REPORT

ON

AUDIT & ASSESSMENT OF QUALITY OF SERVICE

OF

CELLULAR MOBILE TELEPHONE SERVICE

FOR

SOUTH ZONE – KARNATAKA CIRCLE

Report Period: April 2011 – June 2011

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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 2nd quarter (April-June 2011). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken for the period October-December 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
GSM Operators			
1	Aircel Ltd	April-2011	1900-2000 Hrs
2	Airtel Ltd	April-2011	1900-2000 Hrs
3	BSNL	April-2011	1900-2000 Hrs
4	Etisalat	April-2011	1900-2000 Hrs
5	Idea	April-2011	1900-2000 Hrs
6	Reliance Communication (GSM)	April-2011	1900-2000 Hrs
7	Tata Communications (GSM)	April-2011	1900-2000 Hrs
8	Uninor	April-2011	1900-2000 Hrs
9	Videocon	April-2011	1900-2000 Hrs
10	Vodafone	April-2011	1900-2000 Hrs
CDMA Operators			
11	MTS (CDMA)	April-2011	1900-2000 Hrs
12	Reliance Communication (CDMA)	April-2011	1900-2000 Hrs
13	Tata Communications (CDMA)	April-2011	1900-2000 Hrs

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

(A) Cellular Mobile Telephone Services

S/N	3 days Live Data Audit — Name of Parameter	Bench-mark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
			GSM Operators										CDMA Operators		
1	Connection Establishment (Accessibility)														
	a) CSSR (Call Setup Success Rate)	>=95%	99.18%	98.59%	99.31%	99.61%	98.95%	99.69%	98.08%	98.46%	99.52%	95.51%	99.85%	99.53%	96.28%
	b) SDCCH/PAGING congestion	<=1%	0.03%	0.53%	0.00%	0.00%	0.14%	0.49%	0.05%	0.01%	0.48%	0.11%	0%	0%	0%
	c) TCH congestion	<=2%	0.04%	0.46%	0.01%	0.00%	0.18%	0.12%	0.37%	0.00%	0.00%	0.44%	0.16%	0.02%	0.47%
2	Connection maintenance (retainability)														
	a) CDR	<=2%	0.42%	0.94%	1.11%	0.22%	1.27%	0.33%	0.90%	0.94%	0.00%	0.62%	0.38%	0.20%	0.34%
	b) Worst affected cells>3% TCH drop	<=3%	2.16%	2.65%	2.63%	3.17%	3.22%	1.03%	6.42%	10.36%	0.00%	0.87%	0.82%	0.00%	2.87%
	c) Good voice quality	>=95%	98.26%	98.56%	NP	99%	97.33%	98.66%	96.83%	98.92%	99.52%	94.87%	NA	NA	98.25%
3	No of POI having congestion >0.5%		0	0	0	0	2	0	0	0	0	0	0	0	0
4	Response time to customers for assistance														
	a) Accessibility of call centre/Customer Care	>=95%	94.12%	95.00%	65.41%	93.38%	81.59%	100%	82.80%	95.08%	100%	99.34%	100%	92.87%	94.12%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	97.00%	97.50%	91.50%	98.00%	91.65%	97.39%	97.00%	97.00%	100%	36.90%	97.38%	96.00%	96.00%

NA: Not Applicable, NP: Data Not Provided

From the 3 days live data assessment, it is found that all the operators are meeting the network parameters by and large, except for Idea, Tata GSM, Etisalat & Uninor meeting the parameter "Worst affected cells>3% TCH drop", Also, Idea is having 2 POIs with >= 0.5% "POI congestion". Vodafone is having 94.87% connections with good voice quality. % of connections with Good Voice quality data is not generated in the system for TATA CDMA and Reliance CDMA.

Vodafone is also not meeting the benchmark for "% of call answered by operator (Voice to voice)" with the values of 36.9% only. Aircel, BSNL, Etisalat, Idea, Tata GSM & CDMA and MTS are having low "accessibility of call centre".

S/N	Name of Parameter	Bench-mark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
	One Month Data Audit														
								GSM Operators						**CDMA Operators**	
(A)	**Network Service Quality Parameter**														
1	**Network Availability**														
	a) BTS Accumulated Downtime	<=2%	0.07%	0.21%	0.96%	0.52%	0.05%	0.16%	0.09%	0.06%	0.00%	0.06%	0.08%	0.00%	0.37%
	b) Worst affected BTSs due to downtime	<=2%	0.04%	0.06%	1.96%	0.00%	0.07%	0.32%	0.20%	0.00%	0.00%	0.11%	0.10%	0.00%	0.54%
2	**Connection Establishment (Accessibility)**														
	a) CSSR (Call Setup Success Rate)	>=95%	98.88%	98.67%	99.40%	98.97%	98.95%	99.71%	97.93%	98.93%	97.60%	95.63%	99.70%	99.72%	96.07%
	b) SDCCH/PAGING congestion	<=1%	0.03%	0.40%	0.00%	0.00%	0.15%	0.67%	0.08%	0.02%	0.13%	0.12%	0%	0%	0%
	c) TCH congestion	<=2%	0.08%	0.54%	0.00%	0.00%	0.18%	0.17%	0.44%	0.02%	0.00%	0.39%	0.02%	0.16%	0.02%
3	**Connection maintenance (retainability)**														
	a) CDR	<=2%	0.42%	0.96%	1.16%	0.30%	1.27%	0.31%	0.95%	0.89%	1.35%	0.63%	0.40%	0.23%	0.47%
	b) Worst affected cells>3% TCH drop	<=3%	1.50%	2.91%	2.86%	5.12%	2.68%	0.91%	3.82%	9.57%	0.00%	0.58%	0.87%	0.26%	2.54%
	c) Good voice quality	>=95%	98.24%	98.59%	NP	98.37%	97.33%	98.66%	96.90%	98.74%	99.37%	95.50%	NA	NA	98.26%
4	**No of POI's having congestion >0.5%**	<=0.5%	0	0	0	0	2	0	0	0	0	0	0	0	0
(B)	**Customer Service Quality Parameters**														
5	**Metering/billing credibility-Post paid**	<= 0.1%	0.06%	0.02%	0.03%	NA	0.22%	0.10%	0.00%	NA	NA	0.01%	0.04%	0.03%	NA
6	**Metering /billing credibility-Pre paid**	<= 0.1%	0.04%	0.00%	0.01%	0.05%	0.10%	0.01%	0.09%	0.01%	0.01%	0.01%	0.01%	0.02%	0.01%
7	**Resolution of billing/ charging complaints**	100% within 4 weeks	100%	100%	100%	100%	90.85%	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%	86.95%	97.22%	83.71%	99.79%	78.25%	96.83%	92.45%	96.27%	100%	46.66%	96.33%	95.27%	95.06%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	86.90%	97.50%	95.00%	99.79%	90.43%	96.82%	92.45%	96.30%	100%	46.65%	96.33%	95.00%	95.06%
9	**Termination/closure of service**	<=7days	100%	100%	100%	NA	99.26%	100%	100%	NA	NA	100%	100%	100%	NA

S/N	One Month Data Audit / Name of Parameter	Bench-mark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
			GSM Operators										CDMA Operators		
10	Time taken for refunds of deposits after closures.	*100% within 60 days*	100%	100%	100%	NA	100%	100%	100%	NA	NA	100%	100%	100%	NA

NA: Not Applicable, NP: Data Not Provided

From the month data assessment, it is found that all the operators are meeting the network parameters by and large, except for Tata GSM, Etisalat & Uninor not meeting the benchmark for "Worst affected cells>3% TCH drop" with the value of 3.82% & 9.57%. Idea is having 2 POIs with >=0.5% congestion.. % of connections with Good Voice quality data is not generated in the system for TATA CDMA and Reliance CDMA.

Performance related to customer care data is not found to be satisfactory for the parameter "calls answered by operators (voice-to-voice)" for Aircel (86.9%) & Vodafone (46.65%). "Accessibility of call centre" benchmark is not being met by Aircel, BSNL, Idea and Tata GSM & Vodafone. Idea is not meeting the benchmark for "Metering/Billing Credibility" for Post-Paid connections. Idea is also missing the benchmark for "Termination/closure of service" & "Resolution of billing/ charging complaints".

Operator-Assisted Drive Test

The Operator Assisted Drive Test was conducted at Karnataka in Bangalore, Mysore and Mangalore for all the operators. Route covered was about around 100Km depending on city areas within the speed limit of 30Km/hr. 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	Uninor	Vodafone	Rcom CDMA	Tata CDMA	MTS
			GSM Operators								CDMA Operators		
1.1	Blocked Call Rate (<=3%)	Bangalore	0.00%	2.02%	1.09%	1.60%	1.08%	0.61%	1.63%	0.61%	0.00%	0.00%	0.00%
		Mysore	0.00%	3.95%	1.04%	2.14%	3.57%	2.31%	1.33%	0.72%	0.00%	0.00%	0.00%
		Mangalore	0.94%	4.20%	8.13%	2.26%	1.74%	1.01%	0.00%	0.00%	0.00%	0.00%	0.00%
1.2	Dropped Call Rate (<=2%)	Bangalore	0.00%	1.03%	3.80%	2.70%	0.54%	0.61%	1.10%	0.00%	4.10%	0.00%	0.00%
		Mysore	0.00%	2.74%	1.58%	2.70%	0.00%	2.31%	0.00%	0.00%	2.00%	0.00%	0.00%
		Mangalore	0.00%	2.63%	1.77%	2.31%	0.00%	1.01%	0.00%	0.00%	4.70%	0.00%	0.00%
1.3	Percentage of connections with good voice quality (=>95%)												
	(i) 0-4 (w/o frequency hopping)	Bangalore									96.64%	99.44%	99.19%
		Mysore									98.89%	99.70%	98.69%
		Mangalore									98.02%	99.79%	98.24%
	(ii) 0-5 (with frequency hopping)	Bangalore	96.29%	87.17%	94.30%	93.51%	95.16%	90.00%	95.06%	95.35%			
		Mysore	96.27%	87.49%	94.78%	94.98%	95.53%	94.50%	98.97%	95.80%			
		Mangalore	97.22%	90.47%	95.92%	95.81%	96.18%	99.00%	99.73%	97.04%			
1.4	Call Setup Success Rate (>=95%)	Bangalore	100.00%	97.98%	98.91%	98.40%	98.92%	99.39%	98.37%	99.39%	100%	100.00%	100.00%
		Mysore	100.00%	96.05%	98.96%	97.86%	96.43%	97.69%	98.67%	99.28%	100%	100.00%	100.00%
		Mangalore	99.06%	95.80%	91.87%	97.74%	98.26%	98.99%	100.00%	100.00%	100%	100.00%	100.00%

Key observations as could be derived from the table are as under:
• Blocked Call Rate benchmark is not met by Airtel in Mysore & Mangalore, BSNL in Mangalore and Reliance GSM in Mysore.
• Dropped Call Rate benchmark is not met by Airtel in Mysore & Mangalore, BSNL in Bangalore, Tata GSM in Mysore Reliance CDMA in Bangalore & Mangalore and Idea in all the 3 cities..
• "Percentage of connection with good voice quality" benchmark is not met by Airtel, BSNL, Idea & Tata GSM in both Bangalore & Mysore and Airtel in Mangalore.
• BSNL has CSSR of 91.87% in Mangalore.

Independent Drive Test The Independent Drive Test was conducted at Karnataka in Bangalore. 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	Rcom CDMA	Tata CDMA
			GSM Operators							CDMA Operators	
1.2	Blocked Call Rate (<=3%)	Bangalore	1.97%	5.26%	0%	2.16%	8.06%	8.72%	1.13%	0.61%	0.00%
1.3	Dropped Call Rate (<=2%)	Bangalore	1.30%	7.78%	2.79%	0.56%	8.19%	0.56%	0%	0.00%	0.00%
1.4	Percentage of connections with good voice quality (=>95%)										
	(i) 0-4 (w/o frequency hopping)	Bangalore								99.65%	99.43%
	(ii) 0-5 (with frequency hopping)	Bangalore	91.70%	93.28%	94.04%	96.10%	89.08%	93.14%	96.11%		
1.6	Call Setup Success Rate (>=95%)	Bangalore	98.03%	94.74%	100%	97.84%	91.94%	91.28%	98.87%	99.39%	100%

Key observations as could be derived from the table are as under:
• Blocked Call Rate benchmark is not met by Airtel, Tata GSM & Uninor.
• Dropped Call Rate benchmark is not met by Airtel, Idea & Tata GSM.
• "Percentage of connection with good voice quality" benchmark is not met by Aircel, Airtel, Idea, Tata GSM & Uninor.

CHAPTER-3: AUDIT-PMR VERIFICATION

I. Cellular Mobile Telephone Service

S/N	Name of Parameter	Bench-mark	Audit	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
	PMR							GSM Operators						CDMA Operators		
(A)	Network Service Quality Parameter															
1	Network Availability															
	BTS Accumulated Downtime	<=2%	Reported	0.03%	0.17%	0.92%	0.47%	0.03%	0.07%	0.04%	0.02%	0.31%	0.02%	0.11%	0.09%	0.01%
			Verified	0.03%	0.14%	0.92%	0.47%	0.03%	0.07%	0.04%	0.02%	0.31%	0.02%	0.11%	0.09%	0.01%
	Worst affected BTSs due to downtime	<=2%	Reported	0.00%	0.24%	1.91%	4.03%	0.11%	0.06%	0.06%	0.00%	0.00%	0.00%	0.05%	0.02%	0.00%
			Verified	0.00%	0.00%	1.91%	3.17%	0.11%	0.06%	0.06%	0.00%	0.00%	0.00%	0.03%	0.02%	0.00%
2	Connection Establishment (Accessibility)															
	CSSR (Call Setup Success Rate)	>=95%	Reported	99.09%	99.10%	98.18%	99.50%	99.73%	99.70%	99.42%	99.37%	98.81%	99.57%	98.41%	99.48%	99.82%
			Verified	99.09%	99.25%	98.18%	99.56%	99.73%	99.70%	99.42%	99.37%	98.81%	99.57%	98.41%	99.48%	99.82%
	SDCCH/PAGING congestion	<=1%	Reported	0.06%	0.27%	0.16%	0.15%	0.08%	0.05%	0.09%	0.05%	0.21%	0.06%	0.00%	0.00%	0.00%
			Verified	0.06%	0.29%	0.16%	0.22%	0.08%	0.05%	0.09%	0.05%	0.21%	0.06%	0.00%	0.00%	0.00%
	TCH congestion	<=2%	Reported	0.08%	0.39%	0.68%	0.01%	0.49%	0.38%	0.09%	0.01%	0.39%	0.14%	0.15%	0.11%	0.01%
			Verified	0.08%	0.27%	0.68%	0.01%	0.49%	0.38%	0.09%	0.01%	0.39%	0.14%	0.15%	0.11%	0.01%
3	Connection maintenance (retainability)															
	CDR	<=2%	Reported	0.49%	1.11%	0.96%	0.36%	1.28%	0.31%	0.94%	0.49%	0.81%	0.65%	0.70%	0.59%	0.08%
			Verified	0.49%	1.00%	0.96%	0.40%	1.28%	0.31%	0.94%	0.49%	0.81%	0.65%	0.70%	0.59%	0.08%
	Worst affected cells>3% TCH drop	<=3%	Reported	1.78%	3.50%	4.62%	3.69%	4.38%	2.33%	3.03%	3.41%	0.82%	4.90%	1.57%	1.33%	0.01%
			Verified	1.78%	3.97%	4.62%	3.86%	4.38%	2.33%	3.03%	3.41%	0.82%	4.90%	1.57%	1.33%	0.01%
	Good voice quality	>=95%	Reported	98.03%	98.41%	98.67%	98.78%	96.84%	98.82%	97.91%	98.79%	98.53%	98.77%	99.72%	98.75%	99.85%
			Verified	98.03%	98.76%	98.67%	98.83%	96.84%	98.82%	97.91%	98.79%	98.53%	98.77%	99.72%	98.75%	99.85%
4	No. of POI's having congestion >0.5%	<=0.5%	Reported	0	0	0	0	0	0	0	0	0	0	0	0	0
			Verified	1	0	0	0	0	0	0	0	0	0	0	0	0
(B)	Customer Service Quality Parameters															
5	Metering/billing credibility- Post paid	<= 0.1%	Reported	0.13%	0.03%	0.03%	NA	0.09%	0.07%	0.02%	NA	NA	0.08%	0.00%	0.08%	0.01%
			Verified	0.10%	0.03%	0.03%	NA	0.09%	0.07%	0.02%	NA	NA	100.08%	0.00%	0.01%	0.01%

S/N	Name of Parameter	Bench-mark	Audit	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
	PMR						GSM Operators								CDMA Operators		
6	Metering /billing credibility-Pre paid	<= 0.1%	Reported	0.15%	0.00%	0.05%	0.00%	0.03%	0.04%	0.00%	0.00%	0.10%	0.06%	0.14%	0.05%	0.10%
			Verified	0.09%	0.00%	0.05%	0.00%	0.03%	0.04%	0.00%	0.00%	0.10%	0.06%	0.14%	0.10%	0.10%
7	Resolution of billing/ charging complaints	100% within 4 weeks	Reported	100%	100%	100%	NA	82%	100%	100%	100%	100%	100%	100%	100%	100%
			Verified	100%	100%	100%	NA	82%	100%	100%	100%	100%	100%	NA	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%	NA	100%	100%	100%	100%	100%
			Verified	100%	100%	100%	NA	100%	100%	100%	NA	100%	100%	NA	100%	100%
8	Response time to customers for assistance															
	Accessibility of call centre/Customer Care	>=95%	Reported	100%	99.00%	98.00%	95.47%	99.00%	93%	100%	96.80%	100%	100%	98.01%	93.00%	97.00%
			Verified	100%	99.00%	98.00%	95.47%	99.00%	93%	100%	96.80%	100%	100%	100%	97.00%	97.00%
	% call answered by operators(voice to voice) within 60 sec.	>=90%	Reported	83.59%	84.00%	92.00%	98.38%	43.00%	83.00%	87.00%	90.10%	97.20%	78.00%	90.18%	93.00%	93.00%
			Verified	83.59%	84.00%	92.48%	98.38%	43.00%	83.00%	87.00%	90.10%	97.20%	78.00%	81.19%	93.00%	93.00%
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	100%	100%	100%	NA	NA	100%	NA	100%	100%
			Verified	100%	100%	100%	NA	100%	100%	100%	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%	99.00%
			Verified	100%	100%	100%	NA	100%	100%	100%	NA	NA	100%	NA	99%	99.00%

Critical Analysis (PMR Verification):

a. Deviations were found in the figures provided by all the operators & the figures obtained on verification as marked in yellow.

b Etisalat,Airtel,BSNL,idea,TATA GSM,Uninor,Vodafone are not meeting the benchmark for the parameter "Worst affected cells>3% TCH drop".

c. In case of POI congestion, Aircel is having 1 POI with >=0.5% congestion.

d. Idea is not meeting the benchmark for "Resolution of billing/ charging complaints within 4 weeks".

f. Accessibility of Reliance GSM's Customer Care Centre is below benchmark.

g. "% call answered by operators (voice to voice) within 60 sec." benchmark is not met by Aircel, Airtel, Idea, Reliance GSM & CDMA, Tata-GSM and Vodafone.

h.MTS & Tata CDMA are not meeting the 60 days' benchmark for "Refund of deposits after closure of connection".

CHAPTER-4: DETAILED FINDINGS & ANALYSIS

I. Cellular Mobile Telephone Service

(A) MSC Audit

(1) 3 Days Live Data Assessment & Summarized Findings

S/N	Name of Parameter	Bench-mark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
							GSM Operators						CDMA		
A	Network Service Quality Parameter														
1	Connection Establishment (Accessibility)														
	a) CSSR	>=95%	99.18%	98.59%	99.31%	99.61%	98.95%	99.69%	98.08%	98.46%	99.52%	95.51%	99.85%	99.53%	96.28%
	b) SDCCH/PAGING congestion	<=1%	0.03%	0.53%	0.00%	0.00%	0.14%	0.49%	0.05%	0.01%	0.48%	0.11%	0%	0%	0%
	c) TCH congestion	<=2%	0.04%	0.46%	0.01%	0.00%	0.18%	0.12%	0.37%	0.00%	0.00%	0.44%	0.16%	0.02%	0.47%
2	Connection maintenance														
	a) CDR	<=2%	0.42%	0.94%	1.11%	0.22%	1.27%	0.33%	0.90%	0.94%	0.00%	0.62%	0.38%	0.20%	0.34%
	b) Cells having > 3% TCH drop	<=3%	2.16%	2.65%	2.63%	3.17%	3.22%	1.03%	6.42%	10.36%	0.00%	0.87%	0.82%	0.00%	2.87%
	c) Good voice quality	>=95%	98.26%	98.56%	NA	99.00%	97.33%	98.66%	96.83%	98.92%	99.52%	94.87%	NA	NA	98.25%
	d) No. of cells > 3% TCH drop		178	600	114	2	436	98	868	662	0	189	16	0	79
	e) Total no. of cells in the network		8,250	22,657	4,336	63	13,524	9,492	13,524	6,385	90	21,722	1,961	2,703	2,755
3	No of POI' having congestion >0.5%	<=0.5%	0	0	0	0	2	0	0	0	0	0	0	0	0
	a) Name of POI not meeting the benchmark						AIRTEL CMTS, BSNL CELLONE								
	b) Total No. of circuits on POI		83,123	232484	45477	1,236	110,861	79,220	3,277	15,695	509	102,815	79,220	54,199	29,572
	c) Avg No. of call attempts on POI		379,211	6726248	478442	4,119	2,366,653	600,809	469,973	282,840	85	2,516,139	600,809	29,222	771,638
	d) Avg traffic served on POI (Erlang)		11,101	117210	19212	26	76,118	24,275	6,927	7,515	55	58,816	24,275	535	19,728
	e) Total number of working POI Service Area wise		39	152	38	50	50	101	3	45	16	165	101	90	51
	f) Equipped Capacity of Network in respect of Traffic in erlang		81,374	652426	94,000	466	137,696	84022	234,293	94,800	165	187,667	218251	255,471	45,800
	g) Total traffic handled in TCBH in erlang		16,666	506022	48,828	30	123,504	37462	97,367	19,127	17	140,533	56872	37,047	26,510

S/N	Name of Parameter	Bench-mark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
			GSM Operators										CDMA		
(B)	**Customer Service Quality Parameters**														
4	**Response time to customers for assistance**														
	a) Accessibility of call centre	>=95%	94.12%	95.00%	65.41%	93.38%	81.59%	100%	82.80%	95.08%	100%	99.34%	100%	92.87%	94.12%
	b) % of call answered by operators(voice to voice) within 60 sec	>=90%	97.00%	97.50%	91.50%	98.00%	91.65%	97.39%	97.00%	97.00%	100%	36.90%	97.38%	96.00%	96.00%
	c) No. of call attempts to call centre / customer care nos. during TCBH (Avg)		41,466	4,124,205	934,587	468	1,545,592	95,577	1,574,232	520,784	124	75,041	1,457,370	931,565	41,466
	d) No. of calls connected and answered successfully to call centre / customer care nos. during TCBH (Avg)		39,026	3,917,800	611,279	437	1,260,982	95,577	1,303,443	495,156	124	74,545	1,457,370	865,113	39,026

NA: Not Applicable, NP: Data 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 >= 95%):** All operators are meeting the benchmark with values lying between 95.51% and 99.85%.
- **SDCCH/PAGING Channel congestion (benchmark <= 1%):** All operators are meeting the benchmark with values lying between 0% and 0.53%.
  .
- **TCH congestion (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 0.47%.
- **Call drop rate (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 1.27%.
- **Cell exceeding 3% TCH drop (benchmark <= 3%):** Except for Idea, Tata GSM, Etisalat & Uninor, all the operators are satisfying the benchmark with value in between 0% and 2.87%.
- **Connections with good voice quality (benchmark >= 95%):** CDMA service providers have declared that the parameter is not system generated. Except for Vodafone with a value of 94.87%, rest of the GSM operators are meeting the benchmark.
- **No. of POI's having Congestion >0.5%:** No operator is having POIs with >=0.5% congestion except for Idea having 2 such POIs. 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):** Aircel, BSNL, Etisalat, Idea, Tata GSM & CDMA and MTS are not meeting the benchmark.
- **%age of call answered by operator (Voice to voice) (benchmark >90%): %):** Except for Vodafone with a value of 36.9%, rest of the operator are meeting the benchmark with value in between 91.5% and 100%.

(2) Month Data Assessment & Summarized Findings

S/N	Name of Parameter	Bench-mark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
			GSM Operators										CDMA Operators		
(A)	**Network Service Quality Parameter**														
1	**Network Availability**														
	a) BTS Accumulated Downtime	<=2%	0.07%	0.21%	0.96%	0.52%	0.05%	0.16%	0.09%	0.06%	0.00%	0.06%	0.08%	0.00%	0.37%
	b) Worst affected BTSs due to downtime	<=2%	0.04%	0.06%	1.96%	0.00%	0.07%	0.32%	0.20%	0.00%	0.00%	0.11%	0.10%	0.00%	0.54%
	c) Total no. of BTSs in the licensed service area		2,836	8,175	1,175	21	4,550	3,164	4,582	2,164	30	7,544	1,961	889	920
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		1,514	12,633	8,089	79	1,616	3,568	2,929	962	-	2,990	1,146	-	2,451
	e) No. of BTSs having accumulated downtime of >24 hours in a month		1	5	23	0	3	10	9	0	0	8	2	0	5
2	**Connection Establishment (Accessibility)**														
	a) CSSR (Call Setup Success Rate)	>=95%	98.88%	98.67%	99.40%	98.97%	98.95%	99.71%	97.93%	98.93%	97.60%	95.63%	99.70%	99.72%	96.07%
	b) SDCCH/PAGING congestion	<=1%	0.03%	0.40%	0.00%	0.00%	0.15%	0.67%	0.08%	0.02%	0.13%	0.12%	0	0	0
	c) TCH congestion	<=2%	0.08%	0.54%	0.00%	0.00%	0.18%	0.17%	0.44%	0.02%	0.00%	0.39%	0.02%	0.16%	0.02%
3	**Connection maintenance (retainability)**														
	a) CDR	<=2%	0.42%	0.96%	1.16%	0.30%	1.27%	0.31%	0.95%	0.89%	1.35%	0.63%	0.40%	0.23%	0.47%
	b) Worst affected cells>3% TCH drop	<=3%	1.50%	2.91%	2.86%	5.12%	2.68%	0.91%	3.82%	9.57%	0.00%	0.58%	0.87%	0.26%	2.54%
	c) Good voice quality	>=95%	98.24%	98.59%	NA	98.37%	97.33%	98.66%	96.90%	98.74%	99.37%	95.50%	NA	NA	98.26%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		124	659	124	3	362	86	517	611	-	126	17	7	70
	e) Total no. of cells in the network		8,250	22,657	4,336	63	13,524	9,492	13,524	6,385	90	21,722	1,961	2,703	2,755

S/N	Name of Parameter	Bench-mark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
							GSM Operators						CDMA Operators		
4	**No of POI's having congestion >0.5%**	*<=0.5%*	0	0	0	0	2	0	0	0	0	0	0	0	0
	a) Name of POI not meeting the benchmark						AIRTEL CMTS, BSNL CELLONE								
	b) Total No. of call attempts on POI (Avg.)		380124	6737646	486322	32,852	2,413,414	605,730	156,658	288,715	1,184	2,629,992	605,730	300,711	833,182
	c) Total traffic served on POI (Erlang) (Avg.)		12108	118322	20118	21	79,491	24,568	2,309	7,591	414	61,902	24,568	5,272	20,933
	d) Total No. of circuits on POI		83,123	232484	45477	1,236	110,861	79,220	3,277	15,695	509	102,815	79,220	54,199	29,572
	e) Total number of working POI Service Area wise		39	152	38	50	50	101	3	45	16	165	101	90	51
	f) Capacity of POI		82,738	225670	27501	913	107,916	74,468	3,166	14,087	330	103,333	74,468	50,466	28,221
5	**Network Data**														
	a) Equipped Capacity of Network Erlang		81,374	652426	94,000	466	137,696	84022	234,293	94,800	165	187,667	218251	255,471	45,800
	b) Total traffic in TCBH in erlang (Avg.)		16,666	506022	48,828	30	123,504	37462	97,367	19,127	17	140,533	56872	37,047	26,510
	c) Total no. of customers served (as per VLR) on last day of the month		670,560	NR	1,956,053	2,356	4,041,030	NR	3,254,514	481,280	157	4,287,776	NR	744,914	865,893
(B)	**Customer Service Quality Parameters**														
6	**Metering/billing credibility-Post paid**	*<= 0.1%*	0.06%	0.02%	0.03%	NA	0.22%	0.10%	0.00%	NA	NA	0.01%	0.04%	0.03%	NA
	a) No. of bills issued during the period		6,756	897,328	144,244	NA	100,074	20,226	32,679	NA	NA	391,794	244,710	296,184	NA
	b) No. of bills disputed including billing complaints during the period		4	222	46	NA	218	20	-	NA	NA	48	108	81	NA

S/N	Name of Parameter	Bench-mark	Aircel	Airtel	BSNL	Etisal at	Idea	Rcom GSM	Tata GSM	Uninor	Videoc on	Vodafo ne	Rcom CDMA	Tata CDMA	MTS
			GSM Operators										CDMA Operators		
7	Metering /billing credibility-Pre paid	<= 0.1%	0.04%	0.00%	0.01%	0.05%	0.10%	0.01%	0.09%	0.01%	0.01%	0.01%	0.01%	0.02%	0.01%
	a) No. of charging / credit / validity complaints during the quarter		746	282	687	9	4,164	450	6,516	132	1	684	300	288	214
	b) Total no. of pre-paid customers at the end of the quarter		1,768,27 8	18,717,5 43	5,272,7 99	16,45 6	4,116,2 60	4,459,99 3	7,381,24 7	1,097,57 7	9,960	6,149,1 98	3,068,15 9	1,155,64 8	1,442,1 42
8	Resolution of billing/ charging complaints	100% within 4 weeks	100%	100%	100%	100%	90.85%	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		750	14598	733	9	3981	470	6516	132	1	732	408	2909	10074
	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		750	14,598	733	9	4,382	470	6,516	132	1	732	408	2,909	10,074
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		691	504	34	-	133	49	34	-	1	724	115	369	41
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		59	14,094	699	9	4,249	421	6,482	-	-	8	293	2,540	173
	e) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	100%	100%	100%	100%	NP	100%	100%	100%	100%	100%	100%	100%	100%

S/N	Name of Parameter	Bench-mark	Aircel	Airtel	BSNL	Etisal at	Idea	Rcom GSM	Tata GSM	Uninor	Videoc on	Vodafo ne	Rcom CDMA	Tata CDMA	MTS
			GSM Operators										CDMA Operators		
9	**Response time to customers for assistance**														
	a) Accessibility of call centre/Customer Care	>=95%	86.95%	97.22%	83.71%	99.79 %	78.25%	96.83%	92.45%	96.27%	100%	46.66%	96.33%	95.27%	95.06%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	86.90%	97.50%	95.00%	99.79 %	90.43%	96.82%	92.45%	96.30%	100%	46.65%	96.33%	95.00%	95.06%
	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		317,175	4,297,562	14,330	475	4128275	361,900	2,507,816	294,183	21	28,577	176,983	281,516	32,239
	d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		275,775	4,177,988	11,995	474	3230275	350,426	2,318,477	283,223	21	13,333	170,481	268,204	30,647
10	**Termination/closure of service**	<=7days	100%	100%	100%	NA	99.26%	100%	100%	NA	NA	100%	100%	100%	NA
	a) Total No. of requests for Termination / Closure of service received during the quarter		143	6,011	1,988	NA	539	117	812	NA	NA	629	731	3,418	NA
	b) No.of requests for Termination / Closure of service complied within 7 days during the quarter		143	6,011	1,988	NA	535	117	812	NA	NA	629	731	3,418	NA
11	**Time taken for refunds of deposits after closures.**	*100% within 60 days*	100%	100%	100%	NA	100%	100%	100%	NA	NA	100%	100%	100%	NA

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 <=2%):** All operators are meeting the benchmark with values lying between 0% and 0.96%.
➢ **Worst affected BTSs due to downtime (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 1.96%.
➢ **Call setup success rate (benchmark >= 95%):** All operators are meeting the benchmark with values lying between 95.63% and 99.72%.
➢ **SDCCH/PAGING Channel congestion (benchmark <= 1%):** All operators are meeting the benchmark with values lying between 0% and 0.67%.
   Note: CDMA operators are not provided for SDCCH Channel congestion.
➢ **TCH congestion (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 0.54%.
➢ **Call drop rate (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0.23% and 1.35%.
➢ **Cell exceeding 3% TCH drop (benchmark <= 3%):** Except for Tata GSM, Etisalat & Uninor, all the operators are satisfying the benchmark with value in between 0% and 2.91%.
➢ **Connections with good voice quality (benchmark >= 95%):** CDMA service providers have declared that the parameter is not system generated. All of the GSM operators are meeting the benchmark with values lying between 95.50% and 99.37%.
➢ **No. of POI's having Congestion >0.5%:** No operator is having POIs with >=0.5% congestion except for Idea having 2 such POIs. 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 Aircel, BSNL, Idea, Tata GSM & Vodafone, all operators are meeting the benchmark.
➢ **%age of call answered by operator (Voice to voice) (benchmark >90%):** Except for Aircel & Vodafone, all the operators are meeting the benchmark.
➢ **Metering and billing credibility-Postpaid (benchmark <= 0.1%):** Except for Idea with a value of 0.22%, rest of all the operators are meeting the benchmark.
➢ **Metering and billing credibility-Pre paid (benchmark <= 0.1%):** All the operators are meeting the benchmark.
➢ **Resolution of billing/ charging complaints (benchmark 100% within 4 weeks):** Except For Idea, all the operators are meeting the benchmark.
➢ **Termination/Closure of service (Benchmark <= 7 days):** Except for Idea, all operators have satisfied the benchmark.
➢ **Time taken for refunds of deposits after closures (benchmark 100% within <=60 days):** 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
	GSM Operators			
1	Aircel Ltd	2	20	2836
2	Airtel Ltd	41	97	8175
3	BSNL		56	3657
4	Etisalat	1	5	21
5	Idea	6	50	4550
6	Reliance Communication (GSM)	3	18	3164
7	Tata Communications (GSM)	7	32	4582
8	Uninor	2	12	2164
9	Videocon	1	1	30
10	Vodafone	10	101	7544
	CDMA Operators			
11	MTS (CDMA)	1	3	920
12	Reliance Communication (CDMA)	8	6	1961
13	Tata Communications (CDMA)	5	12	889

(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 (>= 95 %) for both one month data and 3 days live data taken in the month of audit.

CSSR	Aircel	Airtel	BSNL	Etisal	Idea	Rcom	Tata	Unino	Video	Voda	Rcom	Tata	MTS
Live	99.18	98.59	99.31	99.61	98.95	99.69	98.08	98.46	99.52	95.51	99.85	99.53	96.28
Month	98.88	98.67	99.40	98.97	98.95	99.71	97.93	98.93	97.60	95.63	99.70	99.72	96.07
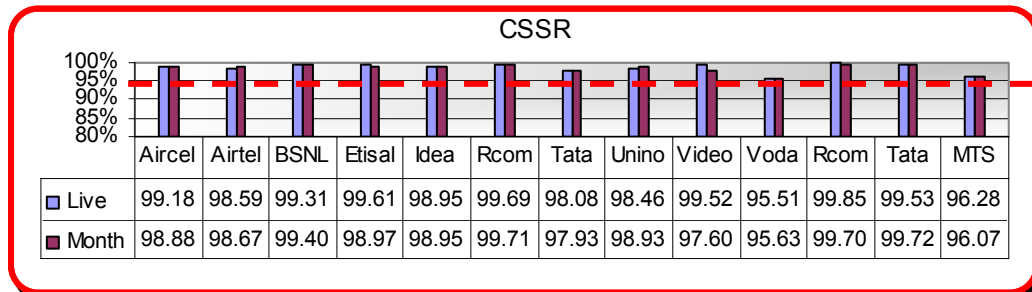
II.   Blocked call rate:

SDCCH congestion (%): All operators are meeting the TRAI benchmarks (<= 1 %) for both one month data and 3 days live data taken in the month of audit.
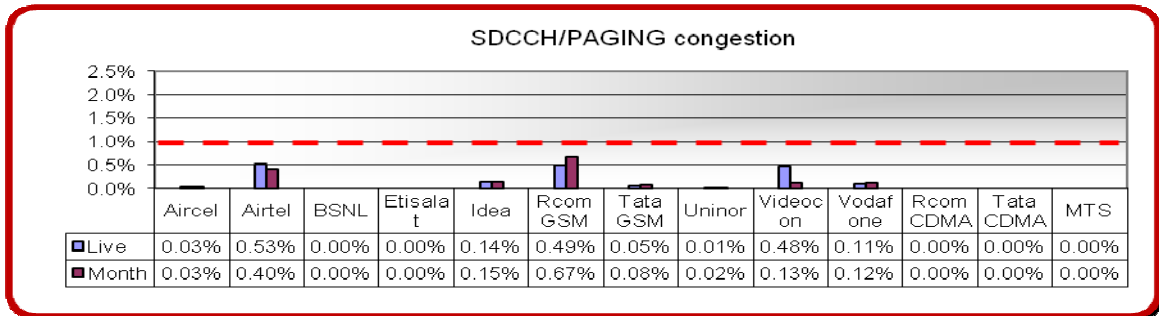
	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
□ Live	0.03%	0.53%	0.00%	0.00%	0.14%	0.49%	0.05%	0.01%	0.48%	0.11%	0.00%	0.00%	0.00%
■ Month	0.03%	0.40%	0.00%	0.00%	0.15%	0.67%	0.08%	0.02%	0.13%	0.12%	0.00%	0.00%	0.00%

SDCCH/PAGING congestion

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

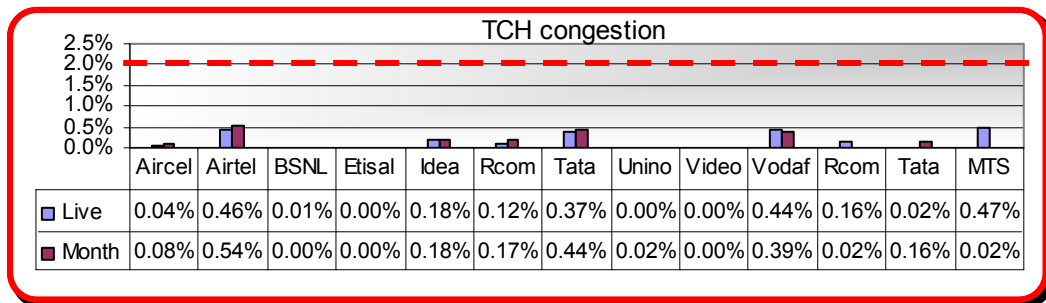|	Aircel	Airtel	BSNL	Etisal	Idea	Rcom	Tata	Unino	Video	Vodaf	Rcom	Tata	MTS
□ Live	0.04%	0.46%	0.01%	0.00%	0.18%	0.12%	0.37%	0.00%	0.00%	0.44%	0.16%	0.02%	0.47%
■ Month	0.08%	0.54%	0.00%	0.00%	0.18%	0.17%	0.44%	0.02%	0.00%	0.39%	0.02%	0.16%	0.02%

TCH congestion

III.   Connection Maintainability (Retainability):

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

	Aircel	Airtel	BSNL	Etisal	Idea	Rcom	Tata	Unino	Video	Vodaf	Rcom	Tata	MTS
□ Live	0.42%	0.94%	1.11%	0.22%	1.27%	0.33%	0.90%	0.94%	0.00%	0.62%	0.38%	0.20%	0.34%
■ Month	0.42%	0.96%	1.16%	0.30%	1.27%	0.31%	0.95%	0.89%	1.35%	0.63%	0.40%	0.23%	0.47%

CDR

Worst affected Cell exceeding 3% TCH Drop: For live data, Idea, Tata GSM, Etisalat & Uninor are found not meeting the benchmark. For Monthly data, Tata GSM, Etisalat & Uninor are not meeting the benchmark. Rests of the operators are meeting the benchmark for both cases.

	Aircel	Airtel	BSNL	Etisal	Idea	Rcom	Tata	Unino	Video	Vodaf	Rcom	Tata	MTS
Live	2.16%	2.65%	2.63%	3.17%	3.22%	1.03%	6.42%	10.36	0.00%	0.87%	0.82%	0.00%	2.87%
Month	1.50%	2.91%	2.86%	5.12%	2.68%	0.91%	3.82%	9.57%	0.00%	0.58%	0.87%	0.26%	2.54%

Percentage of connections with good voice quality (benchmark >= 95%): For live data except Vodafone All operators are meeting the TRAI benchmarks (=> 95%) for both one month data and 3 days live data taken in the month of audit. Data has not been system generated for BSNL, RCOM CDMA & TATA CDMA.
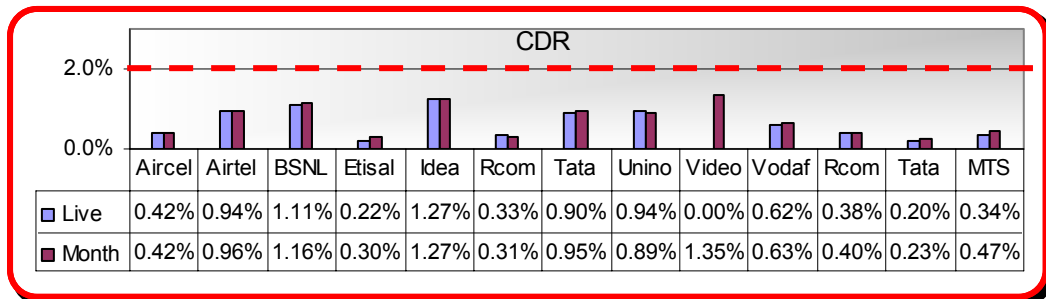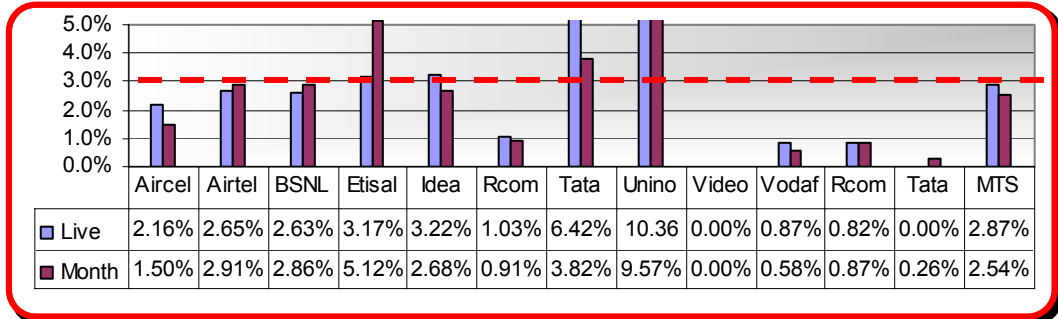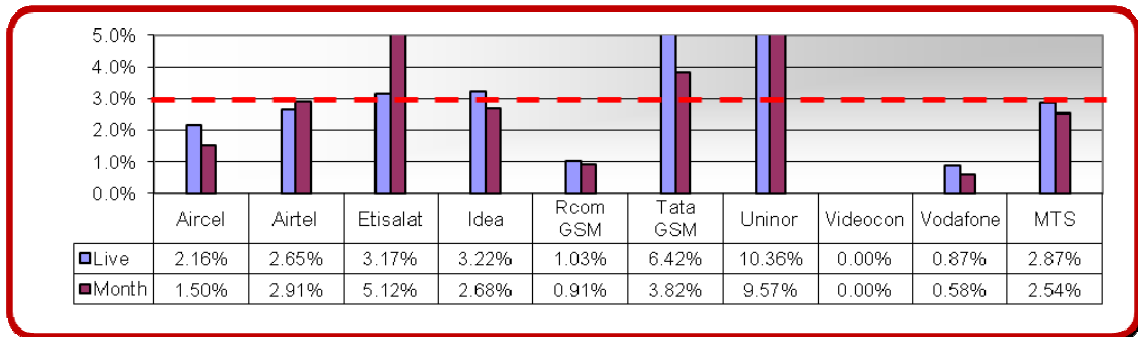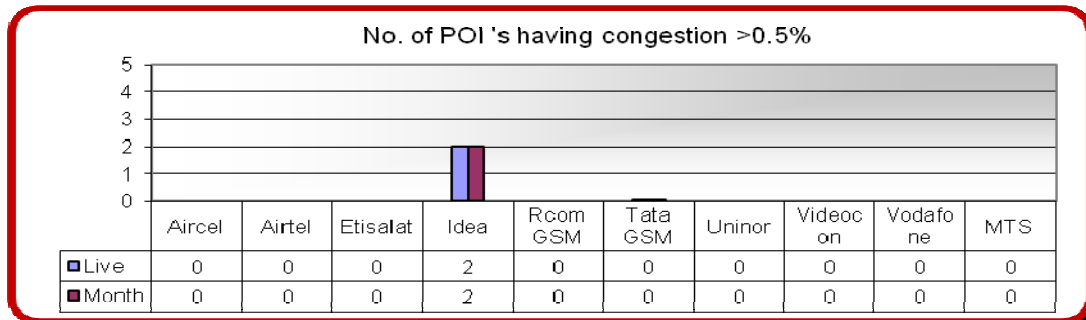
	Aircel	Airtel	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS
Live	2.16%	2.65%	3.17%	3.22%	1.03%	6.42%	10.36%	0.00%	0.87%	2.87%
Month	1.50%	2.91%	5.12%	2.68%	0.91%	3.82%	9.57%	0.00%	0.58%	2.54%

No. of POI's having Congestion >0.5%: All of the operators, except Idea, are having 2 nos. POI with >0.5% congestion in both one month data and 3 days live data taken in the month of audit.

No. of POI 's having congestion >0.5%

	Aircel	Airtel	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS
Live	0	0	0	2	0	0	0	0	0	0
Month	0	0	0	2	0	0	0	0	0	0

B) CUSTOMER SERVICE QUALITY PARAMETERS

(A) **Response time to the customer for assistance**:

Percentage of call answered (Electronically): During live audit, Aircel, BSNL, Etisalat, Idea, Tata GSM & CDMA and MTS are not meeting the benchmark. Similarly, in month audit, Aircel, BSNL, Idea, Tata GSM and Vodafone are found to be having below benchmark value.
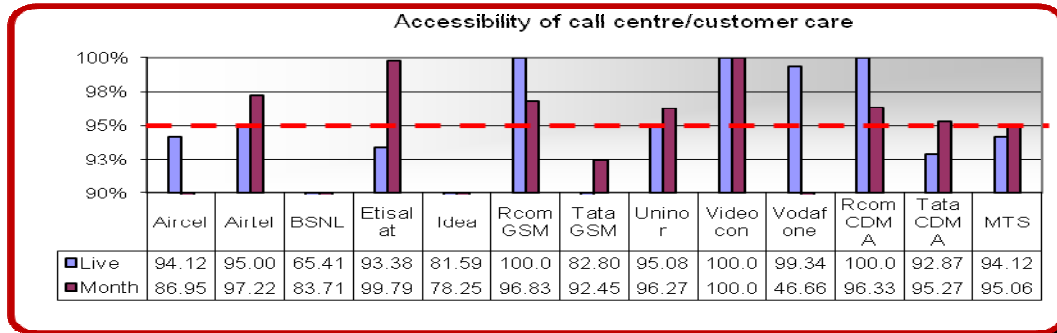
Percentage of call answered by operators (Voice to voice) within 60 sec: During live audit, Vodafone is not meeting the benchmark. Similarly, in month audit, Aircel & Vodafone are found to be having below benchmark value.
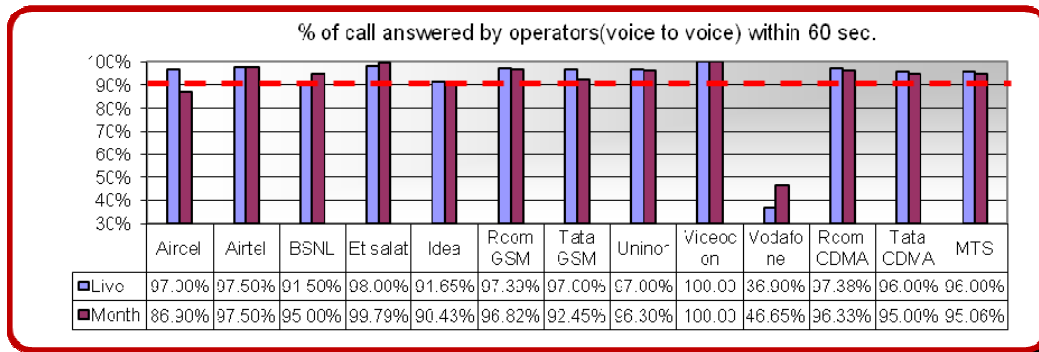

(3) **Critical Analysis**

The above comparative study between live data & month data shows similar trends in both the cases. However, for parameters like "worst affected cells >3% TCH drop" high deviations were found in case of Etisalat, Tata GSM & Uninor. Inconsistency was found in case of BSNL, Aircel, and Vodafone & Tata GSM for "accessibility of call centre" and Aircel & Vodafone for "%age of calls answered by operators (voice to voice).

(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)
Total No. of calls	5	8	5	-	4	7	4	-	-	10	-	5	15
Cases resolved with 4 weeks	5	8	5	-	4	7	4	-	-	10	-	5	15
%age of cases resolved	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.

	OPERATORS NAME												
	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom	Tata	Video-con	Voda-fone	Uninor	MTS	Rcom	Tata
	GSM										CDMA		
1ST HALF (10AM to 01 PM)	36	46	33	44	36	44	40	45	18	45	46	44	45
2ND HALF (04PM to 07 PM)	33	44	40	47	18	42	38	46	16	40	43	42	41
In % age	69.00	90.00	73.00	91.00	54.00	86.00	78.00	91.00	34.00	85.00	89.00	86.00	86.00

(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)
Aircel	-	98%	99%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Airtel	100%	-	99%	100%	100%	99%	100%	100%	100%	100%	100%	100%	100%
BSNL	100%	100%	-	100%	100%	100%	100%	100%	100%	97%	100%	100%	98%
Etisalat	100%	100%	100%	-	100%	100%	100%	100%	100%	100%	100%	97%	100%
Idea	100%	98%	98%	100%	-	100%	100%	100%	100%	100%	100%	100%	100%
Reliance (GSM)	100%	100%	100%	100%	100%	-	100%	100%	100%	100%	100%	100%	100%
Tata (GSM)	99%	96%	100%	100%	100%	97%	-	97%	100%	100%	100%	100%	100%
Uninor	100%	100%	99%	100%	100%	100%	100%	-	100%	100%	100%	100%	100%
Videocon	100%	98%	100%	100%	99%	98%	100%	100%	-	99%	100%	100%	99%
Vodafone	99%	100%	98%	100%	100%	100%	100%	100%	100%	-	100%	100%	100%
MTS	100%	98%	100%	100%	100%	99%	100%	100%	100%	98%	-	100%	100%
Reliance (CDMA)	99%	100%	100%	100%	98%	100%	100%	98%	100%	100%	100%	-	100%
Tata (CDMA)	98%	100%	100%	100%	100%	100%	100%	98%	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:	Kengeri, Rajeshwari nagar, Nayandhalli
MEDIUM DENSE:	Madiwala, Silk Board, Bommanahalli, Parappana agrahara.
HIGH DENSE:	Jaya nagar, Gandhi Bazar, Chamrajpet, Kalasipalya, Peenya, Malleshwaram, Nandhini layout

MYSORE

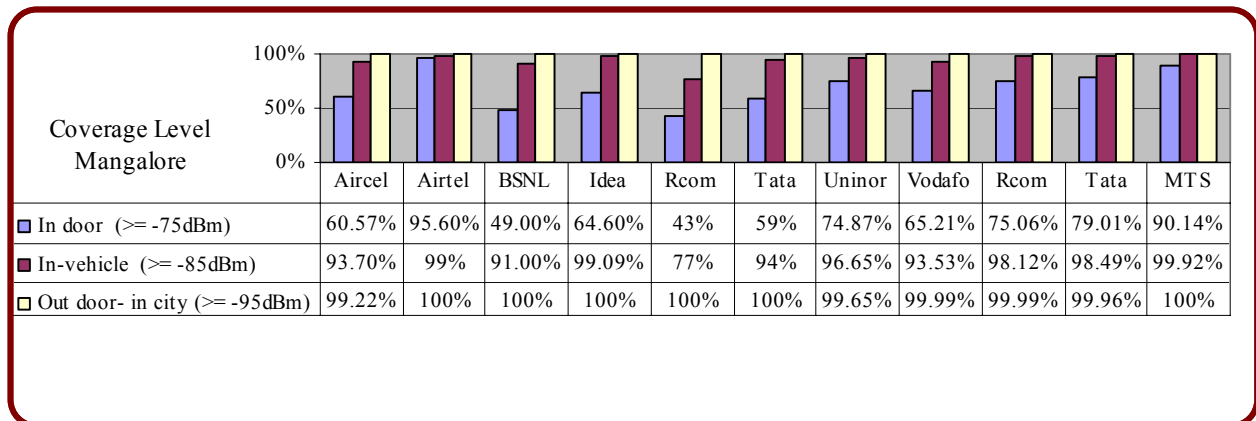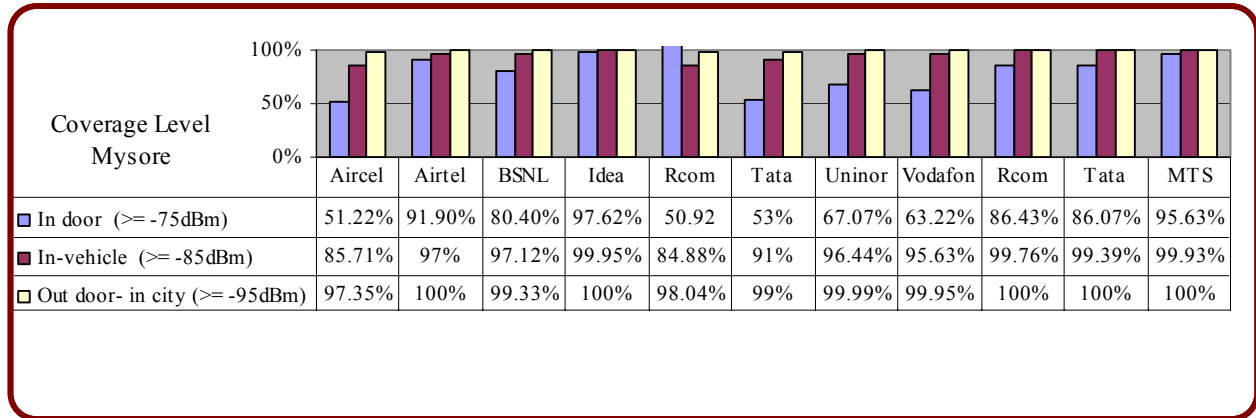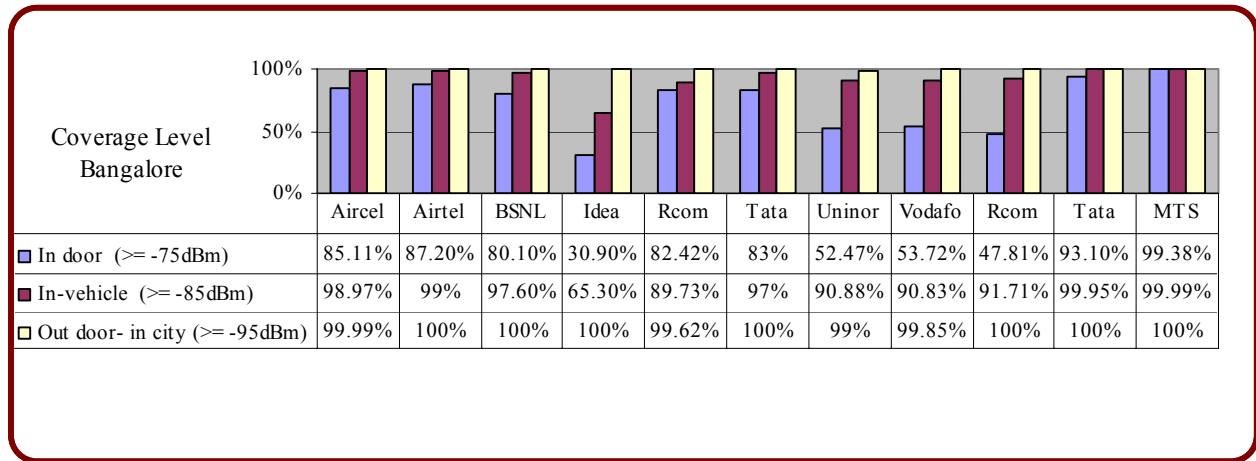|	
LOW DENSE:	KHB Colony, Rajeshwari nagar
MEDIUM DENSE:	Hinkal, Bogadi, Mahadesh badavane, Hunumanth nagar, Saraswathipuram.
HIGH DENSE:	ARS road, Kumargre, Agrahara, Vivekananda nagar, Silk factory, Udaygiri

MANGALORE

LOW DENSE:	Kulshekra, Padil, Thokuutu, Kullur, KIOCL, Surathkal
MEDIUM DENSE:	Ullala, Garudi, Pandeshwara, Sultanbateri, Kapikad, Yayadi, Kavoor
HIGH DENSE:	Valancia, Mangaladevi, Attavar, Jeppu, Bunder, Kankanadi, Hamppanakatta, Jtoyhi PVS, Lal bagh, Lady hill, Urva store

2)   Performance (for the respective cities)

Operator assisted Drive Test

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vodafone	Rcom CDMA	Tata CDMA	MTS
			GSM Operators								CDMA Operators		
1.1	Call Attempts	Bangalore	169	198	183	188	186	165	184	167	184	164	168
		Mysore	209	152	191	187	168	173	151	139	163	162	167
		Mangalore	106	119	123	133	115	99	106	89	112	99	128
1.2	Blocked Call Rate (<=3%)	Bangalore	0	2.02%	1.09%	1.60%	1.08%	0.61%	1.63%	0.61%	0	0%	0
		Mysore	0	3.95%	1.04%	2.14%	3.57%	2.31%	1.33%	0.72%	0	0%	0
		Mangalore	0.94%	4.20%	8.13%	2.26%	1.74%	1.01%	0%	0	0	0%	0
1.3	Dropped Call Rate (<=2%)	Bangalore	0	1.03%	3.80%	2.70%	0.54%	0.61%	1.10%	0	4.10%	0%	0
		Mysore	0	2.74%	1.58%	2.70%	0	2.31%	0	0	2.00%	0%	0
		Mangalore	0	2.63%	1.77%	2.31%	0	1.01%	0	0	4.70%	0%	0
1.4	Percentage of connections with good voice quality (=>95%)												
	(i) 0-4 (w/o frequency hopping)	Bangalore									96.64%	99.44%	99.19%
		Mysore									98.89%	99.70%	98.69%
		Mangalore									98.02%	99.79%	98.24%
	(ii) 0-5 (with frequency hopping)	Bangalore	96.29%	87.17%	94.30%	93.51%	95.16%	90.00%	95.06%	95.35%			
		Mysore	96.27%	87.49%	94.78%	94.98%	95.53%	94.50%	98.97%	95.80%			
		Mangalore	97.22%	90.47%	95.92%	95.81%	96.18%	99.00%	99.73%	97.04%			
1,5	Service Coverage												
	In door (>= -75dBm)	Bangalore	85.11%	87.20%	80.10%	30.90%	82.42%	83%	52.47%	53.72%	47.81%	93.10%	99.38%
		Mysore	51.22%	91.90%	80.40%	97.62%	50.92	53%	67.07%	63.22%	86.43%	86.07%	95.63%
		Mangalore	60.57%	95.60%	49.00%	64.60%	43%	59%	74.87%	65.21%	75.06%	79.01%	90.14%
	In-vehicle (>= -85dBm)	Bangalore	98.97%	99%	97.60%	65.30%	89.73%	97%	90.88%	90.83%	91.71%	99.95%	99.99%
		Mysore	85.71%	97%	97.12%	99.95%	84.88%	91%	96.44%	95.63%	99.76%	99.39%	99.93%
		Mangalore	93.70%	99%	91.00%	99.09%	77%	94%	96.65%	93.53%	98.12%	98.49%	99.92%
	Out door- in city (>= -95dBm)	Bangalore	99.99%	100%	100%	100%	99.62%	100%	99%	99.85%	100%	100%	100%
		Mysore	97.35%	100%	99.33%	100%	98.04%	99%	99.99%	99.95%	100%	100%	100%
		Mangalore	99.22%	100%	100%	100%	100%	100%	99.65%	99.99%	99.99%	99.96%	100%

Graphical Representation

Coverage Level Bangalore	Aircel	Airtel	BSNL	Idea	Rcom	Tata	Uninor	Vodafo	Rcom	Tata	MTS
In door (>= -75dBm)	85.11%	87.20%	80.10%	30.90%	82.42%	83%	52.47%	53.72%	47.81%	93.10%	99.38%
In-vehicle (>= -85dBm)	98.97%	99%	97.60%	65.30%	89.73%	97%	90.88%	90.83%	91.71%	99.95%	99.99%
Out door- in city (>= -95dBm)	99.99%	100%	100%	100%	99.62%	100%	99%	99.85%	100%	100%	100%

Coverage Level Mysore	Aircel	Airtel	BSNL	Idea	Rcom	Tata	Uninor	Vodafon	Rcom	Tata	MTS
In door (>= -75dBm)	51.22%	91.90%	80.40%	97.62%	50.92	53%	67.07%	63.22%	86.43%	86.07%	95.63%
In-vehicle (>= -85dBm)	85.71%	97%	97.12%	99.95%	84.88%	91%	96.44%	95.63%	99.76%	99.39%	99.93%
Out door- in city (>= -95dBm)	97.35%	100%	99.33%	100%	98.04%	99%	99.99%	99.95%	100%	100%	100%

Coverage Level Mangalore	Aircel	Airtel	BSNL	Idea	Rcom	Tata	Uninor	Vodafo	Rcom	Tata	MTS
In door (>= -75dBm)	60.57%	95.60%	49.00%	64.60%	43%	59%	74.87%	65.21%	75.06%	79.01%	90.14%
In-vehicle (>= -85dBm)	93.70%	99%	91.00%	99.09%	77%	94%	96.65%	93.53%	98.12%	98.49%	99.92%
Out door- in city (>= -95dBm)	99.22%	100%	100%	100%	100%	100%	99.65%	99.99%	99.99%	99.96%	100%

(3)   Critical Analysis

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

- Blocked Call Rate benchmark is not met by Airtel in Mysore & Mangalore, BSNL in Mangalore and Reliance GSM in Mysore.
- Dropped Call Rate benchmark is not met by Airtel in Mysore & Mangalore, BSNL in Bangalore, Tata GSM in Mysore Reliance CDMA in Bangalore & Mangalore and Idea in all the 3 cities..
- "Percentage of connection with good voice quality" benchmark is not met by Airtel, BSNL, Idea & Tata GSM in both Bangalore & Mysore and Airtel in Mangalore.
- BSNL has CSSR of 91.87% in Mangalore.

(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: Kengeri, Rajeshwari nagar, Nayandhalli
MEDIUM DENSE: Madiwala, Silk Board, Bommanahalli, Parappana agrahara.
HIGH DENSE: Jaya nagar, Gandhi Bazar, Chamrajpet, Kalasipalya, Peenya, Malleshwaram, Nandhini layout

2) Performance (for the respective cities)

Independent Drive Test

SN	Parameter	City Name	Aircel	Airtel	Idea	Rcom GSM	Tata GSM	Uninor	Vodafone	Rcom CDMA	Tata CDMA
			GSM Operators							CDMA Operators	
1.1	Call Attempts	Bangalore	152	190	179	185	186	195	177	165	168
1.2	Blocked Call Rate (<=3%)	Bangalore	1.97%	5.26%	0%	2.16%	8.06%	8.72%	1.13%	0.61%	0.00%
1.3	Dropped Call Rate (<=2%)	Bangalore	1.30%	7.78%	2.79%	0.56%	8.19%	0.56%	0%	0.00%	0.00%
1.4	Percentage of connections with good voice quality (=>95%)										
	(i) 0-4 (w/o frequency hopping)	Bangalore								99.65%	99.43%
	(ii) 0-5 (with frequency hopping)	Bangalore	91.70%	93.28%	94.04%	96.10%	89.08%	93.14%	96.11%		
1.5	Service Coverage										
	In door (>= -75dBm)	Bangalore	79.85%	75.12%	90.59%	51.11%	86%	58.00%	75.20%	95.94%	100%
	In-vehicle (>= -85dBm)	Bangalore	88.40%	78.17%	99.64%	90.35%	98%	91.00%	96.84%	99.99%	100%
	Out door- in city (>= -95dBm)	Bangalore	100%	100%	99.99%	99%	100%	99%	100%	99.99%	100%
1.6	Call Setup Success Rate (>=95%)	Bangalore	98.03%	94.74%	100%	97.84%	91.94%	91.28%	98.87%	99.39%	100%

Graphical Representation

Coverage Level Bangalore	Aircel	Airtel	Idea	Rcom	Tata	Uninor	Vodafone	Rcom	Tata
■ In door (>= -75dBm)	79.85%	75.12%	90.59%	51.11%	86%	58.00%	75.20%	95.94%	100%
■ In-vehicle (>= -85dBm)	88.40%	78.17%	99.64%	90.35%	98%	91.00%	96.84%	99.99%	100%
□ Out door- in city (>= -95dBm)	100%	100%	99.99%	99%	100%	99%	100%	99.99%	100%
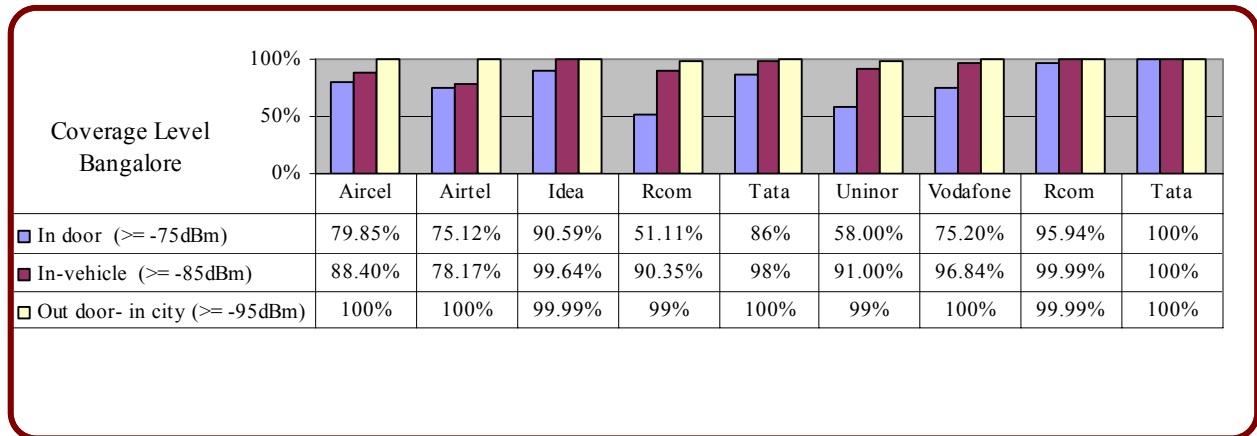
(3) Critical Analysis

- Blocked Call Rate benchmark is not met by Airtel, Tata GSM & Uninor.

- Dropped Call Rate benchmark is not met by Airtel, Idea & Tata GSM.

- "Percentage of connection with good voice quality" benchmark is not met by Aircel, Airtel, Idea, and Tata GSM & Uninor.

(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 <=3% for "worst affected cells >3% TCH drop" is not met by Tata GSM, Etisalat & Uninor. Idea is having 2 POIs with >=0.5% congestion.

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 >=90%. Apart from this, the "accessibility of call centre" parameter benchmark is not met Aircel, BSNL, Tata GSM & Vodafone.

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

Regarding **Resolution of billing/ Charging complaints**, Idea & Tata CDMA shows below benchmark value.

Regarding **Termination/ Closure of service**, Idea shows below benchmark value.

During **Drive Tests**, high Blocked Call Rates were found in case of Airtel (Mysore, Mangalore), BSNL (Mangalore), Rcom GSM (Mysore). Similarly, dropped call rate benchmark was not meeting by Airtel (Mysore, Mangalore), BSNL (Bangalore), Idea (Bangalore, Mysore & Mangalore),Tata GSM(Mysore) and Rcom CDMA (Bangalore, Mysore & Mangalore). Most of the GSM operators have below benchmark %age of connections with good voice quality. BSNL is seen to have 91.87% CSSR in Mangalore and Idea has 94.02% CSSR in Bangalore 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