

**REPORT**  
**ON**  
**AUDIT & ASSESSMENT OF QUALITY OF SERVICE**  
**OF**  
**CELLULAR MOBILE TELEPHONE SERVICE**  
**FOR**  
**SOUTH ZONE – KARNATAKA CIRCLE**

***Report Period: Jan 2011 – March 2011***

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*- Not conducted for this quarter*

III. Broadband Service Providers

*- Not conducted for this quarter*

## CHAPTER-1: INTRODUCTION

### I. Background

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

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

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

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

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

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

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

## II. Objectives and Methodology

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

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

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 Karnataka 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. This has resulted in high value for ‘Cell exceeding 3% TCH drop’ parameter for some of the service providers.

## CHAPTER-2: EXECUTIVE SUMMARY

### I. Preface

This report highlights the findings for the audit & assessment of Quality of Service of Cellular Mobile Services in Karnataka Circle in 1<sup>st</sup> quarter (January – March 2011). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken for the period July – September 2010.

Following are the various operators covered in Karnataka circle (South 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	Feb-2011	1900-2000 Hrs
2	Airtel Ltd	Feb-2011	1900-2000 Hrs
3	BSNL	Mar-2011	1900-2000 Hrs
4	Etisalat	Feb-2011	1900-2000 Hrs
5	Idea	Feb-2011	1900-2000 Hrs
6	Reliance Communication (GSM)	Jan-2011	1900-2000 Hrs
7	Tata Communications (GSM)	Feb-2011	1900-2000 Hrs
8	Uninor	Feb-2011	1900-2000 Hrs
9	Videocon	Mar-2011	1900-2000 Hrs
10	Vodafone	Feb-2011	1900-2000 Hrs
<b>CDMA Operators</b>			
11	MTS (CDMA)	Feb-2011	1900-2000 Hrs
12	Reliance Communication (CDMA)	Feb-2011	1900-2000 Hrs
13	Tata Communications (CDMA)	Feb-2011	1900-2000 Hrs

**Note:** During Karnataka Circle Audit for Q1 it was found that Etisalat and Videocon service providers are under roll out obligation.

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

### (A) Cellular Mobile Telephone Services

3 days Live Data Audit		Bench- mark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videoc on	V-fone	MTS	Rcom CDMA	Tata CDMA
Name of Parameter			GSM Operators										CDMA Operators		
<b>Connection Establishment (Accessibility)</b>															
a) CSSR (Call Setup Success Rate)		>=95%	99.34%	99.25%	99.47%	99.62%	97.02%	99.70%	97.75%	99.29%	100%	98.89%	96.28%	99.56%	99.04%
b) SDCCH/PAGING congestion		<=1%	0.04%	0.21%	0.12%	0.00%	0.24%	0.04%	0.18%	0.01%	0.17%	0.04%	0.00%	0.00%	0%
c) TCH congestion		<=2%	0.04%	0.37%	0.82%	0.00%	0.37%	0.44%	0.49%	0.02%	0.00%	0.83%	0.47%	0.09%	0%
<b>Connection maintenance (retainability)</b>															
a) CDR		<=2%	0.50%	0.78%	0.79%	0.33%	1.20%	0.32%	1.03%	0.43%	1.96%	0.61%	0.34%	0.49%	0.03%
b) Worst affected cells>3% TCH drop		<=5%	2.43%	3.81%	1.13%	0.04%	3.70%	2.55%	7.59%	4.04%	3.33%	5.14%	1.00%	1.19%	0.00%
c) Good voice quality		>=95%	98.22%	98.75%	NA	99%	97.41%	98.67%	97.06%	98.82%	95.68%	95.87%	98.25%	NA	NA
<b>No. of POI's having congestion &gt;0.5%</b>			0	0	0	0	1	0	0	0	0	0	0	0	0
<b>Response time to customers for assistance</b>															
a) Accessibility of call centre/Customer Care		>=95%	100%	98%	99.9%	97.88%	57%	100%	100%	99%	100%	100%	100%	100%	100%
b) % call answered by operators(voice to voice) within 60 sec.		>=90%	100%	96.4%	96%	100%	70%	84.62%	97%	96%	100%	96.00%	98%	89%	100%

NA: Not Applicable, NP: Not Received

From the 3 days live data assessment, it is found that all the operators are meeting the network parameters by and large, except for Tata GSM & Vodafone not meeting the benchmark for “Worst affected cells>3% TCH drop” with the value of 7.59% & 5.14% respectively.

Performance related to customer care data is found to be satisfactory for most of the operators for the parameter “calls answered by operators (voice-to-voice)” except for Idea, RCOM GSM and RCOM CDMA respectively. Idea is having a below benchmark value for “accessibility of call centre” parameter.



**Month data assessment**

<b>One Month Data Audit</b>		<b>Bench-mark</b>	<b>Aircel</b>	<b>Airtel</b>	<b>BSNL</b>	<b>Etisalat</b>	<b>Idea</b>	<b>Rcom GSM</b>	<b>Tata GSM</b>	<b>Uninor</b>	<b>Videocon</b>	<b>Vodafone</b>	<b>MTS</b>	<b>Rcom CDMA</b>	<b>Tata CDMA</b>
<b>Name of Parameter</b>			<b>GSM Operators</b>										<b>CDMA Operators</b>		
<b>Network Service Quality Parameter</b>															
<b>Network Availability</b>															
a) BTS Accumulated Downtime		<=2%	0.03%	0.16%	1.35%	0.17%	0.03%	0.06%	0.05%	0.02%	0.88%	0.00%	0.17%	0.08%	0.01%
b) Worst affected BTSs due to downtime		<=2%	0.00%	0.00%	2.07%	0.00%	0.04%	0.10%	0.11%	0.00%	0.00%	0.04%	0.00%	0.05%	0.00%
<b>Connection Establishment (Accessibility)</b>															
a) CSSR (Call Setup Success Rate)		>=95%	99.37%	99.21%	99.73%	99.58%	97.19%	99.70%	97.38%	99.37%	98.11%	98.93%	96.08%	99.55%	99.76%
b) SDCCH/PAGING congestion		<=1%	0.05%	0.26%	0.13%	0.00%	0.30%	0.05%	0.31%	0.02%	0.08%	0.06%	0.00%	0.00%	0.00%
c) TCH congestion		<=2%	0.03%	0.38%	0.80%	0.00%	0.35%	0.49%	0.71%	1.00%	0.00%	0.13%	0.02%	0.08%	0.01%
<b>Connection maintenance (retainability)</b>															
a) CDR		<=2%	0.48%	0.99%	0.66%	0.27%	1.17%	0.32%	1.02%	0.43%	1.21%	0.54%	0.47%	0.51%	0.13%
b) Worst affected cells>3% TCH drop		<=5%	1.38%	3.61%	1.97%	0.03%	4.02%	2.50%	4.40%	0.40%	2.22%	3.88%	2.63%	1.23%	0.00%
c) Good voice quality		>=95%	98.21%	98.77%	NA	99.16%	97.46%	98.80%	96.97%	98.75%	95.62%	94.34%	98.26%	NA	NA
<b>POI congestion</b>		<=0.5%	0	0	0	0	1	0	0	3	0	0	0	0	0
<b>Customer Service Quality Parameters</b>															
<b>Metering/billing credibility-Post paid</b>		<= 0.1%	0.03%	0.03%	0.02%	NA	0.09%	0.10%	0.00%	NA	NA	0.08%	NA	0.09%	0.00%
<b>Metering /billing credibility-Pre paid</b>		<= 0.1%	0.03%	0.01%	0.03%	0.00%	0.31%	0.10%	0.00%	0.02%	0.00%	0.11%	0.09%	0.09%	0.02%
<b>Resolution of billing/ charging complaints</b>		100% within 4 weeks	100%	100%	100%	NA	100%	100.0%	100%	100%	NA	100%	100%	100%	99.82%
a) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints		<=1 week	100%	100%	100%	NA	100%	100%	100%	100%	NA	100%	100%	100%	100%
<b>Response time to customers for assistance</b>															
a) Accessibility of call centre/Customer Care		>=95%	100%	99.89%	97.40%	98.00%	91.99%	100%	100%	95.00%	100%	100%	97.30%	100%	92%
b) % call answered by operators(voice to voice) within 60 sec.		>=90%	95.87%	79%	97%	100%	48.38%	76.91%	75%	90.00%	100%	94.10%	95.08%	83.27%	93%
<b>Termination/closure of service</b>		<=7days	100%	100%	100%	NA	100%	100%	99.81%	NA	NA	100%	NA	100%	100%
<b>Time taken for refunds of deposits after closures.</b>		100% within 60 days	100%	100%	100%	NA	100%	100%	100%	NA	NA	100%	NA	100%	96.81%

NA: Not Applicable, NP: Not Received

From the month data assessment, it is found that all the operators are meeting the network parameters by and large, except for BSNL not meeting the benchmark for "worst affected BTS" with a value of 2.07%, and Vodafone not meeting the benchmark for %age of good voice quality with a value of 94.34%.

Performance related to customer care data is found to be satisfactory for most of the operators for the parameter "calls answered by operators (voice-to-voice)", with only Airtel, Idea, RGSM, Tata GSM, and Rcom CDMA not meeting the 90% benchmark. A below benchmark performance is observed in case of Idea (91.99%) for "accessibility of call centre" parameter. Idea & Vodafone are not meeting the benchmark for "Metering/Billing Credibility (Post/Pre-Paid)". Tata GSM is not meeting the benchmark for "termination of closure of service".

### Operator-Assisted Drive Test

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

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Unin or	V-fone	MTS	Rcom CDMA	Ta CDM	
			GSM Operators							CDMA Operators				
1.1	Blocked Call Rate (<=3%)	Bangalore	0	0.65		1.77	0	0.62	0	0	0.51	0.19	0	
		Mysore	0	3.62	5.18	6.43	0.8	1.39	0.36	0	0.85	0.6	0	
		Mangalore	0	1.42	6.6	13.07	0	1.05	0.5	0	0	0	0	
1.2	Dropped Call Rate (<=2%)	Bangalore	1.28	0.66		2.74	0.71	1.25	1.06	1.18	2.58	0	0	
		Mysore	0.32	1.15	0.68	3.05	0.81	0.35	0	0.43	2.01	0	0.8	
		Mangalore	0	0.98	3.03	3.01	0	3.19	0.1	0	1.92	0	0.6	
1.3	Percentage of connections with good voice quality (=>95%)													
		(i) 0-4 (w/o frequency hopping)	Bangalore									96.32	98.4	99.
			Mysore									96.61	98.37	98.
	Mangalore										98.36	99.45	99.	
	(ii) 0-5 ( with frequency hopping)	Bangalore	96.02	89.3		92.97	96.48	92.45	96.38	95				
		Mysore	96.11	88	95.37	90.1	96.53	91.66	97.17	93				
Mangalore		96.55	92	92.59	90.98	98.19	90.99	97.17	97					
1.4	Call Setup Success Rate (>=95%)	Bangalore	100	99.35		98.23	100	99.38	98.93	100	99.5	98.06	100	
		Mysore	100	96.38	95	93.57	98.4	98.61	97.99	100	99.1	99.3	100	
		Mangalore	100	98.58	93.4	86.93	100	98.95	99.64	100	100	100	100	

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

- Blocked Call Rate benchmark is not met by BSNL & Idea in Mysore (5.18% & 6.43%) and Mangalore (6.6% & 13.07%) respectively and Airtel in Mysore (3.62%).
- Drop call rate benchmark is not met by Idea & MTS in Bangalore (2.74% & 2.58%) and Mysore (3.05% & 2.01%) respectively.
- BSNL (3.03%), Idea (3.01%) & TATA GSM (3.19%) did not meet the Drop call rate benchmark in Mangalore.
- Good voice quality benchmark is not met by Airtel and Idea in all 3 cities.
- Tata GSM & Vodafone not meet Voice quality benchmark in Mysore, while BSNL and TATA GSM in Mangalore respectively.
- CSSR benchmark is not met by BSNL (93.4%) in Mangalore and Idea in Mysore (93.57%) & Mangalore (86.93%) respectively.

*Note: Due to Time constraint, BSNL Drive Test not had done in Bangalore.*

### Independent Drive Test

The Independent Drive Test was conducted at Karnataka in Bangalore, Mysore and Mangalore. Here again, zones were selected for covering different density areas (High, Medium & Low dense areas).

SN	Parameter	City Name	Aircel	Airtel	Idea	Rcom GSM	Tata GSM	Uninor	Vodafone	MTS	Rcom CDMA	Tata CDMA	
			GSM Operators						CDMA Operators				
1.1	Blocked Call Rate (<=3%)	Bangalore	0	3.55	1.7	0.7	1.83	1.28	2.8	0	1.5	0	
		Mysore	1.43	1.68	4.39	4.29	5.2	0.96	1.29	0.3	0.6	0	
		Mangalore	1.93	3.4	3.79	0.78	5.83	0.8	1.4	0.7	0	0	
1.2	Dropped Call Rate (<=2%)	Bangalore	3.72	3.06	1.8	0.7	1.22	1.31	0.74	3.6	0.38	0	
		Mysore	1.63	3.51	5.74	3	4.92	2.27	0.43	2.9	0.34	0.46	
		Mangalore	2.96	2.65	0	0	4.17	0.81	1.96	0	0	0.7	
1.3	Percentage of connections with good voice quality (=>95%)												
		(i) 0-4 (w/o frequency hopping)	Bangalore								95.68	98.79	99.92
			Mysore								96.73	98.32	99
	Mangalore									98.95	97.66	99	
	(ii) 0-5 (with frequency hopping)	Bangalore	95.92	93	92.97	95.69	88	96.26	96				
		Mysore	94.66	89	91.23	93.4	80	96.6	93				
Mangalore		97.02	89	91	97.6	86	97.72	89					
1.4	Call Setup Success Rate (>=95%)	Bangalore	100	96.44	98.43	99.3	98.17	100	97.18	100	98.44	100	
		Mysore	98.56	95.63	94.5	96	91.34	99.36	98.7	99.7	99.65	100	
		Mangalore	98.07	96.58	86.36	99.21	94.16	99.2	96.68	99.3	100	100	

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

- Good Voice Quality parameter is not met by Aircel(94.66%) & Rcom GSM(93.4%) in Mysore respectively and Vodafone in Mysore (93%) and Vodafone in Mangalore (89%).
- Airtel is deviating from the benchmarks for Dropped Call Rate & Good Voice Quality in all 3 cities and Blocked Call Rate in Bangalore (3.55%) & Mangalore (3.4%) respectively.
- Aircel is meeting all the benchmarks except showing deviation in Dropped Call Rate in Bangalore (3.72%) & Mangalore (2.96%) respectively.
- RCOM GSM is meeting all the benchmarks except for Blocked call rate & Drop call rate in Mysore (4.29% and 3% respectively).
- Good voice quality benchmark is not met by the Idea & Tata GSM in all 3 cities respectively.
- Blocked Call rate & CSSR benchmark is not met by Idea and Tata GSM in Mysore & Mangalore respectively.
- Drop Call rate benchmark is not met by Idea (5.74%), Tata GSM (4.92%), Uninor (2.27%) & MTS (2.9%) in Mysore respectively.

Note: Due to Time constraint, BSNL Drive Test was not conducted.

### III. PMR Verification

#### I. Cellular Mobile Telephone Service

PMR		Bench- mark	Audit	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videoc on	Vodaf one	MTS	Rcom CDM A	Tata CDM A
S/ N	Name of Parameter															
(A)	<b>Network Service Quality Parameter</b>															
1	<b>Network Availability</b>															
	BTS Accumulated Downtime	<=2%	Reported	0.04%	0.25%	1.69%	0.49%	0.05%	0.12%	0.05%	0.02%	0.21%	0.06%	0.12	0.11	0.03
			Verified	0.04%	0.25%	1.69%	0.49%	0.05%	0.12%	0.05%	0.02%	0.21%	0.06%	0.12	0.11	0.03
	Worst affected BTSs due to downtime	<=2%	Reported	0.00%	0.04%	1.94%	1.83%	0.14%	0.15%	0.03%	0.00%	0.00%	0.09%	0.00%	0.07%	0.00%
Verified			0.00%	0.04%	1.94%	1.83%	0.14%	0.15%	0.03%	0.00%	0.00%	0.09%	0.00%	0.07%	0.00%	
2	<b>Connection Establishment (Accessibility)</b>															
	CSSR (Call Setup Success Rate)	>=95%	Reported	98.67%	96.79%	98.00%	99.52%	99.85%	99.63%	99.64%	99.47%	97.96%	99.59%	98.25%	99.47%	99.47%
			Verified	98.67%	96.79%	98.00%	99.52%	99.85%	99.63%	99.64%	99.47%	97.96%	99.59%	98.25%	99.47%	99.47%
	SDCCH/PAGING congestion	<=1%	Reported	0.16%	0.45%	0.23%	0.01%	0.03%	0.11%	0.06%	0.03%	0.00%	0.06%	0.00%	0.00%	0.00%
			Verified	0.16%	0.45%	0.23%	0.01%	0.03%	0.11%	0.06%	0.03%	0.00%	0.06%	0.00%	0.00%	0.00%
	TCH congestion	<=2%	Reported	0.32%	0.48%	0.84%	0.00%	0.42%	0.42%	0.11%	0.01%	0.00%	0.13%	0.24%	0.05%	0.05%
			Verified	0.32%	0.48%	0.84%	0.00%	0.42%	0.42%	0.11%	0.01%	0.00%	0.13%	0.24%	0.05%	0.05%
	3	<b>Connection maintenance (retainability)</b>														
CDR		<=2%	Reported	0.47%	1.40%	1.33%	0.00%	1.24%	0.38%	1.08%	0.40%	1.33%	0.70%	0.44%	0.60%	0.21%
			Verified	0.47%	1.40%	1.33%	0.00%	1.24%	0.38%	1.08%	0.40%	1.33%	0.70%	0.44%	0.60%	0.21%
Worst affected cells>3% TCH drop		<=5%	Reported	2.35%	4.54%	3.80%	0.06%	4.66%	2.22%	4.80%	4.67%	0.00%	4.98%	1.07%	1.23%	0.16%
			Verified	2.35%	4.54%	3.80%	0.06%	4.66%	2.22%	4.80%	4.67%	0.00%	4.98%	1.07%	1.23%	0.16%
Good voice quality		>=95%	Reported	98.07%	98.20%	98.33%	98.38%	97.00%	98.82%	96.99%	99.04%	99.03%	98.77%	99.79%	98.92%	99.66%
			Verified	98.07%	98.20%	98.33%	98.38%	97.00%	98.82%	96.99%	99.04%	99.03%	98.77%	99.79%	98.92%	99.66%
4		<b>No. of POI's having congestion &gt;0.5%</b>	Reported	0	0	0	0	0	0	0	0	0	0	1	0	0
	Verified		0	0	0	0	0	0	0	0	0	0	1	0	0	
(B)	<b>Customer Service Quality Parameters</b>															
5	<b>Metering/billing credibility-Post paid</b>	<= 0.1%	Reported	0.10%	0.10%	0.05%	NA	0.10%	0.07%	0.00%	NA	NA	0.08%	NA	0.07%	0.01%
			Verified	0.10%	0.10%	0.05%	NA	0.10%	0.07%	0.00%	NA	NA	0.08%	NA	0.07%	0.01%

6	Metering /billing credibility-Pre paid	<= 0.1%	Reported	0.10%	0.10%	0.04%	0.03%	0.02%	0.03%	0.00%	0.09%	0.00%	0.05%	0.19%	0.05%	0.06%	
			Verified	0.10%	0.10%	0.04%	0.03%	0.02%	0.03%	0.00%	0.09%	0.00%	0.05%	0.19%	0.05%	0.06%	
7	Resolution of billing/ charging complaints	100% within 4 weeks	Reported	100%	100%	100%	100%	100%	100.0%	100%	100%	NA	100%	100%	100%	100%	
			Verified	100%	100%	100%	100%	100%	100.0%	100%	100%	100%	NA	100%	100%	100%	100%
	Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	Reported	100%	100%	100%	NA	100%	100%	100%	100%	NA	NA	100%	100%	100%	100%
			Verified	100%	100%	100%	NA	100%	100%	100%	100%	NA	NA	100%	100%	100%	100%
8	Response time to customers for assistance		Reported														
			Verified														
	Accessibility of call centre/Customer Care	>=95%	Reported	100%	100%	98.00%	99.30 %	99%	100%	100%	92.59%	100%	100%	97%	100%	95%	
			Verified	100%	100%	98.00%	99.30 %	99%	100%	100%	92.59%	100%	100%	97%	100%	95%	
% call answered by operators(voice to voice) within 60 sec.	>=90%	Reported	87.30%	92.00%	92.72%	99.86 %	81.50 %	83%	86.43%	93.74%	100%	86.63 %	92.82 %	90%	92.58 %		
		Verified	87.30%	92.00%	92.72%	99.86 %	81.50 %	83%	86.43%	93.74%	100%	86.63 %	92.82 %	90%	92.58 %		
9	Termination/closure of service																
	No. of requests for Termination / Closure of service complied within 7 days during the quarter	<=7days	Reported	100%	100%	100%	NA	99.84%	100%	99.90%	NA	NA	100%	NA	100%	100%	
			Verified	100%	100%	100%	NA	99.84%	100%	99.90%	NA	NA	100%	NA	100%	100%	
10	Time taken for refunds of deposits after closures.	100% within 60 days	Reported	100%	100%	100%	NA	100%	100%	100%	NA	NA	100%	NA	100%	99%	
			Verified	100%	100%	100%	NA	100%	100%	100%	NA	NA	100%	NA	100%	99%	

### Critical Analysis (PMR Verification):

- The figures proved by all the operators match the figures obtained on verification.
- In case of POI congestion, only MTS (1%) is not meeting the benchmark with minimal margin.
- MTS is not meeting the benchmark for "Metering/Billing Credibility-Prepaid".
- Accessibility of Uninor's Customer Care Centre is very poor (92.59%).
- "% call answered by operators (voice to voice) within 60 sec." benchmark is not met by Aircel, Idea, RCOM GSM, Tata-GSM, &Vodafone.
- Idea & Tata-GSM don't meet the 7-days' benchmark for "Resolution of complaints". Tata-CDMA is not meeting the 60 days' benchmark for "Refund of deposits after closure of connection".

## CHAPTER-4: DETAILED FINDINGS &amp; ANALYSIS

## I. Cellular Mobile Telephone Service

## (A) MSC Audit

## (1) 3 Days Live Data Assessment &amp; Summarized Findings

S/N	Name of Parameter	Bench- mark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videoc on	Vodafo ne	MTS	Rcom CDMA	Tata CDMA
			GSM Operators										CDMA Operators		
<b>A</b>	<b>Network Service Quality Parameter</b>														
<b>1</b>	<b>Connection Establishment (Accessibility)</b>														
	a) CSSR	>=95%	99.34%	99.25%	99.47%	99.62%	97.02%	99.70%	97.75%	99.29%	100%	98.89%	96.28%	99.56%	99.04%
	b) SDCCH/PAGING congestion	<=1%	0.04%	0.21%	0.12%	0.00%	0.24%	0.04%	0.18%	0.01%	0.17%	0.04%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.04%	0.37%	0.82%	0.00%	0.37%	0.44%	0.49%	0.02%	0.00%	0.83%	0.47%	0.09%	0.00%
<b>2</b>	<b>Connection maintenance</b>														
	a) CDR	<=2%	0.50%	0.78%	0.79%	0.33%	1.20%	0.32%	1.03%	0.43%	1.96%	0.61%	0.34%	0.49%	0.03%
	b) Cells having > 3% TCH drop	<=5%	2.43%	3.81%	1.13%	0.04%	3.70%	2.55%	7.59%	4.04%	3.33%	5.14%	1.00%	1.19%	0.00%
	c) Good voice quality	>=95%	98.22%	98.75%	NA	99.00%	97.41%	98.67%	97.06%	98.82%	95.68%	95.87%	98.25%	NA	NA
	d) No. of cells > 3% TCH drop		191	846	247	0.53	490	231	1018	258	3	1394	103	23	0
	e) Total no. of cells in the network		7872	22188	21729	63	13528	9060	13416	6397	90	20852	8143	1961	2640
<b>3</b>	<b>No. of POI's having congestion &gt;0.5%</b>		0	0	0	0	1	0	0	0	0	0	0	0	0
	a) Name of POI not meeting the benchmark						Airtel, BSNL CELLO NE								
	b) Total No. of circuits on POI		2,329,779	232,304	45,417	1,236	102,869	88,173	3,277	14,926	479	79,393	29,712	88,173	42,651
	c) Avg No. of call attempts on POI		412,984	6,600,600	469,433	4,883	1,855,875	775,424	203,160	258,649	474	2,134,352	787,032	775,424	98,748,818
	d) Avg traffic served on POI (Erlang)		11,374	116,301	18,315	33	67,130	31,744	2,488	6,996	455	45,828	20,122	31,744	16,782
	e) Total number of working POI Service Area wise		38	152	38	50	49	128	3	44	29	134	51	128	145
	f) Equipped Capacity of Network in respect of Traffic in erlang		78434	647729	57752	93	131593	83879	225272	54320	NP	4517	15266	218251	246656
	g) Total traffic handled in TCBH in erlang		16789	484549	24775	26	114330	33453	89213	7521	NP	3568	8836	56872	23686
<b>(B)</b>	<b>Customer Service Quality Parameters</b>														
<b>4</b>	<b>Response time to customers for assistance</b>														
	a) Accessibility of call centre	>=95%	100%	98%	99.9%	97.88%	57%	100%	100%	99%	100%	100%	100%	100%	100%
	b) % of call answered by operators(voice to voice) within 60 sec	>=90%	100%	96.40%	96%	100%	70%	84.62%	97%	96%	100%	96%	98%	89%	100%
	c) No. of call attempts to call centre / customer care nos. during TCBH (Avg)		100	100	255,605	94	100	100	100	100	100	100	50	100	100
	d) No. of calls connected and answered successfully to call centre / customer care nos. during TCBH (Avg)		100	98	255,405	92	57	100	100	99	100	100	50	100	100

NA: Not Applicable, NP: Not Provided

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

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

- **Call setup success rate (benchmark  $\geq 95\%$ ):** All operators are meeting the benchmark with values lying between 96.28% and 100%.
- **SDCCH/PAGING Channel congestion (benchmark  $\leq 1\%$ ):** All operators are meeting the benchmark with values lying between 0% and 0.24%.  
*Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.*
- **TCH congestion (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark with values lying between 0% and 0.83%.
- **Call drop rate (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark with values lying between 0.03% and 1.96%.
- **Cell exceeding 3% TCH drop (benchmark  $\leq 5\%$ ):** Except for Tata GSM & Vodafone with a value of 7.59% & 5.14% respectively, rest of the operators are satisfying the benchmark with value in between 0% and 4.04%.
- **Connections with good voice quality (benchmark  $\geq 95\%$ ):** 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 95.87% and 99%.
- **No. of POI's having Congestion  $>0.5\%$ :** Except for Idea with 1 no. of POI having congestion  $>0.5\%$ , rests of the operator are meeting the benchmark. There was no congestion found overall on the POI, 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.
- **%age of call answered by operator (electronically) (benchmark  $>95\%$ ):** Except for Idea, all operators are meeting the benchmark with values lying between 97.88% to 100%.
- **%age of call answered by operator (Voice to voice) (benchmark  $>90\%$ ):** Except for Idea, RCOM GSM & RCOM CDMA, rest of the operator are meeting the benchmark with value in between 96% and 100%.

## (2) Month Data Assessment & Summarized Findings

S/N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators										CDMA Operators		
(A)	<b>Network Service Quality Parameter</b>														
1	<b>Network Availability</b>														
	a) BTS Accumulated Downtime	<=2%	0.03%	0.16%	1.35%	0.17%	0.03%	0.06%	0.05%	0.02%	0.88%	0.00%	0.17%	0.08%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	2.07%	0.00%	0.04%	0.10%	0.11%	0.00%	0.00%	0.04%	0.00%	0.05%	0.00%
	c) Total no. of BTSs in the licensed service area		2,717	8,007	3,657	21	4,421	1,401	4,561	2,133	10	7,144	854	1,961	872
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		501	8,488	36,567	24	938	3,020	1,639	344	66	24	965	1,039	85
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	1	76	0	2	3	5	0	0	3	0	1	0
2	<b>Connection Establishment (Accessibility)</b>														
	a) CSSR (Call Setup Success Rate)	>=95%	99.37%	99.21%	99.73%	99.58%	97.19%	99.70%	97.38%	99.37%	98.11%	98.93%	96.08%	99.55%	99.76%
	b) SDCCH/PAGING congestion	<=1%	0.05%	0.26%	0.13%	0.00%	0.30%	0.05%	0.31%	0.02%	0.08%	0.06%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.03%	0.38%	0.80%	0.00%	0.35%	0.49%	0.71%	1.00%	0.00%	0.13%	0.02%	0.08%	0.01%
3	<b>Connection maintenance (retainability)</b>														
	a) CDR	<=2%	0.48%	0.99%	0.66%	0.27%	1.17%	0.32%	1.02%	0.43%	1.21%	0.54%	0.47%	0.51%	0.13%
	b) Worst affected cells>3% TCH drop	<=5%	1.38%	3.61%	1.97%	0.03%	4.02%	2.50%	4.40%	0.40%	2.22%	3.88%	2.63%	1.23%	0.00%
	c) Good voice quality	>=95%	98.21%	98.77%		99.16%	97.46%	98.80%	96.97%	98.75%	95.62%	94.34%	98.26%	NA	NA
	d) Total No. of cells exceeding 3% TCH drop (call drop)		109	803	429	0.046	537	226.67	593	25	2	1019	70	24	0
	e) Total no. of cells in the network		7872	22188	21729	63	13528	9060	13416	6397	90	20852	8143	1961	2640
4	<b>No. of POI's having congestion &gt;0.5%</b>		0	0	0	0	1	0	0	3	0	0	0	0	0
	a) Name of POI not meeting the benchmark						Airtel, BSNL CELLONE			BSNL L1 LOCAL, Airtel, Reliance					
	b) Total No. of call attempts on POI (Avg.)		425,258	6,505,600	653,452	47,126	2,149,091	765,311	206,622	283,184	580	2,056,766	850,884	765,311	101,140,420
	c) Total traffic served on POI (Erlang) (Avg.)		11,593	113,964	17,498	32	71,393	31,488	2,536	7,260	455	41,674	21,369	31,488	16,797
	d) Total No. of circuits on POI		2,329,779	232,304	45,417	1,236	102,869	88,173	3,277	14,926	479	79,393	29,712	88,173	42,651



	e) Total number of working POI Service Area wise		38	152	38	50	49	128	3	44	29	134	51	128	145
	f) Capacity of POI		82,810	225,550	27,461	1,690	100,989	82,688	3,165	13,332	9,002	71,904	28,785	82,688	39,005
5	<b>Network Data</b>														
	a) Equipped Capacity of Network Erlang		78434	647729	57752	93	131593	83879	225272	54320	1743	4517	15266	218251	246656
	b) Total traffic in TCBH in erlang (Avg.)		16789	484549	24775	26	114330	33453	89213	7521	10	3568	8836	56872	23686
	c) Total no. of customers served (as per VLR) on last day of the month		667713	13660676	1853845	1785	3466805	NP	3230804	393212	693	3929925	865893	NP	790647
(B)	<b>Customer Service Quality Parameters</b>														
6	<b>Metering/billing credibility-Post paid</b>	$\leq 0.1\%$	0.03%	0.03%	0.02%	NA	0.09%	0.10%	0.00%	NA	NA	0.08%	NA	0.09%	0.00%
	a) No. of bills issued during the period		7236	833066	147196	NA	79518	21383	20499	NA	NA	385754	NA	246900	257489
	b) No. of bills disputed including billing complaints during the period		2	229	30	NA	73	22	125	NA	NA	327	NA	220	4
7	<b>Metering /billing credibility-Pre paid</b>	$\leq 0.1\%$	0.03%	0.01%	0.03%	0.00%	0.31%	0.10%	0.00%	0.02%	0.00%	0.11%	0.09%	0.09%	0.02%
	a) No. of charging / credit / validity complaints during the quarter		566	685	1678	0	1135	412	4724	187	0	6733	1083	279	220
	b) Total no. of pre-paid customers at the end of the quarter		1,855,239	13,782,694	5021073	8,800	3,708,399	4,127,659	6,777,953	855,328	8,951	5,896,957	1,257,771	3,047,847	1,415,260
8	<b>Resolution of billing/ charging complaints</b>	<i>100% within 4 weeks</i>	100%	100%	100%	NA	100%	100.0%	100%	100%	NA	100%	100%	100%	99.82%
	a) No. of billing/(post paid) and charging, credit/validity (pre paid) complaints resolved within 4 weeks during the quarter		570	914	1708	-	1208	434	4849	187	-	7060	1083	499	2797
	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		570	914	1708	-	1208	434	4849	187	-	7060	1083	499	2797
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		518	914	1703	-	1122	58	37	187	-	6919	715	199	224
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		52	0	5	-	86	376	4812	0	-	141	368	300	2573
	e) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	$\leq 1$ week	100%	100%	100%	NA	100%	100%	100%	100%	100%	NA	100%	100%	100%

9	<b>Response time to customers for assistance</b>														
	a) Accessibility of call centre/Customer Care	>=95%	100%	99.89%	97.40%	98%	91.99%	100%	100%	95%	100%	100%	97.30%	100%	92.00%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	95.87%	79%	97%	100%	48.38%	76.91%	75%	90%	100%	94.10%	95.08%	83.27%	93%
	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		1,347,513	28,398,738	181988	1,065	4,074,759	276,637	8,261,705	620,197	100	4,422,919	36,270	735,937	334,168
d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		1,347,513	28,367,813	177166	1,049	3,748,385	276,637	8,261,705	586,207	100	4,422,919	35,290	735,937	305,251	
10	<b>Termination/closure of service</b>	<=7days	100%	100%	100%	NA	100%	100%	99.81%	NA	NA	100%	NA	100%	100%
	a) Total No. of requests for Termination / Closure of service received during the quarter		25	5,533	2765	NA	389	237	770,569	NA	NA	6,091	NA	1,232	2,868
	b) No.of requests for Termination / Closure of service complied within 7 days during the quarter		25	5,533	2765	NA	389	237	535	NA	NA	6,091	NA	1,232	2,868
11	<b>Time taken for refunds of deposits after closures.</b>	100% within 60 days	100%	100%	100%	NA	100%	100%	100%	NA	NA	100%	NA	100%	96.81%

NA: Not Applicable, NP: Not Provided

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

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

- **BTS accumulated downtime (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark with values lying between 0.03% and 1.35%.
- **Worst affected BTSs due to downtime (benchmark  $\leq 2\%$ ):** Except BSNL, all operators are meeting the benchmark with values lying between 0% and 0.11%.
- **Call setup success rate (benchmark  $\geq 95\%$ ):** All operators are meeting the benchmark with values lying between 96.08% and 99.76%.
- **SDCCH/PAGING Channel congestion (benchmark  $\leq 1\%$ ):** All operators are meeting the benchmark with values lying between 0% and 0.31%.  
*Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.*
- **TCH congestion (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark with values lying between 0% and 1%.
- **Call drop rate (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark with values lying between 0.13% and 1.21%.
- **Cell exceeding 3% TCH drop (benchmark  $\leq 5\%$ ):** All the operators are satisfying the benchmark with value in between 0.40% and 4.4%.
- **Connections with good voice quality (benchmark  $\geq 95\%$ ):** CDMA service providers have declared that the parameter is not system generated. Except for Vodafone with a value of 94.34% Rest of the GSM operators are meeting the benchmark with values lying between 95.62% and 99.16%.
- **No. of POI's having Congestion  $>0.5\%$ :** Except for Idea and Uninor with 1 & 3 no. of POI's respectively having congestion  $>0.5\%$ , Rest of the operators are meeting the benchmark. There was no congestion found overall on the POI, 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.
- **%age of call answered by operator (electronically) (benchmark  $>95\%$ ):** Except for Idea & Tata CDMA, all operators are meeting the benchmark with values lying between 95% to 100%.
- **%age of call answered by operator (Voice to voice) (benchmark  $>90\%$ ):** Except for Airtel, Idea, Tata GSM, RCOM GSM & RCOM CDMA, all operators are meeting the benchmark with values lying between 90% to 100%.
- **Metering and billing credibility-Postpaid (benchmark  $\leq 0.1\%$ ):** All operators are meeting the benchmark.
- **Metering and billing credibility-Pre paid (benchmark  $\leq 0.1\%$ ):** Except for Idea & Vodafone with value of 0.31% & 0.11% respectively, all the operators are meeting the benchmark with values lying between 0% and 0.1%.
- **Resolution of billing/ charging complaints (benchmark 100% within 4 weeks):** Except For Tata CDMA, All operators are meeting the benchmark.
- **Termination/Closure of service (Benchmark  $\leq 7$  days):** Except for Tata GSM, all operators have satisfied the benchmark.
- **Time taken for refunds of deposits after closures (benchmark 100% within  $\leq 60$  days):** Except for Tata CDMA, all operators have satisfied the benchmark.

**(1) Sample Coverage**

Switches/BSC/BTS details of operators:

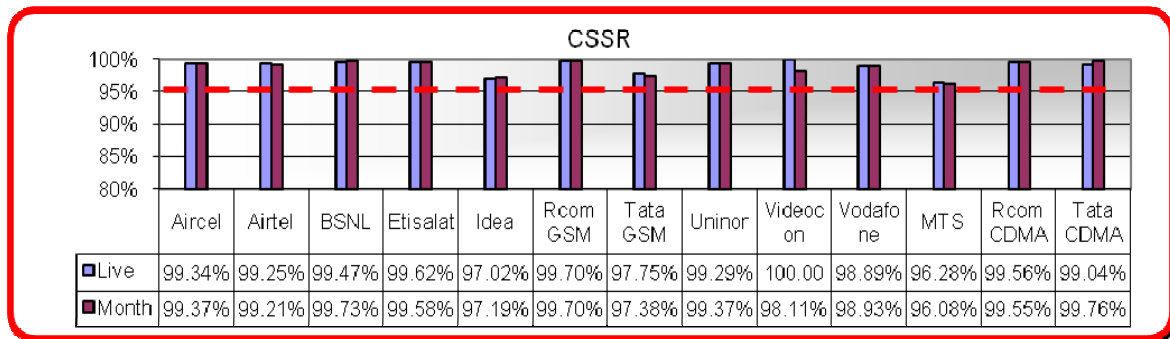
Sl.	Name of Service Provider	No. of MSC	No. of BSC	No. of BTS
<b>GSM Operators</b>				
1	Aircel Ltd	2	18	2717
2	Airtel Ltd	41	94	8008
3	BSNL		56	3657
4	Etisalat	1	4	21
5	Idea	5	72	4421
6	Reliance Communication (GSM)	3	18	3020
7	Tata Communications (GSM)	7	32	4561
8	Uninor	2	12	2110
9	Videocoin	1	1	10
10	Vodafone	10	101	7144
<b>CDMA Operators</b>				
11	MTS (CDMA)	1	3	854
12	Reliance Communication (CDMA)	8	6	1961
13	Tata Communications (CDMA)	5	11	872

**(2) Performance (Graphical Representation)**

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

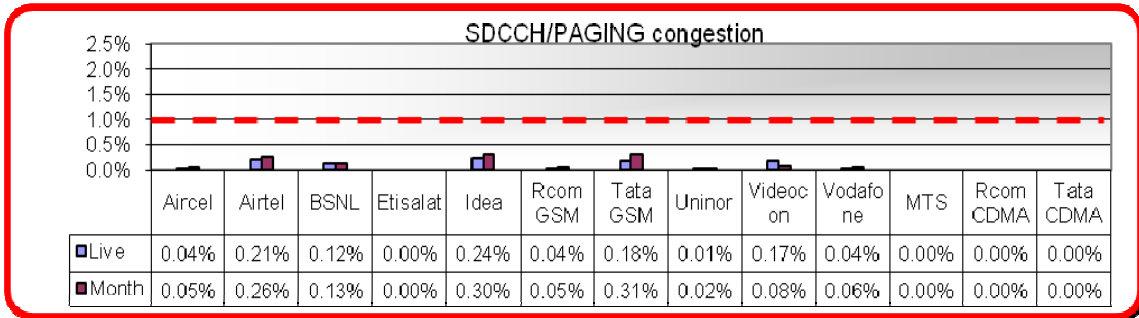
## A) NETWORK PERFORMANCE

- I. **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.

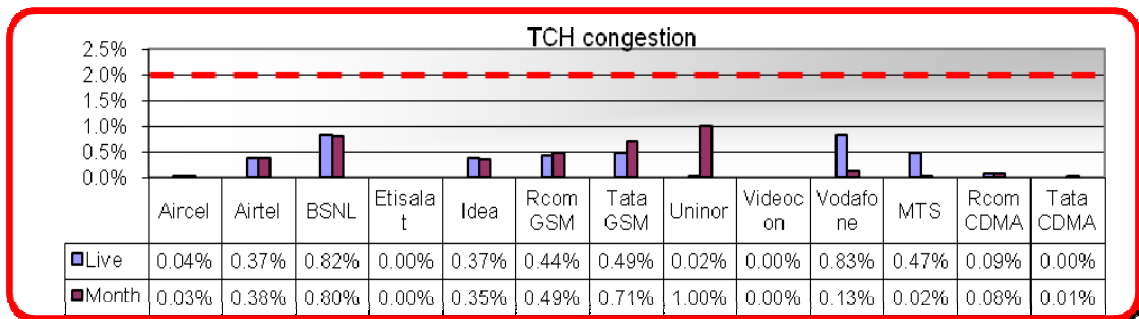


**II. Blocked call rate:**

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

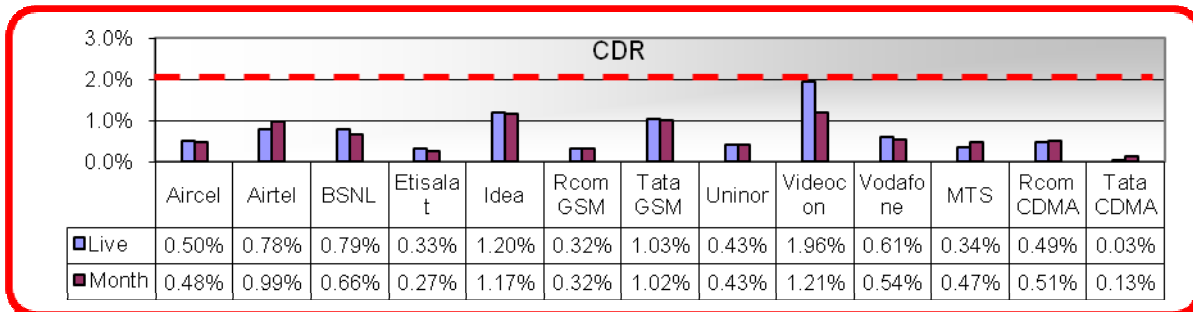


**TCH congestion (%):** All operators are meeting the TRAI benchmarks ( $\leq 2\%$ ) for both one month data and 3 days live data taken in the month of audit.

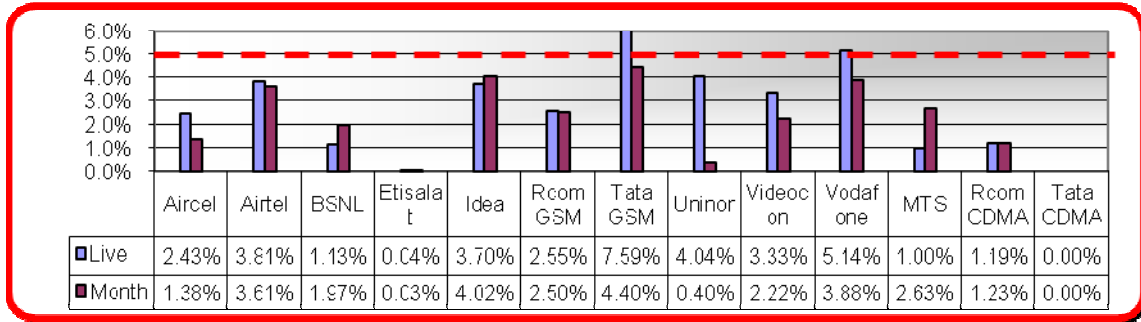


**III. Connection Maintainability (Retainability):**

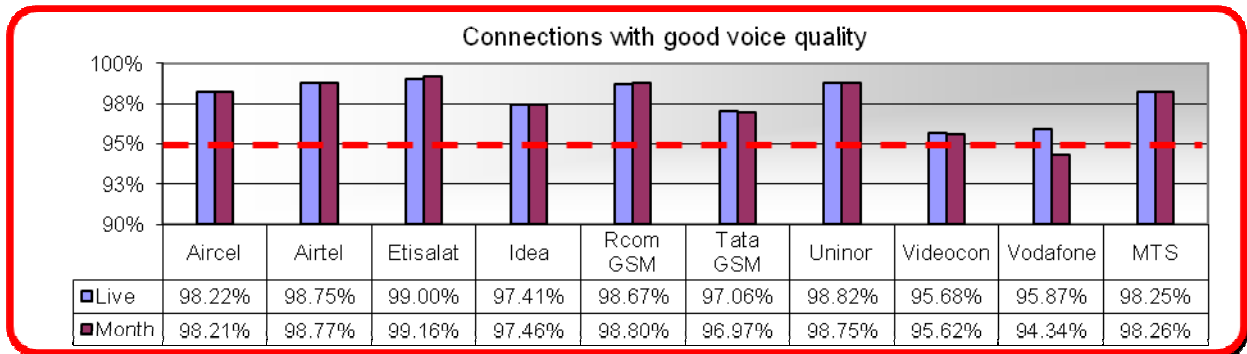
**Call drop rate (%):** All operators are meeting the TRAI benchmarks ( $\leq 2\%$ ) for both one month data and 3 days live data taken in the month of audit.



**Worst affected Cell exceeding 3% TCH Drop:** For live data, Tata GSM & Vodafone with a value of 7.59% and 5.14% respectively is found not meeting the benchmark of  $\leq 5\%$ . Rests of the operators are meeting the benchmark for both cases.

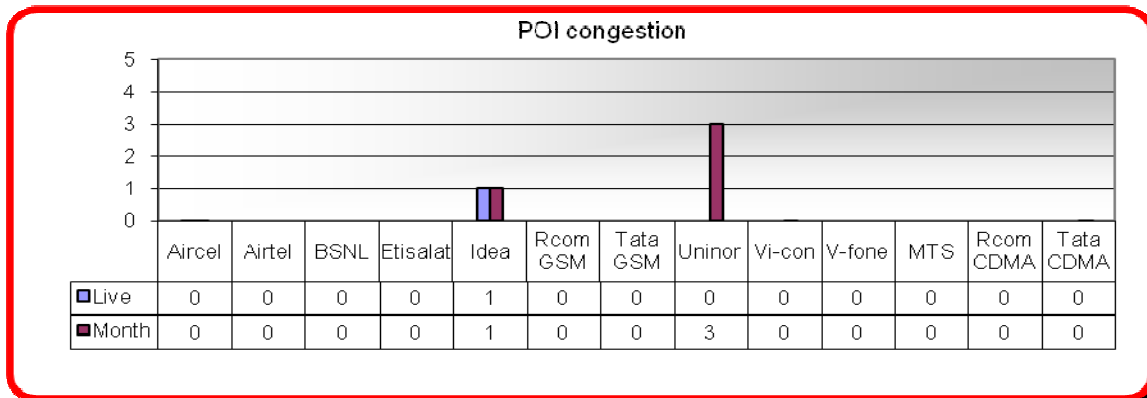


**Percentage of connections with good voice quality (benchmark  $\geq 95\%$ ):** For month data except Vodafone All operators are meeting the TRAI benchmarks ( $\Rightarrow 95\%$ ) for both one month data and 3 days live data taken in the month of audit. Data has not been provided by BSNL for both Live & month data audit. In case of BSNL, RCOM CDMA and TATA CDMA the data is not generated in the system.



**No. of POI having Congestion  $>0.5\%$  congestion:**

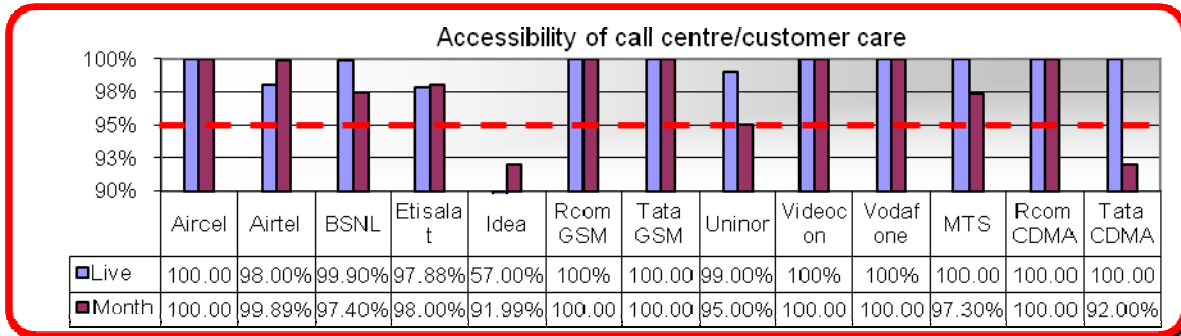
M/s Uninor has 3 no of POIs for the month and M/s idea has one no of POI for Live and month having congestion  $>0.5\%$ .



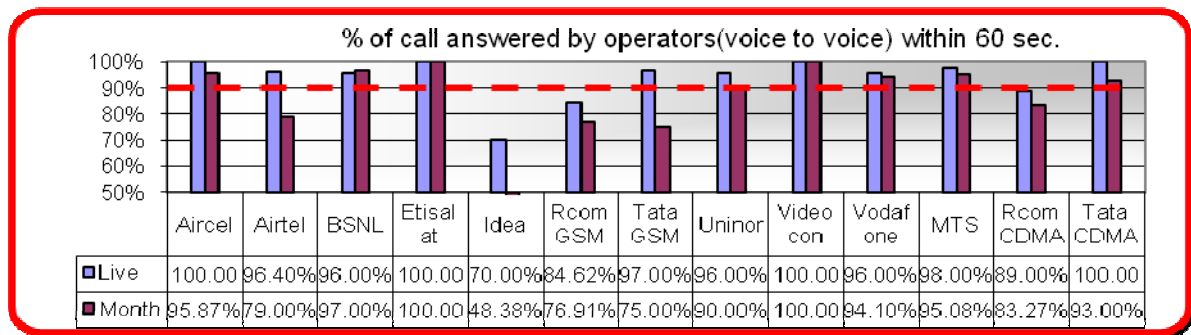
B) CUSTOMER SERVICE QUALITY PARAMETERS

(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 taken in the month of audit except for Tata CDMA in live data audit (92.23%) and Idea for both cases (91.99% for month data audit & 57% for live data audit).



**Percentage of call answered by operators (Voice to voice) within 60 sec:** For Live data, only Idea, Reliance-GSM & CDMA are not meeting the benchmark. For month data, only Airtel, Idea, Reliance GSM, Tata-GSM & Reliance CDMA are not meeting the benchmark. Rest all operators are meeting benchmark.



(3) Critical Analysis

The above comparative study between live data & month data shows similar trends in both the cases. However, inconsistency in live & month data was found for parameters like “worst affected cells >3% TCH drop” (Tata GSM & Vodafone), “accessibility of call centre” (Tata-CDMA) and “%age of calls answered by operator” (Airtel & Tata GSM).

**(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	BSNL	Etisalat	Idea	Reliance (GSM)	Tata (GSM)	Uninor	Videocon	Vodafone	MTS	Reliance (CDMA)	Tata (CDMA)
<b>Total No. of calls</b>	5	8	5	-	4	7	4	-	-	10	-	5	5
<b>Cases resolved with 4 weeks</b>	5	8	5	-	4	7	4	-	-	10	-	5	5
<b>%age of cases resolved</b>	100%	100%	100%	-	100%	100%	100%	-	-	100%	-	100%	100%

**(3) Live calling to call center:**

Fifty nos. of calls were made at Bangalore in each half and below given no. of calls got connected to the call center within 60 sec.

	Calls made	OPERATORS NAME													
		Aircel	Airtel	BSNL	Etisalat	Idea	Rcom	Tata	Videocon	Vodafone	Uninor	MTS	Rcom	Tata	
		GSM										CDMA			
1ST HALF (10AM TO 01 PM)	50	46	42	44	46	39	46	46	46	46	44	46	46	41	
2ND HALF (04PM TO 07 PM)	50	44	36	40	41	22	37	33	45	41	39	44	39	42	
In % age		90.00	78.00	84.00	87.00	61.00	83.00	79.00	91.00	87.00	83.00	90.00	85.00	83.00	

**(4) Level 1 Calling:** Level 1 calling such as calling at emergency no. (Police, Fire, Hospital), Railway enquiry system etc were made so as to check the service of such short codes. In Bangalore it was found to be functional.

**(5) Critical Analysis**

Random numbers were selected from the operators' database of billing/metering complaints and calls were made to the customers to get their feedback for complaint redressal. It was found that the operators had made refunds in 100% cases as claimed by their records.



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

A sample of 2x50 test calls per Service Providers with in the licensed service area (Karnataka 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	BSNL	Etisalat	Idea	Reliance (GSM)	Tata (GSM)	Uninor	Videocon	Vodafone	MTS	Reliance (CDMA)	Tata (CDMA)
<b>Aircel</b>	-	98%	99%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
<b>Airtel</b>	100%	-	99%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
<b>BSNL</b>	100%	100%	-	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
<b>Etisalat</b>	100%	100%	100%	-	100%	100%	100%	100%	100%	100%	100%	97%	100%
<b>Idea</b>	100%	98%	98%	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%
<b>Tata (GSM)</b>	99%	96%	100%	100%	100%	97%	-	97%	100%	100%	100%	100%	100%
<b>Uninor</b>	100%	100%	99%	100%	100%	100%	100%	-	100%	100%	100%	100%	100%
<b>Videocon</b>	100%	98%	100%	100%	99%	98%	100%	100%	-	99%	100%	100%	99%
<b>Vodafone</b>	99%	100%	100%	100%	100%	100%	100%	100%	100%	-	100%	100%	100%
<b>MTS</b>	100%	98%	100%	100%	100%	100%	100%	100%	100%	98%	-	100%	100%
<b>Reliance (CDMA)</b>	99%	100%	100%	100%	100%	100%	100%	98%	100%	100%	100%	-	100%
<b>Tata (CDMA)</b>	98%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	-

**(3) Critical Analysis**

In the inter-operator call assessment test, calls were made from one operator to other operators so as to check congestion on both the operators' network. In such cases, the radio part, switch part & the POI in-between the operators are involved and hence if any congestion is found in the network, it may be due to any of these parts. The result shows that there is not much congestion on the operator networks.

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

The Operator Assisted Drive Test was conducted at Karnataka 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*****BANGALORE***

LOW DENSE: Yeshwantpur, Mathekeri  
 MEDIUM DENSE: Kormanagala, BTM, Jaynagar, JP Nagar, Madiwala, Silk Board.  
 HIGH DENSE: MG Road, Commercial Street, Richmond flyover

***MYSORE***

LOW DENSE: Ring Road, Bogadi, Banni Mantap  
 MEDIUM DENSE: Hebbal ind. Area, JP Nagar, Railway Station.  
 HIGH DENSE: Mandi Mohalla, KT Street, NR Mohalla, and Sabar Street

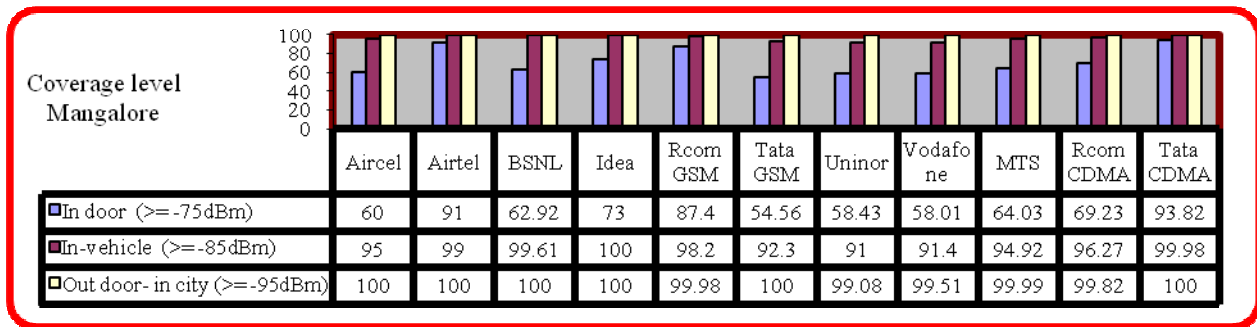
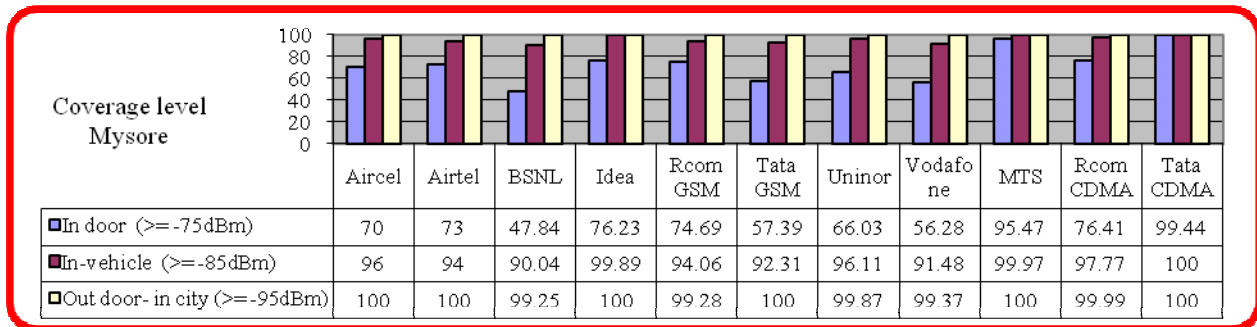
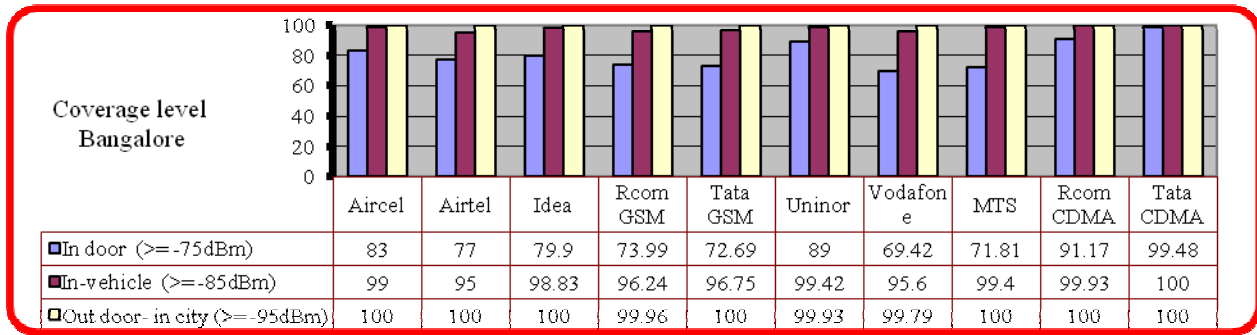
***MANGALORE***

LOW DENSE: Mangala nagar, Pandeshwara, kotara, Lady hill, Landlinks  
 MEDIUM DENSE: Velensiya, Urwa, Kadari Park  
 HIGH DENSE: Kankanadi circle, Balmatta circle, State Bank, Hampankatta circle, Darodi, Lalbagh

## 2) Performance (for the respective cities)

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators									CDMA Operators	
1.1	Call Attempts	Bangalore	156	153		113	141	161	188	170	195	258	186
		Mysore	310	276	309	280	250	288	553	232	351	289	245
		Mangalore	125	211	212	153	125	95	199	112	156	140	147
1.2	Blocked Call Rate (<=3%)	Bangalore	0	0.65		1.77	0	0.62	0	0	0.51	0.19	0
		Mysore	0	3.62	5.18	6.43	0.8	1.39	0.36	0	0.85	0.6	0
		Mangalore	0	1.42	6.6	13.07	0	1.05	0.5	0	0	0	0
1.3	Dropped Call Rate (<=2%)	Bangalore	1.28	0.66		2.74	0.71	1.25	1.06	1.18	2.58	0	0
		Mysore	0.32	1.15	0.68	3.05	0.81	0.35	0	0.43	2.01	0	0.82
		Mangalore	0	0.98	3.03	3.01	0	3.19	0.1	0	1.92	0	0.68
1.4	Percentage of connections with good voice quality (>=95%)												
	(i) 0-4 (w/o frequency hopping)	Bangalore									96.32	98.4	99.62
		Mysore									96.61	98.37	98.34
		Mangalore									98.36	99.45	99.23
	(ii) 0-5 ( with frequency hopping)	Bangalore	96.02	89.3		92.97	96.48	92.45	96.38	95			
		Mysore	96.11	88	95.37	90.1	96.53	91.66	97.17	93			
Mangalore		96.55	92	92.59	90.98	98.19	90.99	97.17	97				
1.5	Service Coverage												
	In door (>= -75dBm)	Bangalore	83	77		79.9	73.99	72.69	89	69.42	71.81	91.17	99.48
		Mysore	70	73	47.84	76.23	74.69	57.39	66.03	56.28	95.47	76.41	99.44
		Mangalore	60	91	62.92	73	87.4	54.56	58.43	58.01	64.03	69.23	93.82
	In-vehicle (>= -85dBm)	Bangalore	99	95		98.83	96.24	96.75	99.42	95.6	99.4	99.93	100
		Mysore	96	94	90.04	99.89	94.06	92.31	96.11	91.48	99.97	97.77	100
		Mangalore	95	99	99.61	100	98.2	92.3	91	91.4	94.92	96.27	99.98
	Out door- in city (>= -95dBm)	Bangalore	100	100		100	99.96	100	99.93	99.79	100	100	100
		Mysore	100	100	99.25	100	99.28	100	99.87	99.37	100	99.99	100
Mangalore		100	100	100	100	99.98	100	99.08	99.51	99.99	99.82	100	
1.6	Call Setup Success Rate (>=95%)	Bangalore	100	99.35		98.23	100	99.379	98.93	100	99.5	98.06	100
		Mysore	100	96.38	95	93.57	98.4	98.611	97.99	100	99.1	99.3	100
		Mangalore	100	98.58	93.4	86.93	100	98.947	99.64	100	100	100	100

### 3) Graphical Representation



### (3) Critical Analysis

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

- Blocked Call Rate benchmark is not met by BSNL & Idea in Mysore (5.18% & 6.43%) and Mangalore (6.6% & 13.07%) respectively and Airtel in Mysore (3.62%).
- Drop call rate benchmark is not met by Idea & MTS in Bangalore (2.74% & 2.58%) and Mysore (3.05% & 2.01%) respectively.
- BSNL (3.03%), Idea (3.01%) & TATA GSM (3.19%) did not meet the Drop call rate benchmark in Mangalore.
- Good voice quality benchmark is not met by Airtel and Idea in all 3 cities.
- Tata GSM & Vodafone not meet Voice quality benchmark in Mysore, while BSNL and TATA GSM in Mangalore respectively.
- CSSR benchmark is not met by BSNL (93.4%) in Mangalore and Idea in Mysore (93.57%) & Mangalore (86.93%) respectively.

**(E) Independent Drive Test****(1) Sample Coverage**

The Independent Drive Test was conducted at Karnataka after operators assisted drive test was over for respective operators. Route cover was about around 80-100Km depending on city areas within the speed limit of 30Km/hr.

**Drive Test Locations*****BANGALORE***

LOW DENSE: Yeshwantpur, Mathekeri  
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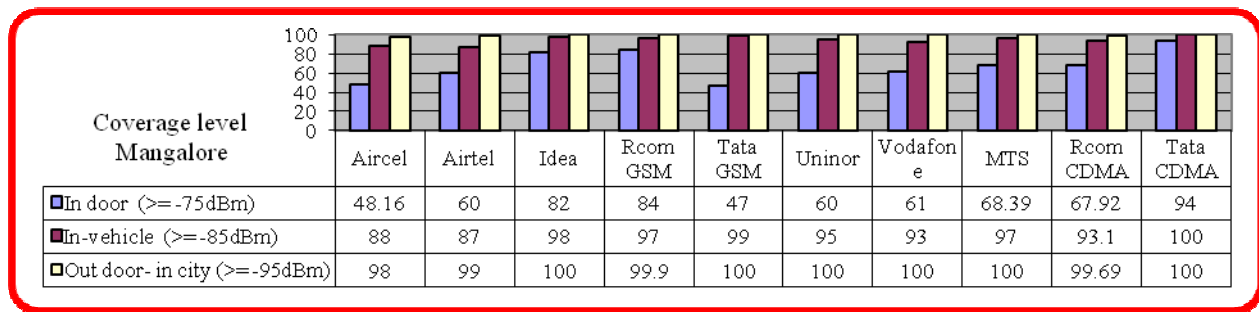
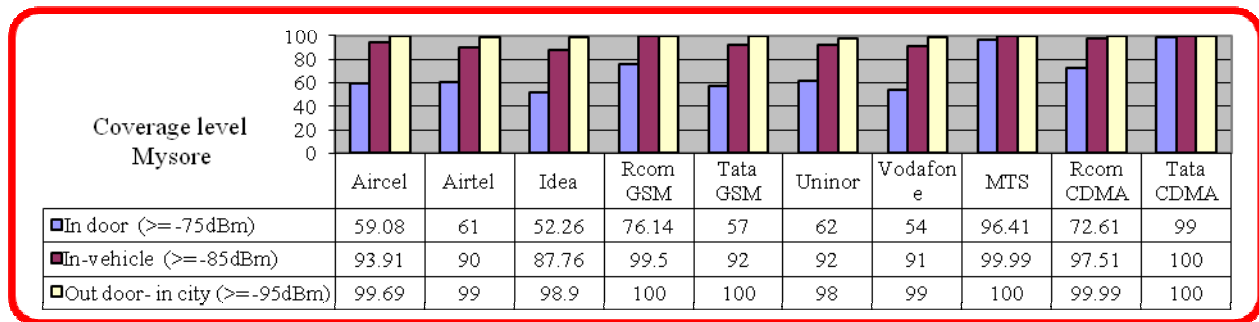
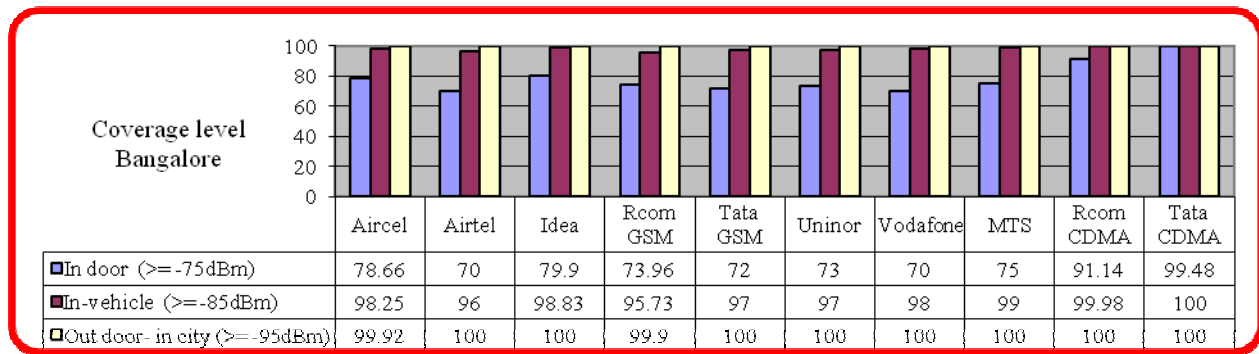
***MANGALORE***

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2) Performance (for the respective cities)

SN	Parameter	City Name	Aircel	Airtel	Idea	Rcom GSM	Tata GSM	Uninor	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators						CDMA Operators			
1.1	Call Attempts	Bangalore	188	169	113	142	164	156	142	194	257	186
		Mysore	559	298	273	233	289	312	232	312	289	245
		Mangalore	207	117	264	127	120	125	211	153	141	147
1.2	Blocked Call Rate (<=3%)	Bangalore	0	3.55	1.7	0.7	1.83	1.28	2.8	0	1.5	0
		Mysore	1.43	1.68	4.39	4.29	5.2	0.96	1.29	0.3	0.6	0
		Mangalore	1.93	3.4	3.79	0.78	5.83	0.8	1.4	0.7	0	0
1.3	Dropped Call Rate (<=2%)	Bangalore	3.72	3.06	1.8	0.7	1.22	1.31	0.74	3.6	0.38	0
		Mysore	1.63	3.51	5.74	3	4.92	2.27	0.43	2.9	0.34	0.46
		Mangalore	2.96	2.65	0	0	4.17	0.81	1.96	0	0	0.7
1.4	Percentage of connections with good voice quality (=>95%)											
	(i) 0-4 (w/o frequency hopping)	Bangalore								95.68	98.79	99.92
		Mysore								96.73	98.32	99
		Mangalore								98.95	97.66	99
	(ii) 0-5 ( with frequency hopping)	Bangalore	95.92	93	92.97	95.69	88	96.26	96			
		Mysore	94.66	89	91.23	93.4	80	96.6	93			
Mangalore		97.02	89	91	97.6	86	97.72	89				
1.5	Service Coverage											
	In door (>= -75dBm)	Bangalore	78.66	70	79.9	73.96	72	73	70	75	91.14	99.48
		Mysore	59.08	61	52.26	76.14	57	62	54	96.41	72.61	99
		Mangalore	48.16	60	82	84	47	60	61	68.39	67.92	94
	In-vehicle (>= -85dBm)	Bangalore	98.25	96	98.83	95.73	97	97	98	99	99.98	100
		Mysore	93.91	90	87.76	99.5	92	92	91	99.99	97.51	100
		Mangalore	88	87	98	97	99	95	93	97	93.1	100
	Out door- in city (>= -95dBm)	Bangalore	99.92	100	100	99.9	100	100	100	100	100	100
		Mysore	99.69	99	98.9	100	100	98	99	100	99.99	100
Mangalore		98	99	100	99.9	100	100	100	100	99.69	100	
1.6	Call Setup Success Rate (>=95%)	Bangalore	100	96.44	98.43	99.3	98.17	100	97.18	100	98.44	100
		Mysore	98.56	95.63	94.5	96	91.34	99.36	98.7	99.7	99.65	100
		Mangalore	98.07	96.58	86.36	99.21	94.16	99.2	96.68	99.3	100	100

### 3) Graphical Representation



### (3) Critical Analysis

- Good Voice Quality parameter is not met by Aircel (94.66%) & RCom GSM (93.4%) in Mysore respectively and Vodafone in Mysore (93%) and in Mangalore (89%).
- Airtel is deviating the benchmarks for Dropped Call Rate & Good Voice Quality in all 3 cities and Blocked Call Rate in Bangalore (3.55%) & Mangalore (3.4%) respectively.
- Aircel do not meet the Bench mark for Dropped Call Rate in Bangalore (3.72%) & Mangalore (2.96%) respectively.
- RCOM GSM do not meet the Bench mark for Blocked call rate & Drop call rate in Mysore (4.29% and 3% respectively).
- Good voice quality benchmark is not met by the Idea & Tata GSM in all the 3 cities.
- Blocked Call rate & CSSR benchmark is not met by Idea and Tata GSM in Mysore & Mangalore respectively.
- Drop Call rate benchmark is not met by Idea (5.74%), Tata GSM (4.92%), Uninor (2.27%) & MTS (2.9%) in Mysore respectively.

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

From live, month, PMR and Drive Tests findings, it can be concluded that on an average, performance of the operators in the service area (Karnataka) is by and large satisfactory for **Network Parameters**. However, the benchmark of  $\leq 5\%$  for “worst affected cells  $>3\%$  TCH drop” is not met by Tata GSM (7.59% for live) and Vodafone (5.14% for live data) respectively

Under **Customer Service Quality Parameter** “operator answered calls (voice-to-voice) within 60 seconds” parameter it is found that most of the operators are fulfilling TRAI benchmark of  $\geq 90\%$ . Apart from this, the “accessibility of call centre” parameter benchmark is not met by Idea and Tata CDMA.

Regarding **Metering/Billing Credibility** issues, Idea and Vodafone shows below benchmark value for Pre-paid connections.

During **Drive Tests**, high Blocked Call Rates were found in case of Airtel (Mysore), BSNL (Mysore & Mangalore), Idea (Mysore & Mangalore), Tata GSM (Mysore & Mangalore) and Reliance GSM (Mysore). Similarly, dropped call rate benchmark was not met by BSNL (Mangalore), Idea (Bangalore, Mysore & Mangalore), Tata GSM (Mangalore) and MTS (Bangalore & Mysore). Most of the GSM operators have below benchmark %age of connections with good voice quality. Idea is seen to have 93.57% CSSR in Mysore and 86.93% CSSR in Mangalore with is less than the TRAI benchmark of 95%.

**III. Basic Telephone Service (Wireline) Providers**

*.....Audit not done for this quarter*

**IV. Broadband Service Providers**

*.....Audit not done for this quarter*