

**REPORT**  
**ON**  
**AUDIT & ASSESSMENT OF QUALITY OF SERVICE**  
**OF**  
**CELLULAR MOBILE TELEPHONE SERVICE**  
**FOR**  
**MUMBAI CIRCLE**  
*(WEST ZONE)*

***Report Period: APRIL 2012 - JUNE 2012***

**Telecommunications Consultants India Ltd.**  
TCIL Bhawan, Greater Kailash Part – I  
New Delhi – 110048  
Phone: +91-11-26202020 Fax: +91-1126242266  
Internet: <http://www.tcil-india.com>

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- II. Basic Telephone Service (Wireline) Providers  
- *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 (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.

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## 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.

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 Mumbai 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 Mumbai Circle in 2<sup>nd</sup> quarter (April 2012 - June 2012). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken during the period Oct 2011 – Dec 2011.

Following are the various operators covered in Mumbai 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
<b>GSM Operators</b>			
1	Aircel Ltd	May-2012	2000-2100 Hrs
2	Airtel Ltd	May-2012	1900-2000 Hrs
3	Idea	May-2012	2000-2100 Hrs
4	Loop	May-2012	2000-2100 Hrs
5	MTNL (GSM)	May-2012	2000-2100 Hrs
6	TTSL (GSM)	May-2012	1900-2000 Hrs
7	Reliance Communication (GSM)	May-2012	1900-2000 Hrs
8	Uninor	May-2012	2000-2100 Hrs
9.	Videocon	May-2012	2000-2100 Hrs
10	Vodafone	May-2012	1900-2000 Hrs
<b>CDMA Operators</b>			
11	MTS	May-2012	1900-2000 Hrs
12	MTNL(CDMA)	May-2012	1100-1200 Hrs
13	Reliance Communication (CDMA)	May-2012	1900-2000 Hrs
14	TTSL (CDMA)	May-2012	1900-2000 Hrs

Note: ETISALAT has closed its operation in Mumbai Circle.

## II. Findings from Quality of Service Audit (Operator wise for each parameter)

### (A) Cellular Mobile Telephone Services

#### 3 days Live Data Audit

3 days Live Data Audit		B-mark	Aircel	Airtel	Idea	Loop	MTNL GSM	Rcom GSM	TTSL GSM	Uninor	Videocon	V-fone	MTS	MTNL CDMA	Rcom CDMA	Tata CDMA	
S/N	Name of Parameter																
GSM Operators											CDMA Operators						
(A)-1	Network Service Quality Parameter																
	BTS Accumulated Downtime	<=2%	0.03%	0.003%	0.02%	0.012%	0.53%	0.32%	0.008%	0.01%	Videocon is on ICR with Loop in Mumbai	0.03%	0.01%	0.75%	0.42%	0.00%	
	Worst affected BTS due to downtime	<=2%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		0.06%	0.00%	0.00%	0.00%	0.00%	0.00%
1	Connection Establishment (Accessibility)																
	a) CSSR (Call Setup Success Rate)	>=95%	98.29%	99.99%	98.62%	99.99%	97.28%	99.75%	99.70%	99.23%		99.69%	99.29%	97.05%	98.76%	99.18%	
	b) SDCCH/PAGING congestion	<=1%	0.01%	0.00%	0.09%	0.02%	0.03%	0.01%	0.05%	0.04%		0.09%	0.00%	0.80%	0.02%	0.01%	
	c) TCH congestion	<=2%	0.02%	0.01%	0.32%	0.01%	0.01%	0.01%	0.04%	0.01%		0.31%	0.00%	0.02%	0.01%	0.00%	
2	Connection maintenance (retainability)																
	a) CDR	<=2%	0.68%	0.40%	1.61%	0.50%	0.37%	0.42%	0.36%	1.58%		0.70%	0.33%	1.37%	0.35%	0.58%	
	b) Worst affected cells>3% TCH drop	<=3%	2.59%	0.00%	2.80%	0.30%	1.81%	0.00%	2.64%	1.84%		2.24%	0.13%	2.75%	0.00%	1.59%	
	c) Good voice quality	>=95%	97.66%	99.64%	98.52%	98.27%	97.51%	99.25%	97.25%	98.13%		97.79%	100.0%	96.71%	99.76%	NA	
3	No of POI having > 0.5% congestion	>=0.5%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4	Response time to customers for assistance																
	a) Accessibility of call centre/Customer Care	>=95%	99.09%	100.0%	100.0%	98.70%	94.80%	99.58%	99.56%	99.98%	100.0%	99.99%	95.94%	95.99%	99.49%	99.66%	
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	98.74%	98.32%	99.00%	97.87%	94.10%	92.89%	97.07%	98.87%	96.88%	95.54%	95.93%	94.94%	94.80%	93.94%	

NA: Not Applicable, NP: Not Provided

From the above 3 days live data assessment table, it is found that all operators are meeting network parameters. In case of "Good voice quality" Tata (CDMA) reported that the data is not system generated. Rests of the operators are satisfying the benchmark successfully.

In case of performance related to Customer Care data it is seen that for the parameters "Accessibility of call centre/Customer Care" MTNL-GSM performance are showing values below benchmark.

**Month data assessment:**

<b>One Month Data Audit</b>		B-mark	Aircel	Airtel	Idea	Loop	MTNL GSM	Rcom GSM	TTSL GSM	Uninor	Videoco n	V-fone	MTS	MTNL CDMA	Rcom CDMA	Tata CDMA		
S/ N	Name of Parameter		GSM Operators								CDMA Operators							
(A)	<b>Network Service Quality Parameter</b>																	
1	<b>Network Availability</b>										Videoccon is on ICR with Loop in Mumbai							
	a) BTS Accumulated Downtime	<=2%	0.01%	0.004%	0.02%	0.05%	0.58%	0.22%	0.01%	0.02%			0.02%	0.06%	0.78%	0.25%	0.08%	
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	0.00%	0.00%	1.30%	0.38%	0.00%	0.00%			0.08%	0.00%	1.82%	0.22%	0.42%	
2	<b>Connection Establishment (Accessibility)</b>																	
	a) CSSR	>=95%	98.32%	99.99%	99.18%	99.98%	97.38%	99.72%	99.69%	99.20%			99.66%	99.30%	97.04%	98.94%	99.19%	
	b) SDCCCH/PAGING congestion	<=1%	0.01%	0.00%	0.08%	0.03%	0.02%	0.01%	0.04%	0.06%			0.07%	0.00%	0.72%	0.01%	0.03%	
	c) TCH congestion	<=2%	0.01%	0.01%	0.29%	0.01%	0.01%	0.02%	0.04%	0.01%			0.34%	0.00%	0.02%	0.01%	0.007%	
3	<b>Connection maintenance (retainability)</b>																	
	a) CDR	<=2%	0.67%	0.41%	1.63%	0.49%	0.36%	0.44%	0.34%	1.64%			0.71%	0.32%	1.40%	0.37%	0.51%	
	b)Worst affected cells>3% TCH drop	<=3%	2.46%	0.00%	2.78%	0.33%	1.82%	0.00%	2.95%	1.86%			2.42%	0.07%	2.54%	0.00%	1.97%	
	c) Good voice quality	>=95%	97.70%	99.73%	98.66%	98.30%	97.72%	99.22%	97.26%	98.17%		97.83%	100.0%	96.38%	99.77%	NA		
4	<b>No of POI having &gt; 0.5% congestion</b>	>=0.5%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
(B)	<b>Customer Service Quality Parameters</b>																	
5	<b>Metering/billing credibility- Post paid</b>	<= 0.1%	0.01%	0.01%	0.04%	0.05%	0.09%	0.06%	0.00%	NA	NA	0.097%	0.10%	0.02%	0.00%	0.00%		
6	<b>Metering /billing credibility- Pre paid</b>	<= 0.1%	0.04%	0.002%	0.080%	0.05%	0.005%	0.10%	0.00%	0.020%	0.00%	0.03%	0.006%	0.00%	0.07%	0.00%		
7	<b>Resolution of billing/ charging complaints (within 4 weeks)</b>	100%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%		
	a) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	98.00%	100.0%	100.0%	100.0%	100.0%		
8	<b>Response time to customers for assistance</b>																	
	a) Accessibility of call centre/Customer Care	>=95%	71.13%	100.0%	100.0%	99.15%	95.80%	99.59%	99.44%	99.95%	100.0%	99.99%	95.79%	92.11%	99.43%	99.58%		
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	49.47%	98.61%	95.71%	98.35%	95.46%	93.45%	94.07%	97.66%	96.07%	93.06%	95.95%	90.63%	94.25%	94.99%		
9	<b>Termination/closure of service (&lt;=7days)</b>	100%	100.0%	100.0%	100.0%	100.0%	NP	100.0%	100.0%	NA	NA	100.0%	100.0%	100.0%	100.0%	100.0%		
10	<b>Time taken for refunds of deposits after closures. (within 60 days)</b>	100%	100.0%	100.0%	100.0%	100.0%	NP	100.0%	100.0%	NA	NA	100.0%	100.0%	100.0%	100.0%	100.0%		

NA: Not Applicable, NP: Not Provided

From the above month data assessment table, it is found that all operators are meeting network parameters. In case of “*Good voice quality*” Tata (CDMA) reported that the data is not system generated. Rest of the operators are satisfying the benchmark successfully.

In case of performance related to Customer Care data it is seen that for the parameters “*Accessibility of call centre/Customer Care*” & “*% call answered by operators(voice to voice) within 60 sec*” Aircel & MTNL-CDMA performance are showing values below benchmark and for parameter “*Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints*” benchmark is not met by Vodafone.

## Operator-Assisted Drive Test

S/N	Parameter	City Name	Aircel	Airtel	MTNL GSM	Idea	Rcom GSM	Tata GSM	LOOP	Uninor	V-fone	MTNL CDMA	MTS	RCom CDMA	Tata CDMA	
1.1	Blocked Call Rate (<=3%)	Mumbai	0.48%	0.93%	1.10%	0.00%	0.43%	0.47%	0.53%	2.77%	0.96%	1.39%	0.00%	1.40%	0.00%	
1.2	Dropped Call Rate (<=2%)		0.48%	0.00%	4.42%	0.00%	0.43%	0.47%	0.53%	0.50%	0.00%	6.25%	0.00%	0.00%	0.36%	
1.3	% of connections with good voice quality (=>95%)															
	(i) 0-4 (w/o frequency hopping)											93.33%	99.26%	97.40%	95.90%	
	(ii) 0-5 ( with frequency hopping)		89.69%	96.15%	92.10%	91.37%	95.18%	95.91%	99.52%	91.93%	96.20%					
1.4	Call Setup Success Rate (>=95%)		99.52%	99.07%	98.90%	100.0%	99.57%	99.53%	99.47%	97.23%	99.0%	98.61%	100.0%	98.60%	100.0%	

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

- “Dropped Call rate” is not met by MTNL (GSM&CDMA).
- “Good voice quality” is not met by Aircel, MTNL (GSM&CDMA), Idea and Uninor.

NOTE1-- Videocon is having an ICR agreement with Loop and Etisalat has closed its operation in Mumbai Circle.

## Independent Drive Test

SN	Parameter	City Name	Aircel	Airtel	MTNL	Idea	Rcom GSM	V-fone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators						CDMA Operators		
1.1	Blocked Call Rate (<=3%)	Mumbai	1.12%	0.00%	0.00%	0.00%	2.50%	0.00%	0.00%	0.00%	0.00%
1.2	Dropped Call Rate (<=2%)		0.00%	0.00%	2.86%	0.00%	0.00%	1.02%	0.00%	0.00%	0.71%
1.3	% of connections with good voice quality (=>95%)										
	(i) 0-4 (w/o frequency hopping)								98.98%	99.35%	96.10%
	(ii) 0-5 ( with frequency hopping)		93.13%	96.50%	91.10%	94.59%	95.03%	96.02%			
1.4	Call Setup Success Rate (>=95%)	98.88%	100.0%	100.0%	100.0%	97.50%	100.0%	100.0%	100.0%	100.0%	

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

- “Dropped Call Rate” is not met by MTNL-GSM.
- “Good voice quality” is not met by Aircel, MTNL-GSM & Idea.

NOTE-- Videocon is having an ICR agreement with Loop and Etisalat has closed its operation in Mumbai Circle.



PMR		Bench- mark	Audit	Aircel	Airtel	Idea	LOOP	MTNL (GSM)	Rcom GSM	Tata GSM	Uninor	V-fone	MTS CDMA	MTNL (CDMA)	Rcom (CDMA)	Tata (CDMA)
S/N	Name of Parameter															
8	<b>Response time to customers for assistance</b>															
	Accessibility of call centre/Customer Care	>=95%	Reported	100%	99.80%	94.58%	98.72%	95.94%	99.24%	96.00%	97.56%	99.68%	97.00%	96.09%	99.27%	98.00%
			Verified	100%	99.80%	94.58%	98.72%	95.94%	99.24%	96.00%	97.56%	99.68%	97.00%	96.09%	99.27%	98.00%
	% call answered by operators(voice to voice) within 60 sec.	>=90%	Reported	91.97%	89.00%	94.18%	98.29%	98.89%	90.17%	91.00%	66.56%	92.21%	90.00%	84.04%	88.18%	87.00%
Verified			91.97%	89.00%	94.18%	98.29%	98.89%	90.17%	91.00%	66.56%	92.21%	90.00%	84.04%	88.18%	87.00%	
9	<b>Termination/closure of service</b>															
	No. of requests for Termination / Closure of service complied within 7 days during the quarter (<=7days )		Reported	98.00%	100%	100%	100%	100%	100%	100%	NA	100%	100%	100%	100%	100%
			Verified	98.00%	100%	100%	100%	100%	100%	100%		100%	100%	100%		
10	<b>Time taken for refunds of deposits after closures (within 60 days).</b>	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%	99.00%

No deviations was found in data provided by the services providers (as per there records).

## CHAPTER-4: Detailed Findings & Analysis

### I. Cellular Mobile Telephone Service:

#### (A) MSC Audit--

##### 1) Live measurement data assessment & summarized findings

S/N	Name of Parameter	Bench mark	Aircel	Airtel	Idea	Loop	MTNL GSM	Rcom GSM	TTSL GSM	Uninor	Videocon	Vodafone	MTS	MTNLCDMA	Rcom CDMA	Tata CDMA	
			GSM Operators										CDMA Operators				
<b>(A)-1</b>	<b>Network Service Quality Parameter</b>																
	BTS Accumulated Downtime	<=2%	0.03%	0.003%	0.02%	0.012%	0.53%	0.32%	0.008%	0.01%	Videocon is on ICR with Loop in Mumbai	0.03%	0.01%	0.75%	0.42%	0.00%	
	Worst affected BTS due to downtime	<=2%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		0.06%	0.00%	0.00%	0.00%	0.00%	0.00%
	Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		40	8	35	19	383	556	14	16		87	2	119	275	2	
	No. of BTSs having accumulated downtime of >24 hours in a month		0	0	0	0	0	0	0	0		2	0	0	0	0	
<b>2</b>	<b>Connection Establishment (Accessibility)</b>																
	a) CSSR	>=95%	98.29%	99.99%	98.62%	99.99%	97.28%	99.75%	99.70%	99.23%		99.69%	99.29%	97.05%	98.76%	99.18%	
	b) SDCCCH/PAGING congestion	<=1%	0.01%	0.00%	0.09%	0.02%	0.03%	0.01%	0.05%	0.04%		0.09%	0.00%	0.80%	0.02%	0.01%	
	c) TCH congestion	<=2%	0.02%	0.01%	0.32%	0.01%	0.01%	0.01%	0.04%	0.01%		0.31%	0.00%	0.02%	0.01%	0.00%	
<b>3</b>	<b>Connection maintenance</b>																
	a) CDR	<=2%	0.68%	0.40%	1.61%	0.50%	0.37%	0.42%	0.36%	1.58%		0.70%	0.33%	1.37%	0.35%	0.58%	
	b) Cells having > 3% TCH drop	<=3%	2.59%	0.00%	2.80%	0.30%	1.81%	0.00%	2.64%	1.84%	2.24%	0.13%	2.75%	0.00%	1.59%		
	c) Good voice quality	>=95%	97.66%	99.64%	98.52%	98.27%	97.51%	99.25%	97.25%	98.13%	97.79%	100.0%	96.71%	99.76%	NA		
	d) No. of cells > 3% TCH drop		455	0	641	55	147	1	393	247	594	6	109	0	136		
	e) Total no. of cells in the network		5853	8700	7618	6074	2704	7194	4968	4466	8834	1484	1320	2733	2850		
<b>4</b>	<b>No of POI having &gt; 0.5% congestion</b>	>=0.5%	0	0	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	Nil	Nil	
	b) Total No. of circuits on POI		86813	128770	125724	74396	99885	44300	67772	40793	7134	272114	12843	1225	53100	67772	
	c) Avg No. of call attempts on POI		519176	2568340	2361691	9416142	976258	640733	1028227	819894	122355	3302246	78189	9262	490228	1028227	
	d) Avg traffic served on POI (Erlang)		10868	61987	71873	343413	30831	21281	25927	19876	2287	115823	1663	927	19294	25927	
	e) Total number of working POI Service Area wise		252	488	290	60	102	12	180	53	39	240	44	13	12	180	
	f) Equipped Capacity of Network in respect of Traffic in erlang		72654	183574	91574	165259	825716	72000	85706	46933	165259	218448	42000	32000	168000	85706	
	g) Total traffic handled in TCBH in erlang		20036	92377	73384	76878	308310	63549	28182	26121	66849	173388	3716	623	18270.03	28182	
<b>(B)</b>	<b>Customer Service Quality Parameters</b>																
<b>5</b>	<b>Response time to customers for assistance</b>																
	a) Accessibility of call centre	>=95%	99.09%	100.0%	100.0%	98.70%	94.80%	99.58%	99.56%	99.98%	100.0%	99.99%	95.94%	95.99%	99.49%	99.66%	
	b) % of call answered by operators(voice to voice) within 60 sec	>=90%	98.74%	98.32%	99.00%	97.87%	94.10%	92.89%	97.07%	98.87%	96.88%	95.54%	95.93%	94.94%	94.80%	93.94%	
	c) No. of call attempts to call centre / customer care nos. during TCBH (Avg)		3420	125599	45471	102588	22890	59805	3828	55868	30035	146818	9956	573	20005	1469	
	d) No. of calls connected and answered successfully to call centre / customer care nos. during TCBH (Avg)		3377	123484	45017	100407	21539	55550	3716	55239	29098	140271	9551	544	18965	1380	

## Parameter-wise Findings (Live Data Assessment):

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

- **BTS Accumulated Downtime (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark.
- **Worst Affected BTS Due to Downtime (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark.
- **Call setup success rate (benchmark  $\geq 95\%$ ):** All operators are meeting the benchmark.
- **SDCCH/PAGING Channel congestion (benchmark  $\leq 1\%$ ):** All operators are meeting the benchmark.  
*Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.*
- **TCH congestion (benchmark  $\leq 2\%$ ):** All the operators are complying the benchmark.
- **Call drop rate (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark.
- **Cell exceeding 3% TCH drop (benchmark  $\leq 5\%$ ):** All operators the operators are satisfying the benchmark.
- **Connections with good voice quality (benchmark  $\geq 95\%$ ):** All the operators are meeting the benchmark.
- **No of POI  $>0.5\%$  Congestion (benchmark  $\geq 0.5\%$ ):** None of operators are having POI  $> 0.5\%$  congestion. Some cases were found where individual POIs are showing high utilization/usage , few are in the range of over 100% though causing no traffic failure due to overflow technique i.e. the 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 MTNL-GSM, all operators are meeting the benchmark.
- **%age of call answered by operator (Voice to voice) (benchmark  $>90\%$ ):** All operators are meeting the benchmark.

## 2) Month data assessment & summarized findings:

S/N	Name of Parameter	Bench mark	Aircel	Airtel	Idea	Loop	MTNL (GSM)	Rcom GSM	TTSL GSM	Uninor	Videocon	Vodafone	MTS	MTNL CDMA)	Rcom CDMA	Tata CDMA	
			GSM Operators										CDMA Operators				
(A)	<b>Network Service Quality Parameter</b>																
1	<b>Network Availability</b>										Videocon is an ICR with Loop in Mumbai						
	a) BTS Accumulated Downtime	<=2%	0.01%	0.004%	0.02%	0.05%	0.58%	0.22%	0.01%	0.02%		0.02%	0.06%	0.78%	0.25%	0.08%	
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	0.00%	0.00%	1.30%	0.38%	0.00%	0.00%		0.08%	0.00%	1.82%	0.22%	0.42%	
	c) Total no. of BTSs in the licensed service area		2076	3462	2666	2164	1003	2383	2467	1501		3581	494	220	911	948	
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		190	99	350	742	4321	3909	195	245		459	217	1277	1663	582	
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	0	0	0	13	9	0	0		3	0	4	2	4	
2	<b>Connection Establishment (Accessibility)</b>																
	a) CSSR (Call Setup Success Rate)	>=95%	98.32%	99.99%	99.18%	99.98%	97.38%	99.72%	99.69%	99.20%		99.66%	99.30%	97.04%	98.94%	99.19%	
	b) SDCCH/PAGING congestion	<=1%	0.01%	0.00%	0.08%	0.03%	0.02%	0.01%	0.04%	0.06%		0.07%	0.00%	0.72%	0.01%	0.03%	
	c) TCH congestion	<=2%	0.01%	0.01%	0.29%	0.01%	0.01%	0.02%	0.04%	0.01%		0.34%	0.00%	0.02%	0.01%	0.007%	
3	<b>Connection maintenance (retainability)</b>																
	a) CDR	<=2%	0.67%	0.41%	1.63%	0.49%	0.36%	0.44%	0.34%	1.64%		0.71%	0.32%	1.40%	0.37%	0.51%	
	b) Worst affected cells>3% TCH drop	<=3%	2.46%	0.00%	2.78%	0.33%	1.82%	0.00%	2.95%	1.86%		2.42%	0.07%	2.54%	0.00%	1.97%	
	c) Good voice quality	>=95%	97.70%	99.73%	98.66%	98.30%	97.72%	99.22%	97.26%	98.17%		97.83%	100.0%	96.38%	99.77%	NA	
	d) Total No. of cells exceeding 3% TCH drop (call drop)		4,458	0	6,559	629	1,522	4	4,536	2,576		6,614	33	1,041	0	1,742	
	e) Total no. of cells in the network		5853	8700	7618	6074	2704	7194	4968	4466		8834	1484	1320	2733	2850	
4	<b>No of POI having &gt; 0.5% congestion</b>	>=0.5%	0	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	NIL		
	b) Total No. of call attempts on POI (Avg.)		514473	2567268	2507391	9532144	287134	647361	1030575	820954	102560	3365762	83894	9685	470362	1030575	
	c) Total traffic served on POI (Erlang) (Avg.)		10819	60469	71112	352165	30832	21039	26038	20011	1888	116085	1767	977	19739	26038	
	d) Total No. of circuits on POI		86813	128770	125724	74396	99885	44300	67772	40793	7134	272114	12843	1225	53100	67772	
	e) Total number of working POI Service Area wise		252	488	290	60	102	12	180	53	39	240	44	13	12	180	
	f) Capacity of POI		81257	122170	117250	66162	79908	40164	64573	38220	8027	262636	12557	644	47547	64573	

S/N	Name of Parameter	Bench mark	Aircel	Airtel	Idea	Loop	MTNL (GSM)	Rcom GSM	TTSL GSM	Uninor	Videocon	Vodafone	MTS	MTNL CDMA	Rcom CDMA	Tata CDMA
			GSM Operators											CDMA Operators		
5	<b>Network Data</b>															
	a) Equipped Capacity of Network Erlang		72654	183574	91574	165259	825716	72000	85706	46933	165259	218448	42000	32000	168000	85706
	b) Total traffic in TCBH in erlang (Avg.)		20036	92377	73384	76878	308310	63549	28182	26121	66849	173388	3716	623	18270.03	28182
	c) Total no. of customers served (as per VLR) on last day of the month		662301	3031036	2263803	1254563	809656	2995397	1123287	726470	319458	4680459	129643	26739	3019181	1123287
(B)	<b>Customer Service Quality Parameters</b>															
5	<b>Metering/billing credibility-Post paid</b>	$\leq 0.1\%$	0.01%	0.01%	0.04%	0.05%	0.09%	0.06%	0.00%	NA	NA	0.097%	0.10%	0.02%	0.00%	0.00%
	a) No. of bills issued during the period		35453	514139	242991	325759	137966	76933	57589	NA	NA	1568144	11565	12534	525115	217742
	b) No. of bills disputed including billing complaints during the period		2	50	98	155	129	48	0	NA	NA	1515	12	2	5	1
6	<b>Metering /billing credibility-Pre paid</b>	$\leq 0.1\%$	0.04%	0.002%	0.080%	0.05%	0.005%	0.10%	0.00%	0.020%	0.00%	0.03%	0.006%	0.00%	0.07%	0.00%
	a) No. of charging / credit / validity complaints during the quarter		540	61	2,070	1,356	63	4716	0	295	13	1,331	30	0	2429	1
	b) Total no. of pre-paid customers at the end of the quarter		1325552	3315216	2575389	2926990	1250564	4716579	2696615	1459806	942688	4316168	516016	76236	3427551	1749344
7	<b>Resolution of billing/ charging complaints (within 4 weeks)</b>	100%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	a) No. of billing/(post paid) and charging, credit/validity (pre paid) complaints resolved within 4 weeks during the quarter		542	111	2168	1511	192	4764	0	295	13	2846	42	2	2434	2
	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		542	111	2168	1511	192	4764	0	295	13	2846	42	2	2434	2
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		542	111	2168	1511	192	4764	0	295	13	2846	42	2	2434	2
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		0	0	0	0	0	0	0	0	0	0	0	0	0	0
	e) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	$\leq 1$ week	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	98.00%	100.0%	100.0%	100.0%

S/N	Name of Parameter	Bench mark	Aircel	Airtel	Idea	Loop	MTNL (GSM)	Rcom GSM	TTSL GSM	Uninor	Videocon	Vodafone	MTS	MTNL CDMA	Rcom CDMA	Tata CDMA
			GSM Operators										CDMA Operators			
8	<b>Response time to customers for assistance</b>															
	a) Accessibility of call centre/Customer Care	>=95%	71.13%	100.0%	100.0%	99.15%	95.80%	99.59%	99.44%	99.95%	100.0%	99.99%	95.79%	92.11%	99.43%	99.58%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	49.47%	98.61%	95.71%	98.35%	95.46%	93.45%	94.07%	97.66%	96.07%	93.06%	95.95%	90.63%	94.25%	94.99%
	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		597126	1255976	489345	1092458	216824	575661	40408	606360	30007	1511999	28083	6233	217694	15455
	d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		295387	1238530	468355	1074432	206981	537942	38011	592146	28828	1407108	26947	5649	205180	14680
9	<b>Termination/closure of service</b>	<=7days	100.0%	100.0%	100.0%	100.0%	NP	100.0%	100.0%	NA	NA	100.0%	100.0%	100.0%	100.0%	100.0%
	a) Total No. of requests for Termination / Closure of service received during the quarter		348	204	1474	920		646	1661			4390	90	3627	1635	6170
	b) No.of requests for Termination / Closure of service complied within 7 days during the quarter		348	204	1474	920		646	1661			4390	90	3627	1635	6170
10	<b>Time taken for refunds of deposits after closures (within 60 days).</b>	100%	100.0%	100.0%	100.0%	100.0%		100.0%	100.0%			100.0%	100.0%	100.0%	100.0%	100.0%

➤ **Parameter-wise Findings (Month Data Assessment):**

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

- **BTS accumulated downtime (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark.
- **Worst affected BTSs due to downtime (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark.
- **Call setup success rate (benchmark  $\geq 95\%$ ):** All operators are meeting the benchmark.
- **SDCCH/PAGING Channel congestion (benchmark  $\leq 1\%$ ):** All operators are meeting the benchmark.  
*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.
- **Call drop rate (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark.
- **Cell exceeding 3% TCH drop (benchmark  $\leq 3\%$ ):** All the operators are satisfying the benchmark.
- **Connections with good voice quality (benchmark  $\geq 95\%$ ):** All the operators are meeting the benchmark.
- **No of POI > 0.5% Congestion (benchmark  $\leq 0.5\%$ ):** It is found that none of the operators are having any POI more than 0.5% congestion but cases were found where individual POIs are showing high utilization/usage. Some are in the range of over 100% though causing no traffic failure due to overflow technique i.e. the extra traffic is carried over by some other operating POI as has been designed to do so.
- **Metering and billing credibility-Post paid (benchmark  $\leq 0.1\%$ ):** All the operators are meeting the benchmark.
- **Metering and billing credibility-Pre paid (benchmark  $\leq 0.1\%$ ):** All the operators are meeting the benchmark.
- **Response time to customers for assistance- Accessibility of call centre/Customer Care (benchmark  $\geq 95\%$ ):** All the operators are meeting the benchmark.
- **% call answered by operators (voice to voice) within 60 sec (benchmark  $\geq 90\%$ ):** All operators are satisfying the benchmark respectively.
- **Resolution of billing/ charging complaints (benchmark 100% within 4 weeks):** All operators are meeting the benchmark.
- **Accessibility of call centre/Customer Care:** Except Aircel & MTNL-CDMA, all operators are meeting the benchmark.
- **% call answered by operators (voice to voice) within 60 sec.:** Except Aircel, all operators are meeting the benchmark.
- **Termination/Closure of service (Benchmark  $\leq 7$  days):** All operators are meeting the benchmark.
- **Time taken for refunds of deposits after closures:** All operators are meeting the benchmark.

**(3) Sample Coverage****Switches/BSC/BTS details of operators:**

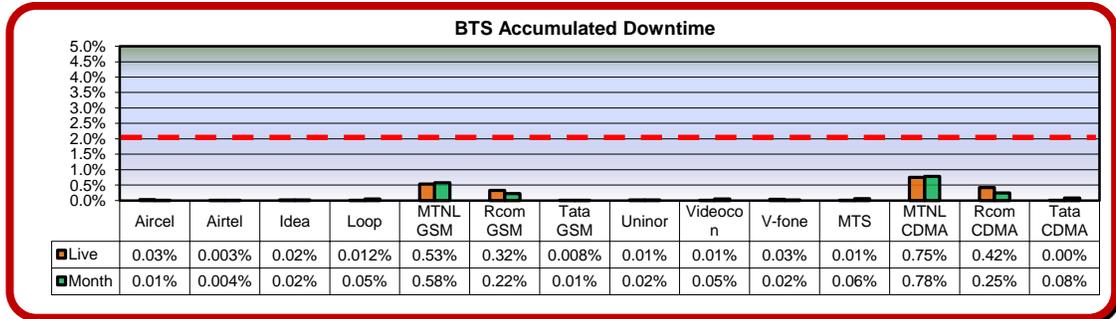
Sl.	Name of Service Provider	No. of MSC	No. of BSC	No. of BTS
<b>GSM Operators</b>				
1	Aircel Ltd	2	21	2076
2	Airtel Ltd	12	67	3462
3	Idea	6	25	2666
4	Loop	2	23	2164
5	MTNL(GSM)	8	46	1003
6	Reliance Communication (GSM)	3	11	2383
7	TTSL (GSM)	4	15	2467
8	Videocon	2	23	2164
9.	Uninor	3	14	1501
10	Vodafone	23	62	3581
<b>CDMA Operators</b>				
11.	MTNL (CDMA)	2	3	220
12.	MTS	1	2	494
13	Reliance Communication (CDMA)	12	7	911
14.	TTSL (CDMA)	5	6	948

**(4) Performance (Graphical Representation)**

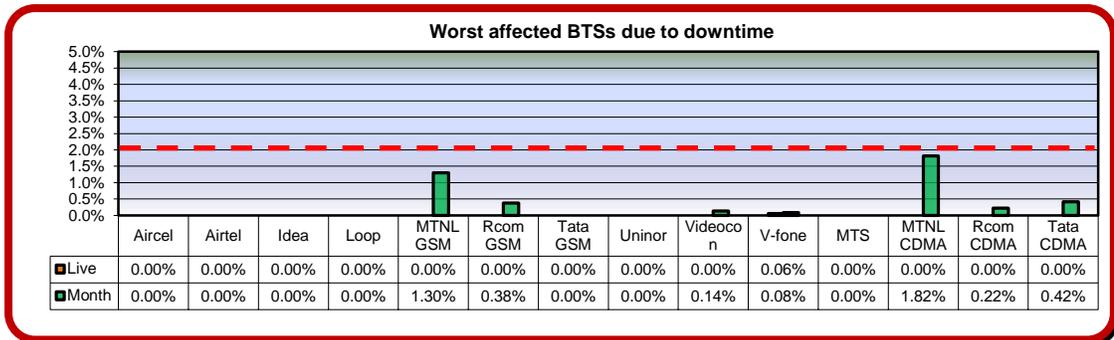
**Comparison between Live measurements and One month data Audit – Cellular Mobile Telephone Services**

**A) NETWORK PERFORMANCE**

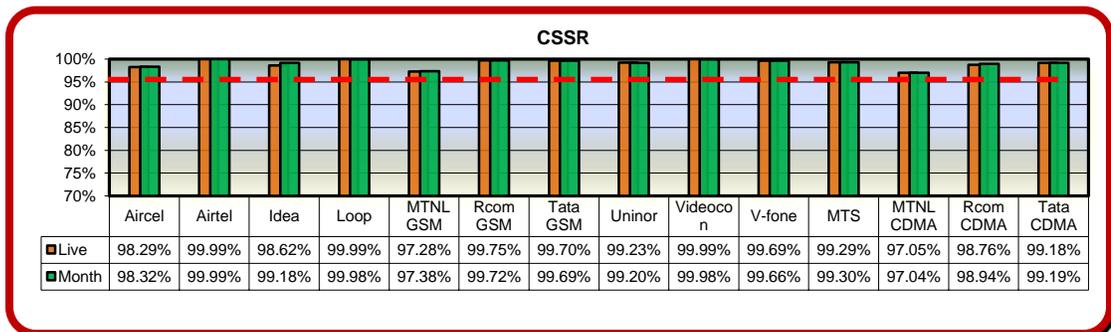
**BTS Accumulated Downtime:** All operators are meeting the TRAI benchmarks ( $\leq 2\%$ ) for both one month data and 3 days live data taken in the month of audit. Videocon is having an ICR agreement with Loop.



**Worst Affected BTS Due to Downtime:** All operators are meeting the TRAI benchmarks ( $\leq 2\%$ ) for both one month data and 3 days live data taken in the month of audit. Videocon is having an ICR agreement with Loop.

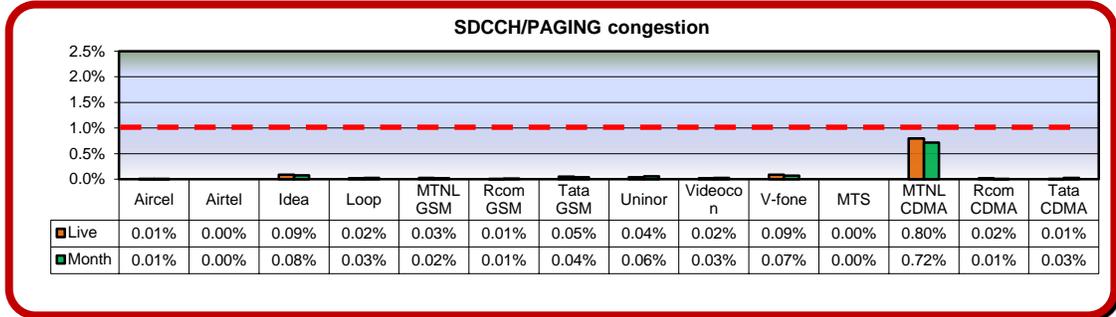


**Call setup success rate:** All operators are meeting the TRAI benchmarks ( $\geq 95\%$ ) for both one month data and 3 days live data taken in the month of audit.

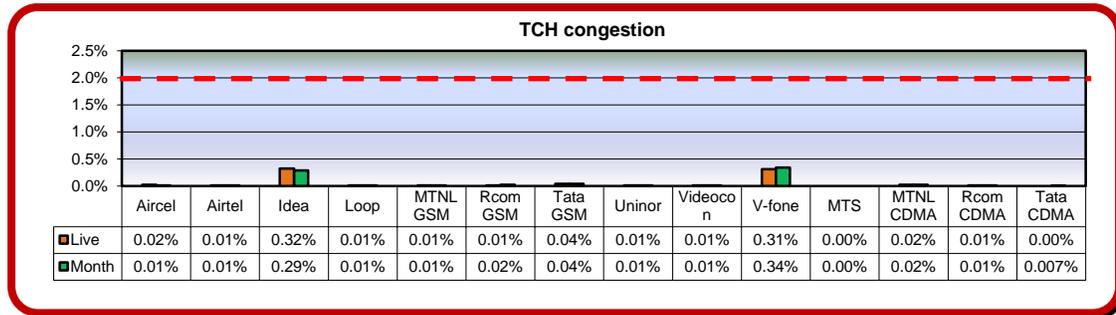


**Blocked call rate:**

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

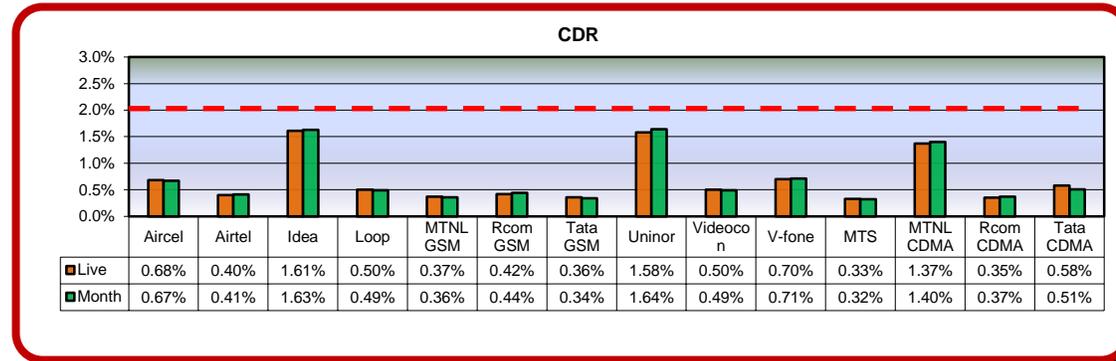


**TCH congestion (%):** All operators are meeting the TRAI benchmarks ( $\leq 2\%$ ) for both one month data and 3 days live data.

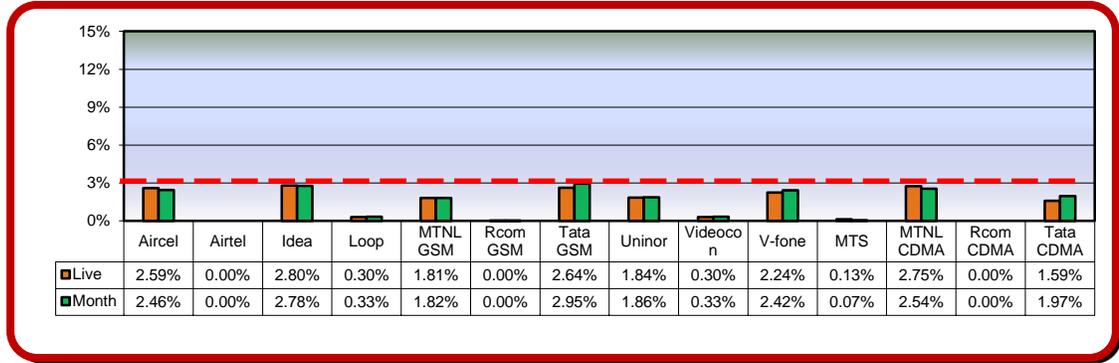


**Connection Maintainability (Retain ability):**

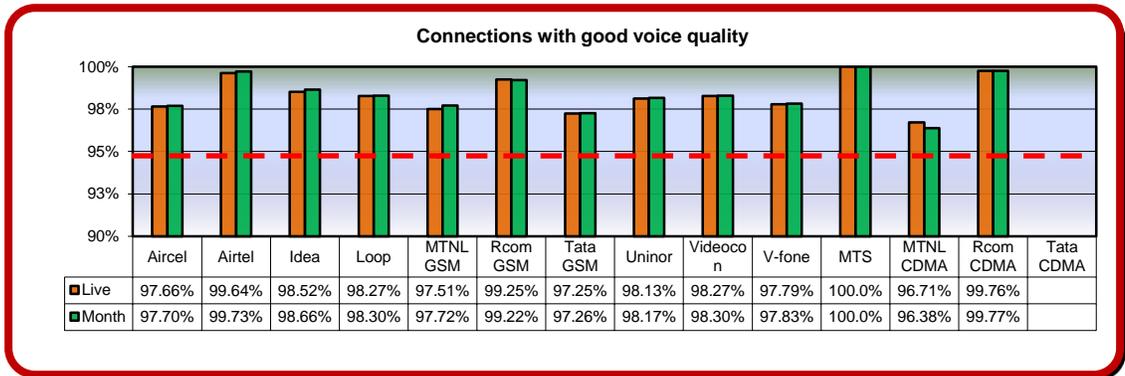
**Call drop rate (%):** All operators are meeting the TRAI benchmarks ( $\leq 2\%$ ) for both one month data and 3 days live data taken in the month of audit.



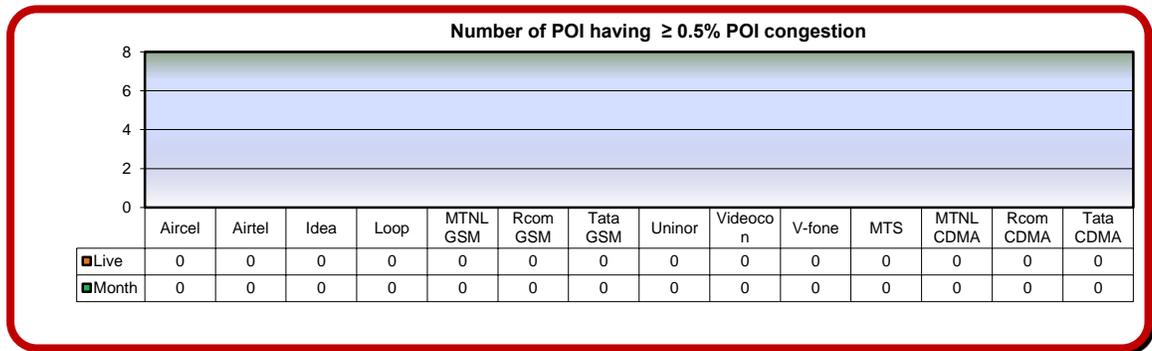
**Worst affected Cell exceeding 3% TCH Drop:** For both live and month data, all operators are found meeting the value set as a benchmark by TRAI. Etisalat has closed its operation in Mumbai circle. Videocon is having an ICR agreement with Loop.



**Percentage of connections with good voice quality (benchmark >= 95%):** All operators are meeting the TRAI benchmarks (=> 95%) for both one month data and 3 days live data taken in the month of audit. Videocon is having an ICR agreement with Loop.



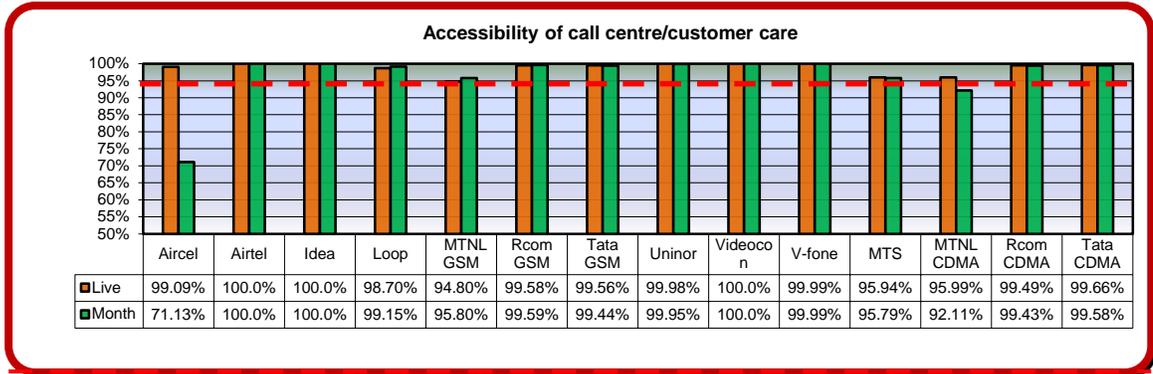
**No of POI > 0.5% Congestion:** None of the operators are having individual POI > 0.5% congestion for both one month data and 3 days live data, taken in the month of audit.



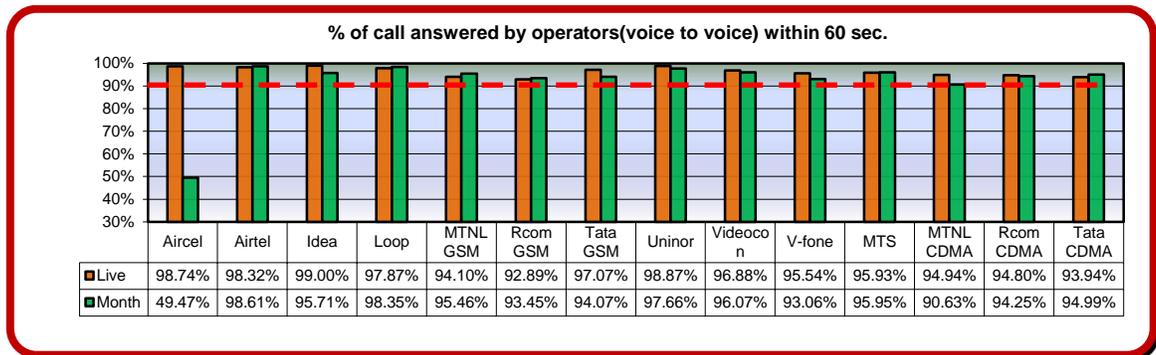
B) CUSTOMER SERVICE QUALITY PARAMETERS

(A) Response time to the customer for assistance:

**Percentage of call answered (Electronically):** All operators are meeting the TRAI benchmarks (>= 95%) for both one month data and 3 days live data, except MTNL (GSM) in 3 days & Aircel & MTNL (CDMA) which are deviating in month data cases.



**Percentage of call answered by operators (Voice to voice) within 60 sec:** For month & live data, all operators are meeting the benchmark, except Aircel which is not meeting the benchmark in month.



(5) Critical Analysis

The above comparative study between live data & month data shows similar trends in both the cases. However, it is found all the operators satisfying the network parameters. As far as Metering & billing cases for post-paid as well as in prepaid services all operators are satisfying the benchmark.

For parameter “%age of calls answered by operator” (voice to voice)” only Aircel is having deviation in live data assessment and parameter “Accessibility of call centre” in both Live & month part, Aircel & MTNL-CDMA are not meeting the benchmark in comparison to other operators.

**(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 (live calling for billing complaints)**

Calling Operator	Aircel	Airtel	Idea	Loop	MTNL GSM	Rcom GSM	Uninor	Videocon	Vodafone	MTS	MTNL CDMA	Rcom CDMA	Tata CDMA
Total No. of Calls Attempted	100	100	100	100	100	100	100	13	100	42	2	100	2
Total No. of calls Answered	92	89	94	82	87	92	89	12	90	41	2	91	2
Cases resolved with 4 weeks	92	89	94	82	87	92	89	12	90	41	2	91	2
%age of cases resolved	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

**(3) Live calling to call centre (Mumbai)**

Calling Operator	Aircel	Airtel	Idea	Loop	MTNL (GSM)	RCOM (GSM)	TTSL (GSM)	Uninor	Videocon	Vodafone	MTS	MTNL (CDMA)	RCOM (CDMA)	TTSL (CDMA)
Call Centre No.	121/198	121/198	198/12345	121	1500	121/198	121	*222/*333	121	111/198	155	121	*222/*333	121
Total No. of Calls Attempted	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Total No. of calls connected to IVR	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Calls got connected to agent within 60 Sec	93	97	94	94	93	95	95	96	93	97	96	92	95	95
%age of calls got answered	93%	97%	94%	94%	93%	95%	95%	96%	93%	97%	96%	92%	95%	95%

**(4) Level 1 live calling (Mumbai)**

Emergency No.	No. of calls made	Aircel	Airtel	Idea	Loop	MTNL (GSM)	RCOM (GSM)	TTSL (GSM)	Uninor	Videocon	V-fone	MTS	MTNL (CDMA)	RCOM (CDMA)	TTSL (CDMA)
100	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
101	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
102	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
139	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

**(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.
- Some of the calls were not successful for various reasons such as customer not reachable, number busy or switched off etc. Among the successful calls, it was found that the operators had made refunds 100% in most of the cases as claimed by their records.
- Satisfactory results were found for all the operators during live calling to their respective call centers. Similar result was found in case of Level-1 calling for emergency nos. 100, 101 & 102 etc.

**(C) Inter operator call assessment**

**(1) Sample coverage**

A sample of 2x50 test calls per Service Providers with in the licensed service area (Mumbai Circle) were made between 1100 to 1400 hrs and between 1600 to 1900 hrs so that TCBH hours for all the operators were covered.

**(2) Performance based on live measurement**

Calling Operator	Aircel	Airtel	Idea	Loop	MTNL (GSM)	Reliance (GSM)	Tata (GSM)	Uninor	Videocon	Vodafone	MTS	MTNL (CDMA)	Reliance (CDMA)	Tata (CDMA)
<b>Aircel</b>	-	100%	97%	100%	97%	99%	100%	96%	100%	100%	100%	98%	100%	100%
<b>Airtel</b>	100%	-	100%	98%	100%	100%	99%	100%	100%	100%	98%	100%	100%	100%
<b>Idea</b>	100%	100%	-	100%	99%	97%	100%	100%	100%	97%	100%	100%	96%	100%
<b>Loop</b>	99%	98%	96%	-	100%	100%	95%	100%	100%	98%	99%	100%	98%	100%
<b>MTNL (GSM)</b>	100%	99%	100%	100%	-	100%	100%	100%	100%	100%	100%	100%	100%	100%
<b>Reliance (GSM)</b>	100%	100%	100%	100%	100%	-	100%	100%	100%	100%	100%	100%	100%	100%
<b>Tata (GSM)</b>	98%	97%	100%	100%	100%	98%	-	100%	100%	100%	96%	100%	100%	100%
<b>Uninor</b>	100%	98%	97%	100%	96%	98%	100%	-	97%	96%	99%	100%	100%	96%
<b>Videocon</b>	99%	100%	100%	96%	100%	100%	100%	100%	-	100%	97%	100%	98%	100%
<b>Vodafone</b>	100%	97%	100%	99%	100%	96%	100%	98%	100%	-	100%	100%	100%	100%
<b>MTS</b>	100%	100%	100%	96%	98%	100%	100%	97%	100%	100%	-	100%	99%	100%
<b>MTNL (CDMA)</b>	100%	98%	100%	100%	100%	99%	100%	100%	100%	100%	100%	-	96%	98%
<b>Reliance (CDMA)</b>	99%	100%	98%	100%	100%	100%	100%	96%	100%	100%	99%	100%	-	97%
<b>Tata (CDMA)</b>	100%	100%	97%	100%	100%	98%	100%	100%	96%	100%	99%	100%	99%	-

**(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 result shows that there is not much congestion on the operator network.

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

**(1) Sample Coverage**

The Operator Assisted Drive Test was conducted at Mumbai for all the operators. Route covered was about around 80-100Km depending on city areas within the speed limit of 30Km/hr.

**Drive Test Locations**

***MUMBAI***

HIGH DENSE: Marine Drive, J J Flyover, Dadar , Mahim , Peddar Road , Haji Ali , Worli Prabhadevi

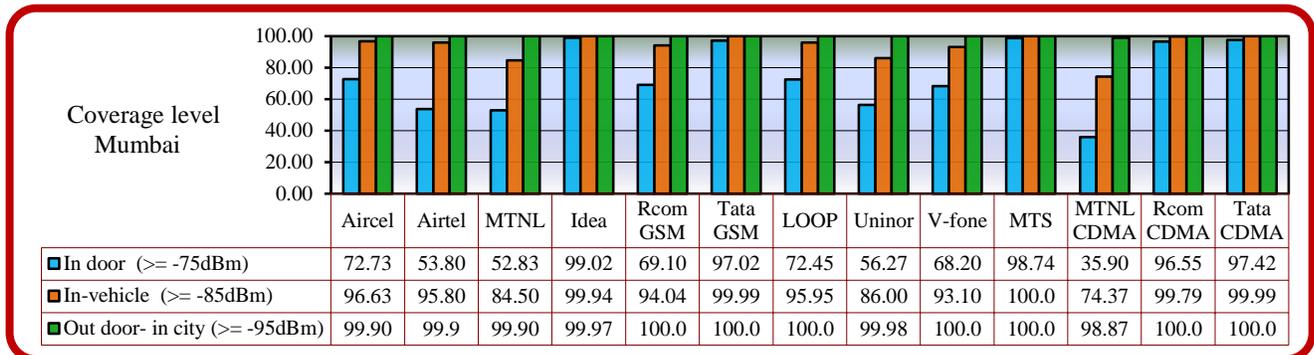
MEDIUM DENSE: W.E Highway, S.V road

LOW DENSE: Eastern Express Highway, Thane Belapur Road, Sion Panvel Highway, Shilphata, Dombivali, Kalyan.

**(2). Performance Operator assisted drive test (for respective cities):**

SN	Parameter	City Name	Aircel	Airtel	MTNL GSM	Idea	Rcom GSM	Tata GSM	LOOP	Uninor	V-fone	MTS	MTNL CDMA	Rcom CDMA	Tata CDMA	
1.1	Call Attempts	Mumbai	210	215	181	213	234	214	187	397	208	257	144	215	281	
1.2	Blocked Call Rate (<=3%)		0.48%	0.93%	1.10%	0.00%	0.43%	0.47%	0.53%	2.77%	0.96%	0.00%	1.39%	1.40%	0.00%	
1.3	Dropped Call Rate (<=2%)		0.48%	0.00%	4.42%	0.00%	0.43%	0.47%	0.53%	0.50%	0.00%	0.00%	6.25%	0.00%	0.36%	
1.4	Percentage of connections with good voice quality (=>95%)															
	(i) 0-4 (w/o frequency hopping)												99.26%	93.33%	97.40%	95.90%
	(ii) 0-5 ( with frequency hopping)		89.69%	96.15%	92.10%	91.37%	95.18%	95.91%	99.52%	91.93%	96.20%					
1.5	Service Coverage															
	In door (>= -75dBm)		72.73	53.80	52.83	99.02	69.10	97.02	72.45	56.27	68.20	98.74	35.90	96.55	97.42	
	In-vehicle (>= -85dBm)		96.63	95.80	84.50	99.94	94.04	99.99	95.95	86.00	93.10	100.0	74.37	99.79	99.99	
	Out door- in city (>= -95dBm)		99.90	99.9	99.90	99.97	100.0	100.0	100.0	99.98	100.0	100.0	98.87	100.0	100.0	
1.6	Call Setup Success Rate (>=95%)		99.52%	99.07%	98.90%	100.0%	99.57%	99.53%	99.47%	97.23%	99.0%	100.0%	98.61%	98.60%	100.0%	

## 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:

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

- “Dropped call Rate” is not met by (MTNL-GSM&CDMA).
- “Good voice quality” is not met by Aircel, MTNL (GSM&CDMA), Idea & Uninor.

**Note1:** Videocon is having ICR agreement with Loop.

**(D) Independent Drive Test**

**(1) Sample Coverage**

The Operator Assisted Drive Test was conducted at Mumbai for all the operators. Route covered was about around 40-60 Km depending on city areas within the speed limit of 25Km/hr.

**Drive Test Locations**

**Mumbai**

HIGH DENSE: Dadar (South) Internal Road

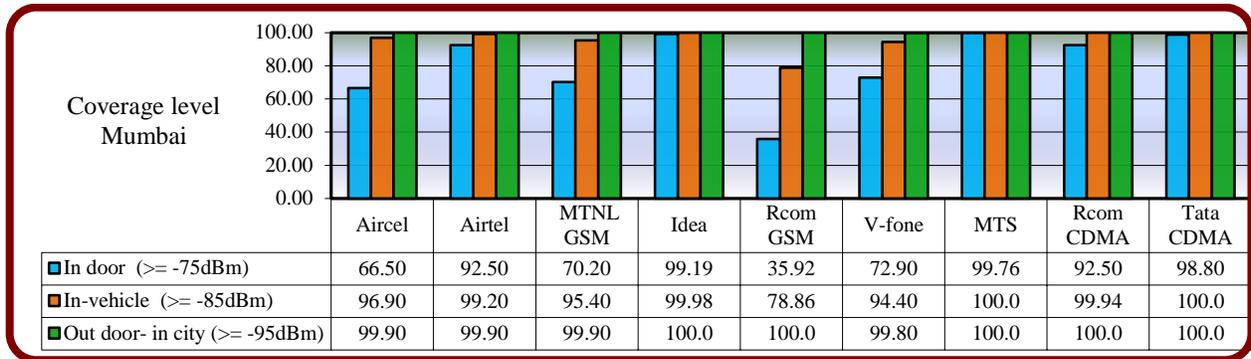
MEDIUM DENSE: Dadar (East)

LOW DENSE: Dadar (West)

**(2). Performance Operator assisted drive test (for respective cities):**

SN	Parameter	City Name	Aircel	Airtel	MTNL GSM	Idea	Rcom GSM	V-fone	MTS	Rcom CDMA	Tata CDMA	
			GSM Operators						CDMA Operators			
1.1	Call Attempts	Mumbai	89	81	70	107	80	98	75	71	140	
1.2	Blocked Call Rate (<=3%)		1.12%	0.00%	0.00%	0.00%	2.50%	0.00%	0.00%	0.00%	0.00%	
1.3	Dropped Call Rate (<=2%)		0.00%	0.00%	2.86%	0.00%	0.00%	1.02%	0.00%	0.00%	0.71%	
1.4	Percentage of connections with good voice quality (=>95%)											
	(i) 0-4 (w/o frequency hopping)								98.98%	99.35%	96.10%	
	(ii) 0-5 ( with frequency hopping)		93.13%	96.50%	91.10%	94.59%	95.03%	96.02%				
1.5	Service Coverage											
	In door (>= -75dBm)		66.50	92.50	70.20	99.19	35.92	72.90	99.76	92.50	98.80	
	In-vehicle (>= -85dBm)		96.90	99.20	95.40	99.98	78.86	94.40	100.0	99.94	100.0	
	Out door- in city (>= -95dBm)		99.90	99.90	99.90	100.0	100.0	99.80	100.0	100.0	100.0	
1.6	CSSR (>=95%)	98.88%	100.0%	100.0%	100.0%	97.50%	100.0%	100.0%	100.0%	100.0%		

## 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:

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

- “*Dropped Call Rate*” is not met by MTNL-GSM.
- “*Good voice quality*” is not met by Aircel, MTNL-GSM & Idea.

**Note:** Videocon is having an ICR agreement with Loop.

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

From Live, Month, PMR and Drive Tests findings, it can be observed that on an average, performance of the operators in the service area (Mumbai) is somehow satisfactory for **Network Parameters**.

Under **Customer Service Quality Parameter** “% of Calls answered by the operators (voice-to-voice) within 60 seconds” parameter is found that Aircel is not fulfilling TRAI benchmark of  $\geq 90\%$  in live data measurement. Apart from this, the “accessibility of call centre” parameter, Aircel & MTNL (GSM&CDMA) are not met in both Live & Month data audit, rest all operators are complying the benchmarks.

During **Drive Tests**, high Drop call rate were found in case of MTNL-GSM. Although Good voice quality is not met by Aircel, Idea, and Uninor & MTNL-GSM in comparison to other operators.

**NOTE-- ETISALAT has closed its operation in Mumbai Circle.**