REPORT

ON

AUDIT & ASSESSMENT OF QUALITY OF SERVICE

OF

CELLULAR MOBILE TELEPHONE SERVICE

FOR

SOUTH ZONE – KERALA CIRCLE

Report Period: Jan 2011 – March 2011

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 center
-   4) Level 1 calling
-   5) Critical Analysis

(C) Inter operator call assessment
1) Sample coverage
2) Performance based on live measurement
3) Performance based on data collected from MSCs
4) 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.

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 2011). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken for the period July – September 2010.

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

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

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

(A)   Cellular Mobile Telephone Services

S/N	Name of Parameter	Bench-mark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
	3 days Live Data Audit						GSM Operators						CDMA Operators		
1	**Connection Establishment (Accessibility)**														
	a) CSSR (Call Setup Success Rate)	>=95%	99.40%	99.56%	98.45%	99.90%	99.86%	99.77%	98.97%	99.39%	98.30%	97.13%	99.36%	99.74%	99.86%
	b) SDCCH/PAGING congestion	<=1%	0.01%	0.19%	0.25%	0.00%	0.32%	0.05%	0.07%	0.00%	0.00%	0.37%	NA	0.0%	0.0%
	c) TCH congestion	<=2%	0.01%	0.23%	1.55%	0.00%	0.79%	0.04%	0.14%	0.07%	0.08%	2.30%	0.00%	0.03%	0.00%
2	**Connection maintenance (retainability)**														
	a) CDR	<=2%	0.49%	0.68%	0.55%	0.27%	0.94%	0.27%	0.78%	1.03%	1.40%	0.59%	0.32%	0.54%	0.15%
	b) Worst affected cells>3% TCH drop	<=5%	3.38%	1.19%	2.29%	3.51%	2.59%	3.01%	4.87%	13.38%	5.23%	1.84%	1.53%	1.17%	0.00%
	c) Good voice quality	>=95%	97.85%	98.23%	99.63%	98.50%	95.62%	98.43%	98.28%	98.05%	97.82%	97.60%	100.00%		
3	**No of POIs not meeting benchmark**	<=0.5%	0	0	0	0	0	0	0	0	0	0	0	0	0
4	**Response time to customers for assistance**														
	a) Accessibility of call centre/Customer Care	>=95%	96.00%	96.00%	99.92%	99.00%	98.75%	100.00%	99.00%	99.00%	98.50%	100.00%	99.54%	100.00%	71.00%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	97.00%	24.70%	98.17%	100.00%	97.80%	98.34%	90.76%	99.00%	93.90%	98.00%	90.16%	94.84%	85.00%

NA: Not Applicable, NR: Not Received

From the 3 days live data assessment, it is found that all the operators are meeting the network parameters by and large, except for Uninor & Videocon not meeting the benchmark for "Worst affected cells>3% TCH drop" with the value of 13.38% & 5.23% respectively and Vodafone not meeting the benchmark for "TCH congestion" with a value of 2.3%. Network Parameter "Good voice quality" for RCOM CDMA & TATA CDMA are not system generated.

Performance related to customer care data is found to be satisfactory for most of the operators. Discrepancies are found in the parameter "calls answered by operators (voice-to-voice)" for Airtel (24.7%) and Tata CDMA (85%). BSNL is having a below benchmark value for "accessibility

of call centre" parameter with value of 71%.

One Month Data Audit		Bench-mark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Video con	Vodafone	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%	0.01%	0.03%	0.44%	0.10%	0.02%	0.02%	0.01%	0.00%	0.17%	0.02%	0.02%	0.01%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.05%	0.71%	0.00%	0.02%	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%	99.36%	99.61%	98.60%	99.50%	99.87%	99.76%	98.99%	99.28%	98.10%	97.32%	99.27%	99.73%	99.87%
	b) SDCCH/PAGING congestion	<=1%	0.02%	0.17%	0.29%	0.00%	0.30%	0.12%	0.08%	0.01%	0.01%	0.49%	NA	0.0%	0.0%
	c) TCH congestion	<=2%	0.03%	0.18%	1.40%	0.00%	0.77%	0.05%	0.12%	0.08%	0.32%	1.99%	0.00%	0.03%	0.00%
3	Connection maintenance (retainability)														
	a) CDR	<=2%	0.49%	0.61%	0.53%	1.48%	0.93%	0.28%	0.77%	1.01%	1.32%	0.59%	0.31%	0.57%	0.15%
	b) Worst affected cells>3% TCH drop	<=5%	2.49%	1.20%	2.06%	3.92%	2.66%	2.88%	5.30%	12.62%	4.86%	0.50%	1.61%	1.12%	0.00%
	c) Good voice quality	>=95%	97.93%	98.37%	99.38%	98.40%	95.68%	98.95%	98.25%	98.02%	97.83%	97.57%	100.00%		
4	No of POIs not meeting benchmark	<=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%	0.02%	0.39%	0.07%	NA	0.03%	0.03%	0.00%	NA	NA	0.09%	NA	0.02%	0.22%
6	Metering /billing credibility-Pre paid	<= 0.1%	0.16%	6.79%	0.14%	0.02%	0.00%	0.09%	0.00%	0.00%	0.43%	0.03%	0.02%	0.09%	0.02%
7	Resolution of billing/ charging complaints	100% within 4 weeks	100%	100%	NR	100%	100%	100%	NR	100%	100%	100%	100%	100%	NR
	a) Period of applying credit/waiver/adjustment to the customers	<=1 week	100%	NR	NR	NA	100%	100%	NR	NR	100%	100%	100%	100%	NR

#	Parameter	Benchmark													
	account from the date of resolutions of complaints														
8	**Response time to customers for assistance**														
	a) Accessibility of call centre/Customer Care	>=95%	94.00%	96.35%	99.89%	95.00%	98.71%	100.00%	99.00%	92.00%	98.50%	100.00%	99.03%	100.00%	96.00%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	87.30%	44.10%	91.84%	96.00%	95.85%	90.51%	92.00%	87.00%	90.79%	96.70%	90.63%	87.89%	98.00%
9	**Termination/closure of service**	<=7days	100%	100%	100%	NA	100%	100%	100%	NA	0%	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	0%	100%	NA	100%	100%

NA: Not Applicable, NR: Not Received

From the month data assessment, it is found that all the operators are meeting the network parameters by and large, except for Tata GSM & Uninor not meeting the benchmark for "Worst affected cells>3% TCH drop" with the value of 5.3% & 12.62% respectively. Network Parameter "Good voice quality" for RCOM CDMA & TATA CDMA are not system generated.

For the parameter "calls answered by operators (voice-to-voice)", Aircel (87.3%), Airtel (44.1%), Uninor (87%) and Reliance CDMA (87.89%) are not meeting the benchmark of 90%. A below benchmark performance is observed in case of Airecel (94%) and Uninor (92%) for "accessibility of call centre" parameter. Aircel, Airtel, BSNL, Videocon & Tata CDMA are not meeting the benchmark for "Metering/Billing Credibility (Post/Pre-Paid)".

Operator-Assisted Drive Test

The Operator Assisted Drive Test was conducted at Kerala for all the operators. Route covered was about around 80-100Km depending on city areas within the speed limit of 30Km/hr. The cities covered were Cochin, Trivendrum and Calicut. 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	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators									CDMA Operators		
1.1	Blocked Call Rate (<=3%)	Cochin	0.00%	0.61%	0.59%	3.25%	1.27%	0.00%	1.41%	3.37%	0.79%	0.00%	0.00%	0.00%
		Trivendrum	0.00%	2.99%	2.24%	3.16%	1.60%	1.07%	1.52%	2.22%	2.07%	0.00%	0.00%	0.00%
		Calicut	0.00%	3.23%	0.00%	2.86%	0.89%	0.92%	0.00%	2.86%	4.38%	0.00%	0.00%	0.00%
1.2	Dropped Call Rate (<=2%)	Cochin	0.56%	0.61%	2.37%	0.65%	0.00%	0.69%	0.70%	0.56%	1.59%	0.61%	0.00%	0.00%
		Trivendrum	0.62%	5.99%	0.00%	0.00%	0.53%	1.08%	0.00%	0.44%	1.38%	0.51%	0.53%	0.00%
		Calicut	0.00%	2.42%	0.00%	0.95%	0.89%	0.00%	0.00%	0.57%	3.51%	0.00%	1.36%	0.00%
1.3	Percentage of connections with good voice quality (=>95%) (i) 0-4 (w/o frequency hopping)	Cochin										99.25	99.44	99.09
		Trivendrum										99.79	97.54	98.84
		Calicut										99.94	97.52	98.49
	(ii) 0-5 (with frequency hopping)	Cochin	97.33	90.33	92.8	84.88	95.47	97.33	92	95	94			
		Trivendrum	93.76	89.8	95.17	83.51	96.38	94	95.33	96.47	95			
		Calicut	96.99	89.5	97.49	82.91	98.14	89	94	97.13	95			
1.4	Call Setup Success Rate (>=95%)	Cochin	100.00%	99.39%	99.41%	96.75%	98.73%	100.00%	98.59%	96.63%	99.21%	100.00%	100.00%	100.00%
		Trivendrum	100.00%	97.01%	97.76%	96.84%	98.40%	98.93%	98.48%	97.78%	97.93%	100.00%	100.00%	100.00%
		Calicut	100.00%	96.77%	100.00%	97.14%	99.11%	99.08%	100.00%	97.14%	95.62%	100.00%	100.00%	100.00%

Key observations as could be derived from the table are as under:
• Blocked Call Rate benchmark is not met by Idea & Videocon in Cochin, Idea in Trivendum and Airtel & Vodafone in Calicut.
• Dropped Call Rate benchmark is not met by Airtel in Trivendum & Calicut and BSNL in Cochin.
• "%age of Good Quality connections" parameter benchmark is not met by Airtel & Idea in any of the cities. Similar results were found for Aircel (Trivendrum), BSNL (Cochin), Tata GSM (Trivendum & Calicut), Uninor (Cochin & Calicut) and Vodafone (Cochin).

Independent Drive Test

The Independent Drive Test was conducted at Kerala in Trivendrum & Calicut. Here again, 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	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
							GSM Operators						CDMA Operators	
1.1	Blocked Call Rate (<=3%)	Trivendrum	9.27%	1.17%	0.00%	1.59%	12.56%	1.68%	1.10%	10.24%	2.19%	1.61%	0.00%	0.00%
		Calicut	1.23%	5.93%	0.00%	9.35%	0.00%	3.28%	0.00%	2.06%	2.08%	0.00%	0.00%	0.00%
1.2	Dropped Call Rate (<=2%)	Trivendrum	7.28%	1.17%	0.62%	1.06%	5.38%	0.56%	2.19%	7.90%	0.73%	1.61%	0.53%	0.00%
		Calicut	0.61%	0.85%	0.00%	1.44%	2.16%	1.64%	0.00%	2.06%	1.04%	0.65%	0.78%	0.00%
1.3	Percentage of connections with good voice quality (=>95%)													
	(i) 0-4 (w/o frequency hopping)	Trivendrum										99.75	97.45	98.92
		Calicut										99.87	98.03	98.18
	(ii) 0-5 (with frequency hopping)	Trivendrum	90.56	94.55	93.91	78.65	95.07	90.45	95.5	80.21	95.03			
		Calicut	96.55	88.1	95	91.8	96.39	92.09	91	92.48	93.6			
1.4	Call Setup Success Rate (>=95%)	Trivendrum	90.73%	98.83%	100.00%	98.41%	87.44%	98.32%	98.90%	89.76%	97.81%	98.39%	100.00%	100.00%
		Calicut	98.77%	94.07%	100.00%	90.65%	100.00%	96.72%	100.00%	97.94%	97.92%	100.00%	100.00%	100.00%

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

• Blocked Call Rate benchmark is not met by Aircel, Reliance GSM & Videocon in Trivendurm and Airtel, Idea & Tata GSM in Calicut.

• Dropped Call Rate benchmark is not met by Aircel, Reliance GSM, Uninor & Videocon in Trivendurm and Reliance GSM & Videocon in Calicut.

• "%age of Good Quality connections" parameter benchmark is not met by Airtel, Idea, Tata GSM & Videocon in any of the cities. Similar results were found for Aircel (Trivendrum), BSNL (Trivendum), Uninor (Calicut) and Vodafone (Calicut).

• CSSR benchmark is not met by Aircel, Reliance GSM & Videocon in Trivendurm and Airtel & Idea in Calicut.

III. PMR Verification

I. Cellular Mobile Telephone Service

PMR		Bench -mark	Audit	Aircel	Airtel	BSNL	Etisal at	Idea	Rcom GSM	Tata GSM	Unino r	Video con	Vodaf one	MTS	Rcom CDM A	Tata CDM A
S/ N	Name of Parameter							GSM Operators							CDMA Operators	
(A)	Network Service Quality Parameter															
1	Network Availability															
	BTS Accumulated Downtime	<=2%	Reporte d	0.02%	0.02%	0.37%	0.04%	0.07%	0.02%	0.02%	0.09%	0.15%	0.02%	0.03%	0.03%	0.01%
			Verified	0.02%	0.02%	0.37%	0.04%	0.07%	0.02%	0.02%	0.06%	0.15%	0.02%	0.03%	0.03%	0.01%
	Worst affected BTSs due to downtime	<=2%	Reporte d	0.02%	0.02%	0.70%	0.00%	0.04%	0.00%	0.07%	0.03%	0.00%	0.04%	0.00%	0.00%	0.00%
			Verified	0.02%	0.02%	0.70%	0.00%	0.04%	0.00%	0.07%	0.03%	0.00%	0.04%	0.00%	0.00%	0.00%
2	Connection Establishment (Accessibility)															
	CSSR (Call Setup Success Rate)	>=95 %	Reporte d	99.36 %	99.62 %	99.00 %	98.90 %	99.72 %	99.57 %	99.21 %	98.92 %	99.82 %	99.17 %	99.10 %	99.70 %	99.83 %
			Verified	99.36 %	99.62 %	99.00 %	98.90 %	99.72 %	99.57 %	99.21 %	98.92 %	99.82 %	99.17 %	99.10 %	99.70 %	99.83 %
	SDCCH/PAGING congestion	<=1%	Reporte d	0.01%	0.17%	0.07%	0.00%	0.22%	0.01%	0.07%	0.05%	0.02%	0.06%	0.00%	0.00%	0.00%
			Verified	0.01%	0.17%	0.07%	0.00%	0.22%	0.01%	0.07%	0.01%	0.02%	0.06%	0.00%	0.00%	0.00%
	TCH congestion	<=2%	Reporte d	0.03%	0.17%	1.27%	0.00%	0.53%	0.04%	0.04%	0.01%	0.01%	0.56%	0.00%	0.04%	0.00%
			Verified	0.03%	0.17%	1.27%	0.00%	0.53%	0.04%	0.04%	0.01%	0.01%	0.56%	0.00%	0.04%	0.00%
3	Connection maintenance (retainability)															
	CDR	<=2%	Reporte d	0.56%	0.63%	0.70%	0.78%	0.94%	0.49%	0.59%	0.89%	1.63%	0.65%	0.26%	0.75%	0.23%
			Verified	0.56%	0.61%	0.70%	0.78%	0.94%	0.49%	0.59%	0.89%	1.63%	0.65%	0.37%	0.75%	0.23%
	Worst affected cells>3% TCH drop	<=5%	Reporte d	3.84%	1.09%	2.67%	0.12%	1.53%	2.73%	1.41%	0.67%	11.53 %	0.87%	0.62%	2.08%	0.06%
			Verified	3.84%	1.09%	2.67%	0.12%	1.53%	2.73%	1.41%	0.67%	11.53 %	0.87%	0.62%	2.08%	0.06%
	Good voice quality	>=95 %	Reporte d	97.38 %	98.24 %	99.90 %	97.18 %	96.11 %	98.98 %	97.68 %	99.13 %	97.13 %	97.34 %	99.44 %	99.03 %	99.66 %
			Verified	97.38 %	98.34 %	99.90 %	97.18 %	96.11 %	98.98 %	97.68 %	99.13 %	97.13 %	97.34 %	99.44 %	99.03 %	99.66 %
4	POI congestion	<=0.5 %	Reporte d	0	0	0	0	0	0	0	0	0	0	0	0	0
			Verified	0	0	0	0	0	0	0	0	0	0	0	0	0
(B)	Customer Service Quality Parameters															

#	Parameter	Benchmark														
5	Metering/billing credibility-Post paid	<= 0.1%	Reported	0.30%	0.05%	0.00%	NA	0.06%	0.05%	0.01%	0.30%	NA	0.09%	NA	8.00%	0.00%
			Verified	0.30%	0.05%	0.00%	NA	0.06%	0.05%	0.01%	0.30%	NA	0.09%	NA	8.00%	0.00%
6	Metering /billing credibility-Pre paid	<= 0.1%	Reported	0.05%	0.00%	0.00%	0.00%	0.00%	0.04%	0.005%	1.00%	0.10%	0.03%	0.05%	0.04%	0.02%
			Verified	0.05%	0.00%	0.00%	0.00%	0.00%	0.04%	0.005%	1.00%	0.10%	0.03%	0.05%	0.04%	0.02%
7	Resolution of billing/ charging complaints	100% within 4 weeks	Reported	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%
			Verified	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%
	Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	Reported	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%
			Verified	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%
8	Response time to customers for assistance															
	Accessibility of call centre/Customer Care	>=95 %	Reported	100.00%	100.00%	100.00%	99.56%	99.00%	100.00%	100.00%	97.39%	100.00%	100.00%	99.00%	100.00%	97.00%
			Verified	100.00%	100.00%	100.00%	99.56%	99.00%	100.00%	100.00%	97.39%	100.00%	100.00%	99.00%	100.00%	97.00%
	% call answered by operators(voice to voice) within 60 sec.	>=90 %	Reported	89.52%	85.90%	82.00%	100.00%	95.56%	89.00%	92.86%	NA	91.00%	92.68%	90.44%	88.00%	93.27%
			Verified	89.52%	85.90%	82.00%	100.00%	95.56%	89.00%	92.86%	NA	91.00%	92.68%	90.44%	88.00%	93.27%
9	Termination/closure of service															
	No.of requests for Termination / Closure of service complied within 7 days during the quarter	<=7days	Reported	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	NA	NA	100.00%	NA	100.00%	100.00%
			Verified	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	NA	NA	100.00%	NA	100.00%	100.00%
10	Time taken for refunds of deposits after closures.	100% within 60 days	Reported	100.00%	100.00%	100.00%	NA	100.00%	100.00%	NA	NA	NA	100.00%	NA	100.00%	95.00%
			Verified	100.00%	100.00%	100.00%	NA	100.00%	100.00%	NA	NA	NA	100.00%	NA	100.00%	95.00%

Critical Analysis (PMR Verification):

a. The figures provided by all the operators match the figures obtained on verification.

d. Aircel, Uninor & Reliance CDMA are not meeting the benchmark for "Metering/Billing Credibility-Postpaid".

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

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

h. Tata-CDMA is not meeting the 60 days' benchmark for "Refund of deposits after closure of connection".

IV: 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	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Video con	Vodafone	MTS	Rcom CDMA	Tata CDMA
							GSM Operators						CDMA Operators		
A	Network Service Quality Parameter														
1	Connection Establishment (Accessibility)														
	a) CSSR	>=95%	99.40%	99.56%	98.45%	99.90%	99.86%	99.77%	98.97%	99.39%	98.30%	97.13%	99.36%	99.74%	99.86%
	b) SDCCH/PAGING congestion	<=1%	0.01%	0.19%	0.25%	0.00%	0.32%	0.05%	0.07%	0.00%	0.00%	0.37%	NA	0.0%	0.0%
	c) TCH congestion	<=2%	0.01%	0.23%	1.55%	0.00%	0.79%	0.04%	0.14%	0.07%	0.08%	2.30%	0.00%	0.03%	0.00%
2	Connection maintenance														
	a) CDR	<=2%	0.49%	0.68%	0.55%	0.27%	0.94%	0.27%	0.78%	1.03%	1.40%	0.59%	0.32%	0.54%	0.15%
	b) Cells having > 3% TCH drop	<=5%	3.38%	1.19%	2.29%	3.51%	2.59%	3.01%	4.87%	13.38%	5.23%	1.84%	1.53%	1.17%	0.00%
	c) Good voice quality	>=95%	97.85%	98.23%	99.63%	98.50%	95.62%	98.43%	98.28%	98.05%	97.82%	97.60%	100.00%		
	d) No. of cells > 3% TCH drop		388	458	383	5	548	182	335	18	670	699	17	14	0
	e) Total no. of cells in the network		6,867	13,205	11,719	114	14,230	6,033	5,761	3,900	2,742	11,754	2,049	3,582	1,673
3	No of POIs not meeting benchmark	<=0.5%	0	0	0	0	0	0	0	0	0	0	0	0	0
	a) Name of POI not meeting the benchmark														
	b) Total No. of circuits on POI		17,879	115,675	42,504	2,187	120,271	36,826	11,862	8,668	15,742	127,275	10,625	36,826	28,315
	c) Avg No. of call attempts on POI		10,272	96,844	57,140	24	22,611	222,717	31,825	57,557	134,428	56,780	4,184	222,717	NA
	d) Avg traffic served on POI (Erlang)		98	1,770	703	1	654	13,163	825	1,880	5,304	2,385	130	13,163	NA
	e) Total number of working POI Service Area wise		63	152	13	25	131	75	11	43	61	36	42	75	64
	f) Equipped Capacity of Network in respect of Traffic in erlang		59,495	169,890	213,481	841	205,305	40,601	70,498	42,000	18,147	143,469	19,000	138,640	94,373
	g) Total traffic handled in TCBH in erlang		15,279	107,723	108,216	5	212,554	11,981	27,471	2,988	4,433	148,162	3,486	37,403	21,000

(B)	**Customer Service Quality Parameters**														
4	**Response time to customers for assistance**														
	a) Accessibility of call centre	>=95%	96.00%	96.00 %	99.92 %	99.00%	98.75 %	100.00 %	99.00%	99.00 %	98.50 %	100.00 %	99.54%	100.00 %	71.00 %
	b) % of call answered by operators(voice to voice) within 60 sec	>=90%	97.00%	24.70 %	98.17 %	100.00 %	97.80 %	98.34%	90.76%	99.00 %	93.90 %	98.00 %	90.16%	94.84 %	85.00 %
	c) No. of call attempts to call centre / customer care nos. during TCBH (Avg)		10,094	209,240	56,306	11	23,315	6,294	6,170	4,178	13,780	17,546	935	15,505	903
	d) No. of calls connected and answered successfully to call centre / customer care nos. during TCBH (Avg)		9,794	51,775	55,278	11	22,803	6,294	5,600	4,155	12,942	17,137	843	15,505	767

NA: Not Applicable, NR: Not Received

Parameter-wise Findings (Live Data Assessment):

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

➢ **Call setup success rate (benchmark >= 95%):** All operators are meeting the benchmark with values lying between 97.13% and 99.9%.

➢ **SDCCH/PAGING Channel congestion (benchmark <= 1%):** All operators are meeting the benchmark with values lying between 0% and 0.37%.

➢ **TCH congestion (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 1.55%.

➢ **Call drop rate (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0.15% and 1.4%.

➢ **Cell exceeding 3% TCH drop (benchmark <= 5%):** Except for Uninor & Videocon, all the operators are satisfying the benchmark with value in between 0% and 4.87%.

➢ **Connections with good voice quality (benchmark >= 95%):** CDMA service providers have declared that the parameter is not system generated. GSM operators are meeting the benchmark with values lying between 95.62% and 99.63%.

➢ **POI Congestion (benchmark <= 0.5%):** All the operators are meeting the benchmark with value of 0%. There was no congestion found overall on the POI, but cases were found where individual POIs are showing high utilization/usage. Some are in the range of over 100% though causing no traffic failure due to overflow technique i.e. the extra traffic is carried over by some other operating POI as has been designed to do so.

➢ **%age of call answered by operator (electronically) (benchmark >95):** Except for Tata CDMA, all operators are meeting the benchmark with values lying between 96% to 100%.

➢ **%age of call answered by operator (Voice to voice) (benchmark >90%):** Except for Airtel & Tata CDMA, all operators are meeting the benchmark with values lying between 90.16% to 100%.

S/N	Name of Parameter	Bench mark	Aircel	Airtel	BSNL	Etisala t	Idea	Rcom GSM	Tata GSM	Uninor	Videoc on	Vodafo ne	MTS	Rcom CDMA	Tata CDM A
			GSM Operators										CDMA Operators		
(A)	**Network Service Quality Parameter**														
1	**Network Availability**														
	a) BTS Accumulated Downtime	*<=2%*	0.01%	0.03%	0.44%	0.10%	0.02%	0.02%	0.01%	0.00%	0.17%	0.02%	0.02%	0.01%	0.01 %
	b) Worst affected BTSs due to downtime	*<=2%*	0.00%	0.05%	0.71%	0.00%	0.02%	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		2,267	4,442	4,070	38	4,739	2,011	1,941	1,303	914	3,929	683	1,194	557
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		143	859	12,155	0	678	217	108	678	1,073	821	104	82	47
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	2	29	0	1	0	0	0	4	2	0	0	0
2	**Connection Establishment (Accessibility)**														
	a) CSSR (Call Setup Success Rate)	*>=95%*	99.36%	99.61%	98.60%	99.50%	99.87%	99.76%	98.99%	99.28%	98.10%	97.32%	99.27%	99.73%	99.87 %
	b) SDCCH/PAGING congestion	*<=1%*	0.02%	0.17%	0.29%	0.00%	0.30%	0.12%	0.08%	0.01%	0.01%	0.49%	NA	0.0%	0.0%
	c) TCH congestion	*<=2%*	0.03%	0.18%	1.40%	0.00%	0.77%	0.05%	0.12%	0.08%	0.32%	1.99%	0.00%	0.03%	0.00 %
3	**Connection maintenance (retainability)**														
	a) CDR	*<=2%*	0.49%	0.61%	0.53%	1.48%	0.93%	0.28%	0.77%	1.01%	1.32%	0.59%	0.31%	0.57%	0.15 %
	b) Worst affected cells>3% TCH drop	*<=5%*	2.49%	1.20%	2.06%	3.92%	2.66%	2.88%	5.30%	12.62%	4.86%	0.50%	1.61%	1.12%	0.00 %
	c) Good voice quality	*>=95%*	97.93%	98.37%	99.38%	98.40%	95.68%	98.95%	98.25%	98.02%	97.83%	97.57%	100.00 %		
	d) Total No. of cells exceeding 3% TCH drop (call drop)		171	158	242	4	379	174	305	485	132	59	33	15	1
	e) Total no. of cells in the network		6,867	13,205	11,719	114	14,230	6,033	5,761	3,900	2,742	11,754	2,049	3,582	1,673
4	**No of POIs not meeting benchmark**	*<=0.5%*	0	0	0	0	0	0	0	0	0	0	0	0	0
	a) Name of POI not meeting the benchmark														

		Benchmark													
	b) Total No. of call attempts on POI (Avg.)		10,280	96,844	54,001	184	22,816	226,025	826,230	57,557	135,146	56,634	4,186	226,025	130,333
	c) Total traffic served on POI (Erlang) (Avg.)		96	1,770	757	7	648	13,055	28,686	1,413	5,311	2,394	129	13,055	4,097
	d) Total No. of circuits on POI		17,879	115,675	42,504	2,187	120,271	36,826	11,862	8,668	15,742	127,275	10,625	36,826	28,315
	e) Total number of working POI Service Area wise		63	152	13	25	131	75	11	43	61	36	42	75	64
	f) Capacity of POI		17,312	NR	NA	1,806	115,243	33,876	11,413	7,531	14,301	123,610	9,643	33,876	25,664
5	**Network Data**														
	a) Equipped Capacity of Network Erlang		59,495	169,890	213,481	841	205,305	40,601	70,498	42,000	18,147	143,469	19,000	138,640	94,373
	b) Total traffic in TCBH in erlang (Avg.)		15,279	107,723	108,216	5	212,554	11,981	27,471	2,988	4,433	148,162	3,486	37,403	21,000
	c) Total no. of customers served (as per VLR) on last day of the month		502,858	3,015,469	3,674,187	NR	5,945,692	NR	954,052	159,601	106,284	3,907,076	244,962	NR	376,570
(B)	**Customer Service Quality Parameters**														
6	**Metering/billing credibility-Post paid**	*<= 0.1%*	0.02%	0.39%	0.07%	NA	0.03%	0.03%	0.00%	NA	NA	0.09%	NA	0.02%	0.22%
	a) No. of bills issued during the period		4,372	114,252	174,802	NA	212,204	11,588	6,463	NA	NA	171,307	NA	233,526	60,299
	b) No. of bills disputed including billing complaints during the period		1	442	131	NA	55	4	29	NA	NA	153	NA	58	130
7	**Metering /billing credibility-Pre paid**	*<= 0.1%*	0.16%	6.79%	0.14%	0.02%	0.00%	0.09%	0.00%	0.00%	0.43%	0.03%	0.02%	0.09%	0.02%
	a) No. of charging / credit / validity complaints during the quarter		326	22,877	6,268	1	52	331	510	174	1,871	1,472	101	422	1,534
	b) Total no. of pre-paid customers at the end of the quarter		2,046,560	3,366,492	4,554,832	4,630	6,284,872	3,530,095	2,587,529	650,713	437,474	4,890,537	459,712	4,495,476	692,826
8	**Resolution of billing/ charging complaints**	*100% within 4 weeks*	100%	100%	NR	100%	100%	100%	NR	100%	100%	100%	100%	100%	NR
	a) No. of billing/(post paid) and charging, credit/validity (pre paid) complaints resolved within 4 weeks during the quarter														

#	Parameter	Benchmark													
	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		327	23,319	6,399	1	107	335	NR	NR	1,871	1,625	4,364	480	NR
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		722	618	5,577	0	100	29	NR	NR	1,871	1,621	24	126	NR
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		395	22,701	0	1	7	306	NR	NR	0	4	77	354	NR
	e) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	100%	NR	NR	NA	100%	100%	NR	NR	100%	100%	100%	100%	NR
9	**Response time to customers for assistance**														
	a) Accessibility of call centre/Customer Care	>=95%	94.00%	96.35%	99.89%	95.00%	98.71%	100.00%	99.00%	92.00%	98.50%	100.00%	99.03%	100.00%	96.00%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	87.30%	44.10%	91.84%	96.00%	95.85%	90.51%	92.00%	87.00%	90.79%	96.70%	90.63%	87.89%	98.00%
	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		3,421	65,243	43,154	82	50,502	6,440	59,287	5,022	136,298	1,063,905	7,185	15,743	136,199
	d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		2,987	28,781	39,632	79	48,407	6,440	54,710	4,370	123,750	1,029,316	6,512	15,743	133,210
10	**Termination/closure of service**	<=7days	100%	100%	100%	NA	100%	100%	100%	NA	0%	100%	NA	100%	100%
	a) Total No. of requests for Termination / Closure of service received during the quarter		104	440	4,569	0	1,454	281	88	NA	0	512	NA	1,290	0
	b) No.of requests for Termination / Closure of service complied within 7 days during the quarter		104	440	4,569	0	1,454	281	88	NA	0	512	NA	1,290	0
11	**Time taken for refunds of deposits after closures.**	100% within 60 days	100%	100%	100%	NA	100%	100%	100%	NA	0%	100%	NA	100%	100%

NA: Not Applicable, NR: Not Received

Parameter-wise Findings (Month Data Assessment):

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

➢ **BTS accumulated downtime (benchmark <=2%):** All operators are meeting the benchmark with values lying between 0% and 0.44%.
➢ **Worst affected BTSs due to downtime (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 0.71%.
➢ **Call setup success rate (benchmark >= 95%):** All operators are meeting the benchmark with values lying between 97.32% and 99.87%.
➢ **SDCCH/PAGING Channel congestion (benchmark <= 1%):** All operators are meeting the benchmark with values lying between 0% and 0.49%.
➢ **TCH congestion (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 1.99%.
➢ **Call drop rate (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0.15% and 1.48%.
➢ **Cell exceeding 3% TCH drop (benchmark <= 5%):** Except for Tata GSM & Uninor, all the operators are satisfying the benchmark with value in between 0% and 4.86%.
➢ **Connections with good voice quality (benchmark >= 95%):** CDMA service providers have declared that the parameter is not system generated. GSM operators are meeting the benchmark with values lying between 95.68% and 99.38%.
➢ **POI Congestion (benchmark <= 0.5%):** All the operators are meeting the benchmark with value of 0%. There was no congestion found overall on the POI, but cases were found where individual POIs are showing high utilization/usage. Some are in the range of over 100% though causing no traffic failure due to overflow technique i.e. the extra traffic is carried over by some other operating POI as has been designed to do so.
➢ **%age of call answered by operator (electronically) (benchmark >95%):** Except for Aircel & Uninor, all operators are meeting the benchmark with values lying between 95% to 100%.
➢ **%age of call answered by operator (Voice to voice) (benchmark >90%):** Except for Aircel, Airtel, Uninor & Reliance CDMA, all operators are meeting the benchmark with values lying between 90.51% to 98%.
➢ **Metering and billing credibility-Post paid (benchmark <= 0.1%):** Except for Airtel & Tata-CDMA with values of 0.39% & 0.22% respectively, all other operators are meeting the benchmark.
➢ **Metering and billing credibility-Pre paid (benchmark <= 0.1%):** Except for Aircel, Airtel, BSNL & Videocon, all the operators are meeting the benchmark with values lying between 0% and 0.09%.
➢ **Resolution of billing/ charging complaints (benchmark 100% within 4 weeks):** All operators are meeting the benchmark.
➢ **Termination/Closure of service (Benchmark <= 7 days):** All operators have satisfied the benchmark.
➢ **Time taken for refunds of deposits after closures (benchmark 100% within <=60 days):** All operators have satisfied the benchmark.
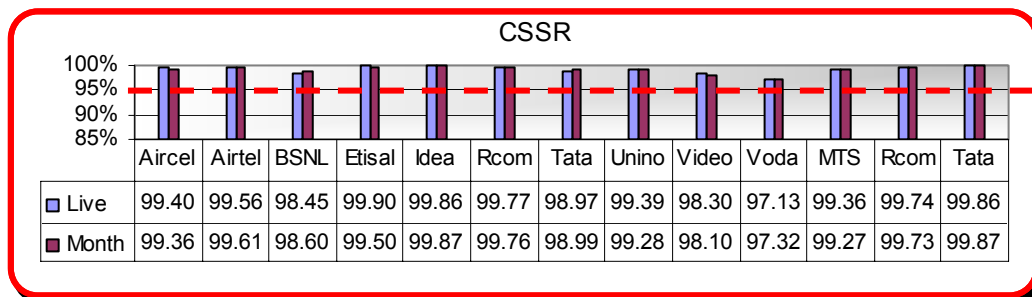
(1)   Sample Coverage

Switches/BSC/BTS details of operators:

Sl.	Name of Service Provider	No. of MSC	No. of BSC	No. of BTS
	GSM Operators			
1	Aircel Ltd	1	14	2627
2	Airtel Ltd	11	39	4442
3	BSNL	20	65	4070
4	Etisalat	0	3	38
5	Idea	18	80	4739
6	Reliance Communication (GSM)	4	11	2084
7	Tata Communications (GSM)	2	15	1941
8	Uninor	2	18	1284
9	Videocon	3	6	914
10	Vodafone	12	63	3929
	CDMA Operators			
11	MTS (CDMA)	1	2	683
12	Reliance Communication (CDMA)	7	0	1211
13	Tata Communications (CDMA)	3	6	557

(2)   Performance (Graphical Representation)

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

A)   NETWORK PERFORMANCE

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

	Aircel	Airtel	BSNL	Etisal	Idea	Rcom	Tata	Unino	Video	Voda	MTS	Rcom	Tata
Live	99.40	99.56	98.45	99.90	99.86	99.77	98.97	99.39	98.30	97.13	99.36	99.74	99.86
Month	99.36	99.61	98.60	99.50	99.87	99.76	98.99	99.28	98.10	97.32	99.27	99.73	99.87

II.   Blocked call rate:

SDCCH congestion (%): All operators are meeting the TRAI benchmarks (<= 1 %) for both one month data and 3 days live data taken in the month of audit. The parameter is not applicable to CDMA networks.

SDCCH/PAGING congestion

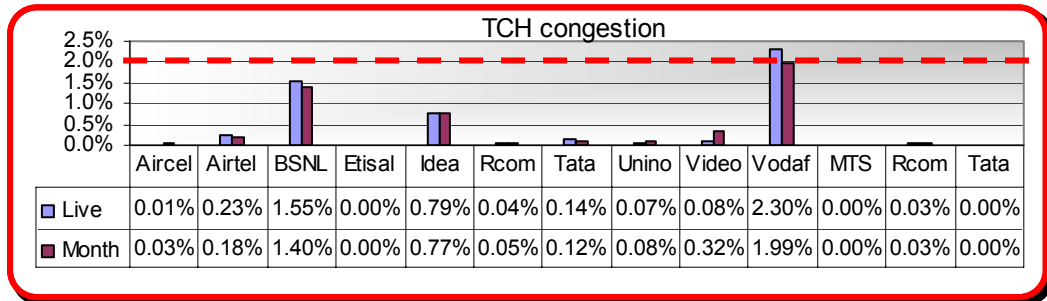|	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videoco	Vodafone	MTS	Rcom CDMA	Tata CDMA
Live	0.01	0.19	0.25	0.00	0.32	0.05	0.07	0.00	0.00	0.37	0.00	0.00	0.00
Month	0.02	0.17	0.29	0.00	0.30	0.12	0.08	0.01	0.01	0.49	0.00	0.00	0.00
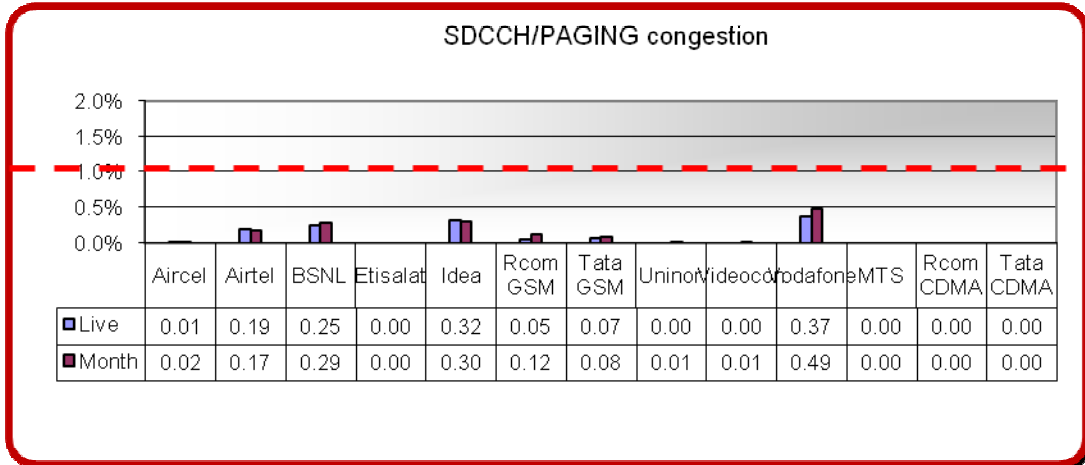
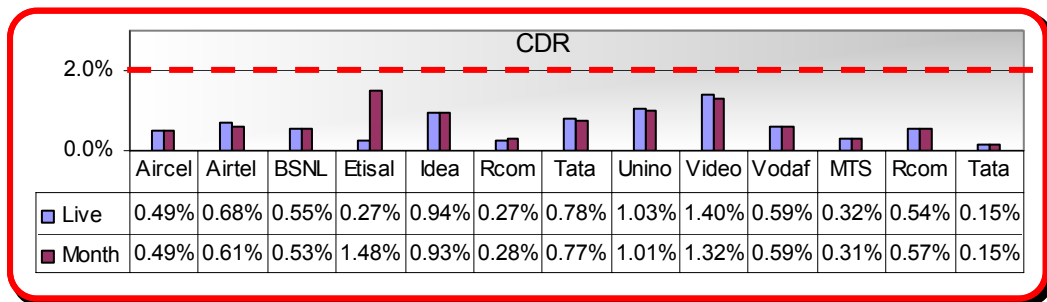**TCH congestion (%):**   All operators are meeting the TRAI benchmarks (<= 2%) for both one month data and 3 days live data taken in the month of audit, except for Vodafone (2.3%) in 3 days live assessment..

TCH congestion

	Aircel	Airtel	BSNL	Etisal	Idea	Rcom	Tata	Unino	Video	Vodaf	MTS	Rcom	Tata
Live	0.01%	0.23%	1.55%	0.00%	0.79%	0.04%	0.14%	0.07%	0.08%	2.30%	0.00%	0.03%	0.00%
Month	0.03%	0.18%	1.40%	0.00%	0.77%	0.05%	0.12%	0.08%	0.32%	1.99%	0.00%	0.03%	0.00%

III.   Connection Maintainability (Retainability):

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

CDR

	Aircel	Airtel	BSNL	Etisal	Idea	Rcom	Tata	Unino	Video	Vodaf	MTS	Rcom	Tata
Live	0.49%	0.68%	0.55%	0.27%	0.94%	0.27%	0.78%	1.03%	1.40%	0.59%	0.32%	0.54%	0.15%
Month	0.49%	0.61%	0.53%	1.48%	0.93%	0.28%	0.77%	1.01%	1.32%	0.59%	0.31%	0.57%	0.15%

Worst affected Cell exceeding 3% TCH Drop: For month data, Tata GSM & Uninor are found not meeting the benchmark with a value of 5.3% & 12.62% respectively. Videocon is not meeting the benchmark in live data with a value of 5.23%. Rest of the operators are meeting the benchmark for both cases.

	Aircel	Airtel	BSNL	Etisal	Idea	Rcom	Tata	Unino	Video	Vodaf	MTS	Rcom	Tata
☐ Live	3.38%	1.19%	2.29%	3.51%	2.59%	3.01%	4.87%	13.38	5.23%	1.84%	1.53%	1.17%	0.00%
☐ Month	2.49%	1.20%	2.06%	3.92%	2.66%	2.88%	5.30%	12.62	4.86%	0.50%	1.61%	1.12%	0.00%

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

Connections with good voice quality

	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videoco	Vodafone	MTS	Rcom CDMA	Tata CDMA
☐ Live	97.85	98.23	99.63	98.50	95.62	98.43	98.28	98.05	97.82	97.60	100.0		
☐ Month	97.93	98.37	99.38	98.40	95.68	98.95	98.25	98.02	97.83	97.57	100.0		

POI Congestion: All operators are meeting the TRAI benchmarks (<= 0.5%) for both one month data and 3 days live data taken in the month of audit.

POI congestion

	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videoco	Vodafone	MTS	Rcom CDMA	Tata CDMA
☐ Live	0	0	0	0	0	0	0	0	0	0	0	0	0
☐ Month	0	0	0	0	0	0	0	0	0	0	0	0	0

B)   CUSTOMER SERVICE QUALITY PARAMETERS

(A)   Response time to the customer for assistance:

Percentage of call answered (Electronically): All operators are meeting the TRAI benchmarks (>= 95%) for both one month data and 3 days live data taken in the month of audit except for Aircel & Uninor in month data audit and Tata CDMA for live data audit.
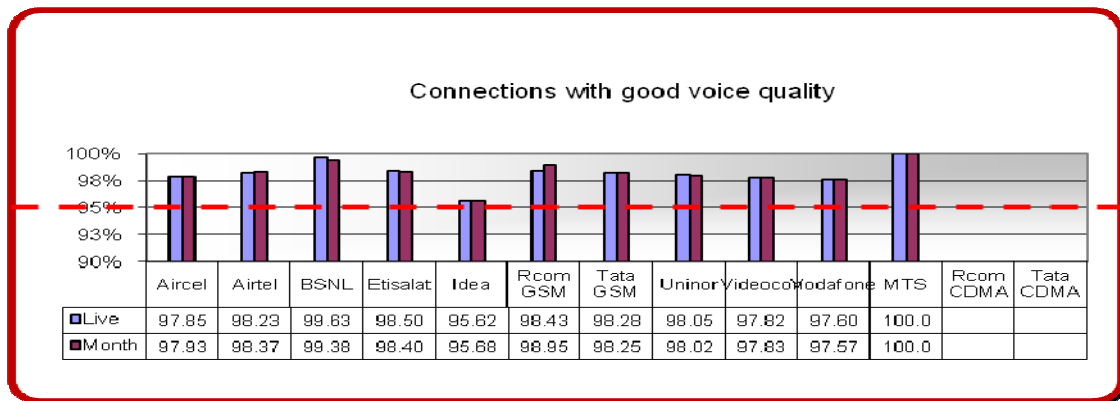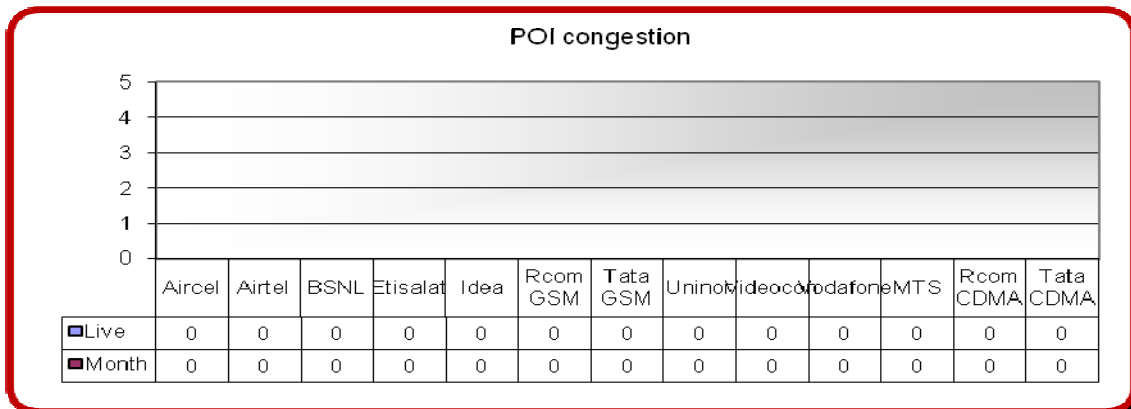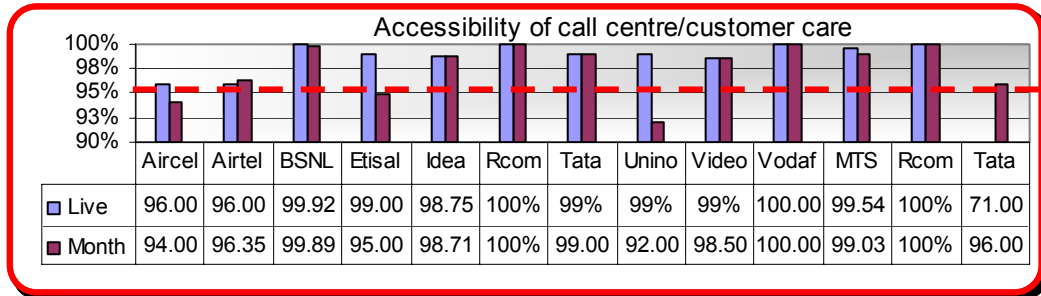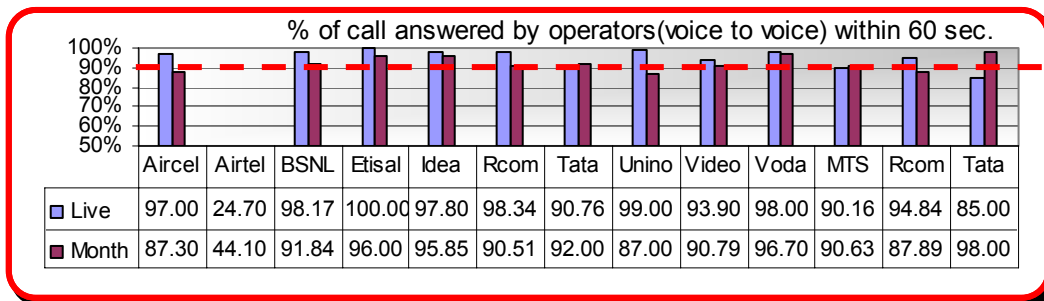
	Aircel	Airtel	BSNL	Etisal	Idea	Rcom	Tata	Unino	Video	Vodaf	MTS	Rcom	Tata
Live	96.00	96.00	99.92	99.00	98.75	100%	99%	99%	99%	100.00	99.54	100%	71.00
Month	94.00	96.35	99.89	95.00	98.71	100%	99.00	92.00	98.50	100.00	99.03	100%	96.00

Accessibility of call centre/customer care

Percentage of call answered by operators (Voice to voice) within 60 sec: Airtel is not meeting the benchmark in both live & month data audit. Similarly, Tata CDMA for Live data audit and Aircel, Uninor & Reliance CDMA for month data audit.

	Aircel	Airtel	BSNL	Etisal	Idea	Rcom	Tata	Unino	Video	Voda	MTS	Rcom	Tata
Live	97.00	24.70	98.17	100.00	97.80	98.34	90.76	99.00	93.90	98.00	90.16	94.84	85.00
Month	87.30	44.10	91.84	96.00	95.85	90.51	92.00	87.00	90.79	96.70	90.63	87.89	98.00

% of call answered by operators(voice to voice) within 60 sec.

(3)   Critical Analysis

The above comparative study between live data & month data shows similar trends in both the cases. However, inconsistency in live & month data was found for parameters like "worst affected cells >3% TCH drop" (Vodafone), "CDR" (Etisalat) and "accessibility of call centre" (Uninor).

(B) Redressal

(1) Sample coverage

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

(2) Performance (live calling for billing complaints)

Calling Operator	Aircel	Airtel	BSNL	Etisalat	Idea	Reliance (GSM)	Tata (GSM)	Uninor	Videocon	Vodafone	MTS	Reliance (CDMA)	Tata (CDMA)
Total No. of calls	10	8	5	9	13	10	5	9	7	12	11	7	9
Cases resolved with 4 weeks	10	8	5	9	13	10	5	9	7	12	11	7	9
%age of cases resolved	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

(3) Live calling to Call center:
Fifty nos. of calls were made at Cochin in each half and below given no. of calls got connected to the call center within 60 Sec.

	OPERATORS NAME												
	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom	Tata	Video-con	Voda-fone	Uninor	MTS	Rcom	Tata
	GSM											CDMA	
1ST HALF (10AM TO 01 PM)	42	40	47	44	48	47	47	47	46	40	47	47	46
2ND HALF (04PM TO 07 PM)	39	44	49	46	46	48	45	39	40	32	39	45	38
In % age	81.00	84.00	96.00	90.00	94.00	95.00	92.00	86.00	86.00	72.00	86.00	92.00	84.00

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

(5) Critical Analysis

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

(C) Inter operator call assessment

(1) Sample coverage

A sample of 2x50 test calls per Service Providers with in the licensed service area (Kerala Circle) were made between 1900 to 2100 hrs so that TCBH hours for all the operators were covered.

(2) Performance based on live measurement

Calling Operator	Aircel	Airtel	BSNL	Etisalat	Idea	Reliance (GSM)	Tata (GSM)	Uninor	Videocon	Vodafone	MTS	Reliance (CDMA)	Tata (CDMA)
Aircel	-	100%	97%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Airtel	100%	-	100%	100%	100%	99%	100%	100%	100%	100%	100%	100%	98%
BSNL	100%	100%	-	99%	100%	100%	100%	100%	100%	98%	100%	100%	100%
Etisalat	98%	100%	100%	-	100%	100%	100%	100%	100%	100%	100%	100%	100%
Idea	100%	98%	100%	100%	-	100%	100%	100%	100%	100%	100%	100%	100%
Reliance (GSM)	100%	100%	100%	100%	95%	-	100%	100%	100%	100%	99%	100%	100%
Tata (GSM)	100%	100%	100%	100%	100%	100%	-	100%	100%	100%	100%	100%	100%
Uninor	96%	100%	100%	100%	100%	100%	100%	-	100%	100%	100%	100%	100%
Videocon	100%	100%	96%	100%	100%	100%	100%	100%	-	100%	100%	100%	99%
Vodafone	100%	100%	100%	97%	100%	100%	100%	100%	100%	-	100%	100%	100%
MTS	100%	100%	100%	100%	100%	97%	100%	100%	100%	100%	-	100%	100%
Reliance (CDMA)	100%	97%	100%	100%	100%	100%	99%	100%	100%	100%	100%	-	100%
Tata (CDMA)	100%	100%	98%	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 80-100Km depending on city areas within the speed limit of 30Km/hr.

DRIVE TEST LOCATIONS

Cochin

Low Dense: Seaport airport road, Padamughal, Vallarpadam, Vypin Island and Airport
Medium Dense: Fort Cochi, Mattanchery, Pallarivattom, Vytilla, Kundanoor Junction, HMT Junction, Aluva
High Dense: Padma – Marine Drive, Willington Island, MG Road, KSRTC Bus stand, High Court, Panampally Nagar, North Railway Station, Edapally-Carborandum – Aluva Town

Trivendrum

Low Dense: Kovalam, Chakkai, Shangumugham, Airport, Attukulangara, Kinfrapark, Enjackal, Valiyuthura
Medium Dense: Medical College, Kazhakkoottam, Sreekaryam, Poojappura, Pattom, Kesavadasapuram
High Dense: Vellayambalam, Thampanoor, Secratriate, Kowdiyar, PMG Technopark

Calicut

Low Dense: Ramanattukkara, Vaidyaharngadi, Ayyikkarappadi, Kottappuram, Pulikkal, Airport, Vellimadukunnu, Moozhikkal, Karanthur, Kunnamangalam, Chathamangalam, REC Engg College
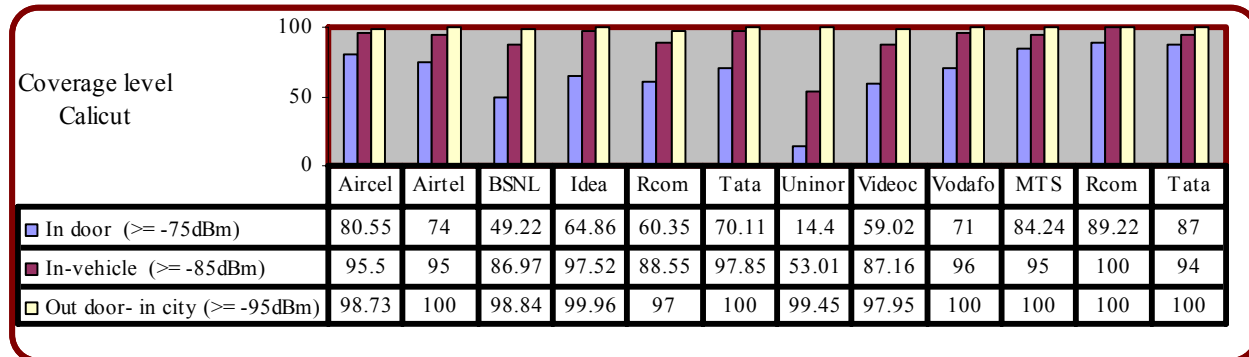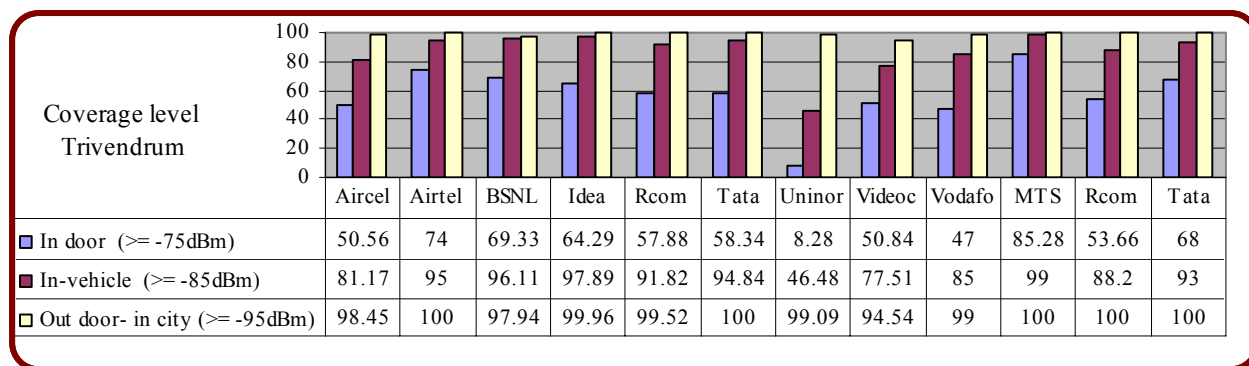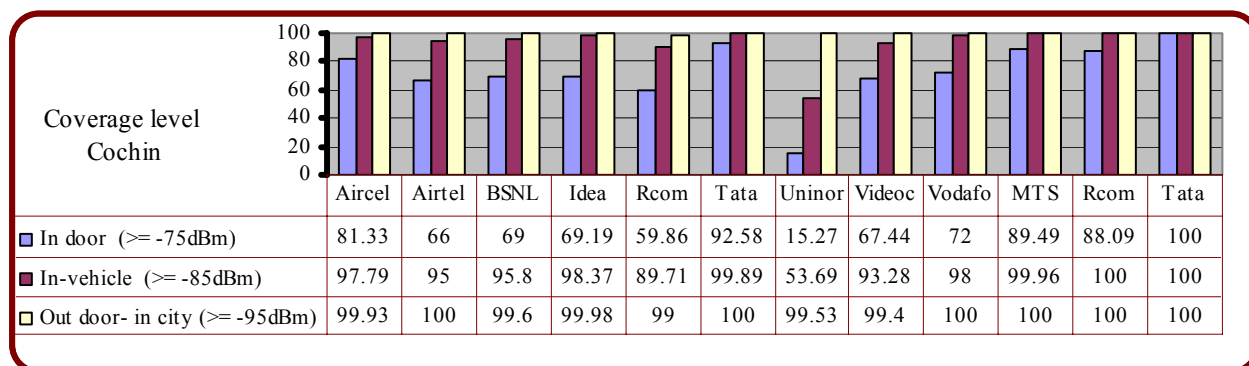**Medium Dense:** Arayidathupalam, Mankavu, Meenchanda, Nallalam, Cheruvannur, Feroke, Ramanattukkara, Malaprambu, Paroppady, Vellimadukunnu, Thondayad, Chevayur, Medical college
High Dense: Westhill, Nadakkavu, Eranjipalam, Arayidathupalam, Mavoorroad, Palayam, Railway Station, Kuttichira Beach, Jafferkhan colony

2) Performance (for the respective cities)

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators									CDMA Operators		
1.1	Call Attempts	Cochin	177	163	169	154	157	144	142	178	126	163	156	130
		Trivendrum	160	167	134	190	188	186	197	225	145	197	188	112
		Calicut	136	124	128	105	112	109	110	175	114	153	221	114
1.2	Blocked Call Rate (<=3%)	Cochin	0.00%	0.61%	0.59%	3.25%	1.27%	0.00%	1.41%	3.37%	0.79%	0.00%	0.00%	0.00%
		Trivendrum	0.00%	2.99%	2.24%	3.16%	1.60%	1.07%	1.52%	2.22%	2.07%	0.00%	0.00%	0.00%
		Calicut	0.00%	3.23%	0.00%	2.86%	0.89%	0.92%	0.00%	2.86%	4.38%	0.00%	0.00%	0.00%
1.3	Dropped Call Rate (<=2%)	Cochin	0.56%	0.61%	2.37%	0.65%	0.00%	0.69%	0.70%	0.56%	1.59%	0.61%	0.00%	0.00%
		Trivendrum	0.62%	5.99%	0.00%	0.00%	0.53%	1.08%	0.00%	0.44%	1.38%	0.51%	0.53%	0.00%
		Calicut	0.00%	2.42%	0.00%	0.95%	0.89%	0.00%	0.00%	0.57%	3.51%	0.00%	1.36%	0.00%
1.4	Percentage of connections with good voice quality (=>95%)													
	(i) 0-4 (w/o frequency hopping)	Cochin										99.25	99.44	99.09
		Trivendrum										99.79	97.54	98.84
		Calicut										99.94	97.52	98.49
	(ii) 0-5 (with frequency hopping)	Cochin	97.33	90.33	92.8	84.88	95.47	97.33	92	95	94			
		Trivendrum	93.76	89.8	95.17	83.51	96.38	94	95.33	96.47	95			
		Calicut	96.99	89.5	97.49	82.91	98.14	89	94	97.13	95			
1,5	Service Coverage													
	In door (>= -75dBm)	Cochin	81.33	66	69	69.19	59.86	92.58	15.27	67.44	72	89.49	88.09	100
		Trivendrum	50.56	74	69.33	64.29	57.88	58.34	8.28	50.84	47	85.28	53.66	68
		Calicut	80.55	74	49.22	64.86	60.35	70.11	14.4	59.02	71	84.24	89.22	87
	In-vehicle (>= -85dBm)	Cochin	97.79	95	95.8	98.37	89.71	99.89	53.69	93.28	98	99.96	100	100
		Trivendrum	81.17	95	96.11	97.89	91.82	94.84	46.48	77.51	85	99	88.2	93
		Calicut	95.5	95	86.97	97.52	88.55	97.85	53.01	87.16	96	95	100	94
	Out door- in city (>= -95dBm)	Cochin	99.93	100	99.6	99.98	99	100	99.53	99.4	100	100	100	100
		Trivendrum	98.45	100	97.94	99.96	99.52	100	99.09	94.54	99	100	100	100
		Calicut	98.73	100	98.84	99.96	97	100	99.45	97.95	100	100	100	100
1.6	Call Setup Success Rate (>=95%)	Cochin	100.00%	99.39%	99.41%	96.75%	98.73%	100.00%	98.59%	96.63%	99.21%	100.00%	100.00%	100.00%
		Trivendrum	100.00%	97.01%	97.76%	96.84%	98.40%	98.93%	98.48%	97.78%	97.93%	100.00%	100.00%	100.00%
		Calicut	100.00%	96.77%	100.00%	97.14%	99.11%	99.08%	100.00%	97.14%	95.62%	100.00%	100.00%	100.00%

Graphical Representation

Coverage level Cochin	Aircel	Airtel	BSNL	Idea	Rcom	Tata	Uninor	Videoc	Vodafo	MTS	Rcom	Tata
■ In door (>= -75dBm)	81.33	66	69	69.19	59.86	92.58	15.27	67.44	72	89.49	88.09	100
■ In-vehicle (>= -85dBm)	97.79	95	95.8	98.37	89.71	99.89	53.69	93.28	98	99.96	100	100
□ Out door- in city (>= -95dBm)	99.93	100	99.6	99.98	99	100	99.53	99.4	100	100	100	100

Coverage level Trivendrum	Aircel	Airtel	BSNL	Idea	Rcom	Tata	Uninor	Videoc	Vodafo	MTS	Rcom	Tata
■ In door (>= -75dBm)	50.56	74	69.33	64.29	57.88	58.34	8.28	50.84	47	85.28	53.66	68
■ In-vehicle (>= -85dBm)	81.17	95	96.11	97.89	91.82	94.84	46.48	77.51	85	99	88.2	93
□ Out door- in city (>= -95dBm)	98.45	100	97.94	99.96	99.52	100	99.09	94.54	99	100	100	100

Coverage level Calicut	Aircel	Airtel	BSNL	Idea	Rcom	Tata	Uninor	Videoc	Vodafo	MTS	Rcom	Tata
■ In door (>= -75dBm)	80.55	74	49.22	64.86	60.35	70.11	14.4	59.02	71	84.24	89.22	87
■ In-vehicle (>= -85dBm)	95.5	95	86.97	97.52	88.55	97.85	53.01	87.16	96	95	100	94
□ Out door- in city (>= -95dBm)	98.73	100	98.84	99.96	97	100	99.45	97.95	100	100	100	100

(3)   Critical Analysis

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

- Blocked Call Rate benchmark is not met by Idea & Videocon in Cochin, Idea in Trivendum and Airtel & Vodafone in Calicut.
- Dropped Call Rate benchmark is not met by Airtel in Trivendum & Calicut and BSNL in Cochin.
- "%age of Good Quality connections" parameter benchmark is not met by Airtel & Idea in any of the cities. Similar results were found for Aircel (Trivendrum), BSNL (Cochin), Tata GSM (Trivendum & Calicut), Uninor (Cochin & Calicut) and Vodafone (Cochin).

(E) Independent Drive Test

(1) Sample Coverage

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

DRIVE TEST LOCATIONS

Trivendrum

Low Dense: Kovalam, Chakkai, Shangumugham, Airport, Attukulangara, Kinfrapark, Enjackal, Valiyuthura
Medium Dense: Medical College, Kazhakkoottam, Sreekaryam, Poojappura, Pattom, Kesavadasapuram
High Dense: Vellayambalam, Thampanoor, Secratriate, Kowdiyar, PMG Technopark

Calicut

Low Dense: Ramanattukkara, Vaidyaharngadi, Ayyikkarappadi, Kottappuram, Pulikkal, Airport, Vellimadukunnu, Moozhikkal, Karanthur, Kunnamangalam, Chathamangalam, REC Engg College
Medium Dense: Arayidathupalam, Mankavu, Meenchanda, Nallalam, Cheruvannur, Feroke, Ramanattukkara, Malaprambu, Paroppady, Vellimadukunnu, Thondayad, Chevayur, Medical college
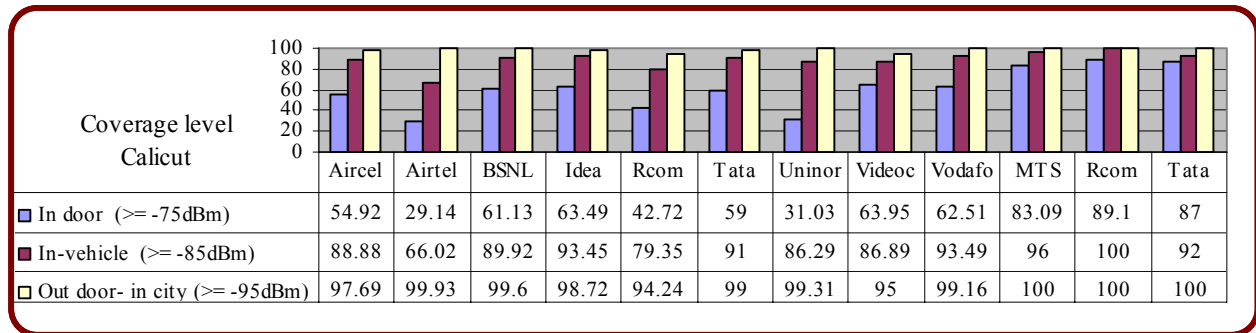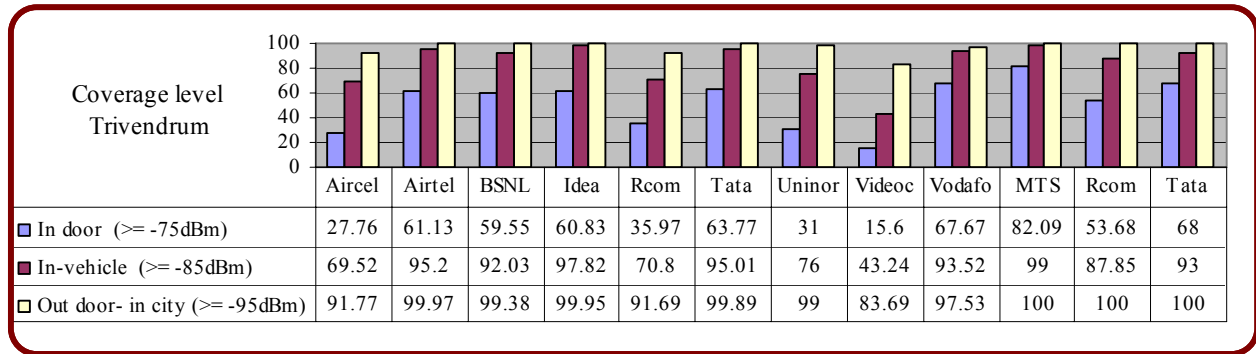**High Dense:** Westhill, Nadakkavu, Eranjipalam, Arayidathupalam, Mavoorroad, Palayam, Railway Station, Kuttichira Beach, Jafferkhan colony

2) Performance (for the respective cities)

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators									CDMA Operators		
1.1	Call Attempts	Trivendrum	151	171	162	189	223	179	91	215	137	186	188	111
		Calicut	162	118	112	139	232	122	109	97	96	152	128	102
1.2	Blocked Call Rate (<=3%)	Trivendrum	9.27%	1.17%	0.00%	1.59%	12.56%	1.68%	1.10%	10.24%	2.19%	1.61%	0.00%	0.00%
		Calicut	1.23%	5.93%	0.00%	9.35%	0.00%	3.28%	0.00%	2.06%	2.08%	0.00%	0.00%	0.00%
1.3	Dropped Call Rate (<=2%)	Trivendrum	7.28%	1.17%	0.62%	1.06%	5.38%	0.56%	2.19%	7.90%	0.73%	1.61%	0.53%	0.00%
		Calicut	0.61%	0.85%	0.00%	1.44%	2.16%	1.64%	0.00%	2.06%	1.04%	0.65%	0.78%	0.00%
1.4	Percentage of connections with good voice quality (=>95%)													
	(i) 0-4 (w/o frequency hopping)	Trivendrum										99.75	97.45	98.92
		Calicut										99.87	98.03	98.18
	(ii) 0-5 (with frequency hopping)	Trivendrum	90.56	94.55	93.91	78.65	95.07	90.45	95.5	80.21	95.03			
		Calicut	96.55	88.1	95	91.8	96.39	92.09	91	92.48	93.6			
1.5	Service Coverage													
	In door (>= -75dBm)	Trivendrum	27.76	61.13	59.55	60.83	35.97	63.77	31	15.6	67.67	82.09	53.68	68
		Calicut	54.92	29.14	61.13	63.49	42.72	59	31.03	63.95	62.51	83.09	89.1	87
	In-vehicle (>= -85dBm)	Trivendrum	69.52	95.2	92.03	97.82	70.8	95.01	76	43.24	93.52	99	87.85	93
		Calicut	88.88	66.02	89.92	93.45	79.35	91	86.29	86.89	93.49	96	100	92
	Out door- in city (>= -95dBm)	Trivendrum	91.77	99.97	99.38	99.95	91.69	99.89	99	83.69	97.53	100	100	100
		Calicut	97.69	99.93	99.6	98.72	94.24	99	99.31	95	99.16	100	100	100
1.6	Call Setup Success Rate (>=95%)	Trivendrum	90.73%	98.83%	100.00%	98.41%	87.44%	98.32%	98.90%	89.76%	97.81%	98.39%	100.00%	100.00%
		Calicut	98.77%	94.07%	100.00%	90.65%	100.00%	96.72%	100.00%	97.94%	97.92%	100.00%	100.00%	100.00%

Graphical Representation

Coverage level Trivendrum	Aircel	Airtel	BSNL	Idea	Rcom	Tata	Uninor	Videoc	Vodafo	MTS	Rcom	Tata
In door (>= -75dBm)	27.76	61.13	59.55	60.83	35.97	63.77	31	15.6	67.67	82.09	53.68	68
In-vehicle (>= -85dBm)	69.52	95.2	92.03	97.82	70.8	95.01	76	43.24	93.52	99	87.85	93
Out door- in city (>= -95dBm)	91.77	99.97	99.38	99.95	91.69	99.89	99	83.69	97.53	100	100	100

Coverage level Calicut	Aircel	Airtel	BSNL	Idea	Rcom	Tata	Uninor	Videoc	Vodafo	MTS	Rcom	Tata
In door (>= -75dBm)	54.92	29.14	61.13	63.49	42.72	59	31.03	63.95	62.51	83.09	89.1	87
In-vehicle (>= -85dBm)	88.88	66.02	89.92	93.45	79.35	91	86.29	86.89	93.49	96	100	92
Out door- in city (>= -95dBm)	97.69	99.93	99.6	98.72	94.24	99	99.31	95	99.16	100	100	100

(3)   Critical Analysis

- Blocked Call Rate benchmark is not met by Aircel, Reliance GSM & Videocon in Trivendurm and Airtel, Idea & Tata GSM in Calicut.

- Dropped Call Rate benchmark is not met by Aircel, Reliance GSM, Uninor & Videocon in Trivendurm and Reliance GSM & Videocon in Calicut.

- "%age of Good Quality connections" parameter benchmark is not met by Airtel, Idea, Tata GSM & Videocon in any of the cities. Similar results were found for Aircel (Trivendrum), BSNL (Trivendum), Uninor (Calicut) and Vodafone (Calicut).

- CSSR benchmark is not met by Aircel, Reliance GSM & Videocon in Trivendurm and Airtel & Idea in Calicut.

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(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 by and large satisfactory for **Network Parameters**. However, the benchmark of <=5% for "worst affected cells >3% TCH drop" is not met by Tata GSM (month audit), Uninor (both live & month audit) and Videocon (live audit). TCH congestion was found in case of Vodafone in live data audit.

Under **Customer Service Quality Parameter** "operator answered calls (voice-to-voice) within 60 seconds" parameter, it is found that Aircel & Tata CDMA are not meeting the benchmark in live audit. Similar result was found in case of month audit for Aircel, Airtel, Uninor & Reliance CDMA.Apart from this, the "accessibility of call centre" parameter benchmark is not met by Tata CDMA (live audit), Aircel (month audit) and Uninor.

Regarding **Metering/Billing Credibility** issues, Aircel, Airtel, BSNL & Videocon show below benchmark value for Pre-paid connections. Similar results are found for Airtel & Tata-CDMA for post-paid connections.

During **Drive Tests (independent)**, Blocked Call Rate benchmark is not met by Aircel, Reliance GSM & Videocon in Trivendurm and Airtel, Idea & Tata GSM in Calicut. Dropped Call Rate benchmark is not met by Aircel, Reliance GSM, Uninor & Videocon in Trivendurm and Reliance GSM & Videocon in Calicut. The parameter "%age of Good Quality connections" benchmark is not met by Airtel, Idea, Tata GSM & Videocon in any of the cities. Similar results were found for Aircel (Trivendrum), BSNL (Trivendum), Uninor (Calicut) and Vodafone (Calicut). CSSR benchmark is not met by Aircel, Reliance GSM & Videocon in Trivendurm and Airtel & Idea in Calicut.

III.   Basic Telephone Service (Wireline) Providers
……...Audit not done for this quarter

IV.   Broadband Service Providers
……...Audit not done for this quarter