REPORT
ON
AUDIT & ASSESSMENT OF QUALITY OF SERVICE
OF
CELLULAR MOBILE TELEPHONE SERVICES
FOR
KARNATAKA CIRCLE
(SOUTH ZONE)

Report Period: Oct 2011 – Dec 2011

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III. Broadband Service Providers

- ***Not Done for this quarter***

CHAPTER-1: INTRODUCTION

I. Background

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

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

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

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

i) Create conditions for consumer satisfaction by making known the quality of service, which the service provider is required to provide, and the user has a right to expect.

ii) Measure the Quality of Service provided by the Service Providers from time to time and to compare them with the norms so as to assess the level of performance.

iii) Generally protect the interests of consumers of telecommunication services.

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

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

II. Objectives and Methodology

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

i) Verification of the data submitted by the service providers to TRAI as part of QoS monitoring reports i.e. Quarterly Performance Monitoring Reports (PMRs) and monthly Point of Interconnection (POI) Congestion Reports with reference to the records maintained by the service provider.
ii) Verification of the performance of service providers against the Quality of Service benchmarks laid down by TRAI using live measurement for 3 days during the month in which the audit and assessment is carried out.
iii) Verification of the performance of service providers against the Quality of Service benchmarks laid down by TRAI using the data for the entire month during which the live measurement is carried out.
iv) Drive tests of the mobile networks both operators assisted and independent drive test (as and where required).
v) Billing and call center's data verification.
vi) Live testing of the efficiency of the call center / customer care help line.
vii) Level 1 (Emergency nos.) calling

To fulfill the above mentioned Scope of Work audit was performed on different Systems, Facilities and Field data collection.

Systems audited:-

1. Network Switching Centre (NSS)
2. Base Station Subsystem(BSS)
3. Billing Applications
4. Customer Care applications

Facilities audited:-

1. Billing documents.
2. Customer Care records.

Field data collections carried out:-

1. RF network coverage including KPIs (Key Performance Index)
2. Inter Operator Call Assessment
3. Checking of Customer Billing/Refund Complaints (Random sample)
4. Customer Care efficiency
5. The live calling was made to assess the quality of services for Inter Operator Call Assessment, Customer Billing/Refund Complaints and Customer Care efficiency.

In order to carry out the above scope of work:-

- ✓ TCIL auditors visited all the NSS (Network Sub System) and BSS (Base-station Sub System) to check data for all the operators in their respective service area.

- ✓ All the NSS and BSS data for the relevant details were collected either directly from the centralized NOC or through a remote access to the NOC.

- ✓ The Radio parameters were audited/verified from the data collected from OMC-R (Operation and Maintenance Center – Radio, as part of BSS data).

- ✓ The Drive test was conducted in high, low and medium dense areas including highways, commercial complex and residential areas and special attention was paid for the areas for which TRAI has received complaints.

- ✓ The POI and other network related parameters were audited/verified from the data collected from the OMC-S (Operation and Maintenance Center – Switch as part of NSS data).

- ✓ The data related to Billing and Customer care was checked for the previous month and verified with the customers by calling them on random basis. The process of registration and handling of the complaints was also studied for the various operators. Call centre number were called for measuring the efficiency of the call centre.

- ✓ The inter operator call assessment test was carried out during the time period as is specified in the tender document. TCBH (Time Consistent Busy Hour) is taken after observation of the traffic consistently for 3 days prior to the audit activity.

- ✓ Data has been collected for busy hour of network in case of live assessment & month of audit for all service providers & verified that service providers are providing busy hour data only for QoS service. We found that TCBH hour is matching with network busy hour as provided by service providers for 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.

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 4th quarter (Oct – Dec 2011). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken during the period April – June 2011.

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	Nov-2011	1900-2000 Hrs
2	Airtel Ltd	Nov-2011	1900-2000 Hrs
3	BSNL	Nov-2011	1900-2000 Hrs
4	Etisalat	Nov-2011	1900-2000 Hrs
5	Idea	Nov-2011	2000-2100 Hrs
6	Reliance Communication (GSM)	Nov-2011	2100-2200 Hrs
7	Tata Communications (GSM)	Nov-2011	1900-2000 Hrs
8	Uninor	Nov-2011	1900-2000 Hrs
9	Videocon	Nov-2011	1900-2000 Hrs
10	Vodafone	Nov-2011	1900-2000 Hrs
CDMA Operators			
11	MTS (CDMA)	Nov-2011	1900-2000 Hrs
12	Reliance Communication (CDMA)	Nov-2011	2100-2200 Hrs
13	Tata Communications (CDMA)	Nov-2011	1900-2000 Hrs

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

(A) Cellular Mobile Telephone Service Providers

3 days Live Data Audit		Bench-mark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
S/N	Name of Parameter		GSM Operators										CDMA		
1	**Network Availability**														
	a) BTS accumulated downtime	<= 2%	0.05%	0.27%	0.92%	0.07%	0.07%	0.20%	0.06%	0.04%	0.00%	0.02%	0.17%	0.01%	0.20%
	b) Worst affected BTSs due to downtime	<= 2%	0.00%	0.00%	0.22%	0.00%	0.02%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%
2	**Connection Establishment (Accessibility)**														
	a) CSSR (Call Setup Success Rate)	*>=95%*	99.40%	98.58%	99.15%	99.88%	95.89%	99.67%	98.17%	99.01%	98.66%	99.43%	99.32%	98.86%	97.67%
	b) SDCCH/PAGING congestion	*<=1%*	0.03%	0.61%	0.15%	0.00%	0.11%	0.01%	0.11%	0.05%	0.02%	0.07%	0.00%	0.00%	0.00%
	c) TCH congestion	*<=2%*	0.04%	0.33%	1.43%	0.00%	0.73%	0.03%	0.40%	0.03%	0.00%	0.28%	0.08%	0.06%	0.22%
3	**Connection maintenance (Retainability)**														
	a) CDR	*<=2%*	0.75%	0.66%	1.13%	0.27%	1.10%	0.54%	0.79%	1.30%	0.68%	0.76%	0.52%	0.24%	0.43%
	b) Worst affected cells>3% TCH drop	*<=3%*	2.92%	0.00%	1.78%	1.06%	1.54%	0.01%	6.42%	2.73%	0.00%	2.47%	0.13%	0.12%	0.92%
	c) Good voice quality	*>=95%*	98.56%	98.7%	NA	98.99%	97.09%	99.13%	98.21%	98.52%	98.52%	98.68%	NA	NA	NA
4	**No. of POI's congestion having congestion >0.5%**	*<=0.5%*	0	0	0	0	1	0	0	3	0	0	0	0	0
5	**Response time to customers for assistance**														
	a) Accessibility of call centre/Customer Care	*>=95%*	100%	100%	100%	100%	98%	100%	100%	96.00%	100%	100%	99.00%	100%	100%
	b) % call answered by operators(voice to voice) within 60 sec.	*>=90%*	100%	92.00%	93.00%	100%	61.00%	93.00%	97.00%	95.00%	100%	93.00%	96.00%	97.00%	96.00%

NA: Not Applicable, NR: Not Received

Observations:

From the 3 days live data assessment, it is found that the operators are meeting most of the network parameters, except the following:

a) For the parameter "Worst affected cells>3% TCH drop", TATA GSM are found not meeting the benchmark
b) For the parameter "% of call answered by operator (Voice to voice)" Idea was found not meeting the benchmark.
c) In case of POI parameter Uninor & Idea were found to have 3 & 1 No's of POI's congestion over >0.5%.
d) For the parameter "Good Voice Quality", the BSNL & CDMA operators are confirmed that the parameter is not system generated.

One Month Data Audit		Bench-mark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
S/N	Name of Parameter		GSM Operators										CDMA		
(A)	**Network Service Quality Parameter**														
1	**Network Availability**														
	a) BTS Accumulated Downtime	*<=2%*	0.10%	0.16%	1.23%	0.89%	0.06%	0.20%	0.05%	0.02%	0.65%	0.03%	0.17%	0.01%	0.22%
	b) Worst affected BTSs due to downtime	*<=2%*	0.18%	0.89%	1.26%	0.00%	0.20%	1.20%	0.12%	0.00%	0.00%	0.10%	0.00%	0.00%	0.00%
2	**Connection Establishment (Accessibility)**														
	a) CSSR (Call Setup Success Rate)	*>=95%*	99.50%	98.85%	99.19%	99.72%	95.91%	99.65%	98.13%	99.09%	99.28%	99.41%	99.27%	98.38%	97.70%
	b) SDCCH/PAGING congestion	*<=1%*	0.02%	0.33%	0.15%	0.00%	0.12%	0.03%	0.07%	0.05%	0.01%	0.10%	0.00%	0.00%	0.00%
	c) TCH congestion	*<=2%*	0.03%	0.31%	1.51%	0.00%	0.62%	0.04%	0.41%	0.03%	0.00%	0.26%	0.13%	0.04%	0.22%
3	**Connection maintenance (Retainability)**														
	a) CDR	*<=2%*	0.74%	0.68%	1.18%	0.56%	1.11%	0.53%	0.81%	1.27%	0.08%	0.67%	0.54%	0.25%	0.50%
	b) Worst affected cells>3% TCH drop	*<=3%*	2.60%	2.65%	2.09%	3.17%	1.52%	0.03%	3.89%	2.84%	0.00%	2.57%	0.13%	0.14%	1.70%
	c) Good voice quality	*>=95%*	98.56%	98.71%	NA	98.99%	97.05%	99.16%	98.22%	98.55%	99.18%	98.68%	NA	NA	NA
4	**No. of POI's having congestion >0.5%**	*<=0.5%*	0	0	0	0	1	0	0	5	0	0	0	0	0
(B)	**Customer Service Quality Parameters**														
5	**Metering/billing credibility-Post paid**	*<= 0.1%*	0.06%	0.01%	0.02%	NA	0.13%	0.10%	0.94%	NA	NA	0.09%	0.07%	0.58%	0.05%
6	**Metering /billing credibility-Pre paid**	*<= 0.1%*	0.03%	0.00%	0.02%	0.00%	0.01%	0.07%	0.00%	0.01%	0.00%	0.09%	0.02%	0.01%	0.01%
7	**Resolution of billing/ charging complaints**	*100% within 4 weeks*	100%	100%	100%	NA	100%	100%	100%	100%	NA	100%	100%	100%	100%
	a) Period of applying credit/waiver/adjustment to the customer's account from the date of resolutions of complaints	*<=1 week*	100%	100%	100%	NA	67%	100%	100%	100%	NA	100%	100%	100%	100%
8	**Response time to customers for assistance**														
	a) Accessibility of call centre/Customer Care	*>=95%*	100%	100%	100%	99.00%	97.00%	99.00%	100%	96.45%	100%	100%	99.00%	100%	98.94%
	b) % call answered by operators(voice to voice) within 60 sec.	*>=90%*	96.70%	89.00%	90.50%	100.00%	46.00%	95.00%	99.59%	92.00%	100.00%	87.00%	97.00%	99.26%	95.00%
9	**Termination/closure of service**	*100%*	100%	100%	1.00%	NA	98.68%	100%	100%	NA	NA	100%	100%	100%	NA
10	**Time taken for refunds of deposits after closures.**	*100% within 60 days*	100%	100%	100%	NA	100%	100%	100%	NA	NA	100%	100%	99.60%	NA

NA: Not Applicable, NR: Not Received

Observations:

From the month data assessment, it is found that the operators are meeting most of the network parameters with some exceptional cases as given below:

For the parameter "Worst affected cells having >3% TCH drop" it is found that Etisalat & Tata GSM are not meeting the benchmark with a values of 3.17% & 3.89% respectively.

In case of POI parameter Uninor & Idea were found to have 5 & 1 No's of POI's congestion over >0.5%.

Performance related to customer care data is not found to be satisfactory for the parameter "calls answered by operators (voice-to-voice)" for Airtel, Idea & Vodafone.

The "Metering/billing credibility -postpaid" benchmark is not meeting by Idea, Tata GSM & Tata CDMA.

The benchmark "Period of applying credit/waiver/adjustment to customers", is not meeting by Idea with a value of 67% respectively.

In case of parameter "termination/closure of service", BSNL, Idea are having below benchmark performance.

In case of parameter "Time taken for refunds of deposits" Tata CDMA is showing below benchmark performance.

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	Blocked Call Rate (<=3%)	Bangalore	0.39%	1.63%	1.85%	3%	2.58%	4.25%	0.51%	3.64%	0.52%	0.00%	1.50%
		Bellary	0.60%	0.00%	0.59%	1%	1%	2.84%	1.11%	1.49%	0.71%	0.00%	0.00%
		Tumkur	0.00%	1.72%	0.00%	2%	2%	7.10%	0.00%	5.05%	0.00%	0.00%	0.00%
1.2	Dropped Call Rate (<=2%)	Bangalore	0.00%	1.63%	2.80%	3.12%	1.05%	1.41%	0.51%	0.47%	0.00%	0.00%	1.02%
		Bellary	1.20%	0.00%	1.77%	0.97%	0.00%	2.13%	2.22%	4.47%	0.00%	1.37%	0.00%
		Tumkur	0.00%	0.00%	0.00%	0.00%	0.82%	0.00%	0.56%	0.00%	0.00%	0.00%	0.00%
1.3	Percentage of connections with good voice quality (=>95%)												
	(i) 0-4 (w/o frequency hopping)	Bangalore									99.37%	99.32%	99.03%
		Bellary									99.37%	98.19%	99.79%
		Tumkur									98.82%	99.96%	99.52%
	(ii) 0-5 (with frequency hopping)	Bangalore	95.11%	95.48%	91.16%	92.82%	94.57%	91.52%	93.71%	95.62%			
		Bellary	96.94%	95.15%	95.47%	94.83%	95.78%	91.27%	96.95%	95.58%			
		Tumkur	95.57%	96.28%	97.22%	91.07%	93.44%	92.05%	96.16%	95.85%			
1.4	Call Setup Success Rate (>=95%)	Bangalore	99.61	98.37	98.15	96.96	97.42	95.75	99.49	96.36	99.48	100	98.5
		Bellary	99.4	100	99.41	99.04	99.28	97.16	98.89	98.51	99.29	100	100
		Tumkur	100	98.28	100	97.6	97.54	92.9	100	94.95	100	100	100

Observations:

- "Block Call rate" parameter is not meeting the benchmark for Idea in Bangalore city & Tata GSM, Vodafone are in both Bangalore & Tumkur cities.
- "Drop call rate" parameter is not meeting the benchmark for BSNL, Idea in Bangalore city & Tata GSM , Uninor, Vodafone in Bellary city.
- "Percentage of connection with good voice quality" parameter is not meeting the benchmark by BSNL (bangalore), Idea (Bangalore, Bellary, Tumkur), Rcom GSM (Bangalore, Tumkur), TATA GSM (Bangalore, Bellary, Tumkur), Uninor (Bangalore).
- "CSSR" parameter is not meeting the benchmark by Tata GSM & Vodafone in Tumkur city.

Independent Drive Test

SN	Parameter	VODAFONE	TATA GSM	UNINOR	IDEA	RCOM	AIRTEL
		Chickamagalur		Shimoga	Raichur		Hassan
1.1	Call Attempts	58	66	133	110	129	109
1.2	Block Call Rate (<= 3%)	1.72%	3.03%	1.50%	9.09%	0.78%	0.92%
1.3	Drop Call Rate (<= 2%)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1.4	Percentage of Connections with good voice quality (>= 95%)	97.31%	91.61%	95.58%	96.50%	95.73%	95.56%
1.5	Service Coverage						
	Indoor (>= -75dbm)	56.35	93.5	67.48	70.1	76.86	85.66
	In-Vehicle (>= -85dbm)	88.2	96.43	92.13	96.9	95.29	96.75
	Outdoor -in City (>= -95dbm)	98.52	99.01	99.55	99.9	100	100
1.6	Call Setup Success Rate (>= 95%)	98.28	96.97	98.5	90.91	99.22	99.08

Observations:

- TATA GSM is not meeting the benchmark of "Blocked call rate" & “Good voice quality” parameters in Chickamagalur city.
- Idea is not meeting the benchmark of “Block Call rate” & “Call setup Success rate” parameters in Raichur city.

CHAPTER-3: Audit PMR data Verification results

I. Cellular Mobile Telephone Service

PMR		Bench-mark	Audit	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
S/N	Name of Parameter			GSM Operators										CDMA Operators		
(A)	**Network Service Quality Parameter**															
1	**Network Availability**															
	BTS Accumulated Downtime	*<=2%*	Reported	0.08	0.2	1.35	0.16	0.04	0	0.07	0.03	0	0.03	0	0.02	0.18
			Verified	0.08	0.2	1.35	0.16	0.04	0	0.07	0.03	0	0.04	0	0.02	0.18
	Worst affected BTSs due to downtime	*<=2%*	Reported	0.15	0.04	1.79	0	0.15	0	0.14	0	0	0	0	0	0.18
			Verified	0.15	0.04	1.79	0	0.15	0	0.14	0	0	0	0	0	0.18
2	**Connection Establishment (Accessibility)**															
	CSSR (Call Setup Success Rate)	*>=95%*	Reported	99%	99%	99%	100%	100%	100%	98%	99%	98%	67%	100%	100%	98%
			Verified	99%	99%	99%	100%	100%	100%	98%	99%	98%	99.16%	100%	100%	98%
	SDCCH/PAGING congestion	*<=1%*	Reported	0.04	0.4	0.33	0.02	0.21	0.01	0.1	0.03	0.08	0	0	0	0
			Verified	0.04	0.4	0.33	0.02	0.21	0.01	0.1	0.03	0.08	0.12	0	0	0
	TCH congestion	*<=2%*	Reported	0.07	0.53	0.87	0	0.51	0	0.41	0.01	0.09	0	0	0.07	0.23
			Verified	0.07	0.53	0.87	0	0.51	0	0.41	0.01	0.09	0.48	0	0.07	0.23
3	**Connection maintenance (Retainability)**															
	CDR	*<=2%*	Reported	0.43	1.04	1.08	0.14	1.37	0	0.95	0.77	0.9	0.01	0	0.14	0.44
			Verified	0.43	1.04	1.08	0.14	1.37	0	0.95	0.77	0.9	0.67	0	0.14	0.44
	Worst affected cells>3% TCH drop	*<=3%*	Reported	0.01	0.03	4.69	1.6	2.65	0	3.14	0.65	0	0.04	0.01	0.25	1.48
			Verified	0.01	0.03	4.69	1.6	2.65	0	3.14	0.65	0	3.59	0.01	0.25	1.48
	Good voice quality	*>=95%*	Reported	98%	98%	99%	99%	97%	99%	97%	99%	99%	99%	100%	100%	99%
			Verified	98%	98%	99%	99%	97%	99%	97%	99%	99%	99%	100%	100%	99%
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	0	0	0	0	0	0	0	0	0	0	0	0	0
(B)	**Customer Service Quality Parameters**															

5	**Metering/billing credibility-Post paid**	*<= 0.1%*	Reported	0.06	0	0.02	0	0	0	0	0	0	0	0	0	0.03
			Verified	0.06	0	0.02	0	0	0	0	0	0	0	0	0.01	0.03
6	**Metering /billing credibility-Pre paid**	*<= 0.1%*	Reported	0.1	0	0.04	0	0	0	0	0	0	0	0	0	0.05
			Verified	0.1	0	0.04	0	0	0	0	0	0	0	0	0.02	0.05
7	**Resolution of billing/ charging complaints**	*100% within 4 weeks*	Reported	100	100	100	1	100	100	100	0	100	100	100	100	100
			Verified	100	100	100	1	100	100	100	0	100	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	0	100	100	100	0	100	100	100	100	100
			Verified	100	100	100	0	100	100	100	0	100	100	100	100	100
8	**Response time to customers for assistance**															
	Accessibility of call centre/Customer Care	*>=95%*	Reported	100	100	98	1	98	100	99	97	97	100	100	97	97
			Verified	100	100	98	1	98	100	99	97	97	100	100	97	97
	% call answered by operators(voice to voice) within 60 sec.	*>=90%*	Reported	89	95	90	1	65	87	93	96	95	60	89	94	95
			Verified	89	95	90	1	65	87	93	96	95	60	89	94	95
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	0	100	100	100	0	0	100	100	100	NA
			Verified	100	100	100	0	100	100	100	0	0	100	100	100	NA
10	**Time taken for refunds of deposits after closures.**	*100% within 60 days*	Reported	100	100	100	0	100	100	100	0	0	100	100	100	NA
			Verified	100	100	100	0	100	100	100	0	0	100	100	100	NA

Critical Analysis (PMR Verification):

A). Most of the operator's data is almost matching with the PMR data.

B). Vodafone showing variation in network related parameters like CSSR, SDCCH Congestion, TCH Congestion, CDR, Worst affected Cells >3% TCH drop.

II. Basic Telephone Service (Wireline) Providers

-Not conducted for this quarter

III. Broadband Service Providers

-Not conducted for this quarter

Chapter -4
Detailed Findings & Analysis

(A) MSC Audit
(1) 3 days measurement data assessment & summarized findings

S/N	Name of Parameter	Benchmark	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	**Network Availability**														
	a) BTS accumulated downtime	<= 2%	0.05%	0.27%	0.92%	0.07%	0.07%	0.20%	0.06%	0.04%	0.00%	0.02%	0.17%	0.01%	0.20%
	b) Worst affected BTSs due to downtime	<= 2%	0.00%	0.00%	0.22%	0.00%	0.02%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%
	c) Total no.of BTSs in the licensed service area		2859	8269	4990	21	4932	3257	4954	2164	30	7744	1768	926	1122
	d) Sum of BTSs downtime in 3days in hours i.e. total outage time of all BTSs in hours during 3days Live		101	1594	3299.7	1.05	242	469	219	63.6	0	103	216	7	162
	e) No of BTSs having accumulated downtime of >24 hours in 3days Live		0	0	11	0	1	0	0	0	0	1	0	0	0
2	**Connection Establishment (Accessibility)**														
	a) CSSR	*>=95%*	99.40%	98.58%	99.15%	99.88%	95.89%	99.67%	98.17%	99.01%	98.66%	99.43%	99.32%	98.86%	97.67%
	b) SDCCH/PAGING congestion	*<=1%*	0.03%	0.61%	0.15%	0.00%	0.11%	0.01%	0.11%	0.05%	0.02%	0.07%	0.00%	0.00%	0.00%
	c) TCH congestion	*<=2%*	0.04%	0.33%	1.43%	0.00%	0.73%	0.03%	0.40%	0.03%	0.00%	0.28%	0.08%	0.06%	0.22%
3	**Connection maintenance**														
	a) CDR	*<=2%*	0.75%	0.66%	1.13%	0.27%	1.10%	0.54%	0.79%	1.30%	0.68%	0.76%	0.52%	0.24%	0.43%
	b) Cells having > 3% TCH drop	*<=3%*	2.92%	2.50%	1.78%	1.06%	1.54%	0.01%	6.42%	2.73%	0.00%	2.47%	0.13%	0.11%	0.92%
	c) Good voice quality	*>=95%*	98.56%	98.70%	NA	98.99%	97.09%	99.13%	98.21%	98.52%	98.52%	98.68%	NA	NA	NA
	d) No. of cells > 3% TCH drop		243	574	263	0.67	224	1	936	174	0	555	7	3	34
	e) Total no. of cells in the network		8322	23006	14798	63	14559	9771	14586	6375	90	22490	5304	2830	3713
4	**No. of POI's having congestion >0.5%**	*<=0.5%*	0	0	0	0	1	0	0	3	0	0	0	0	0
	a) Name of POI not meeting the benchmark						BSNL - CELLONE			IDEA, AIRTEL FIXED					

	b) Total No. of circuits on POI		81733	232901	39295	1236	118778	15860	8253	22445	429	113913	2010768	50011	40255
	c) Avg No. of call attempts on POI		451594	6177566	888306.3	1102.6	2513260	230166	389508.67	523816	31	2840109	491527	1408605	978127
	d) Avg traffic served on POI (Erlang)		11077.51	116574.54	25403	25.646	44106.47	5939	5825.53	14103.67	68.42	66030	24006	27945.4	22521.9
	e) Total number of working POI Service Area wise		37	151	44	27	53	23	8	58	14	154	96	151	57
	f) Equipped Capacity of Network in respect of Traffic in erlang		79159	665974	332655.9	466	155801.73	108000	252710	68220.38	5000	196432.7	230000	266664	74306
	g) Total traffic handled in TCBH in erlang		18744	447406	87770.74	48.8	121286.59	100697	106803	30854	0.8	155239	67956	38296	41971
(B)	**Customer Service Quality Parameters**														
5	**Response time to customers for assistance**														
	a) Accessibility of call centre	*>=95%*	100%	100%	100%	100%	98.00%	100%	100%	96.00%	100%	100%	99.00%	100%	100%
	b) % of call answered by operators(voice to voice) within 60 sec	*>=90%*	100%	92.00%	93.00%	100%	61.00%	93.00%	97.00%	95.00%	100%	93.00%	96.00%	97.00%	96.00%

NA: Not Applicable, NR: Not Received

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:-

- **BTS Accumulated downtime (benchmark <=2%):** All operators are meeting the benchmark with values lying between 0% and 0.92%
- **Worst affected BTSs due to downtime (benchmark <=2%):** All the operators are meeting the benchmark with values lying between 0.00% and 0.22%.
- **Call setup success rate (benchmark >=95%):** All operators are meeting the benchmark with values lying between 95.89% and 99.88%.
- **SDCCH/PAGING Channel congestion (benchmark <= 1%):** All operators are meeting the benchmark with values lying between 0% and 0.61%.
- **TCH congestion (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 1.43%.
- **Call drop rate (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0.24% and 1.13%.
- **Cell exceeding 3% TCH drop (benchmark <= 3%):** Except Tata GSM with a value of 6.42% rest of the operators are satisfying the benchmark with value in between 0% and 2.92%.
  Airtel has not reported the data for this parameter.
- **Connections with good voice quality (benchmark >= 95%):** CDMA operators & BSNL has declared that the parameter is not system generated. Rests of the operators are meeting the benchmark with values lying between 97.97% and 99.19%.
  Airtel has not reported the data for this parameter.
- **No. of POI's having Congestion >0.5% (benchmark <= 0.5%):** Idea & Uninor were found to have 1 & 3 nos. of POI with congestion over 0.5% in the individual POIs. For rest of the 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.
- **%age of call answered by operator (electronically) (benchmark >95):** All operators are meeting the benchmark with values in between 96% and 100%.
- **%age of call answered by operator (Voice to voice) (benchmark >90%): %):** Except for Idea , rest of the operators are satisfying the benchmark with value in between 92% and 100%.

2) One month data audit report & summarized findings

S/N	Name of Parameter	Benchmark	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%*	0.10%	0.16%	1.23%	0.89%	0.06%	0.20%	0.05%	0.02%	0.65%	0.03%	0.17%	0.01%	0.22%
	b) Worst affected BTSs due to downtime	*<=2%*	0.18%	0.89%	1.26%	0.00%	0.20%	1.20%	0.12%	0.00%	0.00%	0.10%	0.00%	0.00%	0.00%
	c) Total no. of BTSs in the licensed service area		2859	8269	4990	21	4932	3257	4954	2164	30	7744	1768	926	1122
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		2117	9256.48	44086.4	134	2047	4678	1914	362.47	141.21	1509	2208	64.07	1749
	e) No. of BTSs having accumulated downtime of >24 hours in a month		5	74	63	0	10	39	6	0	0	5	0	0	0
2	**Connection Establishment (Accessibility)**														
	a) CSSR (Call Setup Success Rate)	*>=95%*	99.50%	98.85%	99.19%	99.72%	95.91%	99.65%	98.13%	99.09%	99.28%	99.41%	99.27%	98.38%	97.70%
	b) SDCCH/PAGING congestion	*<=1%*	0.02%	0.33%	0.15%	0.00%	0.12%	0.03%	0.07%	0.05%	0.01%	0.10%	0.00%	0.00%	0.00%
	c) TCH congestion	*<=2%*	0.03%	0.31%	1.51%	0.00%	0.62%	0.04%	0.41%	0.03%	0.00%	0.26%	0.13%	0.04%	0.22%
3	**Connection maintenance (Retainability)**														
	a) CDR	*<=2%*	0.74%	0.68%	1.18%	0.56%	1.11%	0.53%	0.81%	1.27%	0.08%	0.67%	0.54%	0.25%	0.50%
	b) Worst affected cells>3% TCH drop	*<=3%*	2.60%	2.65%	2.09%	3.17%	1.52%	0.03%	3.89%	2.84%	0.00%	2.57%	0.13%	0.14%	1.70%
	c) Good voice quality	*>=95%*	98.56%	98.71%	NA	98.99%	97.05%	99.16%	98.22%	98.55%	99.18%	98.68%	NA	NA	NA
	d) Total No. of cells exceeding 3% TCH drop (call drop)		216	610	309	2	220	3	567	181	0	579	7	4	63

	e) Total no. of cells in the network		8322	23006	14798	63	14559	9771	14586	6375	90	22490	5304	2830	3713
4	**No. of POI's having congestion >0.5%**	*<=0.5%*	0	0	0	0	1	0	0	5	0	0	0	0	0
	a) Name of POI not meeting the benchmark														
	b) Total No. of call attempts on POI (Avg.)		426817	6089633	882671	934	1143861	230166	376503	505988	18	2682799	428746	1376189	955952
	c) Total traffic served on POI (Erlang) (Avg.)		10208.98	113746	24567	22	59499	5986	5659	13455.95	64.19	62537	21075	26708.76	21665.6
	d) Total No. of circuits on POI		81733	232901	39295	1236	118778	15860	8253	22445	429	113913	2010768	50011	40255
	e) Total number of working POI Service Area wise		37	151	44	27	53	23	8	58	14	154	96	151	57
	f) Capacity of POI		80973.38	226148	35999.05	912.58	116250	14852.24	7961	21985.92	274.46	110056	1870441	46564.49	38593.5
5	**Network Data**														
	a) Equipped Capacity of Network Erlang		79159	665974	332655.9	466	155801	108000	252710	68220.38	5000	196432.7	230000	266664	74306
	b) Total traffic in TCBH in erlang (Avg.)		18744	447406	87770.74	48.8	121286	100697	106803	30854.04	0.8	155239	NR	38296.72	41971.56
	c) Total no. of customers served (as per VLR) on last day of the month		792527	13508710	3826428	2533	4633250	NR	3519989	862618	88	4717454	NR	731546	1243036
(B)	**Customer Service Quality Parameters**														
6	**Metering/billing credibility-Post paid**	*<= 0.1%*	0.06%	0.01%	0.02%	NA	0.13%	0.10%	0.94%	NA	NA	0.09%	0.07%	0.58%	0.05%
	a) No. of bills issued during the period		6400	1887350	138596	NA	162913	33793	51822	NA	NA	422707	254852	188969	11026
	b) No. of bills disputed including billing complaints during the period		4	198	34	NA	209	33	489	NA	NA	384	191	1102	6
7	**Metering /billing credibility-Pre paid**	*<= 0.1%*	0.03%	0.00%	0.02%	0.00%	0.01%	0.07%	0.00%	0.01%	0.00%	0.09%	0.02%	0.01%	0.01%

	a) No. of charging / credit / validity complaints during the quarter		507	213	1358	0	575	2954	45	126	0	5583	761	52	230
	b) Total no. of pre-paid customers at the end of the quarter		1656806	38596291	5888766	26119	5112442	4342308	6948902	1317766	11947	6220159	3085134	705500	1773965
8	**Resolution of billing/ charging complaints**	*100% within 4 weeks*	100%	100%	100%	NA	100%	100%	100%	100%	NA	100%	100%	100%	100%
	a) No. of billing/(post paid) and charging, credit/validity (pre paid) complaints resolved within 4 weeks during the quarter		511	411	1392	NA	782	2987	1023	126	NA	5967	952	2256	236
	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		563	13330	1392	NA	4243	2987	1023	126	NA	6085	952	2256	236
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		511	411	1322	NA	169	529	3	126	NA	5967	216	30	94
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		52	12919	70	NA	4074	2458	531	0	NA	118	736	1124	142
	e) Period of applying credit/waiver/adjustment to the customer's account from the date of resolutions of complaints	*<=1 week*	100%	100%	100%	NA	67%	100%	100%	100%	NA	100%	100%	100%	100%
9	**Response time to customers for assistance**														
	a) Accessibility of call centre/Customer Care	*>=95%*	100%	100%	100%	99.00%	97.00%	99.00%	100%	96.45%	100%	100%	99.00%	100%	98.94%
	b) % call answered by operators(voice to voice) within 60 sec.	*>=90%*	96.70%	89.00%	90.50%	100%	46.00%	95.00%	99.59%	92.00%	100%	87.00%	97.00%	99.26%	95.00%
	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		11256	521447	406449	554	1654283	490330	671056	351995	120	168289	87572	38106	42531

	d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		10881	464729	367799	554	765620	466493	668336	323101	120	146117	85291	37824	40413
10	**Termination/closure of service**	*<=7days*	100%	100%	1%	NA	98.68%	100%	100%	NA	NA	100%	100%	100%	NA
	a) Total No. of requests for Termination / Closure of service received during the quarter		257	5749	2455	NA	532	100	876	NA	NA	5643	895	3823	NA
	b) No. of requests for Termination / Closure of service complied within 7 days during the quarter		257	5749	22	NA	525	100	876	NA	NA	5643	895	3823	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%	99.60%	NA

NA: Not Applicable, NR: Not Received

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 0.01% and 1.23%.
- **Worst affected BTSs due to downtime (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 1.26%.
- **Call setup success rate (benchmark >= 95%):** All operators are meeting the benchmark with values lying between 97.7% and 99.72%.
- **SDCCH/PAGING Channel congestion (benchmark <= 1%):** All operators are meeting the benchmark wit values lying between 0% and 0.33%.
  Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.
- **TCH congestion (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 1.51%.
- **Call drop rate (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0.08% and 1.27%.
- **Cell exceeding 3% TCH drop (benchmark <= 3%):** Except for Etisalat, Tata GSM with a values of 3.17%, 3.89% remaining all the operators are satisfying the benchmark with value in between 0% and 2.65%.
- **Connections with good voice quality (benchmark >= 95%):** All CDMA operators are declared that the parameter is not system generated. Rests of the operators are meeting the benchmark with values lying between 97.05% and 99.18%.
- **No. of POI's having Congestion >0.5% (benchmark <= 0.5%):** Idea & Uninor were found to have 1 & 5 nos. of POI with congestion over 0.5% in the individual POIs. For rest of the 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.
- **%age of call answered by operator (electronically) (benchmark >95): A**ll operators are meeting the benchmark with values lying between 96.45% to 100%.
- **%age of call answered by operator (Voice to voice) (benchmark >90%):** Except for Airtel, Idea, and Vodafone with a value of 89%, 46%, and 87% respectively. Rest of the operators are meeting the benchmark with values lying between 90.5% to 100%.
- **Metering and billing credibility-Post paid (benchmark <= 0.1%):** Except for Idea, TATA GSM, Tata CDMA with a values of 0.13%, 0.94%, 0.58% rest of the operators are meeting the benchmark.
- **Metering and billing credibility-Pre paid (benchmark <= 0.1%):** 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):** All the operators are meeting the benchmark.
- **Termination/Closure of service (Benchmark <= 7 days):** Except for BSNL, Idea with a value of 1%, 98.68% rest of the operators has satisfied the benchmark.
- **Time taken for refunds of deposits after closures (benchmark 100% within <=60 days):** Except for Tata CDMA rest of the all operators have satisfied the benchmark.

(1) Sample Coverage

Switches/BSC/BTS details of operators:

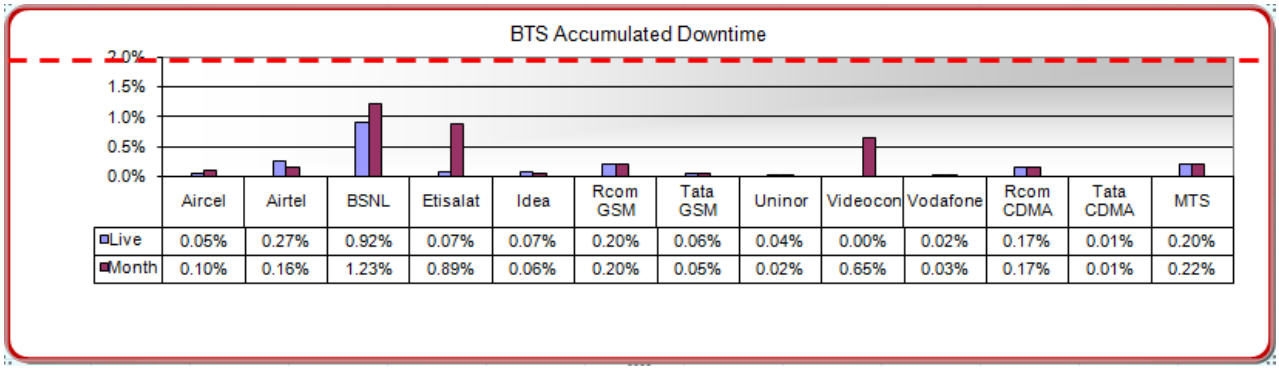
Sl.	Name of Service Provider	No. of MSC+GMSC	No. of BSC	No. of BTS
GSM Operators				
1	Aircel Ltd	3	20	2859
2	Airtel Ltd	56	99	8269
3	BSNL	12	124	4990
4	Etisalat	3	1	21
5	Idea	9	47	4932
6	Reliance Communication (GSM)	4	18	3257
7	Tata Communications (GSM)	7	32	4954
8	Uninor	3	14	2164
9	Videocon	1	2	30
10	Vodafone	14	100	7744
CDMA Operators				
11	MTS (CDMA)	2	4	1122
12	Reliance Communication (CDMA)	10	6	1768
13	Tata Communications (CDMA)	9	11	926

(2) Performance (Graphical Representation)

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

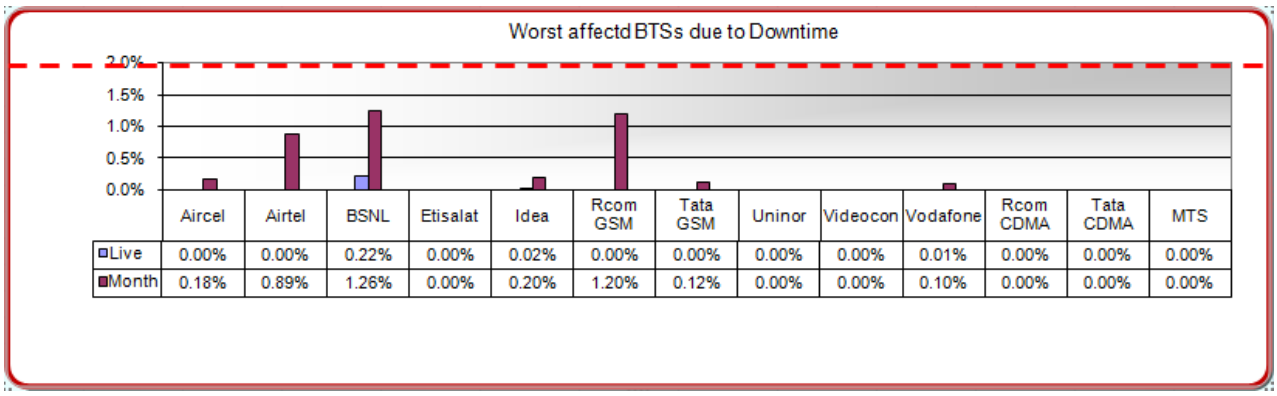
A) NETWORK PERFORMANCE

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



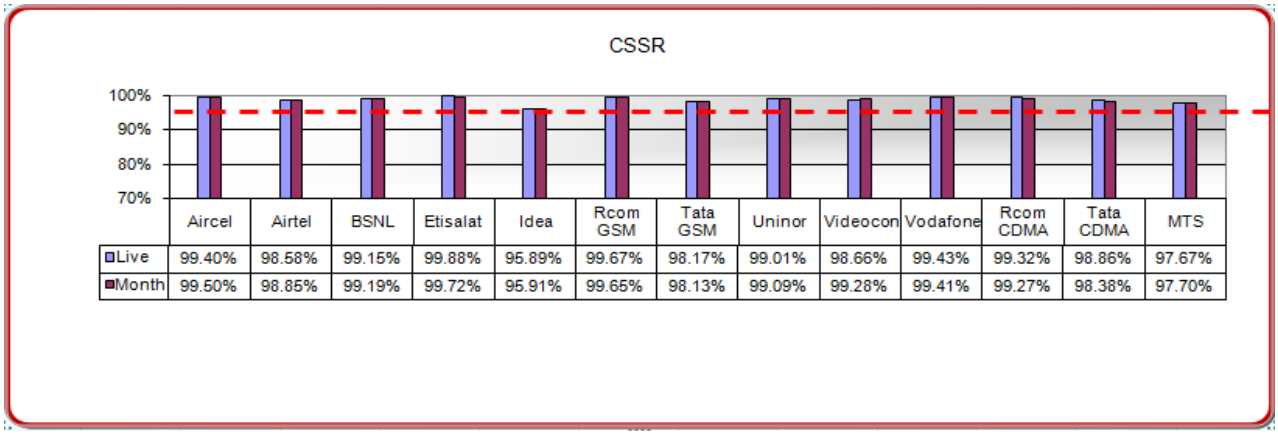
	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
Live	0.05%	0.27%	0.92%	0.07%	0.07%	0.20%	0.06%	0.04%	0.00%	0.02%	0.17%	0.01%	0.20%
Month	0.10%	0.16%	1.23%	0.89%	0.06%	0.20%	0.05%	0.02%	0.65%	0.03%	0.17%	0.01%	0.22%

Worst affected BTSs due to downtime: 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	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
Live	0.00%	0.00%	0.22%	0.00%	0.02%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%
Month	0.18%	0.89%	1.26%	0.00%	0.20%	1.20%	0.12%	0.00%	0.00%	0.10%	0.00%	0.00%	0.00%

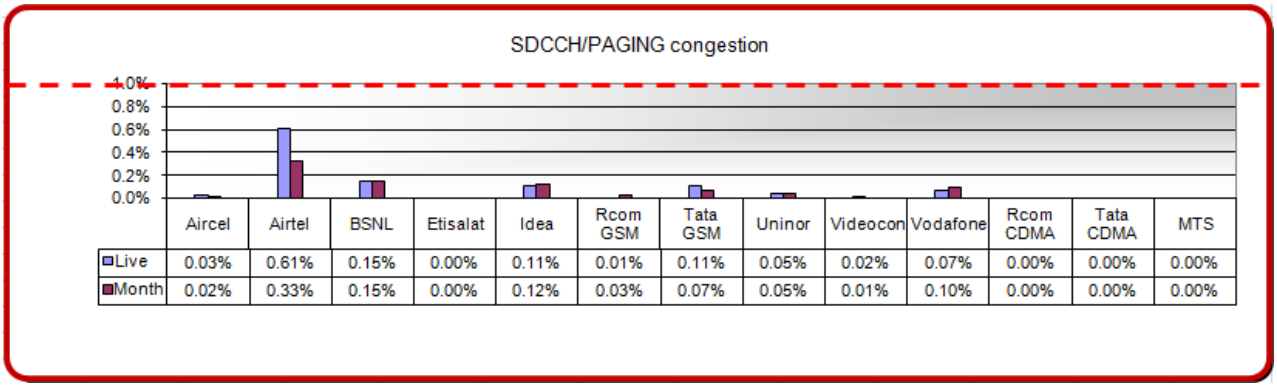
Call setup success rate: All operators are meeting the TRAI benchmarks (>= 95 %) for both one month data and 3 days live data taken in the month of audit.



	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
Live	99.40%	98.58%	99.15%	99.88%	95.89%	99.67%	98.17%	99.01%	98.66%	99.43%	99.32%	98.86%	97.67%
Month	99.50%	98.85%	99.19%	99.72%	95.91%	99.65%	98.13%	99.09%	99.28%	99.41%	99.27%	98.38%	97.70%

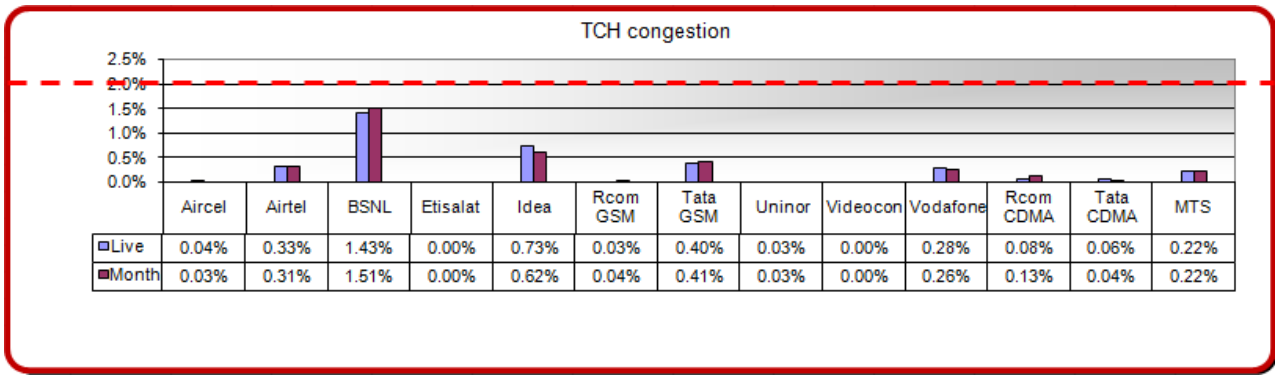
Blocked call rate:

SDCCH/Paging 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%	0.61%	0.15%	0.00%	0.11%	0.01%	0.11%	0.05%	0.02%	0.07%	0.00%	0.00%	0.00%
Month	0.02%	0.33%	0.15%	0.00%	0.12%	0.03%	0.07%	0.05%	0.01%	0.10%	0.00%	0.00%	0.00%

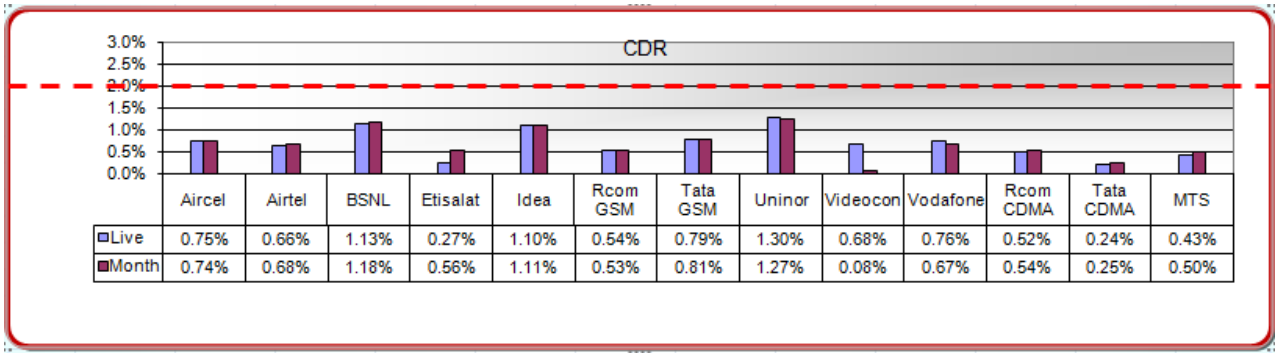
TCH congestion (%): All operators are meeting the TRAI benchmarks (<= 2%) for both one month data and 3 days live data taken in the month of audit.



	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
Live	0.04%	0.33%	1.43%	0.00%	0.73%	0.03%	0.40%	0.03%	0.00%	0.28%	0.08%	0.06%	0.22%
Month	0.03%	0.31%	1.51%	0.00%	0.62%	0.04%	0.41%	0.03%	0.00%	0.26%	0.13%	0.04%	0.22%

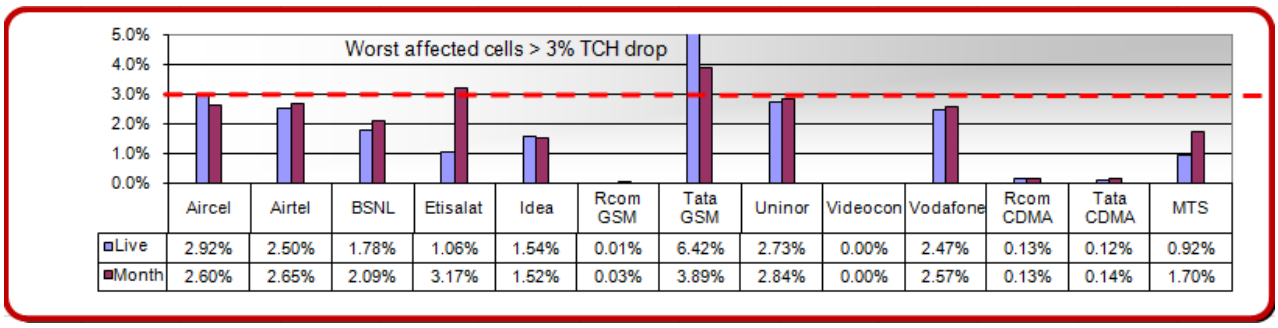
Connection Maintainability (Retainability):

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.



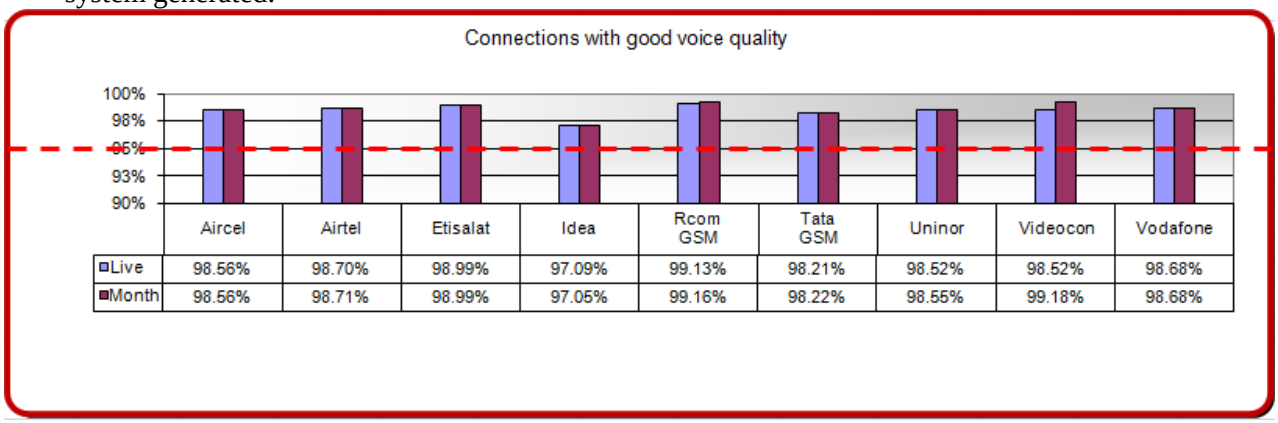
	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
Live	0.75%	0.66%	1.13%	0.27%	1.10%	0.54%	0.79%	1.30%	0.68%	0.76%	0.52%	0.24%	0.43%
Month	0.74%	0.68%	1.18%	0.56%	1.11%	0.53%	0.81%	1.27%	0.08%	0.67%	0.54%	0.25%	0.50%

Worst affected Cell exceeding 3% TCH Drop: Tata GSM is not meeting the benchmark in live data & month audit data with a values of 6.42%, 3.89%. Etisalat is not meeting the benchmark in month audit data with a value of 3.17% respectively. Rests of the operators are meeting the benchmark for both cases.



	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
Live	2.92%	2.50%	1.78%	1.06%	1.54%	0.01%	6.42%	2.73%	0.00%	2.47%	0.13%	0.12%	0.92%
Month	2.60%	2.65%	2.09%	3.17%	1.52%	0.03%	3.89%	2.84%	0.00%	2.57%	0.13%	0.14%	1.70%

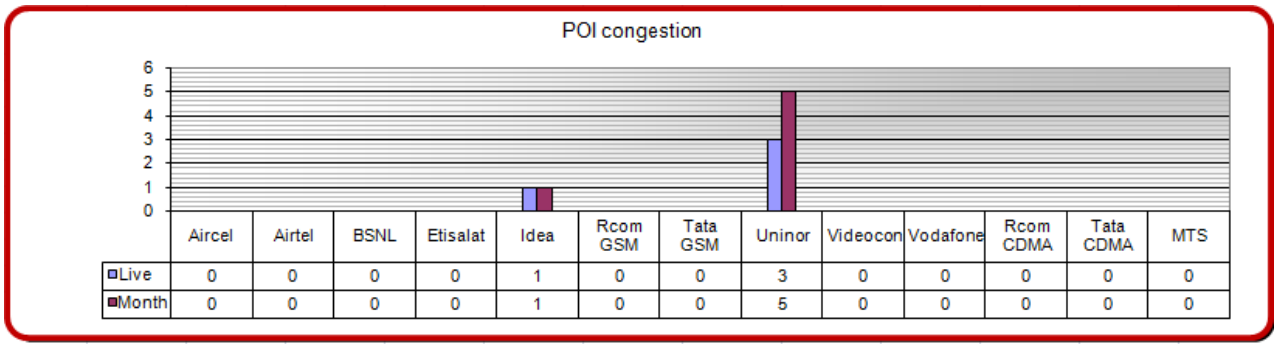
Percentage of connections with good voice quality (benchmark >= 95%): All operators are meeting the TRAI benchmarks (=> 95%) for both one month data and 3 days live data taken in the month of audit. The CDMA operators & BSNL has declared that this parameter is not system generated.



	Aircel	Airtel	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone
Live	98.56%	98.70%	98.99%	97.09%	99.13%	98.21%	98.52%	98.52%	98.68%
Month	98.56%	98.71%	98.99%	97.05%	99.16%	98.22%	98.55%	99.18%	98.68%

No. of POI having > 0.5% Congestion:

Idea & Uninor is not meeting the benchmark on their individual POI's in both Live & month audit. There is no congestion found for other operators during the time of audit.

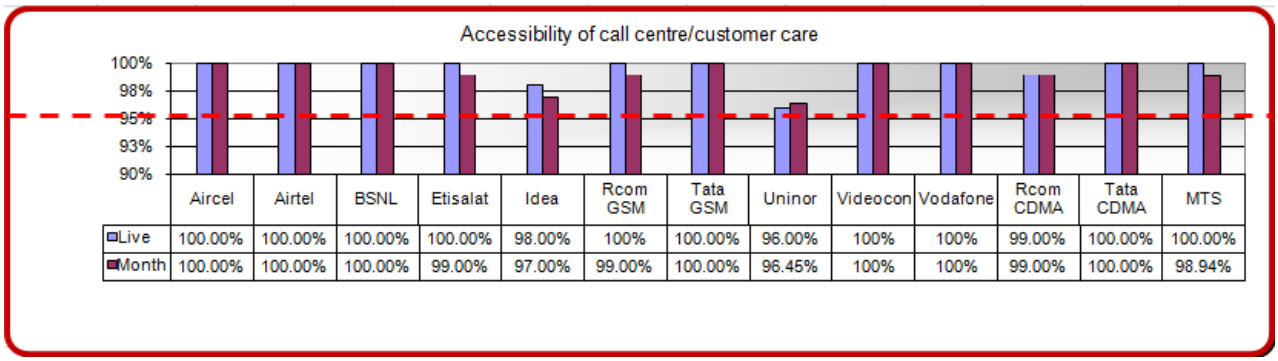


	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
Live	0	0	0	0	1	0	0	3	0	0	0	0	0
Month	0	0	0	0	1	0	0	5	0	0	0	0	0

B) CUSTOMER SERVICE QUALITY PARAMETERS

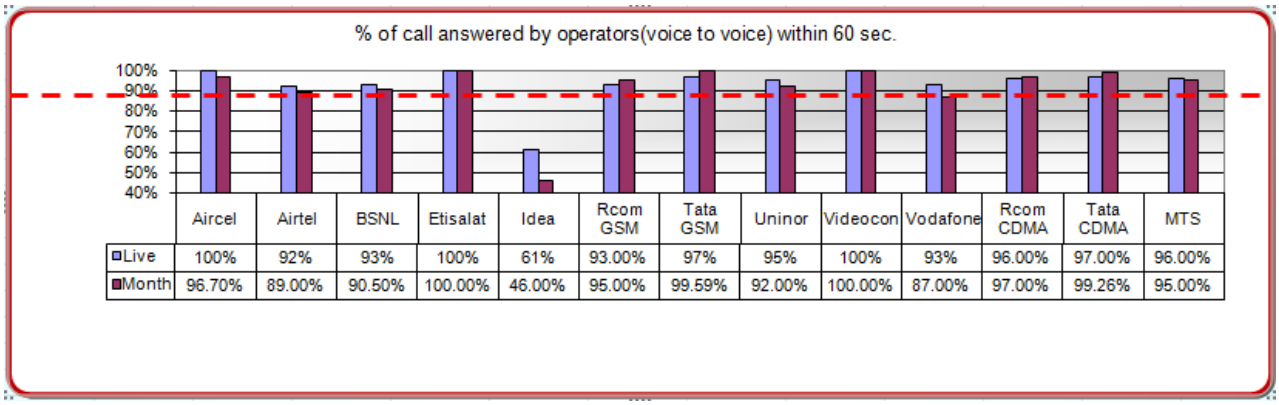
Response time to the customer for assistance:

Percentage of call answered (Electronically): All operators are meeting the TRAI benchmarks (>= 95%) for both one month data and 3 days live data taken in the month of audit with a values in between 96% to 100%



	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
Live	100.00%	100.00%	100.00%	100.00%	98.00%	100%	100.00%	96.00%	100%	100%	99.00%	100.00%	100.00%
Month	100.00%	100.00%	100.00%	99.00%	97.00%	99.00%	100.00%	96.45%	100%	100%	99.00%	100.00%	98.94%

Percentage of call answered by operators (Voice to voice) within 60 sec: Idea is not meeting the benchmark for both live & month audit data similarly Airtel, Vodafone are showing below benchmark for month audit data. Rests of the operators are meeting the benchmark.



	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
Live	100%	92%	93%	100%	61%	93.00%	97%	95%	100%	93%	96.00%	97.00%	96.00%
Month	96.70%	89.00%	90.50%	100.00%	46.00%	95.00%	99.59%	92.00%	100.00%	87.00%	97.00%	99.26%	95.00%

(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" benchmark is not meeting by Tata GSM for both month & live audit data, Etisalat for month audit data.
- "POI congestion" benchmark is not meeting by Idea for monthly audit data.
- "Metering/billing credibility for postpaid" benchmark is not meeting by Idea, Tata GSM, Tata CDMA.
- "Period of applying credit/waiver/adjustment to customers" benchmark is not meeting by Idea.
- "%age of calls answered by operator" benchmark is not meeting by Airtel, Idea, and Vodafone.
- "Termination/ closure of service" benchmark is not meeting by BSNL, Idea.

(A) Redressal

(1) Sample coverage

A sample of billing complaints was taken for each operator and calls were made for assessing the resolution of billing/charging complaints within 4 weeks as claimed by the respective operators.

(2) Performance (live calling for billing complaints)

Calling Operator	Aircel	Airtel	Idea	Reliance (GSM)	Tata (GSM)	Uninor	Vodafone	Reliance (CDMA)	Tata (CDMA)	Sistema (MTS)
Total No. of calls attempted	13	17	14	9	12	10	15	8	8	8
Total No. of calls	8	10	8	7	7	6	8	5	6	3
Cases resolved with 4 weeks	8	10	8	7	7	6	8	5	6	3
%age of cases resolved	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Note: The difference between call attempts and call answer is because of either Switch off, Number busy, No response or out of reach in the Network.

(3) Live calling to call centre

Calling Operator	Aircel	Airtel	BSNL	Etisalat	Idea	Tata GSM	Uninor	Videocon	Vodafone	MTS	Tata CDMA
Total No. of Calls Attempted	100	100	100	100	100	100	100	100	100	100	100
Total No. of calls connected to IVR	100	97	96	99	97	100	96	100	100	100	99
Calls got connected to agent within 60 Sec	100	92	93	100	61	97	95	100	93	96	97
%age of calls got answered	100%	92%	93%	100%	61%	97%	95%	100%	93%	96%	97%

(4) Level 1 live calling

Emergency no.	No. of calls made	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	UNINOR	MTS	RCOM CDMA	TATA CDMA
		Bangalore										
100	1	1	1	1	1	1	1	1	1	1	1	1
101	1	1	1	1	1	1	1	1	1	1	1	1
102/ 108	1	1	1	1	1	1	1	1	1	1	1	1
139	2	2	2	2	2	2	2	2	2	2	2	2
		Bellary										
100	1	1	1	1	1	1	1	1	1	1	1	1
101	1	1	1	1	1	1	1	1	1	1	1	1
102/ 108	1	1	1	1	1	1	1	1	1	1	1	1
139	2	2	2	2	2	2	2	2	2	2	2	2
		Tumkur										
100	1	1	1	1	1	1	1	1	1	1	1	1
101	1	1	1	1	1	1	1	1	1	1	1	1
102/ 108	1	1	1	1	1	1	1	1	1	1	1	1
139	2	2	2	2	2	2	2	2	2	2	2	2

(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.

In case of Call centre live calling all operators IVR calls are mostly get connected. However Congestion is found in BSNL and Idea after the IVR level that is when the calls are routed to the call center agent.

For emergency, Level 1 calling all the operators is found to be functional.

(B) 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 calling

Calling Operator	Aircel	Airtel	BSNL	Etisalat	Idea	Reliance (GSM)	Tata (GSM)	Uninor	Videocon	Vodafone	Reliance (CDMA)	Tata (CDMA)	Sistema (MTS)
	Bangalore												
Aircel	-	100%	99%	100%	100%	99%	100%	100%	100%	99%	100%	100%	100%
Airtel	99%	-	100%	100%	98%	96%	99%	96%	100%	99%	100%	99%	100%
BSNL	100%	99%	-	100%	97%	100%	99%	97%	100%	100%	100%	100%	100%
Etisalat	100%	100%	99%	-	100%	100%	100%	100%	100%	100%	100%	100%	97%
Idea	100%	96%	98%	100%	-	100%	99%	100%	100%	97%	99%	100%	100%
Reliance (GSM)	100%	100%	99%	100%	100%	-	100%	98%	100%	100%	100%	100%	100%
Tata (GSM)	100%	99%	98%	100%	100%	99%	-	99%	100%	100%	100%	99%	100%
Uninor	99%	96%	97%	100%	95%	98%	100%	-	97%	100%	100%	100%	97%
Videocon	100%	100%	99%	100%	100%	99%	100%	99%	-	100%	100%	100%	100%
Vodafone	100%	100%	98%	100%	99%	100%	100%	100%	100%	-	100%	98%	100%
Reliance (CDMA)	100%	100%	99%	100%	100%	100%	96%	100%	99%	100%	-	100%	100%
Tata (CDMA)	100%	100%	100%	100%	98%	100%	100%	99%	100%	99%	100%	-	100%
Sistema (MTS)	100%	100%	96%	100%	98%	100%	100%	100%	100%	100%	99%	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.

(C) 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:	Mysore road, Anekal, Sarjapur, Mahadevapura, Anekal, HAL, Marthahalli, Bellandur, Agrahara.
MEDIUM DENSE:	Indira nagar, HSR layout, Kamanhalli, Someshwara temple, Hundusthan lever, Doorvani nagar, Benaiganahalli
HIGH DENSE:	Koramangla, Majestic, JP nagar, Shivaji nagar, Krishnaraja puram, Electronic city, Domlur, Hebbal, Mathikere, Sanjay nagar, Peenya Industrial area, Teachers colony, Trinty circle, Bangalore Central, BDA market complex, St John Medical college road, Adugodi, Forum Mall.

BELLARY

LOW DENSE:	Havambhavi, Bapuji nagar colony, Raghavendra Theatre, Sanjay Gandhi nagar, Mundargindi area, Gandhi road, Allipura, Parcathi nagar
MEDIUM DENSE:	Bellary Law college, Madhuri Nursing home, National college, Badri narayana temple, Radio park, APMC yard, Rahimabad layout, S.N pet, Srirampura colony
HIGH DENSE:	Kanekal Bus stand, Benkiramma temple, Sanna market, Graham road, Shankar colony, Surya eye hospital road, Patel nagar, Thaiammakatta, Madabur, Patel nagar, Vishveshwar nagar.

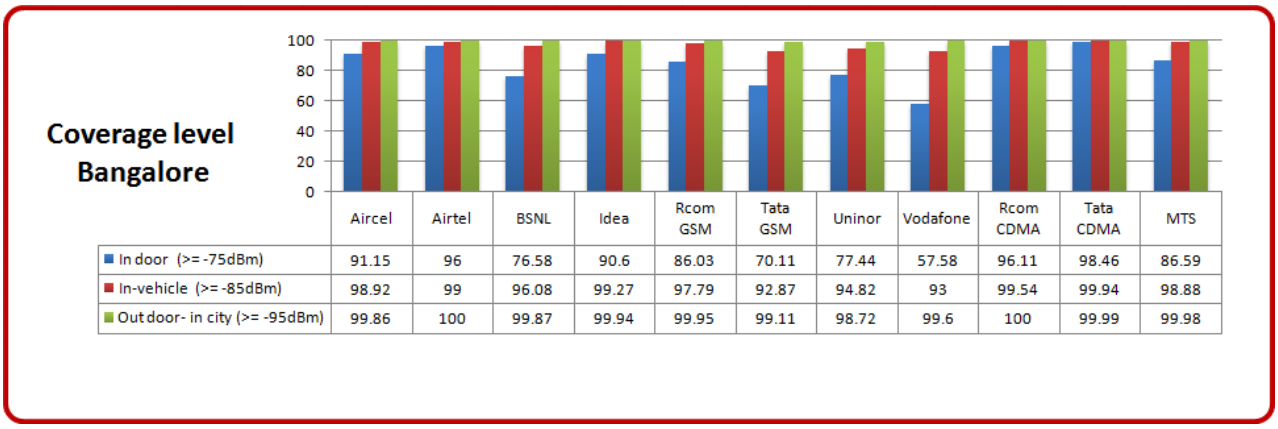
TUMKUR

LOW DENSE:	Belagumba, Tuda layout, Siragate, Shettihalli gate, KSSIDC, BH road, VR colony, Vinobha nagar, Maralurdinea
MEDIUM DENSE:	Daana palace, Nrupathunga, Devarayapatna, Azad park road, SSIT college, Shivaramkathnagar, Bhimasandra, Railway station road.
HIGH DENSE:	Mandipet, Vinayaka nagar, Gandhi nagar, Ayyappa temple, kodi road, Shrinidhi engineering Industries, HMS enterprises, Siddhartha engg college, HMT factory, Sidhagangamatt, Batwadi, ABB ltd, Raghavendra nagar, Hanumantpura, Indira nagar II.

2) Performance (for the respective cities)

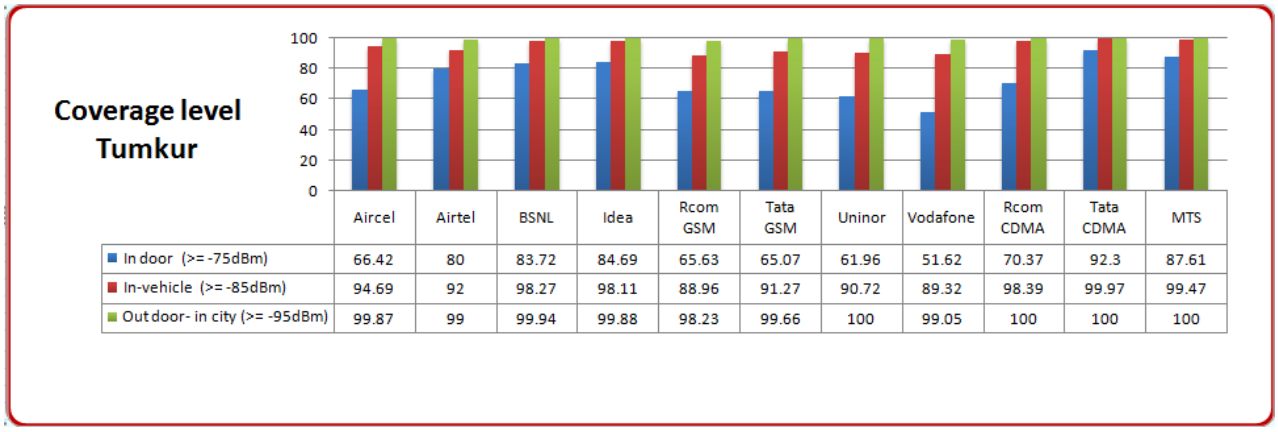
SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vodafone	Rcom CDMA	Tata CDMA	MTS
			GSM Operators								CDMA Operators		
1.1	Call Attempts	Bangalore	255	123	164	198	194	212	196	220	192	207	195
		Bellary	166	82	169	104	139	141	180	134	140	146	105
		Tumkur	154	174	154	125	122	155	177	99	129	150	151
1.2	Blocked Call Rate (<=3%)	Bangalore	0.39%	1.63%	1.85%	3%	2.58%	4.25%	0.51%	3.64%	0.52%	0.00%	1.50%
		Bellary	0.60%	0.00%	0.59%	0.96%	0.72%	2.84%	1.11%	1.49%	0.71%	0.00%	0.00%
		Tumkur	0%	1.72%	0.00%	2.40%	2.46%	7.10%	0.00%	5.05%	0.00%	0.00%	0.00%
1.3	Dropped Call Rate (<=2%)	Bangalore	0.00%	1.63%	2.80%	3.12%	1.05%	1.41%	0.51%	0.47%	0.00%	0%	1.02%
		Bellary	1%	0.00%	1.77%	0.97%	0.00%	2.13%	2.22%	4.47%	0.00%	1.37%	0.00%
		Tumkur	0%	0.00%	0.00%	0.00%	0.82%	0.00%	0.56%	0.00%	0.00%	0%	0.00%
1.4	Percentage of connections with good voice quality (=>95%)												
	(i) 0-4 (w/o frequency hopping)	Bangalore									99.37%	99.32%	99.03%
		Bellary									99.37%	98.19%	99.79%
		Tumkur									98.82%	99.96%	99.52%
	(ii) 0-5 (with frequency hopping)	Bangalore	95.11%	95.48%	91.16%	92.82%	94.57%	91.52%	93.71%	95.62%			
		Bellary	96.94%	95.15%	95.47%	94.83%	95.78%	91.27%	96.95%	95.58%			
		Tumkur	95.57%	96.28%	97.22%	91.07%	93.44%	92.05%	96.16%	95.85%			
1.5	Service Coverage												
	In door (>= -75dBm)	Bangalore	91.15	96	76.58	90.6	86.03	70.11	77.44	57.58	96.11	98.46	86.59
		Bellary	43.32	89	94.04	70.68	76.4	46.54	72.02	59.93	74.21	94.13	62.16
		Tumkur	66.42	80	83.72	84.69	65.63	65.07	61.96	51.62	70.37	92.3	87.61
	In-vehicle (>= -85dBm)	Bangalore	98.92	99	96.08	99.27	97.79	92.87	94.82	93	99.54	99.94	98.88
		Bellary	79.7	99	99.5	96.76	94.05	83.96	92.35	95.46	97.88	98.65	92.82
		Tumkur	94.69	92	98.27	98.11	88.96	91.27	90.72	89.32	98.39	99.97	99.47
	Outdoor- in city (>= -95dBm)	Bangalore	99.86	100	99.87	99.94	99.95	99.11	98.72	99.6	100	99.99	99.98
		Bellary	97.13	100	100	100	100	99.34	99.79	99.82	100	100	99.97
		Tumkur	99.87	99	99.94	99.88	98.23	99.66	100	99.05	100	100	100
1.6	Call Setup Success Rate (>=95%)	Bangalore	99.61	98.37	98.15	96.96	97.42	95.75	99.49	96.36	99.48	100	98.5
		Bellary	99.4	100	99.41	99.04	99.28	97.16	98.89	98.51	99.29	100	100
		Tumkur	100	98.28	100	97.6	97.54	92.9	100	94.95	100	100	100

Graphical Representation:



	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vodafone	Rcom CDMA	Tata CDMA	MTS
In door (>= -75dBm)	91.15	96	76.58	90.6	86.03	70.11	77.44	57.58	96.11	98.46	86.59
In-vehicle (>= -85dBm)	98.92	99	96.08	99.27	97.79	92.87	94.82	93	99.54	99.94	98.88
Out door- in city (>= -95dBm)	99.86	100	99.87	99.94	99.95	99.11	98.72	99.6	100	99.99	99.98

	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vodafone	Rcom CDMA	Tata CDMA	MTS
In door (>= -75dBm)	43.32	89	94.04	70.68	76.4	46.54	72.02	59.93	74.21	94.13	62.16
In-vehicle (>= -85dBm)	79.7	99	99.5	96.76	94.05	83.96	92.35	95.46	97.88	98.65	92.82
Out door- in city (>= -95dBm)	97.13	100	100	100	100	99.34	99.79	99.82	100	100	99.97



	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vodafone	Rcom CDMA	Tata CDMA	MTS
In door (>= -75dBm)	66.42	80	83.72	84.69	65.63	65.07	61.96	51.62	70.37	92.3	87.61
In-vehicle (>= -85dBm)	94.69	92	98.27	98.11	88.96	91.27	90.72	89.32	98.39	99.97	99.47
Out door- in city (>= -95dBm)	99.87	99	99.94	99.88	98.23	99.66	100	99.05	100	100	100

(3) Critical Analysis

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

- "Block Call rate" benchmark is not meeting by Idea (Bangalore) with a value of 3.04%, Tata GSM (Bangalore,Tumkur) with value of 4.25%, 7.1% and Vodafone (Bangalore, Tumkur) with a values of 3.64%, 5.05%.
- "Drop Call rate" benchmark is not meeting by BSNL, Idea in Bangalore city with a values of 2.8%, 3.12% and by Tata GSM, Uninor, Vodafone in Bellary city with a values of 2.13%, 2.22%, 4.47% respectively.
- "Connections with good quality" benchmark is not meeting by BSNL (Bangalore), Idea (Bangalore, Bellary, Tumkur), Rcom GSM (Bangalore, Tumkur), Tata GSM (Bangalore, Bellary, Tumkur), Uninor (Bangalore).
- "Call Setup Success Rate" benchmark is not meeting by Idea & Tata GSM in Tumkur city.

(D) Independent Drive Test

1) Sample Coverage

The Independent Drive Test was conducted in Karnataka for 4 different Cities namely ***"Chickamagalur, Shimoga, Raichur and Hassan"***. All the service providers city wise radio coverage with call testing was performed individually through drive test activity on different days. Route covered was about around 70kms for Chickamagalur (Vodafone, Tata GSM), 80kms for Shimoga (Uninor), 90kms for Raichur (Idea, Rcom GSM) and 70kms for Hassan (Airtel) depending on city areas within the speed limit of 30Km/hr.

Drive Test Locations and Service provider's name:

1)	Chickamagalur	:	VODAFONE, TATA GSM
2)	Shimoga	:	UNINOR
3)	Raichur	:	RCOM GSM, IDEA
4)	Hassan	:	AIRTEL

Area Coverage details:

1).CHICKAMAGALUR: Malandur road, Basavanahalli road, kempanahalli road, IG road, MG road, Vijayapura, KM road, Maduvan extension, Jyothi nagar, hornadu road, Engineering college, Kadur road, Mulubanahalli, MM halli, Giradevanahalli, Hiramangalore, Darmastala road, Chickamagalur bus stand, Court area, Mudigeri road, City market.

2).SHIMOGA: APMC yard, Shimoga jail, railway station, Shayadri science college, Teartlite linerspvt ltd, Nehru stadium, Court area, MCGANN district hospital

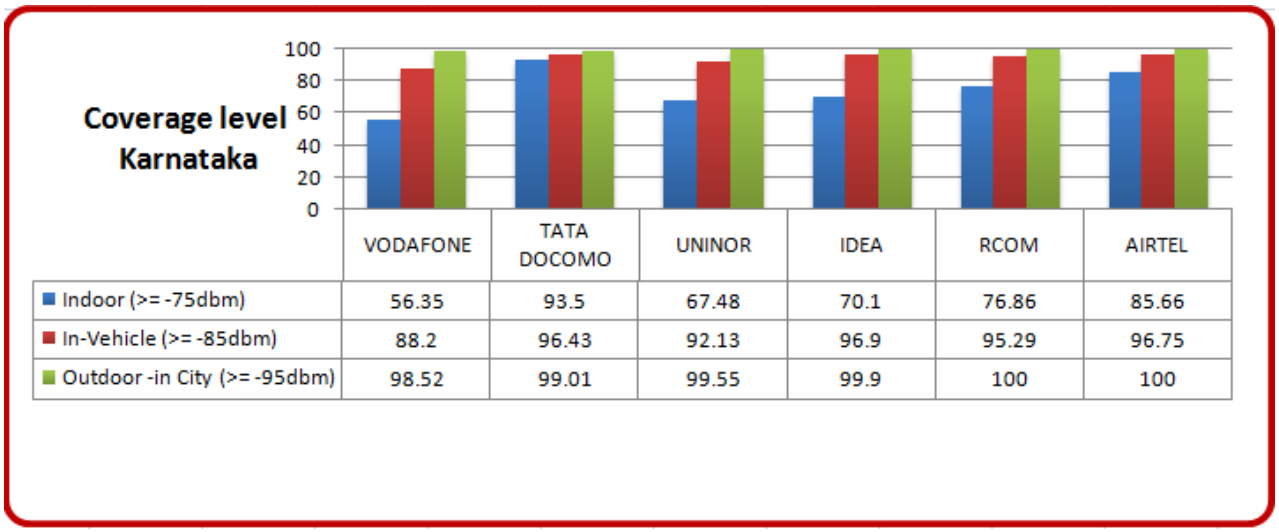
3).RAICHUR: Hyderabad road, Gandhi chowk, Maleshwar chowk, Bhaseweshwar circle, Station chowk, RTO circle, Theen khandil, Mahaveer chowk, Ek minar, Super market, BRB Circle, Gunj circle, Bus stand area, University area.

4).HASSAN: K.R Puram, Hemavathi nagar, Jayanagar, Pension Mohalla, B.M road, Old bus stand, M.G road, Sakleshpur road, Aduvalli, Industrial area, Salegameroad, New bus stand, Gavenahalli, Boovanahalli, Dasarakuppalu, HN Pura road, Hanumantpur road, Bangalore road.

2) Performance (for the respective cities)

SN	Parameter	VODAFONE	TATA GSM	UNINOR	IDEA	RCOM GSM	AIRTEL
		Chickamagalur		Shimoga	Raichur		Hassan
1.1	Call Attempts	58	66	133	110	129	109
1.2	Block Call Rate (<= 3%)	1.72%	3.03%	1.50%	9.09%	0.78%	0.92%
1.3	Drop Call Rate (<= 2%)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1.4	Percentage of Connections with good voice quality (>= 95%)	97.31%	91.61%	95.58%	96.50%	95.73%	95.56%
1.5	Service Coverage						
	Indoor (>= -75dbm)	56.35	93.5	67.48	70.1	76.86	85.66
	In-Vehicle (>= -85dbm)	88.2	96.43	92.13	96.9	95.29	96.75
	Outdoor -in City (>= -95dbm)	98.52	99.01	99.55	99.9	100	100
1.6	Call Setup Success Rate (>= 95%)	98.28	96.97	98.5	90.91	99.22	99.08

Graphical Representation:



(3) Critical Analysis

All the operators meeting the benchmark according to the guidelines given by TRAI, the service coverage is also found satisfactory. In the drive test, we considered high preference to railway stations, bus stations, Govt hospitals, crowded areas like market, Highways & major roads with in the town.

Name of Operator	VODAFONE	TATA GSM	UNINOR	IDEA	RCOM	AIRTEL
Name of the City	Chickamagalur		Shimoga	Raichur		Hassan
No. of BTS covering the City	**10**	**15**	**21**	**17**	**17**	**25**

The drive test is done with in municipal boundary & when we are moving out from the boundary, the coverage levels are going weak as most of the operators don't have any continuity sites.
In Chickamagalur town, Vodafone is meeting all the benchmarks and TATA GSM is not meeting the benchmarks of "Block Call rate", "Connections with Good Quality".
The Chickamagalur town is covered with 10 no. of BTSs by Vodafone & 15 no. of BTSs by TATA GSM.

Uninor is meeting all the benchmarks provided by TRAI in Shimoga town. Uninor is covering the town with 21 no. of sites.

While in case of Raichur town, Idea is not meeting the benchmarks of "Block call rate", "CSSR" parameters & Rcom GSM is meeting all the benchmarks.
Raichur town is covering with 17 no. of sites by Idea & 17 no. of sites by Rcom GSM.

In Hassan town, the Airtel is meeting all the benchmark provided by TRAI. The Hassan town is covered with 25 no. of sites.

In Karnataka circle, all operators are providing the satisfactory coverage levels within the town municipal premises. When we going the outside the boundary, the coverage levels are becoming poor because there is no continuity sites other than Airtel & Vodafone in respective cities.

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

From live, month 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 Etisalat (3.17% for month audit data), Tata GSM (6.42% for live audit data, 3.89% for month audit data).

Regarding the POI Congestion, the Idea & Uninor were found not meeting the benchmark on some of their individual POI's.

Under **Customer Service Quality Parameter,** "**operator answered calls (voice-to-voice) within 60 seconds"** parameter is not meeting by Idea (Live & month audit data), Airtel and Vodafone (month audit data).

Regarding **Metering/Billing Credibility** issues, Idea, Tata GSM & Tata CDMA are showing below benchmark values for Post-paid connections.

Regarding **Period of applying credit/waiver/adjustment to the customers,** the Idea is showing the value below benchmark.

Regarding **Termination/Closure of Service** issues, BSNL, Idea are showing below benchmark with a values of 1%, 98.68% i.e., beyond 7days.

During **Operator assisted Drive Tests**, it was observed that the network parameters mainly affected for most of the operators was "good voice quality". However other technical parameters like "blocked or dropped call rate" in Bangalore was showing higher value for BSNL, Idea, Tata GSM & Vodafone. Similarly, Uninor in Bellary while Tata GSM & Vodafone in Tumkur showing higher value for the same parameter. The "CSSR" parameter is not met by Vodafone & Tata GSM in Tumkur city.

II. Basic Telephone Service (Wireline) Providers

- **Not conducted for this quarter**

III. Broadband Service Providers

- **Not conducted for this quarter**