

REPORT

ON

AUDIT & ASSESSMENT OF QUALITY OF SERVICE

OF

CELLULAR MOBILE TELEPHONE SERVICE

FOR

SOUTH ZONE – KERALA CIRCLE

Report Period: July 2011 - September 2011

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

Table of Contents

CHAPTER-1: Introduction

- I. Background
- II. Objectives and Methodology

CHAPTER-2: Executive Summary

- I. Preface
- II. Findings from Quality of Service Audit (Operator wise for each parameter)
 - (A) Cellular Mobile Telephone Service Providers
 - 3 days Live Data Audit
 - One Month Data Audit
 - Operator Assisted Drive Test
 - Independent Drive Test
 - (B) Basic Telephone Service (Wireline) Providers
 - *Not conducted for this quarter*
 - (C) Broadband Service Providers
 - *Not conducted for this quarter*

CHAPTER-3: Audit-PMR data verification results

- I. Cellular Mobile Telephone Service
- II. Basic Service (Wire Line) Service
 - *Not conducted for this quarter*
- III. Broadband Service
 - *Not conducted for this quarter*

CHAPTER-4: Detailed Findings & Analysis

- I. Cellular Mobile Telephone Service
 - (A) **MSC audit**
 - 1) 3 days live measurement data assessment & summarized findings
 - 2) One month audit data report & summarized findings
 - 3) Sample coverage
 - 4) Performance (Graphical Representation)
 - 5) Critical Analysis
 - (B) **Redressal**
 - 1) Sample coverage
 - 2) Performance based on live measurement for three days
 - 3) Live Calling to Call Centre
 - 4) Level 1 Live Calling
 - 5) Critical Analysis

(C) Inter operator call assessment

- 1) Sample coverage
- 2) Performance based on live measurement
- 3) Critical Analysis

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

1. Sample Coverage
2. Performance (for the respective cities)
3. Critical Analysis

(E) Independent Drive Test

1. Sample Coverage
2. Performance (for the respective cities)
3. Critical Analysis

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

II. Basic Telephone Service (Wireline) Providers

- Not conducted for this quarter

III. Broadband Service Providers

- Not conducted for this quarter

CHAPTER-1: INTRODUCTION

I. Background

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

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

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

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

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

TRAI has been carrying out regular reviews of the status of quality of service of the networks of all operators. In continuation to these efforts, TRAI has selected through bidding process TCIL as the Audit Agency to audit and assess the Quality of Service rendered by the service providers' namely Basic (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) Emergency (Level 1) call testing done.

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 Kerala 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 Kerala Circle in 3rd quarter (July-September 2011). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken during the period January-March 2011.

Following are the various operators covered in Kerala circle (South Zone) for Cellular Mobile (Wireless) services QoS audit & assessment. The Month of audit & TCBH information is also given below:

S/N	Name of Service Provider	Month of Audit	TCBH Hour
GSM Operators			
1	Aircel Ltd	July-2011	2000-2100 hrs
2	Airtel Ltd	July-2011	2000-2100 hrs
3	BSNL	July-2011	2000-2100 hrs
4	Etisalat	July-2011	1900-2000 hrs
5	Idea	July-2011	2000-2100 hrs
6	Reliance Communication (GSM)	July-2011	2000-2100 hrs
7	Tata Communications (GSM)	July-2011	2000-2100 hrs
8	Uninor	July-2011	2000-2100 hrs
9	Videocon	July-2011	2000-2100 hrs
10	Vodafone	July-2011	2000-2100 hrs
CDMA Operators			
11	MTS (CDMA)	July-2011	1900-2000 hrs
12	Reliance Communication (CDMA)	July-2011	1900-2000 hrs
13	Tata Communications (CDMA)	July-2011	2000-2100 hrs

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

(A) Cellular Mobile Telephone Services

3 days Live Data Audit		Bench- mark	Aircel	Airtel	BSNL	Etisala t	Idea	Rcom	TATA	Uninor	Vi- con	V-fone	MTS	Rcom	TATA
S/ N	Name of Parameter														
1	Network Availability														
	a) BTS Accumulated Downtime	<=2%	0.02%	0.01%	0.40%	0.00%	0.01%	0.12%	0.02%	0.01%	0.02%	0.02%	0.01%	0.11%	0.03%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2	Connection Establishment (Accessibility)														
	a) CSSR (Call Setup Success Rate)	>=95%	99.80%	98.83%	98.45%	100%	99.92%	99.78%	98.99%	99.35%	98.45%	97.30%	98.91%	99.53%	99.43%
	b) SDCCH/PAGING congestion	<=1%	0.01%	0.11%	0.14%	0.00%	0.17%	0.03%	0.07%	0.00%	0.00%	0.35%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.01%	0.17%	1.55%	0.00%	0.36%	0.06%	0.26%	0.00%	0.00%	2.08%	0.00%	0.07%	0.00%
3	Connection maintenance (retainability)														
	a) CDR	<=2%	0.60%	1.32%	0.58%	0.51%	1.08%	0.28%	1.11%	1.21%	1.10%	0.64%	0.51%	0.26%	0.22%
	b) Worst affected cells>3% TCH drop	<=3%	4.66%	7.06%	2.26%	3.51%	2.80%	0.78%	8.86%	13.61%	13.83%	2.27%	2.16%	0.59%	1.01%
	c) Good voice quality	>=95%	97.38%	95.96%	99.86%	98.11%	95.21%	98.86%	98.08%	97.80%	98.12%	97.16%	100%	NA	NA
4	No of POI having congestion(>0.5%)	<=0.5%	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Response time to customers for assistance														
	a) Accessibility of call centre/Customer Care	>=95%	100%	NP	100%	NP	98.9%	98.9%	100%	99.0%	100%	100%	96.3%	99.9%	99.6%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	98.2%	NP	74.4%	NP	96.6%	89.2%	94.0%	100%	100%	98.2%	89.0%	93.2%	94.6%

NA: Not Applicable, NP: Data Not Provided

- From the 3 days live data assessment, it is found that AIRCEL, AIRTEL, ETISALAT, Tata GSM, UNINOR & VIDEOCON are not meeting the benchmark for the parameter "worst affected cells >3% TCH drop".
- Customer care data is found to be satisfactory for most of the operators except BSNL, Rcom GSM & MTS for the parameter "calls answered by operators (voice-to-voice)".

One Month Data Audit		Bench- mark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom	TATA	Uninor	Vi-con	V- fone	MTS	Rcom	TATA
S/N	Name of Parameter														
(A)	Network Service Quality Parameter														
1	Network Availability														
	a) BTS Accumulated Downtime	<=2%	0.02%	0.02%	0.58%	0.09%	0.02%	0.01%	0.01%	0.02%	0.04%	0.02%	0.02%	0.01%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.07%	0.75%	0.00%	0.06%	0.00%	0.05%	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%
	c) Total no. of BTSs in the licensed service area		2349	4459	4396	38	4976	2126	1939	1340	918	4070	691	1194	561
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		275	536	19117	27	798	186	156	217	245	553	81	98	48
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	3	33	0	3	0	1	0	0	2	0	0	0
2	Connection Establishment (Accessibility)														
	a) CSSR (Call Setup Success Rate)	>=95%	99.70%	98.72%	98.55%	99.78%	99.90%	99.80%	98.74%	99.32%	98.45%	97.42%	98.83%	99.50%	99.32%
	b) SDCCH/PAGING congestion	<=1%	0.01%	0.22%	0.18%	0.00%	0.27%	0.05%	0.09%	0.02%	0.20%	0.33%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.02%	0.17%	1.45%	0.00%	0.46%	0.05%	0.23%	0.04%	0.37%	1.97%	0.00%	0.08%	0.00%
3	Connection maintenance (retainability)														
	a) CDR	<=2%	0.57%	1.31%	0.57%	1.57%	1.05%	0.30%	1.06%	1.24%	1.09%	0.66%	0.48%	0.27%	0.23%
	b) Worst affected cells>3% TCH drop	<=3%	2.38%	6.48%	2.28%	2.63%	2.48%	0.82%	8.16%	13.91%	13.00%	2.35%	2.40%	0.59%	0.95%
	c) Good voice quality	>=95%	97.07%	95.98%	99.84%	98.43%	95.36%	98.86%	98.01%	97.71%	98.05%	97.09%	100%	NA	NA
4	No of POI having congestion (>0.5%)	<=0.5%	0	0	0	0	0	0	0	0	0	0	0	0	0
(B)	Customer Service Quality Parameters														
5	Metering/billing credibility-Post paid	<=0.1%	0.55%	0.04%	0.06%	NA	0.04%	0.09%	0.00%	NA	NA	0.09%	NA	0.05%	0.00%
6	Metering /billing credibility-Pre paid	<=0.1%	0.02%	0.00%	0.04%	0.00%	0.00%	0.06%	0.01%	0.02%	0.09%	0.05%	0.02%	0.01%	0.01%
7	Resolution of billing/ charging complaints	100% within 4 weeks	100%	100%	95%	NA	100%	100%	100%	NA	100%	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	100%	100%	100%	NA	100%	100%	100%	100%	100%
8	Response time to customers for assistance														
	a) Accessibility of call centre/Customer Care	>=95%	100%	100%	100%	98.53%	97.99%	99.24%	100%	99.00%	99.93%	100%	99.22%	99.89%	98.00%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	98.54%	89.72%	79.04%	100%	96.77%	86.67%	96.52%	97.37%	99.72%	98.10%	90.02%	93.83%	97.17%
9	Termination/closure of service	<=7day s	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	100%	100%	100%	NA	100%	100%	100%	NA	NA	100%	NA	100%	100%

NA: Not Applicable, NP: Data Not Provided

From the month data assessment, it is found that most of the operators are meeting the network parameters. Deviations are found under the Network Parameter for the parameter 'Worst affected cells>3% TCH drop' AIRTEL, Tata GSM, UNINOR & VIDEOCON.

Performance related to customer care, data is found to be satisfactory for most of the operators. AIRTEL, BSNL & RCOM GSM are below benchmark performance for "calls answered by operators (voice-to-voice)". AIRCEL have low Billing/Metering Credibility in case of Post-Paid connections.

Operator-Assisted Drive Test

The Operator Assisted Drive Test was conducted at Kerala for all the operators. Route covered was about around 100-130Km depending on city areas within the speed limit of 30Km/hr. The cities covered were Calicut, Kollam and Trissur. In all the cities, zones were selected for covering different density areas (High, Medium & Low dense areas).

S/N	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom	Tata	Uninor	Vi-con	V-fone	MTS	Rcom	Tata
			GSM Operators									CDMA Operators		
1.1	Blocked Call Rate (<=3%)	Calicut	0	0	1.28	0	0.63	1.33	0	1.16	2.44	0	0	0
		Kollam	1.97	1.94	2.34	0	0	0	0	5.85	4.32	0	0.58	0
		Trissur	1.12	0.58	2.26	0.60	0	3.83	0	1.31	2.33	0	0	0
1.2	Dropped Call Rate (<=2%)	Calicut	0	0	2.56	0	0.63	0.67	0	2.31	0.61	0	0.61	0
		Kollam	1.97	1.29	-	0.62	0	0	0	1.06	0	0	0	0
		Trissur	0	0	1.69	0.60	0	0.55	0	1.31	2.33	0	0	0
1.3	Percentage of connections with good voice quality (>=95%)													
	(i) 0-4 (w/o frequency hopping)	Calicut										99.89	98.70	97.92
		Kollam										99.21	97.34	99.40
		Trissur										99.95	99.44	97.83
	(ii) 0-5 (with frequency hopping)	Calicut	95.73	94.20	98.00	86.73	96.61	99.00	94.67	95.00	95.27			
		Kollam	93.00	89.10	91.86	83.80	95.46	98.33	94.67	96.00	95.30			
Trissur		94.57	91.00	96.80	81.71	97.42	99.25	95.00	96.00	92.52				
1.4	Call Setup Success Rate (>=95%)	Calicut	100	100	98.72	100	99.61	98.68	100	96.53	97.56	100	100	100
		Kollam	98.00	97.40	97.26	100	100	100	100	96.81	95.58	100	99.33	100
		Trissur	98.87	99.40	97.74	99.40	100	96.17	100	97.39	97.60	100	100.00	100

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

- Blocked Call Rate parameter is not met by Videocon & Vodafone in **Kollam** city and Tata GSM in Trissur.
- Dropped Call Rate parameter is not met by BSNL & Videocon in Calicut city and & Vodafone in **Trissur** city.
- Good Voice Quality parameter is not met by Airtel, Idea & Uninor in **Calicut** city.
- Good Voice Quality parameter is not met by Aircel, Airtel, BSNL, Idea & Uninor in **Kollam** city
- Good Voice Quality parameter is not met by Aircel, Airtel, Idea & Vodafone in **Trissur** city

Independent Drive Test

.....Submitted as a separate report

CHAPTER-3: AUDIT-PMR DATA VERIFICATION

I. Cellular Mobile Telephone Service

S/N	PMR Name of Parameter	Bench -mark	Audit	Aircel	Airtel	BSNL	Etisala t	Idea	RCOM	TAT A	Uninor	Videoco n	Vodafon e	MTS	RCO M	TATA	
				GSM Operators									CDMA Operators				
(A)	Network Service Quality Parameter																
1	Network Availability																
	BTS Accumulated Downtime	<=2%	Reported	0.01%	0.03%	0.37%	0.00%	0.03%	0.01%	0.01%	0.05%	0.08%	0.01%	0.01%	0.01%	0.01%	0.10%
			Verified	0.01%	0.03%	0.37%	0.00%	0.05%	0.01%	0.01%	0.05%	0.08%	0.01%	0.01%	0.01%	0.01%	0.10%
	Worst affected BTSs due to downtime	<=2%	Reported	0.00%	0.04%	0.60%	0.00%	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%
Verified			0.00%	0.04%	0.60%	0.00%	0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2	Connection Establishment (Accessibility)																
	CSSR (Call Setup Success Rate)	>=95%	Reported	99.35%	99.59%	98.33%	99.44%	99.85%	99.79%	98.19%	98.80%	97.12%	98.52%	99.26%	99.75%	99.86%	
			Verified	99.35%	99.59%	98.33%	99.44%	99.85%	99.79%	98.19%	98.80%	97.12%	97.75%	99.26%	99.75%	99.86%	
	SDCCH/PAGING congestion	<=1%	Reported	0.03%	0.19%	0.23%	0.00%	0.26%	0.12%	0.13%	0.06%	0.02%	0.15%	0.00%	0.00%	0.00%	
			Verified	0.03%	0.19%	0.23%	0.00%	0.26%	0.12%	0.13%	0.06%	0.02%	0.25%	0.00%	0.00%	0.00%	
	TCH congestion	<=2%	Reported	0.03%	0.18%	1.43%	0.00%	0.75%	0.05%	0.13%	0.09%	0.30%	1.16%	0.00%	0.03%	0.00%	
Verified			0.03%	0.18%	1.43%	0.00%	0.75%	0.05%	0.13%	0.09%	0.30%	1.16%	0.00%	0.03%	0.00%		
3	Connection maintenance (retainability)																
	CDR	<=2%	Reported	0.50%	0.64%	0.64%	0.99%	0.95%	0.46%	0.72%	1.01%	1.30%	0.60%	0.21%	0.53%	0.13%	
			Verified	0.50%	0.64%	0.64%	0.99%	0.95%	0.46%	0.72%	1.01%	1.30%	0.60%	0.32%	0.53%	0.13%	
	Worst affected cells>3% TCH drop	<=5%	Reported	2.25%	1.21%	2.12%	3.89%	1.57%	3.45%	1.68%	0.96%	2.11%	0.79%	0.09%	1.26%	0.04%	
			Verified	2.25%	1.21%	2.12%	3.89%	1.57%	3.45%	1.68%	0.96%	2.11%	0.56%	0.16%	1.26%	0.04%	
	Good voice quality	>=95%	Reported	97.65%	98.36%	99.69%	97.96%	95.50%	98.02%	98.24%	98.91%	97.83%	97.81%	99.97%	98.97%	99.79%	
Verified			97.65%	98.36%	99.69%	97.96%	95.50%	98.02%	98.24%	98.91%	97.83%	97.54%	99.97%	98.97%	99.79%		
4	POI congestion	<=0.5%	Reported	0	0	6	0	0	0	0	0	2	0	0	0	0	
			Verified	0	0	6	0	0	0	0	0	0	2	0	0	0	
(B)	Customer Service Quality Parameters																

5	Metering/billing credibility-Post paid	<= 0.1%	Reported	0.00%	0.03%	0.06%	NA	NR	0.00%	0.00%	NA	NA	0.10%	0.00%	0.00%	0.02%
			Verified	0.00%	0.03%	0.02%	NA	0.02%	0.00%	0.00%	NA	NA	0.10%	0.00%	0.00%	0.00%
6	Metering /billing credibility-Pre paid	<= 0.1%	Reported	0.28%	0.01%	0.10%	0.10%	NR	0.02%	0.00%	0.11%	0.02%	0.03%	0.07%	0.02%	0.04%
			Verified	0.28%	0.01%	0.10%	0.10%	0.00%	0.02%	0.00%	0.11%	0.01%	0.03%	0.07%	0.02%	0.02%
7	Resolution of billing/ charging complaints	100% within 4 weeks	Reported	100%	100%	100%	100%	NR	100%	100%	100%	100%	100%	100%	100%	100%
			Verified	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	Reported	100%	100%	100%	NA	NR	100%	100%	NA	100%	100%	100%	100%	100%
			Verified	100%	100%	100%	NA	100%	100%	100%	NA	100%	100%	100%	100%	100%
8	Response time to customers for assistance		Reported													
			Verified													
	Accessibility of call centre/Customer Care	>=95 %	Reported	100%	100%	100%	97.10%	NR	100%	100%	99.68%	100%	100%	99.00%	100%	97.00%
			Verified	100%	100%	100%	97.10%	98.72%	100%	100%	99.68%	97.30%	100%	99.00%	100%	98.00%
% call answered by operators(voice to voice) within 60 sec.	>=90 %	Reported	83.71%	80.00%	85.00%	99.08%	NR	89.00%	90.00 %	93.20%	100%	97%	92.60%	91.00%	94.00%	
		Verified	83.71%	80.00%	85.30%	99.08%	99.21%	89.00%	90.00 %	93.20%	92%	97%	92.60%	91.00%	95.00%	
9	Termination/closure of service		Reported													
			Verified													
			No.of requests for Termination / Closure of service complied within 7 days during the quarter	<=7d ays	Reported	100%	100%	100%	NA	NR	100%	100%	NA	NA	100%	0.00%
		Verified	100%	100%	100%	NA	100%	100%	100%	NA	NA	100%	0.00%	100%	100%	
10	Time taken for refunds of deposits after closures.	100% within 60 days	Reported	100%	100%	100%	NA	NR	100%	100%	NA	NA	100%	0.00%	100%	98.00%
			Verified	100%	100%	100%	NA	100%	100%	100%	NA	NA	100%	0.00%	100%	98.00%

Critical Analysis (PMR Verification):

- The figures proved to be matching with the data obtained from all the operators for verification.
- In case of POI congestion BSNL (6%) and Videocon (2%) are not meeting the benchmark with high margins.
- Aircel & Uninor are not meeting the benchmark for "Metering/Billing Credibility-Prepaid".
- "% call answered by operators (voice to voice) within 60 sec." benchmark is not met by Aircel, Airtel, BSNL, & Rcom GSM.
- Tata-CDMA is the only operator 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 Measurement Data Assessment & Summarized Findings

S/N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom	TATA	Uninor	Vi-con	V-fone	MTS	Rcom	TATA
			GSM Operators									CDMA Operators			
A	Network Service Quality Parameter														
1	Network Availability														
	a) BTS Accumulated Downtime	<=2%	0.02%	0.01%	0.40%	0.00%	0.01%	0.12%	0.02%	0.01%	0.02%	0.02%	0.01%	0.11%	0.03%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	c) Total no. of BTSs in the licensed service area		2349	4459	4396	38	4976	2126	1939	1340	918	4070	691	1194	561
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		25	45	1262	0	44	186	30	11	13	67	7	98	12
e) No. of BTSs having accumulated downtime of >24 hours in a month		0	0	2	0	0	0	0	0	0	0	0	0	0	
2	Connection Establishment (Accessibility)														
	a) CSSR	>=95%	99.80%	98.83%	98.45%	100%	99.92%	99.78%	98.99%	99.35%	98.45%	97.30%	98.91%	99.53%	99.43%
	b) SDCC/PAGING congestion	<=1%	0.01%	0.11%	0.14%	0.00%	0.17%	0.03%	0.07%	0.00%	0.00%	0.35%	0.00%	0.00%	0.00%
c) TCH congestion	<=2%	0.01%	0.17%	1.55%	0.00%	0.36%	0.06%	0.26%	0.00%	0.00%	2.08%	0.00%	0.07%	0.00%	
3	Connection maintenance														
	a) CDR	<=2%	0.60%	1.32%	0.58%	0.51%	1.08%	0.28%	1.11%	1.21%	1.10%	0.64%	0.51%	0.26%	0.22%
	b) Cells having > 3% TCH drop	<=3%	4.66%	7.06%	2.26%	3.51%	2.80%	0.78%	8.86%	13.61%	13.83%	2.27%	2.16%	0.59%	1.01%
	c) Good voice quality	>=95%	97.38%	95.96%	99.86%	98.11%	95.21%	98.86%	98.08%	97.80%	98.12%	97.16%	100%	NA	NA
	d) No. of cells > 3% TCH drop		327	935	290	4	420	50	510	545	381	276	45	7	17
e) Total no. of cells in the network		7,021	13,247	12,830	114	14,979	6,378	5,757	4,005	2,754	12,136	2,087	1,194	1,687	

S/N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom	TATA	Uninor	Vi-con	V-fone	MTS	Rcom	TATA
			GSM Operators										CDMA Operators		
4	No of POI having congestion (>0.5%)	<=0.5%	0	0	0	0	0	0	0	0	0	0	0	0	0
	a) Name of POI not meeting the benchmark		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	b) Total No. of call attempts on POI (Avg.)		223,327	3,204,340	1,035,938	173	21,444	207,504	491,231	6,282	42,680	2,157,788	3,022	207,504	310,032
	c) Total traffic served on POI (Erlang) (Avg.)		5,778	69,396	35,836	7	586	12,930	15,038	215	1,094	85,610	109	12,930	14,432
	d) Total No. of circuits on POI		12,604	124,851	46,541	2,376	130,589	45,422	23,775	8,700	7,940	134,160	13,335	45,422	42,678
	e) Total number of working POI Service Area wise		38	41	12	25	130	NR	18	38	28	36	53	NP	84
	f) Equipped Capacity of Network in respect of Traffic in erlang		61,751	170,832	228,181	844	215,283	NP	81,315	32,146	18,822	159,786	19,000	NP	116,185
	g) Total traffic handled in TCBH in erlang		15,440	100,096	113,790	5	200,692	NP	31,459	3,457	2,151	142,597	7,781	NP	28,500
(B) Customer Service Quality Parameters															
5	Response time to customers for assistance														
	a) Accessibility of call centre	>=95%	100%	NP	100%	NP	98.89%	98.92%	100%	99.00%	100%	100%	96.33%	99.90%	99.62%
	b) % of call answered by operators(voice to voice) within 60 sec	>=90%	98.15%	NP	74.39%	NP	96.55%	89.19%	94.00%	100%	100%	98.19%	89.02%	93.20%	94.58%
	c) No. of call attempts to call centre / customer care nos. during TCBH (Avg.)		1,709	NP	32,954	NP	28,271	2,941	4,850	100	324	2,046	674	4,689	2,140
	d) No. of calls connected and answered successfully to call centre / customer care nos. during TCBH (Avg.)		1,677	NP	24,515	NP	27,297	2,623	4,559	100	324	2,009	600	4,370	2,024

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 Kerala Service Area are as given below:-

- **BTS accumulated downtime (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values laying between 0% and 0.40%.
- **Worst affected BTSs due to downtime (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values laying between 0% and 0.05%.
- **Call setup success rate (benchmark $\geq 95\%$):** All operators are meeting the benchmark with values laying between 97.30% and 100%.
- **SDCCH/PAGING Channel congestion (benchmark $\leq 1\%$):** All operators are meeting the benchmark with values laying between 0% and 0.35%.
Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.
- **TCH congestion (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values laying between 0.01% and 1.55% except Vodafone with the value of 2.08%.
- **Call drop rate (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values laying between 0.22% and 1.32%.
- **Cell exceeding 3% TCH drop (benchmark $\leq 3\%$):** Except for Aircel, Airtel, Etisalat, Tata (GSM), Uninor & Videocon. Other operators are satisfying the benchmark with value in between 0.59% and 2.80%.
- **Connections with good voice quality (benchmark $\geq 95\%$):** CDMA service providers have declared that the parameter is not system generated. GSM operators are meeting the benchmark with values laying between 95.21% and 100%.
- **Number of POI having $\geq 0.5\%$ POI congestion:** All the operators meeting the benchmark.
- **%age of call answered by operator (electronically) (benchmark $> 95\%$):** All the operators are meeting the benchmark with values laying between 96.33% and 100%.
- **%age of call answered by operator (Voice to voice) (benchmark $> 90\%$):** BSNL, Reliance GSM & MTS are not meeting the benchmark. Rest of the operators is satisfying the benchmark.

(2) One Month Audit Data Report & Summarized Findings

S/N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom	TATA	Uninor	Vi-con	V-fone	MTS	R com	TATA
			GSM Operators										CDMA Operators		
(A)	Network Service Quality Parameter														
1	Network Availability														
	a) BTS Accumulated Downtime	<=2%	0.02%	0.02%	0.58%	0.09%	0.02%	0.01%	0.01%	0.02%	0.04%	0.02%	0.02%	0.01%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.07%	0.75%	0.00%	0.06%	0.00%	0.05%	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%
	c) Total no. of BTSs in the licensed service area		2,349	4,459	4,396	38	4,976	2,126	1,939	1,340	918	4,070	691	1,194	561
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		275	536	19,117	27	798	186	156	217	245	553	81	98	48
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	3	33	0	3	0	1	0	0	2	0	0	0
2	Connection Establishment (Accessibility)														
	a) CSSR (Call Setup Success Rate)	>=95%	99.70%	98.72%	98.55%	99.78%	99.90%	99.80%	98.74%	99.32%	98.45%	97.42%	98.83%	99.50%	99.32%
	b) SDCCH/PAGING congestion	<=1%	0.01%	0.22%	0.18%	0.00%	0.27%	0.05%	0.09%	0.02%	0.20%	0.33%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.02%	0.17%	1.45%	0.00%	0.46%	0.05%	0.23%	0.04%	0.37%	1.97%	0.00%	0.08%	0.00%
3	Connection maintenance (retainability)														
	a) CDR	<=2%	0.57%	1.31%	0.57%	1.57%	1.05%	0.30%	1.06%	1.24%	1.09%	0.66%	0.48%	0.27%	0.23%
	b) Worst affected cells>3% TCH drop	<=3%	2.38%	6.48%	2.28%	2.63%	2.48%	0.82%	8.16%	13.91%	13.00%	2.35%	2.40%	0.59%	0.95%
	c) Good voice quality	>=95%	97.07%	95.98%	99.84%	98.43%	95.36%	98.86%	98.01%	97.71%	98.05%	97.09%	100.00%	0.00%	0.00%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		167	858	292	3	371	52	470	557	358	285	50	7	16
	e) Total no. of cells in the network		7,021	13,247	12,830	114	14,979	6,378	5,757	4,005	2,754	12,136	2,087	1,194	1,687
4	No of POI having congestion	>=0.5%	0	0	0	0	0	0	0	0	0	0	0	0	0
	a) Name of POI not meeting the benchmark		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	b) Total No. of call attempts on POI (Avg.)		232,527	3,301,145	969,598	107	20,766	192,354	512,525	61,168	42,652	2,048,037	3,015	192,354	497,518
	c) Total traffic served on POI (Erlang) (Avg.)		5,771	70,028	34,669	4	586	11,431	14,566	2,048	1,040	82,880	108	11,431	17,831

	d) Total No. of circuits on POI		12,604	126,246	46,541	2,401	128,925	43,486	23,775	8,700	7,940	134,160	13,376	43,486	42,678
	e) Total number of working POI Service Area wise		38	41	12	25	130	NR	18	38	28	36	53	NP	84
5	Network Data														
	a) Equipped Capacity of Network Erlang		61,751	170,832	228,181	844	215,283	NP	81,315	32,146	18,822	159,786	19,000	NP	116,185
	b) Total traffic in TCBH in erlang (Avg.)		15,437	100,654	108,366	4	197,593	NP	31,093	3,241	2,403	139,706	7,721	NP	28,743
	c) Total no. of customers served (as per VLR) on last day of the month		656,937	3,035,020	4,003,705	928	6,534,856	NP	995,831	169,320	79,367	4,375,492	289,016	NP	319,853
(B)	Customer Service Quality Parameters														
6	Metering/billing credibility-Post paid	$\leq 0.1\%$	0.55%	0.04%	0.06%	NA	0.04%	0.09%	0.00%	NA	NA	0.09%	NA	0.05%	0.00%
	a) No. of bills issued during the period		7,215	67,032	179,621	NA	229,759	9,730	63,221	NA	NA	175,016	NA	176,390	63,221
	b) No. of bills disputed including billing complaints during the period		40	27	104	NA	88	9	1	NA	NA	153	NA	82	1
7	Metering /billing credibility-Pre paid	$\leq 0.1\%$	0.02%	0.00%	0.04%	0.00%	0.00%	0.06%	0.01%	0.02%	0.09%	0.05%	0.02%	0.01%	0.01%
	a) No. of charging / credit / validity complaints during the quarter		551	0	1,963	0	36	986	28	161	327	2,665	124	143	28
	b) Total no. of pre-paid customers at the end of the quarter		2,401,742	3,372,316	5,474,720	9,146	6,928,028	1,712,945	233,536	695,308	370,125	5,446,007	515,858	2,195,895	233,536
8	Resolution of billing/ charging complaints	100% within 4 weeks	100%	100%	95%	NA	100%	100%	100%	NA	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		591	27	2,067	NA	124	995	29	NA	327	2,818	124	225	29
	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		591	27	2,067	NA	124	995	295	NA	327	2,818	124	225	295
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		46	27	1,958	NA	112	17	389	NA	8	2,806	26	37	29
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		545	7,205	0	NA	12	978	0	NA	319	12	98	188	266

	e) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	100%	100%	100%	NA	100%	100%	100%	NA	100%	100%	100%	100%	100%
9	Response time to customers for assistance														
	a) Accessibility of call centre/Customer Care	>=95%	100%	100%	100%	98.53%	97.99%	99.24%	100%	99.00%	99.93%	100%	99.22%	99.89%	98.00%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	98.54%	89.72%	79.04%	100.00%	96.77%	86.67%	96.52%	97.37%	99.72%	98.10%	90.02%	93.83%	97.17%
	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		9,728	42,280	23,963	53	54,049	3,315	19,644	4,033	3,529	3,844	7,837	4,460	3,998
	d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		9,586	37,935	18,941	53	52,303	2,873	18,961	3,927	3,519	3,771	7,055	4,185	3,885
10	Termination/closure of service	<=7days	100%	100%	100%	NA	100%	100%	100%	NA	NA	100%	NA	100%	100%
	a) Total No. of requests for Termination / Closure of service received during the quarter		161	564	3,014	NA	1,494	65	47	NA	NA	556	NA	591	889
	b) No.of requests for Termination / Closure of service complied within 7 days during the quarter		161	564	3,014	NA	1,494	65	47	NA	NA	556	NA	591	889
11	Time taken for refunds of deposits after closures.	100% within 60 days	100%	100%	100%	NA	100%	100%	100%	NA	NA	100%	NA	100%	100%

NA: Not Applicable, NP: Data Not Provided

Parameter-wise Findings (Month Data Assessment):

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

- **BTS accumulated downtime (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values laying between 0.01% and 0.58%.
- **Worst affected BTSs due to downtime (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values laying between 0% and 0.75%.
- **Call setup success rate (benchmark $\geq 95\%$):** All operators are meeting the benchmark with values laying between 97.42% and 99.90%.
- **SDCCH/PAGING Channel congestion (benchmark $\leq 1\%$):** All operators are meeting the benchmark with values laying between 0.01% and 0.33%.
Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.
- **TCH congestion (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values laying between 0% and 1.97%.
- **Call drop rate (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values laying between 0.23% and 1.57%.
- **Cell exceeding 3% TCH drop (benchmark $\leq 5\%$):** Airtel, TATA GSM, Uninor & Videocon are not meeting the benchmark. Others are meeting with value in between 0.59% & 2.63%.
- **Connections with good voice quality (benchmark $\geq 95\%$):** CDMA service providers have declared that the parameter is not system generated. GSM operators are meeting the benchmark with values laying between 95.36% and 100%.
- **Number of POI having $\geq 0.5\%$ POI congestion:** All the operators meeting the benchmark.
- **%age of call answered by operator (electronically) (benchmark $>95\%$):** All operators are meeting the benchmark with values laying between 98% and 100%.
- **%age of call answered by operator (Voice to voice) (benchmark $>90\%$):** Airtel, BSNL & Reliance GSM, are not meeting the benchmark.
- **Metering and billing credibility-Post paid (benchmark $\leq 0.1\%$):** Except Aircel all other operators are meeting the benchmark.
- **Metering and billing credibility-Pre paid (benchmark $\leq 0.1\%$):** All the operators are meeting the benchmark.
- **Resolution of billing/ charging complaints (benchmark 100% within 4 weeks):** All the operators are meeting the benchmark.
- **Termination/Closure of service (Benchmark ≤ 7 days):** All the operators are meeting the benchmark.
- **Time taken for refunds of deposits after closures (benchmark 100% within ≤ 60 days):** All the operators are meeting the benchmark.

3) Sample Coverage

Switches/BSC/BTS details of operators:

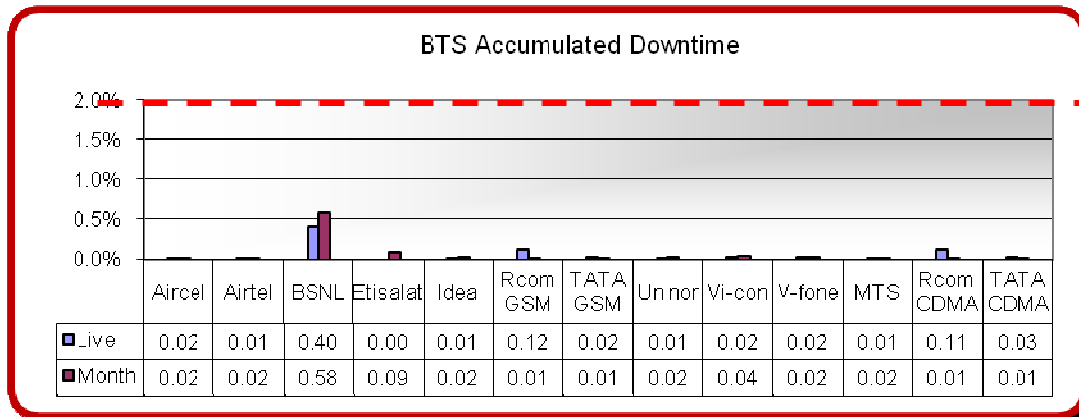
S/N	Name of Service Provider	No. of MSC/ GMSC	No. of BSC	No. of BTS
GSM Operators				
1	Aircel Ltd	1	14	2349
2	Airtel Ltd	11	41	4459
3	BSNL	20	65	4396
4	Etisalat	3	1	38
5	Idea	18	82	4976
6	Reliance Communication (GSM)	4	10	2126
7	Tata Communications (GSM)	3	15	1939
8	Uninor	2	18	1340
9	Videocon	1	6	918
10	Vodafone	8	64	4070
CDMA Operators				
11	MTS (CDMA)	1	2	691
12	Reliance Communication (CDMA)	7	2	1194
13	Tata Communications (CDMA)	4	6	561

4) Performance (Graphical Representation)

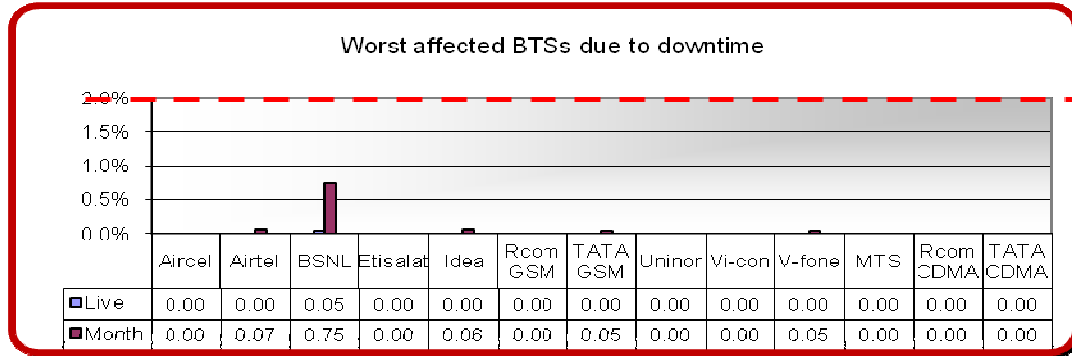
Comparison between Live measurements and One month data Audit – Cellular Mobile Telephone Services

A) NETWORK PERFORMANCE

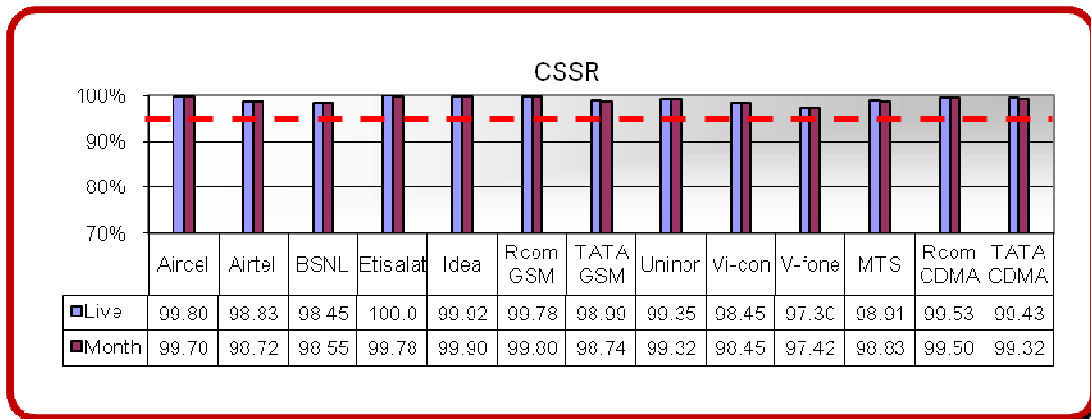
BTS Accumulated Downtime: All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data taken in the month of audit.



Worst affected BTSs due to downtime: All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data taken in the month of audit

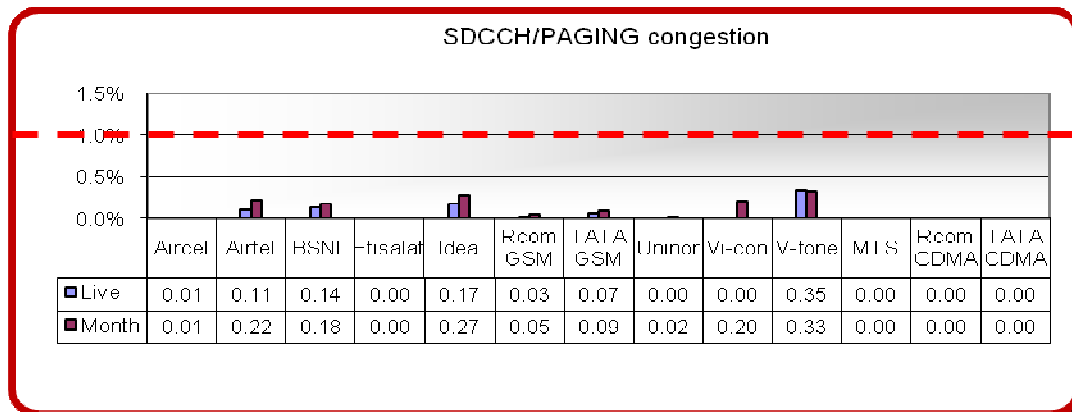


Call setup success rate: All operators are meeting the TRAI benchmarks ($\geq 95\%$) for both one month data and 3 days live data taken in the month of audit.

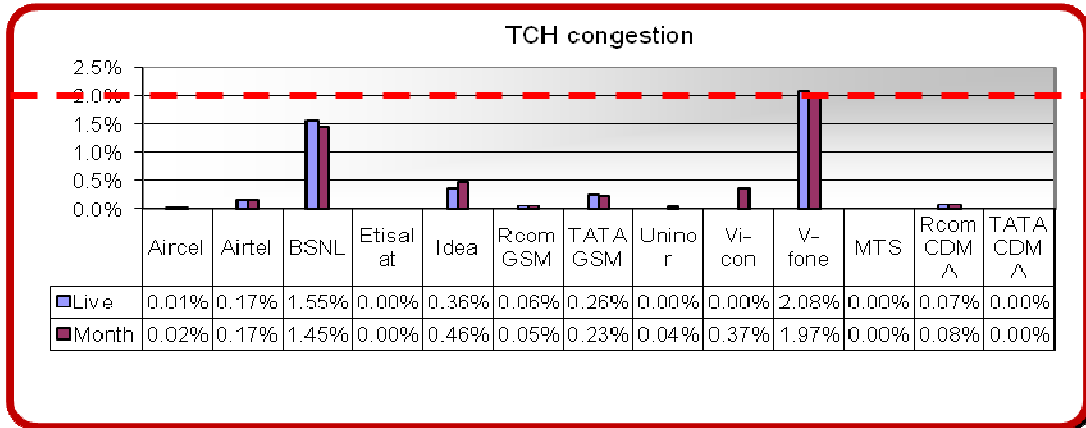


Blocked call rate:

SDCCH congestion: All operators are meeting the TRAI benchmarks ($\leq 1\%$) for both one month data and 3 days live data taken in the month of audit. CDMA operators Reliance & Tata have not provided the data.

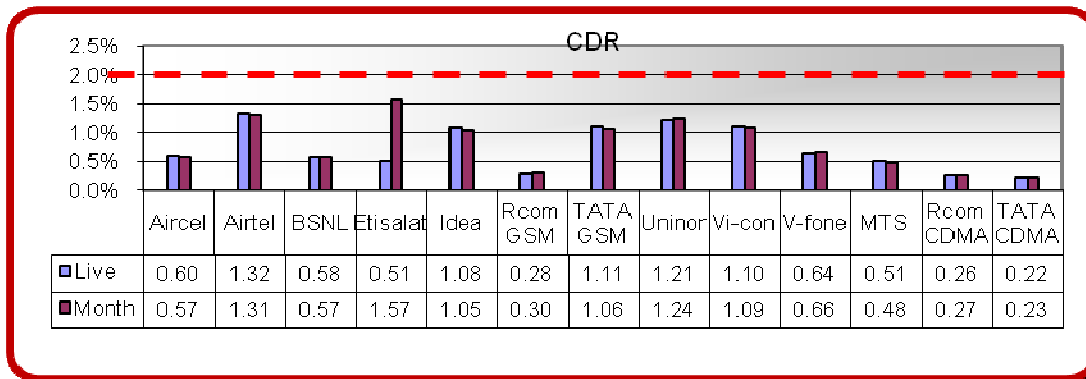


TCH congestion: All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data except for Vodafone with the value of 2.08% in live measurement audit data verification.

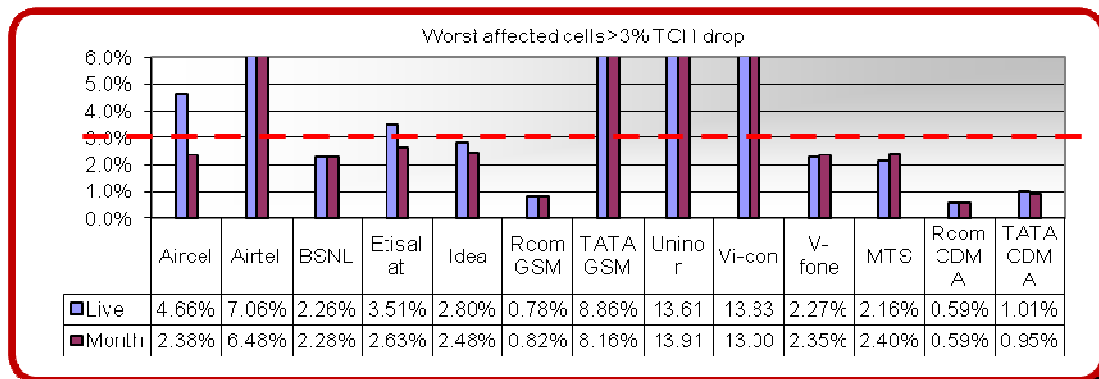


Connection Maintainability (Retainability):

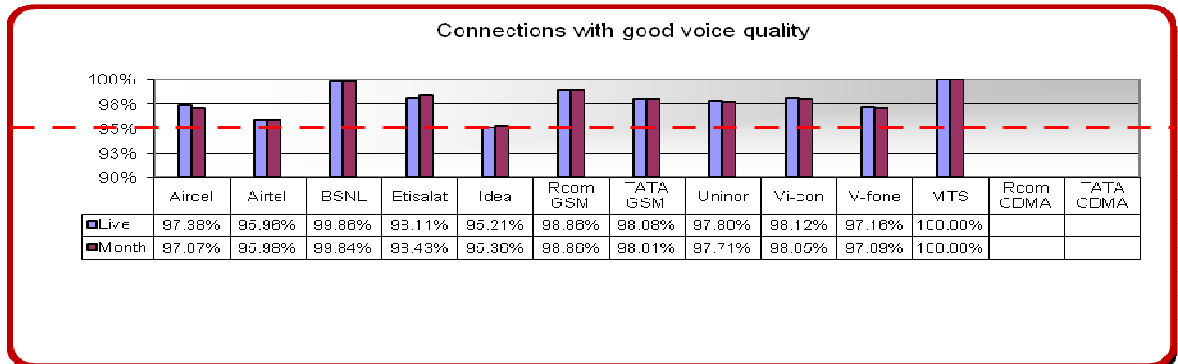
Call drop rate: All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data taken in the month of audit.



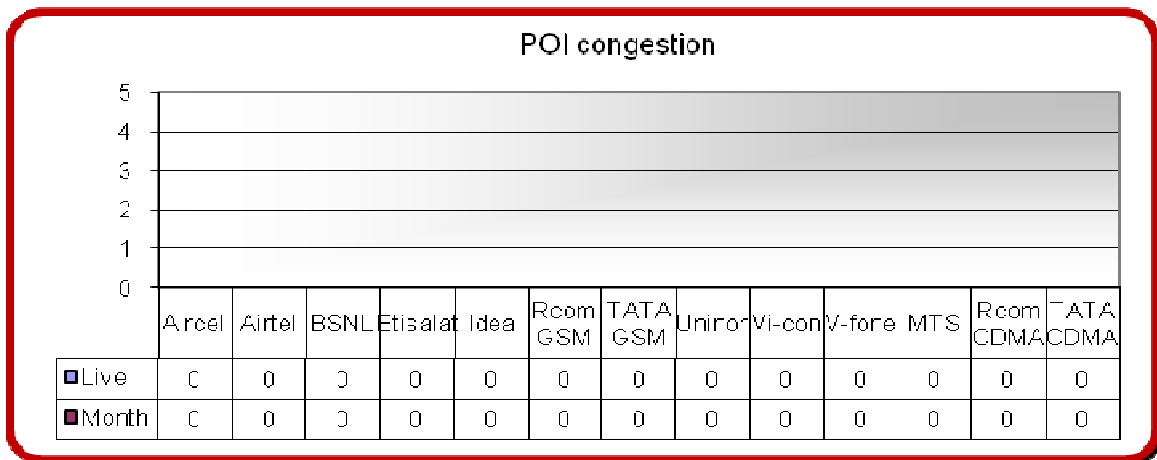
Worst affected Cell exceeding 3% TCH Drop: For live audit Aircel & Etisalat and for both live and month data, Airtel, TATA GSM, Uninor & Videocon are found not meeting the benchmark of $\leq 3\%$. Other operators are meeting the benchmark for both cases.



Percentage of connections with good voice quality: All operators are meeting the TRAI benchmarks ($\geq 95\%$) for both one month data and 3 days live data taken in the month of audit.



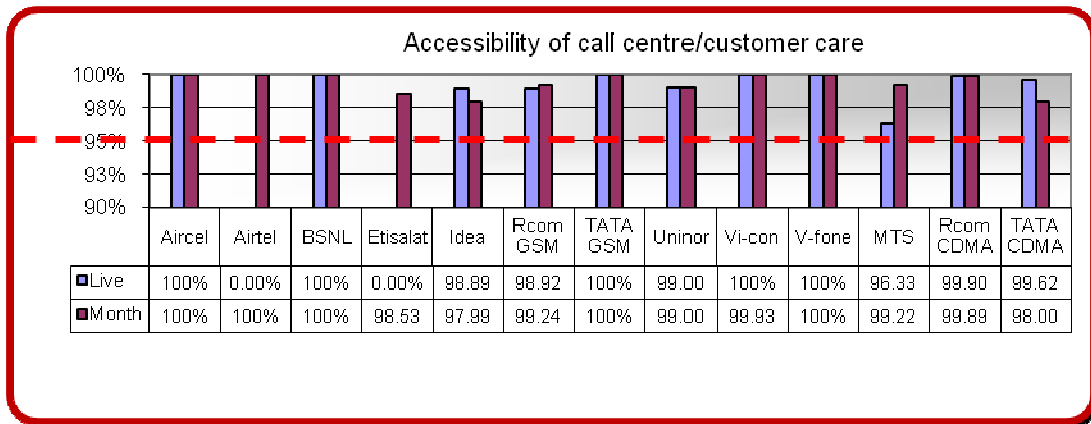
POI Congestion: All operators are meeting the TRAI benchmark ($\leq 0.5\%$) for both one month data and 3 days live data taken in the month of audit.



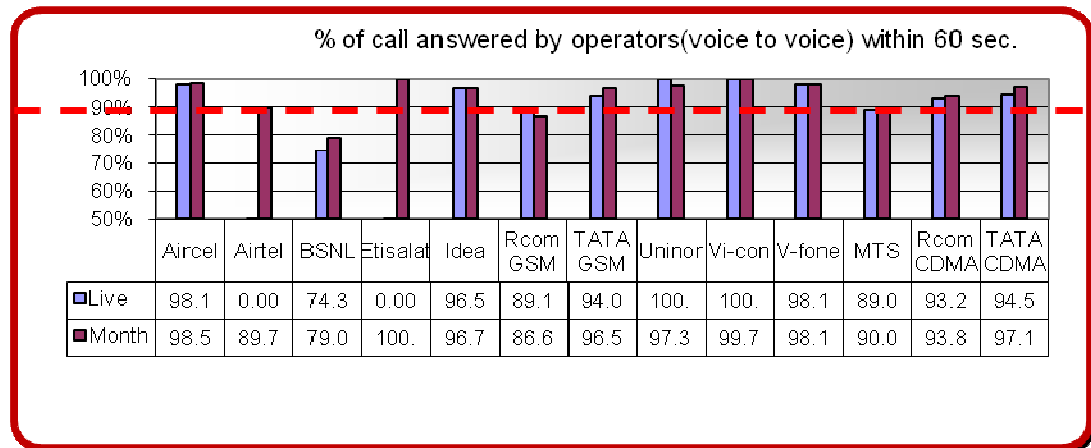
B) CUSTOMER SERVICE QUALITY PARAMETERS

(A) Response time to the customer for assistance:

Percentage of call answered (Electronically): All operators are meeting the TRAI benchmark ($\geq 95\%$) for both one month data and 3 days live data taken in the month of audit.



Percentage of call answered by operators (Voice to voice) within 60 sec: BSNL & Rcom GSM for both live and month audit, MTS for live audit and Airtel for month audit are not meeting the required benchmark against this parameter.



5) Critical Analysis

The above comparative study between live data & month data shows similar trends & consistency in both the cases. However, inconsistency in live & month data was found for the parameter “Worst affected cells>3% TCH drop” with Airtel, TATA GSM, Uninor & Videocon. Customer care parameters are satisfactory with all the operators except with Airtel, BSNL & Rcom GSM in Percentage of call answered by operators (Voice to voice) within 60 sec.

(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 based on live measurement (live calling for billing complaints)

Calling Operator	Aircel	Airtel	BSNL	ETISALAT	Idea	Rcom GSM	Tata GSM	Uninor	Vodafone	VIDEOCON	MTS	Rcom CDMA	Tata CDMA
Total No. of Calls Attempted	100	27	100	No Complaints	100	100	29	No Complaints	100	1001	No Complaints	100	29
Total No. of calls Answered	96	27	95		95	96	29		95	96		95	29
Cases resolved with 4 weeks	96	27	95		94	95	29		95	95		94	29
%age of cases resolved	100%	100%	100%		99%	99%	100%		100%	99%		99%	100%

3) Live calling to call centre

Calling Operator	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
Total No. of Calls Attempted	100	100	100	50	100	100	100	100	100	100	100	100	100
Total No. of calls connected to IVR	100	98	100	50	100	100	100	100	100	100	100	100	100
Calls got connected to agent within 60 Sec	100	98	100	50	100	100	100	100	100	100	100	100	100
%age of calls got answered	100%	98%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

4) Level 1 live calling

Emergency no.		No. of calls made	Airceel	Airtel	BSNL	ETISALAT	Idea	Rcom GSM	Tata GSM	Uninor	Vodafone	VIDEOCON	MTS	Rcom CDMA	Tata CDMA
		Calicut													
100	Police	1	1	1	1	1	1	1	1	1	1	1	1	1	1
101	Fire	1	1	1	1	1	1	1	1	1	1	1	1	1	1
102	Ambulance	1	1	1	1	1	1	1	1	1	1	1	1	1	1
139	Railway	3	3	3	3	3	3	3	3	3	3	3	3	3	3
		Kollam													
100	Police	1	1	1	1	1	1	1	1	1	1	1	1	1	1
101	Fire	1	1	1	1	1	1	1	1	1	1	1	1	1	1
102	Ambulance	1	1	1	1	1	1	1	1	1	1	1	1	1	1
139	Railway	3	3	3	3	3	3	3	3	3	3	3	3	3	3
		Trissur													
100	Police	1	1	1	1	1	1	1	1	1	1	1	1	1	1
101	Fire	1	1	1	1	1	1	1	1	1	1	1	1	1	1
102	Ambulance	1	1	1	1	1	1	1	1	1	1	1	1	1	1
139	Railway	3	3	3	3	3	3	3	3	3	3	3	3	3	3

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% in most of the cases as claimed by their records. For ETISALAT, MTS & Uninor it is not applicable.

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

A sample of 2x50 test calls per Service Providers within the licensed service area (Kerala Circle) were made between 1100 to 1400 hrs and between 1600 to 1900 hrs.

(2) Performance based on live measurement

Calling Operator	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
Aircel	-	98%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Airtel	100%	-	98%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
BSNL	100%	100%	-	100%	100%	98%	100%	100%	99%	100%	100%	100%	100%
Etisalat	100%	100%	100%	-	100%	100%	100%	100%	100%	100%	100%	98%	100%
Idea	100%	100%	100%	100%	-	100%	100%	100%	100%	100%	100%	100%	100%
Reliance (GSM)	100%	100%	100%	100%	100%	-	100%	100%	100%	100%	100%	100%	100%
Tata (GSM)	100%	100%	100%	100%	100%	100%	-	100%	100%	100%	100%	100%	100%
Uninor	100%	98%	100%	100%	100%	100%	100%	-	100%	100%	100%	100%	100%
Videocon	100%	100%	100%	100%	100%	100%	100%	100%	-	100%	100%	100%	100%
Vodafone	100%	100%	100%	100%	100%	100%	100%	100%	100%	-	100%	100%	100%
MTS	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	-	100%	100%
Reliance (CDMA)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	-	100%
Tata (CDMA)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	-

(3) Critical Analysis

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

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

The Operator Assisted Drive Test was conducted at Kerala for all the operators. Route covered was about around 120-140Km depending on city areas within the speed limit of 30Km/hr.

Drive Test Locations**Calicut**

HIGH DENSE:	WESTHILL, NADAKAV, MANANCHIRA, PALAYAM, RAILWAY STATION, MAVOOR ROAD, STADIUM, BEACH ROAD
MEDIUM DENSE:	ERANJIPALAM, MALAPARAMBU, THONDAYAD, CHEVAYUR, MEDICAL COLLEGE
LOW DENSE:	VELLIMADUKUNNU, KARANTHUR, KUNNAMANGALM, REC, KODUVALLY, PAVANGAD, THALAKKULATHUR, ATHOLI, WEST HILL CHUNGAM

Kollam

HIGH DENSE:	CHINNAKADA- RAILWAY STATION- KSRTC - HS JN-LEKSHINADA- NAIRS JN-KALLUPALAM-SN COLEGE JN
MEDIUM DENSE:	ULIYAKOVIL-ASHRAMAM-KARIKODE-KUNDARA- KOTTIYAM- CHATHANOR-PALIMUKKU
LOW DENSE:	PERUMON - VELIMON- MATHILIL- KADAVOOR- NEENDAKARA

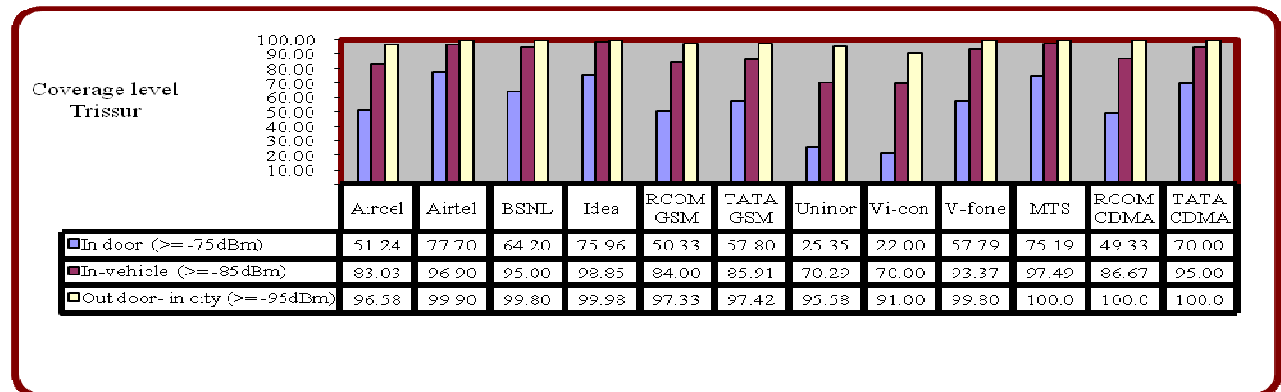
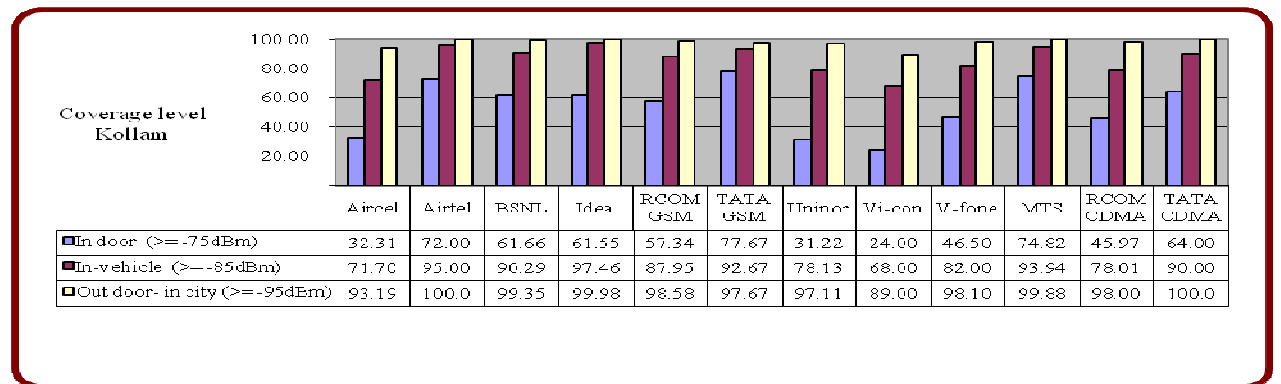
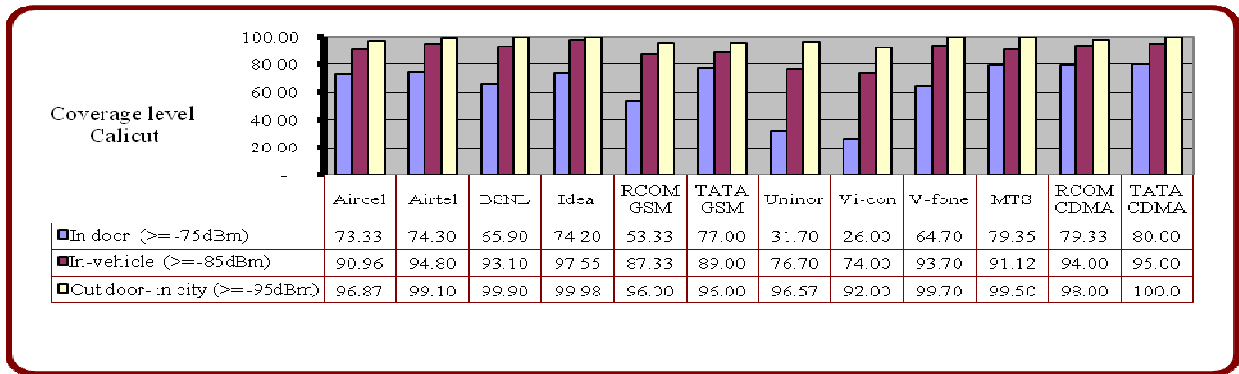
Trissur

HIGH DENSE:	SAKTHA BUS STAND, WEST FORT, AYYANTHOLE, PUNKUNNAM, M.G ROAD, M.O ROAD, EAST FORT, PATURAIKAL, THRISSUR RAILWAYSTATION, CHEMBUKAVU
MEDIUM DENSE:	VIYUR, KOLAZHY, KINALUR, THRISSUR MEDICAL COLLEGE, CHERROOR, PERINGAV, PARAVATTANI, MANNUTHY, NADATHARA, MISSION HOSPITAL, KOORKANCHERY
LOW DENSE:	KANIMANGALAM, PALAKKAL, CHOVOOR, CHERPU, KARUVANNUR, MAPRANAM, IRRINJALAKUDA, PULLUR, KALLETUNKARA, ALUR, PERAMBARA, KODAKARA, NELLAYI, PUDUKKAD, THALORE, OLLUR, CHRISTOPHER NAGAR, KURIACHIRA

2) Performance (for the respective cities)

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	RCOM GSM	TATA GSM	Uninor	Vi-con	V-fone	MTS	RCOM CDMA	TATA CDMA
			GSM Operators									CDMA Operators		
1.1	Call Attempts	Calicut	173	166	156	161	159	150	151	173	164	150	163	158
		Kollam	203	155	171	161	167	197	136	188	185	155	171	137
		Trissur	178	172	177	167	170	183	170	153	172	176	170	157
1.2	Blocked Call Rate (<=3%)	Calicut	0	0	1.28	0	0.63	1.33	0	1.16	2.44	0	0	0
		Kollam	1.97	1.94	2.34	0	0	0	0	5.85	4.32	0	0.58	0
		Trissur	1.12	0.58	2.26	0.60	0	3.83	0	1.31	2.33	0	0	0
1.3	Dropped Call Rate (<=2%)	Calicut	0	0	2.56	0	0.63	0.67	0	2.31	0.61	0	0.61	0
		Kollam	1.97	1.29	-0	0.62	0	-	0	1.06	0	0	0	0
		Trissur	0	0	1.69	0.60	0	0.55	0	1.31	2.33	0	0	0
1.4	Percentage of connections with good voice quality (=>95%)													
	(i) 0-4 (w/o frequency hopping)	Calicut										99.89	98.70	97.92
		Kollam										99.21	97.34	99.40
		Trissur										99.95	99.44	97.83
	(ii) 0-5 (with frequency hopping)	Calicut	95.73	94.20	98.00	86.73	96.61	99.00	94.67	95.00	95.27			
		Kollam	93.00	89.10	91.86	83.80	95.46	98.33	94.67	96.00	95.30			
Trissur		94.57	91.00	96.80	81.71	97.42	99.25	95.00	96.00	92.52				
1.5	Service Coverage													
	In door (>= -75dBm)	Calicut	73.33	74.30	65.90	74.20	53.33	77.00	31.70	26.00	64.70	79.35	79.33	80.00
		Kollam	32.31	72.00	61.66	61.55	57.34	77.67	31.22	24.00	46.50	74.82	45.97	64.00
		Trissur	51.24	77.70	64.20	75.96	50.33	57.80	25.35	22.00	57.79	75.19	49.33	70.00
	In-vehicle (>= -85dBm)	Calicut	90.96	94.80	93.10	97.55	87.33	89.00	76.70	74.00	93.70	91.12	94.00	95.00
		Kollam	71.70	95.00	90.29	97.46	87.95	92.67	78.13	68.00	82.00	93.94	78.01	90.00
		Trissur	83.03	96.90	95.00	98.85	84.00	85.91	70.29	70.00	93.37	97.49	86.67	95.00
	Out door- in city (>= -95dBm)	Calicut	96.87	99.10	99.90	99.98	96.00	96.00	96.57	92.00	99.70	99.50	98.00	100
		Kollam	93.19	100	99.35	99.98	98.58	97.67	97.11	89.00	98.10	99.88	98.00	100
Trissur		96.58	99.90	99.80	99.98	97.33	97.42	95.58	91.00	99.80	100	100	100	
1.6	Call Setup Success Rate (>=95%)	Calicut	100	100	98.72	100	99.61	98.68	100	96.53	97.56	100	100	100
		Kollam	98.00	97.40	97.26	100	100	100	100	96.81	95.58	100	99.33	100
		Trissur	98.87	99.40	97.74	99.40	100	96.17	100	97.39	97.60	100	100	100

Graphical Representation



(3) Critical Analysis

- Blocked Call Rate parameter is not met by Videocon & Vodafone in **Kollam** city and Tata GSM in **Trissur**.
- Dropped Call Rate parameter is not met by BSNL & Videocon in **Calicut** city and & Vodafone in **Trissur** city.
- Good Voice Quality parameter is not met by Airtel, Idea & Uninor in **Calicut** city.
- Good Voice Quality parameter is not met by Aircel, Airtel, BSNL, Idea & Uninor in **Kollam** city.
- Good Voice Quality parameter is not met by Aircel, Airtel, Idea & Vodafone in **Trissur** city.

(E) Independent Drive Test

.....Submitted in Separate report

(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 (Kerala) is found to be satisfactory for **Network Parameters**, except for the parameter benchmark of $\leq 5\%$ for “worst affected cells $> 3\%$ TCH drop” which is not met by **Airtel, Tata GSM, Uninor & Videocon** for both live and month data. These figures are much higher than the normal benchmark.
- Under **Customer Service Quality Parameter** “operator answered calls (voice-to-voice) within 60 seconds” parameter it is found that many operators are fulfilling TRAI benchmark of $\geq 90\%$ except BSNL & Rcom GSM.
- Regarding **Metering/Billing Credibility parameter**, only in Pre-Paid connections values of Aircel & Tata GSM do not meet the benchmark. In case of Post-paid connections all operators are meeting the required benchmark.
- During **Drive Tests (Operator Assisted)** it is noticed that most of the parameters were found to be in order in all the three cities for all the Operators. However slight deviations are found in “Blocked Call Rate” parameter which was not met by Videocon & Vodafone in Kollam and Tata GSM in Trissur, dropped Call Rate parameter is not met by BSNL & Videocon in Calicut city and & Vodafone in Trissur city & “Good Voice Quality” parameter is not met by Airtel, Idea & Uninor in Calicut city, Aircel, Airtel, BSNL, Idea & Uninor in Kollam city and Aircel, Airtel, Idea & Vodafone in Trissur city

II. Basic Telephone Service (Wireline) Providers

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

III. Broadband Service Providers

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