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

West Bengal 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 modules 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 West Bengal 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

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 "West Bengal" circle for Cellular Mobile services

This report highlights the findings for the Audit module for West Bengal 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 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 the customer care, inter operator call assessment, Back check calls for service provisioning and fault repair

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- 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 West Bengal circle

	Name of Operator
Operator 1	Airtel
Operator 2	Aircel
Operator 3	BSNL
Operator 4	Idea
Operator 5	Sistema Shyam
Operator 6	Tata Docomo
Operator 7	Videocon
Operator 8	Tata Tele
Operator 9	Vodafone
Operator 10	Uninor
Operator 11	Reliance GSM
Operator 12	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}

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 West Bengal 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	4602	3291	0.10%	5	0.11%	98.82%	0.26%	0.82%	1.52%	416	14784	2.81%	98.74%	0	29	225277	183704	7019854
Aircel	19:00 - 20:00	2645	7391	0.38%	44	1.66%	97.94%	0.81%	0.99%	1.26%	282	7947	3.55%	95.17%	0	130	142775	37838	1393047
BSNL	19:00 - 20:00	2390	17995	1.01%	46	1.92%	99.00%	0.72%	0.86%	0.48%	339	6978	4.86%	98.21%	0	97	128000	100664	1486955
Idea	19:00 - 20:00	1999	1377	0.09%	29	1.45%	97.00%	0.34%	1.31%	1.45%	174	5995	2.90%	97.12%	0	63	46782	27929	1077760
Sistema Shyam	19:00 - 20:00	831	1650	0.27%	9	1.08%	96.76%	0.00%	0.31%	1.21%	96	2608	3.68%	96.59%	0	54	50400	35995	937162
Tata Docomo	19:00 - 20:00	1409	3847	0.37%	0	0.00%	99.00%	0.05%	0.09%	0.43%	3033	130097	2.33%	96.69%	0	26	58335	16159	752704
Videocon	20:00 - 21:00	3	0	0.00%	0	0.00%	99.00%	0.36%	0.08%	0.94%	0	10	0.00%	99.18%	0	14	5000	522	1908
Tata Tele	20:00 - 21:00	627	431	0.09%	1	0.16%	99.32%	0.00%	0.04%	0.47%	16	1881	0.85%	99.40%	0	148	145960	21669	344469
Vodafone	19:00 - 20:00	6138	1664	0.04%	9	0.15%	96.69%	0.69%	1.92%	1.43%	703	18400	3.82%	95.43%	0	41	258871	259555	9716144
Uninor	19:00 - 20:00	1777	19592	1.48%	37	2.08%	95.00%	0.53%	1.93%	1.80%	264	5331	4.95%	95.86%	6	92	57308	53838	1532254
Reliance GSM	20:00 - 21:00	2342	1020	0.06%	5	0.21%	99.00%	0.19%	0.80%	0.72%	75	6480	1.16%	98.95%	0	20	92000	81214	3505876
Reliance CDMA	19:00 - 20:00	2127	2293	0.14%	7	0.33%	99.00%	0.00%	0.06%	0.40%	5	1294	0.39%	99.25%	0	51	148000	38185	1118097

*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 West Bengal 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	20:00-21:00	20:00-21:00
Aircel	20:00-21:00	20:00-21:00
BSNL	19:00-20:00	19:00-20:00
Idea	19:00-20:00	19:00-20:00
Sistema Shyam	20:00-21:00	20:00-21:00
Tata Docomo	19:00-20:00	19:00-20:00
Videocon	20:00-21:00	20:00-21:00
Tata Tele	19:00-20:00	19:00-20:00
Vodafone	19:00-20:00	19:00-20:00
Uninor	22:00-23:00	22:00-23:00
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 West Bengal circle.

BTSs Accumulated Downtime:
In the West Bengal circle, BSNL (46 BTSs) and Aircel (44 BTSs) experienced the highest outage with these BTSs having more than 24 hours of accumulated downtime hours in the month of audit. Uninor (2.08%) was found to be not meeting TRAI specified benchmark of 2% for worst affected BTSs

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 Tata Indicom with 99.32% 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. Tata Indicom 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 except 6 POIs of Uninor with congestion more than the benchmark (≤0.5%).

Call Drop Rate:
During the audit it was found that all the service providers were measuring this parameter as per the TRAI guidelines. The call drop rate was measured as the ratio of total calls dropped to the total number of call attempts for all operators. Also, all of service providers except BSNL were found to be meeting the TRAI specified benchmark. The lowest call drop rate was of Reliance CDMA at 0.4% while the highest was for Uninor at 1.8%.

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 operators were measuring this parameter as per the TRAI guidelines and all the operators meet the TRAI benchmark for voice quality.

Customer Care / Helpline Assessment
For the percentage of calls answered by operator in 60 seconds aspect all the service providers meet the TRAI benchmark except for Airtel and Vodafone at 84.68% and 75.68%. All the operators except MTS at 51.11% were meeting TRAI benchmark for the accessibility parameter.

Billing performance
All the operators were found to be meeting the benchmark of ≤ 0.1% complaints registered per 100 bills issued except for Tata DoCoMo. The benchmark of 100% billing complaints being resolved within 4 weeks was being met by all the operators. In all cases where customers were due for refund, all the service providers were meeting the TRAI benchmark of 100%.

Inter operator calls assessment

Inter operator call Assessment To↓　　　　　From →	Airtel	Aircel	BSNL	Idea	Sistema Shyam	Tata Docomo	Tata Tele	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%
BSNL	100%	100%	NA	100%	100%	100%	100%	100%	100%	100%	100%
Idea	100%	100%	100%	NA	100%	100%	100%	100%	100%	100%	100%
Sistema Shyam	100%	100%	100%	100%	NA	100%	100%	100%	100%	100%	100%
Tata Docomo	100%	100%	100%	100%	100%	NA	100%	100%	100%	100%	100%
Tata Tele	100%	100%	100%	100%	100%	100%	NA	100%	100%	100%	100%
Vodafone	100%	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. All the operators were able to connect to other operators with 100 out of 100 calls getting completed.

Results of Operator assisted Drive test

The drive test was conducted simultaneously for all the operators present in the West Bengal circle. There was in total of three drive tests conducted in the circle. These tests were conducted in the cities of Malda, Asansol and Siliguri. 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 West Bengal 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 West Bengal circle were conducted in the cities of Malda, Asansol and Siliguri was conducted along the following route:

	Type of location	Malda	Asansol	Siliguri
Outdoor	Peiphery of the city	Gour More -Bulbulli More.	Kali Pahari More via Bypass Kalyanpur Housing	NJP Station – Hill Cart Road – Sinclairs – Shivmandir Road – towards Bagdogra
	Congested area	Mokdam pur,Sarbamongala Pally,Mahesh Mati,Gour Bazar	Court More to Hutton Moreto Hospital Road	Bidhan Road through Fly over – Siliguri Thana – Jalpai more – Burdwan Road – Mahananda Bridge
	Across the city	Railway Station To Govt.Bus Stand ,Ramkrishnapally to Gour More	Burnpur to Ushagram via GT road	Sinclairs via Sevok 2nd Mile – Venues More via Bidhan Road
Indoor	Office complex	Collector Office	HDFC life insurance	LIC Building, Sevoke Road
	Shopping complex	Mayaban Restrurant and Hotel	Asansol International Hotel	Bazaar Kolkata Shopping Mall, Sevoke Road

Tata DoCoMo did not participate in Asansol and Siliguri drive test due to unavailability of their network in these cities.

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

Drive Test – Malda

	B'mark	Airtel		Aircel		BSNL		Idea		Sistema Shyam		Tata Docomo		Tata Tele		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%	97.34%	95.79%	98.68%	92.88%	99.95%	99.82%	98.34%	97.82%	95.03%	89.18%	99.82%	95.64%	88.04%	81.84%	96.11%	92.83%	97.47%	96.19%	81.03%	91.20%	92.62%	96.57%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	98.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	98.73%	98.33%	100.00%	98.31%	100.00%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.27%	1.67%	0.00%	1.69%	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%	1.69%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.32%	100.00%	100.00%

Drive Test – Asansol

	B'mark	Airtel		Aircel		BSNL		Idea		Sistema Shyam		Tata Tele		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
Voice quality	≥ 95%	97.31%	95.69%	99.28%	93.11%	99.19%	98.67%	95.26%	94.71%	94.74%	83.95%	80.66%	76.28%	98.18%	96.28%	99.35%	96.05%	96.41%	90.18%	80.69%	91.42%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	98.33%	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%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.67%	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%	0.67%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Drive Test – Siliguri

	B'mark	Airtel		Aircel		BSNL		Idea		Sistema Shyam		Tata Tele		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
Voice quality	≥ 95%	98.82%	95.53%	94.74%	90.96%	98.52%	98.22%	97.76%	96.01%	83.52%	88.09%	77.81%	74.90%	96.18%	95.07%	96.48%	96.50%	96.60%	93.62%	67.74%	89.51%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	98.33%	99.33%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.34%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.67%	0.67%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.66%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.67%	0.00%	0.00%	0.00%	0.67%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.66%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	0.00%	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%

Not meeting the benchmark

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

ALL SERVICE PROVIDERS

Malda: There was interference and low signal strength recorded for all operators in the outdoor areas of Gour More while in the indoor areas no interference and inadequate coverage was recorded.

Asansol: There was interference and low signal strength recorded for all operators in the outdoor areas of Kali Pahari More while in the indoor areas no interference and inadequate coverage was recorded.

Siliguri: There was interference and low signal strength recorded for all operators in the outdoor areas of Near Hotel Sinclairs, Bidhan More, Jalpai More 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 Aircel, MTS, Tata Indicom, Reliance GSM and Reliance CDMA were not meeting the TRAI benchmark on voice quality for all the three cities. Moreover, Idea and Vodafone were not meeting the TRAI benchmark on voice quality in Asansol and Malda respectively.

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	0.00%	0.00%	98.22%	0.26%	0.88%	1.92%	2.83%	96.55%	100.00%	100.00%	60.00%
Aircel	0.08%	0.00%	99.20%	0.47%	0.25%	1.08%	3.66%	93.88%	84.00%	100.00%	53.00%
BSNL	0.10%	0.33%	98.55%	0.73%	0.81%	0.61%	2.05%	98.97%	100.00%	100.00%	57.00%
Idea	0.01%	0.00%	99.00%	0.13%	0.36%	1.15%	1.61%	96.46%	100.00%	100.00%	66.00%
Sistema Shyam	0.01%	0.00%	98.18%	0.00%	0.04%	1.03%	3.88%	88.29%	NA	100.00%	74.00%
Tata Docomo	0.00%	0.00%	99.00%	0.04%	0.07%	0.50%	3.04%	97.22%	100.00%	100.00%	71.00%
Videocon	0.00%	0.00%	100.00%	0.47%	0.00%	0.00%	0.00%	NA	NA	NA	NA
Tata Tele	0.12%	0.00%	99.65%	0.00%	0.02%	0.32%	0.48%	78.95%	100.00%	100.00%	67.00%
Vodafone	0.05%	0.00%	96.12%	0.63%	2.62%	1.47%	3.91%	95.40%	100.00%	100.00%	64.00%
Uninor	1.83%	0.00%	98.00%	0.97%	1.89%	1.42%	4.84%	96.78%	100.00%	100.00%	39.00%
Reliance GSM	0.00%	0.00%	99.00%	0.18%	0.71%	0.78%	0.57%	92.67%	100.00%	100.00%	66.00%
Reliance CDMA	0.03%	0.00%	99.00%	0.00%	0.05%	0.70%	0.31%	92.34%	NA	100.00%	90.00%

☐ Not meeting the benchmark

During the three day live measurement, It was found that:
- All operators except Vodafone were found to be meeting the TRAI benchmark for Traffic Channel congestion parameter.
- Aircel, MTS, Tata Indicom, Reliance GSM and Reliance CDMA were not meeting the TRAI benchmark for voice quality.
- All the operators except Aircel were found to be meeting the % of complaints resolved within 4 weeks parameter.
- All the operators except Reliance CDMA were found to be not meeting the TRAI benchmark 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
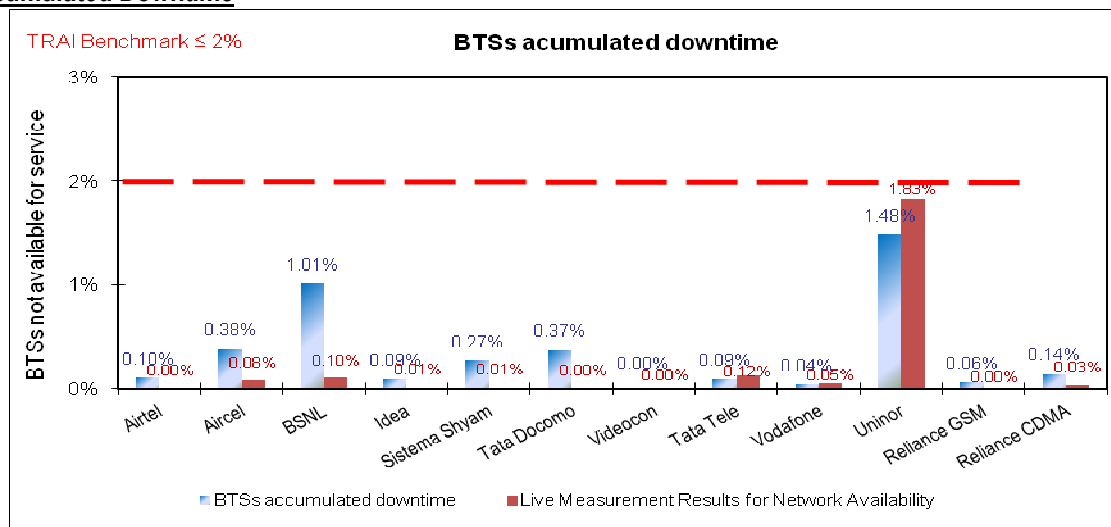
One month
All the operators meet the benchmark
Live measurement
All the operators meet the benchmark

Worst Affected BTSs
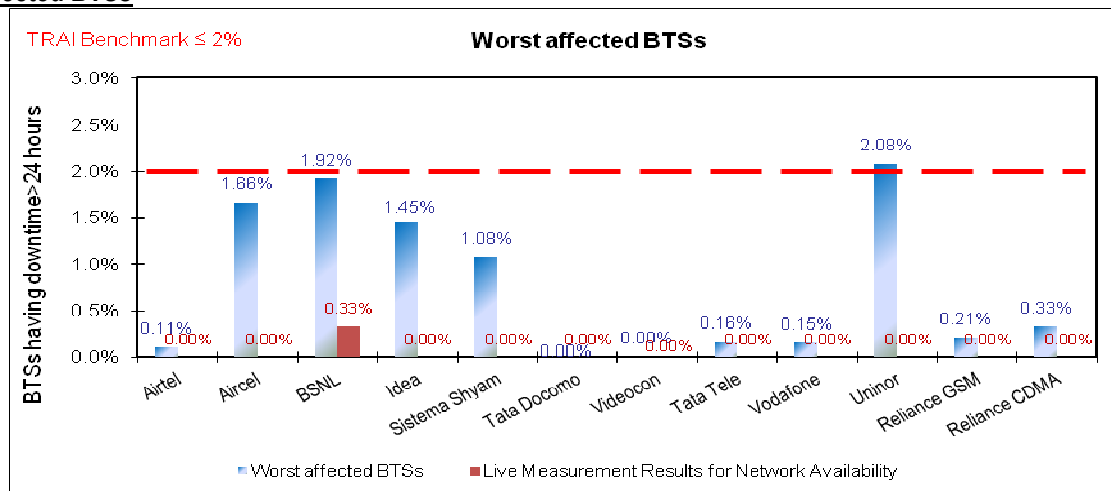
One month
Operator(s) meeting benchmark: Airtel, Aircel, BSNL, Idea, Sistema Shyam, Tata Docomo, Videocon, Tata Tele, Vodafone, Reliance GSM, Reliance CDMA
Operator(s) not meeting the benchmark: Uninor
Live measurement
All the operators meet the benchmark

Call Set-up Success Rate (CSSR)

One month
All the operators meet the benchmark

Live measurement
All the operators meet the benchmark

Drive test
All the operators meet the benchmark

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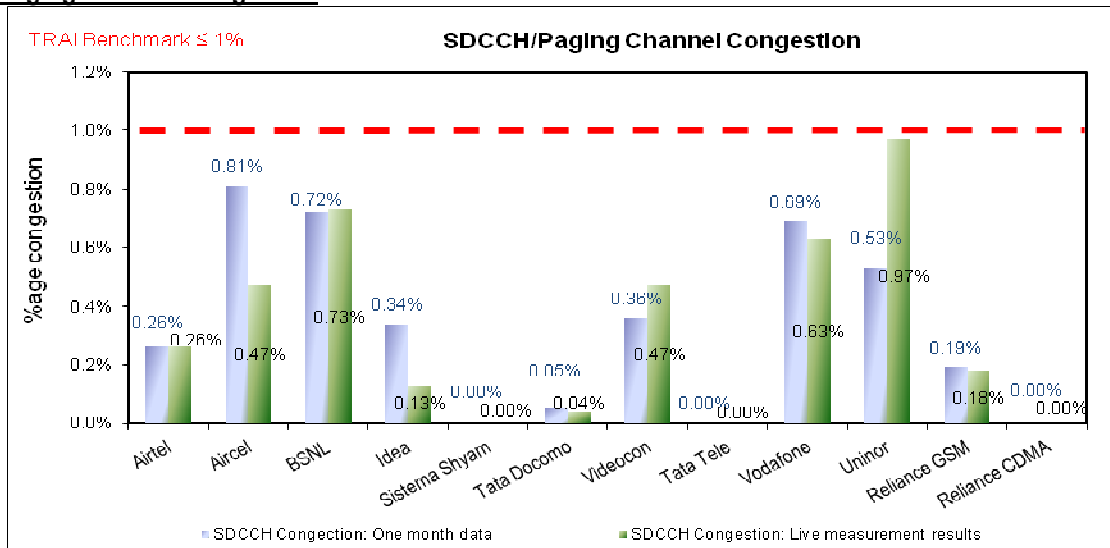
One month
All the operators meet the benchmark

Live measurement
All the operators meet the benchmark

TCH Congestion
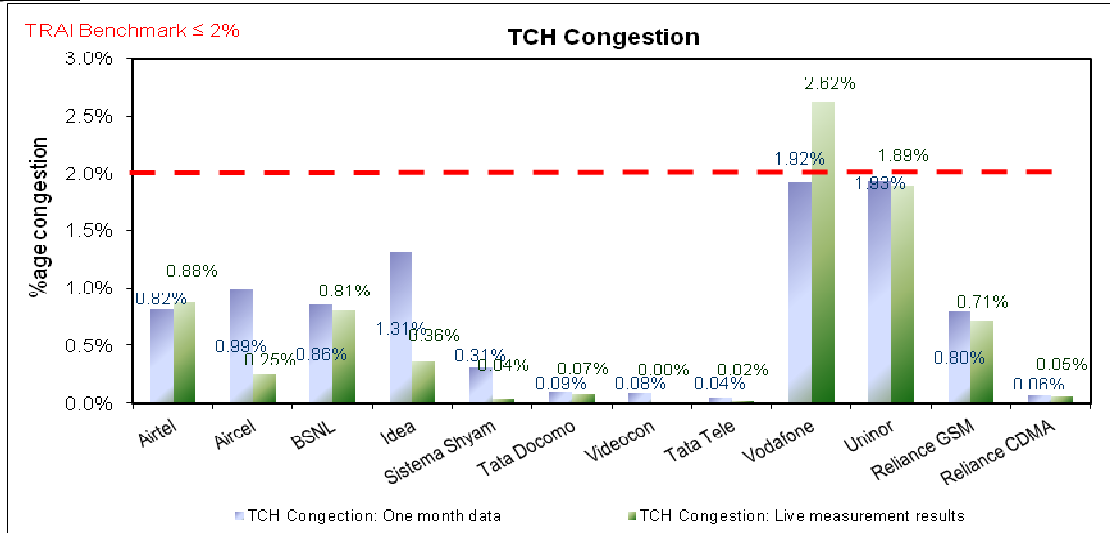
One month
All the operators meet the benchmark

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

Call Drop Rate
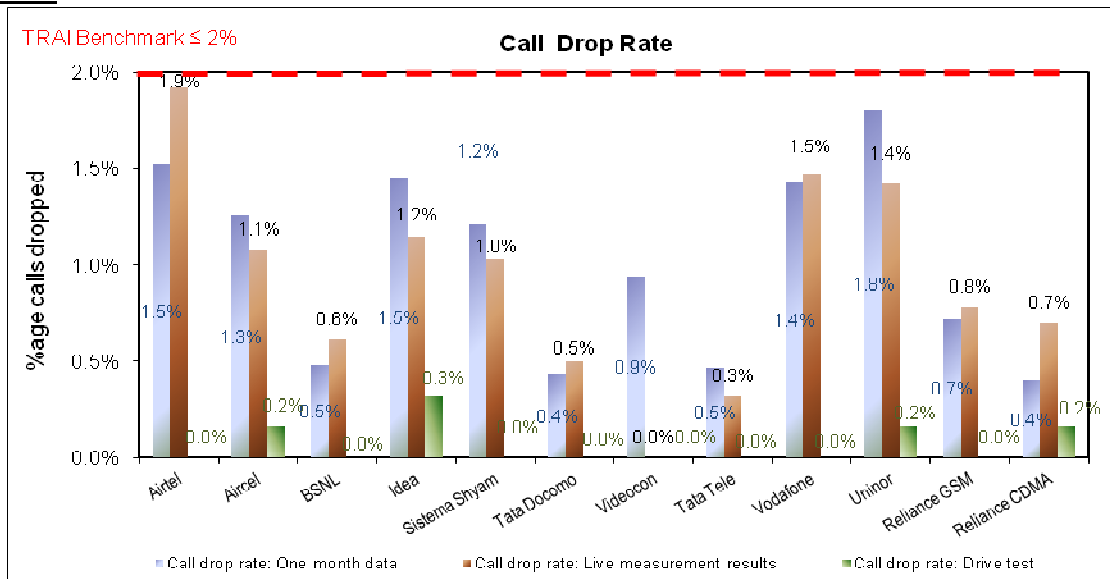
One month
All the operators meet the benchmark

Live measurement
All the operators meet the benchmark

Drive test
All the operators meet the benchmark

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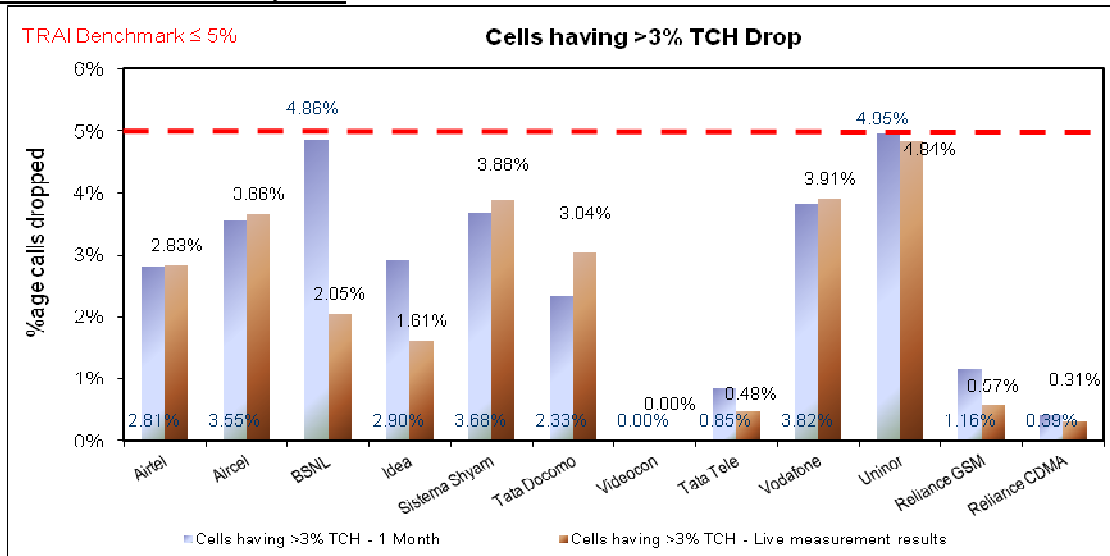
One month
All the operators meet the benchmark

Live measurement
All the operators meet the benchmark

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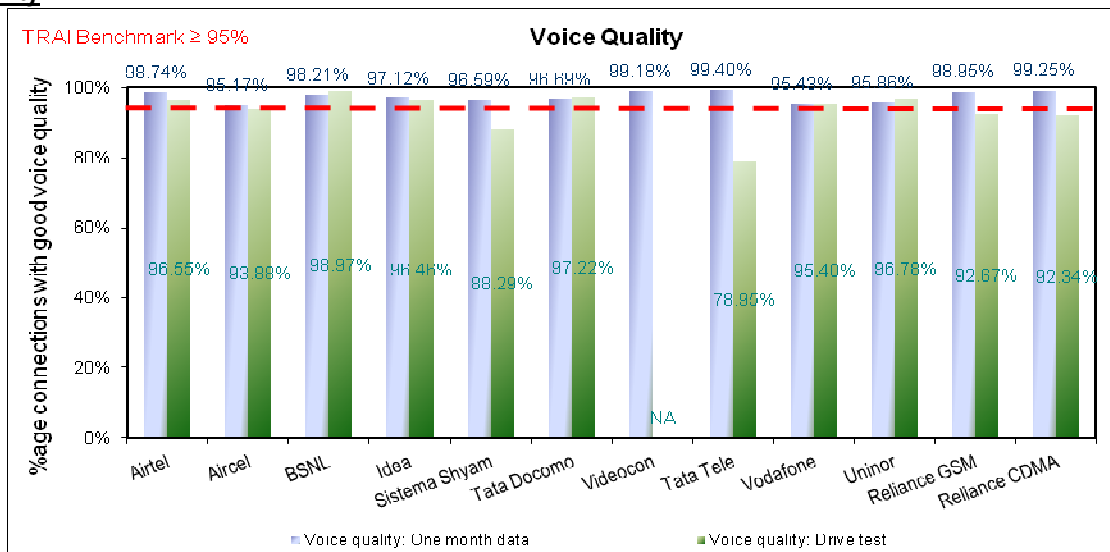
One month
All the operators meet the benchmark

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

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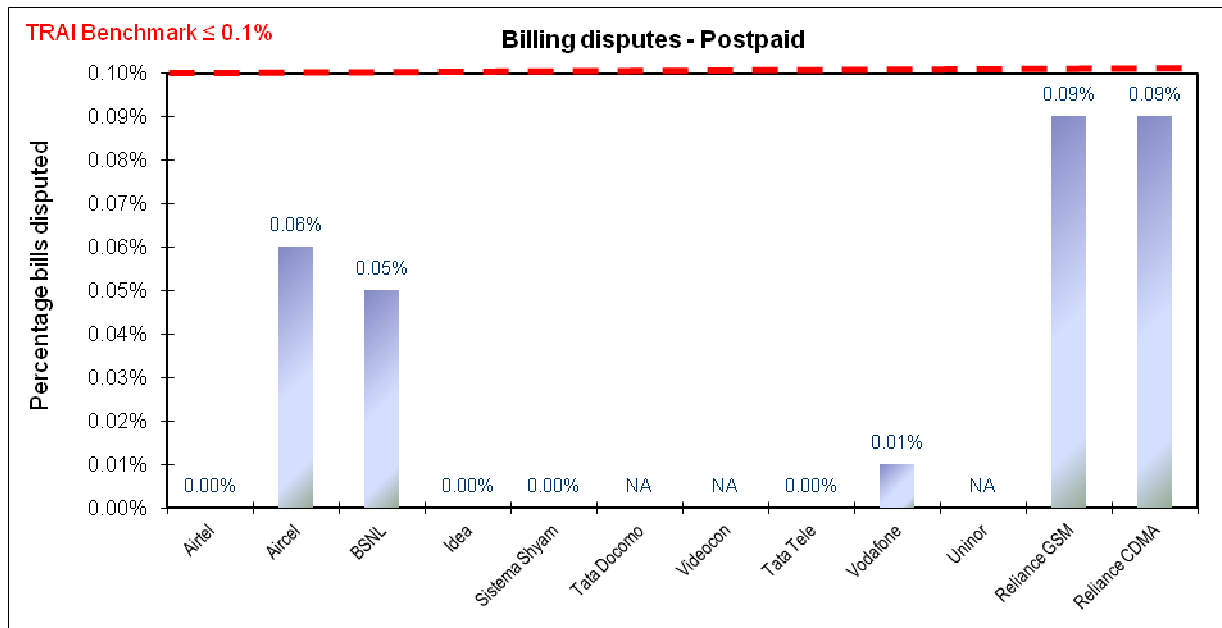
All the operators meet the benchmark

<u>**Complaints - Prepaid**</u>
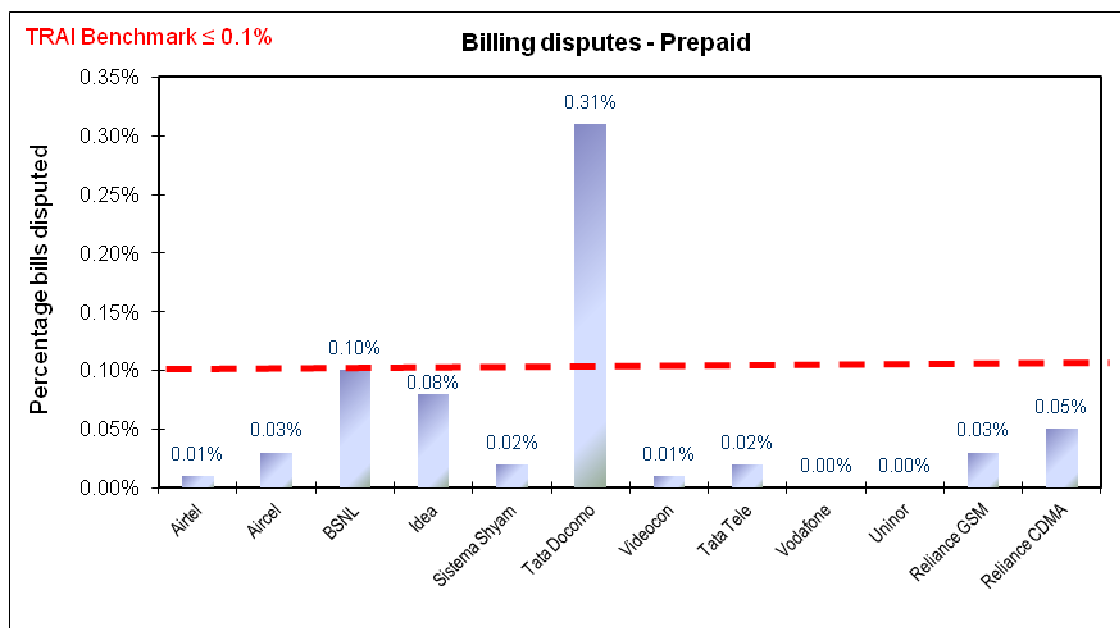
Operator(s) meeting benchmark: Airtel, Aircel, BSNL, Idea, Sistema Shyam, Videocon, Tata Tele, Vodafone, Uninor, Reliance GSM, Reliance CDMA
Operator(s) not meeting the benchmark: Tata Docomo

Resolution of billing complaints

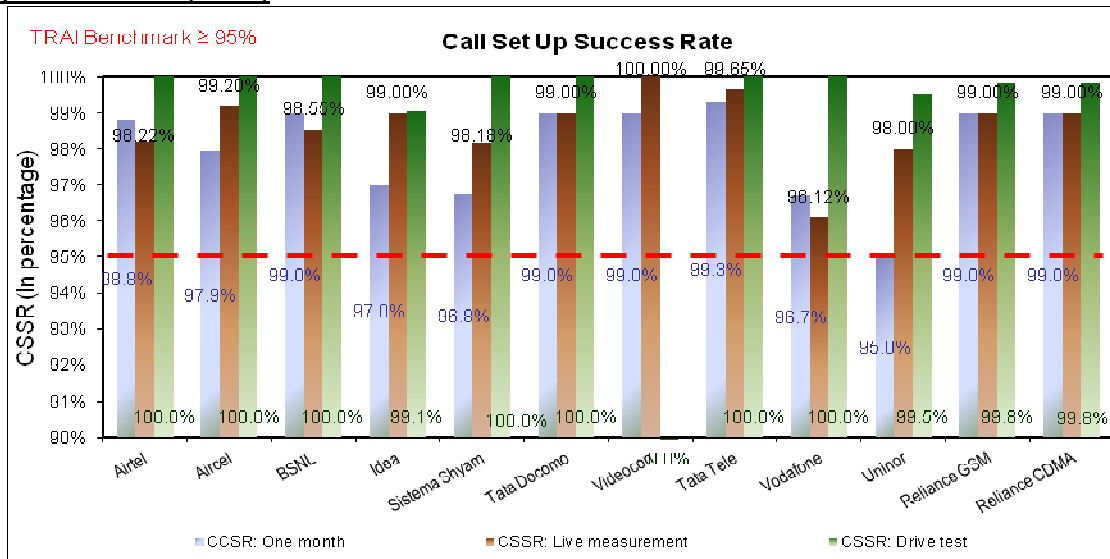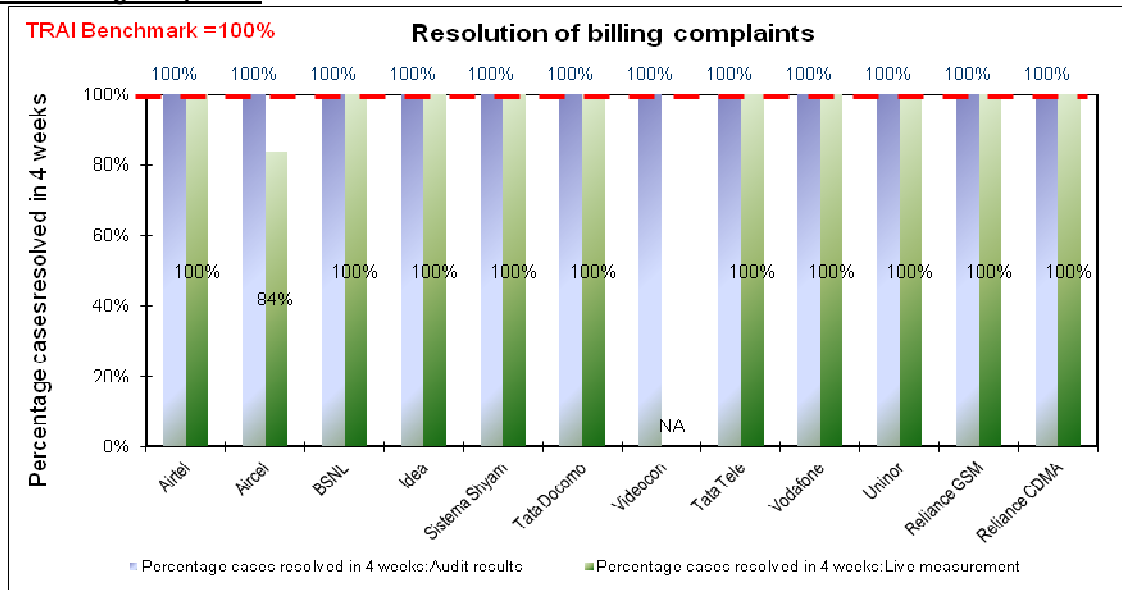## One month
All the operators meet the benchmark

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

Period of applying credit / waiver
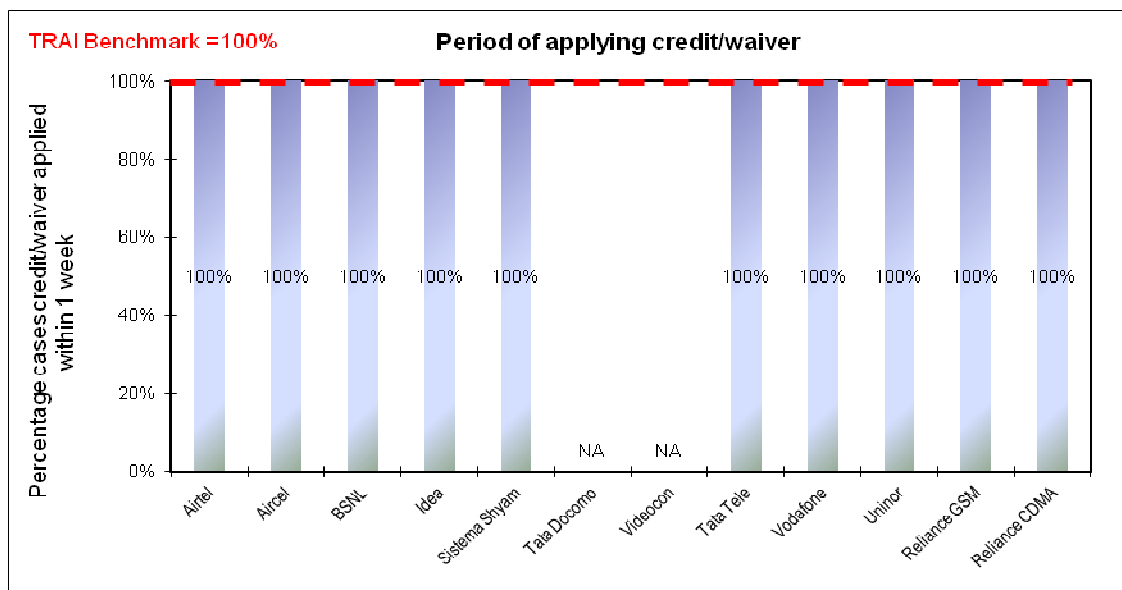
All the operators meet the benchmark

Live calling for billing Complaints

Resolution of billing complaints	Benchmark	Airtel	Aircel	BSNL	Idea	Sistema Shyam	Tata Docomo	Videocon	Tata Tele	Vodafone	Uninor	Reliance GSM	Reliance CDMA
Total Number of calls made		30	50	50	50	50	50	0	50	10	50	50	50
Number of cases resolved in 4 weeks		30	42	50	50	50	50	0	50	10	50	50	50
Percentage cases resolved in four weeks	100%	100%	84%	100%	100%	100%	100%	NA	100%	100%	100%	100%	100%

Customer Care / Helpline: Calls answered
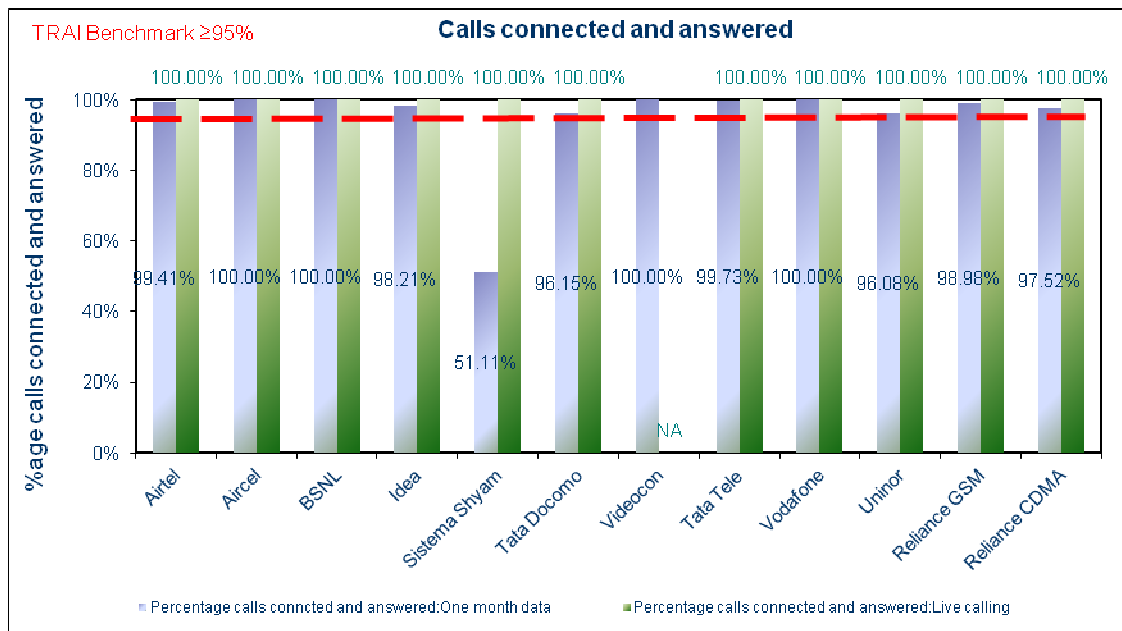
One month

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

Live measurement

All the operators meet the benchmark

Customer Care / Helpline: Calls answered voice to voice
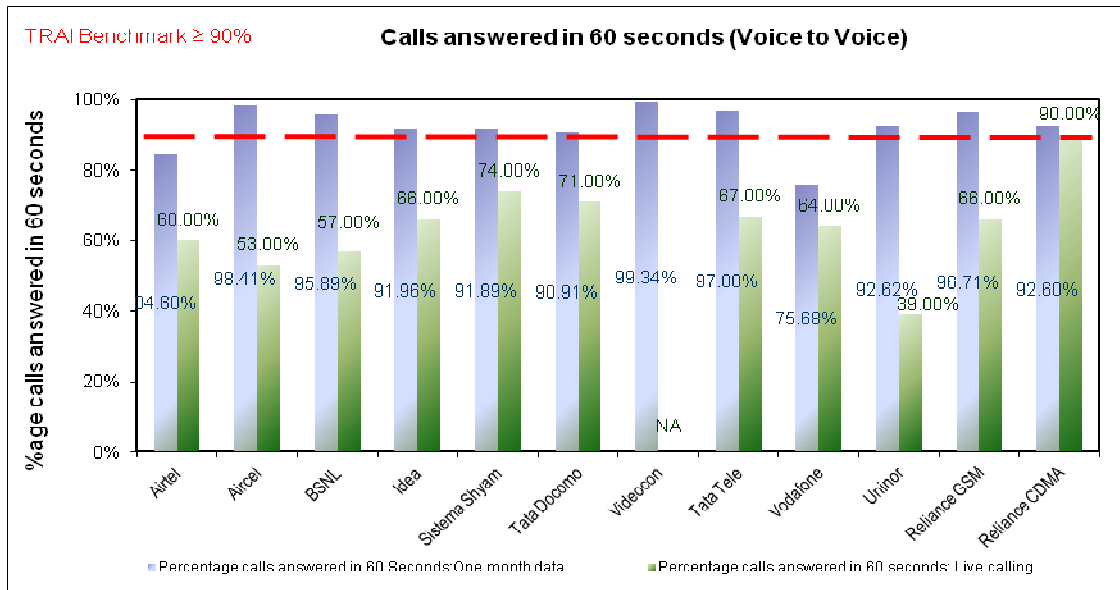
One month
Operator(s) meeting benchmark: Aircel, BSNL, Idea, Sistema Shyam, Tata Docomo, Videocon, Tata Tele, Uninor, Reliance GSM, Reliance CDMA
Operator(s) not meeting the benchmark: Airtel, Vodafone

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

Termination / Closure of service
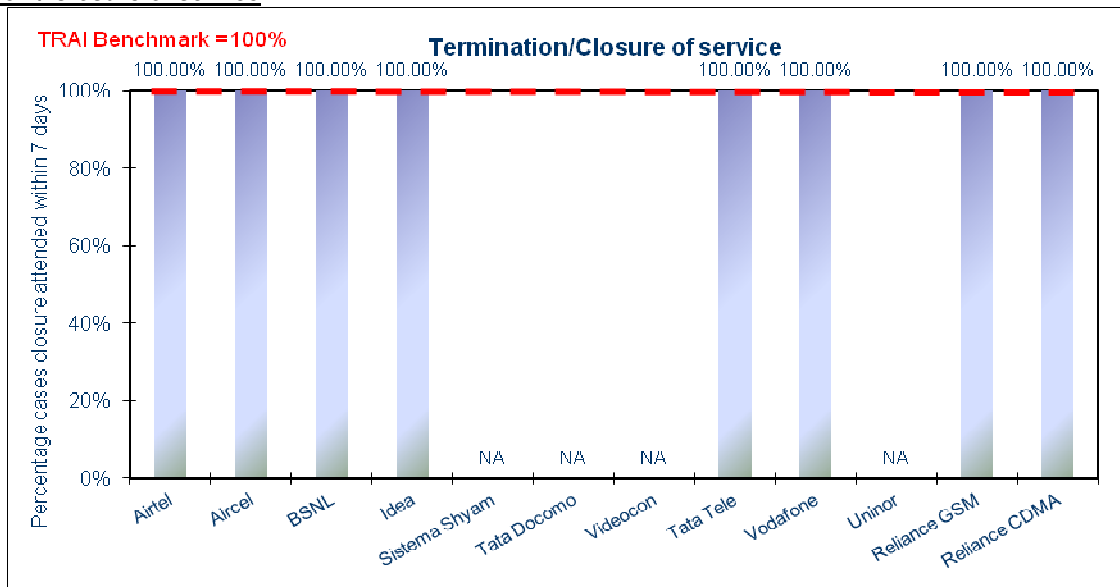
All the operators meet the benchmark

Refund of deposits
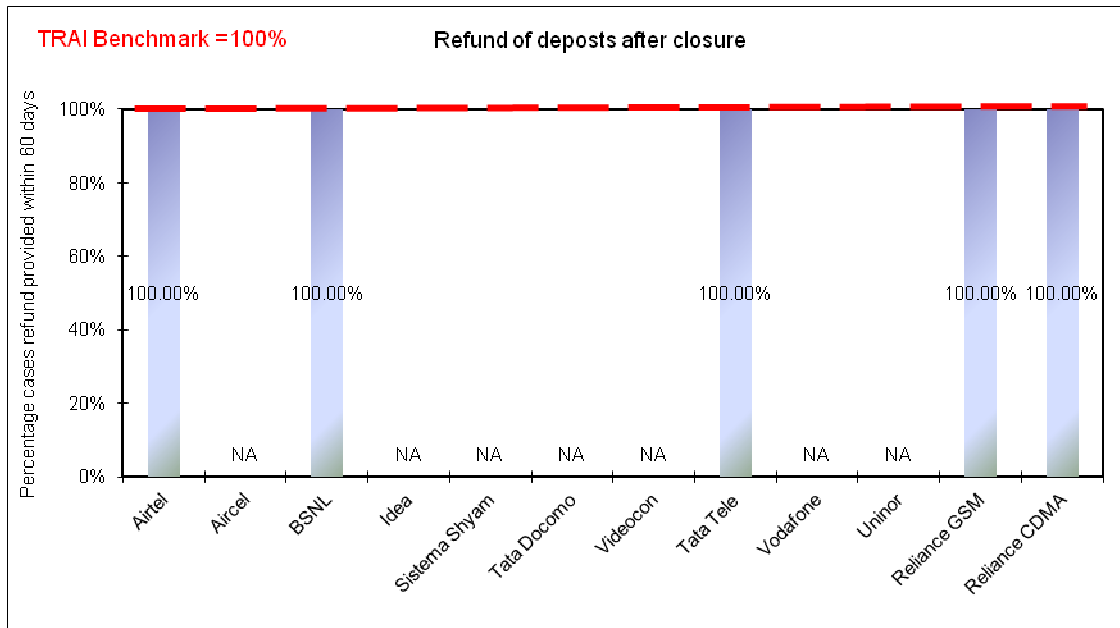
All the operators meet the benchmark

Inter operator calls assessment

Inter operator call Assessment To↓ From →	Airtel	Aircel	BSNL	Idea	Sistema Shyam	Tata Docomo	Tata Tele	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%
BSNL	100%	100%	NA	100%	100%	100%	100%	100%	100%	100%	100%
Idea	100%	100%	100%	NA	100%	100%	100%	100%	100%	100%	100%
Sistema Shyam	100%	100%	100%	100%	NA	100%	100%	100%	100%	100%	100%
Tata Docomo	100%	100%	100%	100%	100%	NA	100%	100%	100%	100%	100%
Tata Tele	100%	100%	100%	100%	100%	100%	NA	100%	100%	100%	100%
Vodafone	100%	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. All the operators were able to connect to other operators with 100 out of 100 calls getting completed.

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	4538	2109	0.06%	12	0.26%	98.89%	0.24%	0.75%	1.31%	242	14486	1.67%	98.71%	0	335	214101	170901	7014558
	IMRB	4538	2109	0.06%	12	0.26%	98.89%	0.24%	0.75%	1.31%	242	14486	1.67%	98.71%	0	335	214101	170901	7014588
Aircel	PMR	2643	3806.8	0.19%	28	1.06%	97.42%	0.54%	1.96%	1.31%	1009.84	7848	12.87%	95.25%	0	127	138479	52012	1646024
	IMRB	2643	3806.8	0.19%	28	1.06%	97.42%	0.54%	1.96%	1.31%	1009.84	7848	12.87%	95.25%	0	127	138479	52012	1646024
BSNL	PMR	2416	17725	0.89%	44	1.70%	98.00%	0.62%	0.98%	0.78%	350	7055	5.97%	98.00%	0	99	136000	107911	1600665
	IMRB	2294	16361	0.99%	42	1.83%	98.52%	0.86%	1.43%	0.64%	324	6691	4.84%	98.46%	0	97	128000	101716.28	1484129
Idea	PMR	1561	901	0.08%	13	0.83%	96.05%	0.28%	1.39%	0.77%	413	4681	8.82%	97.84%	0	51	32828	18302	755095
	IMRB	1561	901	0.08%	13	0.83%	96.05%	0.28%	1.39%	0.77%	413	4681	8.82%	97.84%	0	51	32828	18302	755095
Sistema Shyam	PMR	733	1088	0.20%	9	1.23%	98.55%	0.00%	0.15%	1.18%	88	2221	3.96%	99.77%	0	48	50400	27293	716506
	IMRB	733	1088	0.20%	9	1.23%	98.55%	0.00%	0.15%	1.18%	88	2221	3.96%	99.77%	0	48	50400	27293	716506
Tata Docomo	PMR	1394	118	0.01%	0	0.00%	98.16%	0.02%	0.15%	0.98%	147	4182	3.52%	96.00%	0	20	39256	10925	694184
	IMRB	1394	118	0.01%	0	0.00%	98.16%	0.02%	0.15%	0.98%	147	4182	3.52%	96.00%	0	20	39256	10925	694184
Videocon	PMR	4	5	0.16%	0	0.00%	97.46%	0.38%	1.29%	1.71%	0	13	0.00%	98.00%	0	12	5000	27	2220
	IMRB	4	5	0.16%	0	0.00%	97.46%	0.38%	1.29%	1.71%	0	13	0.00%	98.00%	0	12	5000	27	2220
Tata Tele	PMR	626	268	0.06%	0	0.00%	99.80%	0.00%	0.00%	0.19%	2	1877	0.11%	99.75%	0	136	143910	25904	424264
	IMRB	626	268	0.06%	0	0.00%	99.80%	0.00%	0.00%	0.19%	2	1877	0.11%	99.75%	0	136	143910	25904	424264
Vodafone	PMR	5901	764	0.04%	0	0.00%	96.72%	0.50%	1.96%	1.81%	850	17234	4.93%	95.49%	0	42	233801	224346	8241293
	IMRB	5901	764	0.04%	0	0.00%	96.72%	0.50%	1.96%	1.81%	850	17234	4.93%	95.49%	0	42	233801	224346	8241293
Uninor	PMR	1438	10122	0.95%	28	1.95%	95.59%	0.55%	1.95%	1.92%	274	4447	6.16%	95.53%	0	63	48335	35679	631753
	IMRB	1438	10122	0.95%	28	1.95%	95.59%	0.55%	1.95%	1.92%	274	4447	6.16%	95.53%	0	63	48335	35679	631753
Reliance GSM	PMR	1902	1879	0.14%	16	0.85%	98.97%	0.65%	0.91%	1.04%	163	5706	2.86%	97.55%	0	20	92000	78011	NA
	IMRB	1902	1879	0.14%	16	0.85%	98.97%	0.65%	0.91%	1.04%	163	5706	2.86%	97.55%	0	20	92000	78011	NA
Reliance CDMA	PMR	1294	3752	0.39%	17	1.32%	97.28%	0.00%	0.22%	0.70%	4	1294	0.31%	97.55%	0	21	148000	38698	NA
	IMRB	1294	3752	0.39%	17	1.32%	97.28%	0.00%	0.22%	0.70%	4	1294	0.31%	97.55%	0	21	148000	38698	NA

7.2 Compliance Report Month 2: February 2011

Name of Service Provider		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	4567	2425	0.08%	10	0.22%	98.78%	0.27%	0.83%	1.43%	237	14572	1.63%	98.79%	0	339	219655	182359	7185338
	IMRB	4567	2425	0.08%	10	0.22%	98.78%	0.27%	0.83%	1.43%	237	14572	1.63%	98.79%	0	339	219655	182359	7185338
Aircel	PMR	2638	3895	0.22%	35	1.33%	97.97%	0.47%	1.38%	1.07%	724.43	7833	9.25%	95.36%	0	129	138077.56	50112	1803685
	IMRB	2638	3895	0.22%	35	1.33%	97.97%	0.47%	1.38%	1.07%	724.43	7833	9.25%	95.36%	0	129	138078	50112	1803685
BSNL	PMR	2433	16580	0.89%	41	2.40%	98.00%	0.57%	0.92%	0.78%	360	7097	5.97%	98.00%	0	99	136000	105535	1630734
	IMRB	2308	15901	0.96%	37	1.60%	98.57%	0.82%	1.39%	0.62%	324	6732	4.81%	98.54%	0	97	128000	99105	1513554
Idea	PMR	1711	849	0.07%	13	0.76%	95.74%	0.31%	0.59%	0.68%	410	5131	7.99%	97.97%	0	53	36333	20453	786990
	IMRB	1711	849	0.07%	13	0.76%	95.74%	0.31%	0.59%	0.68%	410	5131	7.99%	97.97%	0	53	36333	20453	786990
Sistema Shyam	PMR	745	1968	0.39%	9	1.20%	96.12%	0.00%	0.44%	0.96%	85	2257	3.77%	98.31%	0	47	50400	31292	797893
	IMRB	745	1968	0.39%	9	1.20%	98.00%	0.00%	0.44%	0.96%	85	2257	3.77%	98.31%	0	47	50400	31292	797893
Tata Docomo	PMR	1402	86	0.01%	0	0.00%	98.00%	0.02%	0.19%	0.70%	85	4206	2.02%	96.00%	0	13	40388	15176	723858
	IMRB	1402	86	0.01%	0	0.00%	98.00%	0.02%	0.19%	0.70%	85	4206	2.02%	96.00%	0	13	40388	15176	723858
Videocon	PMR	4	0	0.00%	0	0.00%	99.07%	0.15%	0.00%	1.57%	0	12	0.00%	98.69%	0	27	5000	4.09	862
	IMRB	4	0	0.00%	0	0.00%	99.00%	0.15%	0.00%	1.57%	0	13	0.00%	98.69%	0	12	5000	4.09	862
Tata Tele	PMR	626	312	0.07%	0	0.00%	99.72%	0.00%	0.01%	0.27%	2	1877	0.11%	99.75%	0	140	144771	25826	420076
	IMRB	626	312	0.07%	0	0.00%	99.72%	0.00%	0.01%	0.27%	2	1877	0.11%	99.75%	0	140	144771	25826	420076
Vodafone	PMR	5941	3167	0.08%	15	0.25%	96.49%	0.64%	1.99%	1.69%	877	17650	4.97%	95.74%	0	42	239672	243730	8712091
	IMRB	5941	3167	0.08%	15	0.25%	96.00%	0.64%	1.99%	1.69%	877	17650	4.97%	95.74%	0	42	239672	243730	8712091
Uninor	PMR	1457	9642	0.88%	21	1.44%	94.00%	0.60%	1.50%	1.90%	224	4371	5.10%	95.80%	0	68	49531	41089	711815
	IMRB	1457	9642	0.88%	21	1.44%	94.00%	0.60%	1.50%	1.90%	224	4371	5.10%	95.80%	0	68	49531	41089	711815
Reliance GSM	PMR	2002	1417	0.11%	8	0.40%	98.25%	0.62%	1.46%	1.07%	183	6006	3.05%	97.59%	0	20	92000	78657	NA
	IMRB	2002	1417	0.10%	8	0.40%	98.00%	0.62%	1.45%	1.07%	183	6006	3.04%	97.59%	0	20	92000	78657	NA
Reliance CDMA	PMR	1294	2408	0.28%	12	0.93%	99.34%	NA	0.22%	0.85%	3	1294	0.23%	97.59%	0	21	148000	39124	NA
	IMRB	1294	2408	0.27%	12	0.92%	99.33%	NA	0.22%	0.85%	3	1294	0.23%	97.59%	0	21	148000	39124	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	4588	2704.3	0.10%	7	0.20%	98.80%	0.30%	0.80%	1.40%	182	14649	1.20%	98.60%	0	352	223293	175734	6955886
	IMRB	4588	2704.3	0.08%	7	0.15%	98.80%	0.25%	0.84%	1.39%	182	14649	1.24%	98.63%	0	352	223293	175734	6955886
Aircel	PMR	2571	4266	0.22%	26	1.01%	98.43%	0.31%	1.02%	0.97%	575	7632	7.53%	95.47%	0	129	133986	43344	1407320
	IMRB	2571	4265.72	0.22%	26	1.01%	98.43%	0.31%	1.02%	0.97%	574.87	7632	7.53%	95.47%	0	129	133986	43344	1407320
BSNL	PMR	2497	17523	1.03%	45	2.45%	98.00%	0.58%	1.02%	0.79%	361	7288	6.10%	98.00%	0	99	136000	109427	1646244
	IMRB	2372	16532	0.97%	41	1.73%	98.61%	0.78%	1.42%	0.59%	334	6924	4.82%	98.58%	0	97	128000	103211	1526859
Idea	PMR	1882	994	0.07%	17	0.90%	95.99%	0.28%	0.44%	0.67%	271	5644	4.80%	98.00%	0	59	41227	23843	840205
	IMRB	1882	994	0.07%	17	0.90%	95.99%	0.28%	0.44%	0.67%	271	5644	4.80%	98.00%	0	59	41227	23843	840205
Sistema Shyam	PMR	789	1540	0.27%	3	0.39%	98.81%	0.00%	0.34%	0.94%	91	2379	3.83%	98.87%	0	49	50400	32063	830085
	IMRB	769	1539	0.27%	3	0.39%	98.81%	0.00%	0.34%	0.94%	91	2379	3.83%	98.87%	0	49	50400	32063	830085
Tata Docomo	PMR	1403	93	0.09%	0	0.00%	98.00%	0.19%	0.20%	0.42%	17	4148	0.40%	97.00%	0	13	48793	16609	744888
	IMRB	1403	93	0.09%	0	0.00%	98.00%	0.19%	0.20%	0.42%	17	4148	0.40%	97.00%	0	13	48793	16609	744888
Videocon	PMR	4	4	0.14%	0	0.00%	99.09%	0.06%	0.00%	1.32%	0	12	0.00%	98.74%	0	19	5000	10.46	887
	IMRB	4	4	0.14%	0	0.00%	99.00%	0.06%	0.00%	1.32%	0	13	0.00%	98.74%	0	13	5000	10.46	887
Tata Tele	PMR	626	284	0.06%	0	0.00%	99.84%	0.00%	0.00%	0.16%	1	1877	0.05%	99.81%	0	140	144771	25066	408523
	IMRB	626	284	0.06%	0	0.00%	99.84%	0.00%	0.00%	0.16%	1	1877	0.05%	99.81%	0	140	144771	25066	408523
Vodafone	PMR	6111	3078	0.07%	13	0.21%	96.65%	0.72%	1.98%	1.54%	890	17862	4.98%	96.00%	0	42	245018	258950	9441392
	IMRB	6111	3078	0.07%	13	0.21%	96.65%	0.72%	1.98%	1.54%	890	17862	4.98%	96.00%	0	42	245018	258950	9441392
Uninor	PMR	1485	10887	0.90%	2	0.10%	95.00%	0.80%	2.30%	1.70%	238	4456	5.34%	95.00%	0	73	49971	48461	794836
	IMRB	1485	10887	0.90%	2	0.10%	95.00%	0.80%	2.30%	1.70%	238	4456	5.34%	95.00%	0	73	49971	48461	794836
Reliance GSM	PMR	2072	1404	0.09%	4	0.19%	97.90%	0.60%	1.90%	1.14%	250	6216	4.02%	97.53%	0	20	NA	NA	NA
	IMRB	2072	1404	0.09%	4	0.19%	97.90%	0.60%	1.90%	1.14%	250	6216	4.02%	97.53%	0	20	NA	NA	NA
Reliance CDMA	PMR	1294	2805	0.29%	7	0.54%	99.42%	NA	0.15%	0.87%	44	1488	2.95%	97.29%	0	21	NA	NA	NA
	IMRB	1294	2805	0.29%	7	0.54%	99.42%	NA	0.15%	0.87%	44	1488	2.95%	97.29%	0	21	NA	NA	NA

7.4 Cellular Mobile services: Compliance Report January – March 2011

Name of Service Provider		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 / Closure 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
		Metering and Billing												Response time to the customer for assistance				Termination/ closure of service			
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	0.00%	74981	3	0.02%	5113	31490238	100%	5116	39970	5116	34854	100%	94%	129430452	121023185	84.0%	100%	395	395	100%
Airtel	IMRB	0.00%	74981	3	0.02%	5113	31490238	100%	5116	39970	5116	34854	100%	94%	129430452	121023185	84.0%	100%	395	395	100%
Aircel	PMR	0.02%	5634	1	0.03%	2497	2953963	100%	2498	2498	788	1710	100%	100%	5254225	12600116	60.5%	100%	17	17	100%
Aircel	IMRB	0.02%	5634	1	0.03%	2497	2953963	100%	2498	2498	788	1710	100%	100%	5254225	12600116	60.5%	100%	17	17	100%
BSNL	PMR	0.01%	125926	68	0.04%	3638	2858302	100%	3706	3706	3686	20	100%	100%	3856	3660	92.9%	100%	329	329	100%
BSNL	IMRB	0.00%	399598	131	0.03%	7926	23192810	100%	8057	8057	3909	4148	100%	95%	3295	3116	95.6%	100%	5911	5911	100%
Idea	PMR	0.10%	2891	3	0.14%	6962	5130919	100%	6965	6965	7329	504	100%	99%	629378	624963	75.0%	100%	242	242	89%
Idea	IMRB	0.10%	2891	3	0.13%	2321	1728627	100%	7469	7469	6965	504	100%	99%	629378	624963	75.2%	100%	242	242	89%
Sistema Shyam	PMR	NA	NA	0	0.08%	987	1202261	100%	987	987	267	720	100%	100%	208833	193377	93.0%	NA	NA	NA	NA
Sistema Shyam	IMRB	NA	NA	0	0.08%	987	1202261	100%	987	987	267	720	100%	100%	208833	193377	93.0%	NA	NA	NA	NA
Tata Docomo	PMR	NA	NA	NA	0.00%	12327	2780950	100%	12327	12327	22	12305	100%	99%	876270	831543	84%	NA	NA	NA	NA
Tata Docomo	IMRB	NA	NA	NA	0.00%	12327	2780950	100%	12327	12327	22	12305	100%	99%	876270	831543	84%	NA	NA	NA	NA
Videocon	PMR	NA	NA	NA	0.08%	9	11697	100%	9	9	0	9	100%	100%	314	314	100%	NA	NA	NA	NA
Videocon	IMRB	NA	NA	NA	0.08%	9	11697	100%	9	9	0	9	100%	100%	314	314	100%	NA	NA	NA	NA
Tata Tele	PMR	0.03%	42747	11	0.01%	162	1137305	100%	584	585	173	411	100%	99%	282331	279839	96.0%	100%	498	498	100%
Tata Tele	IMRB	0.03%	42747	11	0.01%	162	1137305	100%	584	585	173	411	100%	99%	282331	279839	96.0%	100%	498	498	100%
Vodafone	PMR	0.02%	206916	33	0.01%	563	10348252	100%	596	596	23	573	100%	NA	NA	NA	81.0%	99%	1456	1435	100%
Vodafone	IMRB	0.02%	206916	33	0.01%	563	10348252	100%	596	596	23	573	100%	NA	NA	NA	81.0%	99%	1456	1435	100%

Uninor	**PMR**	NA	NA	NA	0.00%	61	2001722	100%	61	61	NA	NA	NA	96%	9104582	8769474	82.2%	NA	NA	NA	NA
	IMRB	NA	NA	NA	0.00%	61	2001722	100%	61	61	NA	NA	NA	96%	9104582	8769474	82.2%	NA	NA	NA	NA
Reliance GSM	**PMR**	0.10%	13532	14	0.01%	544	4696314	100%	1657	1657	187	187	100%	65.00%	164023	106263	26.0%	100%	183	183	100%
	IMRB	0.10%	13532	14	0.01%	544	4696314	100%	1657	1657	187	187	100%	65.00%	164023	106263	26.0%	100%	183	183	100%
Reliance CDMA	**PMR**	0.06%	115595	67	0.06%	1133	1850976	100%	3467	3467	332	332	100%	95%	5804237	5493055	95.0%	100%	376	376	100%
	IMRB	0.06%	115595	67	0.06%	1133.33	1850976	100%	3467	3467	332	332	100%	94.63%	5804237	5493055	95.0%	100%	376	376	100%

☐ (yellow)	Figures do not match with those reported in PMR
☐ (blue)	Figures verified on all India basis
☐ (pink)	Not meeting benchmark

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

8.0 Conclusions
8.1 Cellular Mobile services

1. Airtel does not meet the benchmark for assessibility of call centre and Percentage of calls answered by the operators (voice to voice) within 60 seconds.
2. Aircel does not meet the benchmark for Worst affected cells having more than 3% TCH drop rate and Percentage of calls answered by the operators (voice to voice) within 60 seconds.
3. BSNL does not meet the benchmark for Worst affected BTSs due to downtime and Worst affected cells having more than 3% TCH drop rate
4. Idea does not meet the benchmark for Worst affected cells having more than 3% TCH drop rate, Metering and billing credibility and Percentage of calls answered by the operators (voice to voice) within 60 seconds.
5. Uninor does not meet the benchmark for CSSR, TCH Congestion, Worst affected cells having more than 3% TCH drop rate and Percentage of calls answered by the operators (voice to voice) within 60 seconds.
6. Tata Docomo does not meet the benchmark for Percentage of calls answered by the operators (voice to voice) within 60 seconds.
7. Vodafone does not meet the benchmark for Percentage of calls answered by the operators (voice to voice) within 60 seconds..
8. Reliance GSM does not meet the benchmark for assessibility of call centre and Percentage of calls answered by the operators (voice to voice) within 60 seconds. Reliance CDMA does not meet the benchmark for assessibility of call centre.

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	0.10%	0.11%	98.82%	0.26%	0.82%	1.52%	2.81%	98.74%	0.00%	0.01%	100.00%	100.00%	99.41%	84.68%	100.00%	100.00%
Aircel	0.38%	1.66%	97.94%	0.81%	0.99%	1.26%	3.55%	95.17%	0.06%	0.03%	100.00%	100.00%	100.00%	98.41%	100.00%	NA
BSNL	1.01%	1.92%	99.00%	0.72%	0.86%	0.48%	4.86%	98.21%	0.05%	0.10%	100.00%	100.00%	100.00%	95.89%	100.00%	100.00%
Idea	0.09%	1.45%	97.00%	0.34%	1.31%	1.45%	2.90%	97.12%	0.00%	0.08%	100.00%	100.00%	98.21%	91.96%	100.00%	NA
Sistema Shyam	0.27%	1.08%	96.76%	0.00%	0.31%	1.21%	3.68%	96.59%	0.00%	0.02%	100.00%	100.00%	51.11%	91.89%	NA	NA
Tata Docomo	0.37%	0.00%	99.00%	0.05%	0.09%	0.43%	2.33%	96.69%	NA	0.31%	100.00%	NA	96.15%	90.91%	NA	NA
Videocon	0.00%	0.00%	99.00%	0.36%	0.08%	0.94%	0.00%	99.18%	NA	0.01%	100.00%	NA	100.00%	99.34%	NA	NA
Tata Tele	0.09%	0.16%	99.32%	0.00%	0.04%	0.47%	0.85%	99.40%	0.00%	0.02%	100.00%	100.00%	99.73%	97.08%	100.00%	100.00%
Vodafone	0.04%	0.15%	96.69%	0.69%	1.92%	1.43%	3.82%	95.43%	0.01%	0.00%	100.00%	100.00%	100.00%	75.68%	100.00%	NA
Uninor	1.48%	2.08%	95.00%	0.53%	1.93%	1.80%	4.95%	95.86%	NA	0.00%	100.00%	100.00%	96.08%	92.62%	NA	NA
Reliance GSM	0.06%	0.21%	99.00%	0.19%	0.80%	0.72%	1.16%	98.95%	0.09%	0.03%	100.00%	100.00%	98.98%	96.71%	100.00%	100.00%
Reliance CDMA	0.14%	0.33%	99.00%	0.00%	0.06%	0.40%	0.39%	99.25%	0.09%	0.05%	100.00%	100.00%	97.52%	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					
BSNL	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					
Videocon	All POI's meeting TRAI specified benchmark					
Tata Tele	All POI's meeting TRAI specified benchmark					
Vodafone	All POI's meeting TRAI specified benchmark					
Uninor	Vodafone (I/O) Asansol	612	58751	610.4	47.1	E1 is augmention require
	Uninor(O) Salt lake GMSC	929	32483	926.5	31.7	E1 is augmention require

	Vodafone (O) Behrampur	742	49412	733.1	23.6	E1 is augmention require
	UNINOR Salt lake GMSC _INTERCIRCLE(O)	1953	56761	1878.1	4.4	E1 is augmention require
	Uninor Intercircle (O) Ruby VMSC	649	16930	622.5	2.9	E1 is augmention require
	Airtel (O) Silliguri	339	14354	282.6	7.3	E1 is augmention require
Reliance GSM	All POI's meeting TRAI specified benchmark					
Reliance CDMA	All POI's meeting TRAI specified benchmark					

9.3 Parameter wise performance reports for Cellular Mobile services

1. Network Availability

Audit Results for Network Availability

	Benchmark	Airtel	Aircel	BSNL	Idea	Sistema Shyam	Tata Docomo	Videocon	Tata Tele	Vodafone	Uninor	Reliance GSM	Reliance CDMA
Number of BTSs in the licensed service area		4602	2645	2390	1999	831	1409	3	627	6138	1777	2342	2127
Sum of downtime of BTSs in a month (in hours)		3291	7390.55	17995	1377	1650	3847	0	431	1664	19591.6	1020	2293
BTSs accumulated downtime (not available for service)	≤ 2%	0.10%	0.38%	1.01%	0.09%	0.27%	0.37%	0.00%	0.09%	0.04%	1.48%	0.06%	0.14%
Number of BTSs having accumulated downtime >24 hours		5	44	46	29	9	0	0	1	9	37	5	7
Worst affected BTSs due to downtime	≤ 2%	0.11%	1.66%	1.92%	1.45%	1.08%	0.00%	0.00%	0.16%	0.15%	2.08%	0.21%	0.33%

Live Measurement Results for Network Availability

	Benchmark	Airtel	Aircel	BSNL	Idea	Sistema Shyam	Tata Docomo	Videocon	Tata Tele	Vodafone	Uninor	Reliance GSM	Reliance CDMA
Number of BTSs in the licensed service area		13779	2649	2390	2014	670	1409	3	628	6138	1794	2403	1294
Sum of downtime of BTSs in a month (in hours)		275.77	1674.00	1732	98	55	43	0	560	2395	24412.7	51	247
BTSs accumulated downtime (not available for service)	≤ 2%	0.00%	0.08%	0.10%	0.01%	0.01%	0.00%	0.00%	0.12%	0.05%	1.83%	0.00%	0.03%
Number of BTSs having accumulated downtime >24 hours		0	0	8	0	0	0	0	0	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	0.33%	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	BSNL	Idea	Sistema Shyam	Tata Docomo	Videocon	Tata Tele	Vodafone	Uninor	Reliance GSM	Reliance CDMA
CSSR	≥ 95%	98.82%	97.94%	99.00%	97.00%	96.76%	99.00%	99.00%	99.32%	96.69%	95.00%	99.00%	99.00%

SDCCH congestion	Benchmark	Airtel	Aircel	BSNL	Idea	Sistema Shyam	Tata Docomo	Videocon	Tata Tele	Vodafone	Uninor	Reliance GSM	Reliance CDMA
SDCCH/Paging channel congestion	≤ 1%	0.26%	0.81%	0.72%	0.34%	0.00%	0.05%	0.36%	0.00%	0.69%	0.53%	0.19%	0.00%

TCH congestion	Benchmark	Airtel	Aircel	BSNL	Idea	Sistema Shyam	Tata Docomo	Videocon	Tata Tele	Vodafone	Uninor	Reliance GSM	Reliance CDMA
TCH congestion	≤ 2%	0.82%	0.99%	0.86%	1.31%	0.31%	0.09%	0.08%	0.04%	1.92%	1.93%	0.80%	0.06%

Live measurement results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Airtel	Aircel	BSNL	Idea	Sistema Shyam	Tata Docomo	Videocon	Tata Tele	Vodafone	Uninor	Reliance GSM	Reliance CDMA
CSSR	≥ 95%	98.22%	99.20%	98.55%	99.00%	98.18%	99.00%	100.00%	99.65%	96.12%	98.00%	99.00%	99.00%

SDCCH congestion	Benchmark	Airtel	Aircel	BSNL	Idea	Sistema Shyam	Tata Docomo	Videocon	Tata Tele	Vodafone	Uninor	Reliance GSM	Reliance CDMA
SDCCH/Paging channel congestion	≤ 1%	0.26%	0.47%	0.73%	0.13%	0.00%	0.04%	0.47%	0.00%	0.63%	0.97%	0.18%	0.00%

TCH congestion	Benchmark	Airtel	Aircel	BSNL	Idea	Sistema Shyam	Tata Docomo	Videocon	Tata Tele	Vodafone	Uninor	Reliance GSM	Reliance CDMA
TCH congestion	≤ 2%	0.88%	0.25%	0.81%	0.36%	0.04%	0.07%	0.00%	0.02%	2.62%	1.89%	0.71%	0.05%

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

CSSR	Benchmark	Airtel	Aircel	BSNL	Idea	Sistema Shyam	Tata Docomo	Videocon	Tata Tele	Vodafone	Uninor	Reliance GSM	Reliance CDMA
Total number of call attempts		750	630	630	630	630	220	NA	651	630	646	630	632
Total number of successful calls established		750	630	630	624	630	220	NA	651	630	643	629	631
CSSR	≥ 95%	100.00%	100.00%	100.00%	99.05%	100.00%	100.00%	NA	100.00%	100.00%	99.54%	99.84%	99.84%

Blocked calls	Benchmark	Airtel	Aircel	BSNL	Idea	Sistema Shyam	Tata Docomo	Videocon	Tata Tele	Vodafone	Uninor	Reliance GSM	Reliance CDMA
%age blocked calls		0.00%	0.00%	0.00%	0.95%	0.00%	0.00%	NA	0.00%	0.00%	0.46%	0.16%	0.16%

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	BSNL	Idea	Sistema Shyam	Tata Docomo	Videocon	Tata Tele	Vodafone	Uninor	Reliance GSM	Reliance CDMA
Total number of calls established		260152983	75342801	3850934204	32583869	56402685	44734325	6825	1900051	12455150	46241859	48831089	39970944
Total number of calls dropped		3959709	947244	18484484	471675	680015	192555	64	9007	178170	830428	350916	160396
Call drop rate	≤ 2%	1.52%	1.26%	0.48%	1.45%	1.21%	0.43%	0.94%	0.47%	1.43%	1.80%	0.72%	0.40%

Cells having more than 3% TCH	Benchmark	Airtel	Aircel	BSNL	Idea	Sistema Shyam	Tata Docomo	Videocon	Tata Tele	Vodafone	Uninor	Reliance GSM	Reliance CDMA
Total number of cells in the network		14784	7947	6978	5995	2608	130097	10	1881	18400	5331	6480	1294
Total number of cells having more than 3% TCH		416	282	339	174	96	3033	0	16	703	264	75	5
Worst affected cells having more than 3% TCH	≤ 5%	2.81%	3.55%	4.86%	2.90%	3.68%	2.33%	0.00%	0.85%	3.82%	4.95%	1.16%	0.39%

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

Call drop rate	Benchmark	Airtel	Aircel	BSNL	Idea	Sistema Shyam	Tata Docomo	Videocon	Tata Tele	Vodafone	Uninor	Reliance GSM	Reliance CDMA
Total number of calls established		22530356	68893172	389611244	38506218	4823588	4358806	64	6587252	13279780	6257403	90129506	6599100
Total number of calls dropped		432665	745028	2376629	443596	49599	21700	0	21027	194553	88854	702079	46194
Call drop rate	≤ 2%	1.92%	1.08%	0.61%	1.15%	1.03%	0.50%	0.00%	0.32%	1.47%	1.42%	0.78%	0.70%

Cells having more than 3% TCH	Benchmark	Airtel	Aircel	BSNL	Idea	Sistema Shyam	Tata Docomo	Videocon	Tata Tele	Vodafone	Uninor	Reliance GSM	Reliance CDMA
Total number of cells in the network		44377	7545	6978	6040	2141	12678	10	5649	18374	5390	7209	1294
Total number of cells having more than 3% TCH		1258	276.4	143	97	83	385	0	27	718	261	41	4
Worst affected cells having more than 3% TCH	≤ 5%	2.83%	3.66%	2.05%	1.61%	3.88%	3.04%	0.00%	0.48%	3.91%	4.84%	0.57%	0.31%

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

Call drop rate	Benchmark	Airtel	Aircel	BSNL	Idea	Sistema Shyam	Tata Docomo	Videocon	Tata Tele	Vodafone	Uninor	Reliance GSM	Reliance CDMA
Total number of calls established		750	630	630	627	630	220	NA	651	630	645	630	632
Total number of calls dropped		0	1	0	2	0	0	NA	0	0	1	0	1
Call drop rate	≤ 2%	0.00%	0.16%	0.00%	0.32%	0.00%	0.00%	NA	0.00%	0.00%	0.16%	0.00%	0.16%

4. Voice quality

Audit Results for Voice quality

Voice quality	Benchmark	Airtel	Aircel	BSNL	Idea	Sistema Shyam	Tata Docomo	Videocon	Tata Tele	Vodafone	Uninor	Reliance GSM	Reliance CDMA
Total number of sample calls		16666047105	6152297329	53176	4278505859	56402685	8108249304	1496695	9572	1816278463	8563792047	3228091648	41943186
Total number of calls with good voice quality		16456653323	5854835648	52224	4155324741	54480963	7839614567	1484473	9515	1733206415	8208916242	3194201481	41630100
%age calls with good voice quality	≥ 95%	98.74%	95.17%	98.21%	97.12%	96.59%	96.69%	99.18%	99.40%	95.43%	95.86%	98.95%	99.25%

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

Voice quality	Benchmark	Airtel	Aircel	BSNL	Idea	Sistema Shyam	Tata Docomo	Videocon	Tata Tele	Vodafone	Uninor	Reliance GSM	Reliance CDMA
Total number of sample calls		53520	908417	1229016	1070217	36977	397705	NA	38980	1294940	1330605	61881	45283
Total number of calls with good voice quality		51674	852857	1216335	1032363	32647	386631	NA	30773	1235314	1287803	57346	41813
%age calls with good voice quality	≥ 95%	96.55%	93.88%	98.97%	96.46%	88.29%	97.22%	NA	78.95%	95.40%	96.78%	92.67%	92.34%

5. POI Congestion

Audit Results for POI Congestion

POI congestion	Benchmark	Airtel	Aircel	BSNL	Idea	Sistema Shyam	Tata Docomo	Videocon	Tata Tele	Vodafone	Uninor	Reliance GSM	Reliance CDMA
Total number of working POIs		29	130	97	63	54	26	14	148	41	92	20	51
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	6	0	0
Total Capacity of all POIs (A) - in erlangs		94350	40807	137234	37742	881404	7478	26.46	37465.6	200930	41336	17935	13608

Traffic served for all POIs (B)- in erlangs		52864	19067	63446.58	24857	567550	3517	4.49	17801.84	125163	27415	15058	8588
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	0.00

Live measurement results for POI congestion
6. Inter Operator Call Assessment

Inter operator call Assessment To↓ From ⟶	Airtel	Aircel	BSNL	Idea	Sistema Shyam	Tata Docomo	Tata Tele	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%
BSNL	100%	100%	NA	100%	100%	100%	100%	100%	100%	100%	100%
Idea	100%	100%	100%	NA	100%	100%	100%	100%	100%	100%	100%
Sistema Shyam	100%	100%	100%	100%	NA	100%	100%	100%	100%	100%	100%
Tata Docomo	100%	100%	100%	100%	100%	NA	100%	100%	100%	100%	100%
Tata Tele	100%	100%	100%	100%	100%	100%	NA	100%	100%	100%	100%
Vodafone	100%	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	BSNL	Idea	Sistema Shyam	Tata Docomo	Videocon	Tata Tele	Vodafone	Uninor	Reliance GSM	Reliance CDMA
Billing diputes - Postpaid													
Total bills generated during the period		24786	1796	45545	866	88	NA	NA	13457	77015	NA	4593	13924
Total number of bills disputed		1	1	21	0	0	NA	NA	0	9	NA	4	13
Percentage bills disputed	≤ 0.1%	0.00%	0.06%	0.05%	0.00%	0.00%	NA	NA	0.00%	0.01%	NA	0.09%	0.09%
Billing diputes - Prepaid													
Number of complaints related to charging, credit & validity		574	902	2988	1135	236	7814	1	68	87	91	1431	895
Total number of prepaid customers in that period		10396175	3235262	3052305	1479142	1398381	2514756	19363	374035	10963126	2492011	5564856	1915372
Percentage of complaints	≤ 0.1%	0.01%	0.03%	0.10%	0.08%	0.02%	0.31%	0.01%	0.02%	0.00%	0.00%	0.03%	0.05%
Resolution of billing complaints													
Total number of billing/charging complaints		10556	903	2666	1135	236	7814	1	254	96	91	1435	908
Total complaints considered invalid		9981	889	37	1506	111	7814	1	185	81	0	1289	569
Number of complaints resolved in 4 weeks from date of receipt for complaints listed in 5.3.1		575	903	2629	1135	236	7814	1	2.54	96	91	1435	908
Percentage complaints resolved within 4 weeks of date of receipt	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Period of applying credit / waiver													

Total number of complaints where credit/waiver is required		575	13	2629	1135	125	0	0	0.69	15	91	146	339
Percentage cases in which credit/waiver was received within 1 week	100%	100%	100%	100%	100%	100%	NA	NA	100%	100%	100%	100%	100%

Live calling results for resolution of billing complaints

Resolution of billing complaints	Benchmark	Airtel	Aircel	BSNL	Idea	Sistema Shyam	Tata Docomo	Videocon	Tata Tele	Vodafone	Uninor	Reliance GSM	Reliance CDMA
Total Number of calls made		30	50	50	50	50	50	NA	50	10	50	50	50
Number of cases resolved in 4 weeks		30	42	50	50	50	50	NA	50	10	50	50	50
Percentage cases resolved in four weeks	100%	100%	84%	100%	100%	100%	100%	NA	100%	100%	100%	100%	100%

8. Customer Care

Audit results for customer care

Customer Care Assessment	Benchmark	Airtel	Aircel	BSNL	Idea	Sistema Shyam	Tata Docomo	Videocon	Tata Tele	Vodafone	Uninor	Reliance GSM	Reliance CDMA
Total number of call attempts to customer care for assistance		23362357	2948093	1746770	294578	1992241	3724677	8456	806828	18362795	5328949	2713065	396605
Number of calls getting connected and answered (electronically)		23224145	2948093	1746770	289306	1018239	3581114	8456	804611	18362795	5120077	2685490	386787
Percentage calls getting connected and answered	≥ 95%	99.41%	100.00%	100.00%	98.21%	51.11%	96.15%	100.00%	99.73%	100.00%	96.08%	98.98%	97.52%
Number of calls getting transferred to the operator (voice to voice)		4668955	1178061	568363	770675	974002	904414	4861	71043	4713463	1751491	1092522	507454
Number of calls answered by operator (voice to voice) within 60 seconds		3953656	1159355	545031	708689	895000	822169	4829	68968	3566938	1622177	1056599	469905
Percentage calls answered within 60 seconds (V2V)	≥ 90%	84.68%	98.41%	95.89%	91.96%	91.89%	90.91%	99.34%	97.08%	75.68%	92.62%	96.71%	92.60%

Live calling results for customer care

Customer Care Assessment	Benchmark	Airtel	Aircel	BSNL	Idea	Sistema Shyam	Tata Docomo	Videocon	Tata Tele	Vodafone	Uninor	Reliance GSM	Reliance CDMA
Total Number of calls received		100	100	100	100	100	100	NA	100	100	100	100	100
Total Number of calls getting connected and answered		100	100	100	100	100	100	NA	100	100	100	100	100
Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	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	BSNL	Idea	Sistema Shyam	Tata Docomo	Videocon	Tata Tele	Vodafone	Uninor	Reliance GSM	Reliance CDMA
Total Number of calls received		100	100	100	100	100	100	NA	100	100	100	100	100
Total Number of calls answered within 60 seconds		60	53	57	66	74	71	NA	67	64	39	66	90
Percentage calls answered within 60 seconds	≥ 90%	60.00%	53.00%	57.00%	66.00%	74.00%	71.00%	NA	67.00%	64.00%	39.00%	66.00%	90.00%

9. Termination / closure of service

Audit results for termination / closure of service

Termination	Benchmark	Airtel	Aircel	BSNL	Idea	Sistema Shyam	Tata Docomo	Videocon	Tata Tele	Vodafone	Uninor	Reliance GSM	Reliance CDMA
Total number of closure request		180	8	167	30	NA	NA	NA	169	530	NA	27	84
Number of requests attended within 7 days		180	8	167	30	NA	NA	NA	169	530	NA	27	84
Percentage cases in which termination done within 7 days	100%	100.00%	100.00%	100.00%	100.00%	NA	NA	NA	100.00%	100.00%	NA	100.00%	100.00%

Audit results for refund of deposits

Refund	Benchmark	Airtel	Aircel	BSNL	Idea	Sistema Shyam	Tata Docomo	Videocon	Tata Tele	Vodafone	Uninor	Reliance GSM	Reliance CDMA
Total number of cases requiring refund of deposits		40	0	136	12	NA	NA	NA	46	592	NA	29	92
Total number of cases where refund was made within 60 days		40	0	136	12	NA	NA	NA	46	592	NA	29	92
Percentage cases in which refund was receive within 60 days	100%	100.00%	NA	100.00%	NA	NA	NA	NA	100.00%	NA	NA	100.00%	100.00%

11. Additional Network Related parameters													
Audit Results for Total Traffic Handled in Erlang													
Traffic in Erlang		Airtel	Aircel	BSNL	Idea	Sistema Shyam	Tata Docomo	Videocon	Tata Tele	Vodafone	Uninor	Reliance GSM	Reliance CDMA
Eqipped capacity of the network		225276.992	142774.57	128000	46782	50400	58335	5000	145960	258871	57308	92000	148000
Total taffic handled in erlang during TCBH		183703.55	37838	100664.05	27929	35995	16159	522.36	21669	259555	53838	81214	38185

Total number of customers as per VLR													
		Airtel	Aircel	BSNL	Idea	Sistema Shyam	Tata Docomo	Videocon	Tata Tele	Vodafone	Uninor	Reliance GSM	Reliance CDMA
Total no. of customers served (as per VLR)		7019854	1393047	1486955	1077760	937162	752704	1908	344469	9716144	1532254	3505876	1118097

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 <u>at least one</u> 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

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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*

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. <u>**Live calling: -**</u> - 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.

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

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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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