%	NA	NA	NA	70.0%	97%	7646	7391	100%
Uninor	PMR	NA	NA	NA	0.00%	17700	1250799	98%	173	177	NA	NA	NA	98.38%	3170975	3119707	85.6%	NA	NA	NA	NA
	IMRB	NA	NA	NA	0.01%	17700	1250799	98%	173	177	NA	NA	NA	98.38%	3170975	3119707	85.6%	NA	NA	NA	NA

Reliance (GSM)	PMR	0.10%	28675	29	0.04%	1092	2890498	100%	3337	3337	603	603	100%	61%	262137	102980	92.0%	100%	339	339	100%
	IMRB	0.10%	28675	29	0.04%	1092	2890498	100%	3337	3337	603	603	100%	61%	262137	102980	92.0%	100%	339	339	100%
Reliance (CDMA)	PMR	0.09%	414407	397	0.07%	1375	1865535	100%	4522	4522	356	356	100%	94.63%	5804237	5493055	95.0%	100%	2658	2658	100%
	IMRB	0.09%	414407	397	0.07%	1375	1865535	100%	4522	4522	356	356	100%	94.63%	5804237	5493055	95.0%	100%	2658	2658	100%

Figures do not match with those reported in PMR

Figures verified on all India basis

Not meeting benchmark

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

IMRB
international

8.0 Conclusions

8.1 Cellular Mobile services

1. The figures reported by BSNL for worst affected BTS due to downtime and call drop do not meet the TRAI specified benchmark of 2%.
2. Airtel, Aircel, Idea, Tata Docomo, Vodafone and Uninor failed to meet the TRAI specified benchmark of 90% for percentage of calls answered by the operators (voice to voice) within 60 seconds parameter.
3. Airtel, Reliance GSM and Reliance CDMA failed to meet the TRAI specified benchmark of 95% for accessibility of call centre parameter.
4. Idea failed to meet the TRAI specified benchmark of 0.1% for Metering and billing credibility parameter for both prepaid and postpaid, while Reliance (GSM) failed to meet this parameter for postpaid and BSNL failed to meet this parameter for prepaid.

9.0 Annexure - I

9.1 Service provider performance report based on one month data

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)			Metering and Billing				Response time to customer for assistance		Termination / closure of service	
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality	Metering and billing credibility (Postpaid)	Metering and billing credibility (Prepaid)	%age complaints resolved within 4 weeks	Period of applying credit/waiver less than 1 week	Accessibility of call centre/ customer care	Percentage of calls answered by operators within 60 sec	%age requests for Termination complied within 7 days	Refund of deposits after closure within 60 days
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 5%	≥ 95%	≤ 0.1%	≤ 0.1%	100%	100%	≥ 95%	≥ 90%	100%	100%
Airtel	0.04%	0.10%	99.30%	0.05%	0.08%	0.97%	0.09%	98.31%	0.03%	0.01%	100.00%	100.00%	99.41%	84.68%	100.00%	100.00%
Aircel	0.01%	0.00%	98.07%	0.18%	0.04%	0.63%	1.32%	97.77%	0.01%	0.03%	100.00%	100.00%	100.00%	95.63%	100.00%	100.00%
Idea	0.09%	0.43%	98.47%	0.15%	0.29%	0.81%	1.47%	98.32%	0.03%	0.12%	100.00%	100.00%	98.16%	90.06%	100.00%	100.00%
Sistema Shyam	0.00%	0.00%	98.06%	0.00%	0.20%	0.77%	1.19%	98.21%	0.00%	0.02%	100.00%	100.00%	48.28%	92.30%	NA	NA
Tata Docomo	0.01%	0.00%	99.22%	0.10%	0.16%	0.63%	1.89%	97.77%	0.00%	0.00%	100.00%	100.00%	99.35%	91.22%	100.00%	100.00%
BSNL	0.75%	4.75%	98.84%	0.00%	0.01%	1.73%	4.98%	99.71%	0.04%	0.18%	29.34%	100.00%	100.00%	96.17%	100.00%	88.89%
Tata Tele-CDMA	0.04%	0.00%	99.62%	0.00%	0.03%	0.82%	1.57%	97.74%	0.01%	0.00%	100.00%	100.00%	99.84%	94.95%	100.00%	100.00%
Vodafone	0.03%	0.04%	99.60%	0.15%	0.40%	0.97%	1.39%	98.39%	0.00%	0.00%	100.00%	100.00%	100.00%	84.05%	99.95%	100.00%
Uninor	0.06%	0.00%	98.83%	0.20%	0.24%	1.83%	3.17%	96.83%	NA	0.01%	100.00%	100.00%	93.70%	81.05%	NA	NA
Reliance (GSM)	0.00%	0.00%	99.69%	0.28%	0.10%	0.03%	0.04%	98.48%	0.09%	0.03%	100.00%	100.00%	98.98%	97.55%	100.00%	100.00%
Reliance (CDMA)	0.06%	0.00%	99.76%	0.00%	0.26%	0.65%	1.49%	99.44%	0.07%	0.04%	100.00%	100.00%	99.81%	92.60%	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
Airtel	All POI's meeting TRAI specified benchmark					
Aircel	All POI's meeting TRAI specified benchmark					
Idea	All POI's meeting TRAI specified benchmark					
Sistema Shyam	All POI's meeting TRAI specified benchmark					
Tata Docomo	All POI's meeting TRAI specified benchmark					
BSNL	All POI's meeting TRAI specified benchmark					
Tata Tele-CDMA	All POI's meeting TRAI specified benchmark					
Vodafone	All POI's meeting TRAI specified benchmark					
Uninor	BSNL L1 1LD TB	30	668.58	7.38	6.53	Overflow traffic of TCL ILD
Reliance (GSM)	All POI's meeting TRAI specified benchmark					
Reliance (CDMA)	All POI's meeting TRAI specified benchmark					

IMRB
international

9.3 Parameter wise performance reports for Cellular Mobile services

1. Network Availability

Audit Results for Network Availability

	Benchmark	Airtel	Aircel	Idea	Sistema Shyam	Tata Docomo	BSNL	Tata Tele-CDMA	Vodafone	Uninor	Reliance (GSM)	Reliance (CDMA)
Number of BTSs in the licensed service area		2010	2075	1624	459	1445	1241	579	2367	1031	1536	470
Sum of downtime of BTSs in a month (in hours)		547.09	80.16	1080	0	114	6940	184	602	441	0	214
BTSs accumulated downtime (not available for service)	≤ 2%	0.04%	0.01%	0.09%	0.00%	0.01%	0.75%	0.04%	0.03%	0.06%	0.00%	0.06%
Number of BTSs having accumulated downtime >24 hours		2	0	7	0	0	59	0	1	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.10%	0.00%	0.43%	0.00%	0.00%	4.75%	0.00%	0.04%	0.00%	0.00%	0.00%

Live Measurement Results for Network Availability

	Benchmark	Airtel	Aircel	Idea	Sistema Shyam	Tata Docomo	BSNL	Tata Tele-CDMA	Vodafone	Uninor	Reliance (GSM)	Reliance (CDMA)
Number of BTSs in the licensed service area		2010	2082	1624	466	1445	1241	579	2367	1032	1567	470
Sum of downtime of BTSs in a month (in hours)		139.7	77.82	71	0	59	431	4.4	72	92	1	24.46
BTSs accumulated downtime (not available for service)	≤ 2%	0.01%	0.01%	0.01%	0.00%	0.01%	0.05%	0.00%	0.00%	0.01%	0.00%	0.01%
Number of BTSs having accumulated downtime >24 hours		1	0	0	0	0	0	0	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.05%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

2. Connection Establishment (Accessibility)

Audit Results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Airtel	Aircel	Idea	Sistema Shyam	Tata Docomo	BSNL	Tata Tele-CDMA	Vodafone	Uninor	Reliance (GSM)	Reliance (CDMA)
CSSR	≥ 95%	99.30%	98.07%	98.47%	98.06%	99.22%	98.84%	99.62%	99.60%	98.83%	99.69%	99.76%

SDCCH congestion	Benchmark	Airtel	Aircel	Idea	Sistema Shyam	Tata Docomo	BSNL	Tata Tele-CDMA	Vodafone	Uninor	Reliance (GSM)	Reliance (CDMA)
SDCCH/Paging channel congestion	≤ 1%	0.05%	0.18%	0.15%	0.00%	0.10%	0.00%	0.00%	0.15%	0.20%	0.28%	0.00%

TCH congestion	Benchmark	Airtel	Aircel	Idea	Sistema Shyam	Tata Docomo	BSNL	Tata Tele-CDMA	Vodafone	Uninor	Reliance (GSM)	Reliance (CDMA)
TCH congestion	≤ 2%	0.08%	0.04%	0.29%	0.20%	0.16%	0.01%	0.03%	0.40%	0.24%	0.10%	0.26%

Live measurement results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Airtel	Aircel	Idea	Sistema Shyam	Tata Docomo	BSNL	Tata Tele-CDMA	Vodafone	Uninor	Reliance (GSM)	Reliance (CDMA)
CSSR	≥ 95%	99.23%	98.09%	99.30%	98.98%	99.00%	98.70%	99.03%	99.58%	98.93%	99.80%	99.78%

SDCCH congestion	Benchmark	Airtel	Aircel	Idea	Sistema Shyam	Tata Docomo	BSNL	Tata Tele-CDMA	Vodafone	Uninor	Reliance (GSM)	Reliance (CDMA)
SDCCH/Paging channel congestion	≤ 1%	0.08%	0.19%	0.08%	0.00%	0.08%	0.00%	0.00%	0.16%	0.30%	0.20%	0.00%

TCH congestion	Benchmark	Airtel	Aircel	Idea	Sistema Shyam	Tata Docomo	BSNL	Tata Tele-CDMA	Vodafone	Uninor	Reliance (GSM)	Reliance (CDMA)
TCH congestion	≤ 2%	0.12%	0.02%	0.08%	0.03%	0.07%	0.00%	0.08%	0.42%	0.20%	0.05%	0.10%

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

CSSR	Benchmark	Airtel	Aircel	Idea	Sistema Shyam	Tata Docomo	BSNL	Tata Tele-CDMA	Vodafone	Uninor	Reliance (GSM)	Reliance (CDMA)
Total number of call attempts		250	210	210	210	229	210	210	210	210	210	210
Total number of successful calls established		250	210	209	210	229	210	210	210	210	210	210
CSSR	≥ 95%	100.00%	100.00%	99.52%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Blocked calls	Benchmark	Airtel	Aircel	Idea	Sistema Shyam	Tata Docomo	BSNL	Tata Tele-CDMA	Vodafone	Uninor	Reliance (GSM)	Reliance (CDMA)
%age blocked calls		0.00%	0.00%	0.48%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

3. Connection Maintenance (Retainability)

Audit Results for Call drop rate and for number of cells having more than 3% TCH

Call drop rate	Benchmark	Airtel	Aircel	Idea	Sistema Shyam	Tata Docomo	BSNL	Tata Tele-CDMA	Vodafone	Uninor	Reliance (GSM)	Reliance (CDMA)
Total number of calls established		113329605	28051578	20053468	19629610	48390537	802037	21599048	112195213	29273348	21244710	37024588
Total number of calls dropped		1101510	176408	161936	150942	305417	13853	176981	1093543	536867	6940	240719
Call drop rate	≤ 2%	0.97%	0.63%	0.81%	0.77%	0.63%	1.73%	0.82%	0.97%	1.83%	0.03%	0.65%

Cells having more than 3% TCH	Benchmark	Airtel	Aircel	Idea	Sistema Shyam	Tata Docomo	BSNL	Tata Tele-CDMA	Vodafone	Uninor	Reliance (GSM)	Reliance (CDMA)
Total number of cells in the network		5518	5890	4767	1423	129130	3310	1908	5886	3090	4539	470
Total number of cells having more than 3% TCH		5	78	70	17	2436	165	30	82	98	2	7
Worst affected cells having more than 3% TCH	≤ 5%	0.09%	1.32%	1.47%	1.19%	1.89%	4.98%	1.57%	1.39%	3.17%	0.04%	1.49%

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

Call drop rate	Benchmark	Airtel	Aircel	Idea	Sistema Shyam	Tata Docomo	BSNL	Tata Tele-CDMA	Vodafone	Uninor	Reliance (GSM)	Reliance (CDMA)
Total number of calls established		10876244	38146439	26589138	26885768	4307615	261341	28125917	11862177	2969848	45508327	26283168
Total number of calls dropped		120833	256167	192293	1569	28778	5037	186659	111648	48792	10032	173468
Call drop rate	≤ 2%	1.11%	0.67%	0.72%	0.01%	0.67%	1.93%	0.66%	0.94%	1.64%	0.02%	0.66%

Cells having more than 3% TCH	Benchmark	Airtel	Aircel	Idea	Sistema Shyam	Tata Docomo	BSNL	Tata Tele-CDMA	Vodafone	Uninor	Reliance (GSM)	Reliance (CDMA)
Total number of cells in the network		16562	5906	4767	1463	12520	3310	1908	17658	3093	4701	470
Total number of cells having more than 3% TCH		25	50	76	32	334	1	95	723	78	12	3
Worst affected cells having more than 3% TCH	≤ 5%	0.15%	0.85%	1.59%	2.19%	2.67%	0.03%	4.98%	4.09%	2.52%	0.26%	0.64%

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

Call drop rate	Benchmark	Airtel	Aircel	Idea	Sistema Shyam	Tata Docomo	BSNL	Tata Tele-CDMA	Vodafone	Uninor	Reliance (GSM)	Reliance (CDMA)
Total number of calls established		210	210	209	210	229	210	210	210	210	250	210
Total number of calls dropped		0	0	0	0	0	0	0	0	0	0	0
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%

4. Voice quality

Audit Results for Voice quality

Voice quality	Benchmark	Airtel	Aircel	Idea	Sistema Shyam	Tata Docomo	BSNL	Tata Tele-CDMA	Vodafone	Uninor	Reliance (GSM)	Reliance (CDMA)
Total number of sample calls		25869477105	4768431170	5361582286	19629610	4389653706	7000	9862	16275995400	5753605802	7037427627	37485119
Total number of calls with good voice quality		25431153323	4662051506	5271647551	19278300	4291811758	6980	9639	16014415915	5570991850	6930475810	37274234
%age calls with good voice quality	≥ 95%	98.31%	97.77%	98.32%	98.21%	97.77%	99.71%	97.74%	98.39%	96.83%	98.48%	99.44%

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

Voice quality	Benchmark	Airtel	Aircel	Idea	Sistema Shyam	Tata Docomo	BSNL	Tata Tele-CDMA	Vodafone	Uninor	Reliance (GSM)	Reliance (CDMA)
Total number of sample calls		52603	310491	315866	12396	58253	370468	11685	59466	52693	55641	13253
Total number of calls with good voice quality		50883	293540	298830	9158	56231	369942	10210	58476	50996	53605	11930
%age calls with good voice quality	≥ 95%	96.73%	94.54%	94.61%	73.88%	96.53%	99.86%	87.38%	98.34%	96.78%	96.34%	90.02%

5. POI Congestion

Audit Results for POI Congestion

POI congestion	Benchmark	Airtel	Aircel	Idea	Sistema Shyam	Tata Docomo	BSNL	Tata Tele-CDMA	Vodafone	Uninor	Reliance (GSM)	Reliance (CDMA)
Total number of working POIs		70	39	57	44	39	110	71	40	71	9	9
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	4	0	0
Total Capacity of all POIs (A) - in erlangs		85035.45	31995	22814	631513	10008	497052	37479.55	74969	25368	8471	10353
Traffic served for all POIs (B)- in erlangs		54944.71	15232	13743	342478	4386	10573	18913.56	46382	15469	5292	6417
POI congestion	≤ 0.5%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Live measurement results for POI congestion

6. Inter Operator Call Assessment

Inter operator call Assessment To. From↓	Airtel	Aircel	Idea	Sistema Shyam	Tata Docomo	BSNL	Tata Tele-CDMA	Vodafone	Uninor	Reliance (GSM)	Reliance (CDMA)
Airtel	NA	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Aircel	100%	NA	100%	100%	100%	100%	100%	100%	100%	100%	100%
Idea	100%	100%	NA	100%	100%	100%	100%	100%	100%	100%	100%
Sistema Shyam	100%	100%	100%	NA	100%	100%	100%	100%	100%	100%	100%
Tata Docomo	100%	100%	100%	100%	NA	100%	100%	100%	100%	100%	100%
BSNL	98%	100%	100%	100%	100%	NA	100%	100%	100%	100%	100%

Tata Tele-CDMA	100%	100%	100%	100%	100%	100%	NA	100%	100%	100%	100%
Vodafone	99%	100%	100%	100%	100%	100%	100%	NA	100%	100%	100%
Uninor	100%	100%	100%	100%	100%	100%	100%	100%	NA	100%	100%
Reliance (GSM)	100%	100%	100%	100%	100%	100%	100%	100%	100%	NA	100%
Reliance (CDMA)	100%	100%	100%	100%	100%	100%	100%	100%	100%	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	Airtel	Aircel	Idea	Sistema Shyam	Tata Docomo	BSNL	Tata Tele-CDMA	Vodafone	Uninor	Reliance (GSM)	Reliance (CDMA)
Billing diputes - Postpaid												
Total bills generated during the period		242206	11410	5803	545	10568	125498	113243	406244	NA	11929	137975
Total number of bills disputed		74	1	2	0	0	45	7	11	NA	11	102
Percentage bills disputed	≤ 0.1%	0.03%	0.01%	0.03%	0.00%	0.00%	0.04%	0.01%	0.00%	NA	0.09%	0.07%
Billing diputes - Prepaid												
Number of complaints related to charging, credit & validity		292	531	894	166	2	4072	17	69	128	1018	865
Total number of prepaid customers in that period		4321728	1726610	764280	704452	1960651	2266676	520889	3988357	1386742	3392499	1936932
Percentage of complaints	≤ 0.1%	0.01%	0.03%	0.12%	0.02%	0.00%	0.18%	0.00%	0.00%	0.01%	0.03%	0.04%
Resolution of billing complaints												
Total number of billing/charging complaints		11441	532	896	166	5776	4117	479	80	128	1029	967
Total complaints considered invalid		11075	423	1170	47	5774	385	455	52	0	825	683
Number of complaints resolved in 4 weeks from date of receipt for complaints listed in 5.3.1		366	532	896	166	5776	1208	479	80	128	1029	967
Percentage complaints resolved within 4 weeks of date of receipt	100%	100%	100%	100%	100%	100%	29%	100%	100%	100%	100%	100%
Period of applying credit / waiver												
Total number of complaints where credit/waiver is required		366	109	896	119	2	2524	24	28	128	204	284
Percentage cases in which credit/waiver was received within 1 week	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Live calling results for resolution of billing complaints

Resolution of billing complaints	Benchmark	Airtel	Aircel	Idea	Sistema Shyam	Tata Docomo	BSNL	Tata Tele-CDMA	Vodafone	Uninor	Reliance (GSM)	Reliance (CDMA)
Total Number of calls made		29	50	50	50	50	50	50	17	50	50	50
Number of cases resolved in 4 weeks		29	50	50	50	50	50	50	17	50	50	50
Percentage cases resolved in four weeks	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

8. Customer Care

Audit results for customer care

Customer Care Assessment	Benchmark	Airtel	Aircel	Idea	Sistema Shyam	Tata Docomo	BSNL	Tata Tele-CDMA	Vodafone	Uninor	Reliance (GSM)	Reliance (CDMA)
Total number of call attempts to customer care for assistance		23362357	2529452	168413	838180	3196093	644677	1648553	4800957	2252273	2713065	646401
Number of calls getting connected and answered (electronically)		23224145	2529452	165314	404677	3175352	644677	1645946	4800957	2110490	2685490	645159
Percentage calls getting connected and answered	≥ 95%	99.41%	100.00%	98.16%	48.28%	99.35%	100.00%	99.84%	100.00%	93.70%	98.98%	99.81%
Number of calls getting transferred to the operator (voice to voice)		4668955	918590	442776	433453	736347	266629	145214	1484203	695426	768144	507454
Number of calls answered by operator (voice to voice) within 60 seconds		3953656	878471	398764	400056	671707	256422	137877	1247535	563610	749360	469905
Percentage calls answered within 60 seconds (V2V)	≥ 90%	84.68%	95.63%	90.06%	92.30%	91.22%	96.17%	94.95%	84.05%	81.05%	97.55%	92.60%

Live calling results for customer care

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

Live calling results for customer care (Voice to Voice)

Customer Care Assessment	Benchmark	Airtel	Aircel	Idea	Sistema Shyam	Tata Docomo	BSNL	Tata Tele-CDMA	Vodafone	Uninor	Reliance (GSM)	Reliance (CDMA)
Total Number of calls received		100	100	100	100	100	100	100	100	100	100	100
Total Number of calls answered within 60 seconds		99	10	78	98	92	97	96	100	96	95	93
Percentage calls answered within 60 seconds	≥ 90%	99.00%	74.00%	78.00%	98.00%	92.00%	97.00%	96.00%	100.00%	96.00%	95.00%	93.00%

9. Termination / closure of service

Audit results for termination / closure of service

Termination	Benchmark	Airtel	Aircel	Idea	Sistema Shyam	Tata Docomo	BSNL	Tata Tele-CDMA	Vodafone	Uninor	Reliance (GSM)	Reliance (CDMA)
Total number of closure request		1605	148	191	NA	268	1302	2108	3873	NA	102	569
Number of requests attended within 7 days		1605	148	191	NA	268	1302	2108	3871	NA	102	569
Percentage cases in which termination done within 7 days	100%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	99.95%	NA	100.00%	100.00%

Audit results for refund of deposits

Refund	Benchmark	Airtel	Aircel	Idea	Sistema Shyam	Tata Docomo	BSNL	Tata Tele-CDMA	Vodafone	Uninor	Reliance (GSM)	Reliance (CDMA)
Total number of cases requiring refund of deposits		265	153	36	NA	33	90	292	592	NA	59	510
Total number of cases where refund was made within 60 days		265	153	36	NA	33	80	292	592	NA	59	510
Percentage cases in which refund was receive within 60 days	100%	100.00%	100.00%	100.00%	NA	100.00%	88.89%	100.00%	100.00%	NA	100.00%	100.00%

11. Additional Network Related parameters												
Audit Results for Total Traffic Handled in Erlang												
Traffic in Erlang		Airtel	Aircel	Idea	Sistema Shyam	Tata Docomo	BSNL	Tata Tele-CDMA	Vodafone	Uninor	Reliance (GSM)	Reliance (CDMA)
Eqipped capacity of the network		116731	73138	32268	50400	62370	80000	210084	126963.9	33139	64000	84000
Total taffic handled in erlang during TCBH		79420	21486	16125	13547	24246	52662	56331	92107	30370	39300	44487

Total number of customers as per VLR												
		Airtel	Aircel	Idea	Sistema Shyam	Tata Docomo	BSNL	Tata Tele-CDMA	Vodafone	Uninor	Reliance (GSM)	Reliance (CDMA)
Total no. of customers served (as per VLR)		3103906	835062	625001	404159	1064878	715025	760044	3295936	729567	1989853	1233323

10.0 <u>Annexure – II Detailed Explanation of Audit methodology (Parameter wise)</u>

10.1 Cellular Mobile services

1. Accumulated Downtime of the Network	
Computational Methodology as per QoS definition	BTSs accumulated downtime (not available for service) shall basically measure the downtime of the BTSs, including its transmission links/circuits during the period of a month, but excludes all planned service downtime for any maintenance or software upgradation. **Computational Methodology:** • BTSs Accumulated downtime = Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month X 100 -- 24 X No. of days in the month X No. of BTSs in the network in the licensed service area • Worst affected BTSs due to downtime = No. of BTSs having accumulated downtime >24 hours in a month X 100 -------------------------- --- Total No. of BTSs in the network in the licensed service area
Benchmark	• BTSs Accumulated downtime (not available for service) ≤ 2% • Worst affected BTSs due to downtime ≤ 2%
Audit Procedure	**IMRB** auditors collected and verified data pertaining to: The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) used for arriving at the benchmark reported to TRAI were audit

2. Call Set-Up Success Rate (CSSR)	

Computational Methodology as per QoS definition	The ratio of calls established to total calls is known CSSR.
	Call Established means the following events have happened in call setup:-
	    ↳ call attempt is made
	    ↳ the TCH is allocated
	    ↳ the call is routed to the outward path of the concerned MSC
	Computational Methodology: Calls Established / Total Call Attempts * 100

Benchmark	> 95%

Audit Procedure	**IMRB** auditors collected and verified data pertaining to
	    ↳ The cell-wise data generated through counters/ MMC available in the switch for traffic measurements was verified by the auditors
	    ↳ CSSR calculation was measured using OMC generated data only
	    ↳ Measurement was done only in Time Consistent Busy Hour (TCBH) period for all days of the week

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3. Network Congestion Parameters	

Computational Methodology as per QoS definition	It means a call is not connected because there is no free channel to serve the call attempt. This parameter represents congestion in the network. It happens at three levels:
	↳ SDCCH Level: Stand-alone dedicated control channel
	↳ TCH Level: Traffic Channel
	↳ POI Level: Point of Interconnect
	
	Computational Methodology:
	↳ **SDCCH / TCH Congestion% = [(A1 x C1) + (A2 x C2) +……+ (An x Cn)] / (A1 + A2 +…+ An)**
	    ● Where:-A1 = Number of attempts to establish SDCCH / TCH made on day 1
	    ● C1 = Average SDCCH / TCH Congestion % on day 1
	    ● A2 = Number of attempts to establish SDCCH / TCH made on day 2
	    ● C2 = Average SDCCH / TCH Congestion % on day 2
	    ● An = Number of attempts to establish SDCCH / TCH made on day n
	    ● Cn = Average SDCCH / TCH Congestion % on day n
	↳ **POI Congestion% = [(A1 x C1) + (A2 x C2) +……+ (An x Cn)] / (A1 + A2 +…+ An)**
	    ● Where:-A1 = POI traffic offered on all POIs (no. of calls) on day 1
	    ● C1 = Average POI Congestion % on day 1
	    ● A2 = POI traffic offered on all POIs (no. of calls) on day 2
	    ● C2 = Average POI Congestion % on day 2
	    ● An = POI traffic offered on all POIs (no. of calls) on day n
	    ● Cn = Average POI Congestion % on day n

Benchmark	**SDCCH Congestion: ≤ 1%** **TCH Congestion: ≤ 2%** **POI Congestion: ≤ 0.5%**
Audit Procedure	**IMRB Auditors collected and verified records pertaining to**: ↳ Audit of the details of SDCCH and TCH congestion percentages computed by the operator (using OMC–Switch data only) was conducted ↳ The operator should be measuring this parameter during Time consistent busy hour (TCBH) only SDCCH ↳ The POI details were verified from the switch for all the links of the operators

4. Call Drop Rate	
Computational Methodology as per QoS definition	The dropped call rate is the ratio of successfully originated calls that were found to drop to the total number of successfully originated calls that were correctly released ↳ **Total calls dropped** = All calls ceasing unnaturally i.e. due to handover or due to radio loss ↳ **Total calls established** = All calls that have TCH allocation during busy hour **Computational Methodology:** Total Calls Dropped / Total Calls Established x 100
Benchmark	**≤ 2%**
Audit Procedure	**IMRB Auditors collected and verified records pertaining to**: ↳ Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR was conducted. ↳ The operator should only be considering those calls which are dropped during Time consistent busy hour (TCBH) for all days of the relevant quarter

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5. Connections with Good Voice Quality	

Computational Methodology as per QoS definition	Definition:
	    ✇ for GSM service providers the calls having a value of 0 – 4 are considered to be of good quality (on a seven point scale)
	    ✇ For CDMA the measure of voice quality is Frame Error Rate (FER). FER is the probability that a transmitted frame will be received incorrectly. Good voice quality of a call is considered when it FER value lies between 0 – 4 %
	Computational Methodology:
	    ✇ **% Connections with good voice quality =** (No. of voice samples with good voice quality / Total number of samples) x 100

Benchmark	**≥ 95%**

Audit Procedure	**IMRB Auditors collected and verified records pertaining to**:
	Audit would be conducted based on the details of periodic drive tests conducted at different part of the network during Time consistent busy hour (TCBH) and used to arrive at the benchmarks reported to TRAI.
	Procedures that were to be followed by operator for obtaining relevant details for computing this parameter were audited
	    ✇ Operator to conduct at least one drive test using standard drive test equipment every week during TCBH
	    ✇ Each drive test should evenly cover the following 5 types of locations:
	    ✇ **3 Outdoor** (Periphery of the city, Congested Area, Across the City), and **2 Indoor** (Office Complex and Shopping Complex)
	    ✇ 2 minute long calls to be initiated and held throughout the drive test
	    ✇ The speed of the vehicle should be kept at around 50km/hr. (around 30 km/hr in case of geographically small cities) – This was ensured during the drive tests conducted by IMRB Auditors
	    ✇ RxQual / FER samples generated during the drive test collected by the operator were verified
	    ✇ *Measurements using Engineering handsets were not acceptable*
	    ✇ All the operators were not maintaining this data at the switch level

6. Service Coverage	
Computational Methodology as per QoS definition	Definition: ↳ The level of signal available in a particular part of a city is known as signal strength. **Computational Methodology:** ↳ Service Coverage for route type x = [(N1 x CSS1) + (N2 x CSS2) + …..+ (Nn x CSSn)] / (N1 + N2 +………..+Nn) ↳ Where:-N1 = Number of calls on type of route x made in drive test 1 ↳ CSS1 = Average coverage signal strength on type of route x in drive test 1 (in dBm) ↳ N2 = Number of calls on type of route x made in drive test 2 ↳ CSS2 = Average coverage signal strength on type of route x in drive test 2 (in dBm) ↳ Nn = Number of calls on type of route x made in drive test n ↳ CSSn = Average coverage signal strength on type of route x in drive test n (in dBm)
Benchmark	**Indoor >= -75 dBm** **In-vehicle >= -85 dBm** **Outdoor – in city >= -95 dBm**

Audit Procedure	**IMRB Auditors collected and verified call centre records pertaining to**:
	↳ Audit was conducted based on the details of periodic drive tests conducted at different part of the network during Time consistent busy hour (TCBH) which were used to arrive at the benchmarks reported to TRAI.
	↳ Procedures were verified that were to be followed by operator for obtaining relevant details for computing this parameter:-
	    ↳ Operator to conduct at least one drive test using standard drive test equipment* every week during Time consistent busy hour (TCBH).
	    ↳ Each drive test should evenly cover the following 5 types of locations: –
	        ↳ 3 Outdoor (Periphery of the city, Congested Area, Across the City), and
	        ↳ 2 Indoor (Office Complex and Shopping Complex)
	↳ *Measurements using Engineering handsets were not acceptable*

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7. Response time to customer	

Computational Methodology	**To connect to Customer care:** The time taken to connect a person (as soon as he presses call) to the IVR of the service provider
	
	To connect to operator: The time taken to connect a person (as soon as he presses 9) to the customer care executive
	
	Computational Methodology:
	• % age of calls getting connected =
	   Total number of calls getting connected X 100
	   -- 	
	                   Total number of calls made
	
	• % age of calls answered within 60 sec (voice to voice) =
	    Total number of calls answered within 60 seconds X 100
	   -- 	
	                   Total number of calls made

Benchmark	✍ % age of calls getting connected and answered ≥ 95% ✍ % age of calls answered by operator (voice to voice) within 60 seconds ≥ 90%
Audit Procedure	-IMRB auditors made test calls from the exchanges to the operator's customer care / helpline / toll free numbers. They will record the time taken to connect a customer's call both to the IVR as well as to a customer care executive. - All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services. - Time to answer the call by the operator should be taken from the time auditor has pressed the requisite button for being assisted by the operator. **Live calling: -** - Overall sample size is 2*50 calls per service provider per circle at different points of time, evenly distributed across the selected exchanges – 50 calls between 1000 HRS to 1300 HRS and 50 calls between 1500 HRS to 1700 HRS - Time to answer the call by the operator was assessed from the time interviewer pressed the requisite button for being assisted by the operator. - All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.

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Quality of Service – Audit module report for Kolkata Circle

8.1 Billing complaints per 100 bills issued	
Computational Methodology as per QoS definition	Billing complaints includes any of the following complaints related to billing from the point of view of customer: • Local call charges billed as STD/ISD or vice-versa • Toll free numbers charged • Wrong roaming charges • Call made/received disputed • Wrongly charged extra for some service (SIM replacement charged twice, service not used but charged etc.) • Cheque submitted on time but charged penalty for paying beyond due date (in case customer is not at fault i.e. all those that operator cannot prove that he/she is not lying) • Payment made but not reflected (may be wrongly adjusted to another customer etc.) **Billing complaints per 100 bills issued =** Total billing complaints** received during the relevant quarter / Total bills generated* during the relevant quarter * *All types of bills generated for customers i.e. printed bills, online bills and any other forms of bills generated are to be included* ** *Only dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end) are to be included. It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.*
Benchmark	< 0.1% billing complaints per 100 bills
Audit Procedure	**IMRB** auditors collected and verified data pertaining to - Number of bills generated - Number of billing complaints received - %age complaints per 100 bills

8.2 Resolution of billing complaints	
Computational Methodology as per QoS definition	**%age of billing complaints resolved within 4 weeks=**(Complaints resolved in 4 weeks from date of receipt / Total billing complaints received during the relevant period) x 100 *Only dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end) are to be included. It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.* *Date of resolution in this case would refer to the date when a communication has taken place from the operator's end to inform the complainant about the final resolution of the issue / dispute.*
Benchmark	100% cases to be resolved within 4 weeks
Audit Procedure	**IMRB Auditors collected and verified data pertaining to** - Total number of billing complaints/bills disputed - Number of complaints resolved in 4 weeks **Live calling : -** **Overall 100 number of live calls** made in a licensed service area/circle for each service provider. However in certain cases the sample could not be achieved as bills disputed (prior to the month of Audit) were found to be less than100

8.3 Period of refunds / payments due to customers	
Computational Methodology as per QoS definition	Period of all refunds = Maximum value of 'Time taken to refund' where:-Time taken to refund = Date of refund – date of complaint resolution
Benchmark	100% cases in less than 1 week
Audit Procedure	Audit of refund details and complaints (only those resulting in refunds) resolution details used for arriving at the figures reported to TRAI to be conducted. Operator to provide details of:- • **Dates of resolution** of all billing complaints resolved in favour of customer and resulting in requirement of a refund by the operator • **Dates of refund** pertaining to all billing complaints received during the relevant quarter Also random live checks of all subscribers entitled for refund were conducted

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