REPORT

ON

AUDIT & ASSESSMENT OF QUALITY OF SERVICE

OF

CELLULAR MOBILE TELEPHONE SERVICES

FOR

MAHARASHTRA -GOA CIRCLE
(WEST ZONE)

Report Period: January 2012 – March 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 (Wireline) 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 (Wireline) 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 1st quarter (January -March 2012). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken for the period July-September 2012.

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	Feb-2012	2000-2100 Hrs
2	Airtel Ltd	Feb-2012	1900-2000 Hrs
3	BSNL	Feb-2012	2100-2200 Hrs
4	Idea	Feb-2012	1900-2000 Hrs
5	Reliance Communications	Feb-2012	1900-2000 Hrs
6	Tata Communications	Feb-2012	1900-2000 Hrs
7	Uninor	Feb-2012	1900-2000 Hrs
8	Videocon	Feb-2012	1100-1200 Hrs
9	Vodafone	Feb-2012	1900-2000 Hrs
CDMA Operators			
10	MTS	Feb-2012	1900-2000 Hrs
11	Reliance Communications	Feb-2012	1900-2000 Hrs
12	Tata Communications	Feb-2012	1900-2000 Hrs

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

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		GSM Operators									CDMA Operators		
1	**Network Availability**													
	a) BTS Accumulated Downtime	*<=2%*	0.02%	0.01%	1.13%	0.39%	0.50%	0.01%	1.27%	0.17%	0.12%	0.20%	0.35%	0.03%
	b) Worst affected BTSs due to downtime	*<=2%*	0.00%	0.01%	0.00%	0.13%	0.05%	0.00%	0.00%	0.02%	0.03%	0.00%	0.00%	0.00%
	Connection Establishment (Accessibility)													
	a) CSSR (Call Setup Success Rate)	*>=95%*	99.58%	99.50%	96.85%	98.40%	99.52%	98.71%	100%	98.01%	96.00%	98.79%	98.92%	97.00%
	b) SDCCH/PAGING congestion	*<=1%*	0.01%	0.03%	1.10%	0.97%	0.11%	0.17%	0.22%	0.67%	1.26%	0.00%	0.00%	0.00%
	c) TCH congestion	*<=2%*	0.01%	0.10%	1.82%	1.02%	0.05%	0.23%	0.00%	0.89%	0.80%	0.10%	0.32%	0.08%
2	**Connection maintenance (retainability)**													
	a) CDR	*<=2%*	0.56%	0.55%	1.96%	1.21%	0.50%	0.83%	0.00%	0.93%	1.67%	0.42%	0.56%	0.95%
	b) Worst affected cells>3% TCH drop	*<=3%*	5.40%	0.88%	4.88%	2.94%	0.01%	2.79%	0.00%	2.64%	2.58%	2.57%	1.08%	2.47%
	c) Good voice quality	*>=95%*	98.24%	99.19%	98.36%	96.92%	98.88%	96.79%	99.91%	97.07%	96.08%	100%	98.28%	NA
3	**No. of POI's having congestion >0.5%**		0	0	0	0	0	0	0	0	7	0	0	0
4	**Response time to customers for assistance**													
	a) Accessibility of call centre/Customer Care	*>=95%*	85%	100%	100%	99%	99%	99%	100%	100%	100%	55%	99%	99%
	b) % call answered by operators(voice to voice) within 60 sec.	*>=90%*	68.82%	100%	95.88%	95.79%	92.60%	97.27%	100%	98.44%	97%	60.23%	96.88%	95.77%

NA: Not Applicable, NR: Not Received

From the 3 days live data assessment, it is found that all the operators are meeting the network parameters by and large, except for Aircel & BSNL are not meeting the benchmark for "Worst affected cells>3% TCH drop" with the value of 5.4 & 4.88% 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 & MTS.

S/N	One Month Data Audit Name of Parameter	Bench-mark	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Videocon	Vodafone	Uninor	MTS	Rcom CDMA	Tata CDMA
			GSM Operators									CDMA Operators		
(A)	**Network Service Quality Parameter**													
1	**Network Availability**													
	a) BTS Accumulated Downtime	*<=2%*	0.04%	0.04%	1.49%	0.44%	0.59%	0.02%	0.70%	0.15%	0.16%	0.12%	0.41%	0.31%
	b) Worst affected BTSs due to downtime	*<=2%*	0.00%	0.04%	1.60%	1.90%	1.70%	0.00%	0.00%	0.50%	0.76%	0.00%	1.61%	0.09%
2	**Connection Establishment (Accessibility)**													
	a) CSSR (Call Setup Success Rate)	*>=95%*	99.78%	99.24%	97.13%	98.19%	99.52%	99.09%	99.19%	97.97%	96.24%	99.00%	98.56%	98.05%
	b) SDCCH/PAGING congestion	*<=1%*	0.01%	0.03%	1.08%	0.90%	0.04%	0.21%	0.29%	0.69%	0.76%	0.00%	0.00%	0.00%
	c) TCH congestion	*<=2%*	0.01%	0.04%	1.81%	1.15%	0.05%	0.32%	0.00%	0.91%	0.68%	0.12%	0.78%	0.10%
3	**Connection maintenance (retainability)**													
	a) CDR	*<=2%*	0.55%	0.54%	1.95%	1.27%	0.47%	0.86%	0.24%	0.92%	1.61%	0.44%	0.65%	0.97%
	b) Worst affected cells>3% TCH drop	*<=3%*	5.49%	0.87%	4.92%	2.91%	0.00%	2.76%	0.11%	2.67%	2.81%	2.56%	0.82%	2.46%
	c) Good voice quality	*>=95%*	98.29%	99.22%	98.19%	96.78%	98.90%	96.76%	99.94%	96.96%	96.13%	100%	98.29%	NA
4	**No. of POI's having congestion >0.5%**		0	0	0	0	0	0	0	0	0	0	0	0
(B)	**Customer Service Quality Parameters**													
5	**Metering/billing credibility-Post paid**	*<= 0.1%*	0.03%	0.02%	0.15%	0.10%	0.10%	0.00%	NA	0.07%	NA	0.05%	0.10%	0.00%
6	**Metering /billing credibility-Pre paid**	*<= 0.1%*	0.03%	0.01%	0.10%	0.10%	0.10%	0.00%	0.00%	0.02%	0.09%	0.01%	0.09%	0.00%
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%*	92%	100%	100%	99%	99%	99%	100%	99%	95%	28%	99%	99%
	b) % call answered by operators(voice to voice) within 60 sec.	*>=90%*	84.49%	98.48%	97.50%	95.69%	92.55%	94.75%	100.00%	97.52%	95.49%	45.52%	94.33%	95.59%
9	**Termination/closure of service**	*<=7days*	99.46%	100%	100%	100%	100%	100%	NA	100%	NA	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%	99%

NA: Not Applicable, NR: Not Received

From the month data assessment, it is found that all the operators are meeting the network parameters by and large, except for except for Aircel & BSNL respectively.

Performance related to customer care data is found to be satisfactory for most of the operators for the parameter “Response time to the customers”, with only Aircel & MTS are not meeting the 90% benchmark. Aicel is not meeting the benchmark for "Termination/closure of service". Tata CDMA is not meeting the benchmark for "time taken for refunds of deposits after closures".

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 Satara, Jalgaon and Nanded. 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%)	SATARA	0	0.77	0.82	0.68	0	0	0.72	4.67	0	1.40	0
		JALGAON	ICR	0	6.46	0.65	3.00	0	0.61	3.05	0	0.00	0
		NANDED	ICR	1.05	1.85	1.49	13.80	0	0	8.13	0	6.10	0
1.2	Dropped Call Rate (<=2%)	SATARA	0.89	0.77	1.63	2.05	0.70	1.66	0	0.99	0	1.40	0.88
		JALGAON	ICR	0	1.94	0.65	0.60	0.61	0	1.55	0	0.01	0.75
		NANDED	ICR	0	0.93	0.76	0.87	0.01	0	0.74	0	0.01	1.05
1.3	Percentage of connections with good voice quality (=>95%)												
	(i) 0-4 (w/o frequency hopping)	SATARA									98.6	99	95.06
		JALGAON									98.7	98	95.17
		NANDED									98.49	97	97
	(ii) 0-5 (with frequency hopping)	SATARA	97.30	96.60	95.60	94.10	96.91	95.19	95.4	94.40			
		JALGAON	ICR	96.00	86.81	95.30	92.48	95.18	96.0	94.80			
		NANDED	ICR	93.30	94.00	94.10	91.00	95.95	95.2	94.80			
1.4	Call Setup Success Rate (>=95%)	SATARA	100	99.23	99.19	99.3	100	100	99.3	95.32	95	98.61	100
		JALGAON	ICR	100	93.54	99.35	97.1	100	99.3	98.47	100	100	100
		NANDED	ICR	98.95	98.89	98.51	86.2	100	100	91.11	100	93.9	100

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

- Blocked call rate parameter is not met by BSNL in Ajmer , RCOM (GSM & CDMA) in Nanded & Uninor in all 3 cities respectively.
- Drop call rate parameter is not met by Idea in Satara.
- " Percentage of conncetions with good voice quality" parameter is not met by Airtel in Nanded, BSNL in Jalgaon & Nanded, Idea in Satara & Nanded, RCOM GSM in Jalgaon & Nanded & Uninor in all 3 cities.
- " CSSR" parameter is not met by BSNL in Jalgaon,RCOM (GSM & CDMA) & Uninor in Nanded.

Independent Drive Test

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

SN	Parameter	MTS	Reliance	Uninor	Idea	Vodafone	Tata GSM	Tata CDMA	MTS	Airtel	Aircel	BSNL
		Bhandara		Latur		Sangli			Dhule		Mapusa	
1.1	Blocked Call Rate (<=3%)	In ICR with Tata	1.91	2.24	0.68	0.68	0	0	0	0	0	0.81
1.2	Dropped Call Rate (<=2%)		0.96	0	0	0	0.88	0	0	0	1.72	1.64
1.3	Percentage of connections with good voice quality (=>95%)											
	(i) 0-4 (w/o frequency hopping)		93.11					95.09	98.59			
	(ii) 0-5 (with frequency hopping)			94.4	95	96.8	95.02			96.9	96.08	95
1.4	Call Setup Success Rate (>=95%)		98.10	97.76	99.31	99.30	100	100	100	100	100	99.19

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

- "Percentage of connections with good voice quality" parameter is not met by Reliance in Bhandara & Uninor in Latur.

CHAPTER-3: AUDIT-PMR DATA VERIFICATION RESULTS

PMR S/N	Name of Parameter	B-mark	Audit	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
				GSM Operators									CDMA Operators		
(A)	**Network Service Quality Parameter**														
1	**Network Availability**														
	BTS Accumulated Downtime	≤2%	Reported	0.05%	0.08%	1.13%	0.35%	0.43%	0.02%	0.11%	0.64%	0.19	0.13%	0.26%	0.02%
			Verified	0.05%	0.08%	1.13%	0.35%	0.43%	0.02%	0.11%	0.64%	0.19	0.13%	0.26%	0.02%
	Worst affected BTSs due to downtime	≤2%	Reported	0.03%	0.06%	1.57%	1.81%	0.95%	0%	0.44%	0%	0.98%	0%	0.26%	0.01%
			Verified	0.03%	0.06%	1.57%	1.81%	0.95%	0%	0.44%	0%	0.98%	0%	0.26%	0.01%
2	**Connection Establishment (Accessibility)**														
	CSSR (Call Setup Success Rate)	≥95%	Reported	99.73%	98.98%	95.21%	97.88%	99.72%	99.18%	96.81%	99.07%	98.18%	99.13%	99.79%	98.22%
			Verified	99.73%	98.98%	95.21%	97.88%	99.72%	99.18%	96.81%	99.07%	98.18%	99.13%	99.79%	98.22%
	SDCCH/PAGING congestion	≤1%	Reported	0.02%	0.07%	0.85%	0.79%	0.19%	0.15%	0.36%	0.23%	0.74%	0%	0.01%	0%
			Verified	0.02%	0.07%	0.85%	0.79%	0.19%	0.15%	0.36%	0.23%	0.74%	0%	0.01%	0%
	TCH congestion	≤2%	Reported	0.01%	0.15%	1.86%	1.34%	0.20%	0.22%	0.18%	0.34%	0.70%	0.04%	0.01%	0.12%
			Verified	0.01%	0.15%	1.86%	1.34%	0.20%	0.22%	0.18%	0.34%	0.70%	0.04%	0.01%	0.12%
3	**Connection maintenance (retainability)**														
	CDR	≤2%	Reported	0.49%	0.83%	1.83%	1.66%	0.18%	0.96%	1.78%	0.64%	1.08%	0.34%	0.40%	1.20%
			Verified	0.49%	0.83%	1.83%	1.66%	0.18%	0.96%	1.78%	0.64%	1.08%	0.34%	0.40%	1.20%
	Worst affected cells>3% TCH drop	≤3%	Reported	3.03%	1.70%	4.87%	2.82%	1.10%	2.78%	3.20%	0%	2.76%	2.67%	0.21%	2.66%
			Verified	3.03%	1.70%	4.87%	2.82%	1.10%	2.78%	3.20%	0%	2.76%	2.67%	0.21%	2.66%
	Good voice quality	≥95%	Reported	98.37%	98.77%	98.20%	96.83%	98.91%	96.68%	95.89%	98.93%	96.98%	99.61%	98.02%	96.59%
			Verified	98.37%	98.77%	98.20%	96.83%	98.91%	96.68%	95.89%	98.93%	96.98%	99.61%	98.02%	96.59%
4	Number of POI having ≥ 0.5% POI congestion		Reported	0	0	0	0	0	0	0	0	0	0	0	0
			Verified	0	0	0	0	0	0	0	0	0	0	0	0
(B)	**Customer Service Quality Parameters**														
5	**Metering/billing credibility-Post paid**	≤0.1%	Reported	0.04%	0.03%	0%	0.08%	0.10%	0.09%	NA	NA	0.18%	0%	0.09%	0.04%
			Verified	0.04%	0.03%	0%	0.08%	0.10%	0.09%	NA	NA	0.18%	0%	0.09%	0.04%
6	**Metering /billing credibility-Pre paid**	≤0.1%	Reported	0.03%	0%	0%	0.04%	0.1%	0%	0.18%	0.01%	0.03%	0%	0.05%	0%
			Verified	0.03%	0%	0%	0.04%	0.1%	0%	0.18%	0.01%	0.03%	0%	0.05%	0%

PMR S/N	Name of Parameter	Bench-mark	Audit	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
				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%	100%	100%	98.78%	98.94%	99%	97.62%	100%	100%	97%	99.43%	99.04%
			Verified	100%	100%	100%	98.78%	98.94%	99%	97.62%	100%	100%	97%	99.43%	99.04%
	% call answered by operators(voice to voice) within 60 sec.	*≥90%*	Reported	90.27%	90%	94%	95.10%	89%	98%	70.55%	98.37%	87.33%	92%	90.16%	97%
			Verified	90.27%	90%	94%	95.10%	89%	98%	70.55%	98.37%	87.33%	92%	90.16%	97%
9	**Termination/closure of service**														
	No. of requests for Termination / Closure of service complied within 7 days during the quarter	≤7days	Reported	97.83%	100%	100%	100%	100%	100%	NA	NA	100%	100%	100%	100%
			Verified	97.83%	100%	100%	100%	100%	100%	NA	NA	100%	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%	100%
			Verified	100%	100%	100%	100%	100%	100%	NA	NA	100%	100%	100%	100%

Critical Analysis (PMR Verification):

No deviations were found in compare to operators reported data.

CHAPTER-4: DETAILED FINDINGS & ANALYSIS

I. Cellular Mobile Telephone Service

(A) MSC Audit

(1) 3 Days Live Measurement Data Assessment & Summarized Findings

S/N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Videocon	Vodafone	Uninor	MTS	Rcom CDMA	Tata CDMA
			GSM Operators									CDMA Operators		
A	**Network Service Quality Parameter**													
1	**Network Availability**													
	a) BTS Accumulated Downtime	*<=2%*	0.02%	0.01%	1.13%	0.39%	0.50%	0.01%	1.27%	0.17%	0.12%	0.20%	0.35%	0.03%
	b) Worst affected BTSs due to downtime	*<=2%*	0%	0.01%	0%	0.13%	0.05%	0%	0%	0.02%	0.03%	0%	0%	0%
	c) Total no. of BTSs in the licensed service area		2193	8980	6681	8790	3639	4026	21	8150	2910	694	2238	2335
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		35	466	5461	2447	1301	44	19	1007	246	105	560	48
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	1	0	11	2	0	0	2	1	0	0	0
	c) CSSR	*>=95%*	99.58%	99.50%	96.85%	98.40%	99.52%	98.71%	100%	98.01%	96.00%	98.79%	98.92%	97%
	d) SDCCH/PAGING congestion	*<=1%*	0.01%	0.03%	1.10%	0.97%	0.11%	0.17%	0.22%	0.67%	1.26%	0%	0%	0%
	e) TCH congestion	*<=2%*	0.01%	0.10%	1.82%	1.02%	0.05%	0.23%	0%	0.89%	0.80%	0.10%	0.32%	0.08%
2	**Connection maintenance**													NA
	a) CDR	*<=2%*	0.56%	0.55%	1.96%	1.21%	0.50%	0.83%	0%	0.93%	1.67%	0.42%	0.56%	0.95%
	b) Cells having > 3% TCH drop	*<=3%*	5.40%	0.88%	4.88%	2.94%	0.01%	2.79%	0%	2.64%	2.58%	2.57%	1.08%	2.47%
	c) Good voice quality	*>=95%*	98.24%	99.19%	98.36%	96.92%	98.88%	96.79%	99.91%	97.07%	96.08%	100%	98.28%	NA
	d) No. of cells > 3% TCH drop		355	232	1002	762	1	334	0	644	223	53	72	176

	e) Total no. of cells in the network		6575	26498	20517	25900	10917	11986	63	24519	8672	2045	6714	2280
3	**No.of POI's having congestion >0.5%**		0	0	0	0	0	0	0	0	7	0	0	0
	a) Name of POI not meeting the benchmark		Nil	NIL	NIL	Nil	Nil	NIL	Nil	Nil	Vodafone, BSNL	Nil	Nil	Nil
	b) Total No. of circuits on POI		14564.7	186481	412779	280529	71545	75098	418	139399	83545	24766.69	38726	107417
	c) Avg No. of call attempts on POI		266563	5393254.33	2734321	8878018	1158516	1104843	108	4742347	2058462	392207	571679	1779000
	d) Avg traffic served on POI (Erlang)		6274.19	120229.43	47238	109304.5	30296.55	35960.29	34.09	74181.9	57335.01	7425.47	17322.09	44657.1
	e) Total number of working POI Service Area wise		72	375	311	322	154	229	13	141	129	66	98	443
	f) Capacity of POI		13791	174737	15745	269581	65539	67879	228	136406	74651	24724	34424	96424
	g) Equipped Capacity of Network in respect of Traffic in erlang		35163	367060	258767	428810	144000	171152	15000	333942	101496	28560	290000	332822
	h) Total traffic handled in TCBH in erlang		13610	256075	126936	376596	133654	93129	0	302270	96668	10274	96242	129953
(B)	**Customer Service Quality Parameters**													
4	**Response time to customers for assistance**													
	a) Accessibility of call centre	*>=95%*	85%	100%	100%	99%	99%	99%	100%	100%	100%	55%	99%	99%
	b) % of call answered by operators(voice to voice) within 60 sec	*>=90%*	68.82%	100%	95.88%	95.79%	92.60%	97.27%	100%	98.44%	97.00%	60.23%	96.88%	95.77%
	c) No. of call attempts to call centre / customer care nos. during TCBH (Avg)		4,214	100	29,961	276,623	1,159,914	67,600	86	10,067	100	21,096	342,818	13,030
	d) No. of calls connected and answered successfully to call centre / customer care nos. during TCBH (Avg)		3,569	100	29,961	273,829	1,146,120	67,135	86	10,067	97	11,625	340,970	12,942

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 <=2%):** All operators are meeting the benchmark with values lying between 0.01% and 1.27%.
- **Worst affected BTSs due to downtime (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 0.13%.
- **Call setup success rate (benchmark >= 95%):** All operators are meeting the benchmark with values lying between 96% and 100%.
- **SDCCH/PAGING Channel congestion (benchmark <= 1%):** All operators are meeting the benchmark with values lying between 0% and 1.26%.
  Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.
- **TCH congestion (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 1.82%.
- **Call drop rate (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 1.96%.
- **Cell exceeding 3% TCH drop (benchmark <= 3%):** Except for Aircel & BSNL, all the operators are satisfying the benchmark with value in between 0% and 2.94%.
- **Connections with good voice quality (benchmark >= 95%):** Tata CDMA has declared that the parameter is not system generated. Other operators are meeting the benchmark with values lying between 96.08% and 100%.
- **POI Congestion (benchmark <= 0.5%):** Uninor shows that seven no of POI's is 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 & MTS, rests of the operators are meeting the benchmark with values lying between 98.81% and 100%.
- **%age of call answered by operator (Voice to voice) (benchmark >90%):** All operators, except for Aircel & MTS, rests of the operators are meeting the benchmark value lying between 92.60% and 100%.

(2) One Month Audit Data Report & Summarized Findings

S/N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Videocon	Vodafone	Uninor	MTS	Rcom CDMA	Tata CDMA
			GSM Operators									CDMA Operators		
(A)	**Network Service Quality Parameter**													
1	**Network Availability**													
	a) BTS Accumulated Downtime	*<=2%*	0.04%	0.04%	1.49%	0.44%	0.59%	0.02%	0.70 %	0.15%	0.16%	0.12%	0.41%	0.31%
	b) Worst affected BTSs due to downtime	*<=2%*	0.00%	0.04%	1.60%	1.90%	1.70%	0.00%	0%	0.50%	0.76%	0.00%	1.61%	0.09%
	c) Total no. of BTSs in the licensed service area		2193	8980	6681	8790	3639	4026	21	8150	2910	694	2238	2335
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		558.5	2689.49	69105	26675.37	14865	445.99	101.94	8310.55	3228.37	590.18	6333	497.37
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	4	107	167	62	0	0	44	22	0	36	2
2	**Connection Establishment (Accessibility)**													
	a) CSSR (Call Setup Success Rate)	*>=95 %*	99.78%	99.24%	97.13%	98.19%	99.52%	99.09%	99.19 %	97.97%	96.24%	99.00%	98.56 %	98.05%
	b) SDCCH/PAGING congestion	*<=1%*	0.01%	0.03%	1.08%	0.90%	0.04%	0.21%	0.29 %	0.69%	0.76%	0.00%	0.00%	0.00%
	c) TCH congestion	*<=2%*	0.01%	0.04%	1.81%	1.15%	0.05%	0.32%	0%	0.91%	0.68%	0.12%	0.78%	0.10%
3	**Connection maintenance (retainability)**													
	a) CDR	*<=2%*	0.55%	0.54%	1.95%	1.27%	0.47%	0.86%	0.24 %	0.92%	1.61%	0.44%	0.65%	0.97%
	b) Worst affected cells>3%	*<=3%*	5.49%	0.87%	4.92%	2.91%	0.00%	2.76%	0.11	2.67%	2.81%	2.56%	0.82%	2.46%

	TCH drop								%					
	c) Good voice quality	*>=95 %*	98.29%	99.22%	98.19%	96.78%	98.90%	96.76%	99.94 %	96.96%	96.13%	100.00 %	98.29 %	NA
	d) Total No. of cells exceeding 3% TCH drop (call drop)		361	231	1009	754	0	331	1	646	244	54	55	179
	e) Total no. of cells in the network		6575	26510	20517	25900	10917	11989	63	24410	8685	2096	6714	2335
4	**No. of POI's having congestion >0.5%**	*<=0.5 %*	0	0	0	0	0	0	0	0	0	0	0	0
	a) Name of POI not meeting the benchmark		Nil	Nil	NIL	Nil	NIL	NIL	Nil	Nil	NIL	Nil	Nil	Nil
	b) Total No. of call attempts on POI (Avg.)		272462.6207	5323038.31	2957450.83	9287810.70	1186112	1111984	77	4685476.28	2400516	405997.24	563285	1800329
	c) Total traffic served on POI (Erlang) (Avg.)		6151.08	118493.71	49197.31	113140.03	30269.11	36276.01	34.4	72479.36	66843.68	7589.06	16885.7	44497.12
	d) Total No. of circuits on POI		14564.66667	186128.76	412779.03	280529	71736	74401	418	139399	83545	24766.69	38726	107586
	e) Total number of working POI Service Area wise		72	400.4137931	311	322	154	229	13	141	129	66	98	443
	f) Capacity of POI		13791.0267	174390.75	15745	269580.51	64817.69	67133.02	227.98	136405.55	74651.21	24724.24	34424	96594.77
5	**Network Data**													
	a) Equipped Capacity of Network Erlang		35163	367060	258767	428810	144000	171152	15000	333942	101496	28560	290000	332822
	b) Total traffic in TCBH in erlang (Avg.)		13066	253840	126057	377461	134732	93131	0	300724	97073	10438	96373	132065
	c) Total no. of customers served (as per VLR) on last day of the month		64775	8487743	4007599	14597600	4616620	3009779	274	11656399	2881330	360315	2269995	2337377
(B)	**Customer Service Quality Parameters**													
5	**Metering/billing credibility-Post paid**	*<= 0.1%*	0.03%	0.02%	0.15%	0.10%	0.10%	0.00%	NA	0.07%	NA	0.05%	0.10%	0.00%
	a) No. of bills issued during the period		13563	322988	479074	860802	44589	49177	NA	525997	NA	3658	315985	212209
	b) No. of bills disputed including billing complaints during the period		4	60	731	821	44	1	NA	377	NA	2	313	8

6	**Metering /billing credibility-Pre paid**	*<= 0.1%*	0.03%	0.01%	0.10%	0.10%	0.10%	0.00%	0.00 %	0.02%	0.09%	0.01%	0.09%	0.00%
	a) No. of charging / credit / validity complaints during the quarter		401	680	5477	14225	7231	3	0	2889	4067	85	2743	9
	b) Total no. of pre-paid customers at the end of the quarter		1207540	11032414	5444314	14050741	7304963	5116967	13681	12138839	4507648	679273	3184164	3817229
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		405	740	6208	15046	7275	4	0	3266	4067	87	3056	17
	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		405	740	6208	15046	7275	4	0	3266	4067	87	3056	17
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		45	740	1610	15046	3555	4	0	3266	4067	31	1608	17
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		360	0	4598	11409	3720	4506	0	0	2343	56	1448	536
	e) 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 %*	92%	100%	100%	99%	99%	99%	100 %	99%	95%	28%	99%	99%

	b) % call answered by operators(voice to voice) within 60 sec.	*>=90 %*	84.49%	98.48%	97.50%	95.69%	92.55 %	94.75 %	100 %	97.52%	95.49 %	45.52 %	94.33 %	95.59 %
	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		500098	24187068	207047	2483999	12169122	569281	138	23503	653460	223853	3830100	115859
	d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		458848	24187068	207047	2454768	12021686	565461	138	23503	624009	63038	3806412	114789
9	**Termination/closure of service**	*<=7days*	99%	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		187	891	5568	5427	127	861	NA	2172	NA	4	1216	2340
	b) No.of requests for Termination / Closure of service complied within 7 days during the quarter		186	891	5568	5427	127	861	NA	2172	NA	4	1216	2340
10	**Time taken for refunds of deposits after closures.**	*100% within 60 days*	100%	100%	100%	100%	100%	100%	NA	100%	NA	100%	100%	99%

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 <=2%):** All operators are meeting the benchmark with values lying between 0.02% and 1.49%.
- **Worst affected BTSs due to downtime (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 1.90%.
- **Call setup success rate (benchmark >= 95%):** All operators are meeting the benchmark with values lying between 96.24% and 99.78%.
- **SDCCH/PAGING Channel congestion (benchmark <= 1%):** All operators are meeting the benchmark with values lying between 0% and 1.08%.
  Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.
- **TCH congestion (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 1.81%.
- **Call drop rate (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0.24% and 1.95%.
- **Cell exceeding 3% TCH drop (benchmark <= 5%):** Except for Aircel & BSNL, all the operators are satisfying the benchmark with value in between 0% and 2.91%.
- **Connections with good voice quality (benchmark >= 95%):** Tata CDMA has declared that the parameter is not system generated. Other operators are meeting the benchmark with values lying between 96.13% and 100%.
- **POI Congestion (benchmark <= 0.5%):** None of the operators ia having POIs greater than 0.5% congestion. 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, are meeting the benchmark with values lying between 95.49% and 100%.
- **%age of call answered by operator (Voice to voice) (benchmark >90%):** Only Aircel & MTS are not meeting the benchmark value.
- **Metering and billing credibility-Post paid (benchmark <= 0.1%):** Except for BSNL, all other operators are meeting the benchmark.
- **Metering and billing credibility-Pre paid (benchmark <= 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, except Aircel, have satisfied the benchmark. Aircel took more than 7 days to close 1 connections out of 187 requests received.
- **Time taken for refunds of deposits after closures (benchmark 100% within <=60 days):** Only Tata CDMA is showing a little deviation. It did not made refunds in 18 cases out of 1526 applicable cases within 60 days. 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:

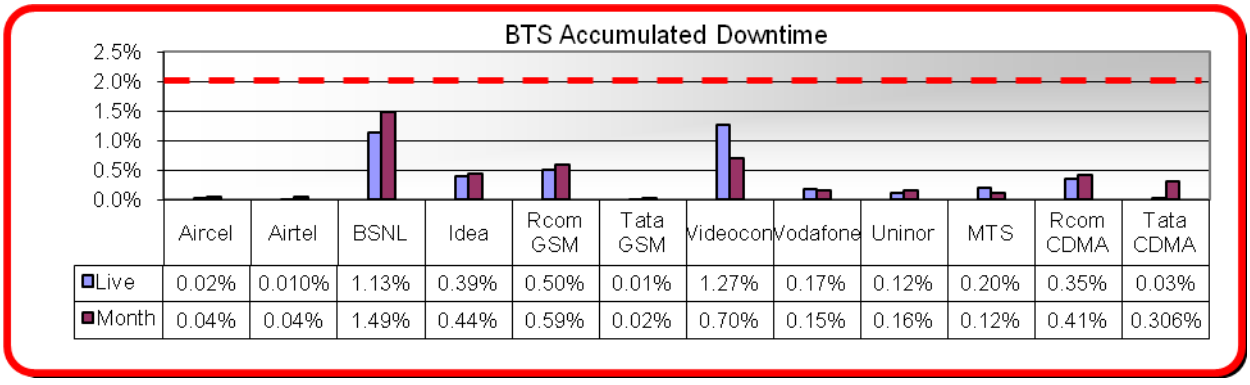
Sl.	Name of Service Provider	No. of MSC/ GMSC	No. of BSC	No. of BTS
GSM Operators				
1	Aircel Ltd	3	15	2193
2	Airtel Ltd	21	143	8980
3	BSNL	14	145	6681
4	Idea	39	80	8790
5	Reliance Communications	5	24	3639
6	Tata Communications	4	31	4026
7	Uninor	4	21	2910
8	Videocon	1	1	21
9	Vodafone	18	108	8150
CDMA Operators				
10	MTS	1	3	694
11	Reliance Communications	11	10	2238
12	Tata Communications	11	21	2335

(4) Performance (Graphical Representation)

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

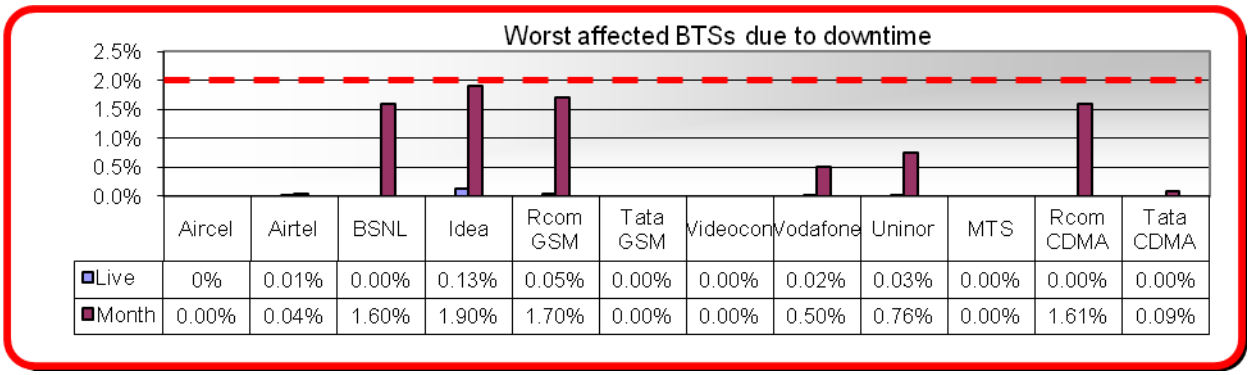
A) NETWORK PERFORMANCE

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



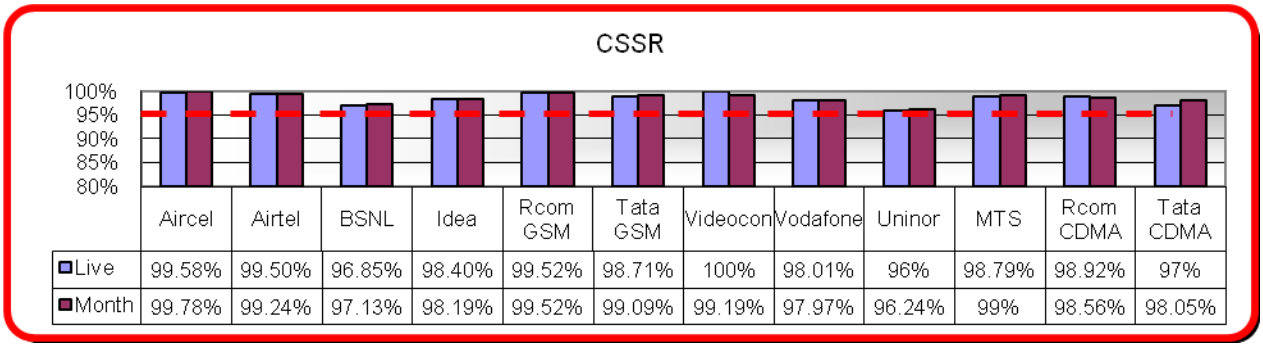
	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Videocon	Vodafone	Uninor	MTS	Rcom CDMA	Tata CDMA
Live	0.02%	0.010%	1.13%	0.39%	0.50%	0.01%	1.27%	0.17%	0.12%	0.20%	0.35%	0.03%
Month	0.04%	0.04%	1.49%	0.44%	0.59%	0.02%	0.70%	0.15%	0.16%	0.12%	0.41%	0.306%

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



	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Videocon	Vodafone	Uninor	MTS	Rcom CDMA	Tata CDMA
Live	0%	0.01%	0.00%	0.13%	0.05%	0.00%	0.00%	0.02%	0.03%	0.00%	0.00%	0.00%
Month	0.00%	0.04%	1.60%	1.90%	1.70%	0.00%	0.00%	0.50%	0.76%	0.00%	1.61%	0.09%

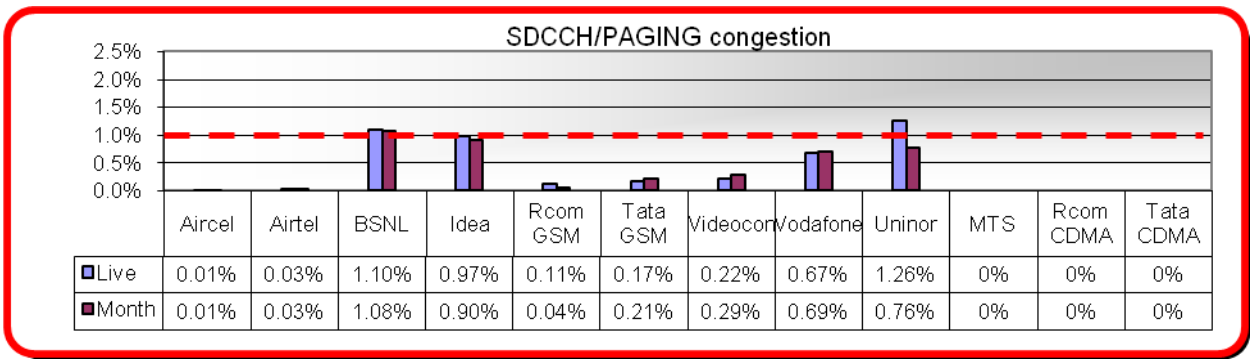
Call setup success rate: All operators are meeting the TRAI benchmarks (>= 95 %) for both one month data and 3 days live data taken in the month of audit.



	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Videocon	Vodafone	Uninor	MTS	Rcom CDMA	Tata CDMA
Live	99.58%	99.50%	96.85%	98.40%	99.52%	98.71%	100%	98.01%	96%	98.79%	98.92%	97%
Month	99.78%	99.24%	97.13%	98.19%	99.52%	99.09%	99.19%	97.97%	96.24%	99%	98.56%	98.05%

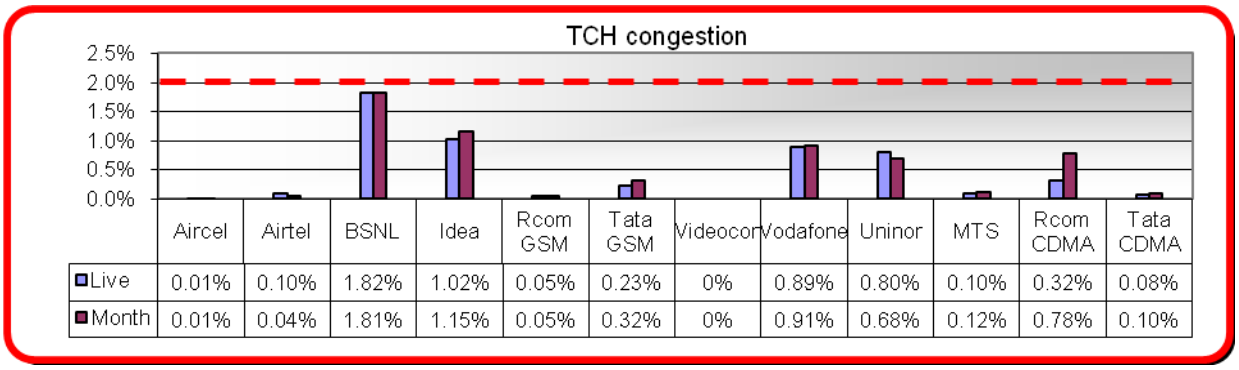
Blocked call rate:

SDCCH congestion: All operators are meeting the TRAI benchmarks (<= 1 %) for both one month data and 3 days live data taken in the month of audit.



	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Videocon	Vodafone	Uninor	MTS	Rcom CDMA	Tata CDMA
Live	0.01%	0.03%	1.10%	0.97%	0.11%	0.17%	0.22%	0.67%	1.26%	0%	0%	0%
Month	0.01%	0.03%	1.08%	0.90%	0.04%	0.21%	0.29%	0.69%	0.76%	0%	0%	0%

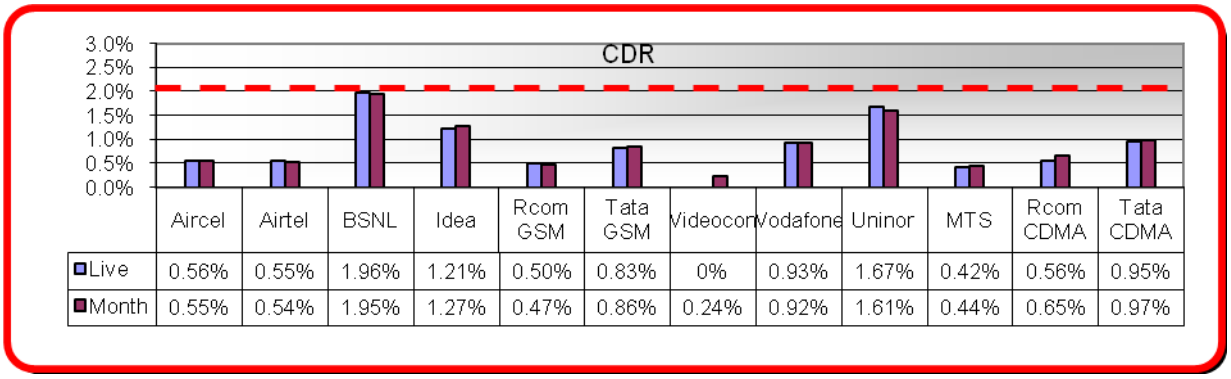
TCH congestion: All operators are meeting the TRAI benchmarks (<= 2%) for both one month data and 3 days live data taken in the month of audit.



	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Videocon	Vodafone	Uninor	MTS	Rcom CDMA	Tata CDMA
Live	0.01%	0.10%	1.82%	1.02%	0.05%	0.23%	0%	0.89%	0.80%	0.10%	0.32%	0.08%
Month	0.01%	0.04%	1.81%	1.15%	0.05%	0.32%	0%	0.91%	0.68%	0.12%	0.78%	0.10%

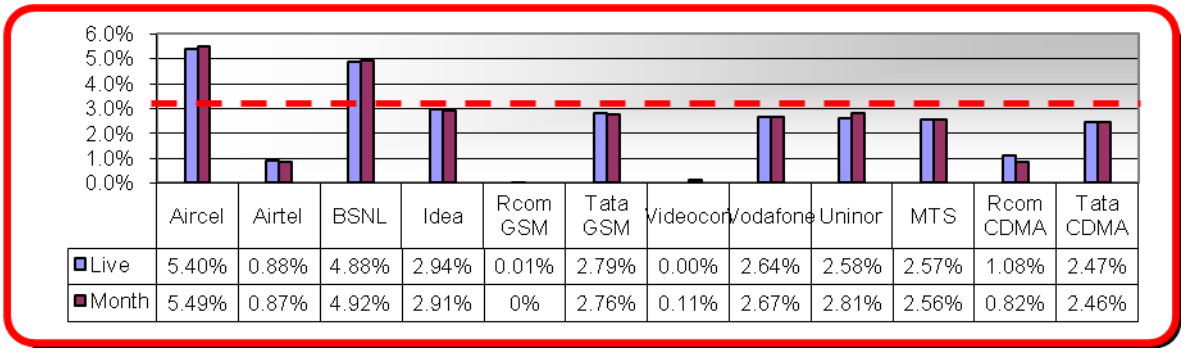
Connection Maintainability (Retainability):

Call drop rate: All operators are meeting the TRAI benchmarks (<=2%) for both one month data and 3 days live data taken in the month of audit.



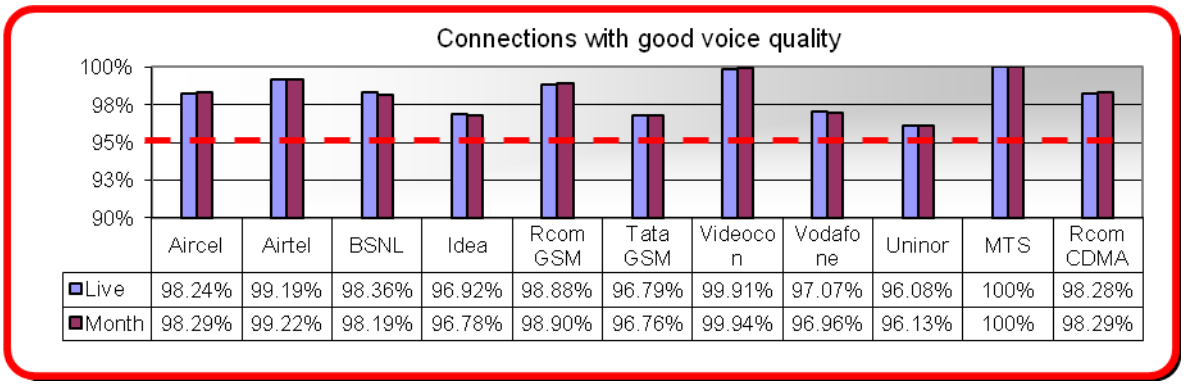
	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Videocon	Vodafone	Uninor	MTS	Rcom CDMA	Tata CDMA
Live	0.56%	0.55%	1.96%	1.21%	0.50%	0.83%	0%	0.93%	1.67%	0.42%	0.56%	0.95%
Month	0.55%	0.54%	1.95%	1.27%	0.47%	0.86%	0.24%	0.92%	1.61%	0.44%	0.65%	0.97%

Worst affected Cell exceeding 3% TCH Drop: For both live and month data, Aircel & BSNL are found not meeting the benchmark of <=3%. Rests of the operators are meeting the benchmark for both cases.



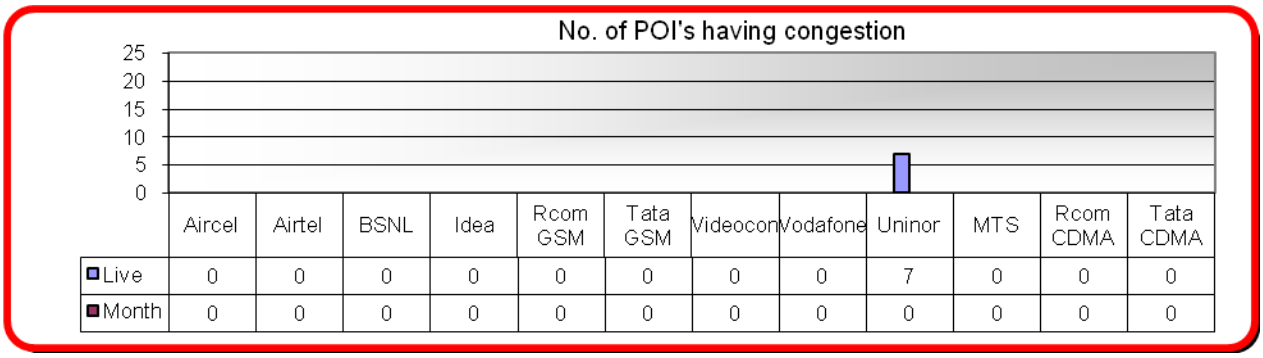
	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Videocon	Vodafone	Uninor	MTS	Rcom CDMA	Tata CDMA
Live	5.40%	0.88%	4.88%	2.94%	0.01%	2.79%	0.00%	2.64%	2.58%	2.57%	1.08%	2.47%
Month	5.49%	0.87%	4.92%	2.91%	0%	2.76%	0.11%	2.67%	2.81%	2.56%	0.82%	2.46%

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



	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Videocon	Vodafone	Uninor	MTS	Rcom CDMA
Live	98.24%	99.19%	98.36%	96.92%	98.88%	96.79%	99.91%	97.07%	96.08%	100%	98.28%
Month	98.29%	99.22%	98.19%	96.78%	98.90%	96.76%	99.94%	96.96%	96.13%	100%	98.29%

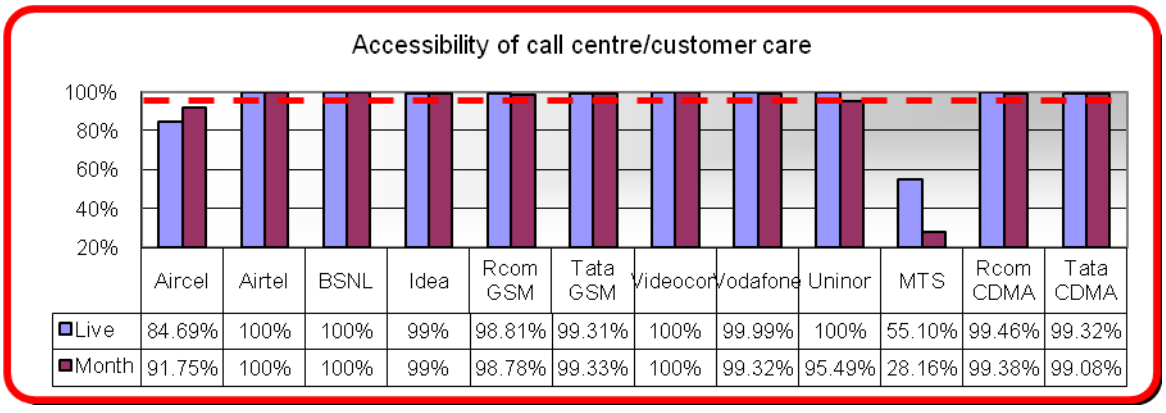
POI Congestion: Uninor is found to have 7 nos of POIs with >=0.5% congestion.



	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Videocon	Vodafone	Uninor	MTS	Rcom CDMA	Tata CDMA
Live	0	0	0	0	0	0	0	0	7	0	0	0
Month	0	0	0	0	0	0	0	0	0	0	0	0

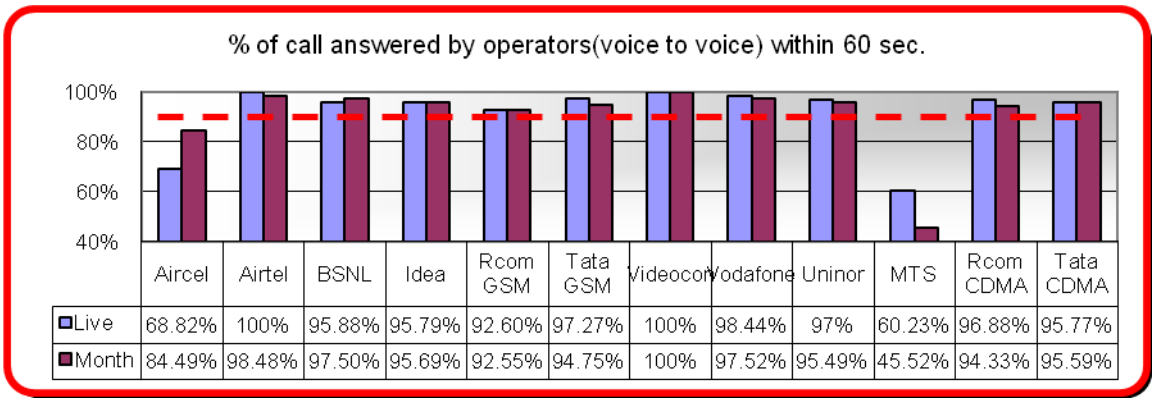
B) CUSTOMER SERVICE QUALITY PARAMETERS

Percentage of call answered (Electronically): All operators, except Aircel & MTS, are meeting the TRAI benchmarks (>= 95%) for both one month data and 3 days live data taken in the month of audit.



	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Videocon	Vodafone	Uninor	MTS	Rcom CDMA	Tata CDMA
Live	84.69%	100%	100%	99%	98.81%	99.31%	100%	99.99%	100%	55.10%	99.46%	99.32%
Month	91.75%	100%	100%	99%	98.78%	99.33%	100%	99.32%	95.49%	28.16%	99.38%	99.08%

Percentage of call answered by operators (Voice to voice) within 60 sec: Aircel & MTS do not meet the 90% benchmark against this parameter.



	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Videocon	Vodafone	Uninor	MTS	Rcom CDMA	Tata CDMA
Live	68.82%	100%	95.88%	95.79%	92.60%	97.27%	100%	98.44%	97%	60.23%	96.88%	95.77%
Month	84.49%	98.48%	97.50%	95.69%	92.55%	94.75%	100%	97.52%	95.49%	45.52%	94.33%	95.59%

(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. Idea has also shown a very high value for "worst affected BTSs due to downtime". Aircel & BSNL have a high value against the "worst affected cells >3% TCH drop" parameter.

While Aircel & MTS have below the benchmark for "Response time to the customers" in both live & month data, Aircel is not meeting benchmark for the parameter "termination/closure" & Tata CDMA not meeting the benchmark for "Time taken for refunds of deposits after closures".

(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	100	100	100
Total No. of calls Answered	72	65	58	69	52	48	55	41	37	45	46
Cases resolved with 4 weeks	72	65	58	69	52	48	55	41	37	45	46
%age of cases resolved	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

(3) Live Calling to Call Centers

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	91	96	98	97	96	97	98	100	98	90	94	95
%age of calls got answered by agent in 60 sec.	91%	96%	98%	97%	96%	97%	98%	100%	98%	90%	94%	95%

(4) Level-1 Live Calling

Emergency no.	Calls Attempted	City: Satara										
		Aircel	Airtel	BSNL	Idea	RCOM GSM	Tata GSM	Vodafone	Uninor	MTS	RCOM CDMA	Tata CDMA
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
139	2	2	2	2	2	2	2	2	2	2	2	2

Emergency no.	Calls Attempted	City: Jalgaon										
		Aircel	Airtel	BSNL	Idea	RCOM GSM	Tata GSM	Vodafone	Uninor	MTS	RCOM CDMA	Tata CDMA
100	2	ICR with TATA	2	2	2	2	2	2	2	2	2	2
101	2		2	2	2	2	2	2	2	2	2	2
102	2		2	2	2	2	2	2	2	2	2	2
139	2		2	2	2	2	2	2	2	2	2	2

Emergency no.	Calls Attempted	City: Nanded										
		Aircel	Airtel	BSNL	Idea	RCOM GSM	Tata GSM	Vodafone	Uninor	MTS	RCOM CDMA	Tata CDMA
100	2	ICR with Tata	2	2	2	2	2	2	2	2	2	2
101	2		2	2	2	2	2	2	2	2	2	2
102	2		2	2	2	2	2	2	2	2	2	2
139	2		2	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 all the operators during live calling to their respective call centers.

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%	99%	100%	100%	100%	100%
Airtel	98%	-	100%	99%	95%	94%	100%	98%	100%	100%	100%
BSNL	99%	98%	-	100%	100%	100%	97%	99%	100%	99%	100%
Idea	100%	100%	100%	-	100%	100%	100%	100%	98%	100%	99%
Rcom GSM	100%	100%	98%	100%	-	100%	100%	100%	100%	100%	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%	99%	100%	100%	98%	100%	96%	-	100%	98%	100%
MTS	100%	100%	100%	100%	100%	100%	100%	100%	-	100%	99%
Rcom CDMA	100%	100%	100%	100%	100%	99%	100%	100%	100%	-	98%
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 Idea-Airtel, Uninor-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

SATARA including Karad

HIGH DENSE:	Pawoi Naka, ST stand,Rajwada,Ishawa Naka, Karad Market area
MEDIUM DENSE:	MIDC area, Shahupuri, Shivraj petrol Pump, Karad bus stand,
LOW DENSE:	Satara to Karad Highway, Outskirt of Karad city

Jalgaon

HIGH DENSE:	Mahabal, Sarafa Bazaar,Railway station, Bus stand
MEDIUM DENSE:	Girna Pumping, Court area, University, Phule Market
LOW DENSE:	MIDC, Ring road & Highway area

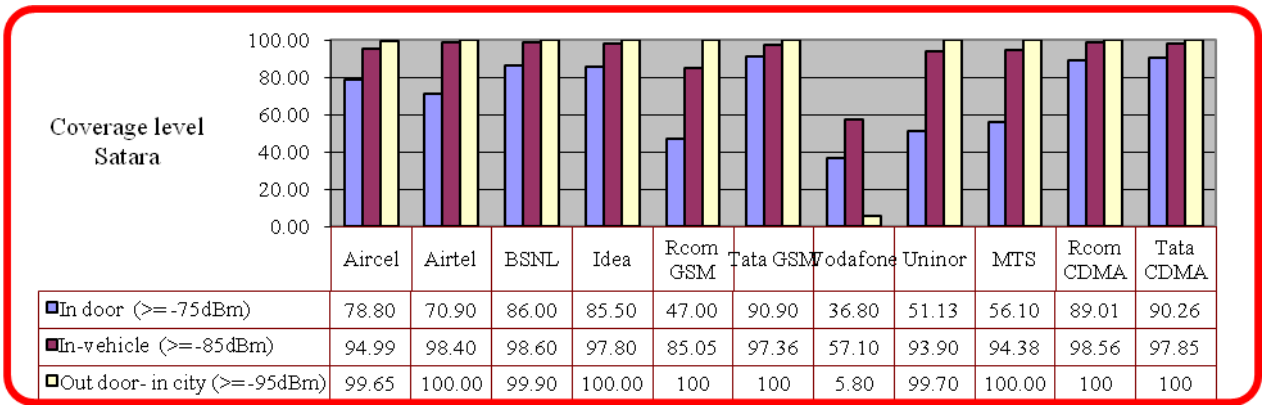
NANDED

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

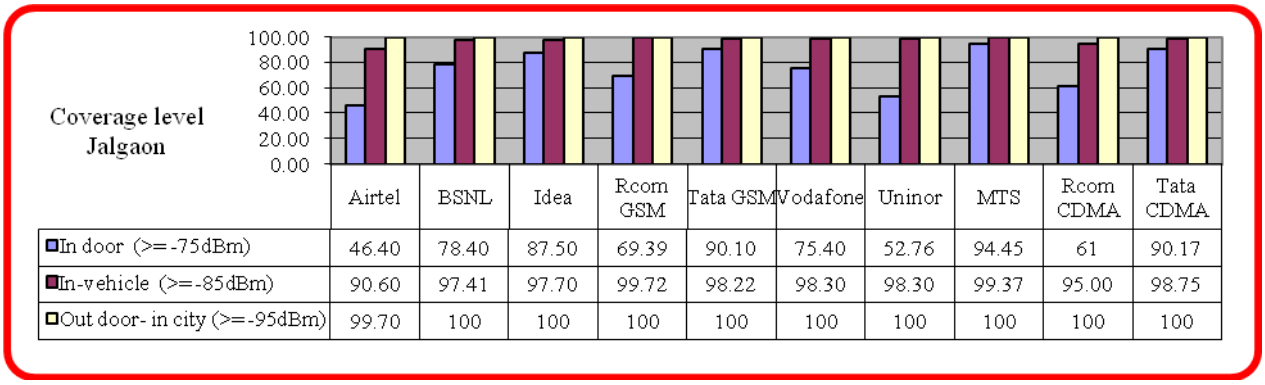
2) Performance (for the respective cities)

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**	SATARA	112	131	123	147	142	120	140	107	100	143	113
		JALGAON	ICR	133	155	155	167	164	164	131	141	154	134
		NANDED	ICR	96	108	134	116	104	107	135	81	197	95
1.2	**Blocked Call Rate (<=3%)**	SATARA	0	0.77	0.82	0.68	0	0	0.72	4.67	0	1.40	0
		JALGAON	ICR	0.00	6.46	0.65	3.00	0	0.61	3.05	0	0.00	0
		NANDED	ICR	1.05	1.85	1.49	13.80	0	0.00	8.13	0	6.10	0
1.3	**Dropped Call Rate (<=2%)**	SATARA	0.89	0.77	1.63	2.05	0.70	1.66	0.00	0.99	0.00	1.40	0.88
		JALGAON	ICR	0.00	1.94	0.65	0.60	0.61	0.00	1.55	0.00	0.01	0.75
		NANDED	ICR	0.00	0.93	0.76	0.87	0.01	0.00	0.74	0.00	0.01	1.05
1.4	**Percentage of connections with good voice quality (=>95%)**												
	(i) 0-4 (w/o frequency hopping)	SATARA									98.6	99.00	95.06
		JALGAON									98.7	98.00	95.17
		NANDED									98.49	97.00	97.00
	(ii) 0-5 (with frequency hopping)	SATARA	97.30	96.60	95.60	94.10	96.91	95.19	95.40	94.40			
		JALGAON	ICR	96.00	86.81	95.30	92.48	95.18	96.00	94.80			
		NANDED	ICR	93.30	94.00	94.10	91.00	95.95	95.20	94.80			
1,5	**Service Coverage (%)**												
	In door (>= -75dBm)	SATARA	78.80	70.90	86.00	85.50	47.00	90.90	36.80	51.13	56.10	89.01	90.26
		JALGAON	ICR	46.40	78.40	87.50	69.39	90.10	75.40	52.76	94.45	61.00	90.17
		NANDED	ICR	62.5	74.7	66.66	32	92.08	94.9	67.51	84.49	50	90.84
	In-vehicle (>= -85dBm)	SATARA	94.99	98.40	98.60	97.80	85.05	97.36	93.90	93.90	94.38	98.56	97.85
		JALGAON	ICR	90.60	97.41	97.70	99.72	98.22	98.30	98.30	99.37	95.00	98.75
		NANDED	ICR	93.30	88.30	95.26	66.00	99.03	99.90	99.90	97.78	77.00	98.51
	Out door- in city (>= -95dBm)	SATARA	99.65	100.00	99.90	100.00	100	100	99.70	99.70	100.00	100	100
		JALGAON	ICR	99.70	100	100	100	100	100	100.00	100.00	100	100
		NANDED	ICR	99.40	100	100	89	100	100	100.00	100.00	100	100
1.6	**Call Setup Success Rate (>=95%)**	SATARA	100	99.23	99.19	99.3	100	100	99.3	95.32	95	98.61	100
		JALGAON	ICR	100	93.54	99.35	97.1	100	99.3	98.47	100	100	100
		NANDED	ICR	98.95	98.89	98.51	86.2	100	100	91.11	100	93.9	100

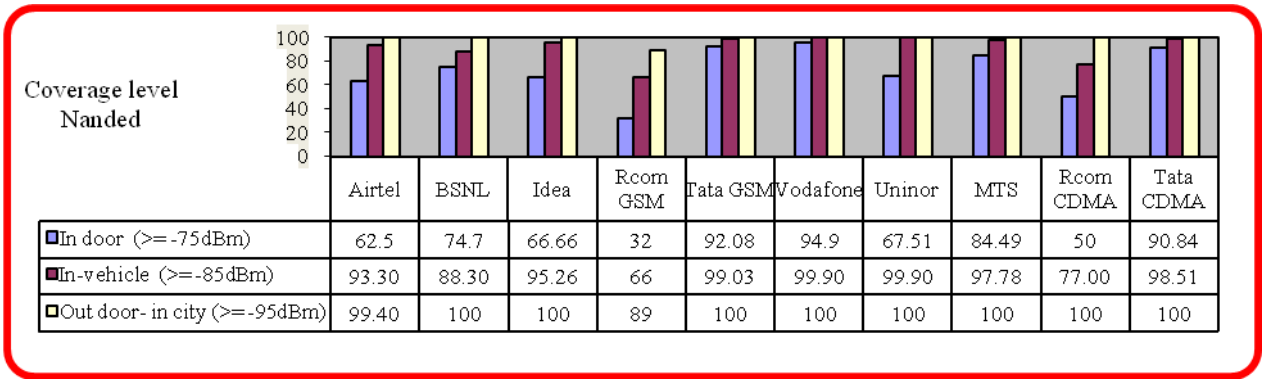
Graphical Representation



	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Vodafone	Uninor	MTS	Rcom CDMA	Tata CDMA
In door (>=-75dBm)	78.80	70.90	86.00	85.50	47.00	90.90	36.80	51.13	56.10	89.01	90.26
In-vehicle (>=-85dBm)	94.99	98.40	98.60	97.80	85.05	97.36	57.10	93.90	94.38	98.56	97.85
Out door- in city (>=-95dBm)	99.65	100.00	99.90	100.00	100	100	5.80	99.70	100.00	100	100



	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Vodafone	Uninor	MTS	Rcom CDMA	Tata CDMA
In door (>=-75dBm)	46.40	78.40	87.50	69.39	90.10	75.40	52.76	94.45	61	90.17
In-vehicle (>=-85dBm)	90.60	97.41	97.70	99.72	98.22	98.30	98.30	99.37	95.00	98.75
Out door- in city (>=-95dBm)	99.70	100	100	100	100	100	100	100	100	100



	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Vodafone	Uninor	MTS	Rcom CDMA	Tata CDMA
In door (>=-75dBm)	62.5	74.7	66.66	32	92.08	94.9	67.51	84.49	50	90.84
In-vehicle (>=-85dBm)	93.30	88.30	95.26	66	99.03	99.90	99.90	97.78	77.00	98.51
Out door- in city (>=-95dBm)	99.40	100	100	89	100	100	100	100	100	100

(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 Jalgaon, RCOM (GSM & CDMA) in Nanded & Uninor in all 3 cities respectively.
• Drop call rate parameter is not met by Idea in Satara.
•" Percentage of conncetions with good voice quality" parameter is not met by Airtel in Nanded, BSNL in Jalgaon & Nanded, Idea in Satara & Nanded, RCOM GSM in Jalgaon & Nanded & Uninor in all 3 cities.
•" CSSR" parameter is not met by BSNL in Jalgaon, RCOM (GSM & CDMA) & Uninor in Nanded.

(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

Bhandara

Vaishali Nagar, Anand Nagar,Bhojapur, Ganeshpur, Kesalwada,Manapure,
Santaji Nagar, Rajiv Ghandhi University, Manvata Primary school, Ridhhi Sidhhi Mandir

Latur

Gunj Golai,Ambejogai Rd, Deshpande Colony Area, MIDC Area, ShriNagar, Market Yard, Beed Hw, Babhalgaon Area, labour Colony,Shahu nagar

Sangli

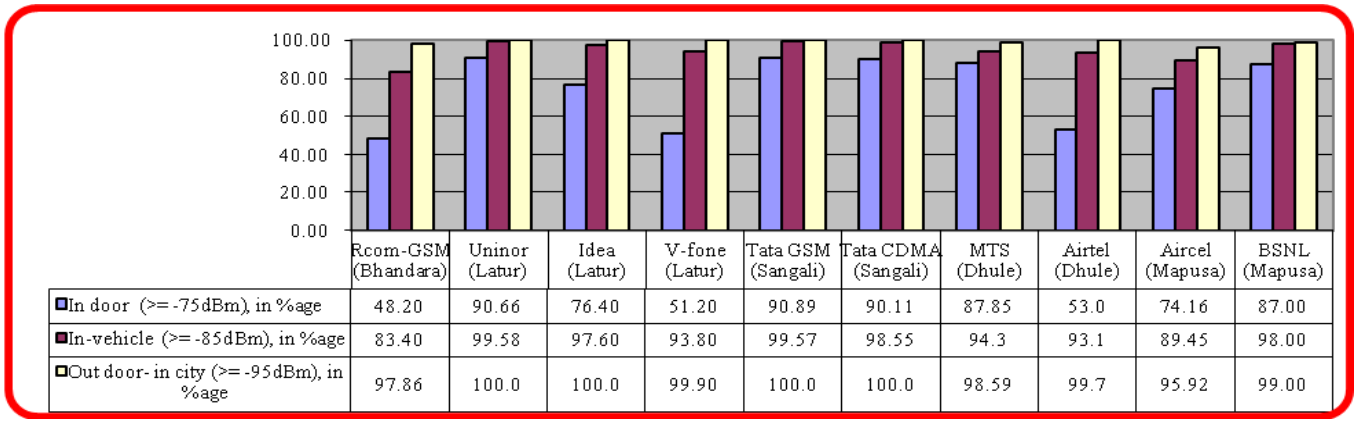
Bus stand, Sangli Gymkhana, Ram mandir, Marathi school, Chandani chowk, Sadanand Hotel, Sangli district central cooperative bank, MG Hostel

Dhule:
Royal Palace, Jhulelal bank, Panch candle chowk, cloth market, Tower garden, Lakshmi Bai chowk, Shriram complex, Sales tax office, Bhawasar colony

Mapusa:
MAPUSA City, Mapusa Beaches, Mapusa to Panjim Highway

2) Performance (for the respective cities)

SN	Parameter	Reliance	Uninor	Idea	Vodafone	Tata GSM	Tata CDMA	MTS	Airtel	Aircel	BSNL
		Bhandara	Latur		Sangli			Dhule		Mapusa	
1.1	Call Attempts	105	134	147	149	113	121	119	118	116	123
1.2	Blocked Call Rate (<=3%)	1.91	2.24	0.68	0.68	0	0	0	0	0	0.81
1.3	Dropped Call Rate (<=2%)	0.96	0	0	0	0.88	0	0	0	1.72	1.63
1.4	Percentage of connections with good voice quality (=>95%)										
	(i) 0-4 (w/o frequency hopping)	93.11					95.09	98.59			
	(ii) 0-5 (with frequency hopping)		94.4	95	96.8	95.02			96.9	96.08	95
1.5	Service Coverage										
	In door (>= -75dBm), in %age	48.2	90.66	76.4	51.2	90.89	90.11	87.85	53	74.159	87
	In-vehicle (>= -85dBm), in %age	83.4	99.58	97.6	93.8	99.57	98.55	94.3	93.1	89.448	98
	Out door- in city (>= -95dBm), in %age	97.86	100	100	99.9	100.06	100	98.59	99.7	95.921	99
1.6	Call Setup Success Rate (>=95%)	98.1	97.76	99.31	99.3	100	100	100	100	100	99.19



(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) "Percentage of connections with good voice quality" parameter is not met by Reliance in Bhandara & Uninor in Latur.

ii) Variations were noticed in case of coverage level. For example, Reliance got 48.2% samples in Bhandara which may be used in-door. This considerably increased for In-vehicle & outdoor connections. Similar cases were found for Vodafone in Sangli and Airtel in Dhule.

(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**.

Idea & RCOM GSM are having low performance as compare to other operators for the parameter 'worst affected BTSs due to downtime'.

Aircel & BSNL have very high %age of cells having >3% TCH drop. For the parameter "POI Congestion", Uninor show a few POIs with congestion >=0.5%.

Under **Response Time to Customer for Assistance** parameters, Aircel & MTS have below benchmark performance.

Regarding **Metering/Billing Credibility** issues, BSNL has shown a value slightly deviating from the prescribed benchmark for postpiad. Minor deviations were found for Tata CDMA in refund cases. Aircel terminated 186 connections against 187 requests received and hence its value against the benchmark dropped considerably to just 99.46%.

During **Drive Tests**, the performance of BSNL in Jalgaon, RCOM (GSM & CDMA) in Nanded & Uninor in all 3 cities found to be below benchmark for blocked call rate. Drop call rate parameter is not met by Idea in Satara. "Percentage of connections with good voice quality" parameter is not met by Airtel in Nanded, BSNL in Jalgaon & Nanded, Idea in Satara & Nanded, RCOM GSM in Jalgaon & Nanded & Uninor in all 3 cities." CSSR" parameter is not met by BSNL in Jalgaon, RCOM (GSM & CDMA) & Uninor in Nanded.

II. Basic Telephone Service (Wireline) Providers

……..Audit not done for this quarter

III. Broadband Service Providers

……..Audit not done for this quarter