

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

***Report Period: April 2011 – June 2011***

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

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## CHAPTER-1: INTRODUCTION

### I. Background

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

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

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

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

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

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

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

## II. Objectives and Methodology

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

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

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 Chennai circle. But for parameters such as ‘Worst affected cell exceeding 3% TCH drop’ and ‘BTs 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 Chennai Circle in 2nd quarter (April – June 2011). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken for the period October – December 2010.

Following are the various operators covered in Chennai 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	April-2011	1900-2000 hrs
2	Airtel Ltd	April-2011	1900-2000 hrs
3	BSNL	April-2011	1900-2000 hrs
4	Reliance Communication (GSM)	April-2011	1900-2000 hrs
5	Tata Communications (GSM)	April-2011	1900-2000 hrs
6	Vodafone	April-2011	1900-2000 hrs
<b>CDMA Operators</b>			
7	Reliance Communication (CDMA)	April-2011	1900-2000 hrs
8	Tata Communications (CDMA)	April-2011	1900-2000 hrs

All the NSS and BSS systems were considered for audit and assessment for the TCBH hours of individual operators.

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

<b>3 days Live Data Audit</b>		<b>Bench- mark</b>	<b>Aircel</b>	<b>Airtel</b>	<b>BSNL</b>	<b>Rcom GSM</b>	<b>Tata GSM</b>	<b>V-fone</b>	<b>Rcom CDMA</b>	<b>Tata CDMA</b>
<b>S/N</b>	<b>Name of Parameter</b>		<b>GSM Operators</b>						<b>CDMA Operators</b>	
<b>1</b>	<b>Connection Establishment (Accessibility)</b>									
	a) CSSR (Call Setup Success Rate)	>=95%	99.34%	98.80%	98.56%	99.84%	99.40%	99.40%	99.62%	99.50%
	b) SDCCH/PAGING congestion	<=1%	0.10%	0.05%	0.39%	0.01%	0.07%	0.26%	0.0%	0.0%
	c) TCH congestion	<=2%	0.31%	0.12%	1.44%	0.02%	0.09%	0.16%	0.03%	0.00%
<b>2</b>	<b>Connection maintenance (retainability)</b>									
	a) CDR	<=2%	0.36%	0.75%	0.55%	0.19%	0.79%	0.50%	0.34%	0.16%
	b) Worst affected cells>3% TCH drop	<=3%	0.39%	0.54%	2.80%	0.68%	3.51%	1.46%	1.15%	0.00%
	c) Good voice quality	>=95%	98.58%	97.69%	93.17%	98.89%	96.69%	98.91%		
<b>3</b>	<b>No of POI not meeting benchmark</b>	<=0.5%	0	0	0	0	0	2	0	0
<b>4</b>	<b>Response time to customers for assistance</b>									
	a) Accessibility of call centre/Customer Care	>=95%	97.3%	99.0%	100.0%	100.0%	100.0%	65.8%	100.0%	100.0%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	72.2%	84.7%	90.0%	92.8%	94.8%	56.3%	97.7%	94.2%

NA: Not Applicable, NP: Data Not Provided

From the 3 days live data assessment, it is found that all the operators are meeting the network parameters by and large, except for Tata GSM not meeting "worst affected cells >3% TCH drop" and BSNL not meeting "%age of connections with good voice quality". Vodafone has 2 POIs showing more than 0.5% congestion. Network Parameter "Good voice quality" for RCOM CDMA & TATA CDMA are not system generated.

Customer care data is found to be satisfactory for most of the operators except Vodafone for the parameter "Accessibility of call centre/Customer Care" and with Aircel, Airtel & Vodafone for the parameter "calls answered by operators (voice-to-voice)".

<b>One Month Data Audit</b>		<b>Bench- mark</b>	<b>Aircel</b>	<b>Airtel</b>	<b>BSNL</b>	<b>Rcom GSM</b>	<b>Tata GSM</b>	<b>V-fone</b>	<b>Rcom CDMA</b>	<b>Tata CDMA</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%	0.17%	0.04%	0.32%	0.13%	0.05%	0.00%	0.13%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	0.68%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>2</b>	<b>Connection Establishment (Accessibility)</b>									
	a) CSSR (Call Setup Success Rate)	>=95%	99.19%	99.14%	98.57%	99.83%	99.42%	99.46%	99.65%	99.36%
	b) SDCCH/PAGING congestion	<=1%	0.38%	0.11%	0.34%	0.04%	0.07%	0.20%	0.0%	0.0%
	c) TCH congestion	<=2%	0.45%	0.15%	0.84%	0.04%	0.08%	0.15%	0.02%	0.01%
<b>3</b>	<b>Connection maintenance (retainability)</b>									
	a) CDR	<=2%	0.38%	0.73%	1.62%	0.21%	0.67%	0.53%	0.37%	0.19%
	b) Worst affected cells>3% TCH drop	<=3%	0.57%	0.73%	2.39%	0.69%	3.53%	1.47%	1.15%	0.00%
	c) Good voice quality	>=95%	98.55%	97.80%	96.92%	98.80%	96.60%	98.87%		
<b>4</b>	<b>No of POI not meeting benchmark</b>	<=0.5%	0	0	0	0	0	2	0	0
<b>(B)</b>	<b>Customer Service Quality Parameters</b>									
<b>5</b>	<b>Metering/billing credibility-Post paid</b>	<= 0.1%	0.08%	0.02%	0.05%	0.09%	0.01%	0.13%	0.03%	0.00%
<b>6</b>	<b>Metering /billing credibility-Pre paid</b>	<= 0.1%	0.00%	0.35%	0.00%	0.01%	0.00%	0.01%	0.01%	0.01%
<b>7</b>	<b>Resolution of billing/ charging complaints</b>	100% within 4 weeks	100%	100%	100%	100%	100%	100%	100%	100%
	a) Period of applying credit/waiver/adjustment to the customer's account from the date of resolutions of complaints	<=1 week	100%	100%	100%	100%	100%	100%	100%	100%
<b>8</b>	<b>Response time to customers for assistance</b>									
	a) Accessibility of call centre/Customer Care	>=95%	96.90%	99.00%	100.00%	100.00%	100.00%	66.01%	100.00 %	100.00 %
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	81.66%	91.19%	93.30%	90.10%	99.57%	73.40%	92.88%	95.30%
<b>9</b>	<b>Termination/closure of service</b>	<=7days	100%	100%	100%	100%	100%	100%	100%	100%
<b>10</b>	<b>Time taken for refunds of deposits after closures.</b>	100% within 60 days	100%	100%	100%	100%	100%	100%	100%	100%

NA: Not Applicable, NP: Data Not Provided



From the month data assessment, it is found that all the operators are meeting the network parameters by and large. Deviations are found under the Network Parameter for the parameter 'Worst affected cells>3% TCH drop' for TATA GSM only. Vodafone has 2 POIs showing more than 0.5% congestion. 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 except for AIRCEL for the parameter "Accessibility of call centre/Customer Care" along with & VODAFONE which is also having below benchmark performance for "calls answered by operators (voice-to-voice)".

Vodafone & Airtel have low Billing/Metering Credibility in case of Post-Paid & Pre-Paid connections respectively.

**Operator-Assisted Drive Test**

The Operator Assisted Drive Test was conducted in and around Chennai for all the operators. Route covered was about around 100-120Km and for all the operators the same route was followed. The speed limit of 30Km/hr was maintained throughout the Drive Test. In Chennai, zones were selected for covering different density areas (High, Medium & Low dense areas).

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vi-Con	V-fone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators								CDMA Operators			
1.1	Blocked Call Rate (<=3%)	Chennai	9.58	0.57	1.80	0.66	0.59	0.55	0.00	2.96	0.00	0.00	0.00	0.00
1.2	Dropped Call Rate (<=2%)	Chennai	0.60	0.00	2.99	1.32	0.00	0.00	2.72	0.00	0.00	0.00	0.58	0.00
1.3	Percentage of connections with good voice quality (>=95%)	Chennai												
	(i) 0-4 (w/o frequency hopping)	Chennai										99.64	98.00	99.60
	(ii) 0-5 ( with frequency hopping)	Chennai	97.17	95.00	96.83	96.01	96.00	95.42	95.97	94.00	96.00			
1.4	Call Setup Success Rate (>=95%)	Chennai	90.27	97.00	97.17	98.68	99.00	99.24	98.00	97.04	99.30	100.00	100.00	100.00

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

- 'Blocked Call Rate' and 'Drop Call rate' benchmarks are not met by AIRCEL, BSNL & UNINOR.
- For the parameter 'Percentage of connections with good voice quality ' it is found that VIDEOCON is not meeting the benchmark & for the parameter "Call Setup Success Rate" it is found that AIRCEL is not meeting the benchmark.

**Independent Drive Test**The Independent Drive Test was conducted in and around Chennai. 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	Vi-Con	V-fone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators										CDMA Operators	
1.1	Blocked Call Rate (<=3%)	Chennai	1.82	1.12	0.00	0.65	3.07	0.00	2.89	3.21	3.05	0.00	0.60	0.00
1.2	Dropped Call Rate (<=2%)	Chennai	2.42	0.00	2.35	0.00	1.23	2.17	2.31	1.28	1.02	0.53	0.00	0.00
1.3	Percentage of connections with good voice quality (=>95%)	Chennai												
	(i) 0-4 (w/o frequency hopping)	Chennai										99.55	99.00	98.80
	(ii) 0-5 ( with frequency hopping)	Chennai	94.87	94.78	94.00	96.90	96.00	95.72	95.40	93.79	95.50			
1.4	Call Setup Success Rate (>=95%)	Chennai	98.20	98.33	98.00	99.62	96.93	99.00	96.10	96.15	94.50	100.00	99.00	100.00

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

- 'Blocked Call Rate' and 'Drop Call rate' benchmarks are not met by AIRCEL, BSNL , RCOM GSM, VIDEOCON & VODAFONE.
- For the parameter 'Percentage of connections with good voice quality ' it is found that AIRCEL, AIRTEL, BSNL & VIDEOCON are not meeting the banchmark & for the parameter "Call Setup Success Rate" it is found that VODAFONE is not meeting the benchmark.

## CHAPTER-3: AUDIT-PMR VERIFICATION

## I. Cellular Mobile Telephone Service

PMR		Bench-mark	Audit	Aircel	Airtel	BSNL	V-fone	Rcom	Tata
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	0.22%	0.04%	0.20%	0.05%	0.60%	0.01%
			Verified	0.22%	0.05%	0.20%	0.05%	0.60%	0.01%
	Worst affected BTSs due to downtime	<=2%	Reported	0.14%	0.00%	0.23%	0.07%	0.00%	0.00%
			Verified	0.14%	0.00%	0.27%	0.07%	0.00%	0.00%
2	<b>Connection Establishment (Accessibility)</b>								
	CSSR (Call Setup Success Rate)	>=95%	Reported	98.15%	99.56%	100%	99.68%	99.55%	99.78%
			Verified	98.15%	99.43%	100%	99.68%	99.55%	99.78%
	SDCCH/PAGING congestion	<=1%	Reported	0.45%	0.07%	0.23%	0.06%	0.00%	0.00%
			Verified	0.45%	0.08%	0.23%	0.06%	0.00%	0.00%
	TCH congestion	<=2%	Reported	0.28%	0.08%	0.33%	0.08%	0.20%	0.10%
			Verified	0.28%	0.10%	0.33%	0.08%	0.20%	0.10%
3	<b>Connection maintenance (retainability)</b>								
	CDR	<=2%	Reported	0.76%	0.54%	0.73%	0.58%	0.62%	0.15%
			Verified	0.76%	0.53%	0.73%	0.58%	0.62%	0.15%
	Worst affected cells>3% TCH drop	<=5%	Reported	0.40%	0.55%	2.53%	1.14%	1.48%	0.00%
			Verified	0.40%	0.42%	2.53%	1.14%	1.48%	0.00%
	Good voice quality	>=95%	Reported	98.23%	99.05%	100%	98.94%	99.06%	99.83%
			Verified	98.23%	99.02%	100%	98.94%	99.06%	99.83%
4	<b>POI congestion</b>	<=0.5%	Reported	0	0	0	0	0	0
			Verified	0	0	0	0	0	0
(B)	<b>Customer Service Quality Parameters</b>								
5	<b>Metering/billing credibility-Post paid</b>	<= 0.1%	Reported	0.54%	0.03%	0.00%	0.02%	0.08%	0.10%
			Verified	0.54%	0.03%	0.00%	0.02%	0.08%	0.10%
6	<b>Metering /billing credibility-Pre paid</b>	<= 0.1%	Reported	0.02%	0.11%	0.20%	0.07%	0.03%	0.16%
			Verified	0.02%	0.11%	0.20%	0.07%	0.03%	0.16%
7	<b>Resolution of billing/ charging complaints</b>	100% within 4 weeks	Reported	100%	100%	100%	100%	100%	100%
			Verified	100%	100%	100%	100%	100%	100%
	Period of applying credit/waiver/adjustment to the	<=1 week	Reported	100%	100%	100%	100%	100%	100%

	customers account from the date of resolutions of complaints		Verified	100%	100%	100%	100%	100%	100%
<b>8</b>	<b>Response time to customers for assistance</b>								
	Accessibility of call centre/Customer Care	$\geq 95\%$	Reported	100%	Included in TN Circle	95%	100%	89.00%	NIL
			Verified	100%		95%	100%	89.00%	NIL
	% call answered by operators(voice to voice) within 60 sec.	$\geq 90\%$	Reported	82.39%		93%	84%	95.00%	NIL
			Verified	82.39%		93%	84%	95.00%	NIL
<b>9</b>	<b>Termination/closure of service</b>								
	No.of requests for Termination / Closure of service complied within 7 days during the quarter	$\leq 7$ days	Reported	100%	100%	100%	100%	100%	NIL
			Verified	100%	100%	100%	100%	100%	NIL
<b>10</b>	<b>Time taken for refunds of deposits after closures.</b>	100% within 60 days	Reported	100%	100%	100%	100%	100%	NA
			Verified	100%	100%	100%	100%	100%	NA

**Critical Analysis (PMR Verification):**

- The figures provided by all the operators match the figures obtained on verification in most of the cases.
- Aircel is found to be not meeting the benchmark for "Metering/Billing Credibility-Postpaid", while Airtel, BSNL & Tata are not meeting the benchmark for "Metering/Billing Credibility-Prepaid".
- Accessibility of Reliance customer care is not meeting the benchmark prescribed by TRAI.
- "% call answered by operators (voice to voice) within 60 sec." benchmark is not met by Aircel and Vodafone.

## CHAPTER-4: DETAILED FINDINGS & ANALYSIS

### I. Cellular Mobile Telephone Service

#### (A) MSC Audit

##### (1) 3 Days Live Data Assessment & Summarized Findings

S/N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Rcom GSM	Tata GSM	V-fone	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%	99.34%	98.80%	98.56%	99.84%	99.40%	99.40%	99.62%	99.50%
	b) SDCCH/PAGING congestion	<=1%	0.10%	0.05%	0.39%	0.01%	0.07%	0.26%	0.0%	0.0%
	c) TCH congestion	<=2%	0.31%	0.12%	1.44%	0.02%	0.09%	0.16%	0.03%	0.00%
<b>2</b>	<b>Connection maintenance</b>									
	a) CDR	<=2%	0.36%	0.75%	0.55%	0.19%	0.79%	0.50%	0.34%	0.16%
	b) Cells having > 3% TCH drop	<=3%	0.39%	0.54%	2.80%	0.68%	3.51%	1.46%	1.15%	0.00%
	c) Good voice quality	>=95%	98.58%	97.69%	93.17%	98.89%	96.69%	98.91%		
	d) No. of cells > 3% TCH drop		21	30	143	20	31	75	4	0
	e) Total no. of cells in the network		5,252	5,564	5,118	2,955	3,890	5,154	347	793
<b>3</b>	<b>No of POI not meeting benchmark</b>	<=0.5%	0	0	0	0	0	2	0	0
	a) Name of POI not meeting the benchmark		Nil	Nil	Nil	Nil	Nil	Reliance ILD & NLD	Nil	Nil
	b) Total No. of circuits on POI		57,474	103,312	161,311	15,472	1,482	82,703	15,472	7,751
	c) Avg No. of call attempts on POI		1,857,929	2,440,060	18,775	155,049	46,174	45,733	155,049	66,303
	d) Avg traffic served on POI (Erlang)		31,348	56,574	554	5,117	774	1,995	5,117	2,011

	e) Total number of working POI Service Area wise		78	128	73	43	4	29	43	41
	f) Equipped Capacity of Network in respect of Traffic in erlang		134,439	181,233	124,462	36,000	60,313	81,593	56,000	85,879
	g) Total traffic handled in TCBH in erlang		57,803	116,273	40,471	0	20,674	61,154	0	13,586
<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%	97.34%	99.00%	100.00%	100.00%	100.00%	65.75%	100.00%	100.00%
	b) % of call answered by operators(voice to voice) within 60 sec	>=90%	72.21%	84.73%	90.00%	92.82%	94.80%	56.30%	97.65%	94.20%
	c) No. of call attempts to call centre / customer care nos. during TCBH (Avg)		22,051	150,437	973	5,970	19,170	13,297	5,280	3,518
	d) No. of calls connected and answered successfully to call centre / customer care nos. during TCBH (Avg)		15,924	127,465	876	5,541	18,173	8,284	5,162	3,314

NA: Not Applicable, NP: Data Not Provided

## Parameter-wise Findings (Live Data Assessment):

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

- **Call Setup Success Rate (CSSR) (benchmark  $\geq 95\%$ ):** All operators are meeting the benchmark with values lying between 98.56% and 99.84%.
- **SDCCH/PAGING Channel congestion (benchmark  $\leq 1\%$ ):** All operators are meeting the benchmark with values lying between 0.0% and 0.39%. Reliance CDMA & Tata CDMA have not provided the data.  
*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 0.00% and 1.44%.
- **Call Drop Rate (CDR) (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark with values lying between 0.16% and 0.79%.
- **Cell exceeding 3% TCH drop (benchmark  $\leq 3\%$ ):** All the operators are satisfying the benchmark except Tata GSM (3.51%) with values lying between 0% and 2.80%.
- **Connections with good voice quality (benchmark  $\geq 95\%$ ):** CDMA service providers have declared that the parameter is not system generated. GSM operators, except for BSNL (93.17%), are meeting the benchmark with values lying between 96.69% and 98.91%.
- **POI Congestion (benchmark  $\leq 0.5\%$ ):** All the operators are meeting the benchmark except Vodafone which has 2 POIs showing more than 0.5% congestion. 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 Vodafone (65.75%), all operators are meeting the benchmark with values lying between 97.34% and 100%.
- **%age of call answered by operator (Voice to voice) (benchmark  $>90\%$ ): %):** Except for Aircel (72.21%), Airtel (84.73%) & Vodafone (56.30%) other operators are meeting the benchmark with values lying between 90% and 97.7%.



## (2) Month Data Assessment & Summarized Findings

S/N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Rcom GSM	Tata GSM	V-fone	Rcom CDMA	Tata CDMA
			GSM Operators						CDMA Operators	
(A)	<b>Network Service Quality Parameter</b>									
1	<b>Network Availability</b>									
	a) BTS Accumulated Downtime	<=2%	0.17%	0.04%	0.32%	0.13%	0.05%	0.00%	0.13%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	0.68%	0.00%	0.00%	0.00%	0.00%	0.00%
	c) Total no. of BTSs in the licensed service area		1,927	2,298	1,759	985	1,352	1,884	347	260
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		2,361	659	4,054	952	486	31	313	5
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	0	12	0	0	0	0	0
2	<b>Connection Establishment (Accessibility)</b>									
	a) CSSR (Call Setup Success Rate)	>=95%	99.19%	99.14%	98.57%	99.83%	99.42%	99.46%	99.65%	99.36%
	b) SDCCH/PAGING congestion	<=1%	0.38%	0.11%	0.34%	0.04%	0.07%	0.20%	0.0%	0.0%
	c) TCH congestion	<=2%	0.45%	0.15%	0.84%	0.04%	0.08%	0.15%	0.02%	0.01%
3	<b>Connection maintenance (retainability)</b>									
	a) CDR	<=2%	0.38%	0.73%	1.62%	0.21%	0.67%	0.53%	0.37%	0.19%
	b) Worst affected cells>3% TCH drop	<=3%	0.57%	0.73%	2.39%	0.69%	3.53%	1.47%	1.15%	0.00%
	c) Good voice quality	>=95%	98.55%	97.80%	96.92%	98.80%	96.60%	98.87%		
	d) Total No. of cells exceeding 3% TCH drop (call drop)		30	41	122	20	137	76	4	0
	e) Total no. of cells in the network		5,252	5,564	5,118	2,955	3,890	5,154	347	793
4	<b>No of POI not meeting benchmark</b>	<=0.5%	0	0	0	0	0	2	0	0

	a) Name of POI not meeting the benchmark		Nil	Nil	Nil	Nil	Nil	0.00	Nil	Nil
	b) Total No. of call attempts on POI (Avg.)		1,685,300	2,228,749	16,818	153,468	44,167	78,881	153,468	85,066
	c) Total traffic served on POI (Erlang) (Avg.)		30,249	52,454	575	5,026	749	1,729	5,026	2,198
	d) Total No. of circuits on POI		57,474	103,312	161,311	15,472	1,482	82,703	15,472	7,751
	e) Total number of working POI Service Area wise		78	128	73	43	4	29	43	41
	f) Capacity of POI		54,926	103,669	161,311	13,967	1,376	2,668	13,967	6,854
<b>5</b>	<b>Network Data</b>									
	a) Equipped Capacity of Network Erlang		134,439	181,233	124,462	36,000	60,313	81,593	56,000	85,879
	b) Total traffic in TCBH in erlang (Avg.)		58,152	112,797	41,994	33,293	21,231	56,874	27,173	13,586
	c) Total no. of customers served (as per VLR) on last day of the month		1,723,040	2,805,732	972,455	NP	522,707	1,559,608	NP	537,389
<b>(B)</b>	<b>Customer Service Quality Parameters</b>									
<b>6</b>	<b>Metering/billing credibility-Post paid</b>	$\leq 0.1\%$	0.08%	0.02%	0.05%	0.09%	0.01%	0.13%	0.03%	0.00%
	a) No. of bills issued during the period		330,800	537,790	137,740	32,625	13,311	281,883	357,921	52,807
	b) No. of bills disputed including billing complaints during the period		253	91	66	30	97	375	96	1
<b>7</b>	<b>Metering /billing credibility-Pre paid</b>	$\leq 0.1\%$	0.00%	0.35%	0.00%	0.01%	0.00%	0.01%	0.01%	0.01%
	a) No. of charging / credit / validity complaints during the quarter		248	1,119	0	400	7,889	763	375	24
	b) Total no. of pre-paid customers at the end of the quarter		3,582,816	3,242,590	167,718	4,177,917	4,879,747	1,778,515	3,762,395	231,536
<b>8</b>	<b>Resolution of billing/ charging complaints</b>	<i>100% within 4 weeks</i>	100%	100%	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		501	1,210	66	430	7,986	1,138	471	630

	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		501	1,210	66	430	7,986	1,138	471	630
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		501	1,210	66	90	6	461	182	75
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		38	8,228	0	340	7,980	677	289	555
	e) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	100%	100%	100%	100%	100%	100%	100%	100%
<b>9</b>	<b>Response time to customers for assistance</b>									
	a) Accessibility of call centre/Customer Care	>=95%	96.90%	99.00%	100.00%	100.00%	100.00%	66.01%	100.00%	100.00%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	81.66%	91.19%	93.30%	90.10%	99.57%	73.40%	92.88%	95.30%
	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		1,154,860	4,008,793	8,720	6,096	1,404	9,120	1,529	3,151
	d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		943,019	3,655,498	8,136	5,492	1,398	7,926	1,420	3,003
<b>10</b>	<b>Termination/closure of service</b>	<=7days	100%	100%	100%	100%	100%	100%	100%	100%
	a) Total No. of requests for Termination / Closure of service received during the quarter		1,922	3,169	627	226	NA	4,305	983	1,917
	b) No.of requests for Termination / Closure of service complied within 7 days during the quarter		1,922	3,169	627	226	NA	4,305	983	1,917
<b>11</b>	<b>Time taken for refunds of deposits after closures.</b>	100% within 60 days	100%	100.00%	100%	100%	100%	100%	100%	100%

NA: Not Applicable, NP: Data Not Provided

## Parameter-wise Findings (Month Data Assessment):

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

- **BTS accumulated downtime (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark with values lying between 0.00% and 0.32%.
- **Worst affected BTSs due to downtime (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark with values lying between 0% and 0.68%.
- **Call setup success rate (benchmark  $\geq 95\%$ ):** All operators are meeting the benchmark with values lying between 98.57% and 99.83%.
- **SDCCH/PAGING Channel congestion (benchmark  $\leq 1\%$ ):** All operators are meeting the benchmark with values lying between 0.04% and 0.38%. Reliance CDMA & Tata CDMA have not provided the data.  
*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 0.01% and 0.84%.
- **Call drop rate (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark with values lying between 0.19% and 1.62%.
- **Cell exceeding 3% TCH drop (benchmark  $\leq 3\%$ ):** All the operators are satisfying the benchmark with value in between 0% and 2.39% except Tata GSM with values 3.53%.
- **Connections with good voice quality (benchmark  $\geq 95\%$ ):** CDMA service providers have declared that the parameter is not system generated All operators are meeting the benchmark with values lying between 96.60% and 99.11%.
- **POI Congestion (benchmark  $\leq 0.5\%$ ):** All the operators are meeting the benchmark except Vodafone which has 2 POIs showing more than 0.5% congestion. 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 Vodafone (66.01%), all operators are meeting the benchmark with values lying between 96.90% to 100%
- **%age of call answered by operator (Voice to voice) (benchmark  $>90\%$ ):** Except for Aircel & Vodafone with 81.66% & 73.40% respectively, all the operators are meeting the benchmark with values lying between 90.10% and 99.57%.
- **Metering and billing credibility-Post paid (benchmark  $\leq 0.1\%$ ):** All operators, except Vodafone are meeting the benchmark.
- **Metering and billing credibility-Pre paid (benchmark  $\leq 0.1\%$ ):** Except for Airtel, all operators are meeting the benchmark.
- **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.
- **Time taken for refunds of deposits after closures (benchmark 100% within  $\leq 60$  days):** All operators have satisfied the benchmark.

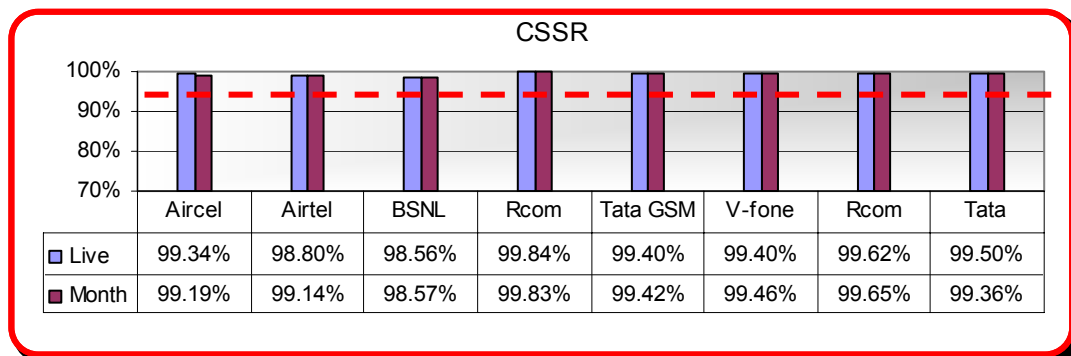
**(1) Sample Coverage**

Switches/BSC/BTS details of operators:

Sl.	Name of Service Provider	No. of MSC/GMSC	No. of BSC	No. of BTS
<b>GSM Operators</b>				
1	Aircel Ltd	12	16	1927
2	Airtel Ltd	17	24	2298
3	BSNL	7	28	1776
4	Reliance Communication (GSM)	1	4	997
5	Tata Communications (GSM)	2	10	1352
6	Vodafone	5	34	1884
<b>CDMA Operators</b>				
7	Reliance Communication (CDMA)	3	-	316
8	Tata Communications (CDMA)	1	2	260

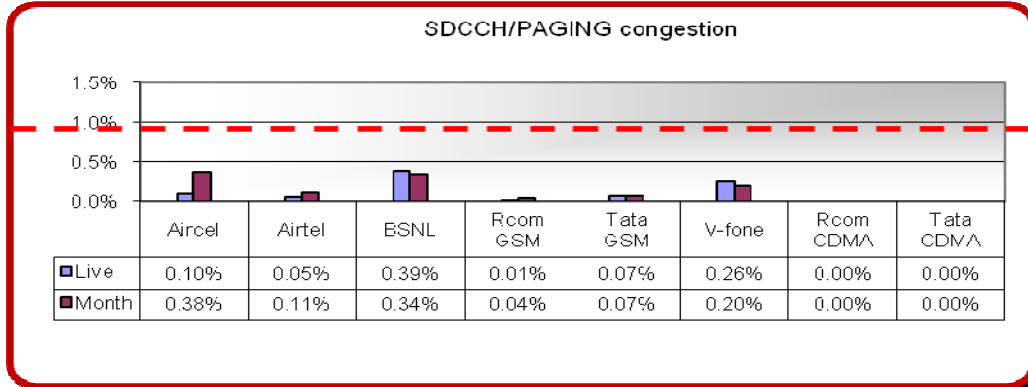
**(2) Performance (Graphical Representation)****Comparison between Live measurements and One month data Audit – Cellular Mobile Telephone Services****A) NETWORK PERFORMANCE**

- I. Call Setup Success Rate (CSSR):** 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

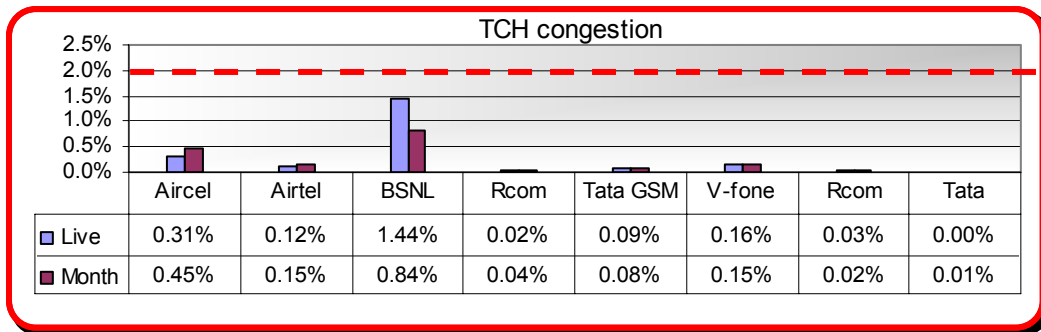


**II. Blocked call rate:**

**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.

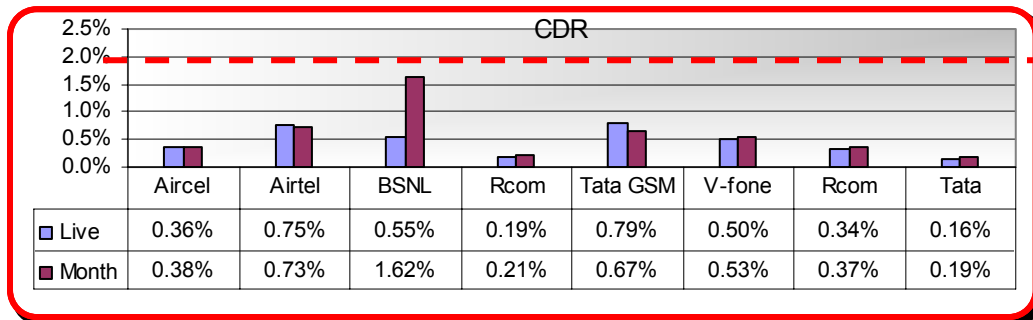


**TCH congestion:** All operators are meeting the TRAI benchmarks ( $\leq 2\%$ ) for both one month data and 3 days live data taken in the month of audit.

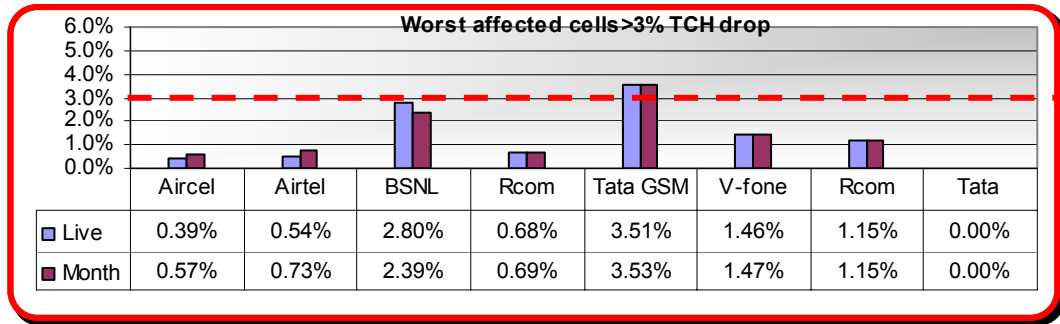


**III. Connection Maintainability (Retainability):**

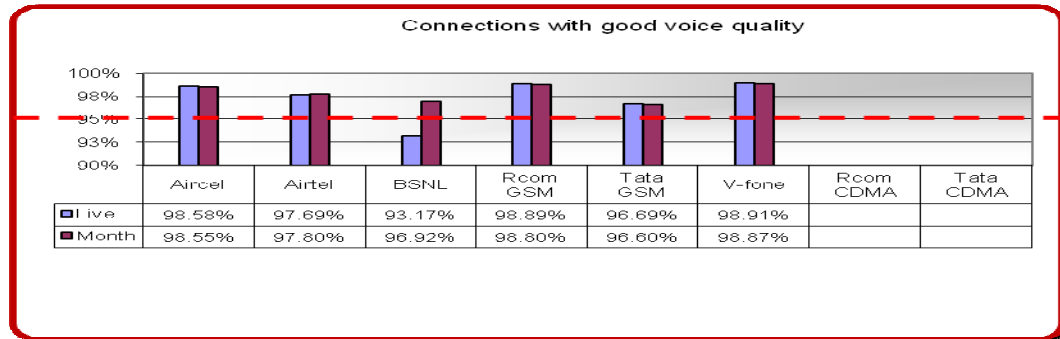
**Call Drop Rate (CDR):** All operators are meeting the TRAI benchmarks ( $\leq 2\%$ ) for both one month data and 3 days live data taken in the month of audit.



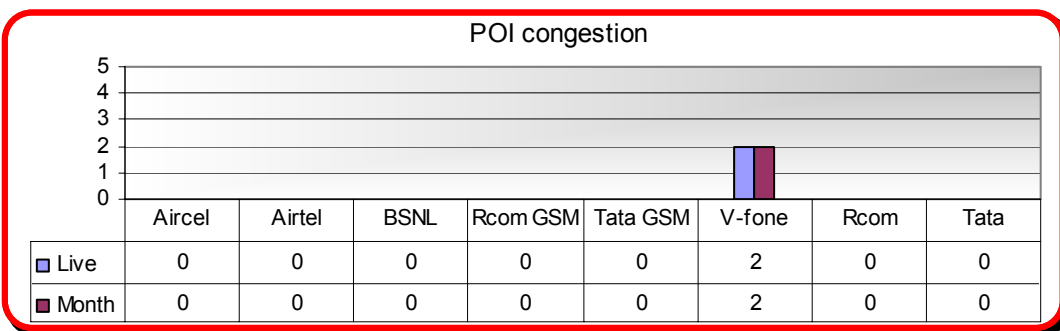
**Worst affected Cell exceeding 3% TCH Drop:** For both live and month data, all the operators are meeting the benchmark except Tata GSM. In all cases data shows consistency for both live measurement and month data audit.



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



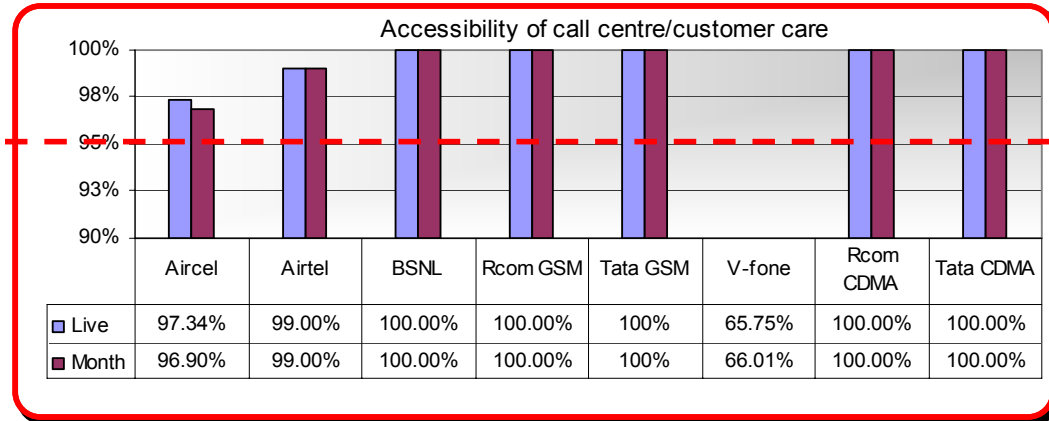
**POI Congestion:** All operators, except Vodafone, have not POI with congestion  $\geq 0.5\%$ . Vodafone is found to have 2 such POIs in both live & month data.



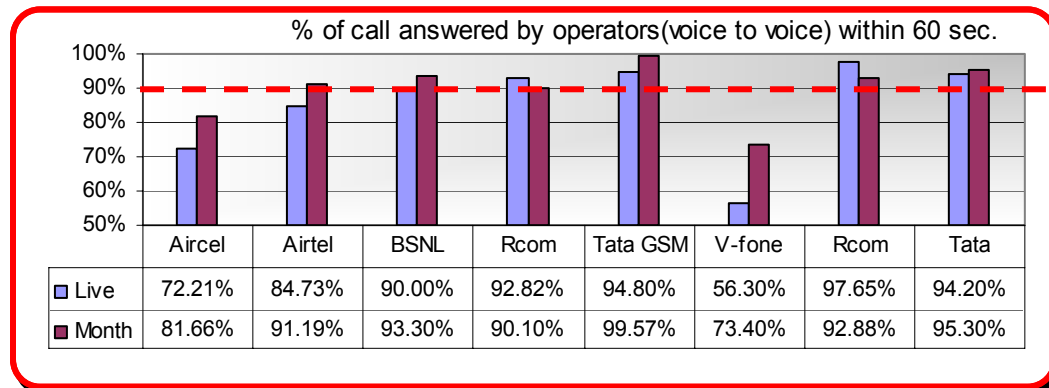
B) CUSTOMER SERVICE QUALITY PARAMETERS

**Response time to the customer for assistance:**

**Percentage of call answered (Electronically):** Vodafone is not meeting the benchmark for both live & month data audit. All other operators are meeting the benchmark.



**Percentage of call answered by operators (Voice to voice) within 60 sec:** Aircel & Vodafone are not meeting the benchmark ( $\geq 90\%$ ) for both one month data and 3 days live data taken in the month of audit. In case of Airtel the operator is not satisfying the benchmark in case of live data audit.



(3) Critical Analysis

From the data tables it is found that all the operators are meeting the network parameters by and large, except for Tata GSM in “Worst affected cells>3% TCH drop” and for BSNL in “Good Voice Quality” not meeting the benchmark.

Performance related to customer care data is not found to be satisfactory for Aircel & Vodafone for the parameter “calls answered by operators (voice-to-voice)” in case of both live & month data audit and for Airtel in live data audit. A below benchmark performance is observed in case of Vodafone for “accessibility of call centre” parameter in both live & month data.

In case of POI congestion, all the operators are found to be performing quite well in terms of meeting the benchmark ( $\leq 0.5\%$ ) except for Vodafone showing POIs with more than 0.5% congestion.



**(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	Rcom GSM	Tata GSM	Vodafone	Rcom GSM	Tata CDMA
<b>Total No. of calls</b>	11	15	7	7	10	11	10	10
<b>Cases resolved with 4 weeks</b>	11	15	7	7	10	11	10	10
<b>%age of cases resolved</b>	100%	100%	100%	100%	100%	100%	100%	100%

**(3) Live calling to Call center:**

	OPERATORS NAME												
	Airce l	Airte l	BSN L	Etisala t	Idea	Rco m	Tata	Video -con	Voda -fone	Unino r	MTS	Rco m	Tata
	GSM										CDMA		
1ST HALF (10AM to 01 PM)	44	46	46	48	47	47	48	43	26	44	47	47	46
2ND HALF (04PM to 07 PM)	18	40	40	43	41	40	41	39	15	40	39	41	39
In % age	62.00	86.00	86.00	91.00	88.00	87.00	89.00	82.00	41.00	84.00	86.00	88.00	85.00

**(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 Chennai 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.

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

A sample of 2x50 test calls per Service Providers within the licensed service area (Chennai Circle) were made between 1900 to 2000 hrs so that TCBH hours for all the operators were covered.

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

Calling Operator	Aircel	Airtel	BSNL	Rcom GSM	Tata GSM	Vodafone	Rcom GSM	Tata CDMA
<b>Aircel</b>	-	100%	100%	100%	100%	100%	100%	99%
<b>Airtel</b>	100%	-	100%	100%	100%	97%	100%	100%
<b>BSNL</b>	100%	99%	-	100%	100%	100%	99%	100%
<b>Rcom GSM</b>	100%	100%	100%	-	100%	100%	100%	100%
<b>Tata GSM</b>	100%	100%	100%	100%	-	100%	100%	100%
<b>Vodafone</b>	98%	100%	100%	100%	100%	-	100%	100%
<b>Rcom CDMA</b>	100%	100%	100%	100%	99%	100%	-	100%
<b>Tata CDMA</b>	100%	100%	98%	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.

**(B) Drive test of the mobile network of service providers**

**(3) Sample Coverage**

The Operator Assisted Drive Test was conducted at Chennai for all the operators. Route covered was about around 100-110Km depending on city areas within the speed limit of 30Km/hr.

**DRIVE TEST LOCATIONS**

**CHENNAI CIRCLE:**

High Dense: Chetpet, Shenoy Nagar, Amanjalarai JN, Koyambedu, Vadapalani, Adayar  
Kobambakkam, Teynampat, Nandhanam, Thiruvanmiyur, Taramani,  
Thambaram Rly. Station, Ekkattuthangal, Jafarkhanpet, Ashok Nagar-100feet Road

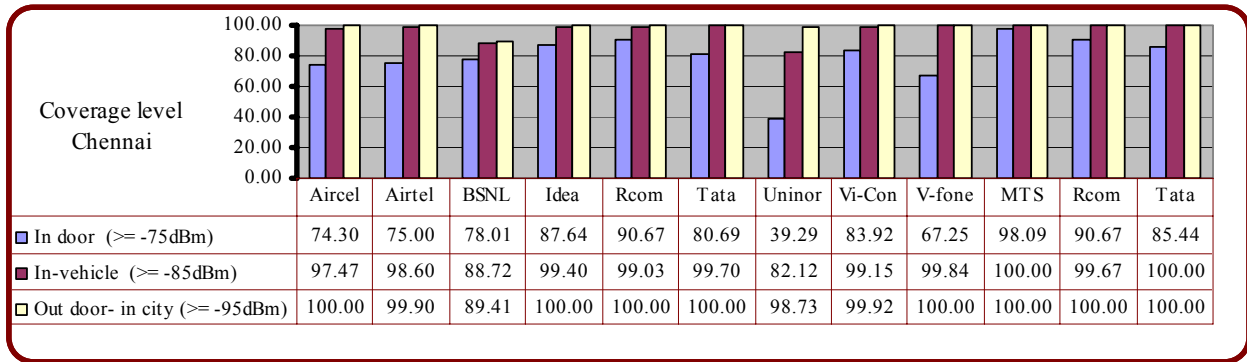
Medium Dense: Velachery-South, PALLIKARANAI, Kamarajpuram, Seleiyur, Tambaram North,  
Kadaperi, Mepz2, Chrompet MIT, Pallavaram, Saligramam, Nirgumbakam,  
Valsaravakkam, Porur.

Low Dense: Karpagambal Nagar, Narayanapuram, Medavakkam, Medavakkam,  
Gouriwakkam East, Meenambakkam, Alandur, SRMC, Kumaranchavadi,  
Pallikuppam, vanagaram, Maduravoil, Nerkundram

## 2) Performance (for the respective cities) - Operator Assisted Drive Test

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vi-Con	V-fone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators						CDMA Operators					
1.1	Call Attempts	Chennai	167.00	174.00	167.00	152.00	170.00	182.00	184.00	169.00	149.00	183.00	172.00	184.00
1.2	Blocked Call Rate (<=3%)	Chennai	9.58	0.57	1.80	0.66	0.59	0.55	0.00	2.96	0.00	0.00	0.00	0.00
1.3	Dropped Call Rate (<=2%)	Chennai	0.60	0.00	2.99	1.32	0.00	0.00	2.72	0.00		0.00	0.58	0.00
1.4	Percentage of connections with good voice quality (>=95%)	Chennai												
	(i) 0-4 (w/o frequency hopping)	Chennai										99.64	98.00	99.60
	(ii) 0-5 ( with frequency hopping)	Chennai	97.17	95.00	96.83	96.01	96.00	95.42	95.97	94.00	96.00			
1.5	Service Coverage	Chennai												
	In door (>= -75dBm)	Chennai	74.30	75.00	78.01	87.64	90.67	80.69	39.29	83.92	67.25	98.09	90.67	85.44
	In-vehicle (>= -85dBm)	Chennai	97.47	98.60	88.72	99.40	99.03	99.70	82.12	99.15	99.84	100.00	99.67	100.00
	Out door- in city (>= -95dBm)	Chennai	100.00	99.90	89.41	100.00	100.00	100.00	98.73	99.92	100.00	100.00	100.00	100.00
1.6	Call Setup Success Rate (>=95%)	Chennai	90.27	97.00	97.17	98.68	99.00	99.24	98.00	97.04	99.30	100.00	100.00	100.00

## 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:

- “Blocked Call Rate” benchmark is not met by Aircel.
- “Dropped Call Rate” benchmark is not met by BSNL & Uninor.
- “%age of Good Voice Quality connections” benchmark is not met by Videocon.
- “Call Setup Success Rate” benchmark is not met by Aircel

e.  
**(C) Independent Drive Test**

**(1) Sample Coverage**

The Independent Drive Test was conducted at Chennai after operators assisted drive test was over for respective operators. Route cover was about around 100-110Km depending on city areas within the speed limit of 30Km/hr.

**DRIVE TEST LOCATIONS**

**CHENNAI CIRCLE :**

High Dense: Chetpet, Shenoy Nagar, Amanjalarai JN, Koyambedu, Vadapalani, Adayar  
Kobambakkam, Teynampat, Nandhanam, Thiruvanmiyur, Taramani,  
Thambaram Rly. Station, Ekkattuthangal, Jafarkhanpet, Ashok Nagar-100feet Road

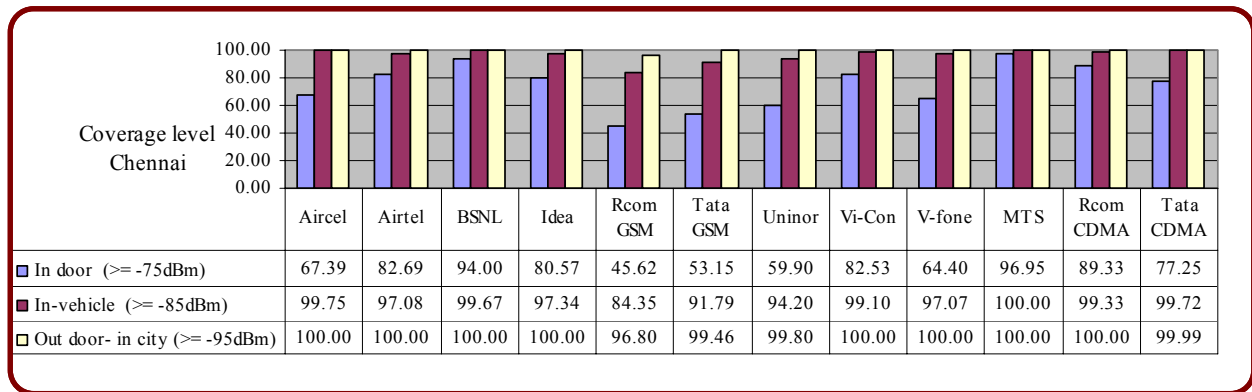
Medium Dense: Velachery-South, PALLIKARANAI, Kamarajpuram, Seleiyur, Tambaram North,  
Kadaperi, Mepz2, Chrompet MIT, Pallavaram, Saligramam, Nirkumbakam,  
Valsaravakkam, Porur.

Low Dense: Karpagambal Nagar, Narayanapuram, Medavakkam, Medavakkam,  
Gouriwakkam East, Meenambakkam, Alandur, SRMC, Kumaranchavadi,  
Pallikuppam, vanagaram, Maduravoil, Nerkundram

## 2) Performance (for the respective cities) - Independent Drive Test

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vi-Con	V-fone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators									CDMA Operators		
1.1	Call Attempts	Chennai	165.00	179.00	170.00	153.00	163.00	184.00	173.00	156.00	197.00	189.00	168.00	184.00
1.2	Blocked Call Rate (<=3%)	Chennai	1.82	1.12	0.00	0.65	3.07	0.00	2.89	3.21	3.05	0.00	0.60	0.00
1.3	Dropped Call Rate (<=2%)	Chennai	2.42	0.00	2.35	0.00	1.23	2.17	2.31	1.28	1.02	0.53	0.00	0.00
1.4	Percentage of connections with good voice quality (=>95%)	Chennai												
	(i) 0-4 (w/o frequency hopping)	Chennai										99.55	99.00	98.80
	(ii) 0-5 ( with frequency hopping)	Chennai	94.87	94.78	94.00	96.90	96.00	95.72	95.40	93.79	95.50			
1.5	Service Coverage	Chennai												
	In door (>= -75dBm)	Chennai	67.39	82.69	94.00	80.57	45.62	53.15	59.90	82.53	64.40	96.95	89.33	77.25
	In-vehicle (>= -85dBm)	Chennai	99.75	97.08	99.67	97.34	84.35	91.79	94.20	99.10	97.07	100.00	99.33	99.72
	Out door- in city (>= -95dBm)	Chennai	100.00	100.00	100.00	100.00	96.80	99.46	99.80	100.00	100.00	100.00	100.00	99.99
1.6	Call Setup Success Rate (>=95%)	Chennai	98.20	98.33	98.00	99.62	96.93	99.00	96.10	96.15	94.50	100.00	99.00	100.00

## Graphical Representation



### (3) Critical Analysis

- CDMA operators have no deviation from the TRAI benchmarks.
- Blocked Call parameter is not met by Rcom GSM (3.07%), Videocon (3.21%) and Vodafone (3.05%).
- Dropped call parameter is not met by Aircel (2.42%), BSNL (2.35%), Tata GSM (2.17%) and Uninor (2.31%).
- Good Voice Quality parameter is met by BSNL (94%) only.
- CSSR is not met by Vodafone (94.5%).



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

From live, month and PMR findings, it can be concluded that on an average, performance of the operators in the service area (Chennai) is by and large satisfactory for **Network Parameters**.

**POI congestion** is found to be satisfying for all the operators for both month and live measurement except for Vodafone.

Under **Customer Service Quality** section, benchmark for the parameter “operator answered calls (voice-to-voice) within 60 seconds” it is found not satisfying for atleast three operators. All the operators need to take care so that there is positive improvement in this regard.

Regarding **Metering/Billing Credibility most of the operators are meeting the benchmark** except Airtel in Pre-paid services and Vodafone in Post-Paid services.

During **Drive Tests**, it is noticed from the report overall performance of the operators **is by and large satisfactory** except few issues. In Blocked Call Rates only Aircel has failed to meet the bench mark. In dropped call rates except BSNL & Uninor all have met the benchmark. In ‘Good voice quality’ only Videocon has slightly deviated from the required benchmark.