

**REPORT**  
**ON**  
**AUDIT & ASSESSMENT OF QUALITY OF SERVICE**  
**OF**  
**CELLULAR MOBILE TELEPHONE SERVICE**  
**FOR**  
**SOUTH ZONE – TAMILNADU CIRCLE**

***Report Period: Jan 2011 – March 2011***

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*- 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 Tamilnadu 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 Tamilnadu Circle in 1<sup>st</sup> 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 Tamilnadu 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
<b>GSM Operators</b>			
1	Aircel Ltd	Feb-2011	1900-2000 Hrs
2	Airtel Ltd	Jan-2011	1900-2000 Hrs
3	BSNL	Jan-2011	1900-2000 Hrs
4	Etisalat	Jan-2011	1900-2000 Hrs
5	Idea	Jan-2011	1900-2000 Hrs
6	Reliance Communication (GSM)	Jan-2011	1900-2000 Hrs
7	Tata Communications (GSM)	Jan-2011	1900-2000 Hrs
8	Uninor	Jan-2011	1900-2000 Hrs
9	Videocon	Jan-2011	1900-2000 Hrs
10	Vodafone	Jan-2011	1900-2000 Hrs
<b>CDMA Operators</b>			
11	MTS (CDMA)	Jan-2011	1900-2000 Hrs
12	Reliance Communication (CDMA)	Jan-2011	1900-2000 Hrs
13	Tata Communications (CDMA)	Jan-2011	1900-2000 Hrs

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

### (A) Cellular Mobile Telephone Services

3 days Live Data Audit		Bench- mark	Aircel	Airtel	BSNL	Etisala t	Idea	Rcom GSM	Tata GSM	Unino r	Videoc on	Vodaf one	MTS	Rcom CDM A	Tata CDM A
S/ N	Name of Parameter		GSM Operators										CDMA Operators		
1	<b>Connection Establishment (Accessibility)</b>														
	a) CSSR (Call Setup Success Rate)	>=95%	98.90 %	98.66 %	98.82 %	99.70%	99.19 %	99.72 %	99.50 %	99.47 %	98.38 %	98.38 %	99.01 %	99.53 %	99.60 %
	b) SDCCH/PAGING congestion	<=1%	0.57%	0.14%	0.11%	0.00%	0.04%	0.04%	0.04%	0.01%	0.03%	0.13%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.79%	0.39%	0.46%	0.00%	0.15%	0.04%	0.04%	0.00%	0.23%	1.06%	0.00%	0.30%	0.00%
2	<b>Connection maintenance (retainability)</b>														
	a) CDR	<=2%	0.45%	0.87%	1.04%	0.27%	0.78%	0.33%	0.42%	0.38%	1.37%	0.72%	1.00%	0.51%	0.09%
	b) Worst affected cells>3% TCH drop	<=5%	2.21%	1.85%	2.72%	0.04%	6.30%	2.30%	3.69%	0.24%	7.94%	3.63%	1.36%	0.77%	0.00%
	c) Good voice quality	>=95%	96.03 %	96.85 %	97.90 %	98.70%	98.58 %	97.14 %	98.58 %	98.93 %	97.72 %	97.05 %	100.00 %		
3	<b>No of POIs not meeting benchmark</b>	<=0.5%	0	0	0	0	0	0	0	0	0	0	0	NR	0
4	<b>Response time to customers for assistance</b>														
	a) Accessibility of call centre/Customer Care	>=95%	97.00 %	96.00 %	92.23 %	99.00%	99.37 %	100%	97%	97%	96%	73.18 %	99.41 %	100.00 %	NR
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	82.00 %	88.00 %	71.00 %	98.00%	14.97 %	96.91 %	97.00 %	77.00 %	83.74 %	83.78 %	85.88 %	95.35 %	NR

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 Idea & Videocon not meeting the benchmark for “Worst affected cells>3% TCH drop” with the value of 6.30% & 9.74% respectively. Network Parameter “Good voice quality” for RCOM CDMA & TATA CDMA are not system generated.

Performance related to customer care data is not found to be satisfactory for most of the operators especially for the parameter “calls answered by operators (voice-to-voice)”. BSNL & Vodafone is having a below benchmark value for “accessibility of call centre” parameter too. Data has not been received from Tata-CDMA for Customer care quality parameters.



**Month data assessment**

<b>One Month Data Audit</b>		<b>Bench- mark</b>	<b>Airce l</b>	<b>Airtel</b>	<b>BSNL</b>	<b>Etisala t</b>	<b>Idea</b>	<b>Rcom GSM</b>	<b>Tata GSM</b>	<b>Unino r</b>	<b>Videoc on</b>	<b>Vodaf one</b>	<b>MTS</b>	<b>Rcom CDM A</b>	<b>Tata CDM A</b>
<b>S/ N</b>	<b>Name of Parameter</b>		<b>GSM Operators</b>										<b>CDMA Operators</b>		
<b>(A)</b>	<b>Network Service Quality Parameter</b>														
<b>1</b>	<b>Network Availability</b>														
	a) BTS Accumulated Downtime	<=2%	0.00 %	0.06%	0.39%	0.00%	0.01%	0.03%	0.02%	0.00%	0.07%	0.02%	0.05%	0.06%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	0.00 %	0.25%	1.44%	0.00%	0.00%	0.00%	0.00%	0.00%	0.14%	0.00%	0.00%	0.00%	0.00%
<b>2</b>	<b>Connection Establishment (Accessibility)</b>														
	a) CSSR (Call Setup Success Rate)	>=95%	98.95 %	98.57 %	98.84 %	99.60 %	99.22 %	99.73 %	99.54 %	99.43 %	98.31 %	98.06 %	99.00 %	99.56 %	99.60 %
	b) SDCCH/PAGING congestion	<=1%	0.44 %	0.19%	0.09%	0.01%	0.20%	0.04%	0.05%	0.02%	0.48%	0.22%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.75 %	0.29%	0.69%	0.00%	0.12%	0.04%	0.06%	0.00%	0.25%	1.32%	0.00%	0.24%	0.00%
<b>3</b>	<b>Connection maintenance (retainability)</b>														
	a) CDR	<=2%	0.46 %	0.89%	0.97%	0.37%	0.79%	0.32%	0.41%	0.39%	1.25%	0.79%	0.95%	0.56%	0.10%
	b) Worst affected cells>3% TCH drop	<=5%	2.19 %	1.88%	3.10%	0.05%	6.59%	2.78%	3.84%	0.22%	3.44%	2.28%	1.84%	0.84%	0.00%
	c) Good voice quality	>=95%	96.07 %	96.94 %	97.74 %	98.70 %	98.52 %	98.92 %	98.64 %	98.93 %	97.77 %	96.99 %	100.00 %		
<b>4</b>	<b>No of POIs not meeting benchmark</b>	<=0.5%	0	0	0	0	0	0	0	0	0	0	0	NR	0
<b>(B)</b>	<b>Customer Service Quality Parameters</b>														
<b>5</b>	<b>Metering/billing credibility-Post paid</b>	<= 0.1%	0.07 %	0.14%	0.01%	NA	0.05%	0.10%	0.02%	NA	NA	0.10%	NA	0.05%	0.22%
<b>6</b>	<b>Metering /billing credibility-Pre paid</b>	<= 0.1%	0.05 %	3.81%	0.25%	0.00%	0.01%	0.10%	0.00%	0.01%	0.25%	0.10%	0.04%	0.10%	0.02%
<b>7</b>	<b>Resolution of billing/ charging complaints</b>	100% within 4 weeks	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	a) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	100%	NR	100%	NR	100%	100%	100%	NR	100%	100%	100%	100%	100%
<b>8</b>	<b>Response time to customers for assistance</b>														
	a) Accessibility of call centre/Customer Care	>=95%	97.00 %	95.55 %	95.01 %	99.00 %	99.08 %	100.00 %	93.00 %	97.00 %	95.04 %	73.86 %	99.51 %	100.00 %	96.00 %

	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	50.00 %	46.00 %	71.00 %	95.00 %	35.00 %	87.79 %	93.00 %	89.00 %	71.25 %	89.78 %	87.16 %	87.30 %	98.00 %
<b>9</b>	<b>Termination/closure of service</b>	<=7days	100%	100%	100%	NA	100%	100%	NR	NA	NA	0%	NA	100%	100%
<b>10</b>	<b>Time taken for refunds of deposits after closures.</b>	100% within 60 days	100%	100%	100%	NA	100%	100%	NR	NA	NA	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 Idea not meeting the benchmark for “Worst affected cells>3% TCH drop” with the value of 6.59%. Network Parameter “Good voice quality” for RCOM CDMA & TATA CDMA are not system generated.

Performance related to customer care data is not found to be satisfactory for most of the operators especially for the parameter “calls answered by operators (voice-to-voice)”, with only Etisalat, Tata GSM & Tata CDMA meeting the 90% benchmark. A below benchmark performance is observed in case of Tata GSM (93%) and Vodafone (73.86%) for “accessibility of call centre” parameter. 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 Tamilnadu 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 Coimbatore, Madurai and Cuddalore with Pondicherry. 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%)	Coimbatore	0	2.08	0	0	0	1.36	0	3.43	0.94	0	0	0	
		Madurai	0	0	3.31	0	0	0	0	0	2.37	1.34	0	0	0
		Cuddalore	0	0	1.21	2.76	0	0	0	0	1.27	4.62	0	0	0
1.2	Dropped Call Rate (<=2%)	Coimbatore	0	0	1.43	0	0.68	0.68	0.00	1.14	0	0	0	0	
		Madurai	0	0	1.99	0	0.58	0	0	0	1.18	0.67	0	1.10	0.53
		Cuddalore	0.86	0	0	0.69	0	0	0	0	1.90	2.31	0	0.51	0
1.3	(i) 0-4 (w/o frequency hopping)	Coimbatore										99.19	96.2	98.82	
		Madurai										99.44	98	99.97	
		Cuddalore										97.76	98.31	98.88	
	(ii) 0-5 ( with frequency hopping)	Coimbatore	97.33	93.03	95.89	95.57	97.93	95.59	99.22	95.18	88.67				
		Madurai	97.17	94.34	96.2	96.1	95	96.21	99.66	95.33	92				
		Cuddalore	96.23	92	96.15	94.57	96.9	97.36	99.69	95.96	91.6				
1.4	Call Setup Success Rate (>=95%)	Coimbatore	100	97.92	100	100	100	99	100	97	99	100	100	100	
		Madurai	100	100	95.98	100	100	100	100	100	98	98.66	100	100	100
		Cuddalore	100	100	99.27	97.18	100	100	100	98.31	98.73	97.69	100	100	100

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

- Blocked Call Rate benchmark is not met by BSNL in Madurai (3.31%) & Videocon in Coimbatore (3.43%).
- Vodafone is meeting benchmarks except Blocked Call Rate & Dropped Call Rate for Cuddalore (4.2% & 2.31% respectively).

**Independent Drive Test**

The Independent Drive Test was conducted at Tamilnadu in Coimbatore and Madurai. 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%)	Coimbatore	0	0.81	0.79	0	0	0.76	1.79	3.23	0	0	0.62	0
		Madurai	0.75	3.91	0	0	0	3.97	0.53	4.67	0	0	0.56	0
1.2	Dropped Call Rate (<=2%)	Coimbatore	0	3.23	0.79	1.39	0	0	0.60	0	0	0.54	0	0
		Madurai	0	0.56	3.82	0	0	1.32	0.53	0.67	1.60	0	0	0
1.3	Percentage of connections with good voice quality (=>95%)													
	(i) 0-4 (w/o frequency hopping)	Coimbatore										99.34	95.88	99.25
		Madurai										99.56	98.33	99.97
	(ii) 0-5 ( with frequency hopping)	Coimbatore	93	90.57	94.73	95.51	98.24	96.54	96.48	93	96			
Madurai		97.13	78.67	95.87	93.65	96.87	92.1	97.65	96.67	92.23				
1.4	Call Setup Success Rate (>=95%)	Coimbatore	100	95.67	99.21	100	100	100	98.21	96	100	100	99.38	100
		Madurai	99	96.08	100	94.48	100	96.2	99.58	97.53	98.4	100	99.44	100

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

- Good Voice Quality parameter is not met by Aircel in Coimbatore (93%) and Vodafone in Madurai (92.23%).
- Airtel is deviating the benchmarks for Dropped Call Rate & Good Voice Quality in Coimbatore (3.23% & 90.57% respectively) and Blocked Call Rate & Good Voice Quality in Madurai (3.91% & 78.67% respectively).
- BSNL is meeting all the benchmarks except showing deviation in Dropped Call Rate in Madurai (3.82%) and Good Voice Quality in Coimbatore (94.73%).
- Idea is meeting all the benchmarks except for Good Voice Quality & CSSR in Madurai (93.65% and 94.48% respectively).
- Tata (GSM) is meeting all the benchmarks except for Blocked Call Rate & Good Voice Quality in Madurai (3.97% and 92.1% respectively).
- Videocon is meeting all the benchmarks except for Blocked Call Rate in Coimbatore & Madurai (3.23% & 4.67% respectively) and Good Voice Quality in Coimbatore (93%).

**III. AUDIT- PMR Verification****I. Cellular Mobile Telephone Service**

PMR		Bench- mark	Audit	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
S/N	Name of Parameter			GSM Operators										CDMA Operators		
(A)	<b>Network Service Quality Parameter</b>															
1	<b>Network Availability</b>															
	BTS Accumulated Downtime	<=2%	Reported	0.21%	0.10%	0.39%	0.13%	0.01%	0.04%	0.06%	0.04%	0.38%	0.03%	0.14%	0.05%	0.03%
			Verified	0.21%	0.10%	0.39%	0.13%	0.01%	0.04%	0.06%	0.04%	0.38%	0.03%	0.14%	0.05%	0.03%
	Worst affected BTSs due to downtime	<=2%	Reported	0.09%	0.11%	1.11%	0.00%	0.00%	0.00%	0.08%	0.03%	0.01%	0.03%	0.00%	0.00%	0.00%
Verified			0.09%	0.11%	1.11%	0.00%	0.00%	0.00%	0.08%	0.03%	0.01%	0.03%	0.00%	0.00%	0.00%	
2	<b>Connection Establishment (Accessibility)</b>															
	CSSR (Call Setup Success Rate)	>=95%	Reported	97.54%	98.98%	97.05%	99.22%	98.81%	99.60%	99.30%	99.44%	99.45%	98.87%	98.52%	99.67%	99.59%
			Verified	97.54%	98.98%	97.05%	99.22%	98.81%	99.60%	99.30%	99.44%	99.45%	98.87%	98.52%	99.67%	99.59%
	SDCCH/PAGING congestion	<=1%	Reported	0.43%	0.27%	0.39%	0.14%	0.03%	0.02%	0.08%	0.02%	0.22%	0.18%	0.00%	0.00%	0.00%
			Verified	0.43%	0.27%	0.39%	0.14%	0.03%	0.02%	0.08%	0.02%	0.22%	0.18%	0.00%	0.00%	0.00%
	TCH congestion	<=2%	Reported	0.49%	0.37%	0.84%	0.00%	0.12%	0.12%	0.08%	0.03%	0.02%	0.64%	0.00%	0.04%	0.01%
Verified			0.49%	0.37%	0.84%	0.00%	0.12%	0.12%	0.08%	0.03%	0.02%	0.64%	0.00%	0.04%	0.01%	
3	<b>Connection maintenance (retainability)</b>															
	CDR	<=2%	Reported	0.51%	0.95%	0.75%	0.68%	0.83%	0.46%	0.44%	0.37%	1.00%	0.81%	0.30%	0.56%	0.47%
			Verified	0.51%	0.95%	0.75%	0.68%	0.83%	0.46%	0.44%	0.37%	1.00%	0.81%	0.30%	0.56%	0.47%
	Worst affected cells>3% TCH drop	<=5%	Reported	1.29%	2.04%	3.15%	0.20%	7.97%	2.11%	1.38%	4.90%	11.92%	2.48%	2.49%	1.20%	0.16%
			Verified	1.29%	2.04%	3.15%	0.20%	7.97%	2.11%	1.38%	4.90%	11.92%	2.48%	2.49%	1.20%	0.16%
	Good voice quality	>=95%	Reported	96.55%	96.60%	99.00%	98.52%	98.12%	98.94%	98.56%	99.18%	97.61%	97.10%	99.38%	99.04%	99.85%
Verified			96.55%	96.60%	99.00%	98.52%	98.12%	98.94%	98.56%	99.18%	97.61%	97.10%	99.38%	99.04%	99.85%	
4	<b>No of POIs not meeting benchmark</b>	<=0.5%	Reported	0	0	0	0	0	0	0	6	1	0	0	0	0
			Verified	0	0	0	0	0	0	0	0	6	1	0	0	0
(B)	<b>Customer Service Quality Parameters</b>															
5	<b>Metering/billing credibility-Post paid</b>	<= 0.1%	Reported	0.04%	0.04%	0.00%	NA	0.28%	0.07%	0.07%	NA	NA	0.04%	NA	0.08%	0.01%
			Verified	0.04%	0.04%	0.00%	NA	0.28%	0.07%	0.07%	NA	NA	0.04%	NA	0.08%	0.01%

6	Metering /billing credibility-Pre paid	<= 0.1%	Reported	0.12%	0.08%	0.00%	0.00%	0.00%	0.05%	0.002%	0.12%	0.00%	0.04%	0.03%	0.02%	0.07%		
			Verified	0.12%	0.08%	0.00%	0.00%	0.00%	0.05%	0.002%	0.12%	0.00%	0.04%	0.03%	0.02%	0.07%		
7	Resolution of billing/ charging complaints	100% within 4 weeks	Reported	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	98.29%	100.00%	100.00%	100.00%	100.00%	100.00%		
			Verified	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	98.29%	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		Reported															
			Verified															
	Accessibility of call centre/Customer Care	>=95%	Reported	100.00%	100.00%	100.00%	99.00%	99.00%	100.00%	100.00%	88.10%	100.00%	100.00%	99.00%	100.00%	97.00%		
			Verified	100.00%	100.00%	100.00%	99.00%	99.00%	100.00%	100.00%	88.10%	100.00%	100.00%	99.00%	100.00%	97.00%		
% call answered by operators(voice to voice) within 60 sec.	>=90%	Reported	49.23%	84.70%	95.00%	99.43%	93.20%	94.00%	80.47%	97.29%	90.00%	85.84%	80.71%	90.00%	94.01%			
		Verified	49.23%	84.70%	95.00%	99.43%	93.20%	94.00%	80.47%	97.29%	90.00%	85.84%	80.71%	90.00%	94.01%			
9	Termination/closure of service		Reported															
			No.of requests for Termination / Closure of service complied within 7 days during the quarter	<=7days	Reported	100.00%	100.00%	100.00%	NA	97.00%	100.00%	96.00%	NA	NA	100.00%	NA	100.00%	100.00%
					Verified	100.00%	100.00%	100.00%	NA	97.00%	100.00%	96.00%	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%	98.00%		
			Verified	100.00%	100.00%	100.00%	NA	100.00%	100.00%	NA	NA	NA	100.00%	NA	100.00%	98.00%		

### Critical Analysis (PMR Verification):

- The figures proved by all the operators match the figures obtained on verification.
- Only Idea & Videocon are not meeting the benchmark for the parameter "Worst affected cells>3% TCH drop" with high margins.
- In case of POI congestion, Videocon (1%) and Uninor (6%) are not meeting the benchmark with high margins.
- Idea is not meeting the benchmark for "Metering/Billing Credibility-Postpaid", while Aircel & Uninor are not meeting the benchmark for "Metering/Billing Credibility-Prepaid".
- Uninor is not meeting the benchmark for "Resolution of billing/ charging complaints within 4 weeks".
- Accessibility of Uninor's Customer Care Centre is very poor (88.1%).
- "% call answered by operators(voice to voice) within 60 sec." benchmark is not met by Aircel, Airtel, Tata-GSM, Vodafone & MTS.
- Idea & Tata-GSM don't meet the 7-days' benchmark for "Resolution of complaints". 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	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA	
			GSM Operators										CDMA Operators			
<b>A</b>	<b>Network Service Quality Parameter</b>															
<b>1</b>	<b>Connection Establishment (Accessibility)</b>															
	a) CSSR	>=95%	98.90%	98.66%	98.82%	99.70%	99.19%	99.72%	99.50%	99.47%	98.38%	98.38%	99.01%	99.53%	99.60%	
	b) SDCCH/PAGING congestion	<=1%	0.57%	0.14%	0.11%	0.00%	0.04%	0.04%	0.04%	0.01%	0.03%	0.13%	0.00%	0.00%	0.00%	
	c) TCH congestion	<=2%	0.79%	0.39%	0.46%	0.00%	0.15%	0.04%	0.04%	0.00%	0.23%	1.06%	0.00%	0.30%	0.00%	
<b>2</b>	<b>Connection maintenance</b>															
	a) CDR	<=2%	0.45%	0.87%	1.04%	0.27%	0.78%	0.33%	0.42%	0.38%	1.37%	0.72%	1.00%	0.51%	0.09%	
	b) Cells having > 3% TCH drop	<=5%	2.21%	1.85%	2.72%	0.04%	6.30%	2.30%	3.69%	0.24%	7.94%	3.63%	1.36%	0.77%	0.00%	
	c) Good voice quality	>=95%	96.03%	96.85%	97.90%	98.70%	98.58%	97.14%	98.58%	98.93%	97.72%	97.05%	100.00%			
	d) No. of cells > 3% TCH drop		388	458	383	5	548	191	335	18	670	699	17	8	0	
	e) Total no. of cells in the network		17,616	24,772	14,108	117	8,707	8,319	9,074	7,517	8,378	19,237	3,252	347	2,188	
<b>3</b>	<b>No of POIs not meeting benchmark</b>	<=0.5%	0	0	0	0	0	0	0	0	0	0	0	NR	0	
	a) Name of POI not meeting the benchmark															
	b) Total No. of circuits on POI		133,943	252,492	74,954	2,372	26,893	49,078	8,188	16,807	29,655	238,439	15,630	NR	16,720	
	c) Avg No. of call attempts on POI		109,934	42,594	56,176	57	7,057	592,471	13,481	2,975	6,486	119,939	6,237	NR	13,429	
	d) Avg traffic served on POI (Erlang)		1,697	1,701	2,184	1	180	21,966	264	89	154	2,233	182	NR	244	
	e) Total number of working POI Service Area wise		41	208	22	51	74	97	12	71	78	64	56	NR	33	
	f) Equipped Capacity of Network in respect of Traffic in erlang		383,543	420,613	224,217	866	61,326	65,267	118,142	83,767	56,354	253,432	14,233	NR	83,662	
	g) Total traffic handled in TCBH in erlang		299,885	294,459	132,256	23	18,980	45,316	26,607	9,282	20,101	248,781	6,975	NR	9,368	
<b>(B)</b>	<b>Customer Service Quality Parameters</b>															



<b>4</b>	<b>Response time to customers for assistance</b>														
	a) Accessibility of call centre	>=95%	97.00%	96.00 %	92.23 %	99.00 %	99.37 %	100.00 %	97.00 %	97.00 %	96.00 %	73.18 %	99.41 %	100.00 %	NR
	b) % of call answered by operators(voice to voice) within 60 sec	>=90%	82.00%	88.00 %	71.00 %	98.00 %	14.97 %	96.91 %	97.00 %	77.00 %	83.74 %	83.78 %	85.88 %	95.35%	NR
	c) No. of call attempts to call centre / customer care nos. during TCBH (Avg)		106,744	74,631	8,782	53	461	77,425	75	7,390	3,723	217,906	1,370	181,853	NR
	d) No. of calls connected and answered successfully to call centre / customer care nos. during TCBH (Avg)		87,978	66,043	6,272	52	69	67,973	73	5,676	3,574	182,551	1,180	158,791	NR

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 Tamilnadu Service Area are as given below:-

- **Call setup success rate (benchmark  $\geq 95\%$ ):** All operators are meeting the benchmark with values lying between 98.38% and 99.72%.
- **SDCCH/PAGING Channel congestion (benchmark  $\leq 1\%$ ):** All operators are meeting the benchmark with values lying between 0% and 0.57%.  
*Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.*
- **TCH congestion (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark with values lying between 0% and 1.06%.
- **Call drop rate (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark with values lying between 0.09% and 1.37%.
- **Cell exceeding 3% TCH drop (benchmark  $\leq 5\%$ ):** Except for Idea & Videocon with a value of 6.30% & 7.94% respectively, rest of the operators are satisfying the benchmark with value in between 0% and 3.69%.
- **Connections with good voice quality (benchmark  $\geq 95\%$ ):** CDMA service providers have declared that the parameter is not system generated. Rest of the GSM operators are meeting the benchmark with values lying between 96.03% and 100%.
- **POI Congestion (benchmark  $\leq 0.5\%$ ):** 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 BSNL & Vodafone, all operators are meeting the benchmark with values lying between 96% to 100%.
- **%age of call answered by operator (Voice to voice) (benchmark  $>90\%$ ): %):** Only Etisalat, Reliance (GSM & CDMA) and Tata GSM.

## (2) Month Data Assessment & Summarized Findings

S/ N	Name of Parameter	Benchma rk	Aircel	Airtel	BSNL	Etisal at	Idea	Rcom GSM	Tata GSM	Unino r	Video con	Vodaf one	MTS	Rcom CDM A	Tata CDM A
			GSM Operators										CDMA Operators		
(A)	<b>Network Service Quality Parameter</b>														
1	<b>Network Availability</b>														
	a) BTS Accumulated Downtime	<=2%	0.00%	0.06%	0.39%	0.00%	0.01%	0.03%	0.02%	0.00%	0.07%	0.02%	0.05%	0.06%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.25%	1.44%	0.00%	0.00%	0.00%	0.00%	0.00%	0.14%	0.00%	0.00%	0.00%	0.00%
	c) Total no. of BTSs in the licensed service area		5,970	8,374	4,789	39	2,938	2,773	3,062	2,518	2,825	6,440	1,084	347	727
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		4,695	3,910	12,604	13	246	526	472	231	1,453	821	363	143	56
	e) No. of BTSs having accumulated downtime of >24 hours in a month		2	21	69	0	0	0	0	0	4	2	0	0	0
2	<b>Connection Establishment (Accessibility)</b>														
	a) CSSR (Call Setup Success Rate)	>=95%	98.95%	98.57%	98.84%	99.60%	99.22%	99.73%	99.54%	99.43%	98.31%	98.06%	99.00%	99.56%	99.60%
	b) SDCCH/PAGING congestion	<=1%	0.44%	0.19%	0.09%	0.01%	0.20%	0.04%	0.05%	0.02%	0.48%	0.22%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.75%	0.29%	0.69%	0.00%	0.12%	0.04%	0.06%	0.00%	0.25%	1.32%	0.00%	0.24%	0.00%
3	<b>Connection maintenance (retainability)</b>														
	a) CDR	<=2%	0.46%	0.89%	0.97%	0.37%	0.79%	0.32%	0.41%	0.39%	1.25%	0.79%	0.95%	0.56%	0.10%
	b) Worst affected cells>3% TCH drop	<=5%	2.19%	1.88%	3.10%	0.05%	6.59%	2.78%	3.84%	0.22%	3.44%	2.28%	1.84%	0.84%	0.00%
	c) Good voice quality	>=95%	96.07%	96.94%	97.74%	98.70%	98.52%	98.92%	98.64%	98.93%	97.77%	96.99%	100.00%		
	d) Total No. of cells exceeding 3% TCH drop (call drop)		385	465	366	6	573	231	349	17	584	438	60	108	0
	e) Total no. of cells in the network		17,616	24,772	14,108	117	8,707	8,319	9,074	7,517	8,378	19,237	3,252	347	2,188

4	<b>No of POIs not meeting benchmark</b>	<=0.5%	0	0	0	0	0	0	0	0	0	0	0	NR	0
	a) Name of POI not meeting the benchmark														
	b) Total No. of call attempts on POI (Avg.)		107,611	40,324	1,257,668	562	6,946	570,398	139,906	2,975	6,459	117,312	5,827	NR	145,764
	c) Total traffic served on POI (Erlang) (Avg.)		1,671	1,613	47,863	1	180	21,258	2,721	89	141	2,235	171	NR	2,527
	d) Total No. of circuits on POI		133,943	252,492	74,954	2,372	26,893	49,078	8,188	16,807	29,655	238,439	15,630	NR	16,720
	e) Total number of working POI Service Area wise		41	208	22	51	74	97	12	71	78	64	56	NR	33
	f) Capacity of POI		120,495	253,585	59,802	1,847	24,999	45,316	7,841	14,445	27,678	238,307	13,842	NR	15,497
5	<b>Network Data</b>														
	a) Equipped Capacity of Network Erlang		383,543	420,613	224,217	866	61,326	65,267	118,142	83,767	56,354	253,432	14,233	NR	83,662
	b) Total traffic in TCBH in erlang (Avg.)		295,172	297,064	132,256	23	18,980	15,712	26,607	8,592	20,101	250,629	6,975	NR	9,368
	c) Total no. of customers served (as per VLR) on last day of the month		8,412,476	8,496,491	1,662,391	2,024	671,292	NR	1,143,883	375,869	543,908	7,133,247	674,762	NR	337,828
(B)	<b>Customer Service Quality Parameters</b>														
5	<b>Metering/billing credibility-Post paid</b>	<= 0.1%	0.07%	0.14%	0.01%	NA	0.05%	0.10%	0.02%	NA	NA	0.10%	NA	0.05%	0.22%
	a) No. of bills issued during the period		420,187	217,032	289,321	NA	15,396	33,722	13,980	NA	NA	181,457	NA	353,878	60,299
	b) No. of bills disputed including billing complaints during the period		298	310	29	NA	7	33	62	NA	NA	180	NA	175	130
6	<b>Metering /billing credibility-Pre paid</b>	<= 0.1%	0.05%	3.81%	0.25%	0.00%	0.01%	0.10%	0.00%	0.01%	0.25%	0.10%	0.04%	0.10%	0.02%
	a) No. of charging / credit / validity complaints during the quarter		7,459	35,161	1,497	0	169	342	6,139	8,700	3,202	9,416	53	378	1,533
	b) Total no. of pre-paid customers at the end of the quarter		15,030,417	9,230,719	5,896,189	12,532	1,186,947	3,477,197	5,269,712	1,209,438	1,274,256	8,439,568	1,344,339	3,746,049	692,826
7	<b>Resolution of billing/ charging complaints</b>	100% within 4 weeks	100%	100%	100%	100%	100%	100.0%	100.0%	100%	100%	100%	100%	100%	100%

	a) No. of billing/(post paid) and charging, credit/validity (pre paid) complaints resolved within 4 weeks during the quarter														
	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter	7,757	35,471	1,526	0	1,071	375	6,201	87	3,147	9,596	4,744	553	1,664	
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter	479	12,704	14	0	176	68	39	NR	3,202	2,128	4	300	1,527	
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter	7,278	22,767	1,512	0	895	307	6,193	NR	0	5,322	49	253	137	
	e) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	100%	NR	100%	NR	100%	100%	100%	NR	100%	100%	100%	100%	
<b>8</b>	<b>Response time to customers for assistance</b>														
	a) Accessibility of call centre/Customer Care	>=95%	97.00%	95.55%	95.01%	99.00%	99.08%	100.00%	93.00%	97.00%	95.04%	73.86%	99.51%	100.00%	96.00%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	50.00%	46.00%	71.00%	95.00%	35.00%	87.79%	93.00%	89.00%	71.25%	89.78%	87.16%	87.30%	98.00%
	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		118,492	168,172	9,619	418	22,880	77,425	91,230	6,362	23,684	58,314	16,803	181,853	136,199
	d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		58,843	77,379	6,833	397	8,015	67,973	84,745	5,666	16,876	52,352	14,646	158,791	133,210
<b>9</b>	<b>Termination/closure of service</b>	<=7days													

	a) Total No. of requests for Termination / Closure of service received during the quarter		1,548	928	4,503	NA	59	629	NR	NA	NA	626	NA	2,128	0
	b) No. of requests for Termination / Closure of service complied within 7 days during the quarter		1,548	928	4,503	NA	59	629	NR	NA	NA	626	NA	2,128	0
<b>10</b>	<b>Time taken for refunds of deposits after closures.</b>	<i>100% within 60 days</i>	100%	100%	100%	NA	100%	100%	NR	NA	NA	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 Tamilnadu Service Area are as given below:-

- **BTS accumulated downtime (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark with values lying between 0% and 0.39%.
- **Worst affected BTSs due to downtime (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark with values lying between 0% and 1.44%.
- **Call setup success rate (benchmark  $\geq 95\%$ ):** All operators are meeting the benchmark with values lying between 98.06% and 99.73%.
- **SDCCH/PAGING Channel congestion (benchmark  $\leq 1\%$ ):** All operators are meeting the benchmark with values lying between 0% and 0.48%.  
*Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.*
- **TCH congestion (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark with values lying between 0% and 1.32%.
- **Call drop rate (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark with values lying between 0.1% and 1.25%.
- **Cell exceeding 3% TCH drop (benchmark  $\leq 5\%$ ):** Except for Idea with a value of 6.59%, all the operators are satisfying the benchmark with value in between 0% and 3.84%.
- **Connections with good voice quality (benchmark  $\geq 95\%$ ):** CDMA service providers have declared that the parameter is not system generated. Rest of the GSM operators are meeting the benchmark with values lying between 96.07% and 98.93%.
- **POI Congestion (benchmark  $\leq 0.5\%$ ):** 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-GSM & Vodafone, all operators are meeting the benchmark with values lying between 95.01% to 100%.
- **%age of call answered by operator (Voice to voice) (benchmark  $>90\%$ ):** Only Etisalat, Tata-GSM & Tata-CDMA are meeting the benchmark with values of 95%, 93% & 98% respectively. Values range from 35% to 89.78% for other operators.
- **Metering and billing credibility-Post paid (benchmark  $\leq 0.1\%$ ):** Except for Airtel & Tata-CDMA with values of 0.14% & 0.22% respectively, all other operators are meeting the benchmark.
- **Metering and billing credibility-Pre paid (benchmark  $\leq 0.1\%$ ):** Except for Airtel, BSNL & Videocon with value of 3.81%, 0.25% & 0.25% respectively, all the operators are meeting the benchmark with values lying between 0% and 0.1%.
- **Resolution of billing/ charging complaints (benchmark 100% within 4 weeks):** All operators are meeting the benchmark.
- **Termination/Closure of service (Benchmark  $\leq 7$  days):** All operators have satisfied the benchmark. Data has not been by BSNL, Etisalat, Tata-GSM, Uninor, Videocon & Tata-CDMA.
- **Time taken for refunds of deposits after closures (benchmark 100% within  $\leq 60$  days):** All operators have satisfied the benchmark.

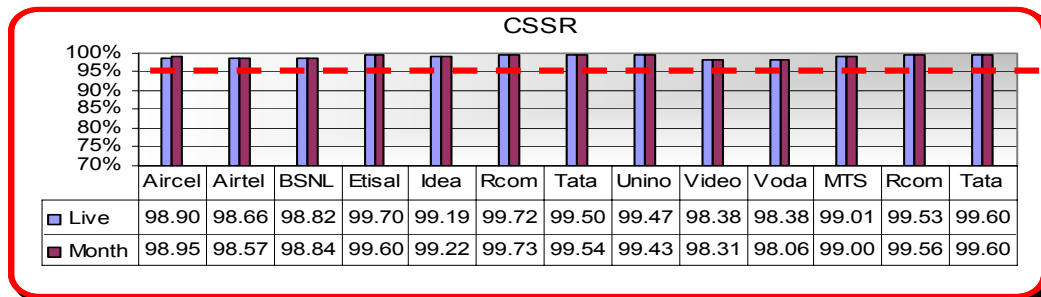
**(1) Sample Coverage**

Switches/BSC/BTS details of operators:

Sl.	Name of Service Provider	No. of MSC	No. of BSC	No. of BTS
<b>GSM Operators</b>				
1	Aircel Ltd	36	61	5970
2	Airtel Ltd	21	86	8374
3	BSNL	16	66	4789
4	Etisalat	1	6	39
5	Idea	2	17	2938
6	Reliance Communication (GSM)	3	11	2939
7	Tata Communications (GSM)	1	18	3062
8	Uninor	2	17	2518
9	Videocon	1	17	2825
10	Vodafone	18	99	6440
<b>CDMA Operators</b>				
11	MTS (CDMA)	1	4	1084
12	Reliance Communication (CDMA)	7	5	1747
13	Tata Communications (CDMA)	2	11	727

**(2) Performance (Graphical Representation)****Comparison between Live measurements and One month data Audit – Cellular Mobile Telephone Services****A) NETWORK PERFORMANCE**

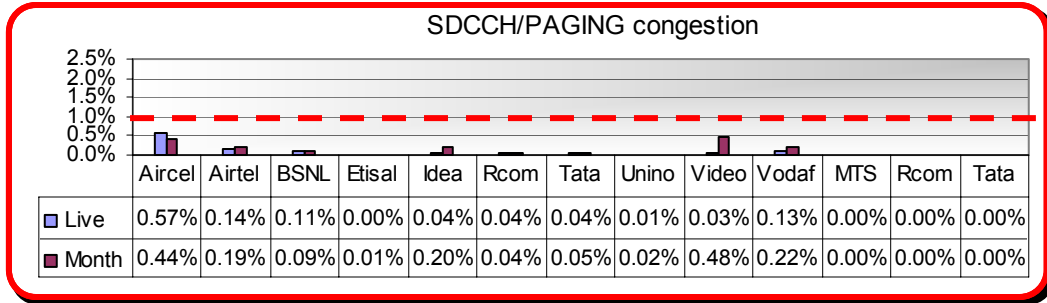
- I. Call setup success rate:** All operators are meeting the TRAI benchmarks ( $\geq 95\%$ ) for both one month data and 3 days live data taken in the month of audit.



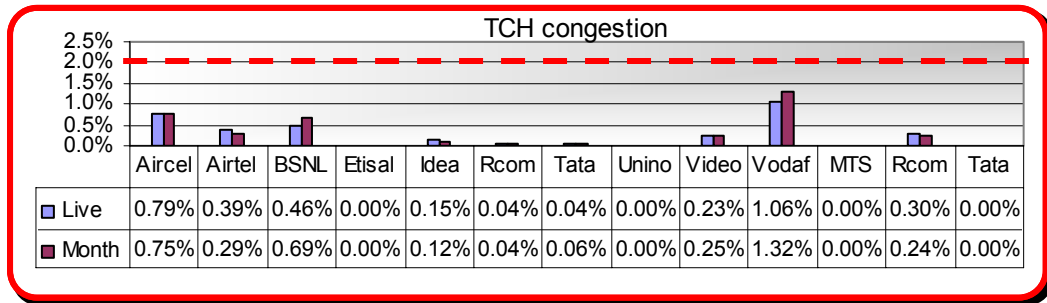


**II. Blocked call rate:**

**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.

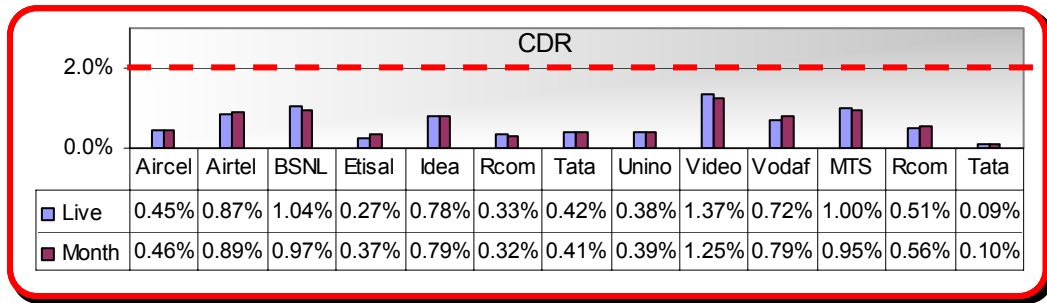


**TCH congestion (%):** All operators are meeting the TRAI benchmarks ( $\leq 2\%$ ) for both one month data and 3 days live data taken in the month of audit.

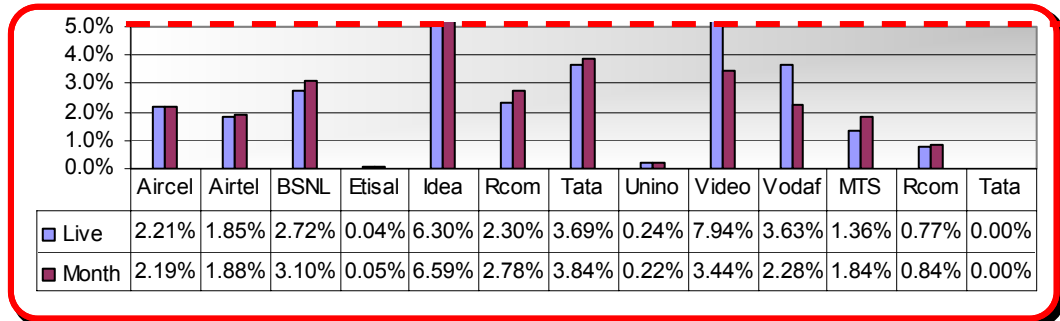


**III. Connection Maintainability (Retainability):**

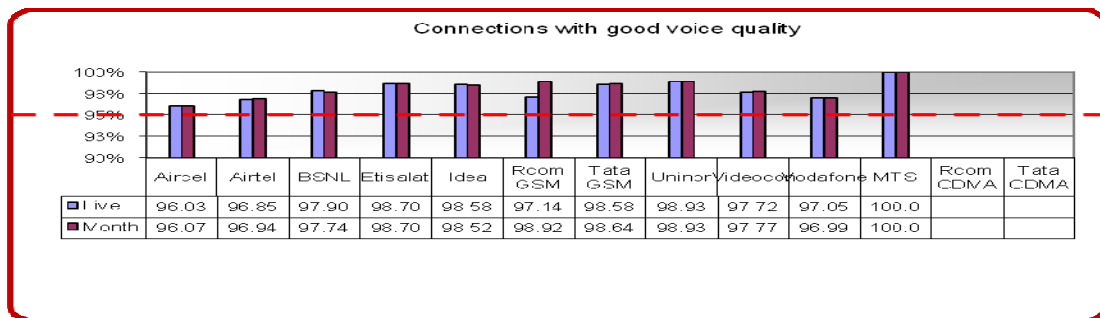
**Call drop rate (%):** All operators are meeting the TRAI benchmarks ( $\leq 2\%$ ) for both one month data and 3 days live data taken in the month of audit.



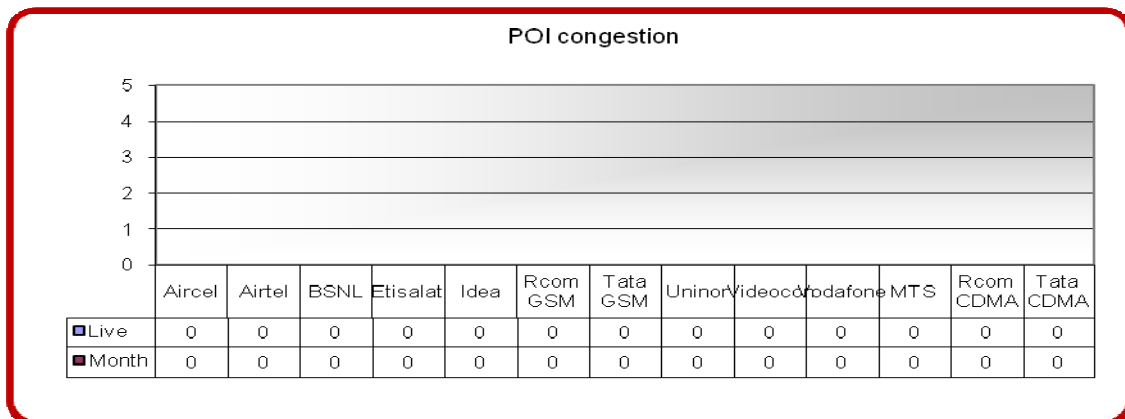
**Worst affected Cell exceeding 3% TCH Drop:** For both live and month data, Idea with a value of 6.30% and 6.59% respectively is found not meeting the benchmark of  $\leq 5\%$ . Videocon is not meeting the benchmark in live data with a value of 7.9%, which is deviating a lot from its month data value of 3.44%. Rest of the operators are meeting the benchmark for both cases.



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



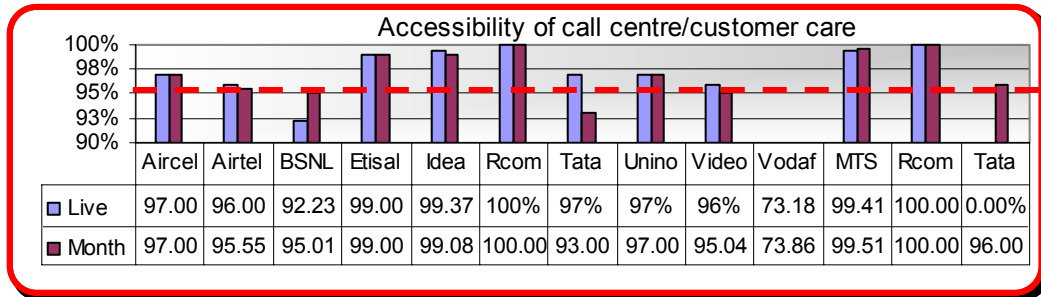
**POI Congestion:** All operators are meeting the TRAI benchmarks ( $\leq 0.5\%$ ) for both one month data and 3 days live data taken in the month of audit.



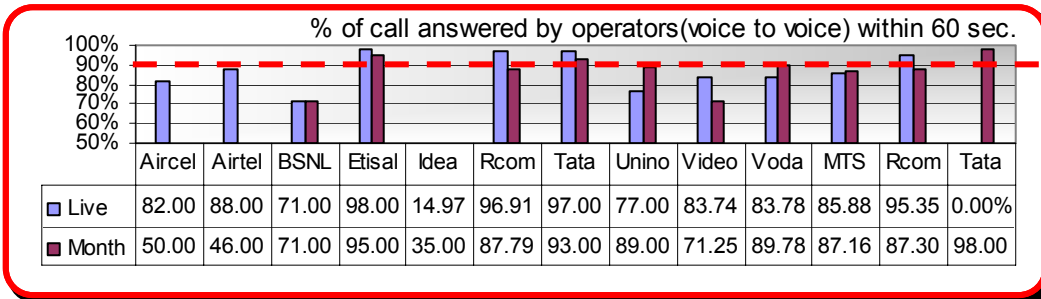
B) CUSTOMER SERVICE QUALITY PARAMETERS

(A) Response time to the customer for assistance:

**Percentage of call answered (Electronically):** All operators are meeting the TRAI benchmarks ( $\geq 95\%$ ) for both one month data and 3 days live data taken in the month of audit except for BSNL in live data audit (92.23%), Tata-GSM in month data audit (93%) and Vodafone for both cases (73.86% for month data audit & 73.18% for live data audit). Data has not been provided by Tata-CDMA for Live data audit.



**Percentage of call answered by operators (Voice to voice) within 60 sec:** For Live data, only Etisalat, Reliance-GSM & CDMA and Tata-GSM are meeting the benchmark. For month data, only Etisalat, Tata-GSM & CDMA are meeting the benchmark. Data has not been provided by Tata-CDMA for Live data audit.



(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” (Videocon), “accessibility of call centre” (BSNL & Tata-GSM) and “%age of calls answered by operator” (Reliance GSM).

**(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)
<b>Total No. of calls</b>	5	7	5	6	13	11	4	8	7	10	5	5	16
<b>Cases resolved with 4 weeks</b>	5	7	5	6	13	11	4	8	7	10	5	5	16
<b>%age of cases resolved</b>	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 Coimbatore & Chennai 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	Videocon	Vodafone	Uninor	MTS	Rcom	Tata
	GSM										CDMA		
1ST HALF (10AM TO 01 PM)	41	43	39	46	44	44	44	45	42	45	48	48	44
2ND HALF (04PM TO 07 PM)	44	38	31	41	38	40	40	31	41	40	40	41	45
In % age	85.00	81.00	70.00	87.00	82.00	84.00	84.00	76.00	83.00	85.00	88.00	89.00	89.00

**(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 Coimbatore 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 (Tamilnadu Circle) were made between 1100 to 1400 hrs and between 1600 to 1900 hrs so that TCBH hours for all the operators were covered.

**(2) Performance based on live measurement**

Calling Operator	Aircel	Airtel	BSNL	Etisalat	Idea	Reliance (GSM)	Tata (GSM)	Uninor	Videocon	Vodafone	MTS	Reliance (CDMA)	Tata (CDMA)
<b>Aircel</b>	-	98%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
<b>Airtel</b>	100%	-	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
<b>BSNL</b>	100%	100%	-	100%	100%	98%	100%	100%	100%	100%	100%	100%	100%
<b>Etisalat</b>	100%	100%	100%	-	100%	100%	100%	100%	100%	100%	100%	97%	100%
<b>Idea</b>	100%	100%	100%	100%	-	100%	100%	100%	100%	100%	100%	100%	100%
<b>Reliance (GSM)</b>	100%	100%	100%	100%	100%	-	100%	100%	100%	100%	100%	100%	100%
<b>Tata (GSM)</b>	99%	96%	100%	100%	100%	97%	-	97%	100%	100%	100%	100%	100%
<b>Uninor</b>	100%	100%	100%	100%	100%	100%	100%	-	100%	100%	100%	100%	100%
<b>Videocon</b>	100%	98%	96%	100%	100%	98%	100%	100%	-	99%	100%	100%	99%
<b>Vodafone</b>	99%	100%	100%	100%	100%	100%	100%	100%	100%	-	100%	100%	100%
<b>MTS</b>	100%	98%	100%	100%	100%	100%	100%	100%	100%	100%	-	100%	100%
<b>Reliance (CDMA)</b>	100%	100%	100%	100%	100%	100%	100%	98%	100%	100%	100%	-	100%
<b>Tata (CDMA)</b>	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	-

**(3) Critical Analysis**

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

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

The Operator Assisted Drive Test was conducted at Tamilnadu 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*****COIMBATORE***

LOW DENSE: Singanallur, Ondipudur, Sungam, Kavundampalayam, GCT,  
 MEDIUM DENSE: Sai baba colony, Thudiyalur, towards Avinashi road  
 HIGH DENSE: Townhall, RS Puram, Ukkadam, Thadagam road,

***MADURAI***

LOW DENSE: Airport, Thiruparankundram, Jaihind Puarm, TVS Nagar  
 MEDIUM DENSE: SS Colony, Anna Nagar, KK Nagar, High Court, Koodal Nagar  
 HIGH DENSE: Veli street, Masi street, Thirunagar, Arapalayam, Simmakal, Mattuthavani, Thallakulam

***CUDDALORE & PONDICHERY***

LOW DENSE: G.H. Road, Collector Office Road, Cuddalore to Pondy Road, Airport Road  
 MEDIUM DENSE: Alpettai, SP Office Road, Laws pet Main Road, Indira Nagar, Aurobindo Ashram  
 HIGH DENSE: Kamarajar Street, Vazhudavur, Koothapakkam, Thattanchavadi

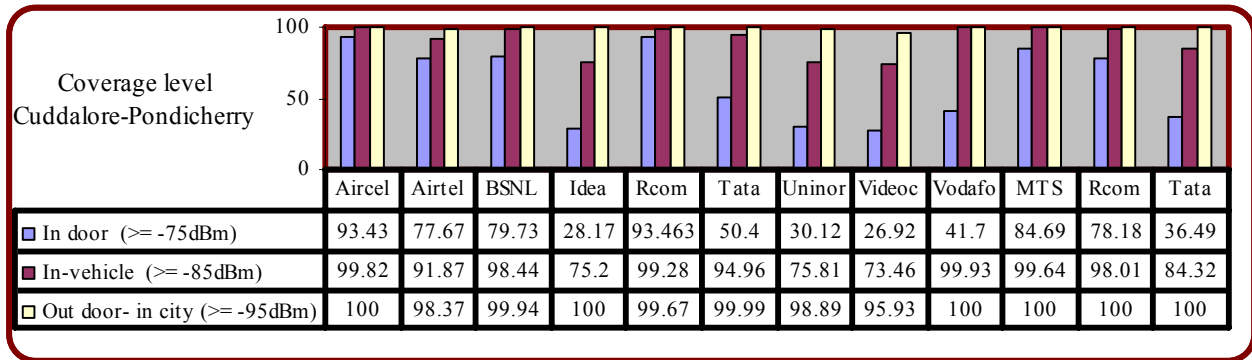
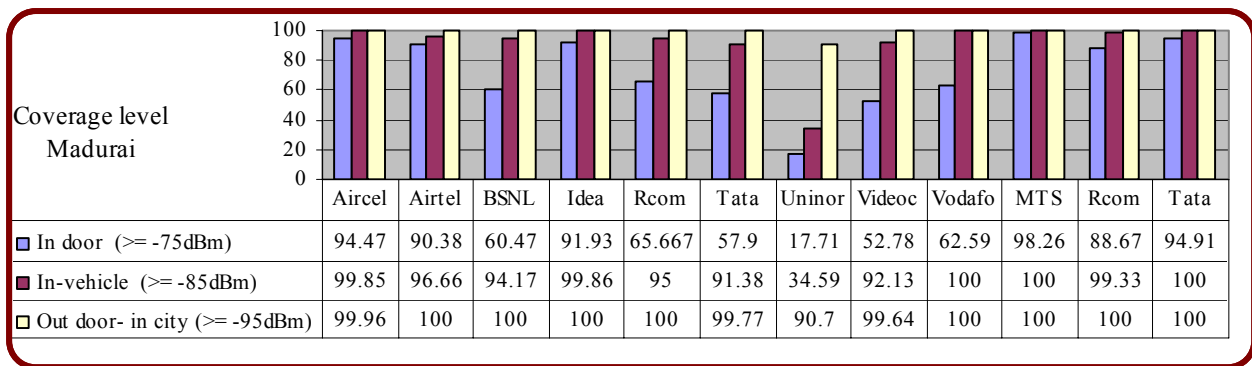
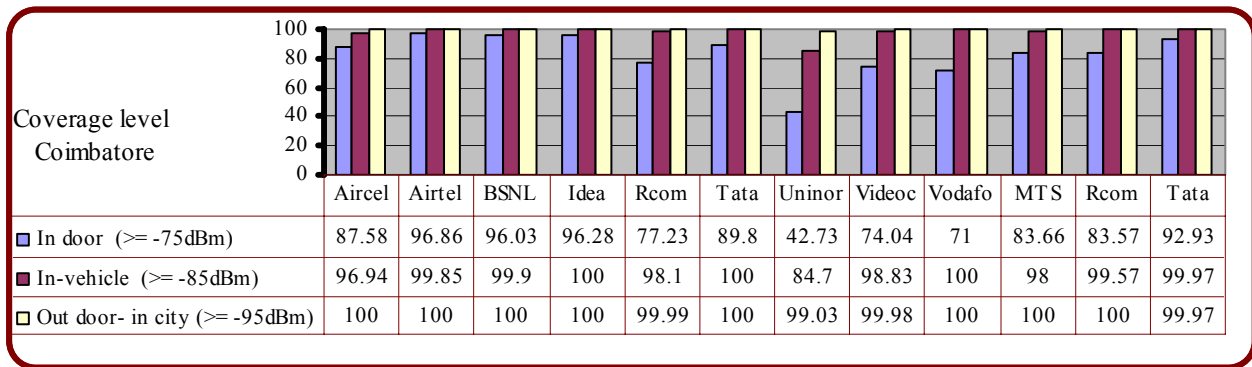
## 2) Performance (for the respective cities)

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	Coimbatore	122	144	140	109	147	147	169	175	106	163	162	132
		Madurai	127	165	151	136	173	189	176	169	149	188	181	190
		Cuddalore	116	119	165	145	177	140	163	158	130	131	196	145
1.2	Blocked Call Rate (<=3%)	Coimbatore	0	2.08	0	0	0	1.36	0	3.43	0.94	0	0	0
		Madurai	0	0	3.31	0	0	0	0	2.37	1.34	0	0	0
		Cuddalore	0	0	1.21	2.76	0	0	0	1.27	4.62	0	0	0
1.3	Dropped Call Rate (<=2%)	Coimbatore	0	0	1.43	0	0.68	0.68	0	1.14	0	0	0	0
		Madurai	0	0	1.99	0	0.58	0	0	1.18	0.67	0	1.10	0.53
		Cuddalore	0.86	0	0	0.69	0	0	0	1.90	2.31	0	0.51	0
1.4	Percentage of connections with good voice quality (=>95%)													
	(i) 0-4 (w/o frequency hopping)	Coimbatore										99.19	96.2	98.82
		Madurai										99.44	98	99.97
		Cuddalore										97.76	98.31	98.88
	(ii) 0-5 ( with frequency hopping)	Coimbatore	97.33	93.03	95.89	95.57	97.93	95.59	99.22	95.18	88.67			
		Madurai	97.17	94.34	96.2	96.1	95	96.21	99.66	95.33	92			
Cuddalore		96.23	92	96.15	94.57	96.9	97.36	99.69	95.96	91.6				
1.5	Service Coverage													
	In door (>= - 75dBm)	Coimbatore	87.58	96.86	96.03	96.28	77.23	89.8	42.73	74.04	71	83.66	83.57	92.93
		Madurai	94.47	90.38	60.47	91.93	65.66667	57.9	17.71	52.78	62.59	98.26	88.67	94.91
		Cuddalore	93.43	77.67	79.73	28.17	93.46333	50.4	30.12	26.92	41.7	84.69	78.18	36.49
	In-vehicle (>= - 85dBm)	Coimbatore	96.94	99.85	99.9	100	98.1	100	84.7	98.83	100	98	99.57	99.97
		Madurai	99.85	96.66	94.17	99.86	95	91.38	34.59	92.13	100	100	99.33	100
Cuddalore		99.82	91.87	98.44	75.2	99.28	94.96	75.81	73.46	99.93	99.64	98.01	84.32	

	Out door- in city ( $\geq -95$ dBm)	Coimbatore	100	100	100	100	99.99	100	99.03	99.98	100	100	100	99.97
		Madurai	99.96	100	100	100	100	99.77	90.7	99.64	100	100	100	100
		Cuddalore	100	98.37	99.94	100	99.67	99.99	98.89	95.93	100	100	100	100
<b>1.6</b>	Call Setup Success Rate ( $\geq 95\%$ )	Coimbatore	100	97.92	100	100	100	99	100	97	99	100	100	100
		Madurai	100	100	95.98	100	100	100	100	98	98.66	100	100	100
		Cuddalore	100	100	99.27	97.18	100	100	98.31	98.73	97.69	100	100	100



## Graphical Representation



### (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:

- BSNL is meeting all the benchmarks except showing deviation in Blocked Call Rate in Madurai (3.31%).
- Videocon is meeting all the benchmarks except for Blocked Call Rate in Coimbatore (3.43%).
- Vodafone is meeting benchmarks except Blocked Call Rate & Dropped Call Rate for Cuddalore (4.2% & 2.31% respectively).

## **(E) Independent Drive Test**

### **(1) Sample Coverage**

The Independent Drive Test was conducted at Tamilnadu 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**

##### ***COIMBATORE***

LOW DENSE: Singanallur, Ondipudur, Sungam, Kavundampalayam, GCT,  
MEDIUM DENSE: Sai baba colony, Thudiyalur, towards Avinashi road  
HIGH DENSE: Townhall, RS Puram, Ukkadam, Thadagam road,

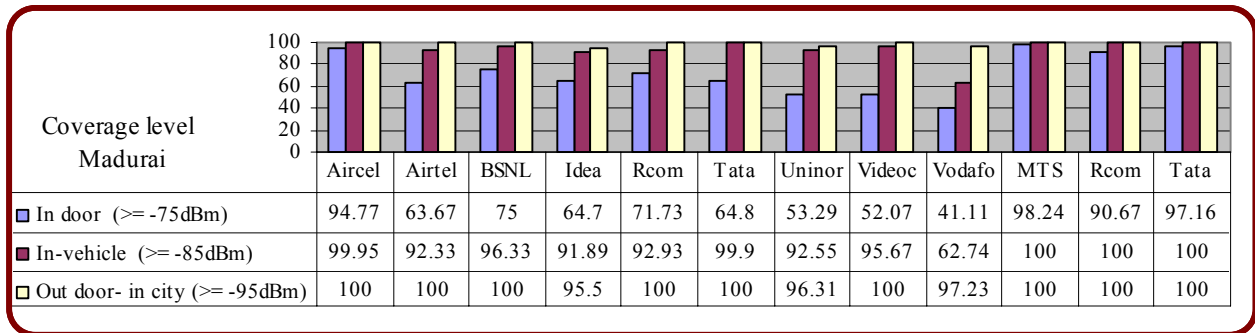
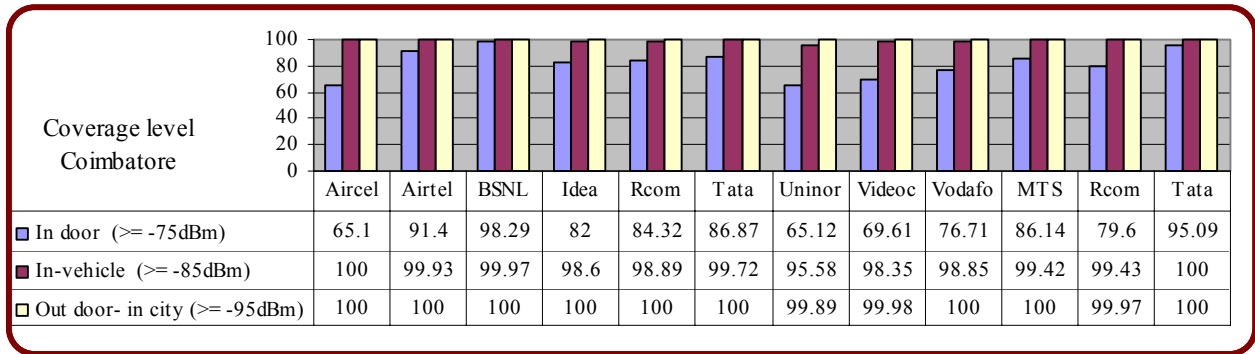
##### ***MADURAI***

LOW DENSE: Airport, Thiruparankundram, Jaihind Puarm, TVS Nagar  
MEDIUM DENSE: SS Colony, Anna Nagar, KK Nagar, High Court, Koodal Nagar  
HIGH DENSE: Veli street, Masi street, Thirunagar, Arapalayam, Simmakal, Mattuthavani, Thallakulam

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	Coimbatore	111	124	127	144	173	131	168	155	126	185	162	141	
		Madurai	133	179	131	163	132	151	190	150	188	193	179	189	
1.2	Blocked Call Rate (<=3%)	Coimbatore	0	0.81	0.79	0	0	0.76	1.79	3.23	0	0	0.62	0	
		Madurai	0.75	3.91	0	0	0	3.97	0.53	4.67	0	0	0.56	0	
1.3	Dropped Call Rate (<=2%)	Coimbatore	0	3.23	0.79	1.39	0	0	0.60	0	0	0.54	0	0	
		Madurai	0	0.56	3.82	0	0	1.32	0.53	0.67	1.60	0	0	0	
1.4	Percentage of connections with good voice quality (>=95%)														
	(i) 0-4 (w/o frequency hopping)	Coimbatore											99.34	95.88	99.25
		Madurai											99.56	98.33	99.97
(ii) 0-5 ( with frequency hopping)	Coimbatore	93	90.57	94.73	95.51	98.24	96.54	96.48	93	96					
	Madurai	97.13	78.67	95.87	93.65	96.87	92.1	97.65	96.67	92.23					
1.5	Service Coverage														
	In door (>= -75dBm)	Coimbatore	65.1	91.4	98.29	82	84.32	86.87	65.12	69.61	76.71	86.14	79.6	95.09	
		Madurai	94.77	63.67	75	64.7	71.73	64.8	53.29	52.07	41.11	98.24	90.67	97.16	
	In-vehicle (>= -85dBm)	Coimbatore	100	99.93	99.97	98.6	98.89	99.72	95.58	98.35	98.85	99.42	99.43	100	
		Madurai	99.95	92.33	96.33	91.89	92.93	99.9	92.55	95.67	62.74	100	100	100	
	Out door- in city (>= -95dBm)	Coimbatore	100	100	100	100	100	100	99.89	99.98	100	100	99.97	100	
Madurai		100	100	100	95.5	100	100	96.31	100	97.23	100	100	100		
1.6	Call Setup Success Rate (>=95%)	Coimbatore	100	95.67	99.21	100	100	100	98.21	96	100	100	99.38	100	
		Madurai	99	96.08	100	94.48	100	96.2	99.58	97.53	98.4	100	99.44	100	

## Graphical Representation



### (3) Critical Analysis

- Aircel & Vodafone are meeting all the benchmarks except for Good Voice Quality in Coimbatore (93%) & Madurai (92.23%) respectively .
- Airtel is deviating the benchmarks for Dropped Call Rate & Good Voice Quality in Coimbatore (3.23% & 90.57% respectively) and Blocked Call Rate & Good Voice Quality in Madurai (3.91% & 78.67% respectively).
- BSNL is meeting all the benchmarks except showing deviation in Dropped Call Rate in Madurai (3.82%) and Good Voice Quality in Coimbatore (94.73%).
- Idea is meeting all the benchmarks except for Good Voice Quality & CSSR in Madurai (93.65% and 94.48% respectively).
- Tata (GSM) is meeting all the benchmarks except for Blocked Call Rate & Good Voice Quality in Madurai (3.97% and 92.1% respectively).
- Videocon is meeting all the benchmarks except for Blocked Call Rate in Coimbatore & Madurai (3.23% & 4.67% respectively) and Good Voice Quality in Coimbatore (93%).

**(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 (Tamilnadu) is by and large satisfactory for **Network Parameters**. However, the benchmark of  $\leq 5\%$  for “worst affected cells  $>3\%$  TCH drop” is not met by Idea (6.59% & 6.30% for month & live data respectively) and Videocon (7.94% for live data).

Under **Customer Service Quality Parameter** “operator answered calls (voice-to-voice) within 60 seconds” parameter it is found that most of the operators are not fulfilling TRAI benchmark of  $\geq 90\%$ . Apart from this, the “accessibility of call centre” parameter benchmark is not met by BSNL, Vodafone and Tata GSM.

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

During **Drive Tests**, high Blocked Call Rates were found in case of Airtel (Madurai), BSNL (Madurai), Tata GSM (Madurai), Videocon (Coimbatore & Madurai) and Vodafone (Cuddalore). Similarly, dropped call rate benchmark was not met by BSNL (Madurai) and Vodafone (Cuddalore). Most of the GSM operators have below benchmark %age of connections with good voice quality. Idea is seen to have 94.48% CSSR in Madurai with is less than the TRAI benchmark of 95%.

**III. Basic Telephone Service (Wireline) Providers**

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

**IV. Broadband Service Providers**

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