

REPORT
ON
AUDIT & ASSESSMENT OF QUALITY OF SERVICE
OF
CELLULAR MOBILE TELEPHONE SERVICES
FOR
WEST ZONE
MAHARASHTRA -GOA CIRCLE

Report Period: April 2012 – June 2012

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- Not conducted for this quarter
- III. Broadband Service Providers
- Not conducted for this quarter

CHAPTER-1: INTRODUCTION

I. Background

TRAI's mission is to create and nurture conditions for growth of telecommunications in the country in a manner and at a pace, which will enable India to play a leading role in emerging global information society. One of the main objectives of Telecom Regulatory Authority of India (TRAI) is to provide a fair and transparent policy environment, which promotes a level playing field and facilitates fair competition.

In pursuance of above objective TRAI has issued from time to time a large number of regulations, orders and directives to deal with issues coming before it and provided the required direction to the evolution of Indian telecom market from a Government owned monopoly to a multi-operator multi service open competitive market.

The directions, orders and regulations issued cover a wide range of subjects including tariff, interconnection and quality of service as well as governance of the Authority.

The purpose of laying down Quality of Service Parameters is to:

- i) Create conditions for consumer satisfaction by making known the quality of service, which the service provider is required to provide, and the user has a right to expect.
- ii) Measure the Quality of Service provided by the Service Providers from time to time and to compare them with the norms so as to assess the level of performance.
- iii) Generally protect the interests of consumers of telecommunication services.

TRAI has been carrying out regular reviews of the status of quality of service of the networks of all operators. In continuation to these efforts, TRAI has selected through bidding process TCIL as the Audit Agency to audit and assess the Quality of Service rendered by the service providers' namely Basic (Wire line) Services, Cellular Mobile Telephone (Wireless) Services and Broadband Services. The Audit for various telecom circles within the Zones has been distributed across four quarterly periods.

The parameters that need to be measured for Basic and Cellular Mobile Services have been specified in the TRAI notification on Quality of Service of Basic (Wire line) and Cellular Mobile (wireless) Services, 2009. The parameters for Broadband Services have been specified in the TRAI notification for Quality of Services of Broadband Service Regulation, 2006.

II. Objectives and Methodology

The primary objective is to audit and assess the Quality of Service being rendered by Basic, Cellular Mobile & Broadband services against the parameters notified by TRAI. The audit and assessment of Quality of Service is conducted for all the basic service providers, unified access service providers, cellular mobile service providers and ISPs (Internet Service Provider) for basic wireline, Cellular Mobile Telephone Services and broadband service. TCIL has undertaken the following audit works as per the Terms of Reference (TOR):

- i) Verification of the data submitted by the service providers to TRAI as part of QoS monitoring reports i.e. Quarterly Performance Monitoring Reports (PMRs) and monthly Point of Interconnection (POI) Congestion Reports with reference to the records maintained by the service provider.
- ii) Verification of the performance of service providers against the Quality of Service benchmarks laid down by TRAI using live measurement for 3 days during the month in which the audit and assessment is carried out.
- iii) Verification of the performance of service providers against the Quality of Service benchmarks laid down by TRAI using the data for the entire month during which the live measurement is carried out.
- iv) Drive tests of the mobile networks both operators assisted and independent drive test (as and where required).
- v) Billing and call center's data verification.
- vi) Live testing of the efficiency of the call center / customer care help line.
- vii) Emergency Level-1 live calling

To fulfill the above mentioned Scope of Work audit was performed on different Systems, Facilities and Field data collection.

Systems audited:-

1. Network Switching Centre (NSS)
2. Base Station Subsystem (BSS)
3. Billing Applications
4. Customer Care applications

Facilities audited:-

1. Billing documents.
2. Customer Care records.

Field data collections carried out:-

1. RF network coverage including KPIs (Key Performance Index)
2. Inter Operator Call Assessment
3. Checking of Customer Billing/Refund Complaints (Random sample)
4. Customer Care efficiency
5. The live calling was made to assess the quality of services for Inter Operator Call Assessment, Customer Billing/Refund Complaints and Customer Care efficiency.

In order to carry out the above scope of work:-

- ✓ TCIL auditors visited all the NSS (Network Sub System) and BSS (Base-station Sub System) to check data for all the operators in their respective service area.
- ✓ All the NSS and BSS data for the relevant details were collected either directly from the centralized NOC or through a remote access to the NOC.
- ✓ The Radio parameters were audited/verified from the data collected from OMC-R (Operation and Maintenance Center – Radio, as part of BSS data).
- ✓ The Drive test was conducted in high, low and medium dense areas including highways, commercial complex and residential areas and special attention was paid for the areas for which TRAI has received complaints.
- ✓ The POI and other network related parameters were audited/verified from the data collected from the OMC-S (Operation and Maintenance Center – Switch as part of NSS data).
- ✓ The data related to Billing and Customer care was checked for the previous month and verified with the customers by calling them on random basis. The process of registration and handling of the complaints was also studied for the various operators. Call centre number were called for measuring the efficiency of the call centre.
- ✓ The inter operator call assessment test was carried out during the time period as is specified in the tender document. TCBH (Time Consistent Busy Hour) is taken after observation of the traffic consistently for 3 days prior to the audit activity.
- ✓ Data has been collected for busy hour of network in case of live assessment & month of audit for all service providers & verified that service providers are providing busy hour data only for QoS service. We found that TCBH hour is matching with network busy hour as provided by service providers for Maharashtra-Goa circle. But for parameters such as 'Worst affected cell exceeding 3% TCH drop' and 'BTSs accumulated down time' CBBH (Cell Bouncing Busy Hour) was taken instead of TCBH (Time Consistent Busy Hours) as per the TRAI new regulation 2009.

CHAPTER-2: EXECUTIVE SUMMARY

I. Preface

This report highlights the findings for the audit & assessment of Quality of Service of Cellular Mobile Services in Maharashtra-Goa Circle in 2nd quarter (April -June 2012). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken for the period October-December 2011.

Following are the various operators covered in Maharashtra-Goa circle (West Zone) for Cellular Mobile (Wireless) services QoS audit & assessment. The Month of audit & TCBH information is also given below.

Sl.	Name of Service Provider	Month of Audit	TCBH Hour
GSM Operators			
1	Aircel Ltd	May-2012	2000-2100 Hrs
2	Airtel Ltd	May-2012	1900-2000 Hrs
3	BSNL	May-2012	2000-2100 Hrs
4	Idea	May-2012	1900-2000 Hrs
5	Reliance Communications	May-2012	1900-2000 Hrs
6	Tata Communications	May-2012	1900-2000 Hrs
7	Uninor	May-2012	1900-2000 Hrs
8	Videocon	May-2012	1100-1200 Hrs
9	Vodafone	May-2012	1900-2000 Hrs
CDMA Operators			
10	MTS	May-2012	1900-2000 Hrs
11	Reliance Communications	May-2012	1900-2000 Hrs
12	Tata Communications	May-2012	1900-2000 Hrs

II. Findings from Quality of Service Audit (Operator wise for each parameter)
(A) Cellular Mobile Telephone Services

3 days Live Data Audit		Bench- mark	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata Docomo	Videocon	Vodafone	Uninor	MTS	Rcom CDMA	Tata Docomo
S/N	Name of Parameter													
1	Network Availability													
	a) BTS Accumulated Downtime	<=2%	0.04%	0.011%	0.98%	0.48%	0.46%	0.006%	0.47%	0.11%	0.41%	0.20%	0.40%	0.46%
	b) Worst affected BTSs due to downtime	<=2%	0%	0.02%	0.04%	0.25%	0.03%	0%	0%	0%	0.03%	0%	0%	0%
	Connection Establishment (Accessibility)													
	a) CSSR (Call Setup Success Rate)	>=95%	99.77%	99.50%	96.93%	98.46%	99.55%	99.41%	98.92%	97.62%	97.86%	99.09%	98.36%	98.64%
	b) SDCCH/PAGING congestion	<=1%	0.01%	0.02%	0.68%	0.74%	0.03%	0.05%	0.02%	0.61%	0.03%	0%	0%	0%
	c) TCH congestion	<=2%	0.05%	0.02%	1.84%	1.04%	0.06%	0.07%	0%	1.16%	0.43%	0.05%	0.01%	0.10%
2	Connection maintenance (retainability)													
	a) CDR	<=2%	0.59%	0.44%	1.93%	1.10%	0.46%	0.74%	0%	0.98%	1.12%	0.38%	0.38%	0.89%
	b) Worst affected cells>3% TCH drop	<=3%	2.85%	0.63%	3.06%	2.67%	0.01%	2.66%	0%	2.34%	2%	2.34%	0%	2.65%
	c) Good voice quality	>=95%	98.10%	99.57%	97.99%	97.58%	98.96%	96.99%	99.85%	97.59%	97.82%	100%	99.76%	NA
3	No. of POI's having congestion >0.5%		0	0	1	0	0	0	0	0	3	0	0	0
4	Response time to customers for assistance													
	a) Accessibility of call centre/Customer Care	>=95%	61%	100%	100%	99%	98.59%	99.35%	100%	99.98%	100%	100%	99.48%	98.54%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	50.99%	99.25%	95.33%	99.27%	98.78%	99.15%	100%	99.84%	100%	100%	99.45%	90.51%

NA: Not Applicable, NR: Not Received

From the 3 days live data assessment, it is found that all the operators are meeting most of the network parameters except for BSNL is not meeting the benchmark for “Worst affected cells>3% TCH drop” with the value of 3.06% respectively.

Performance related to customer care data is found to be satisfactory for most of the operators for the parameter “Response time to customers for assistance” except for Aircel.

One Month Data Audit		Bench- mark	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Videocon	Vodafone	Uninor	MTS	Rcom CDMA	Tata CDMA
S/N	Name of Parameter													
(A)	Network Service Quality Parameter													
1	Network Availability													
	a) BTS Accumulated Downtime	<=2%	0.03%	0.015%	1.64%	0.51%	0.52%	0.001%	0.55%	0.19%	0.20%	0.11%	0.44%	0.015%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.02%	1.90%	1.70%	1.54%	0%	0%	0.55%	0.75%	0%	1.50%	0%
2	Connection Establishment (Accessibility)													
	a) CSSR (Call Setup Success Rate)	>=95%	99.77%	99.48%	97.05%	98.18%	99.54%	99.37%	98.73%	97.53%	97.37%	99.01%	98.45%	98.47%
	b) SDCCH/PAGING congestion	<=1%	0.02%	0.02%	0.71%	0.80%	0.05%	0.10%	0.17%	0.60%	0.17%	0%	0%	0%
	c) TCH congestion	<=2%	0.05%	0.02%	1.91%	1.23%	0.06%	0.11%	0%	1.25%	0.48%	0.08%	0.01%	0.07%
3	Connection maintenance (retainability)													
	a) CDR	<=2%	0.59%	0.43%	1.88%	1.13%	0.46%	0.80%	0.32%	0.95%	1.23%	0.37%	0.33%	0.96%
	b) Worst affected cells>3% TCH drop	<=3%	2.86%	0.63%	2.96%	2.64%	0.01%	2.75%	0%	2.30%	2.07%	2.56%	0%	2.67%
	c) Good voice quality	>=95%	98.13%	99.55%	97.92%	97.51%	98.96%	96.88%	99.93%	97.40%	97.24%	100%	99.76%	NA
4	No. of POI's having congestion >0.5%		0	0	1	0	0	0	0	0	3	0	0	0
(B)	Customer Service Quality Parameters													
5	Metering/billing credibility-Post paid	<= 0.1%	0.06%	0.02%	0.07%	0.08%	0.08%	0.002%	NA	0.05%	NA	0.11%	0.0003%	0.004%
6	Metering /billing credibility-Pre paid	<= 0.1%	0.01%	0.01%	0.09%	0.02%	0.10%	0%	0%	0.04%	0.04%	0.01%	0.04%	0.0001%
7	Resolution of billing/ charging complaints	100% within 4 weeks	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	a) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
8	Response time to customers for assistance													
	a) Accessibility of call centre/Customer Care	>=95%	48.78%	100%	100%	99.11%	94.77%	99.27%	100%	99.98%	95.51%	75.02%	93.83%	98.82%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	23.76%	99.14%	95.85%	98.22%	91.56%	97.66%	100%	92.61%	95.49	95%	89.73%	91.73%
9	Termination/closure of service	<=7days	100%	100%	100%	100%	100%	100%	NA	100%	100%	100%	100%	100%
10	Time taken for refunds of deposits after closures.	100% within 60 days	100%	100%	100%	100%	100%	100%	NA	100%	NA	100%	100%	100%

NA: Not Applicable, NR: Not Received

From the month data assessment, it is found that all the operators are meeting the network parameters.

Performance related to customer care data is found to be satisfactory for most of the operators. For the parameter "Response time to the customers", is not met by Aircel & Rcom CDMA as well as Rcom GSM & MTS are not meeting the benchmark for "Accessibility of call centre". MTS is not meeting the benchmark for the parameter "Metering/billing credibility for postpaid".

Operator-Assisted Drive Test

The Operator Assisted Drive Test was conducted at Maharashtra for all the operators. Route covered was about around 80-100Km depending on city areas within the speed limit of 30Km/hr. The cities covered were Nasik, Nagpur and Bhandara. In all the cities, zones were selected for covering different density areas (High, Medium & Low dense areas).

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Vodafone	Uninor	MTS	Rcom CDMA	Tata CDMA
			GSM Operators						CDMA Operators				
1.1	Blocked Call Rate (<=3%)	NASHIK	0.75	0	0.73	0.64	0.60	0	0	2.08	0.00	0.00	0
		NAGPUR	0	0	6.13	0	0	0	0	0.71	0.00	1.37	0
		BHANDARA	ICR	0	6.57	0	0.90	0	0	1.74	ICR	0.00	0
1.2	Dropped Call Rate (<=2%)	NASHIK	0.76	0	0.73	0.65	0.60	1.60	0	0.43	0.00	0.59	0
		NAGPUR	0	0	7.36	0.00	0.71	1.20	0	0.72	0.00	3.47	0
		BHANDARA	ICR	0	2.19	0.00	0.00	0.88	0	0	ICR	0.00	0
1.3	(i) 0-4 (w/o frequency hopping)	NASHIK									98.97	99.66	95.25
		NAGPUR									98.59	97.50	95.60
		BHANDARA									ICR	98.56	95.36
	(ii) 0-5 (with frequency hopping)	NASHIK	95.93	97.50	92.20	94.00	95.00	96.46	96.50	93.46			
		NAGPUR	97.68	96.02	95.47	94.90	85.28	95.19	95.70	91.90			
		BHANDARA	ICR	96.75	96.70	97.70	86.56	95.76	97.70	94.90			
1.4	Call Setup Success Rate (>=95%)	NASHIK	99.25	100	99.22	99.4	99.4	100	100	97.9	100	100	100
		NAGPUR	100	100	94.61	100	100	100	100	99.3	100	98.63	100
		BHANDARA	ICR	100	99.5	100	99.1	100	100	98.3	ICR	100	100

Key observations as could be derived from the table are as under:

- Blocked call rate parameter is not met by BSNL in Nagpur & Bhandara city.
- Drop call rate parameter is not met by BSNL & Rcom CDMA in Nagpur as well as BSNL is not meeting in Bhandara also.
- "Percentage of connections with good voice quality" parameter is not met by BSNL, Idea & Uninor in Nasik, Idea, Rcom GSM & Uninor in Nagpur & Rcom GSM and Uninor in Bhandara.
- "CSSR" parameter is not met by only BSNL in Nagpur.

Independent Drive Test

The Independent Drive Test was conducted at Maharashtra in Wadi, Latur, Nanded, Jalgaon and Mapusa. Here again, zones were selected for covering different density areas (High, Medium & Low dense areas).

SN	Parameter	BSNL	Tata GSM	Tata CDMA	Airtel	Idea	MTS	Vodafone	Idea
		Wadi			Latur		Nanded	Jalgaon	Mapusa
1.1	Blocked Call Rate (<=3%)	1.01	0	0	0	0.61	0	0.56	0
1.2	Dropped Call Rate (<=2%)	9.09	1.92	0	0	1.84	0	0	0
1.3	Percentage of connections with good voice quality (>=95%)								
	(i) 0-4 (w/o frequency hopping)			95.15			99.24		
	(ii) 0-5 (with frequency hopping)	94.80	95.02		95.53	97.60		95.50	95.20
1.4	Call Setup Success Rate (>=95%)	90.82	100	100	100	99.39	100	99.40	100

Key observations as could be derived from the table are as under:

- BSNL is not meeting the benchmark for the parameter "Dropped call rate", "Percentage of connections with good voice quality" & CSSR in Wadi.

CHAPTER-3: AUDIT-PMR VERIFICATION RESULTS

PMR		B-mark	Audit	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
S/N	Name of Parameter			GSM Operators									CDMA Operators		
(A)	Network Service Quality Parameter														
1	Network Availability														
	BTS Accumulated Downtime	≤2%	Reported	0.08%	0.06%	1.40%	0.46%	0.41%	0.02%	0.19%	0.58%	0.24%	0.19%	0.29%	0.03%
			Verified	0.08%	0.06%	1.40%	0.46%	0.41%	0.02%	0.19%	0.58%	0.24%	0.19%	0.29%	0.03%
	Worst affected BTSs due to downtime	≤2%	Reported	0.20%	0.04%	1.83%	1.72%	1.16%	0.01%	1.06%	0.00%	1.17%	0.00%	0.00%	0.00%
			Verified	0.20%	0.04%	1.83%	1.72%	1.16%	0.01%	1.06%	0.00%	1.17%	0.00%	0.00%	0.00%
2	Connection Establishment (Accessibility)														
	CSSR (Call Setup Success Rate)	≥95%	Reported	99.70%	98.97%	95.00%	97.64%	99.40%	98.99%	96.87%	99.50%	97.86%	99.12%	98.96%	99.09%
			Verified	99.70%	98.97%	95.00%	97.64%	99.40%	98.99%	96.87%	99.50%	97.86%	99.12%	98.96%	99.09%
	SDCCH/PAGING congestion	≤1%	Reported	0.02%	0.03%	0.87%	0.70%	0.16%	0.24%	0.55%	0.13%	0.81%	0.00%	0.01%	0.00%
			Verified	0.02%	0.03%	0.87%	0.70%	0.16%	0.24%	0.55%	0.13%	0.81%	0.00%	0.01%	0.00%
TCH congestion	≤2%	Reported	0.00%	0.08%	1.77%	1.36%	0.11%	0.39%	0.26%	0.00%	0.85%	0.11%	0.35%	0.10%	
			Verified	0.00%	0.08%	1.77%	1.36%	0.11%	0.39%	0.26%	0.00%	0.85%	0.11%	0.35%	0.10%
3	Connection maintenance (retainability)														
	CDR	≤2%	Reported	0.57%	0.70%	1.93%	1.67%	0.67%	0.95%	1.49%	0.50%	0.89%	0.32%	0.62%	1.23%
			Verified	0.57%	0.70%	1.93%	1.67%	0.67%	0.95%	1.49%	0.50%	0.89%	0.32%	0.62%	1.23%
	Worst affected cells>3% TCH drop	≤3%	Reported	1.96%	1.35%	4.87%	2.86%	0.43%	2.80%	2.30%	0.00%	2.67%	2.82%	0.35%	2.72%
			Verified	1.96%	1.35%	4.87%	2.86%	0.43%	2.80%	2.30%	0.00%	2.67%	2.82%	0.35%	2.72%
Good voice quality	≥95%	Reported	98.49%	99.06%	98.23%	97.18%	98.70%	96.90%	96.47%	99.78%	97.35%	99.74%	98.20%	98.51%	
			Verified	98.49%	99.06%	98.23%	97.18%	98.70%	96.90%	96.47%	99.78%	97.35%	99.74%	98.20%	98.51%
4	Number of POI having ≥ 0.5% POI congestion		Reported	0	0	0	0	0	0	2	0	0	0	0	0
			Verified	0	0	0	0	0	0	2	0	0	0	0	0
(B)	Customer Service Quality Parameters														
5	Metering/billing credibility-Post paid	≤0.1%	Reported	0.03%	0.02%	0.04%	0.09%	0.10%	0.00%	0.00%	0.00%	0.10%	0.00%	0.10%	0.01%
			Verified	0.03%	0.02%	0.04%	0.09%	0.10%	0.00%	0.00%	0.00%	0.10%	0.00%	0.10%	0.01%
6	Metering /billing credibility-Pre paid	≤0.1%	Reported	0.10%	0.00%	0.11%	0.10%	0.10%	0.00%	0.18%	0.00%	0.01%	0.00%	0.08%	0.00%
			Verified	0.10%	0.00%	0.11%	0.10%	0.10%	0.00%	0.18%	0.00%	0.01%	0.00%	0.08%	0.00%

PMR		Bench- mark	Audit	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
S/N	Name of Parameter			GSM Operators										CDMA Operators	
7	Resolution of billing/ charging complaints (within 4 weeks)	100%	Reported	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
			Verified	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Period of applying credit/waiver/adjustment to the customer's A/C from the date of resolutions of complaints	≤1 week	Reported	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
			Verified	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
8	Response time to customers for assistance														
	Accessibility of call centre/Customer Care	≥95%	Reported	100%	99.93%	100%	97.37%	98.85%	98%	97.62%	98.70%	99.91%	96%	99.46%	98%
			Verified	100%	99.93%	100%	97.37%	98.85%	98%	97.62%	98.70%	99.91%	96%	99.46%	98%
	% call answered by operators(voice to voice) within 60 sec.	≥90%	Reported	91.67%	91%	98.57%	94.90%	83.58%	92%	70.55%	98.11%	98.04%	91%	86.13%	95%
Verified			91.67%	91%	98.57%	94.90%	83.58%	92%	70.55%	98.11%	98.04%	91%	86.13%	95%	
9	Termination/closure of service														
	No. of requests for Termination / Closure of service complied within 7 days during the quarter	≤7days	Reported	97.00%	100%	100%	100%	100%	100%	NA	NA	100%	100%	100%	100%
			Verified	97.00%	100%	100%	100%	100%	100%	100%	NA	NA	100%	100%	100%
10	Time taken for refunds of deposits after closures.(within 60 days)	100%	Reported	100%	100%	100%	100%	100%	100%	NA	NA	100%	100%	100%	99%
			Verified	100%	100%	100%	100%	100%	100%	100%	NA	NA	100%	100%	100%

Critical Analysis (PMR Verification):

No deviations were found in compare to operators reported data.

- II. Basic Service (Wire Line) Service - *Not conducted for this quarter*
- III. Broadband Service - *Not conducted for this quarter*

CHAPTER-4: DETAILED FINDINGS & ANALYSIS

I. Cellular Mobile Telephone Service

(A) MSC Audit

(1) 3 Days Live Data Assessment & Summarized Findings

S/ N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Videoco n	Vodafon e	Uninor	MTS	Rcom CDMA	Tata CDMA
			GSM Operators								CDMA Operators			
A	Network Service Quality Parameter													
1	Network Availability													
	a) BTS Accumulated Downtime	<=2%	0.04%	0.011%	0.98%	0.48%	0.46%	0.006%	0.47%	0.11%	0.41%	0.20%	0.40%	0.46%
	b) Worst affected BTSs due to downtime	<=2%	0%	0.02%	0.04%	0.25%	0.03%	0%	0%	0%	0.03%	0%	0%	0%
	c) Total no. of BTSs in the licensed service area		2193	9242	6723	8871	3630	4164	21	8380	3076	706	2274	2326
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		56	75.61	4749	3047.28	1195	17.17	7.06	667.97	897.32	103.83	649	54.6
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	2	3	22	1	0	0	0	1	0	0	0
	c) CSSR	>=95%	99.77%	99.50%	96.93%	98.46%	99.55%	99.41%	98.92%	97.62%	97.86%	99.09%	98.36%	98.64%
	d) SDCCH/PAGING congestion	<=1%	0.01%	0.02%	0.68%	0.74%	0.03%	0.05%	0.02%	0.61%	0.03%	0%	0%	0%
	e) TCH congestion	<=2%	0.05%	0.02%	1.84%	1.04%	0.06%	0.07%	0%	1.16%	0.43%	0.05%	0.01%	0.10%
2	Connection maintenance													
	a) CDR	<=2%	0.59%	0.44%	1.93%	1.10%	0.46%	0.74%	0%	0.98%	1.12%	0.38%	0.38%	0.89%
	b) Cells having > 3% TCH drop	<=3%	2.85%	0.63%	3.06%	2.67%	0.01%	2.66%	0%	2.34%	2.00%	2.34%	0%	2.65%
	c) Good voice quality	>=95%	98.10%	99.57%	97.99%	97.58%	98.96%	96.99%	99.85%	97.59%	97.82%	100%	99.76%	NA
	d) No. of cells > 3% TCH drop		187	174	627	704	1	329	0	576	185	50	0	194
	e) Total no. of cells in the network		6579	27390	20489	26394	10890	12355	63	25238	9222	2148	6822	7284
3	No. of POI's having congestion		0	0	1	0	0	0	0	0	3	0	0	0

	>0.5%													
	a) Name of POI not meeting the benchmark		Nil	NIL	IDEA Cellular - 9220	Nil	Nil	NIL	Nil	Nil	Airtel_Local Pune, Idea Local Nagpur, TTS L NLD	Nil	Nil	Nil
	b) Total No. of circuits on POI		14417	190837	90604	428183	73708	69217	357	147303.33	87651	25968	37230	95200
	c) Avg No. of call attempts on POI		292783	5535047.66	1890714	7849400	1159577	989474	7	5226053	2532828.33	362564.7	524292	1488600
	d) Avg traffic served on POI (Erlang)		6574.723	125536.59	61529.347	102680.307	29655.37	27156.827	2.65	79420.827	42690.32	7289.297	15317.01	33539.063
	e) Total number of working POI Service Area wise		70	377	311	406	160	212	11	190	118	65	90	420
	f) Capacity of POI		13708.76	179053.30	63424.00	404578.81	67214.32	62989.08	238.58	145090.07	81475.16	24222.05	33536.68	85329.31
	g) Equipped Capacity of Network in respect of Traffic in erlang		65452.10	374038.39	263293.00	424917.09	144000	182066	15000	348015.27	111697.34	28560.00	260000	776298
	h) Total traffic handled in TCBH in erlang		15123.00	229782.51	123439.84	344097.58	130251	84885	0.45	314804.84	100267.72	10274.00	9132	125870
(B)	Customer Service Quality Parameters													
4	Response time to customers for assistance													
	a) Accessibility of call centre	>=95%	61%	100%	100%	99%	98.59%	99.35%	100%	99.98%	100%	100%	99.48%	98.54%
	b) % of call answered by operators(voice to voice) within 60 sec	>=90%	50.99%	99.25%	95.33%	99.27%	98.78%	99.15%	100%	99.84%	100%	100%	99.45%	90.51%
	c) No. of call attempts to call centre / customer care nos. during TCBH (Avg)		5102	2248199	52749	264587	906218	55946	0	1236542	100	100	338464	13108
	d) No. of calls connected and answered successfully to call centre / customer care nos. during TCBH (Avg)		3112	2248199	52749	262065	893498	55580	0	1236342	100	100	336730	12917

NA: Not Applicable, NP: Not Provided

Parameter-wise Findings (Live Data Assessment):

The parameter wise key takeouts for the Cellular Mobile Telephone Services providers in Maharashtra-Goa Service Area are as given below:-

- **BTS accumulated downtime (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0.01% and 0.98%.
- **Worst affected BTSs due to downtime (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0% and 0.25%.
- **Call setup success rate (benchmark $\geq 95\%$):** All operators are meeting the benchmark with values lying between 96.93% and 99.77%.
- **SDCCH/PAGING Channel congestion (benchmark $\leq 1\%$):** All operators are meeting the benchmark with values lying between 0% and 0.74%.
Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.
- **TCH congestion (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0% and 1.84%.
- **Call drop rate (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0% and 1.93%.
- **Cell exceeding 3% TCH drop (benchmark $\leq 3\%$):** Except for BSNL, all the operators are satisfying the benchmark with value in between 0% and 2.85%.
- **Connections with good voice quality (benchmark $\geq 95\%$):** Tata CDMA has declared that the parameter is not system generated. Other operators are meeting the benchmark with values lying between 96.99% and 100%.
- **POI Congestion (benchmark $\leq 0.5\%$):** BSNL & Uninor shows that 1 & 3 no of POI's are having congestion greater than 0.5% Here POI congestion indicates that there were call failure greater than 0.5% on that particular POI. The calls here indicate only those calls which have been seized by the switch and processed. But cases are found where individual POIs are showing high utilization/usage which are managed by overflow technique i.e. extra traffic is carried over by some other operating POI as has been designed to do so.
- **%age of call answered by operator (electronically) (benchmark $>95\%$):** Except for Aircel, rests of the operators are meeting the benchmark with values lying between 98.54% to 100%.
- **%age of call answered by operator (Voice to voice) (benchmark $>90\%$):** All operators, except for Aircel, rests of the operators are meeting the benchmark value lying between 90.51% to 100%.

(2) Month Data Assessment & Summarized Findings

S/ N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Videocoin	Vodafone	Uninor	MTS	Rcom CDMA	Tata CDMA
			GSM Operators						CDMA Operators					
(A)	Network Service Quality Parameter													
1	Network Availability													
	a) BTS Accumulated Downtime	<=2%	0.03%	0.015%	1.64%	0.51%	0.52%	0.001%	0.55%	0.19%	0.20%	0.11%	0.44%	0.015%
	b) Worst affected BTSs due to downtime	<=2%	0%	0.02%	1.90%	1.70%	1.54%	0%	0%	0.55%	0.75%	0%	1.50%	0%
	c) Total no. of BTSs in the licensed service area		2193	9242	6723	8871	3630	4164	21	8322	3076	706	2274	2326
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		588.92	1021.59	81765	33802.53	14143	184.82	86.69	12049.40	4601.3	590.18	7502	261.93
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	2	130	151	56	0	0	46	23	0	34	0
2	Connection Establishment (Accessibility)													
	a) CSSR (Call Setup Success Rate)	>=95%	99.77%	99.48%	97.05%	98.18%	99.54%	99.37%	98.73%	97.53%	97.37%	99.01%	98.45%	98.47%
	b) SDCCH/PAGING congestion	<=1%	0.02%	0.02%	0.71%	0.80%	0.05%	0.10%	0.17%	0.60%	0.17%	0%	0%	0%
	c) TCH congestion	<=2%	0.05%	0.02%	1.91%	1.23%	0.06%	0.11%	0%	1.25%	0.48%	0.08%	0.01%	0.07%
3	Connection maintenance (retainability)													
	a) CDR	<=2%	0.59%	0.43%	1.88%	1.13%	0.46%	0.80%	0.32%	0.95%	1.23%	0.37%	0.33%	0.96%
	b) Worst affected cells>3% TCH drop	<=3%	2.86%	0.63%	2.96%	2.64%	0.01%	2.75%	0%	2.30%	2.07%	2.56%	0%	2.67%
	c) Good voice quality	>=95%	98.13%	99.55%	97.92%	97.51%	98.96%	96.88%	99.93%	97.40%	97.24%	100%	99.76%	NA
	d) Total No. of cells exceeding 3% TCH drop (call drop)		188	173	607	698	1	339	0	590	190	55	0	195
	e) Total no. of cells in the network		6579	27390	20489	26394	10890	12357	63	25068	9170	2144	6822	7312
	f) Total No. of cells in the network		6579	27390	20489	26394	10890	12357	63	25068	9170	2144	6822	7312
4	No. of POI's having congestion >0.5%	<=0.5%	0	0	1	0	0	0	0	0	3	0	0	0
	a) Name of POI not meeting the benchmark		Nil	Nil	IDEA Cellullar -- 9220	Nil	NIL	NIL	Nil	Nil	Airtel_Local, Idea_Nagpur,TT SL	Nil	Nil	Nil
	b) Total No. of call attempts on POI (Avg.)		289321	5688181	1929399	9103929	1136991	981913	8	5200430	2537425	367400	514729	1510203
	c) Total traffic served on POI (Erlang) (Avg.)		6427.20	126284	NP	216689.26	29139.02	26699.3944	2.89	78822.65	42841.61	7330.91	14932.94045	33969.69
	d) Total No. of circuits on POI		14417	190837	90604	428183	73641	69317	357	145066	87651	25968	37068	95200

	e) Total number of working POI Service Area wise		70	377	311	406	160	212	11	196	118	65	90	420
	f) Capacity of POI		13708.76	179053.30	63424	404578.81	66370.45	63111.077	238.58	142782.50	81475.16	24222.05	32982.59	85329.31
5	Network Data													
	a) Equipped Capacity of Network Erlang		65452.10	374038.39	263293	424917.09	144000	182066	15000	348015.27	111697.34	28560	260000	776298
	b) Total traffic in TCBH in erlang (Avg.)		14867.45	229501.70	120020.96	355663.40	132510.31	87682.46	0.21	314212.55	100234.91	10438.00	9444.54	129327.16
	c) Total no. of customers served (as per VLR) on last day of the month		553684	8485984	4236663	14825700	5032450	2904074	127	12015248	3153786	360315	2296475	2316099
(B)	Customer Service Quality Parameters													
5	Metering/billing credibility-Post paid	<= 0.1%	0.06%	0.02%	0.07%	0.08%	0.08%	0.002%	NA	0.05%	NA	0.11%	0.0003%	0.004%
	a) No. of bills issued during the period		12806	369091	461597	903826	48422	53516	NA	595892	NA	6334	299016	163180
	b) No. of bills disputed including billing complaints during the period		8	84	324	722	39	1	NA	315	NA	7	1	6
6	Metering /billing credibility-Pre paid	<= 0.1%	0.01%	0.01%	0.09%	0.02%	0.10%	0%	0%	0.04%	0.04%	0.01%	0.04%	0.0001%
	a) No. of charging / credit / validity complaints during the quarter		117	1474	4594	2994	7234	0	0	4759	1766	46	1216	2
	b) Total no. of pre-paid customers at the end of the quarter		1421560	11702969	5011519	14276676	7373885	4579989	10957	12416100	4887291	718073	3228251	3267715
7	Resolution of billing/ charging complaints	100% within 4 weeks	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	a) No. of billing/(post paid) and charging, credit/validity (pre paid) complaints resolved within 4 weeks during the quarter		125	1558	4918	5363	7421	964	0	5074	3529	99	2099	556
	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		125	1558	4918	5363	7421	964	0	5074	3529	99	2099	556
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		71	314	2172	3716	7273	1	0	5074	1766	53	1217	8
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		54	1244	2746	1647	148	963	0	0	1763	46	882	548
	e) Period of applying credit/waiver/adjustment to the customers account from the date of	<=1 week	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

	resolutions of complaints													
8	Response time to customers for assistance													
	a) Accessibility of call centre/Customer Care	>=95 %	48.78 %	100%	100%	99.11%	94.77%	99.27%	100 %	99.98%	95.51%	75.02 %	93.83%	98.82%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90 %	23.76 %	99.14%	95.85%	98.22%	91.56%	97.66%	100 %	92.61%	95.49%	95%	89.73%	91.73%
	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		54685	2238597 3	226047	2771279	120723 74	543278	2	1484049 5	796166	122682	3715770	113197
	d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		26678	2238597 3	226047	2746547	119252 90	539509	2	1483780 6	760455	92031	3695552	111735
9	Termination/closure of service	<=7days	100%	100%	100%	100%	100%	100%	NA	100%	NA	100%	100%	100%
	a) Total No. of requests for Termination / Closure of service received during the quarter		130	1922	3864	6149	378	1066	NA	2676	NA	31	1231	2568
	b) No.of requests for Termination / Closure of service complied within 7 days during the quarter		130	1922	3864	6149	378	1066	NA	2676	NA	31	1231	2568
10	Time taken for refunds of deposits after closures (within 60 days).	100%	100%	100%	100%	100%	100%	100%	NA	100%	NA	100%	100%	100%

NA: Not Applicable, NP: Not Provided

Parameter-wise Findings (Month Data Assessment):

The parameter wise key takeouts for the Cellular Mobile Telephone Services providers in Maharashtra-Goa Service Area are as given below:-

- **BTS accumulated downtime (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0% and 1.64%.
- **Worst affected BTSs due to downtime (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0% and 1.90%.
- **Call setup success rate (benchmark $\geq 95\%$):** All operators are meeting the benchmark with values lying between 97.05% and 99.77%.
- **SDCCH/PAGING Channel congestion (benchmark $\leq 1\%$):** All operators are meeting the benchmark with values lying between 0% and 0.80%.
Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.
- **TCH congestion (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0% and 1.91%.
- **Call drop rate (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0.32% and 1.88%.
- **Cell exceeding 3% TCH drop (benchmark $\leq 5\%$):** All operators are satisfying the benchmark with value in between 0% and 2.96%.
- **Connections with good voice quality (benchmark $\geq 95\%$):** Tata CDMA has declared that the parameter is not system generated. Other operators are meeting the benchmark with values lying between 96.88% and 100%.
- **POI Congestion (benchmark $\leq 0.5\%$):** BSNL & Uninor shows that 1 & 3 no of POI's are having congestion greater than 0.5%. Here POI congestion indicates that there were call failure greater than 0.5% on that particular POI. The calls here indicate only those calls which have been seized by the switch and processed. But cases are found where individual POIs are showing high utilization/usage which are managed by overflow technique i.e. extra traffic is carried over by some other operating POI as has been designed to do so.
- **%age of call answered by operator (electronically) (benchmark $>95\%$):** All the operators, except Aircel, MTS & Rcom (GSM & CDMA), are meeting the benchmark with values lying between 95.51% and 100%.
- **%age of call answered by operator (Voice to voice) (benchmark $>90\%$):** Aircel & Rcom CDMA are not meeting the benchmark value.
- **Metering and billing credibility-Post paid (benchmark $\leq 0.1\%$):** Except for MTS, all other operators are meeting the benchmark.
- **Metering and billing credibility-Pre paid (benchmark $\leq 0.1\%$):** All the operators are meeting the benchmark.
- **Resolution of billing/ charging complaints (benchmark 100% within 4 weeks):** All the operators are meeting the benchmark.
- **Termination/Closure of service (Benchmark ≤ 7 days):** All operators have satisfied the benchmark.
- **Time taken for refunds of deposits after closures (benchmark 100% within ≤ 60 days):** All the operators are meeting the benchmark. The parameter is not applicable in case of Videocon & Uninor as they had no refund cases in the month.

(3) Sample Coverage

Switches/BSC/BTS details of operators:

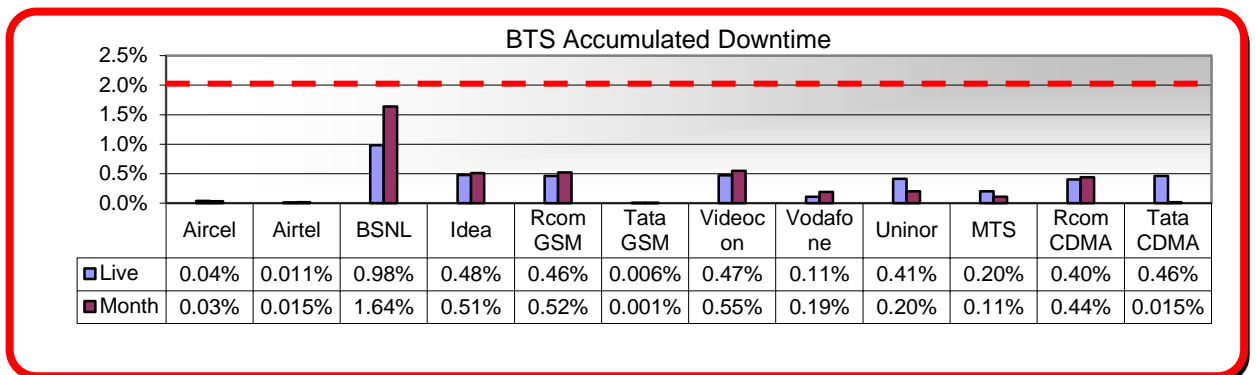
S/N	Name of Service Provider	No. of MSC/GMSC	No. of BSC	No. of BTS
GSM Operators				
1	Aircel Ltd	3	15	2194
2	Airtel Ltd	21	145	9242
3	BSNL	14	145	6723
4	Idea	40	80	8871
5	Reliance Communications	5	24	3630
6	Tata Communications	4	31	4164
7	Uninor	4	21	3076
8	Videocon	1	1	21
9	Vodafone	16	108	8386
CDMA Operators				
10	MTS	1	4	706
11	Reliance Communications	11	10	2274
12	Tata Communications	11	22	2326

(4) Performance (Graphical Representation)

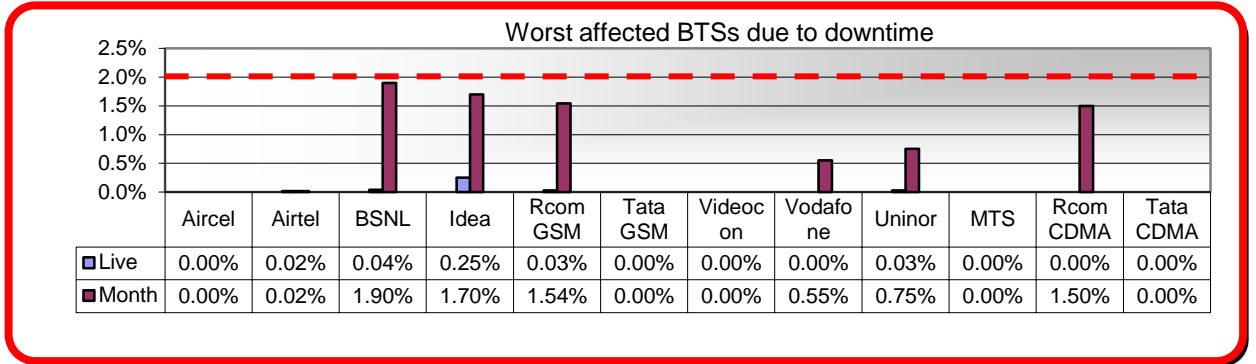
Comparison between Live measurements and One month data Audit – Cellular Mobile Telephone Services

A) NETWORK PERFORMANCE

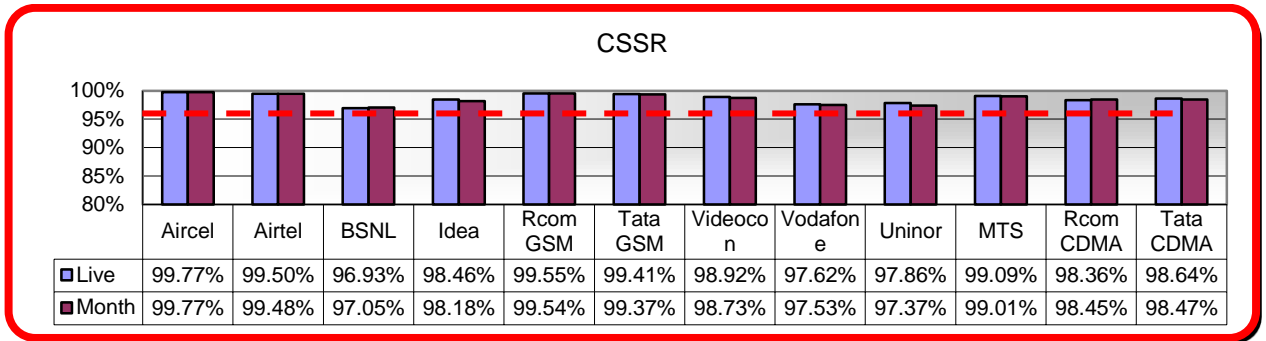
BTS Accumulated Downtime: All operators are meeting the TRAI benchmark for both one month data and 3 days live data.



Worst affected BTS due to Downtime: All operators are meeting the TRAI benchmark for both one month data and 3 days live data.

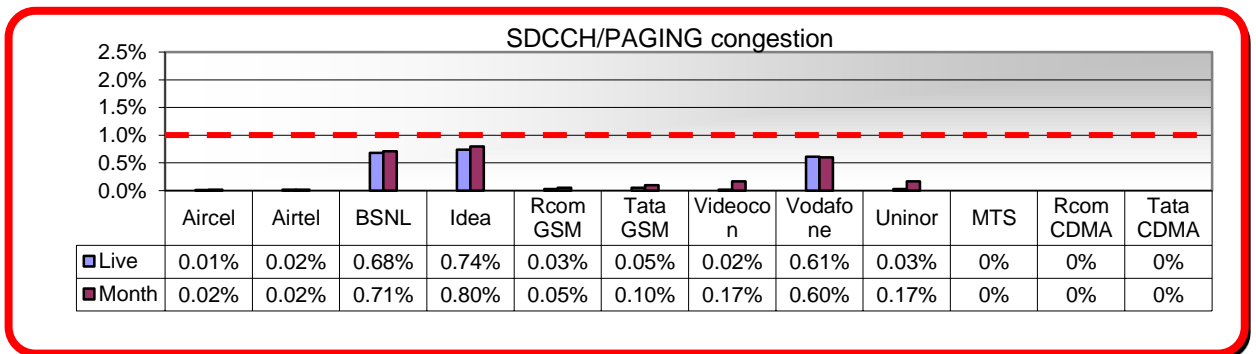


Call setup success rate: All operators are meeting the TRAI benchmarks ($\geq 95\%$) for both one month data and 3 days live data.

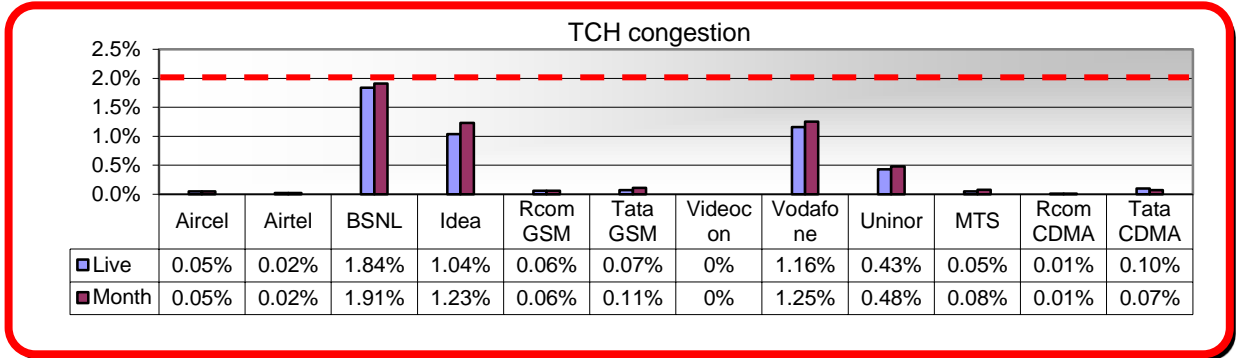


Blocked call rate:

SDCCH congestion: All operators are meeting the TRAI benchmarks ($\leq 1\%$) for both one month data and 3 days live data.

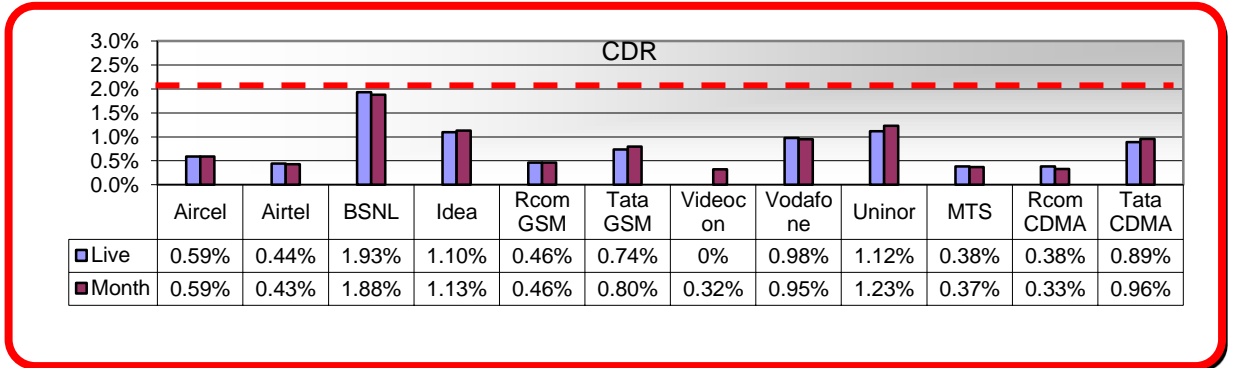


TCH congestion: All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data.

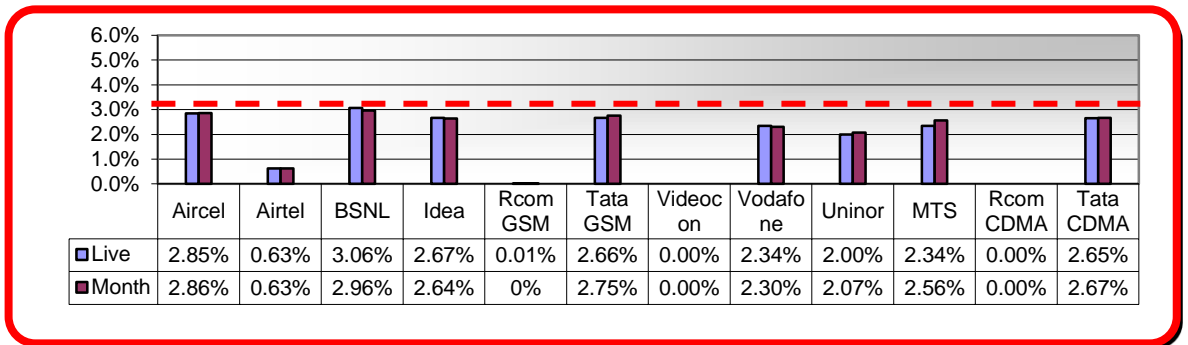


Connection Maintainability (Retainability):

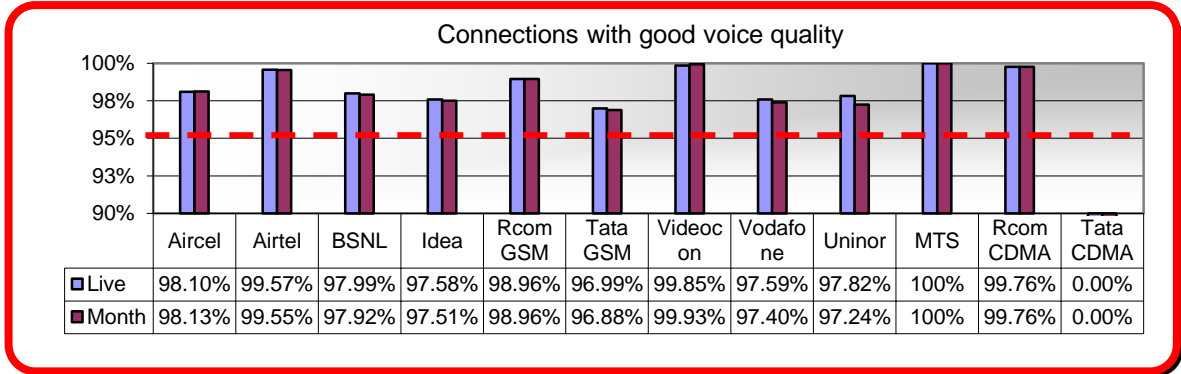
Call drop rate: All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data.



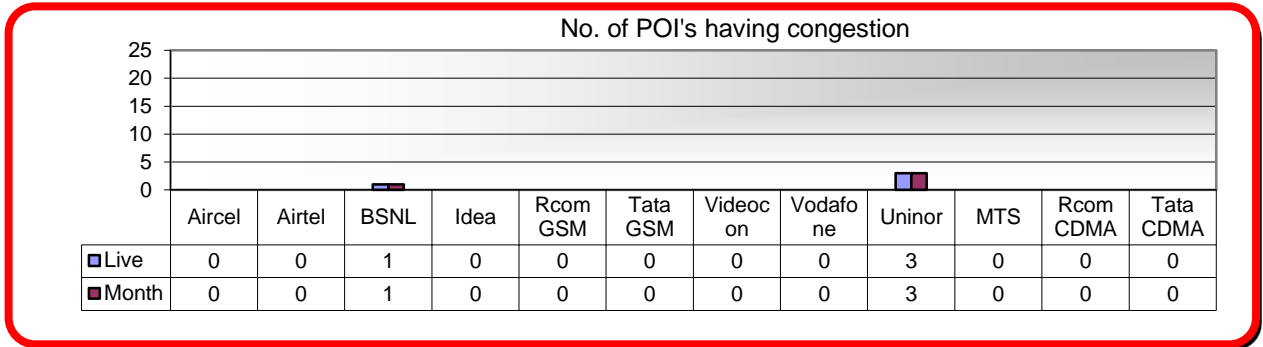
Worst affected Cell exceeding 3% TCH Drop: For both live data, BSNL is found not meeting the benchmark of $\leq 3\%$. Rests of the operators are meeting the benchmark for both cases.



Percentage of connections with good voice quality: All operators are meeting the TRAI benchmarks ($\Rightarrow 95\%$) for both one month data and 3 days live data. Tata CDMA has declared that this parameter is not system generated.

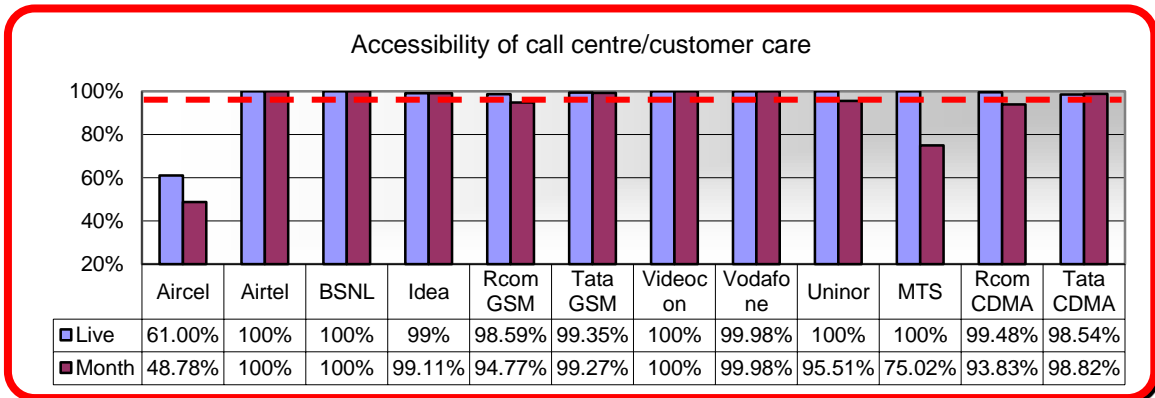


POI Congestion: BSNL & Uninor are found to have 1 & 3 no's of POIs with $\geq 0.5\%$ congestion.

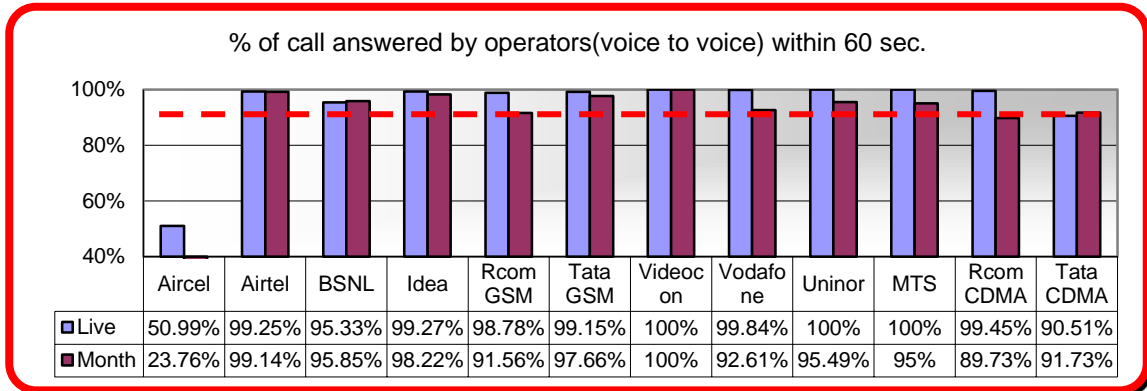


B) CUSTOMER SERVICE QUALITY PARAMETERS

Percentage of call answered (Electronically): Aircel is not meeting the benchmark for live & month both as well as MTS & Rcom (GSM & CDMA) are also not meeting the benchmark in case of month audit. Rest of the operators are meeting the TRAI benchmarks ($\geq 95\%$) for both one month data and 3 days live data.



Percentage of call answered by operators (Voice to voice) within 60 sec: Aircel is not meeting the benchmark for live & month both as well as Rcom CDMA is not meeting the benchmark for month. Rest of the operators are meeting the TRAI benchmarks ($\geq 95\%$) for both one month data and 3 days live data.



(5) Critical Analysis

The above comparative study between live data & month data shows similar trends & consistency in both the cases except for Uninor in SDCCH congestion. BSNL & Idea have also shown a very high value for “worst affected BTSs due to downtime” in case of month of audit. BSNL has a high value against the “worst affected cells >3% TCH drop” parameter for live measurement data.

While Aircel has below the benchmark for “Response time to the customers” in both live & month data. Rcom (GSM & CDMA) & MTS are not meeting the benchmark for the parameter “Accessibility of call centre” in case of month of audit as well as Rcom CDMA is not meeting the benchmark for the parameter “% call answered by operators(voice to voice) within 60 sec”. MTS is not meeting benchmark for the parameter “Metering/billing credibility-Post paid”.

(B) Redressal**(1) Sample coverage**

A sample of billing complaints was taken for each operator and calls were made for assessing the resolution of billing/charging complaints within 4 weeks as claimed by the respective operators.

(2) Performance based on live calling for billing complaints

Calling Operator	Aircel	Airtel	BSNL	Idea	Reliance GSM	Tata GSM	Vodafone	Uninor	MTS	Reliance CDMA	Tata CDMA
Total No. of Calls Attempted	100	100	100	100	100	100	100	100	99	100	100
Total No. of calls Answered	63	69	53	85	48	64	76	46	39	55	65
Cases resolved with 4 weeks	63	69	53	85	48	64	76	46	39	55	65
%age of cases resolved	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

(3) Live Calling to Call Centres

Calling Operator	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
Calls Attempted	100	100	100	100	100	100	100	100	100	100	100	100
Calls connected to IVR	100	100	100	100	100	100	100	100	100	100	100	100
%age of calls connected to IVR	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Calls got connected to agent within 60 Sec	88	97	96	99	93	98	100	100	100	100	95	96
%age of calls got answered by agent in 60 sec.	88%	97%	96%	99%	93%	98%	100%	100%	100%	100%	95%	96%

(4) Level-1 Live Calling

Emergency no.	Calls Attempted	City: Nasik										
		Airce 1	Airte 1	BSNL	Idea	RCOM GSM	Tata GSM	Vodafone	Uninor	MTS	RCOM CDM A	Tata CDM A
100	2	2	2	2	2	2	2	2	2	2	2	2
101	2	2	2	2	2	2	2	2	2	2	2	2
102	2	2	2	2	2	2	2	2	2	2	2	2

Emergency no.	Calls Attempted	City: Nagpur										
		Airce 1	Airte 1	BSNL	Idea	RCOM GSM	Tata GSM	Vodafone	Uninor	MTS	RCOM CDM A	Tata CDM A
100	2	2	2	2	2	2	2	2	2	2	2	2
101	2	2	2	2	2	2	2	2	2	2	2	2
102	2	2	2	2	2	2	2	2	2	2	2	2

Emergency no.	Calls Attempted	City: Bhandara										
		Airce 1	Airte 1	BSNL	Idea	RCOM GSM	Tata GSM	Vodafone	Uninor	MTS	RCOM CDM A	Tata CDM A
100	2	ICR with Tata	2	2	2	2	2	2	2	ICR with Tata	2	2
101	2		2	2	2	2	2	2	2		2	
102	2		2	2	2	2	2	2	2		2	

(5) Critical Analysis

Random numbers were selected from the operators' available database of billing/metering complaints and calls were made to the customers to get their feedback for complaint redressal. No proper response could be obtained in many of the call attempts made (no answer, number not reachable, customer busy, customer not available on phone, customer does not remember about the complaint redressal etc.). However, there was a congruence found in customer feedback and the operators' records wherever a proper response was obtained.

Good results were found for most of the operators during live calling to their respective call centres.

Good results were also found in case of Level-1 calling for emergency nos. 100, 101 & 102. The calls were found to land in the neighboring areas from where the calls were being made.

(C) Inter operator call assessment**(1) Sample coverage**

A sample of 2x50 test calls per Service Providers with in the licensed service area (Maharashtra-Goa Circle) were made between 1100 to 1400 hrs and between 1600 to 1900 hrs.

(2) Performance based on live calling

Calling Operator	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vodafone	MTS	Rcom CDMA	Tata CDMA
Aircel	-	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Airtel	97%	-	98%	100%	100%	98%	100%	100%	100%	100%	99%
BSNL	98%	100%	-	100%	100%	100%	99%	98%	100%	100%	100%
Idea	99%	98%	99%	-	100%	100%	97%	100%	100%	100%	100%
Rcom GSM	100%	100%	99%	98%	-	100%	100%	100%	100%	99%	100%
Tata GSM	100%	100%	100%	100%	100%	-	100%	100%	100%	100%	100%
Uninor	100%	100%	100%	100%	100%	100%	-	100%	100%	100%	100%
Vodafone	100%	97%	100%	99%	97%	100%	99%	-	100%	100%	100%
MTS	100%	100%	100%	100%	100%	100%	100%	100%	-	100%	100%
Rcom CDMA	100%	100%	100%	100%	100%	100%	100%	100%	100%	-	99%
Tata CDMA	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	-

(3) Critical Analysis

In the inter-operator call assessment test, calls were made from one operator to other operators so as to check congestion on both the operators' network. In such cases, the radio part, switch part & the POI in-between the operators are involved and hence if any congestion is found in the network, it may be due to any of these parts. The results are tabulated above and there was congestion found in cases such as Aircel-Airtel, Rcom GSM-Vodafone etc. There is not much congestion found on the operator networks.

(D) Drive test of the mobile network of service providers**(1) Sample Coverage**

The Operator Assisted Drive Test was conducted in Maharashtra-Goa circle for all the operators. The speed limit of 30-35Km/hr was maintained throughout the Drive Test. Zones was selected for covering different density areas (High, Medium & Low dense areas).

Drive Test Locations***Nashik***

HIGH DENSE: Deolali Camp,Deolali market,Nashik road railway station, Peth area
 MEDIUM DENSE: Jail road,CBS College road,Gangapur road, Canada corner,commission office
 LOW DENSE: Satpur MIDC, Ambar MIDC, Mumbai highway SIDCO, Dindori road

Nagpur

HIGH DENSE: Cotton market,Lohapul, Railway station,Sitaburd,Dhantoli, Panchsheel square,Ramdas Peth, Ganesh Peth
 MEDIUM DENSE: Hanuman Nagar, Reshimbagh,Ganesh Nagar, New Nandanvan,Ishwar Nagar
 LOW DENSE: Somalwada, Wardha road, Airport Road,Pande layout, Telecom Nagar

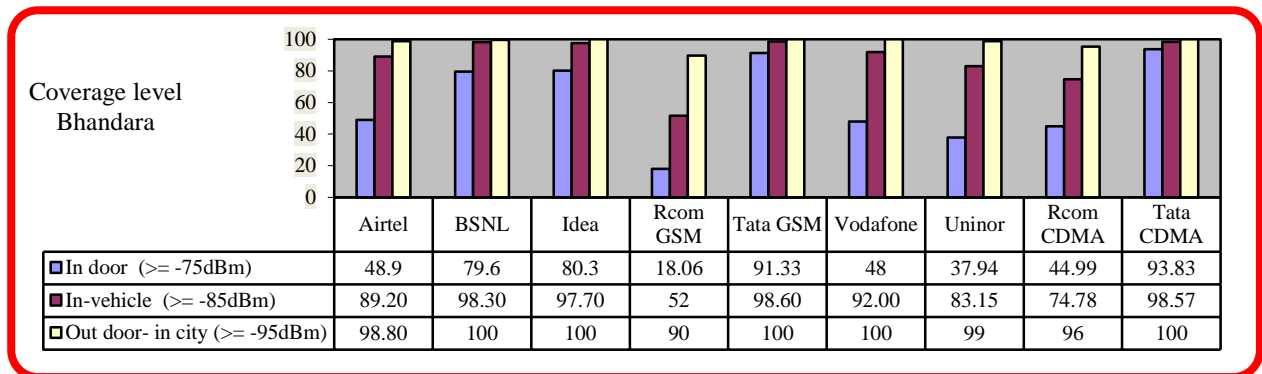
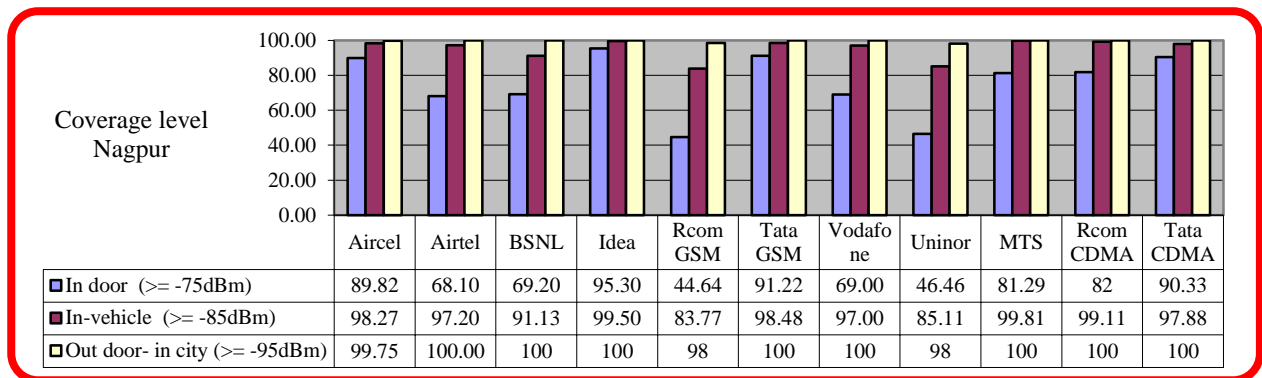
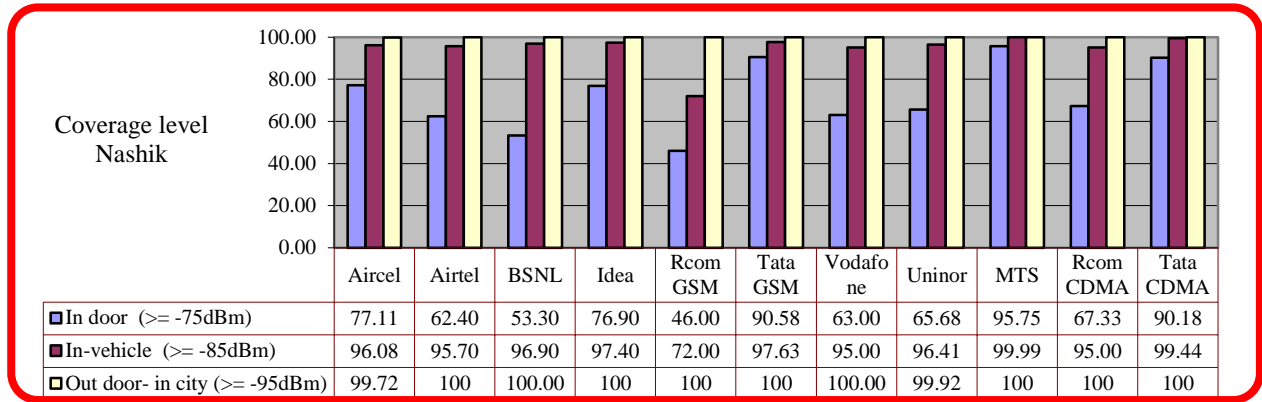
Bhandara

HIGH DENSE: Thana, Railway station,Ashok Nagar, Shashtri Nagar,Mujabi, Bela
 MEDIUM DENSE: Dhaba, Shirshi,Warti,Mahada colony,Pande mahal,Santaji ward
 LOW DENSE: Kardha,Hanuman Temple area, Jay stambh square,Tumshar road

2) Performance (for the respective cities)

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Vodafone	Uninor	MTS	Rcom CDMA	Tata CDMA
			GSM Operators										
1.1	Call Attempts	NASHIK	133	148	137	156	168	187	178	240	163	170	184
		NAGPUR	165	159	163	143	139	167	178	140	141	146	161
		BHANDARA	ICR	123	137	132	111	113	108	115	ICR	111	94
1.2	Blocked Call Rate (<=3%)	NASHIK	0.75	0.00	0.73	0.64	0.60	0.00	0.00	2.08	0.00	0.00	0.00
		NAGPUR	0.00	0.00	6.13	0.00	0.00	0.00	0.00	0.71	0.00	1.37	0.00
		BHANDARA	ICR	0.00	6.57	0.00	0.90	0.00	0.00	1.74	ICR	0.00	0.00
1.3	Dropped Call Rate (<=2%)	NASHIK	0.76	0.00	0.73	0.65	0.60	1.60	0.00	0.43	0.00	0.59	0.00
		NAGPUR	0.00	0.00	7.36	0.00	0.71	1.20	0.00	0.72	0.00	3.47	0.00
		BHANDARA	ICR	0.00	2.19	0.00	0.00	0.88	0.00	0.00	ICR	0.00	0.00
1.4	Percentage of connections with good voice quality (>=95%)												
	(i) 0-4 (w/o frequency hopping)	NASHIK									98.97	99.66	95.25
		NAGPUR									98.59	97.50	95.60
		BHANDARA									ICR	98.56	95.36
	(ii) 0-5 (with frequency hopping)	NASHIK	95.93	97.50	92.20	94.00	95.00	96.46	96.50	93.46			
		NAGPUR	97.68	96.02	95.47	94.90	85.28	95.19	95.70	91.90			
BHANDARA		ICR	96.75	96.70	97.70	86.56	95.76	97.70	94.90				
1.5	Service Coverage (%)												
	In door (>= -75dBm)	NASHIK	77.11	62.40	53.30	76.90	46.00	90.58	63.00	65.68	95.75	67.33	90.18
		NAGPUR	89.82	68.10	69.20	95.30	44.64	91.22	69.00	46.46	81.29	82	90.33
		BHANDARA	ICR	48.9	79.6	80.3	18.06	91.33	48	37.94	ICR	44.99	93.83
	In-vehicle (>= -85dBm)	NASHIK	96.08	95.70	96.90	97.40	72.00	97.63	95.00	96.41	99.99	95.00	99.44
		NAGPUR	98.27	97.20	91.13	99.50	83.77	98.48	97.00	85.11	99.81	99.11	97.88
		BHANDARA	ICR	89.20	98.30	97.70	52	98.60	92.00	83.15	ICR	74.78	98.57
	Out door- in city (>= -95dBm)	NASHIK	99.72	100	100.00	100	100	100	100.00	99.92	100	100	100
		NAGPUR	99.75	100.00	100	100	98	100	100	98	100	100	100
BHANDARA		ICR	98.80	100	100	90	100	100	99	ICR	96	100	
1.6	Call Setup Success Rate (>=95%)	NASHIK	99.25	100	99.22	99.36	99.4	100	100	97.917	100	100	100
		NAGPUR	100	100	94.61	100	100	100	100	99.29	100	98.63	100
		BHANDARA	ICR	100	99.5	100	99.1	100	100	98.26	ICR	100	100

Graphical Representation



(3) Critical Analysis

The drive test data was found to be satisfactory for most of the parameters. However, a few deviations found are listed below:

- Blocked call rate parameter is not met by BSNL in Nagpur & Bhandara city.
- Drop call rate parameter is not met by BSNL & Rcom CDMA in Nagpur as well as BSNL is not meeting in Bhandara also.
- "Percentage of connections with good voice quality" parameter is not met by BSNL, Idea & Uninor in Nashik, Idea, Rcom GSM & Uninor in Nagpur & , Rcom GSM and Uninor in Bhandara.
- "CSSR" parameter is not met by only BSNL in Nagpur.

(E) Independent Drive Test**(6) Sample Coverage**

Independent Tests were conducted in the Maharashtra-Goa circle as per the list given by TRAI .The city-wise radio coverage with call testing was performed individually for each service provider through drive test activity.

Drive Test Locations***Wadi***

Hingna, Air Force Colony, Vikas Nagar_Khadgaon Rd, Wadi, Wadi Police Station, Wardhmna, Suraburdi

Latur

Gunj Golai, Ambejogai Rd, Deshpande Colony Area, MIDC Area, ShriNagar, Market Yard, Beed Hw, Babhalgaon Area, labour Colony, Shahu nagar, Vaibhav Nagar, RingRoadLatur, VivekanandNagar, Agriculture College Area, MITCollege.

Nanded

Bus stand, Sarafa Bazar, Old Mondha Bazar, Traserar Bazar
Airport, MGM College, Gurudwara Temple, Bhgya Nagar (Residential Area), SP office (District Headquarters), Swami Ramanand Thirth University, VIP Road, Railway Station
Nanded MIDC, Doctor Line Area, Wajegaon

Jalgaon:

Mahabal, Sarafa Bazaar, Railway station, Bus stand

MEDIUM DENSE: Girna Pumping, Court area, University, Phule Market

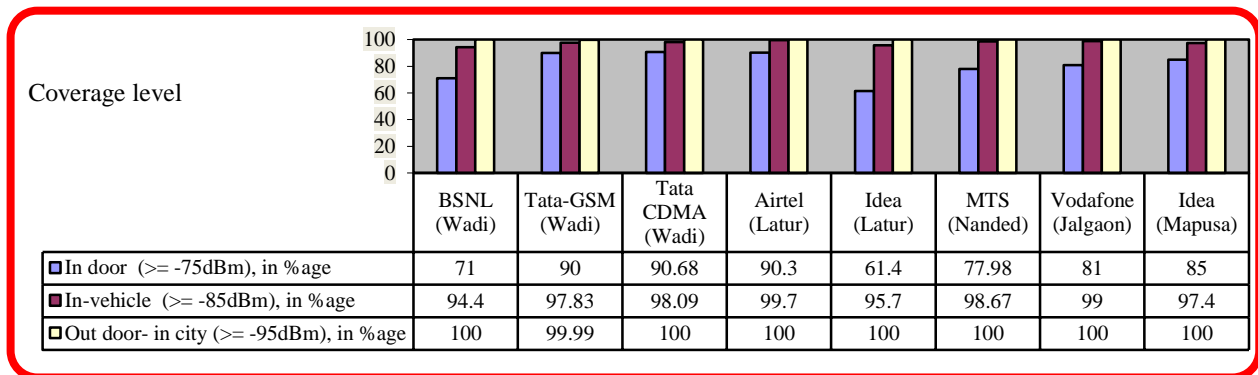
LOW DENSE: MIDC, Ring road & Highway area

Mapusa:

BSNL exchange panjim, Patto bridge, mandovi, porvirum, sangolda, saligoan, calangute, parra, Karaswada GIDC, Mumbai -GOA Highway, XAVIER College, mapusa market, khorlim, ghateshwar nagar, holy cross girls hostel, government agricultural farm, duler mapusa, shivolim, ekta nagar, municipal market, bus stand mapusa, district court

2) Performance (for the respective cities)

SN	Parameter	City Name	BSNL	Tata GSM	Tata CDMA	Airtel	Idea	MTS	Vodafone	Idea
			Wadi			Latur		Nanded	Jalgaon	Mapusa
1.1	Call Attempts		99	104	112	171	164	115	180	136
1.2	Blocked Call Rate (<=3%)		1.01	0	0	0.00	0.61	0	0.56	0
1.3	Dropped Call Rate (<=2%)		9.09	1.92	0	0	1.84	0	0	0
1.4	Percentage of connections with good voice quality (=>95%)									
	(i) 0-4 (w/o frequency hopping)				95.15			99.24		
	(ii) 0-5 (with frequency hopping)		94.8	95.02		95.53	97.6		95.5	95.2
1.5	Service Coverage									
	In door (>= -75dBm), in %age		71	90	90.68	90.3	61.4	77.98	81	85
	In-vehicle (>= -85dBm), in %age		94.4	97.83	98.09	99.7	95.7	98.67	99	97.4
	Out door- in city (>= -95dBm), in %age		100	99.99	100	100	100	100	100	100
1.6	Call Setup Success Rate (>=95%)		90.82	100	100	100	99.39	100	99.4	100



(3) Critical Analysis

The drive test data was found to be satisfactory for most of the parameters. Following are the observations made during the drive tests:

- i) BSNL is not meeting the benchmark for the parameter "Dropped call rate", "Percentage of connections with good voice quality" & CSSR in Wadi.
- ii) Variations were noticed in case of coverage level. For example, Idea got 61.4% samples in Latur which may be used in-door. This considerably increased for In-vehicle & outdoor connections.

(F) Compliance report (Status of service providers with respect to the QoS)

From live audit, month data verification and Drive Tests findings, it can be concluded that on an average, performance of the operators in the service area (Maharashtra-Goa) is satisfactory for **Network Parameters**.

BSNL, Idea & RCOM (GSM & CDMA) are having low performance as compare to other operators for the parameter 'worst affected BTSs due to downtime' in case of month of audit.

BSNL have very high %age of cells having >3% TCH drop in case of live data. For the parameter "POI Congestion", BSNL & Uninor show 1 & 3 no's of POIs with congestion >=0.5%.

Under **Response Time to Customer for Assistance** parameters, Aircel has below benchmark performance. MTS & Rcom (GSM & CDMA) are not meeting the benchmark for the parameter "Accessibility of call centre" in case of month of audit as well as Rcom CDMA is not meeting benchmark for "% call answered by operators (voice to voice) within 60 sec".

Regarding **Metering/Billing Credibility** issues, MTS has shown a value slightly deviating from the prescribed benchmark for postpaid. All operators are complying the benchmark for the parameter "Period of applying credit/waiver/adjustment to the customer's account from the date of resolutions of complaints".

During **Drive Tests**, Blocked call rate parameter is not met by BSNL in Nagpur & Bhandara city. Drop call rate parameter is not met by BSNL & Rcom CDMA in Nagpur as well as BSNL is not meeting benchmark in Bhandara also." Percentage of connections with good voice quality" parameter is not met by BSNL, Idea & Uninor in Nasik, Idea, and Rcom GSM & Uninor in Nagpur & Rcom GSM and Uninor in Bhandara. "CSSR" parameter is not met by only BSNL in Nagpur.

II. Basic Telephone Service (Wireline) Providers

.....Audit not done for this quarter

III. Broadband Service Providers

.....Audit not done for this quarter