

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

Report Period: JAN 2012 – MAR 2012

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.....Not conducted in Mumbai

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- *Not conducted for this quarter*

III. Broadband Service Providers

- *Not conducted for this quarter*

CHAPTER-1: INTRODUCTION

I. Background

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

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

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

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

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

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

The parameters that need to be measured for Basic and Cellular Mobile Services have been specified in the TRAI notification on Quality of Service of Basic (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.

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 1st quarter (Jan 2012 – Mar 2012). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken during the period July 2011 – Sept 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
GSM Operators			
1	Aircel Ltd	Feb-2012	2000-2100 Hrs
2	Airtel Ltd	Feb-2012	1900-2000 Hrs
3	Idea	Feb-2012	2000-2100 Hrs
4	Loop	Feb-2012	2000-2100 Hrs
5	MTNL (GSM)	Jan-2012	2000-2100 Hrs
6	TTSL (GSM)	Feb-2012	1900-2000 Hrs
7	Reliance Communication (GSM)	Feb-2012	1900-2000 Hrs
8	Uninor	Feb-2012	2000-2100 Hrs
9.	Videocon	Feb-2012	2000-2100 Hrs
10	Vodafone	Feb-2012	1900-2000 Hrs
CDMA Operators			
11	MTS	Feb-2012	1900-2000 Hrs
12	MTNL(CDMA)	Jan-- 2012	1100-1200 Hrs
13	Reliance Communication (CDMA)	Feb-2012	1900-2000 Hrs
14	TTSL (CDMA)	Feb-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		Bench- mark	Aircel	Airtel	Idea	Loop	MTNL GSM	Rcom GSM	TTSL GSM	Uninor	Videocon	Vodafone	MTS	MTNL CDMA	Rcom CDMA	Tata CDMA		
S/N	Name of Parameter																GSM Operators	
(A)- 1	Network Service Quality Parameter																	
	BTS Accumulated Downtime	<=2%	0.01%	0%	0.00%	0%	0%	0.14%	0%	0.01%	Videocon is an ICR with Loop in Mumbai	0.00%	0%	0%	0.05%	0.07%		
	Worst affected BTS due to downtime	<=2%	0%	0.00%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	
1	Connection Establishment (Accessibility)																	
	a) CSSR (Call Setup Success Rate)	>=95%	99.93%	99.99%	99.40%	99.91%	99.41%	99.96%	99.82%	99.87%			99.36%	100%	99.23%	99.61%	99.93%	
	b) SDCCH/PAGING congestion	<=1%	0.06%	0.00%	0.11%	0.07%	0.25%	0.02%	0.09%	0.06%			0.17%	0%	0.76%	0.01%	0.00%	
	c) TCH congestion	<=2%	0.01%	0.01%	0.49%	0.02%	0.34%	0.02%	0.09%	0.07%			0.47%	0%	0.01%	0.38%	0.07%	
2	Connection maintenance (retainability)																	
	a) CDR	<=2%	0.73%	0.43%	1.74%	0.52%	1.08%	0.52%	0.82%	1.80%			0.81%	0.27%	1.17%	0.51%	2.56%	
	b) Worst affected cells>3% TCH drop	<=3%	2.63%	0.00%	2.96%	0.50%	1.57%	0.00%	1.96%	2.31%			2.85%	1.83%	0.23%	0.82%	2.38%	
	c) Good voice quality	>=95%	97.70%	99.60%	98.71%	98.23%	96.38%	99.13%	97.23%	97.68%			97.82%	NA	NA	98.50%	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%	87.60%	100%	100%	98.22%	96.50%	99%	99%	100%	100%	100%	96.03%	100%	99%	100%		
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	76.73%	99.22%	97%	97.90%	91%	92.65%	96.27%	99.58%	96.66%	94.96%	96.22%	96.02%	94.85%	94.58%		

From the 3 days live data assessment, it is found that all the operators are meeting the network parameters in SDCCH / PAGING & TCH Congestion. As far as Call Drop rate is concerned only TTSL (CDMA) is not meeting the benchmark.

Performance related to customer care data is found to be satisfactory for most of the operators especially for the parameter “calls answered by operators (voice-to-voice), and Accessibility of call centre except Aircel which are having low value with respect to other operators. Videocon is having an ICR agreement with Loop. Etisalat has closed its operation in Mumbai circle respectively.

Month data assessment:

One Month Data Audit		Bench- mark	Aircel	Airtel	Idea	Loop	MTNL GSM	Rcom GSM	TTSL GSM	Uninor	Videocon	Vodafone	MTS	MTNL CDMA	Rcom CDMA	Tata CDMA
S/N	Name of Parameter															
(A)	Network Service Quality Parameter															
1	Network Availability										Videocon is an ICR with Loop in Mumbai					
	a) BTS Accumulated Downtime	<=2%	0.01%	0.01%	0.02%	0.03%	0.21%	0.19%	0.01%	0.02%		0.03%	0.15%	0.35%	0.24%	0.02%
b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	0.00%	0.09%	1.52%	0.17%	0.00%	0.00%	0.45%		0.00%	1.82%	0.22%	0.22%	
2	Connection Establishment (Accessibility)															
a) CSSR (Call Setup Success Rate)	>=95%	99.30%	99.99%	99.61%	99.93%	99%	99.96%	99.76%	99.89%	99.39%		100%	99.25%	99.46%	99.95%	
b) SDCCH/PAGING congestion	<=1%	0.69%	0.00%	0.08%	0.05%	0.24%	0.02%	0.11%	0.03%	0.10%		0.00%	0.75%	0.01%	0.00%	
c) TCH congestion	<=2%	0.01%	0.01%	0.31%	0.02%	0.41%	0.02%	0.13%	0.08%	0.51%		0.00%	0.00%	0.53%	0.05%	
3	Connection maintenance (retainability)															
a) CDR	<=2%	0.74%	0.47%	1.57%	0.49%	1.11%	0.53%	0.79%	1.80%	0.75%		0.33%	1.28%	0.52%	2.52%	
b) Worst affected cells>3% TCH drop	<=3%	2.80%	0.00%	2.87%	0.40%	2.75%	0.00%	1.84%	2.42%	2.84%		2.03%	4.39%	0.78%	1.84%	
c) Good voice quality	>=95%	97.80%	99.66%	98.62%	98.26%	96.89%	99.14%	97.28%	97.63%	97.81%	NA	NA	98.56%	NA		
4	No of POI having > 0.5% congestion	>=0.5%	0	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%	0.01%	0.01%	0.04%	0.04%	0.09%	0.10%	0.00%	NA	NA	0.14%	0.13%	0.05%	0.10%	0.00%
6	Metering /billing credibility-Pre paid	<= 0.1%	0.03%	0.00%	0.05%	0.03%	0.01%	0.10%	0.00%	0.09%	0.01%	0.01%	0.01%	0.00%	0.10%	0.00%
7	Resolution of billing/ charging complaints	100% within 4 weeks	100%	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%	100%	
8	Response time to customers for assistance															
a) Accessibility of call centre/Customer Care	>=95%	94.40%	100%	100%	99%	96%	99%	99%	99%	100%	100%	96.97%	100%	99%	100%	
b) % call answered by operators(voice to voice) within 60 sec.	>=90%	90.64%	98.82%	98%	98.69%	91%	92.37%	95.88%	96.27%	97.07%	96.05%	94.54%	94.15%	95.44%	95.73%	
9	Termination/closure of service	<=7days	100%	100%	100%	100%	100%	100%	100%	NA	NA	100%	95.16%	100%	100%	100%
10	Time taken for refunds of deposits after closures.	100% within 60 days	No Refunds	100%	100%	100%	100%	100%	100%	NA	NA	100%	No Refunds	100%	100%	99%

From the month data assessment, it is found that all the operators are meeting the network parameters by and large, except MTNL (CDMA), not meeting the benchmark for “Worst affected cells>3% TCH drop”. Call Drop rate is not met by TTSL (CDMA) only. In Metering & Billing cases for Post Paid services few operators like, Videocon and MTS are deviating from the benchmarks, where as in Prepaid services all the operators are meeting the benchmark.

Performance related to customer care data is found to be satisfactory for most of the operators, except for “accessibility of call centre” parameter is being not met by Aircel. In Termination & Closures cases, MTS is deviating from the benchmark as well as in Refunds cases only TTSL (CDMA) is deviating from the benchmark.

Operator-Assisted Drive Test

SN	Parameter	City Name	Aircel	Airtel	Idea	Loop	MTNL (GSM)	Rcom GSM	Tata GSM	Vodafone	Uninor	MTS	Rcom CDMA	MTNL-CDMA	Tata CDMA
			GSM Operators												
1.1	Blocked Call Rate (<=3%)	Mumbai	1.63%	0.00%	0.00%	0.51%	3.58%	0.00%	0.36%	0.00%	3.40%	0.50%	0.00%	0.00%	0.00%
1.2	Dropped Call Rate (<=2%)	Mumbai	4.91%	0.00%	0.93%	1.02%	5.13%	0.50%	1.81%	0.40%	6.12%	0.00%	1.88%	3.53%	1.02%
1.3	Percentage of connections with good voice quality (=>95%)														
	(i) 0-4 (w/o frequency hopping)	Mumbai										98.91%	98.82%	88.13%	96.62%
	(ii) 0-5 (with frequency hopping)	Mumbai	90.50%	97.54%	94.90%	99.06%	95.35%	95.01%	95.97%	95.90%	91.21%				
1.4	Call Setup Success Rate (>=95%)	Mumbai	98.37%	100%	100%	99.49%	96.42%	100%	99.64%	100%	96.60%	99.50%	100%	100%	100%

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

- Blocked Call Rate benchmark is not met by Uninor & MTNL (GSM) in Mumbai.
- Drop Call rate is not met by Aircel, MTNL (GSM), Uninor & MTNL(CDMA).
- In Good voice quality parameter it is found that Aircel, Idea, Uninor & MTNL (CDMA) is not meeting the benchmark respectively.

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

Independent Drive Test

.....Not conducted in Mumbai

CHAPTER-3: AUDIT-PMR VERIFICATION

I. Cellular Mobile Telephone Service PMR Verification:

PMR		Bench- mark	Audit	Aircel	Airtel	Idea	LOOP	MTNL(G MS)	Rcom GSM	Tata GSM	Uninor	Vodafon e	MTS	MTNL (CDM A)	Rcom CDMA)	Tata CDMA	
S/N	Name of Parameter			GSM Operators													
(A)	Network Service Quality Parameter																
1	Network Availability																
	BTS Accumulated Downtime	<=2%	Reported	0.02%	0.02%	0.02%	0.03%	0.49%	0.21%	0.02%	0.04%	0.02%	0.08%	0.47%	0.16%	0.02%	
			Verified	0.02%	0.02%	0.02%	0.03%	0.49%	0.21%	0.02%	0.04%	0.02%	0.08%	0.47%	0.16%	0.02%	
	Worst affected BTSs due to downtime	<=2%	Reported	0.02%	0.15%	0.00%	0.03%	0.77%	0.18%	0.04%	0.00%	0.06%	0.00%	0.07%	0.26%	0.07%	
			Verified	0.02%	0.15%	0.00%	0.03%	0.77%	0.18%	0.04%	0.00%	0.06%	0.00%	0.07%	0.26%	0.07%	
2	Connection Establishment (Accessibility)																
	CSSR (Call Setup Success Rate)	>=95%	Reported	97.90%	99.67%	99.20%	99.11%	98.32%	99.23%	99.33%	99.06%	99.99%	99.35%	98.06%	99.68%	99.11%	
			Verified	97.90%	99.67%	99.20%	99.11%	98.32%	99.23%	99.33%	99.06%	99.99%	99.35%	98.06%	99.68%	99.11%	
	SDCCH/PAGING congestion	<=1%	Reported	0.07%	0.02%	0.10%	0.09%	0.20%	0.11%	0.29%	0.05%	0.30%	0.00%	0.49%	0.02%	0.00%	
			Verified	0.07%	0.02%	0.10%	0.09%	0.20%	0.11%	0.29%	0.05%	0.30%	0.00%	0.49%	0.02%	0.00%	
	TCH congestion	<=2%	Reported	0.01%	0.04%	0.24%	0.03%	0.39%	0.20%	0.20%	0.05%	1.01%	0.01%	0.52%	0.07%	0.02%	
			Verified	0.01%	0.04%	0.24%	0.03%	0.39%	0.20%	0.20%	0.05%	1.01%	0.01%	0.52%	0.07%	0.02%	
3	Connection maintenance (retainability)																
	CDR	<=2%	Reported	0.84%	0.69%	1.21%	0.55%	1.88%	1.03%	0.98%	1.62%	0.89%	0.25%	1.12%	0.34%	0.59%	
			Verified	0.84%	0.69%	1.21%	0.55%	1.88%	1.03%	0.98%	1.62%	0.89%	0.25%	1.12%	0.34%	0.59%	
	Worst affected cells>3% TCH drop	<=5%	Reported	1.93%	0.48%	2.53%	0.43%	3.33%	0.50%	2.39%	2.16%	2.81%	2.04%	0.80%	0.39%	2.21%	
			Verified	1.93%	0.48%	2.53%	0.43%	3.33%	0.50%	2.39%	2.16%	2.81%	2.04%	0.80%	0.39%	2.21%	
	Good voice quality	>=95%	Reported	98.06%	99.69%	98.71%	98.12%	96.02%	99.00%	97.33%	98.44%	97.74%	99.68%	98.47%	99.44%	97.19%	
			Verified	98.06%	99.69%	98.71%	98.12%	96.02%	99.00%	97.33%	98.44%	97.74%	99.68%	98.47%	99.44%	97.19%	
4	No of POI having > 0.5% congestion	>=0.5%	Reported	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.33%	0.00%	0.00%	0.13%	0.00%	0.00%	
			Verified	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.33%	0.00%	0.00%	0.13%	0.00%	0.00%	
(B)	Customer Service Quality Parameters																
5	Metering/billing credibility-Post paid	<= 0.1%	Reported	0.01%	0.02%	0.03%	0.03%	0.05%	0.10%	0.08%	0.00%	0.15%	0.00%	0.08%	0.10%	0.03%	
			Verified	0.01%	0.02%	0.03%	0.03%	0.05%	0.10%	0.08%	0.00%	0.15%	0.00%	0.08%	0.10%	0.03%	
6	Metering /billing credibility-Pre paid	<= 0.1%	Reported	0.02%	0.00%	0.18%	0.06%	0.02%	0.10%	0.00%	0.28%	0.02%	0.00%	0.03%	0.04%	0.00%	
			Verified	0.02%	0.00%	0.18%	0.06%	0.02%	0.10%	0.00%	0.28%	0.02%	0.00%	0.03%	0.04%	0.00%	
7	Resolution of billing/ charging complaints	100% within 4 weeks	Reported	100%	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%	100%	
	Period of applying credit/waiver/adjustment to the customers account from the date of	<=1 week	Reported	100%	100%	100%	100%	100%	100%	100%	0.00%	100%	100%	100%	100%	100%	
			Verified	100%	100%	100%	100%	100%	100%	100%	0.00%	100%	100%	100%	100%	100%	

PMR		Bench- mark	Audit	Aircel	Airtel	Idea	LOOP	MTNL(G MS)	Rcom GSM	Tata GSM	Uninor	Vodafon e	MTS	MTNL (CDM A)	Rcom CDMA)	Tata CDMA	
S/N	Name of Parameter																
	resolutions of complaints																
8	Response time to customers for assistance																
	Accessibility of call centre/Customer Care	>=95%	Reported	100%	98.00%	98.46%	98.55%	95.71%	99.17%	98.00%	97.56%	100.00%	96.00%	96.09%	99.51%	100.00%	
			Verified	100%	98.00%	98.46%	98.55%	95.71%	99.17%	98.00%	97.56%	100.00%	96.00%	96.09%	99.51%	100.00%	
	% call answered by operators(voice to voice) within 60 sec.	>=90%	Reported	83.30%	90.00%	94.17%	97.70%	92.41%	87.00%	98.00%	66.57%	78.98%	93.00%	90.37%	91.95%	92.12%	
Verified			83.30%	90.00%	94.17%	97.70%	92.41%	87.00%	98.00%	66.57%	78.98%	93.00%	90.37%	91.95%	92.12%		
9	Termination/closure of service																
	No. of requests for Termination / Closure of service complied within 7 days during the quarter	<=7days	Reported	92%	100%	100%	100%	100%	100%	100%	0%	100%	0%	100%	100%	100%	
			Verified	92%	100%	100%	100%	100%	100%	100%	100%	0%	100%	0%	100%	100%	100%
10	Time taken for refunds of deposits after closures.	100% within 60 days	Reported	100%	100%	100%	100%	71.71%	100%	100%	0.00%	100%	0%	100%	100%	100%	
			Verified	100%	100%	100%	100%	71.71%	100%	100%	0.00%	100%	0%	100%	100%	100%	

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	MTNLGSM	Rcom GSM	TTSL GSM	Uninor	Videocon	Vodafone	MTS	MTNLCDMA	Rcom CDMA	Tata CDMA	
			GSM Operators										CDMA Operators				
(A)-1	Network Service Quality Parameter										Videocon is an ICR with Loop in Mumbai						
	BTS Accumulated Downtime	<=2%	0.01%	0%	0.00%	0%	0%	0.14%	0.03%	0.01%		0.00%	0%	0%	0%	0.05%	0.07%
	Worst affected BTS due to downtime	<=2%	0%	0.00%	0%	0%	0%	0.00%	0%	0%		0%	0%	0%	0%	0%	0%
	Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		13	16	9	48	76	232	56	11		11	20	60	161	46	
	No. of BTSs having accumulated downtime of >24 hours in a month		0	0	0	2	3	0	0	0		0	0	0	0	0	0
2	Connection Establishment (Accessibility)																
	a) CSSR	>=95%	99.93%	99.99%	99.40%	99.91%	99%	99.96%	99.82%	99.87%		99.36%	100%	99.23%	99.61%	99.93%	
	b) SDCCH/PAGING congestion	<=1%	0.06%	0.00%	0.11%	0.07%	0.25%	0.02%	0.09%	0.06%		0.17%	0.00%	0.76%	0.01%	0.00%	
	c) TCH congestion	<=2%	0.01%	0.01%	0.49%	0.02%	0.34%	0.02%	0.09%	0.07%		0.47%	0.00%	0.01%	0.38%	0.07%	
3	Connection maintenance																
	a) CDR	<=2%	0.73%	0.43%	1.74%	0.52%	1.08%	0.52%	0.82%	1.80%	0.81%	0.27%	1.17%	0.51%	2.56%		
	b) Cells having > 3% TCH drop	<=3%	2.63%	0.00%	2.96%	0.50%	1.57%	0.00%	1.96%	2.31%	2.85%	1.83%	0.23%	0.82%	2.38%		
	c) Good voice quality	>=95%	97.70%	99.60%	98.71%	98.23%	96.38%	99.13%	97.23%	97.68%	97.82%	NA	NA	98.50%	NA		
	d) No. of cells > 3% TCH drop		153	0	217	30	41	0	133	103	250	27	3	22	66		
	e) Total no. of cells in the network		5,828	8,325	7,325	6,041	2,618	6,870	6,780	4,467	8,757	1,478	1,320	2,694	2,778		
4	No of POI having > 0.5% congestion	>=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		27,975	133,543	129,025	52,470	37,066	46,012	67,408	41,412	8,805	262,831	12541	1,223	45,149	67,408	
	c) Avg No. of call attempts on POI		497,837	2,581,268	2,498,176	717,265	285,209	746,118	1,224,390	1198920	185,118	3,359,292	90238	17,499	539,634	1224390	
	d) Avg traffic served on POI (Erlang)		10,913	61,149	72,246	14,617	8,898	23,553	30,333	29,466	3,540	121,647	1804	350	18,882	30,333	
	e) Total number of working POI Service Area wise		57	571	294	63	88	106	181	106	40	426	45	10	112	181	
	f) Equipped Capacity of Network in respect of Traffic in erlang		70,885	178,883	87,793	121,684	919,236	72,000	84,939	46,372	165,010	215,038	42,000	36,000	168,000	120,000	
	g) Total traffic handled in TCBH in erlang		21181	96287	75,453	69945	288100	65821	32475	30850	69623	180216	3984	808	120470	69305	
(B)	Customer Service Quality Parameters																
5	Response time to customers for assistance																
	a) Accessibility of call centre	>=95%	87.60%	100.00%	100%	98%	97%	99%	99%	100%	100.00%	100%	96.03%	100%	99.14%	100%	
	b) % of call answered by operators(voice to voice) within 60 sec	>=90%	76.73%	99.22%	97.42%	97.90%	91%	92.65%	96.27%	99.58%	96.66%	94.96%	96.22%	96.02%	94.85%	94.58%	
	c) No. of call attempts to call centre / customer care nos. during TCBH (Avg)		47,586	136,334	101,190	103,937	33,862	78,135	40,992	63,532	2,661	155,184	4,023	603	28,758	16,712	
	d) No. of calls connected and answered successfully to call centre / customer care nos. during TCBH (Avg)		36,512	135,277	98,582	101,757	30,880	72,395	39,462	63,264	2,572	147,366	3,871	579	27,277	15,807	

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 <= 2%):** All operators are meeting the benchmark.
- **Worst Affected BTS Due to Downtime (benchmark <= 2%):** All operators are meeting the benchmark.
- **Call setup success rate (benchmark >= 95%):** All operators are meeting the benchmark with values lying between 99% and 100%.
- **SDCCH/PAGING Channel congestion (benchmark <= 1%):** All operators are meeting the benchmark with values lying between 0% and 0.76%.
Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.
- **TCH congestion (benchmark <= 2%):** All the operators are complying the benchmark with values lying between 0% and 0.49%.
- **Call drop rate (benchmark <= 2%):** All operators are meeting the benchmark , except TTSL(CDMA) with a value of 2.56%.
- **Cell exceeding 3% TCH drop (benchmark <= 5%):** All operators the operators are satisfying the benchmark.
- **Connections with good voice quality (benchmark >= 95%):** CDMA service providers have declared that the parameter is not system generated. Rest of the GSM operators are meeting the benchmark with values lying between 96% and 99.60%.
- **No of POI >0.5% Congestion (benchmark >= 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):** All operators are meeting the benchmark, except Aircel which is deviating from the benchmark.
- **%age of call answered by operator (Voice to voice) (benchmark >90%): %):** All operators are meeting the benchmark, except Aircel which is showing low value i.e. not 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)	Network Service Quality Parameter															
1	Network Availability															
	a) BTS Accumulated Downtime	<=2%	0.01%	0.01%	0.02%	0.03%	0.21%	0.19%	0.01%	0.02%	Videocon is an ICR with Loop in Mumbai	0.03%	0.15%	0.35%	0.24%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	0.00%	0.09%	1.52%	0.17%	0.00%	0.00%		0.45%	0.00%	1.82%	0.22%	0.22%
	c) Total no. of BTSs in the licensed service area		2,080	3,326	2,568	2,172	986	2,290	2,438	1,506		3,535	492	220	898	925
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		179	316	345	487	1,413	2,961	157	196		684	507	534	1,524	113
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	0	0	2	15	4	0	0		16	0	4	2	2
2	Connection Establishment (Accessibility)															
	a) CSSR (Call Setup Success Rate)	>=95%	99.30%	99.99%	99.61%	99.93%	99.35%	99.96%	99.76%	99.89%	99.39%	100.00%	99.25%	99.46%	99.95%	
	b) SDCCH/PAGING congestion	<=1%	0.69%	0.00%	0.08%	0.05%	0.24%	0.02%	0.11%	0.03%	0.10%	0.00%	0.75%	0.01%	0.00%	
	c) TCH congestion	<=2%	0.01%	0.01%	0.31%	0.02%	0.41%	0.02%	0.13%	0.08%	0.51%	0.00%	0.00%	0.53%	0.05%	
3	Connection maintenance (retainability)															
	a) CDR	<=2%	0.74%	0.47%	1.57%	0.49%	1.11%	0.53%	0.79%	1.80%	0.75%	0.33%	1.28%	0.52%	2.52%	
	b) Worst affected cells>3% TCH drop	<=3%	2.80%	0.00%	2.87%	0.40%	2.75%	0.00%	1.84%	2.42%	2.84%	2.03%	4.39%	0.78%	1.84%	
	c) Good voice quality	>=95%	97.80%	99.66%	98.62%	98.26%	96.89%	99.14%	97.28%	97.63%	97.81%	NA	NA	98.56%	NA	
	d) Total No. of cells exceeding 3% TCH drop (call drop)		163	0	210	24	72	0	125	108	249	30	58	21	51	
	e) Total no. of cells in the network		5,828	8,325	7,325	6,041	2,618	6,870	6,780	4,467	8,757	1478	1,320	2,694	2,778	
4	No of POI having > 0.5% congestion	>=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.)		501,253	2,576,711	2,411,612	702,769	584,068	726,584	1,223,790	1,163,974	143,304	3,566,209	91017	18,932	506,074	1,223,721
	c) Total traffic served on POI (Erlang) (Avg.)		10,558	60,210	71,411	14,395	28,810	22,824	30,127	23,654	2,742	129,512	1831	387	17,915	30,127
	d) Total No. of circuits on POI		27,975	133,543	129,025	52,470	37,066	46,012	67,408	41,412	8,805	262,831	12541	1,223	45,149	67,408
	e) Total number of working POI Service Area wise		57	571	294	63	88	106	181	106	40	426	45	10	112	181
	f) Capacity of POI		26,347	115,242	120,339	46,847	29,652	41,836	64,185	37,636	7,873	252,607	11328	978	40,507	64,185

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	Network Data															
	a) Equipped Capacity of Network Erlang		70,885	178,883	87,793	121,684	919,236	72,000	84,939	46,372	165,010	215,038	42000	36,000	168,000	120,000
	b) Total traffic in TCBH in erlang (Avg.)		21,181	96,287	75,453	69,945	288,100	65,821	32,475	30,850	69,623	180,216	3984	808	120,470	69,305
	c) Total no. of customers served (as per VLR) on last day of the month		659,565	3,169,723	2,354,530	1,344,604	881,494	3,002,116	949,165	837,873	467,209	4,867,933	131865	31,289	3,099,481	910,442
(B)	Customer Service Quality Parameters															
5	Metering/billing credibility-Post paid	<= 0.1%	0.01%	0.01%	0.04%	0.04%	0.09%	0.10%	0.00%	NA	NA	0.14%	0.13%	0.05%	0.10%	0.00%
	a) No. of bills issued during the period		33,415	414,449	220,152	320,324	149,364	73,062	54,610	NA	NA	1,540,189	8449	13,974	540,322	317,024
	b) No. of bills disputed including billing complaints during the period		2	58	94	117	128	71	0	NA	NA	2,097	11	7	539	3
6	Metering /billing credibility-Pre paid	<= 0.1%	0.03%	0.00%	0.05%	0.03%	0.01%	0.10%	0.00%	0.09%	0.01%	0.01%	0.01%	0.00%	0.10%	0.00%
	a) No. of charging / credit / validity complaints during the quarter		405	65	1,447	962	109	4,634	0	1,383	144	645	53	2	3,375	1
	b) Total no. of pre-paid customers at the end of the quarter		1,337,129	3,206,326	2,641,408	2,931,706	1,451,294	4,740,857	2,627,516	1,481,997	1,024,215	4,419,824	662,919	76,101	3,395,119	2,344,014
7	Resolution of billing/ charging complaints	100% within 4 weeks	100%	100%	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		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		407	123	1,541	1,079	237	4,705	388	1,383	144	2,742	64	9	3,914	374
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		22	123	1,541	729	158	4,673	0	267	10	2,742	12	9	1,856	4
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		385	0	0	350	79	32	388	1,116	134	0	52	0	2,058	370
	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%	100%	100%

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	Response time to customers for assistance																
	a) Accessibility of call centre/Customer Care	>=95%	94.40%	100.00%	100%	99%	96%	99%	99%	99%	100.00%	100%	96.97%	100%	99%	100%	
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	90.64%	98.82%	98%	98.69%	91%	92.37%	95.88%	96.27%	97.07%	96.05%	94.54%	94.15%	95.44%	95.73%	
	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		415,827	136,334	101,190	103,937	33,862	78,135	40,992	63,532	2,661	149,794	37,310	603	28,758	16,712	
	d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		376,920	1,377,453	457,926	1,013,896	312,766	618,636	516,824	613,673	25,256	1,415,080	35,272	5,839	255,513	189,376	
9	Termination/closure of service	<=7days	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	95.16%	100%	100%	100%	
	a) Total No. of requests for Termination / Closure of service received during the quarter		313	201	1,215	795	769	645	1,361	NA	NA	5,435	62	2,118	3,022	4,622	
	b) No.of requests for Termination / Closure of service complied within 7 days during the quarter		313	201	1,215	795	769	645	1,361	NA	NA	5,435	59	2,118	3,022	4,622	
10	Time taken for refunds of deposits after closures.	100% within 60 days	No Refunds	100%	100%	100%	100%	100%	100%	NA	NA	100%	No Refunds	100.00%	100%	99%	

➤ **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:-

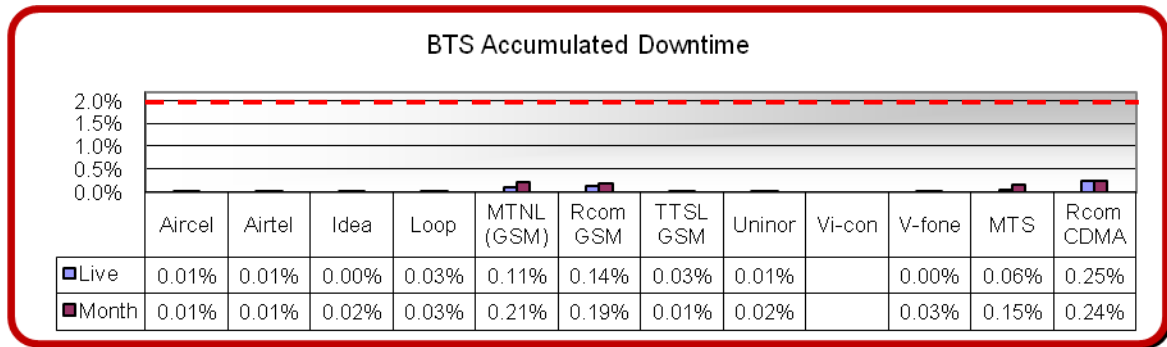
- **BTS accumulated downtime (benchmark <=2%):** All operators are meeting the benchmark with values lying between 0% and 0.35%.
- **Worst affected BTSs due to downtime (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 1.82% respectively
- **Call setup success rate (benchmark >= 95%):** All operators are meeting the benchmark with values lying between 99.25% and 100%.
- **SDCCH/PAGING Channel congestion (benchmark <= 1%):** All operators are meeting the benchmark with values lying between 0% and 0.75%.
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 0.53%.
- **Call drop rate (benchmark <= 2%):** All operators are meeting the benchmark, except TTSL (CDMA) with values lying between 0% and 2.52%.
- **Cell exceeding 3% TCH drop (benchmark <= 3%):** All the operators are satisfying the benchmark, except MTNL (CDMA) with a value 4.39%.
- **Connections with good voice quality (benchmark >= 95%):** CDMA service providers have declared that the parameter is not system generated. Rest of the GSM operators are meeting the benchmark with values lying between 97.28% and 99.18%.
- **No of POI > 0.5% Congestion (benchmark <= 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 <= 0.1%):** Except Vodafone & MTS are deviating the benchmark in comparison to other operator.
- **Metering and billing credibility-Pre paid (benchmark <= 0.1%):** All the operators are meeting the benchmark with values lying between 0% and 0.10%.
- **Response time to customers for assistance- Accessibility of call centre/Customer Care (benchmark >=95%):** All operators are meeting the benchmark, except Aircel with a value lying between 96% and 100% respectively.
- **% call answered by operators (voice to voice) within 60 sec (benchmark >=90%):** All operators are satisfying the benchmark respectively.
- **Resolution of billing/ charging complaints (benchmark 100% within 4 weeks):** All operators are meeting the benchmark.
- **Termination/Closure of service (Benchmark <= 7 days):** All operators have satisfied the benchmark, except MTS with a value 95.16%.
- **Time taken for refunds of deposits after closures (benchmark 100% within <=60 days):** All operators have satisfied the benchmark, except TTSL(CDMA) with a value of 99% respectively.

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

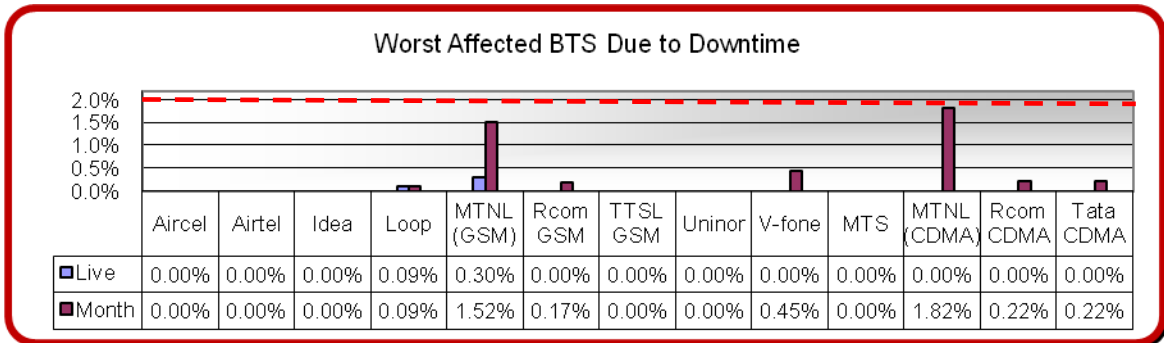
Sl.	Name of Service Provider	No. of MSC	No. of BSC	No. of BTS
GSM Operators				
1	Aircel Ltd	2	21	2080
2	Airtel Ltd	12	69	3326
3	Idea	6	24	2568
4	Loop	1	23	2172
5	MTNL(GSM)	8	15	986
6	Reliance Communication (GSM)	3	11	2290
7	TTSL (GSM)	4	15	2438
8	Videocon	1	23	2172
9	Uninor	3	14	1506
10	Vodafone	23	62	3535
CDMA Operators				
11.	MTNL (CDMA)	2	3	220
12.	MTS	1	2	492
13	Reliance Communication (CDMA)	12	7	898
14.	TTSL (CDMA)	5	6	925

(4) Performance (Graphical Representation)**Comparison between Live measurements and One month data Audit – Cellular Mobile Telephone Services****A) NETWORK PERFORMANCE**

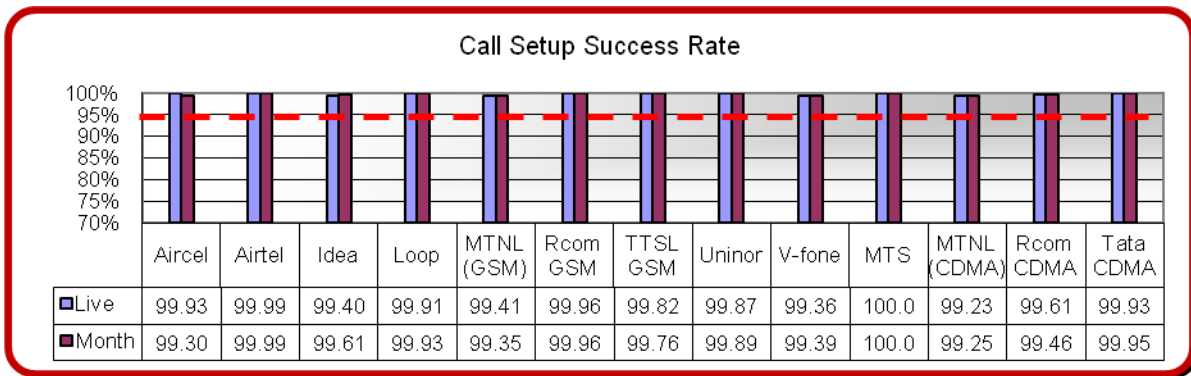
BTS Accumulated Downtime: All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data taken in the month of audit. Videocon is having an ICR agreement with Loop.



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.

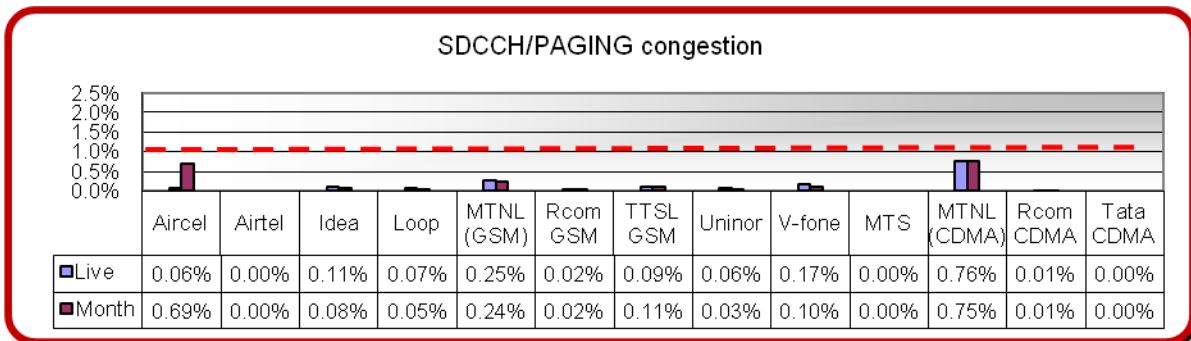


Call setup success rate: All operators are meeting the TRAI benchmarks ($\geq 95\%$) for both one month data and 3 days live data taken in the month of audit.

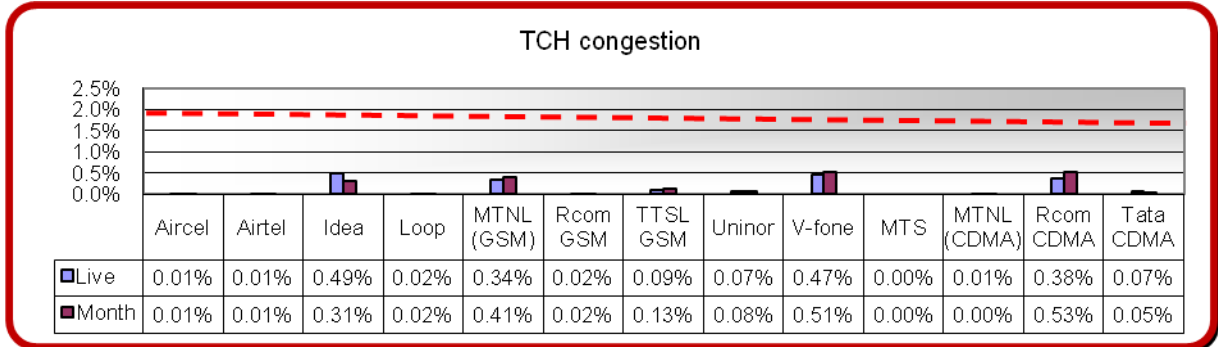


Blocked call rate:

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

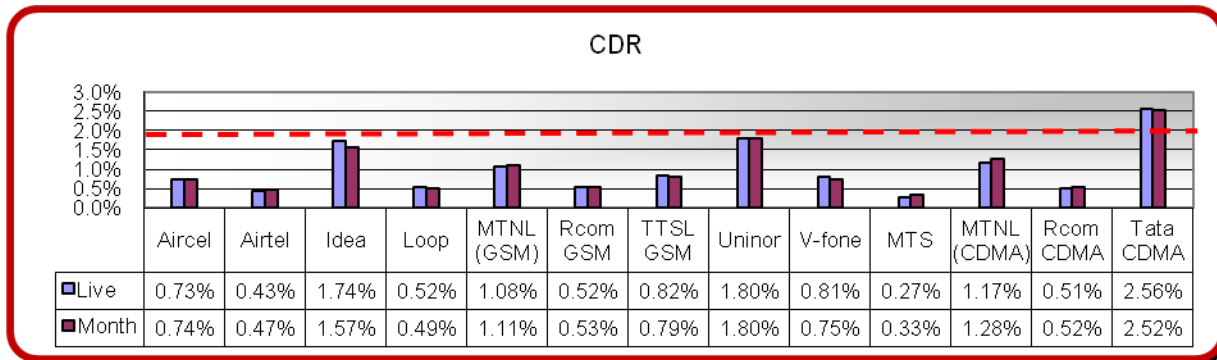


TCH congestion (%): All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data.

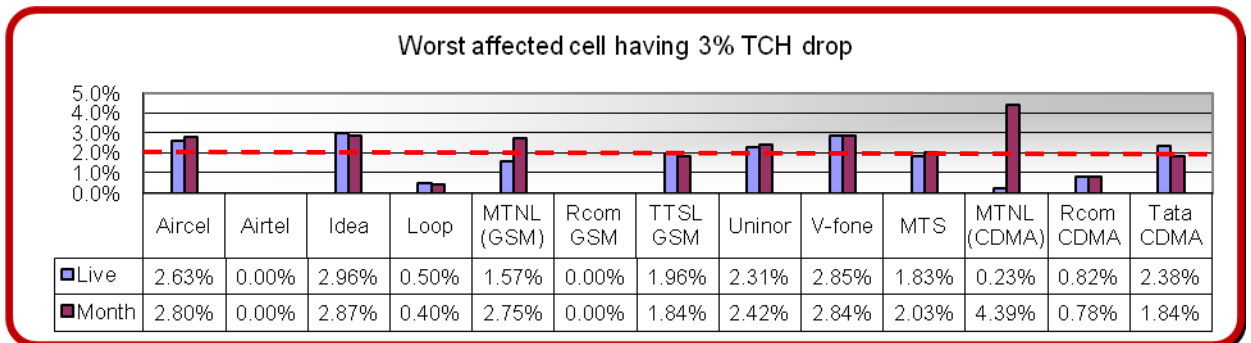


Connection Maintainability (Retain ability):

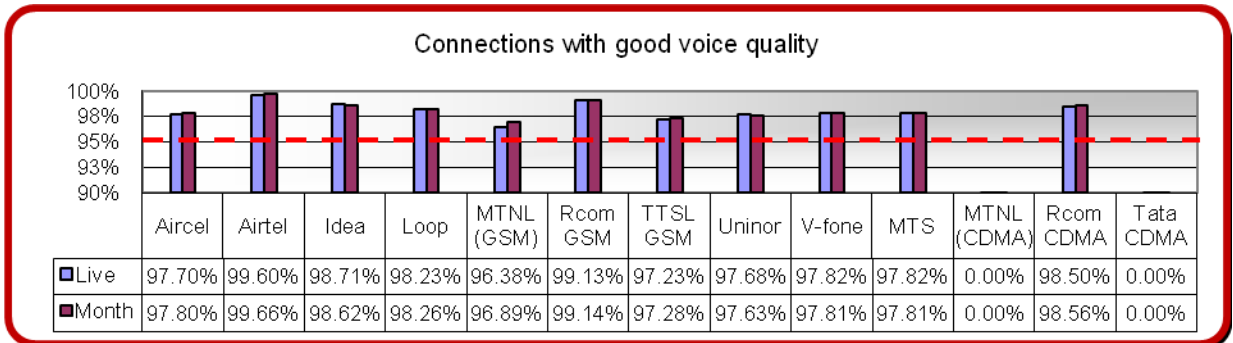
Call drop rate (%): All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data taken in the month of audit, except TTSL(CDMA), which is deviating in both Live & month data respectively.



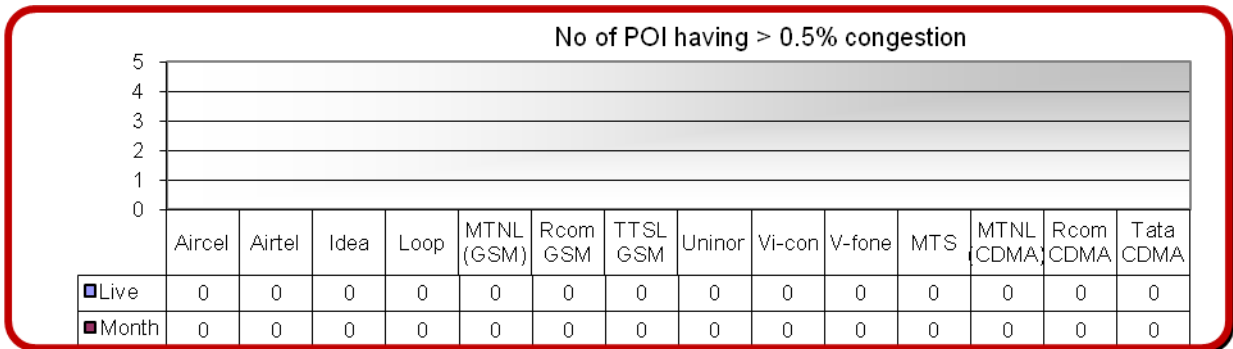
Worst affected Cell exceeding 3% TCH Drop: For both live and month data, all operators are found meeting the value set as a benchmark by TRAI, except MTNL (CDMA) in month data cases which is deviating more in comparison to other operators. Etisalat has closed its operation in Mumbai circle. Videocon is having an ICR agreement with Loop.



Percentage of connections with good voice quality (benchmark $\geq 95\%$): 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. CDMA operators have not provided the data for both cases. Videocon is having an ICR agreement with Loop.



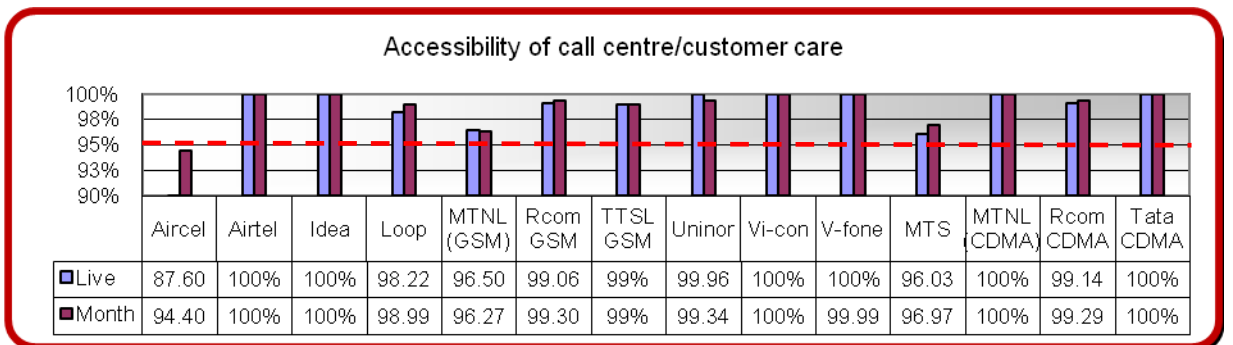
No of POI > 0.5% Congestion: None of the operators are having individual POI > 0.5% congestion for both one month data and 3 days live data, taken in the month of audit.



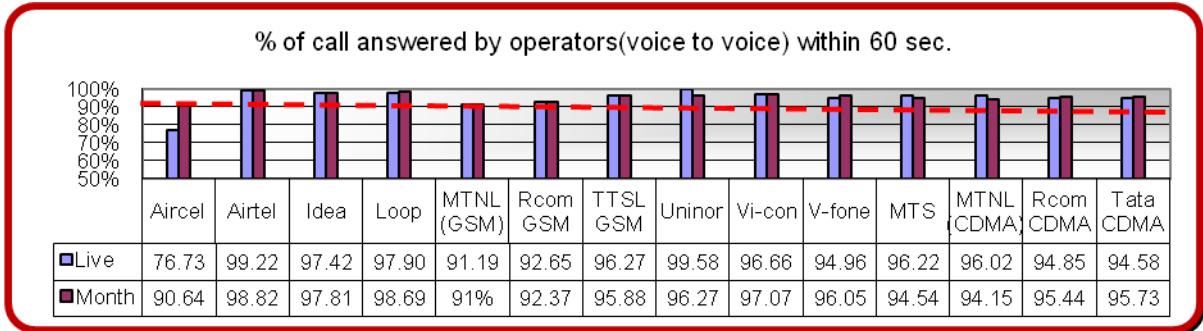
B) CUSTOMER SERVICE QUALITY PARAMETERS

(A) Response time to the customer for assistance:

Percentage of call answered (Electronically): All operators are meeting the TRAI benchmarks ($\geq 95\%$) for both one month data and 3 days live data, except Aircel which is deviating in Live 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 Live. Rest all operators are satisfying in both cases.



(5) Critical Analysis

The above comparative study between live data & month data shows similar trends in both the cases. However, it is found inconsistency for only one operator TTSL (CDMA) in live & month data for the parameter “worst affected cells having >3% TCH drop”. For SDCCH /PAGING congestion parameter, all operators are meeting the benchmark in respect to other operators. As far as Metering & billing cases for post-paid services is concerned only, MTS & Vodafone are slightly deviating from the benchmark “as well as in Prepaid services all operators are satisfying the benchmark. The parameter “%age of calls answered by operator” (voice to voice) only Aircel is having deviation in live data assessment. For Accessibility of call centre parameter in both Live & month part, Aircel is not meeting the benchmark in comparison to other operators. In Termination & Closures, only MTS is deviating from the benchmark with a value of 95.16% in comparison with other operators and as far as Time taken to Refunds of deposits is concerned TTSL (CDMA) is not complying the benchmark respectively.

(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	MTNL GSM	Tata GSM	Idea	Rcom GSM	Loop	Vodafone	Videocon	Uninor	Tata CDMA	MTS	Rcom CDA	MTNL CDMA
Call Attempts	100	100	100	100	100	100	100	100	100	100	100	64	100	9
Calls Answered	94	95	91	93	94	94	90	93	92	93	91	63	95	8
Cases resolved with 4	93	95	91	92	93	94	90	93	91	91	91	63	95	8
% age of cases	99%	100%	100%	99%	99%	100%	100%	100%	99%	98%	100%	100%	100%	100%

(3) Live calling to call centre (Mumbai)

Calling Operator	Aircel	Airtel	Idea	Loop	MTNL (GSM)	RCOM (GSM)	TTSL (GSM)	Uninor	Videocoin	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	Videocoin	V-fone	MTS	MTNL (CDMA)	RCOM (CDMA)	TTSL (CDMA)
100	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
101	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
102	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
139	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

(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 e.t.c.

(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)
Aircel	-	100%	98%	100%	97%	99%	100%	98%	100%	100%	100%	97%	100%	100%
Airtel	100%	-	100%	99%	100%	100%	98%	100%	100%	100%	98%	100%	100%	100%
Idea	100%	100%	-	100%	99%	97%	100%	100%	100%	97%	100%	100%	98%	100%
Loop	98%	97%	96%	-	100%	100%	95%	100%	100%	97%	97%	100%	96%	100%
MTNL(GSM)	100%	98%	100%	100%	-	100%	100%	100%	100%	100%	100%	100%	100%	100%
Reliance (GSM)	100%	100%	100%	100%	100%	-	100%	100%	100%	100%	100%	100%	100%	100%
Tata (GSM)	96%	96%	100%	100%	100%	97%	-	100%	100%	100%	97%	100%	100%	100%
Uninor	100%	96%	95%	100%	99%	96%	100%	-	99%	98%	98%	100%	100%	99%
Videocon	98%	100%	100%	98%	100%	100%	100%	100%	-	100%	99%	100%	98%	100%
Vodafone	100%	99%	100%	97%	100%	98%	100%	97%	100%	-	100%	100%	100%	100%
MTS	100%	100%	100%	98%	98%	100%	100%	96%	100%	100%	-	100%	98%	100%
MTNL(CDMA)	100%	98%	100%	100%	100%	96%	100%	100%	100%	100%	100%	-	97%	97%
Reliance (CDMA)	97%	100%	95%	100%	100%	100%	100%	99%	100%	100%	99%	100%	-	98%
Tata (CDMA)	100%	100%	98%	100%	100%	99%	100%	100%	97%	100%	98%	100%	97%	-

(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: Western Express Highway from Bandra to Borivali, Bandra to Nariman point via Dadar, Worli Naka, Haji Ali, Peddar Road, Babulnath Road, Charni Road, Marine Drive, Trident Hotel

MEDIUM DENSE: CST to Turbhe via Eastern express highway, Lokhandwala.

LOW DENSE: Andheri, Vesrova, Lokhandwala, Oshiwara link Road , Thane Market , VT.

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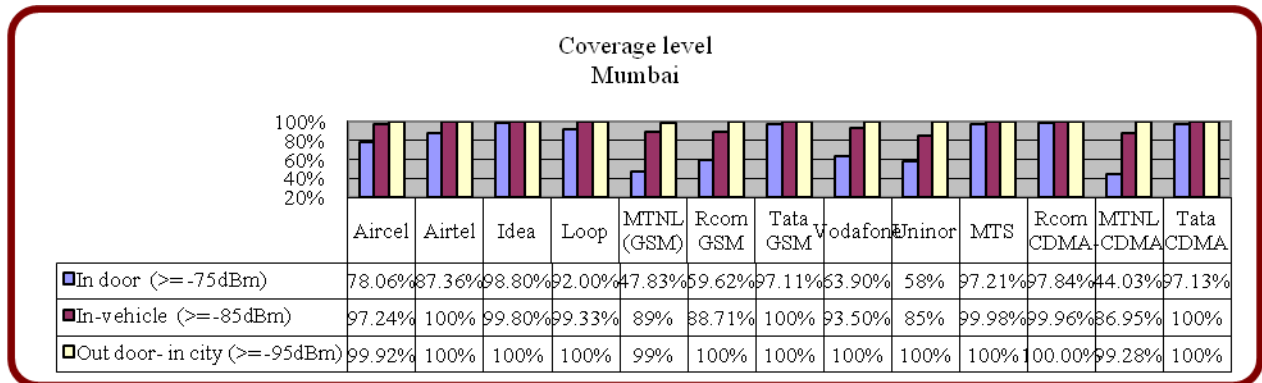
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(2). Performance Operator assisted drive test (for respective cities):

SN	Parameter	City Name	Aircel	Airtel	Idea	Loop	MTNL (GSM)	Rcom GSM	Tata GSM	Vodafone	Uninor	MTS	Rcom CDMA	MTNL-CDMA	Tata CDMA
			GSM Operators												
1.1	Call Attempts	Mumbai	183	225	215	195	253	202	275	250	147	202	212	283	293
1.2	Blocked Call Rate (<=3%)	Mumbai	1.63%	0.00%	0.00%	0.51%	3.58%	0.00%	0.36%	0.00%	3.40%	0.50%	0.00%	0.00%	0.00%
1.3	Dropped Call Rate (<=2%)	Mumbai	4.91%	0.00%	0.93%	1.02%	5.13%	0.50%	1.81%	0.40%	6.12%	0.00%	1.88%	3.53%	1.02%
1.4	Percentage of connections with good voice quality (=>95%)														
	(i) 0-4 (w/o frequency hopping)	Mumbai										98.91%	98.82%	88.13%	96.62%
	(ii) 0-5 (with frequency hopping)	Mumbai	90.50%	97.54%	94.9%	99.06%	95.35%	95.01%	95.97%	95.90%	91.21%				
1.5	Service Coverage	Mumbai													
	In door (>= -75dBm)	Mumbai	78.06%	87.36%	98.80%	92.00%	47.83%	59.62%	97.11%	63.90%	58%	97.21%	97.84%	44.03%	97.13%
	In-vehicle (>= -85dBm)	Mumbai	97.24%	100%	99.80%	99.33%	89%	88.71%	100%	93.50%	85%	99.98%	99.96%	86.95%	100%
	Out door- in city (>= -95dBm)	Mumbai	99.92%	100%	100%	100%	99%	100%	100%	100%	100%	100%	100.00%	99.28%	100%
1.6	Call Setup Success Rate (>=95%)	Mumbai	98.37%	100%	100%	99.49%	96.42%	100%	99.64%	100%	96.60%	99.50%	100%	100%	100%

Graphical Representation

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(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:

- Blocked Call Rate benchmark is not met by MTNL (GSM) & Uninor (3.58%) & (3.40%).
- For Drop call Rate parameter only Aircel, MTNL (GSM & CDMA) & Uninor in Mumbai in comparison to other operators.
- As far as Good voice quality is concerned it is found that only Aircel, Idea, uninor & MTNL (CDMA) are not meeting the benchmarks respectively.
- Videocon is having an ICR agreement with Loop.

(E) Independent Drive Test

.....Not conducted in Mumbai

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**. As far as parameter of worst affected cell > 3% TCH drop is concerned, only one operator MTNL(CDMA) is not complying the benchmark as well as in call drop rate is concerned TTSL(CDMA) is not satisfying the benchmarks respectively.

Regarding **Metering/Billing** cases for post-paid services, Vodafone & MTS are slightly deviating from the benchmark in comparison to other operators as well as in Prepaid service all the operators are complying the benchmarks .

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 is not is met in both Live & Month data audit, rest all operators are complying the benchmarks.

For Termination & closures cases, only MTS is not complying the benchmark .In Time taken to refunds of deposit TTSL (CDMA) is not satisfying the benchmark.

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

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