

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

Report Period: January 2012 - March 2012

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CHAPTER-1: INTRODUCTION

I. Background

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

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

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

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

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

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

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

II. Objectives and Methodology

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

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

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

CHAPTER-2: EXECUTIVE SUMMARY

I. Preface

This report highlights the findings for the audit & assessment of Quality of Service of Cellular Mobile Services in Kerala Circle in 1st quarter (January – March 2012). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken during the period July - September 2011.

S/N	Name of Service Provider	Month of Audit	TCBH Hour
GSM Operators			
1	Aircel Ltd	February - 2012	1900-2000 hrs
2	Airtel Ltd	February - 2012	2000-2100 hrs
3	BSNL	February - 2012	2000-2100 hrs
4	Etisalat	No Audit	
5	Idea	February - 2012	2000-2100 hrs
6	Reliance Communication	February - 2012	2000-2100 hrs
7	Tata	February - 2012	1900-2000 hrs
8	Uninor	February - 2012	2000-2100 hrs
9	Videocon	February - 2012	2000-2100 hrs
10	Vodafone	February - 2012	2000-2100 hrs
CDMA Operators			
11	MTS (CDMA)	February - 2012	1900-2000 hrs
12	Reliance Communication	February - 2012	1900-2000 hrs
13	Tata	February - 2012	1900-2000 hrs

- Etisalat has stopped its services.

II. Findings from Quality of Service Audit (Operator wise for each parameter)
(A) Cellular Mobile Telephone Services Providers

3 days Live Data Audit		Bench- mark	Aircel	Airtel	BSNL	Idea	Rcom GSM	TATA GSM	Uninor	Vi-con	V-fone	MTS	Rcom CDMA	TATA CDMA
S/N	Name of Parameter													
1	Network Availability													
	a) BTS Accumulated Downtime	<=2%	0.01%	0.01%	0.29%	0.03%	0.01%	0.01%	0.01%	0.01%	0.01%	0.03%	0.00%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	0.11%	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%	99.66%	99.57%	98.14%	99.90%	99.92%	99.46%	98.70%	98.73%	98.55%	98.99%	99.45%	98.73%
	b) SDCCH/PAGING congestion	<=1%	0.01%	0.09%	0.28%	0.40%	0.00%	0.06%	0.02%	0.00%	0.11%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.01%	0.15%	1.86%	0.55%	0.01%	0.21%	0.15%	0.00%	1.09%	0.00%	0.08%	0.00%
3	Connection maintenance (Retainability)													
	a) CDR	<=2%	0.53%	0.65%	0.49%	0.70%	0.06%	0.72%	0.96%	0.55%	0.68%	0.33%	0.45%	0.50%
	b) Worst affected cells>3% TCH drop	<=3%	4.86%	7.64%	1.42%	1.82%	0.02%	5.21%	10.53%	1.55%	2.51%	2.27%	0.76%	0.89%
	c) Good voice quality	>=95%	97.85%	97.84%	99.89%	95.17%	99.37%	97.20%	97.16%	98.61%	97.14%	100%	98.75%	NA
4	No of POI's having congestion >0.5%		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%	98.95%	100%	100%	99.47%	98.98%	100%	100.0%	96.35%	100%	100%	98.93%	100%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	87.58%	85.75%	98.73%	97.52%	95.50%	97.31%	99.58%	91.03%	97.6%	94.65%	96.10%	97.34%

NA: Not Applicable, NP: Data Not Provided

From the 3 days live data assessment, it is found that AIRCEL, AIRTEL, Tata GSM & UNINOR 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 for AIRCEL & AIRTEL for the parameter "calls answered by operators (voice-to-voice)".

One Month Data Audit		Bench- mark	Aircel	Airtel	BSNL	Idea	Rcom GSM	TATA GSM	Uninor	Vi- con	V- fone	MTS	Rcom CDMA	TATA CDMA
S/N	Name of Parameter		GSM Operators									CDMA Operators		
(A)	Network Service Quality Parameter													
1	Network Availability													
	a) BTS Accumulated Downtime	<=2%	0.00%	0.01%	0.30%	0.05%	0.01%	0.00%	0.01%	0.03%	0.01%	0.02%	0.01%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.04%	0.61%	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		2352	4532	4619	5232	2179	2061	1221	861	4214	715	1184	562
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		75	452	9637	1705	115	49	65	177	410	97	92	9
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	2	28	0	0	0	0	0	0	0	0	0
2	Connection Establishment (Accessibility)													
	a) CSSR (Call Setup Success Rate)	>=95%	99.63%	99.60%	98.02%	99.91%	99.92%	99.51%	98.35%	98.77%	98.30%	98.96%	99.46%	98.94%
	b) SDCCH/PAGING congestion	<=1%	0.02%	0.11%	0.41%	0.42%	0.00%	0.08%	0.20%	0.00%	0.47%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.02%	0.12%	1.98%	0.60%	0.01%	0.14%	0.46%	0.00%	0.97%	0.00%	0.08%	0.00%
3	Connection maintenance (Retainability)													
	a) CDR	<=2%	0.52%	0.61%	0.52%	0.73%	0.05%	0.72%	0.99%	0.45%	0.67%	0.33%	0.47%	0.55%
	b) Worst affected cells>3% TCH drop	<=3%	4.85%	7.45%	1.61%	2.08%	0.02%	5.04%	10.67%	1.24%	2.49%	2.13%	0.73%	0.89%
	c) Good voice quality	>=95%	97.87%	97.98%	99.86%	95.36%	99.39%	97.28%	97.13%	98.58%	97.14%	100%	98.72%	NA
4	No of POI's having congestion >0.5%		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%	0.18%	0.01%	0.03%	0.01%	0.09%	0.00%	NA	NA	0.09%	NA	0.08%	0.00%
6	Metering /billing credibility-Pre paid	<= 0.1%	0.02%	0.05%	0.02%	0.00%	0.05%	0.00%	0.01%	0.04%	0.02%	0.01%	0.01%	0.00%
7	Resolution of billing/ charging complaints	100% within 4 weeks	100%	100%	100%	100%	100%	100%	100%	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%	100%	100%	100%	100%	100%	100%	100%	100%	100%
8	Response time to customers for assistance													
	a) Accessibility of call centre/Customer Care	>=95%	98.88%	100%	100%	99.39%	99.22%	100%	100.00%	98.12%	100%	100.00%	99.28%	100%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	84.56%	93.16%	97.89%	97.04%	96.77%	96.15%	99.72%	92.86%	98.16%	92.27%	96.87%	96.48%
9	Termination/closure of service	<=7days	100%	100%	100%	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%	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 all the operators are meeting the network parameters.

Deviations are found under the parameter 1. For the parameter 'Worst affected cells>3% TCH drop' Aircel, Airtel, Tata GSM & Uninor. Performance related to customer care, data is found to be satisfactory for most of the operators. However deviations are found in "Metering/billing credibility-Postpaid" with Aircel and in "Accessibility of call centre/Customer Care" with Aircel.

Operator-Assisted Drive Test

The Operator Assisted Drive Test was conducted in Kerala for all the operators. Route covered was about around 100-120Km depending on city areas within the speed limit of 30Km/hr. The cities covered were Ernakulam, Kannur and Malappuram. In all the cities, zones were selected for covering different density areas (High, Medium & Low dense areas).

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vi-con	V-fone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators									CDMA Operators		
1.1	Blocked Call Rate (<=3%)	Ernakulam	1.15	0.63	0	0.59	0	1.83	0.61	0	3.97	0	0	0
		Kannur	0	0.68	0	0.62	0	0	0.64	0	3.21	0	0	0
		Malappuram.	0	0	0.66	1.23	0	0.58	0	0	3.33	0	0	0.55
1.2	Dropped Call Rate (<=2%)	Ernakulam	0.57	0	0.67	0.59	0	0.61	0	0	3.31	0	0	0
		Kannur	0	2.04	0	0	0	0	0	0	0	0	0	0
		Malappuram.	0	0	0.66	1.23	0	0	0	0	0	0	0	0
1.3	Percentage of connections with good voice quality (>=95%)													
	(i) 0-4 (w/o frequency hopping)	Ernakulam	0	0	0	0	0	0	0	0	0	99.69	99.63	99.70
		Kannur	0	0	0	0	0	0	0	0	0	99.62	98.99	99.67
		Malappuram.	0	0	0	0	0	0	0	0	0	99.91	99.49	97.97
	(ii) 0-5 (with frequency hopping)	Ernakulam	98.88	95.40	94.20	86.77	98.11	97.77	89.60	96.33	91.00	0	0	0
		Kannur	97.04	95.20	98.17	84.44	98.75	99.22	93.95	98.27	97.03	0	0	0
Malappuram.		98.35	96.70	98.67	85.73	97.38	98.92	96.46	98.09	95.30	0	0	0	
1.4	Call Setup Success Rate (>=95%)	Ernakulam	98.85	99.37	100	99.11	100	98.17	96.36	100	96.03	100	100	100
		Kannur	100	99.32	100	99.38	100	100	96.47	100	96.79	100	100	100
		Malappuram.	100	100	99.37	98.77	100	99.42	97.59	100	96.67	100	100	99.45

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

- Blocked Call Rate' benchmark is not met by **Vodafone** in Ernakulam, Kannur & Malappuram.
- Dropped Call Rate' benchmark is not met by **Airtel** in Kannur and **Vodafone** in Ernakulam..
- Good Voice Quality parameter is not met by **Idea** in Ernakulam, Kannur & Malappuram, **Uninor** in Ernakulam & Kannur & **Vodafone** in Ernakulam

Independent Drive Test

Parameter	Vodafone (Kalpetta)	Tata GSM (Kollam)	Rcom GSM (Kottayam)	BSNL (Painavu)
Call Attempts	87	125	106	55
Blocked Call Rate (<=3%)	1.15	1.60	0	0
Dropped Call Rate (<=2%)	0	1.6	0	1.82
Percentage of connections with good voice quality (=>95%)				
(i) 0-4 (w/o frequency hopping)				
(ii) 0-5 (with frequency hopping)	96.94	98.33	99.19	98.39
Service Coverage				
In door (>= -75dBm)	57.95	76.33	54.67	59.70
In-vehicle (>= -85dBm)	86.46	95.67	85.00	80.61
Outdoor- in city (>= -95dBm)	98.79	100	97.67	98.66
Call Setup Success Rate (>=95%)	98.84	98.40	100	100

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

All the four operators are meeting the required benchmark in the independent drive test as mentioned above.

Uninor has no BTS in **Kalpetta** and Videocon is having ICR arrangements at **Painavu**. Hence, independent drive test for these two operators could not be conducted.

CHAPTER-3: AUDIT-PMR VERIFICATION

I. Cellular Mobile Telephone Service

PMR		Bench- mark	Audit	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vi-con	Vo- fone	MTS	Rcom CDMA	Tata CDMA
S/N	Name of Parameter			GSM Operators									CDMA Operators		
(A)	Network Service Quality Parameter														
1	Network Availability														
	BTS Accumulated Downtime	<=2%	Reported	0.02%	0.02%	0.47%	0.02%	0.01%	0.01%	0.05%	0.06%	0.02%	0.01%	0.01%	0.01%
			Verified	0.02%	0.02%	0.47%	0.02%	0.01%	0.01%	0.05%	0.06%	0.02%	0.01%	0.01%	0.01%
	Worst affected BTSs due to downtime	<=2%	Reported	0.01%	0.05%	0.73%	0.07%	0.00%	0.02%	0.02%	0.18%	0.02%	0.00%	0.00%	0.00%
			Verified	0.01%	0.05%	0.73%	0.07%	0.00%	0.02%	0.02%	0.18%	0.02%	0.00%	0.00%	0.00%
2	Connection Establishment (Accessibility)														
	CSSR (Call Setup Success Rate)	>=95%	Reported	99.69%	98.78%	98.33%	99.88%	99.82%	97.73%	99.13%	99.72%	97.32%	99.06%	99.49%	99.21%
			Verified	99.69%	98.78%	98.53%	99.88%	99.82%	97.73%	99.13%	99.72%	97.32%	99.06%	99.49%	99.21%
	SDCCH/PAGING congestion	<=1%	Reported	0.01%	0.19%	0.27%	0.24%	0.05%	0.08%	0.05%	0.00%	0.33%	0.00%	0.01%	0.00%
			Verified	0.01%	0.19%	0.24%	0.24%	0.05%	0.08%	0.05%	0.00%	0.33%	0.00%	0.01%	0.00%
	TCH congestion	<=2%	Reported	0.02%	0.14%	1.47%	0.36%	0.05%	0.26%	0.06%	0.01%	1.96%	0.00%	0.04%	0.00%
			Verified	0.02%	0.14%	1.47%	0.36%	0.05%	0.26%	0.06%	0.01%	1.96%	0.00%	0.04%	0.00%
3	Connection maintenance (Retainability)														
	CDR	<=2%	Reported	0.36%	1.25%	0.60%	1.01%	0.29%	1.03%	1.20%	1.01%	0.63%	0.47%	0.26%	0.36%
			Verified	0.36%	1.25%	0.60%	1.01%	0.29%	1.03%	1.20%	1.01%	0.63%	0.47%	0.26%	0.36%
	Worst affected cells>3% TCH drop	<=5%	Reported	1.44%	2.69%	2.10%	1.66%	1.36%	2.60%	1.42%	0.70%	0.63%	0.35%	0.59%	1.38%
			Verified	1.44%	2.69%	2.10%	1.66%	1.36%	2.60%	1.42%	0.70%	0.63%	0.35%	0.59%	1.38%
	Good voice quality	>=95%	Reported	97.66%	96.13%	99.83%	95.43%	98.94%	98.06%	97.67%	98.19%	97.10%	100%	99.47%	99.18%
			Verified	97.66%	96.13%	99.83%	95.43%	98.94%	98.06%	97.67%	98.19%	97.10%	100%	99.47%	99.18%
4	No. of POI's having congestion >0.5%	<=0.5%	Reported	0	0	0.33	0	0	0	0	0	0	0	0	0
			Verified	0	0	0.33	0	0	0	0	0	0	0	0	0
(B)	Customer Service Quality Parameters														
5	Metering/billing credibility-Post paid	<= 0.1%	Reported	0.32%	0.02%	0.00%	0.04%	0.09%	0.00%	0.00%	0.00%	0.09%	0.00%	0.05%	0.00%
			Verified	0.32%	0.02%	0.00%	0.04%	0.09%	0.00%	0.00%	0.00%	0.09%	0.00%	0.05%	0.00%
6	Metering /billing credibility-Pre paid	<= 0.1%	Reported	0.07%	0.04%	0.00%	0.00%	0.04%	0.00%	0.06%	0.07%	0.04%	0.00%	0.02%	0.01%
			Verified	0.07%	0.04%	0.00%	0.00%	0.04%	0.00%	0.06%	0.07%	0.04%	0.00%	0.02%	0.01%

7	Resolution of billing/ charging complaints	100% within 4 weeks	Reported	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	99%	
			Verified	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Period of applying credit/waiver/adjustment to the customer's account from the date of resolutions of complaints	<=1 week	Reported	100%	100%	100%	100%	100%	100%	0.00%	100%	100%	100%	100%	100%	100%
			Verified	100%	100%	100%	100%	100%	100%	100%	0.00%	100%	100%	100%	100%	100%
8	Response time to customers for assistance	>=95%	Reported	100%	100%	100%	98.91%	99.21%	99.00%	99.63%	99.06%	100%	99.68%	99.78%	99.00%	
			Verified	100%	100%	100%	97.74%	99.21%	99.00%	99.63%	99.06%	100%	99.68%	99.78%	99.00%	
	% call answered by operators(voice to voice) within 60 sec.	>=90%	Reported	93.88%	93.00%	62.00%	95.55%	88.00%	98.00%	97.38%	98.97%	94.30%	90.03%	93.63%	98.00%	
			Verified	93.88%	93.00%	60.33%	95.55%	88.00%	98.00%	97.38%	98.97%	94.30%	90.03%	93.63%	98.00%	
9	Termination/closure of service	<=7days	Reported	100%	100%	100%	100%	100%	100%	0.00%	0.00%	100%	0.00%	100%	100%	
			Verified	100%	100%	100%	100%	100%	100%	100%	0.00%	0.00%	100%	0.00%	100%	100%
10	Time taken for refunds of deposits after closures.	100% within 60 days	Reported	100%	100%	100%	100%	100%	100%	0.00%	0.00%	100%	0.00%	100%	100%	
			Verified	100%	100%	100%	100%	100%	100%	100%	0.00%	0.00%	100%	0.00%	100%	100%

Critical Analysis (PMR Verification):

- Deviation found in case of BSNL for the parameters “CSSR, “SDCCH/PAGING Congestion” & “% call answered by operators (voice to voice) within 60 sec”.
- Similarly, Deviation found in case of Idea for the parameter “Accessibility of call centre/Customer Care “.

CHAPTER-4: DETAILED FINDINGS & ANALYSIS**I. Cellular Mobile Telephone Service****(A) MSC Audit****(1) 3 Days Live Data Assessment & Summarized Findings**

S/N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Idea	Rcom GSM	TATA GSM	Uninor	Vi-con	V-fone	MTS	Rcom CDMA	TATA CDMA
			GSM Operators								CDMA Operators			
A	Network Service Quality Parameter													
1	Network Availability													
	a) BTS Accumulated Downtime	<=2%	0.01%	0.01%	0.29%	0.03%	0.01%	0.01%	0.01%	0.01%	0.01%	0.03%	0.00%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	0.11%	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		2352	4532	4619	5232	2179	2061	1221	861	4214	715	1184	562
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		11	25	967	121	8	9	9	8	34	18	2	0
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	0	5	0	0	0	0	0	0	0	0	0
2	Connection Establishment (Accessibility)													
	a) CSSR	>=95%	99.66%	99.57%	98.14%	99.90%	99.92%	99.46%	98.70%	98.73%	98.55%	98.99%	99.45%	98.73%
	b) SDCCH/PAGING congestion	<=1%	0.01%	0.09%	0.28%	0.40%	0.00%	0.06%	0.02%	0.00%	0.11%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.01%	0.15%	1.86%	0.55%	0.01%	0.21%	0.15%	0.00%	1.09%	0.00%	0.08%	0.00%
3	Connection maintenance													
	a) CDR	<=2%	0.53%	0.65%	0.49%	0.70%	0.06%	0.72%	0.96%	0.55%	0.68%	0.33%	0.45%	0.50%
	b) Cells having > 3% TCH drop	<=3%	4.86%	7.64%	1.42%	1.82%	0.02%	5.21%	10.53%	1.55%	2.51%	2.27%	0.76%	0.89%
	c) Good voice quality	>=95%	97.85%	97.84%	99.89%	95.17%	99.37%	97.20%	97.16%	98.61%	97.14%	100%	98.75%	NA
	d) No. of cells > 3% TCH drop		342	1,033	192	284	1	319	385	40	316	50	27	15
	e) Total no. of cells in the network		7,033	13,522	13,566	15,640	6,537	6,127	3,655	2,583	12,573	2,203	3,552	1,691
4	No of POI's having congestion >0.5%		0	0	0	0	0	0	0	0	0	0	0	0
	a) Name of POI not meeting the benchmark		Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
	b) Total No. of call attempts on POI (Avg.)		205,912	3,731,060	1,426,815	2,966,348	55,728	622,391	99,591	21,840	4,515,469	177,847	230,636	375,041

	c) Total traffic served on POI (Erlang) (Avg.)		5,111	81,523	45,155	70,021	1,657	16,968	2,253	748	92,040	6,369	10,314	10,632
	d) Total No. of circuits on POI		12,149	145,779	53,673	104,557	6,571	30,192	3,362	2,306	145,208	16,289	36,696	50,336
	e) Total number of working POI Service Area wise		36	45	12	93	NP	19	9	26	36	55	NP	84
	f) Equipped Capacity of Network in respect of Traffic in erlang		62,381	173,319	238,853	232,904	50,000	94,324	29,833	17,253	172,490	19,000	142,000	115,570
	g) Total traffic handled in TCBH in erlang		17,255	108,454	137,941	218,126	36721	36,876	7,325	2,187	167,983	8,003	47329	32,166
(B)	Customer Service Quality Parameters													
5	Response time to customers for assistance													
	a) Accessibility of call centre	>=95%	98.95%	100%	100%	99.47%	98.98%	100%	100%	96.35%	100%	100%	98.93%	100%
	b) % of call answered by operators(voice to voice) within 60 sec	>=90%	87.58%	85.75%	98.73%	97.52%	95.50%	97.31%	99.58%	91.03%	97.63%	94.65%	96.10%	97.34%
	c) No. of call attempts to call centre / customer care nos. during TCBH (Avg)		24,333	16,814	44,164	46,749	1,534	11,179	3,546	78	48,170	187	1,720	1,431
	d) No. of calls connected and answered successfully to call centre / customer care nos. during TCBH (Avg)		21,311	14,418	43,604	45,589	1,465	10,878	3,531	71	47,026	177	1,653	1,393

NA: Not Applicable, NP: Data Not Provided

Parameter wise Findings (Live Data Assessment):

The parameter wise key takeout's 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 lying between 0% and 0.29%.
- **Worst affected BTSs due to downtime (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0% and 0.11%.
- **Call setup success rate (benchmark $\geq 95\%$):** All operators are meeting the benchmark with values lying between 98.14% and 99.92%.
- **SDCCH/PAGING Channel congestion (benchmark $\leq 1\%$):** All operators are meeting the benchmark with values lying between 0% and 0.40%.
Note: CDMA operators have the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.
- **TCH congestion (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0.0% and 1.86%.
- **Call drop rate (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0.06% and 0.96%.
- **Cell exceeding 3% TCH drop (benchmark $\leq 3\%$):** Aircel, Airtel, Tata (GSM) & Uninor are not meeting the benchmark 3%. Other operators are satisfying the benchmark with value in between 0.02% and 2.51%.
- **Connections with good voice quality (benchmark $\geq 95\%$):** GSM operators are meeting the benchmark with values lying between 95.17% and 100%. For this parameter, Tata CDMA values are not system generated.
- **Number of POI's having $\geq 0.5\%$ congestion:** All the operators are meeting the benchmark.
- **%age of call answered by operator (electronically) (benchmark $> 95\%$):** All the operators are meeting the benchmark with values lying between 96.35% and 100%.
- **%age of call answered by operator (Voice to voice) (benchmark $> 90\%$):** Aircel & Airtel are not meeting the benchmark value of 90%. Others meeting the benchmark with values lying between 91.03% and 99.58%

(2) One Month audit data report & summarized findings

S/N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Idea	Rcom GSM	TATA GSM	Uninor	Vi-con	V-fone	MTS	Rcom CDMA	TATA CDMA
			GSM Operators										CDMA Operators	
(A)	Network Service Quality Parameter													
1	Network Availability													
	a) BTS Accumulated Downtime	<=2%	0.00%	0.01%	0.30%	0.05%	0.01%	0.00%	0.01%	0.03%	0.01%	0.02%	0.01%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.04%	0.61%	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		2,352	4,532	4,619	5,232	2,179	2,061	1,221	861	4,214	715	1,184	562
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		75	452	9,637	1,705	115	49	65	177	410	97	92	9
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	2	28	0	0	0	0	0	0	0	0	0
2	Connection Establishment (Accessibility)													
	a) CSSR (Call Setup Success Rate)	>=95%	99.63%	99.60%	98.02%	99.91%	99.92%	99.51%	98.35%	98.77%	98.30%	98.96%	99.46%	98.94%
	b) SDCCH/PAGING congestion	<=1%	0.02%	0.11%	0.41%	0.42%	0.00%	0.08%	0.20%	0.00%	0.47%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.02%	0.12%	1.98%	0.60%	0.01%	0.14%	0.46%	0.00%	0.97%	0.00%	0.08%	0.00%
3	Connection maintenance (Retainability)													
	a) CDR	<=2%	0.52%	0.61%	0.52%	0.73%	0.05%	0.72%	0.99%	0.45%	0.67%	0.33%	0.47%	0.55%
	b) Worst affected cells>3% TCH drop	<=3%	4.85%	7.45%	1.61%	2.08%	0.02%	5.04%	10.67%	1.24%	2.49%	2.13%	0.73%	0.89%
	c) Good voice quality	>=95%	97.87%	97.98%	99.86%	95.36%	99.39%	97.28%	97.13%	98.58%	97.14%	100%	98.72%	NA
	d) Total No. of cells exceeding 3% TCH drop (call drop)		341	1,008	219	325	1	309	390	32	313	47	26	15
	e) Total no. of cells in the network		7,033	13,522	13,566	15,640	6,537	6,127	3,655	2,583	12,573	2,203	3,552	1,691
4	No of POI having congestion >0.5%		0	0	0	0	0	0	0	0	0	0	0	0
	a) Name of POI not meeting the benchmark		Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
	b) Total No. of call attempts on POI (Avg.)		215,581	3,589,008	1,413,532	2,864,105	59,035	603,955	95,725	20,101	4,504,329	172,877	217,558	517,121
	c) Total traffic served on POI (Erlang) (Avg.)		5,298	78,315	43,642	67,717	1,756	16,722	2,234	689	91,142	6,218	10,278	13,232
	d) Total No. of circuits on POI		12,149	145,779	53,673	102,065	6,571	30,192	3,486	2,296	145,231	16,289	36,696	50,336

	e) Total number of working POI Service Area wise		36	45	12	86	NP	19	9	26	36	55	NP	84
5	Network Data													
	a) Equipped Capacity of Network Erlang		62,381	173,319	238,853	232,904	50,000	94,324	29,833	17,253	172,490	19,000	142,000	115,570
	b) Total traffic in TCBH in erlang (Avg.)		16,252	103,611	139,612	216,089	35,118	36,324	6,906	2,059	160,674	7,829	44,131	32,629
	c) Total no. of customers served (as per VLR) on last day of the month		651,640	2,959,560	4,547,164	6,985,309	981,247	1,109,787	235,612	55,128	4,696,742	303,637	1,432,679	283,338
(B)	Customer Service Quality Parameters													
6	Metering/billing credibility-Post paid	$\leq 0.1\%$	0.18%	0.01%	0.03%	0.01%	0.09%	0.00%	NA	NA	0.09%	NA	0.08%	0.00%
	a) No. of bills issued during the period		10,087	143,429	185,341	246,488	12,774	73,095	NA	NA	177,488	NA	195,798	73,095
	b) No. of bills disputed including billing complaints during the period		18	13	52	22	12	0	NA	NA	154	NA	156	0
7	Metering /billing credibility-Pre paid	$\leq 0.1\%$	0.02%	0.05%	0.02%	0.00%	0.05%	0.00%	0.01%	0.04%	0.02%	0.01%	0.01%	0.00%
	a) No. of charging / credit / validity complaints during the quarter		370	2,203	1,389	29	930	0	39	104	1,276	43	316	0
	b) Total no. of pre-paid customers at the end of the quarter		2,377,053	4,259,916	6,414,864	7,152,015	1,834,963	308,029	719,177	240,595	5,664,230	573,001	2,211,159	308,029
8	Resolution of billing/ charging complaints	<i>100% within 4 weeks</i>	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	a) No. of billing/(postpaid) and charging, credit/validity (pre-paid) complaints resolved within 4 weeks during the quarter		388	8,831	1,441	51	942	229	39	104	1,430	43	472	229
	b) Total no. of billing (postpaid) and charging, credit / validity (pre-paid) complaints received during the quarter		388	8,831	1,441	51	942	229	39	104	1,430	43	472	229
	c) No. of billing complaints (postpaid) and charging, credit/ validity complaints (pre-paid) resolved in favour of the customer during the quarter		6	2,216	1,397	42	569	0	39	61	1,424	8	198	0

	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		382	6,615	44	9	373	278	0	43	6	35	274	229
	e) Period of applying credit/waiver/adjustment to the customer's account from the date of resolutions of complaints	<i><=1 week</i>	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
9	Response time to customers for assistance													
	a) Accessibility of call centre/Customer Care	<i>>=95%</i>	98.88%	100%	100%	99.39%	99.22%	100%	100%	98.12%	100%	100%	99.28%	100%
	b) % call answered by operators(voice to voice) within 60 sec.	<i>>=90%</i>	84.56%	93.16%	97.89%	97.04%	96.77%	96.15%	99.72%	92.86%	98.16%	92.27%	96.87%	96.48%
	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		23,370	16,466	40,847	47,265	1,578	17,439	3,574	56	44,973	194	1,758	1,618
	d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		19,761	15,339	39,987	45,864	1,527	16,768	3,564	52	44,147	179	1,703	1,561
10	Termination/closure of service	<i><=7days</i>	100%	100%	100%	100%	100%	100%	NA	NA	100%	NA	100%	100%
	a) Total No. of requests for Termination / Closure of service received during the quarter		157	440	1,709	1,250	59	284	NA	NA	595	NA	493	1,082
	b) No. of requests for Termination / Closure of service complied within 7 days during the quarter		157	440	1,709	1,250	59	284	NA	NA	595	NA	493	1,082
11	Time taken for refunds of deposits after closures.	<i>100% within 60 days</i>	100%	100%	100%	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 takeout's 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 lying between 0.0% and 0.30%.
- **Worst affected BTSs due to downtime (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0% and 0.61%.
- **Call setup success rate (benchmark $\geq 95\%$):** All operators are meeting the benchmark with values lying between 98.02% and 99.92%.
- **SDCCH/PAGING Channel congestion (benchmark $\leq 1\%$):** All operators are meeting the benchmark with values lying between 0.0% and 0.42%.
Note: CDMA operators have the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.
- **TCH congestion (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0% and 1.98%.
- **Call drop rate (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0.05% and 0.99%.
- **Cell exceeding 3% TCH drop (benchmark $\leq 5\%$):** Aircel, Airtel, TATA GSM & Uninor are not meeting the benchmark. Others are meeting with value in between 0.02% & 2.49%.

- **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 lying between 95.36% and 99.86%. For this parameter, Tata CDMA value is not system generated.
- **Number of POI having $\geq 0.5\%$ POI congestion:** All the operators are meeting the benchmark.

- **%age of call answered by operator (electronically) (benchmark $> 95\%$):** All operators are meeting the benchmark with values lying between 98.12% and 100%.
- **%age of call answered by operator (Voice to voice) (benchmark $> 90\%$):** All operators are meeting the benchmark with values lying between 92.27% and 99.72% except Aircel (84.56%).

- **Metering and billing credibility-Postpaid (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:

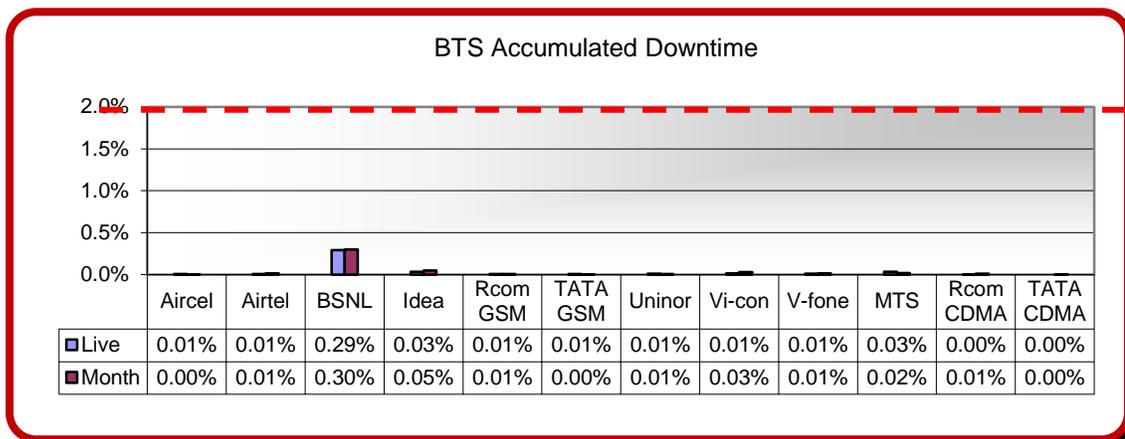
S/N	Name of Service Provider	No. of MSC/ GMSC	No. of BSC	No. of BTS
GSM Operators				
1	Aircel Ltd	3	15	2352
2	Airtel Ltd	11	42	4532
3	BSNL	20	66	4619
4	Etisalat	No Audit		
5	Idea	12	68	5232
6	Reliance Communication (GSM)	3	10	2179
7	Tata Communications (GSM)	3	15	2061
8	Uninor	2	18	1221
9	Videocon	1	6	861
10	Vodafone	8	64	4214
CDMA Operators				
11	MTS (CDMA)	1	2	715
12	Reliance Communication (CDMA)	7	2	1184
13	Tata Communications (CDMA)	5	7	562

4) Performance (Graphical Representation)

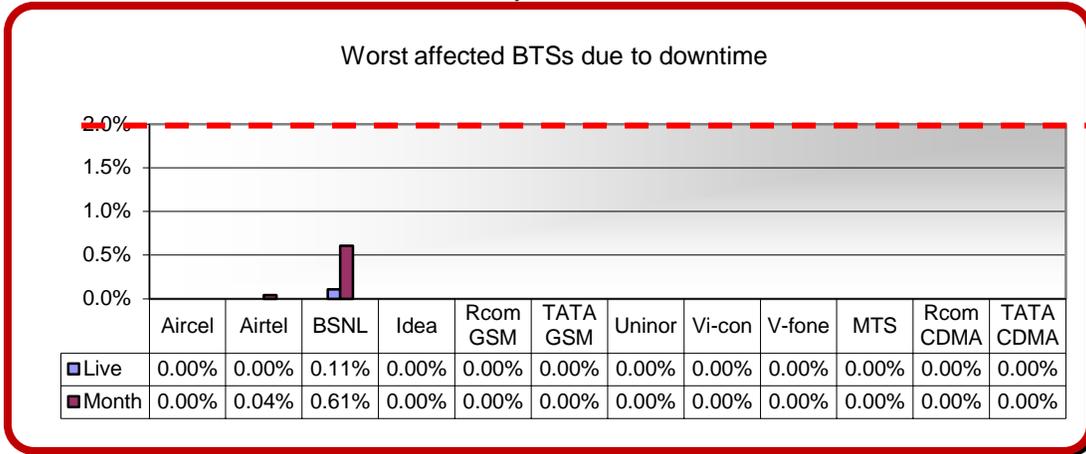
Comparison between Live measurements and One month data Audit – Cellular Mobile Telephone Services

A) NETWORK PERFORMANCE

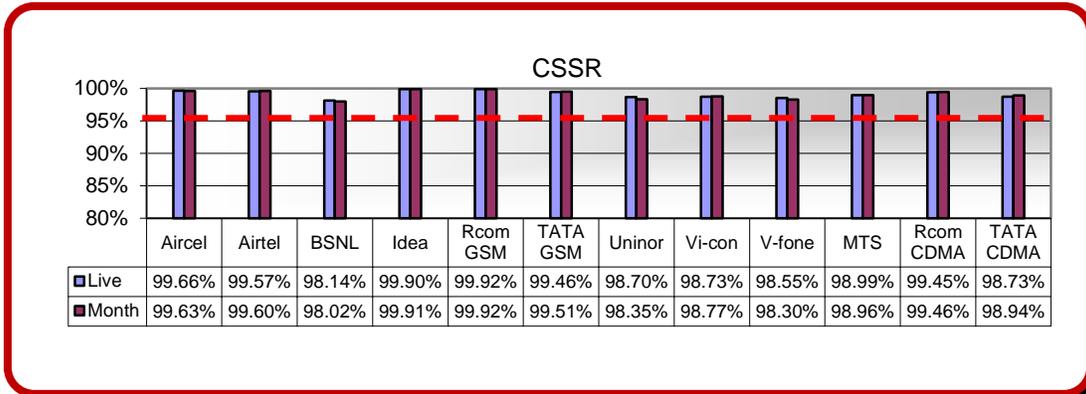
BTS Accumulated Downtime: All operators are meeting the TRAI benchmarks ($\leq 2\%$)
For both one month data and 3 days live data taken in the month of audit.



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

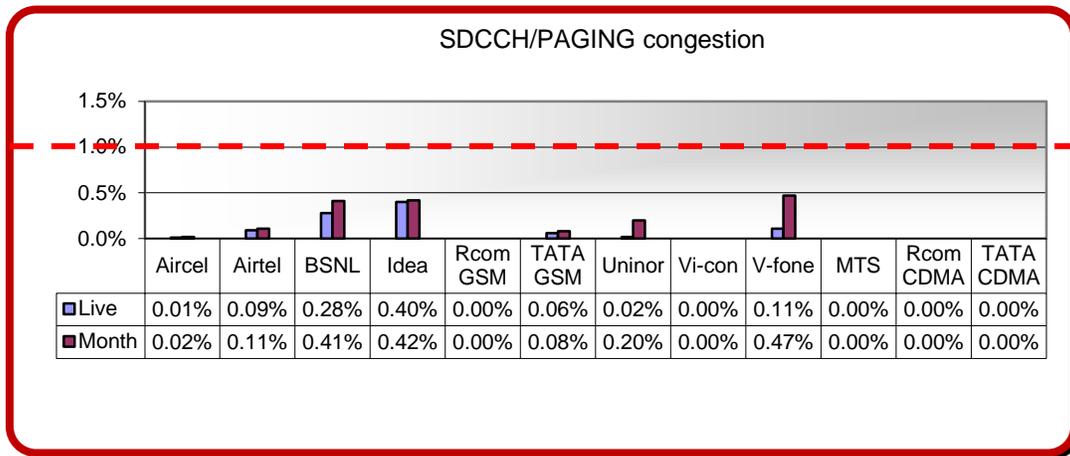


Call setup success rate: All operators are meeting the TRAI benchmarks ($\geq 95\%$) for both one month data and 3 days live data taken in the month of audit.

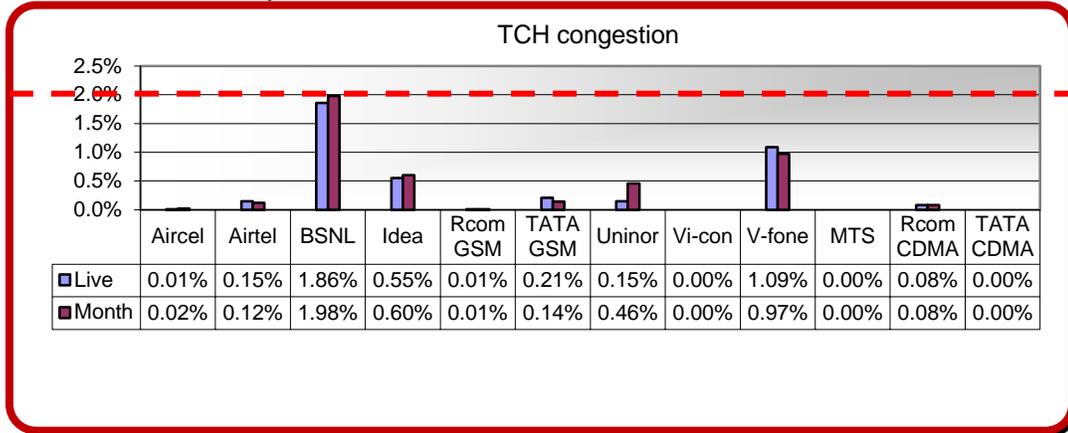


Blocked call rate:

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.

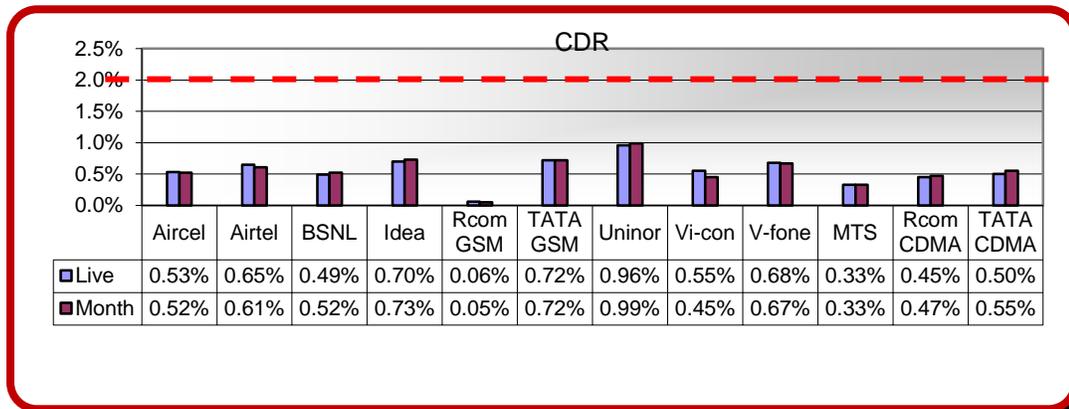


TCH congestion: All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data taken in the month of audit.

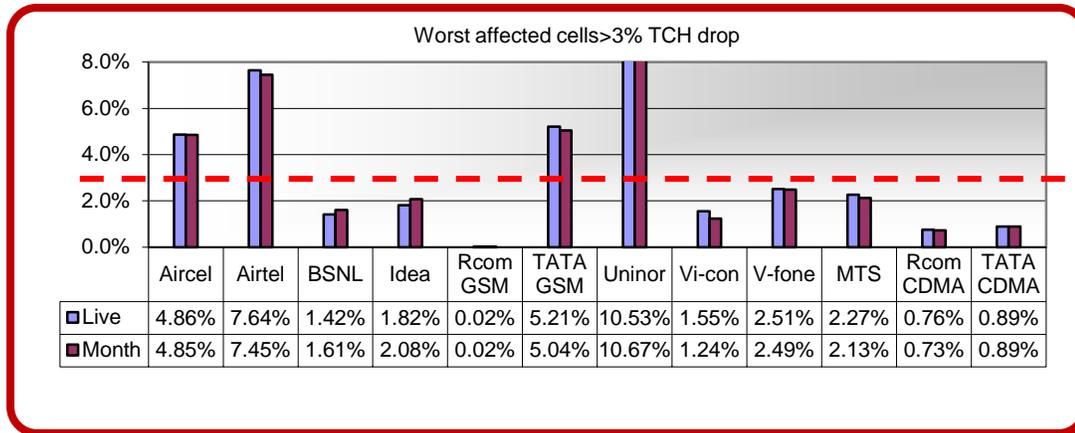


Connection Maintainability (Retainability):

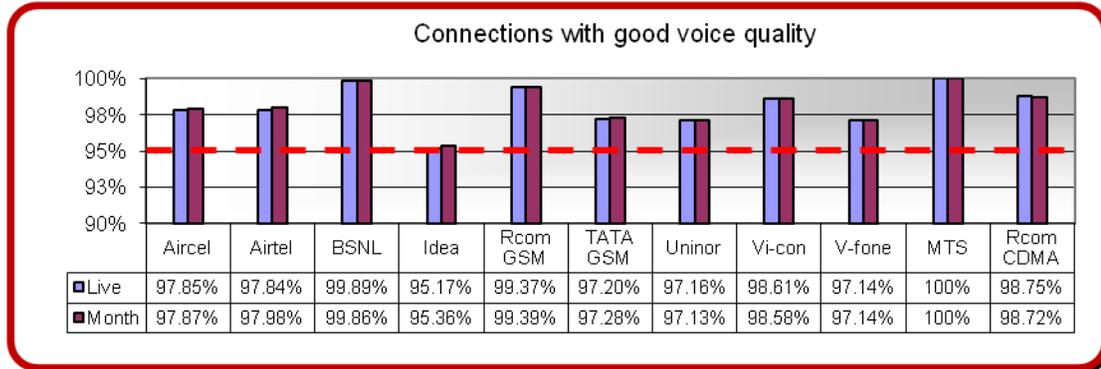
Call drop rate: All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data taken in the month of audit.



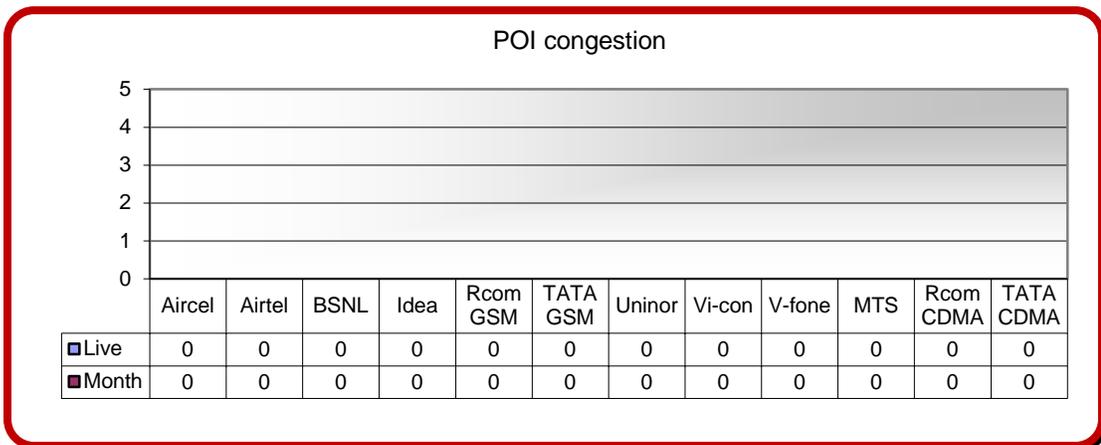
Worst affected Cell exceeding 3% TCH Drop: For live audit Aircel Airtel, Tata GSM & Uninor for both live and month data are not meeting the benchmark of $\leq 3\%$. Other operators are meeting the benchmark for both cases.



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. For this parameter, Tata CDMA value is not system generated.



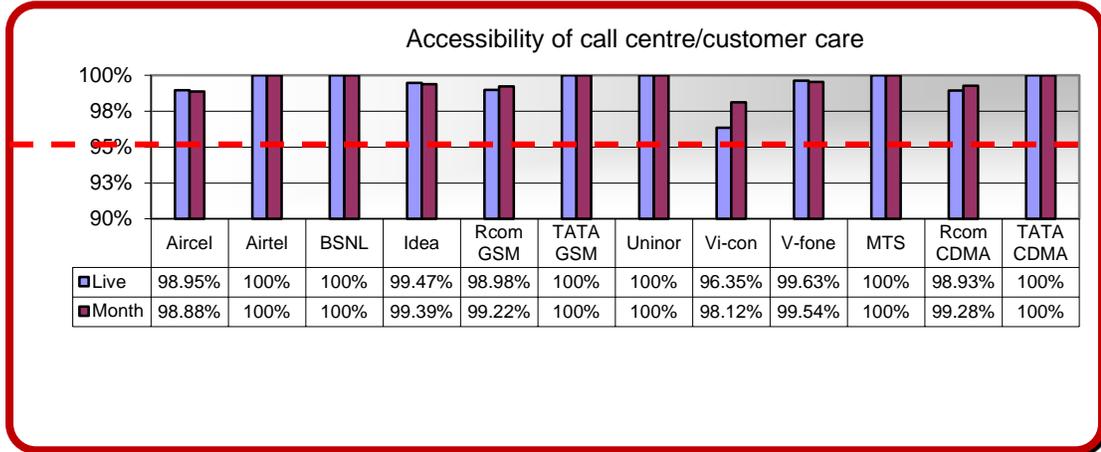
No. of POI's having Congestion >0.5%: All operators are meeting the TRAI benchmark ($\geq 0.5\%$) for both one month data and 3 days live data taken in the month of audit.



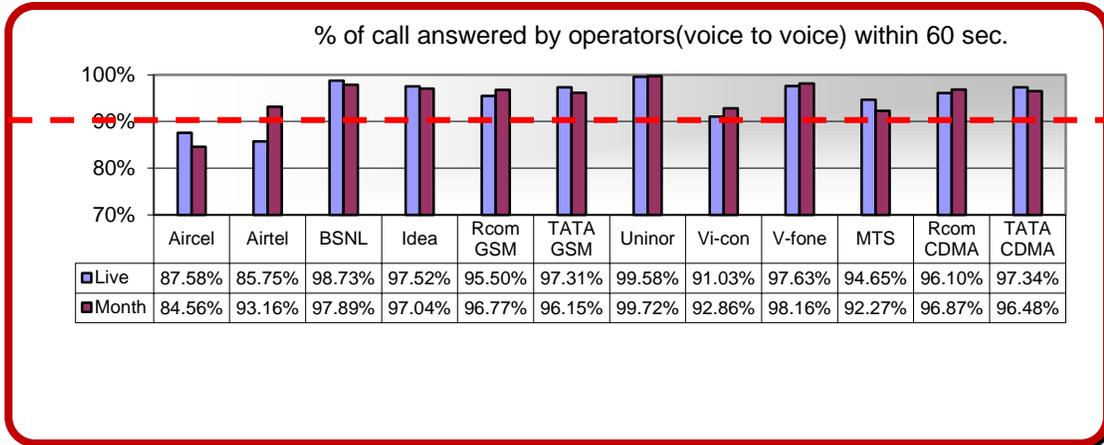
B) CUSTOMER SERVICE QUALITY PARAMETERS

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: Airtel for live audit and Aircel for both live and 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 Aircel, Airtel, Tata GSM &Uninor. Customer care parameters are satisfactory with all the operators except with Aircel in Metering/billing credibility-Postpaid and with Aircel & Airtel in % of calls 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 (live calling for billing complaints)

Calling Operator	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
Total No. of Calls Attempted	115	121	110	51	130	103	39	104	128	43	112	109
Total No. of calls Answered	100	100	100	43	100	100	31	100	100	34	100	100
Cases resolved with 4 weeks	100	100	100	43	100	100	31	100	100	34	100	100
%age of cases resolved	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Note: During the verification in some cases we could not get answer from few subscribers. However those whom we contacted have confirmed their complaint and subsequently solved by the operator. For Idea, Uninor & MTS total complaints are less than 100 hence all the complaints are tested.

3) Live Calling To Call Centre

Q1-2012 Kerala Circle Call Centre Test Calls												
Calling Operator	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
Call Centre No.	121	121	2502	198	*333	121	121	121	111	198	*333	121
Total No. of Calls Attempted	100	100	100	100	100	100	100	100	100	100	100	100
Total No. of calls connected to IVR	100	100	100	100	100	100	100	100	100	100	100	100
Calls got connected to agent within 60 Sec	100	99	100	100	100	100	100	100	100	100	100	100
%age of calls got answered	100%	99%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

NOTE: Calls were made from the Operators place. All the calls were connected within 60 seconds. 100 calls total made i.e. 50 each for Prepaid and Post paid except Uninor, Videocon & MTS who have only Prepaid services.

4) Level 1 Live Calling

Emergency calls were made in office of the respective operator at Ernakulam. Also Calls were made for 100 & 101 from Kannur & Malappuram and below given is the success rate.

Emergency no.	No. of calls made	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA	
Kannur														
100	2	2	2	2	2	2	2	2	2	2	2	2	2	Police
101	2	2	2	2	2	2	2	2	2	2	2	2	2	Fire service
108	1	1	1	1	1	1	1	1	1	1	1	1	1	Emergency Ambulance
139	2	2	2	2	2	2	2	2	2	2	2	2	2	Railway Enquiry
Malappuram														
100	2	2	2	2	2	2	2	2	2	2	2	2	2	Police
101	2	2	2	2	2	2	2	2	2	2	2	2	2	Fire service
108	1	1	1	1	1	1	1	1	1	1	1	1	1	Emergency Ambulance
139	2	2	2	2	2	2	2	2	2	2	2	2	2	Railway Enquiry
Ernakulam														
100	2	2	2	2	2	2	2	2	2	2	2	2	2	Police
101	2	2	2	2	2	2	2	2	2	2	2	2	2	Fire service
108	1	1	1	1	1	1	1	1	1	1	1	1	1	Emergency Ambulance
139	2	2	2	2	2	2	2	2	2	2	2	2	2	Railway Enquiry

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 100% in most of the cases as claimed by their records. Rcom has not provided the data for verification.

Calls were made from Operators office at Ernakulam for Call Centre test calls. 200 calls total made i.e. 100 each for Prepaid and Postpaid except Uninor, Videocon & MTS as these operators are having prepaid services only. Call centre calls were successfully connected within the 60 seconds time for all the operators.

All the level 1 calls were also answered by the agent and found as per requirement. It was confirmed from the called party that the location was nearer to the calling place. However there were occasion calls were not answered in case of Level-1 calling for emergency nos. 100, 101 & 102. Also Calls were made for 100 & 101 from Kannur & Malappuram.

(C) Inter Operator Call Assessment**(1) Sample coverage**

A sample of 2x50 test calls per Service Providers with in 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	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
Aircel	-	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Airtel	100%	-	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
BSNL	100%	100%	-	100%	100%	100%	100%	100%	100%	100%	100%	100%
Idea	100%	100%	99%		100%	100%	100%	100%	100%	100%	100%	100%
Reliance (GSM)	100%	100%	100%	100%	-	100%	100%	100%	100%	100%	100%	100%
Tata (GSM)	100%	100%	100%	100%	100%	-	99%	100%	100%	100%	100%	100%
Uninor	100%	100%	100%	100%	100%	100%	-	100%	100%	100%	100%	100%
Videocon	100%	100%	100%	100%	100%	100%	100%	-	100%	100%	100%	100%
Vodafone	100%	99%	100%	100%	100%	100%	100%	100%	-	100%	100%	100%
MTS	100%	100%	100%	100%	100%	100%	100%	100%	100%	-	100%	100%
Reliance (CDMA)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	-	100%
Tata (CDMA)	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 100-120Km depending on city areas within the speed limit of 30Km/hr.

Drive Test Locations**Ernakulam**

High Dense:	Panampilly Nagar, Mg Rd, South Rly Stn, Ksrtc, Kaloor, Palarivattom, Edapally, Mattanchery, Thoppumpady, Marine Drive, High Court, North Rly Stn, Kadavantra
Medium Dense:	Kalamaserry, Alwaye, Padivattom, Vazhakkala, Thrikkakara
Low Dense:	Nedumbassery, Athani, Kundanoor, Wellington Island

Kannur

High Dense:	Kannur Old Busstand-New Busstand-Prabath Jn-Kanathoor Temple-Muneeshwaran Kovil-Akg Hospital-Pallikunnu-Puthiyatheru, Edahcry, Sundaeswara Temple, Thana, Melechowa, Thazhechovva-Thayyil-Padanna-Kazanakotta
Medium Dense:	7th Mile-Trichambaram-Thaliparamba. Valapatanam-Manna-Chirakkal-Alavil-Chalad-Thalikkavu
Low Dense:	Pappinissery-Velapuram-Keechery-Kalliasery-Mangad-Dharmasala-Kkalam.Thazhechovva-Keezhuthally-Thottada-Nadal-Chala-Chalakunnu.

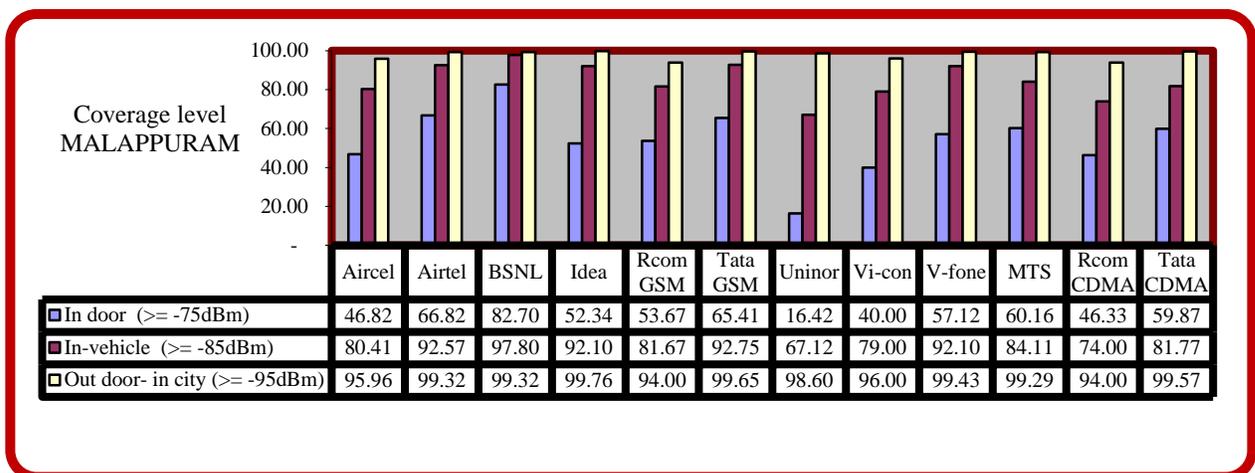
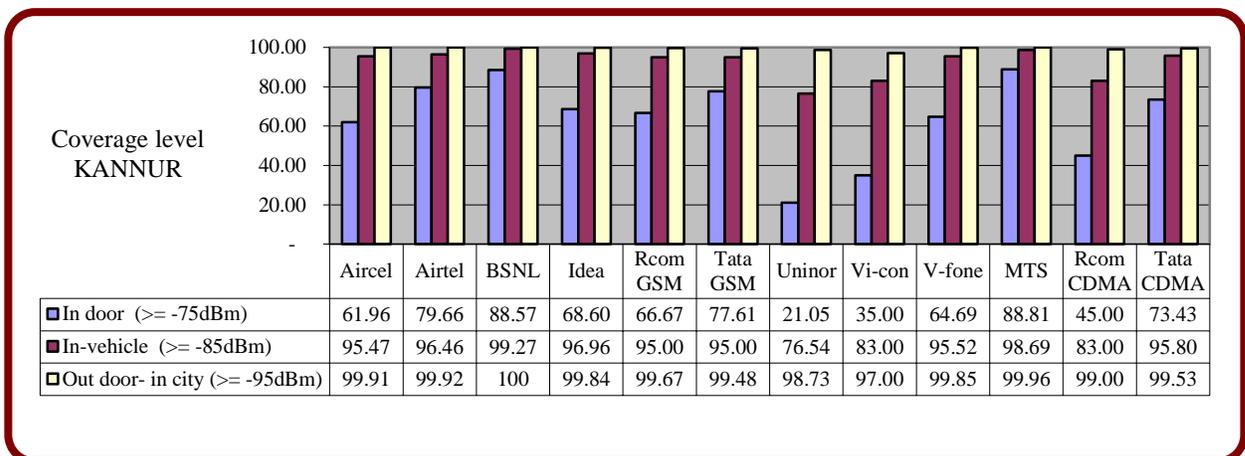
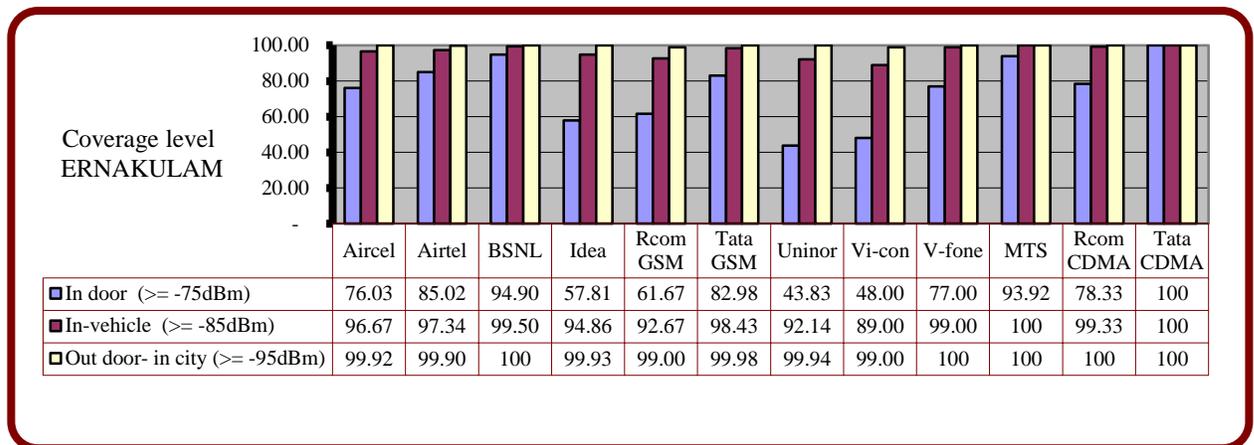
Malappuram

High Dense:	Malappuramkottappady-Downhill-Busstand--Civilstation-Ksrtc Busstand-Angadipuram-Jubillejunction-Perinthalmanna Bypass-Poopalam-Alshifa Hospital-Ootyroad-Manazhy Busstand-Ksrtc-Ems Hospital-Manjeridistrict Court-Hospital-Manjeri Jn-Thurakkal-Melakkam-Manjeri New Bstatnd-Old Stand
Medium Dense:	Melmuri-Varangode-Panakkad-Anagippuram-Valanchery Road-Puthanagadi-Msp Office-Kavungal-Kootilangadi-Kererankundu-Makkaraparambu
Low Dense:	Makkaraparuschool-Ramapuram-Pananganagra-Thoroorkad-Aripra-Anakkayam-Muttippalam

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	Ernakulam	174	159	149	170	163	164	165	164	151	192	159	164
		Kannur	164	147	147	162	154	151	157	161	156	153	159	143
		Malappuram.	174	179	151	162	165	173	133	96	150	190	161	182
1.2	Blocked Call Rate (<=3%)	Ernakulam	1.15	0.63	0	0.59	0	1.83	0.61	0	3.97	0	0	0
		Kannur	0	0.68	0	0.62	0	0	0.64	0	3.21	0	0	0
		Malappuram.	0	0	0.66	1.23	0	0.58	0	0	3.33	0	0	0.55
1.3	Dropped Call Rate (<=2%)	Ernakulam	0.57	0	0.67	0.59	0	0.61	0	0	3.31	0	0	0
		Kannur	0	2.04	0	0	0	0	0	0	0	0	0	0
		Malappuram.	0	0	0.66	1.23	0	0	0	0	0	0	0	0
1.4	Percentage of connections with good voice quality (=>95%)													
	(i) 0-4 (w/o frequency hopping)	Ernakulam										99.69	99.63	99.70
		Kannur										99.62	98.99	99.67
		Malappuram.										99.91	99.49	97.97
	(ii) 0-5 (with frequency hopping)	Ernakulam	98.88	95.40	94.20	86.77	98.11	97.77	89.60	96.33	91.00			
		Kannur	97.04	95.20	98.17	84.44	98.75	99.22	93.95	98.27	97.03			
Malappuram.		98.35	96.70	98.67	85.73	97.38	98.92	96.46	98.09	95.30				
1.5	Service Coverage													
	In door (>= -75dBm)	Ernakulam	76.03	85.02	94.90	57.81	61.67	82.98	43.83	48.00	77.00	93.92	78.33	100
		Kannur	61.96	79.66	88.57	68.60	66.67	77.61	21.05	35.00	64.69	88.81	45.00	73.43
		Malappuram.	46.82	66.82	82.70	52.34	53.67	65.41	16.42	40.00	57.12	60.16	46.33	59.87
	In-vehicle (>= -85dBm)	Ernakulam	96.67	97.34	99.50	94.86	92.67	98.43	92.14	89.00	99.00	100	99.33	100
		Kannur	95.47	96.46	99.27	96.96	95.00	95.00	76.54	83.00	95.52	98.69	83.00	95.80
		Malappuram.	80.41	92.57	97.80	92.10	81.67	92.75	67.12	79.00	92.10	84.11	74.00	81.77
	Out door- in city (>= -95dBm)	Ernakulam	99.92	99.90	100	99.93	99.00	99.98	99.94	99.00	100	100	100	100
		Kannur	99.91	99.92	100	99.84	99.67	99.48	98.73	97.00	99.85	99.96	99.00	99.53
Malappuram.		95.96	99.32	99.32	99.76	94.00	99.65	98.60	96.00	99.43	99.29	94.00	99.57	
1.6	Call Setup Success Rate (>=95%)	Ernakulam	98.85	99.37	100	99.11	100	98.17	96.36	100	96.03	100	100	100
		Kannur	100	99.32	100	99.38	100	100	96.47	100	96.79	100	100	100
		Malappuram.	100	100	99.37	98.77	100	99.42	97.59	100	96.67	100	100	99.45

Graphical Representation



(3) Critical Analysis

- Blocked Call Rate' benchmark is not met by Vodafone in Ernakulam, Kannur & Malappuram.
- Dropped Call Rate' benchmark is not met by Airtel in Kannur and Vodafone in Ernakulam.
- Good Voice Quality parameter is not met by Idea in Ernakulam, Kannur & Malappuram, Uninor in Ernakulam & Kannur & Vodafone in Ernakulam.

E) Independent Drive Test

The Independent Drive Test was conducted in Kerala in four cities namely Kalpetta, Kollam, Kottayam & Panavu. 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 55 kms for **Vodafone** in Kalpetta, 102 Kms for **Tata GSM** in Kollam, 75Kms for **RCOM GSM** in Kottayam and 40Kms for **BSNL** in Painavu depending on city areas within the speed limit of 30Km/hr. The drive was conducted within the municipality area of each city / town.

Drive Test Locations and Service provider's name:

- 1) Kalpetta - VODAFONE
- 2) Kollam - TATA GSM
- 3) Kottayam - RCOM GSM
- 4) Panavu - BSNL

1) Sample Coverage

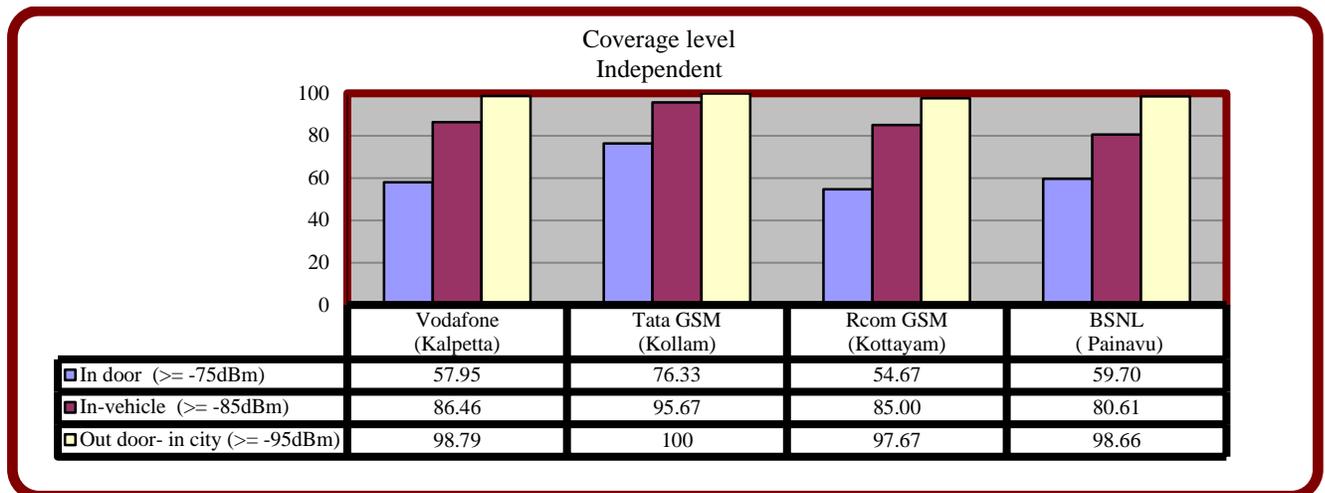
Area Coverage details:

Kalpetta-	Kalpetta Town-Skmj Hss-Civil Station-Kainatty Jn-Vengapally Rd-Bsnl Staff Quarters-Byepass Jn; Choondal-Collector's Bungalow-Kakkavayal-Meenangadi-Edapetty-Muttil-Puthurvayal
Kollam-	Kollam Town,Palkulangara,Nair Hospital,Chinnakada,Thamaakulam,Beach Road, Mundakal, Railway Stn And Ksrct Bus Stand.Parwathyar Jn. Ayathil, Polaihode To Karamkode.Civil Station, Ramankulamkara, Palace Nagar Thevally, Shakthi Kulangara.
Kottayam-	Ettumanur-Thellakam-Shankranthi-Sh Mount-Mangalam Jn.-Kodimatha-Civil Station-Collectrate-Railway Station-Ksrct Bus Station-Thirunakkara-Market Road-Kanjikuzhy-Chingavanam-Pallom-Nattakam-Vadavathur-Manarcaud-Chungam-Aymanam-Vazhappally-Kumarakom
Painavu-	Idukki District Hospital, Cheruthonni Town, Cooperative Bank Vazhathope, St Geogre School Premises Vazhathopeexcise Range Office Painavu, Civil Station Road Painavu, Idukki Dam Bottom, Pwd Guest House Painavu, Govt Polytechnic Painavu, Idukki Engineering College, Bsnl Telephone Exchange

2) Performance (For the Respective Cities)

Parameter	Vodafone (Kalpetta)	Tata GSM (Kollam)	Rcom GSM (Kottayam)	BSNL (Painavu)
Call Attempts	87	125	106	55
Blocked Call Rate (<=3%)	1.15	1.60	0	0
Dropped Call Rate (<=2%)	0	1.6	0	1.82
Percentage of connections with good voice quality (=>95%)				
(i) 0-4 (w/o frequency hopping)				
(ii) 0-5 (with frequency hopping)	96.94	98.33	99.19	98.39
Service Coverage				
In door (>= -75dBm)	57.95	76.33	54.67	59.70
In-vehicle (>= -85dBm)	86.46	95.67	85.00	80.61
Outdoor- in city (>= -95dBm)	98.79	100	97.67	98.66
Call Setup Success Rate (>=95%)	98.84	98.40	100	100

Graphical Representation



3) Critical Analysis

All the four operators are meeting the required benchmark in the independent drive test as mentioned above.

Uninor has no BTS in **Kalpetta** and Videocon is having ICR arrangements at **Painavu**. Hence, independent drive test for these two operators could not be conducted.

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

From live, month, PMR and Drive Test (both Operator Assisted and Independent) findings, it can be concluded that on an average, performance of the operators in the service area (Kerala) is satisfactory for **Network Parameters**. Only in one parameter namely “worst affected cells >3% TCH drop” Aircel, Airtel, Tata GSM & Uninor are not meeting the required benchmark for both live and month data.

Under **Customer Service Quality** Parameter “Accessibility of call centre/Customer Care” is found that many operators have improved their performances. However, Aircel for both live and month data and Airtel for live data did not meet the benchmark in “operator answered calls (voice-to-voice) within 60 seconds”.

Regarding **Metering/Billing Credibility parameter**, in Pre-Paid all operators are meeting the required benchmark. In case of Post-paid connections, Aircel is not 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. The Drive test performances of operators are satisfactory. Deviations are noticed in “Blocked Call Rate’ with Vodafone in Ernakulam, Kannur & Malappuram, in “Dropped Call Rate’ with Airtel in Kannur and with Vodafone in Ernakulam and in Good Voice Quality parameter with Idea in Ernakulam, Kannur & Malappuram, Uninor in Ernakulam & Kannur & Vodafone in Ernakulam.

In case of **Independent Drive Test** the performance of all the four operators are as per TRAI benchmark for all the parameter. Uninor has no BTS in **Kalpetta** and Videocon is having ICR arrangements at **Painavu**. Hence, independent drive test for these two operators could not be conducted.