

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

Report Period: October 2011 – December 2011

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- II. Basic Telephone (Wire line) Service
 - **Not conducted for this quarter**
- III. Broadband ServiceProviders
 - **Not conducted for this quarter**

CHAPTER-1: INTRODUCTION

I. Background

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

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

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

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

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

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

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

II. Objectives and Methodology

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

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

To fulfill the above mentioned Scope of Work audit was performed on different Systems, Facilities and Field data collection.

Systems audited:-

1. Network Switching Centre (NSS)
2. Base Station Subsystem(BSS)
3. Billing Applications
4. Customer Care applications

Facilities audited:-

1. Billing documents.
2. Customer Care records.

Field data collections carried out:-

1. RF network coverage including KPIs (Key Performance Index)
2. Inter Operator Call Assessment
3. Checking of Customer Billing/Refund Complaints (Random sample)
4. Customer Care efficiency

5. The live calling was made to assess the quality of services for Inter Operator Call Assessment, Customer Billing/Refund Complaints and Customer Care efficiency.

In order to carry out the above scope of work:-

- ✓ TCIL auditors visited all the NSS (Network Sub System) and BSS (Base-station Sub System) to check data for all the operators in their respective service area.
- ✓ All the NSS and BSS data for the relevant details were collected either directly from the centralized NOC or through a remote access to the NOC.
- ✓ The Radio parameters were audited/verified from the data collected from OMC-R (Operation and Maintenance Center – Radio, as part of BSS data).
- ✓ The Drive test was conducted in high, low and medium dense areas including highways, commercial complex and residential areas and special attention was paid for the areas for which TRAI has received complaints.
- ✓ The POI and other network related parameters were audited/verified from the data collected from the OMC-S (Operation and Maintenance Center – Switch as part of NSS data).
- ✓ The data related to Billing and Customer care was checked for the previous month and verified with the customers by calling them on random basis. The process of registration and handling of the complaints was also studied for the various operators. Call centre number were called for measuring the efficiency of the call centre.
- ✓ The inter operator call assessment test was carried out during the time period as is specified in the tender document. TCBH (Time Consistent Busy Hour) is taken after observation of the traffic consistently for 3 days prior to the audit activity.
- ✓ Data has been collected for busy hour of network in case of live assessment & month of audit for all service providers & verified that service providers are providing busy hour data only for QoS service. We found that TCBH hour is matching with network busy hour as provided by service providers for Chennai 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 Chennai Circle in 4th quarter (October-December 2011). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken during the period April – June 2011.

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
GSM Operators			
1	Aircel Ltd	November-2011	1900-2000 hrs
2	Airtel Ltd	November-2011	1900-2000 hrs
3	BSNL	November-2011	1900-2000 hrs
4	Reliance Communication (GSM)	November-2011	1900-2000 hrs
5	Tata Communications (GSM)	November-2011	1900-2000 hrs
6	Vodafone	November-2011	1900-2000 hrs
CDMA Operators			
7	Reliance Communication (CDMA)	November-2011	1900-2000 hrs
8	Tata Communications (CDMA)	November-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**

3 days Live Data Audit										
S/ N	Name of Parameter	Bench- mark	Aircel	Airtel	BSNL	Rcom GSM	TATA GSM	V-fone	Rcom CDMA	TATA CDMA
			GSM Operators						CDMA Operators	
1	Network Availability									
	a) BTS Accumulated Downtime	<=2%	2.10%	0.07%	0.86%	0.08%	0.02%	0.00%	0.08%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	0.59%	0.00%	0.00%	0.00%	0.00%	0.00%
2	Connection Establishment (Accessibility)									
	a) CSSR (Call Setup Success Rate)	>=95%	98.44%	99.16%	97.29%	99.80%	99.35%	99.39%	99.33%	99.44%
	b) SDCCH/PAGING congestion	<=1%	0.57%	0.06%	0.26%	0.01%	0.06%	0.24%	0.00%	0.00%
	c) TCH congestion	<=2%	1.08%	0.14%	0.33%	0.02%	0.04%	0.15%	0.38%	0.00%
3	Connection maintenance (retainability)									
	a) CDR	<=2%	0.58%	0.91%	0.66%	0.41%	0.99%	0.61%	0.45%	0.11%
	b) Worst affected cells>3% TCH drop	<=3%	1.59%	0.93%	2.55%	0.03%	5.77%	1.63%	0.27%	0.00%
	c) Good voice quality	>=95%	98.28%	97.16%	97.24%	99.47%	97.86%	98.77%	98.58%	0.00%
4	No of POI having congestion	>=0.5%	0	0	0	0	0	0	0	0
5	Response time to customers for assistance									
	a) Accessibility of call centre/Customer Care	>=95%	96%	INCL ED IN TN CIRCL E REPORT	100%	NA	99%	61%	100%	99%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	87%		97%	NA	94%	96%	98%	96%
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. Deviations in Network Parameters found in following cases:

- " BTS Accumulated Downtime <=2% " with Aircel (2.1%) & 2. "'Worst affected cells>3% TCH drop" with Tata GSM (5.77%).

Deviations in Customer care Parameters found in following cases:

- "Accessibility of call centre/Customer Care >=95%" with Vodafone (61%) & 2. % call answered by operators (voice to voice) within 60 sec.>=90% with Aircel (87%)

One Month Data Audit		Bench- mark	Aircel	Airtel	BSNL	Rcom GSM	TATA GSM	V- fone	Rcom CDMA	TATA CDMA
S/N	Name of Parameter									
(A)	Network Service Quality Parameter									
1	Network Availability									
	a) BTS Accumulated Downtime	<=2%	1.93%	0.12%	0.48%	0.26%	0.05%	0.00%	0.37%	0.03%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.82%	1.76%	0.29%	0.00%	0.00%	1.33%	0.00%
2	Connection Establishment (Accessibility)									
	a) CSSR (Call Setup Success Rate)	>=95%	98.30%	99.10%	97.29%	99.69%	99.32%	99.48%	99.36%	99.34%
	b) SDCCH/PAGING congestion	<=1%	0.58%	0.10%	0.32%	0.01%	0.06%	0.14%	0.00%	0.00%
	c) TCH congestion	<=2%	1.27%	0.19%	0.28%	0.09%	0.07%	0.15%	0.35%	0.01%
3	Connection maintenance (retainability)									
	a) CDR	<=2%	0.53%	0.89%	0.72%	0.41%	1.00%	0.59%	0.45%	0.22%
	b) Worst affected cells>3% TCH drop	<=3%	1.51%	1.18%	2.83%	0.10%	5.42%	1.69%	0.27%	0.00%
	c) Good voice quality	>=95%	98.35%	97.26%	96.29%	99.48%	97.85%	98.75%	98.56%	0.00%
4	No of POI having congestion	>=0.5%	0	0	0	0	0	0	0	0
(B)	Customer Service Quality Parameters									
5	Metering/billing credibility-Post paid	<= 0.1%	0.04%	0.01%	0.02%	NA	0.62%	0.04%	0.08%	0.19%
6	Metering /billing credibility-Pre paid	<= 0.1%	0.01%	0.02%	0.00%	NA	0.01%	0.08%	0.02%	0.04%
7	Resolution of billing/ charging complaints	100% within 4 weeks	100%	100%	100%	NA	100%	100%	100%	100%
	a) Period of applying credit/waiver/adjustment to the customer's account from the date of resolutions of complaints	<=1 week	100%	100%	100%	NA	100%	100%	100%	100%
8	Response time to customers for assistance									
	a) Accessibility of call centre/Customer Care	>=95%	93%	INCLUDED IN TN CIRCLE REPORT	100%	NA	99%	59%	100%	99%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	90%		99%	NA	92%	92%	98%	96%
9	Termination/closure of service	<=7days	100%	100%	100%	NA	100%	100%	100%	100%
10	Time taken for refunds of deposits after closures.	100% within 60 days	100%	100%	100%	NA	97%	100%	100%	98%

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.

Deviation in one Network Parameters found in following case:

1. "Worst affected cells > 3% TCH drop" with Tata GSM (5.42%).

Deviations in Customer care Parameters found in following cases :

1. "Metering/billing credibility-Post paid \leq 0.1%" with Tata GSM(0.62%) & Tata CDMA (0.19%), 2. "Accessibility of call centre/Customer Care \geq 95%" with Aircel (93%) & Vodafone (59%), 3. "Time taken for refunds of deposits after closures 100% within 60 days" with Tata GSM (97%) & Tata CDMA (98%).

Operator-Assisted Drive Test

The Operator Assisted Drive Test was conducted in and around Chennai for all the operators. Route covered was about around 110Km 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	1.71	0.00	5.61	1.05	0.00	0.00	0.56	3.85	3.43	0.00	0.00	0.00
1.2	Dropped Call Rate (<=2%)	Chennai	0.57	0.00	3.57	0.53	0.00	0.00	0.56	0.96	0.57	0.00	0.00	0.54
1.3	Percentage of connections with good voice quality (>=95%)	Chennai												
	(i) 0-4 (w/o frequency hopping)	Chennai										98.39	96.00	98.68
	(ii) 0-5 (with frequency hopping)	Chennai	96.63	95.00	97.60	95.00	95.26	95.13	96.88	95.00	96.47			
1.4	Call Setup Success Rate (>=95%)	Chennai	98.29	100	94.39	97.89	100	100	99.43	96.15	97.44	100	100	100

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

- Blocked Call Rate' benchmark is not met by BSNL, VIDEOCON & VODAFONE.
- 'Drop Call rate' benchmarks is not met by BSNL.

All other parameters are found in order.

CHAPTER-3: AUDIT-PMR VERIFICATION											
I. Cellular Mobile Telephone Service											
PMR		Bench-mark	Audit	Aircel	Airtel	BSNL	Rcom GSM	TATA GSM	V-fone	Rcom CDMA	TATA CDMA
S/ N	Name of Parameter										
			GSM Operators						CDMA Operators		
(A)	Network Service Quality Parameter										
1	Network Availability										
	BTS Accumulated Downtime	<=2%	Reported	0.20%	0.06%	0.30%	0.00%	0.02%	0.00%	0.00%	0.01%
			Verified	0.20%	0.06%	0.30%	0.00%	0.02%	0.00%	0.00%	0.01%
	Worst affected BTSs due to downtime	<=2%	Reported	0.00%	0.04%	0.63%	0.00%	0.00%	0.00%	0.00%	0.00%
			Verified	0.00%	0.04%	0.63%	0.00%	0.00%	0.00%	0.00%	0.00%
2	Connection Establishment (Accessibility)										
	CSSR (Call Setup Success Rate)	>=95%	Reported	98%	99%	100%	100%	97%	99%	100%	100%
			Verified	98%	99%	100%	100%	97%	99%	100%	100%
	SDCCH/PAGING congestion	<=1%	Reported	0.56%	0.15%	0.20%	0.00%	0.07%	0.00%	0.00%	0.00%
			Verified	0.56%	0.15%	0.23%	0.00%	0.07%	0.22%	0.00%	0.00%
	TCH congestion	<=2%	Reported	0.52%	0.10%	0.20%	0.00%	0.09%	0.00%	0.00%	0.01%
			Verified	0.52%	0.10%	0.23%	0.00%	0.09%	0.15%	0.00%	0.59%
3	Connection maintenance (retainability)										
	CDR	<=2%	Reported	0.41%	0.75%	0.70%	0.00%	0.68%	0.01%	0.00%	0.20%
			Verified	0.41%	0.75%	0.70%	0.00%	0.68%	0.51%	0.00%	0.20%
	Worst affected cells>3% TCH drop	<=5%	Reported	0.00%	0.01%	2.03%	0.00%	0.63%	0.01%	0.01%	0.13%
			Verified	0.34%	0.77%	2.03%	0.00%	0.70%	1.05%	0.01%	0.12%
	Good voice quality	>=95%	Reported	99%	98%	100%	99%	98%	99%	99%	99.00%
			Verified	99%	98%	100%	99%	98%	99%	99%	99.00%
4	POI congestion	<=0.5%	Reported	0	0	0	0	0	0	0	0
			Verified	0	0	0	0	0	0	0	0
(B)	Customer Service Quality Parameters										
5	Metering/billing credibility-Post paid	<= 0.1%	Reported	0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
			Verified	0.06%	0.01%	0.00%	0.00%	0.00%	0.02%	0.00%	0.00%
6	Metering /billing credibility-Pre paid	<= 0.1%	Reported	0.02%	0.00%	0.10%	0.00%	0.00%	0.00%	0.00%	0.00%
			Verified	0.02%	0.03%	0.10%	0.00%	0.00%	0.07%	0.00%	0.01%
7	Resolution of billing/ charging complaints	100% within 4 weeks	Reported	100%	100%	100%	0.00%	0.00%	100%	100%	100%
			Verified	100%	100%	100%	0.00%	0.00%	100%	100%	100%

	Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	$\leq 1 \text{ week}$	Reported	100%	100%	100%	0.00%	0.00%	100%	100%	100%
			Verified	100%	100%	100%	0.00%	0.00%	100%	100%	100%
8	Response time to customers for assistance										
	Accessibility of call centre/Customer Care	$\geq 95\%$	Reported	100%	INCLUDED IN TN REPORTS	99%	0.00%	0.00%	100%	100%	0.00%
			Verified	100%		99%	0.00%	0.00%	100%	100%	NA
	% call answered by operators(voice to voice) within 60 sec.	$\geq 90\%$	Reported	87%		97%	0.00%	0.00%	93%	91%	0.00%
			Verified	93.16%		97%	0.00%	0.00%	93%	91%	NA
9	Termination/closure of service										
	No.of requests for Termination / Closure of service complied within 7 days during the quarter	$\leq 7 \text{ days}$	Reported	100%	100%	100%	0.00%	0.00%	100%	100%	0.00%
			Verified	100%	100%	100%	0.00%	0.00%	100%	100%	NA
10	Time taken for refunds of deposits after closures.	$100\% \text{ within } 60 \text{ days}$	Reported	100%	100%	100%	0.00%	0.00%	100%	100%	0.00%
			Verified	100%	100%	100%	0.00%	0.00%	100%	100%	NA

Critical Analysis (PMR Verification):

The figures proved by all the operators by and large match the figures obtained on verification except very minor changes.

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	
A	Network Service Quality Parameter									
1	Network Availability									
	a) BTS Accumulated Downtime	<=2%	2.10%	0.07%	0.86%	0.08%	0.02%	0.00%	0.08%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	0.59%	0.00%	0.00%	0.00%	0.00%	0.00%
	c) Total no. of BTSs in the licensed service area		1863	2318	1880	1018	1409	1899	375	275
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		2821	119	1168	57	25	0	21	0
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	0	11	0	0	0	0	0
1	Connection Establishment (Accessibility)									
	a) CSSR	>=95%	98.44%	99.16%	97.29%	99.80%	99.35%	99.39%	99.33%	99.44%
	b) SDCCH/PAGING congestion	<=1%	0.57%	0.06%	0.26%	0.01%	0.06%	0.24%	0.00%	0.00%
	c) TCH congestion	<=2%	1.08%	0.14%	0.33%	0.02%	0.04%	0.15%	0.38%	0.00%
2	Connection maintenance									
	a) CDR	<=2%	0.58%	0.91%	0.66%	0.41%	0.99%	0.61%	0.45%	0.11%
	b) Cells having > 3% TCH drop	<=3%	1.59%	0.93%	2.55%	0.03%	5.77%	1.63%	0.27%	0.00%
	c) Good voice quality	>=95%	98.28%	97.16%	97.24%	99.47%	97.86%	98.77%	98.58%	0.00%
	d) No. of cells > 3% TCH drop (Avg.)		81	53	140	1	233	85	3	0
	e) Total no. of cells in the network		5,100	5,676	5,480	3,054	4,040	5,200	1,125	813
3	No of POI having congestion	>=0.5%	0	0	0	0	0	0	0	0
	a) Name of POI not meeting the benchmark		NA	NA	NA	NA	NA	NA	NA	NA
	b) Total No. of call attempts on POI (Avg.)		1,562,179	2,385,476	10,728	28,144	42,345	1,065,471	157,865	117,590

	c) Total traffic served on POI (Erlang) (Avg.)		28,570	60,578	431	512	775	48,187	6,327	3,056	
	d) Total No. of circuits on POI		60,193	108,322	152,015	2,169	1,482	83,294	17,976	7,948	
	e) Total number of working POI Service Area wise		78	132	80	NP	4	29	NP	47	
	f) Equipped Capacity of Network in respect of Traffic in erlang		127,940	186,284	91,538	36,000	56,482	81,896	56,000	90,151	
	g) Total traffic handled in TCBH in erlang		60,067	122,511	29,694	NP	18,319	63,540	0	8,135	
(B)	Customer Service Quality Parameters										
4	Response time to customers for assistance										
	a) Accessibility of call centre	>=95%	96%	INCLUDED IN TN CIRCLE REPORT	100%	NA	99%	61%	100%	99%	
	b) % of call answered by operators(voice to voice) within 60 sec	>=90%	87%		97%	NA	94%	96%	98%	96%	
	c) No. of call attempts to call centre / customer care nos. during TCBH (Avg)		15,487		1,069	NA	38,413	11,217	1,723	1,676	
	d) No. of calls connected and answered successfully to call centre / customer care nos. during TCBH (Avg)		13,465		1,039	NA	36,096	10,717	1,685	1,613	
	NA: Not Applicable, NP: Data Not Provided										

Parameter-wise Findings (Live Data Assessment):

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

- **BTS accumulated downtime (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0.0% and 0.86% except Aircel (2.1%).
- **Worst affected BTSs due to downtime (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0% and 0.59%.
- **Call Setup Success Rate (CSSR) (benchmark $\geq 95\%$):** All operators are meeting the benchmark with values lying between 97.29% and 99.80%.
- **SDCCH/PAGING Channel congestion (benchmark $\leq 1\%$):** All operators are meeting the benchmark with values lying between 0.00% 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 0.0% and 1.08%.
- **Call Drop Rate (CDR) (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0.11% and 0.99%.
- **Cell exceeding 3% TCH drop (benchmark $\leq 3\%$):** All the operators are satisfying the benchmark except Tata GSM (5.77%) with values lying between 0% and 2.55%.
- **Connections with good voice quality (benchmark $\geq 95\%$):** CDMA service providers have declared that the parameter is not system generated. GSM operators are meeting the benchmark with values lying between 97.16% and 99.47%.
- **POI Congestion (benchmark $\leq 0.5\%$):** All the operators are meeting the benchmark. 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 $>95\%$):** All the operators are meeting the benchmark except Vodafone (61%) with values lying between 96% and 100%. For Airtel it is included in TN reports.
- **%age of call answered by operator (Voice to voice) (benchmark $>90\%$):** All the operators are meeting the benchmark except Aircel (87%) with values lying between 94% and 98%. For Airtel it is included in TN reports.

(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)	Network Service Quality Parameter									
1	Network Availability									
	a) BTS Accumulated Downtime	<=2%	1.93%	0.12%	0.48%	0.26%	0.05%	0.00%	0.37%	0.03%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.82%	1.76%	0.29%	0.00%	0.00%	1.33%	0.00%
	c) Total no. of BTSs in the licensed service area		1,863	2,318	1,880	1,018	1,409	1,899	375	275
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		25,862	1,996	6,506	1,904	493	12.75	1,011	55
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	0	11	0	0	0	0	0
2	Connection Establishment (Accessibility)									
	a) CSSR (Call Setup Success Rate)	>=95%	98.30%	99.10%	97.29%	99.69%	99.32%	99.48%	99.36%	99.34%
	b) SDCCH/PAGING congestion	<=1%	0.58%	0.10%	0.32%	0.01%	0.06%	0.14%	0.00%	0.00%
	c) TCH congestion	<=2%	1.27%	0.19%	0.28%	0.09%	0.07%	0.15%	0.35%	0.01%
3	Connection maintenance (retainability)									
	a) CDR	<=2%	0.53%	0.89%	0.72%	0.41%	1.00%	0.59%	0.45%	0.22%
	b) Worst affected cells>3% TCH drop	<=3%	1.51%	1.18%	2.83%	0.10%	5.42%	1.69%	0.27%	0.00%
	c) Good voice quality	>=95%	98.35%	97.26%	96.29%	99.48%	97.85%	98.75%	98.56%	0.00%
	d) Total No. of cells exceeding 3% TCH drop (call drop)(Avg.)		77	67	155	3	219	88	3	0

	e) Total no. of cells in the network		5,100	5,676	5,480	3,054	4,040	5,200	1,125	813
4	No of POI having congestion	$\geq 0.5\%$	0	0	0	0	0	0	0	0
	a) Name of POI not meeting the benchmark		NA	NA	NA	NA	NA	NA	NA	NA
	b) Total No. of call attempts on POI (Avg.)		1,493,978	2,351,066	11,081	30,152	41,770	1,075,253	145,067	108,448
	c) Total traffic served on POI (Erlang) (Avg.)		27,580	57,553	401	631	747	50,352	5,924	2,757
	d) Total No. of circuits on POI		60,193	108,322	152,015	2,169	1,482	87,308	18,038	7,948
	e) Total number of working POI Service Area wise		78	132	80	NP	4	29	NP	47
5	Network Data									
	a) Equipped Capacity of Network Erlang		127,940	186,284	91,538	36,000	56,482	81,896	56,000	90,151
	b) Total traffic in TCBH in erlang (Avg.)		57,428	110,052	27,661	34,622	17,989	60,981	23,814	11,488
	c) Total no. of customers served (as per VLR) on last day of the month		1,721,066	3,109,289	916,977	NA	678,292	1,714,604	728,137	485,462
(B)	Customer Service Quality Parameters									
6	Metering/billing credibility-Post paid	$\leq 0.1\%$	0.04%	0.01%	0.02%	NA	0.62%	0.04%	0.08%	0.19%
	a) No. of bills issued during the period		326,466	580,090	139,309	NA	27,882	314,098	233,307	172,597
	b) No. of bills disputed including billing complaints during the period		115	59	24	NA	173	119	190	329
7	Metering /billing credibility-Pre paid	$\leq 0.1\%$	0.01%	0.02%	0.00%	NA	0.01%	0.08%	0.02%	0.04%
	a) No. of charging / credit / validity complaints during the quarter		351	551	0	NA	249	1,526	218	138
	b) Total no. of pre-paid customers at the end of the quarter		4,042,421	3,504,481	1,305,766	NA	4,067,782	1,888,343	960,292	384,761
8	Resolution of billing/ charging complaints	100% within 4 weeks	100%	100%	100%	NA	100%	100%	100%	100%
	a) No. of billing/(post paid) and charging, credit/validity (pre paid) complaints resolved within 4 weeks during the quarter		466	5,801	24	NA	422	1,645	408	467

	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		466	5,801	24	NP	422	1,645	408	467
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		438	610	24	NP	422	1,645	153	464
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		28	5,191	0	NP	0	0	255	3
	e) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<i><=1 week</i>	100%	100%	100%	NP	100%	100%	100%	100%
9	Response time to customers for assistance									
	a) Accessibility of call centre/Customer Care	<i>>=95%</i>	93%	INCLUDED IN TN CIRCLE REPORT	100%	NP	99%	59%	100%	99%
	b) % call answered by operators(voice to voice) within 60 sec.	<i>>=90%</i>	90%		99%	NP	92%	92%	98%	96%
	c) Total no. of call attempts to call centre& customer care nos. during TCBH (Avg.).		14,794		946	NP	42,675	11,307	2,026	1,984
	d) No. of calls connected and answered successfully to call centre& customer care nos. during TCBH (Avg.).		13,282		941	NP	39,396	10,373	1,982	1,912
10	Termination/closure of service	<i><=7days</i>	100%	100%	100%	NP	100%	100%	100%	100%
	a) Total No. of requests for Termination / Closure of service received during the quarter		2,028	5,015	266	NP	654	3,179	691	2,708
	b) No .of requests for Termination / Closure of service complied within 7 days during the quarter		2,028	5,015	266	NP	654	3,179	691	2,708
11	Time taken for refunds of deposits after closures.	<i>100% within 60 days</i>	100%	100%	100%	NP	97%	100%	100%	98%
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 1.93%.
- **Worst affected BTSs due to downtime (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0% and 1.76%.
- **Call setup success rate (benchmark $\geq 95\%$):** All operators are meeting the benchmark with values lying between 97.29% and 99.69%.
- **SDCCH/PAGING Channel congestion (benchmark $\leq 1\%$):** All operators are meeting the benchmark with values lying between 0.00% and 0.58%. 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 1.27%.
- **Call drop rate (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0.22% and 1%.
- **Cell exceeding 3% TCH drop (benchmark $\leq 3\%$):** All the operators are satisfying the benchmark with value in between 0% and 2.83% except Tata GSM with values 5.42%.
- **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 96.29% and 99.48%.
- **POI Congestion (benchmark $\leq 0.5\%$):** All the operators are meeting the benchmark. 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 $>95\%$):** Aircel (93%) & Vodafone (59%) are not meeting the benchmark.
- **%age of call answered by operator (Voice to voice) (benchmark $>90\%$):** All the operators are meeting the meeting the benchmark.
- **Metering and billing credibility-Post paid (benchmark $\leq 0.1\%$):** Tata GSM (0.62%)& Tata CDMA (0.19%) are not meeting the benchmark.
- **Metering and billing credibility-Pre paid (benchmark $\leq 0.1\%$):** All the operators are meeting the meeting the benchmark.
- **Resolution of billing/ charging complaints (benchmark 100% within 4 weeks):** All operators are meeting the benchmark.
- **Termination/Closure of service (Benchmark ≤ 7 days):** All operators have satisfied the benchmark.
- **Time taken for refunds of deposits after closures (benchmark 100% within ≤ 60 days):** Tata GSM (97%)& Tata CDMA (98%) are not meeting the benchmark.

(1) Sample Coverage

Switches/BSC/BTS details of operators:

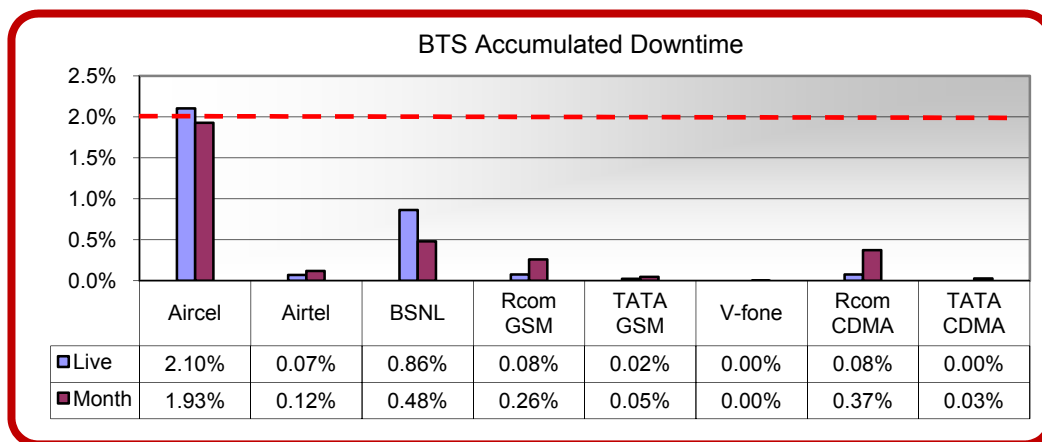
Sl.	Name of Service Provider	No. of MSC/GMSC	No. of BSC	No. of BTS
GSM Operators				
1	Aircel Ltd	12	16	1863
2	Airtel Ltd	17	25	2318
3	BSNL	6	28	1880
4	Reliance Communication (GSM)	1	4	1018
5	Tata Communications (GSM)	1	13	1409
6	Vodafone	4	34	1899
CDMA Operators				
7	Reliance Communication (CDMA)	3	-	375
8	Tata Communications (CDMA)	1	2	275

(2) Performance (Graphical Representation)

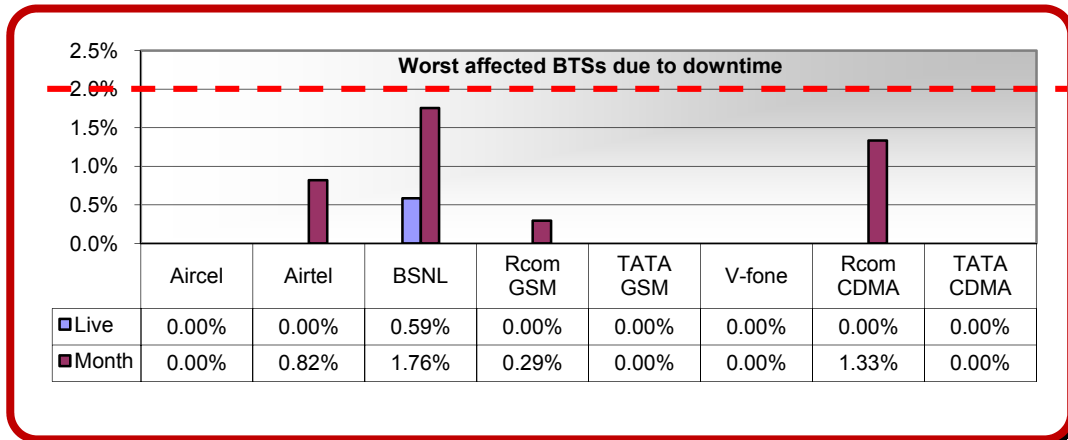
Comparison between Live measurements and One month data Audit – Cellular Mobile Telephone Services

A) NETWORK PERFORMANCE

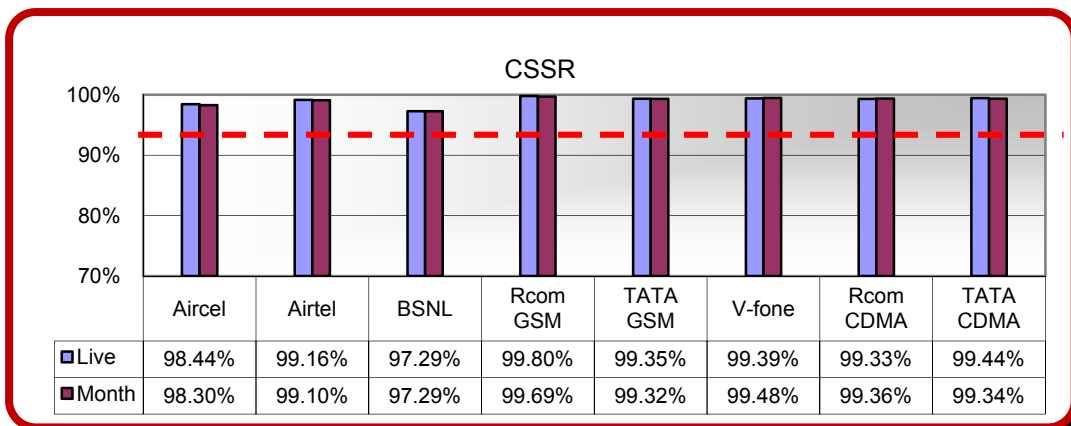
- I. **BTS Accumulated Downtime:** All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data taken in the month of audit except Aircel which is not meeting in live audit.



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

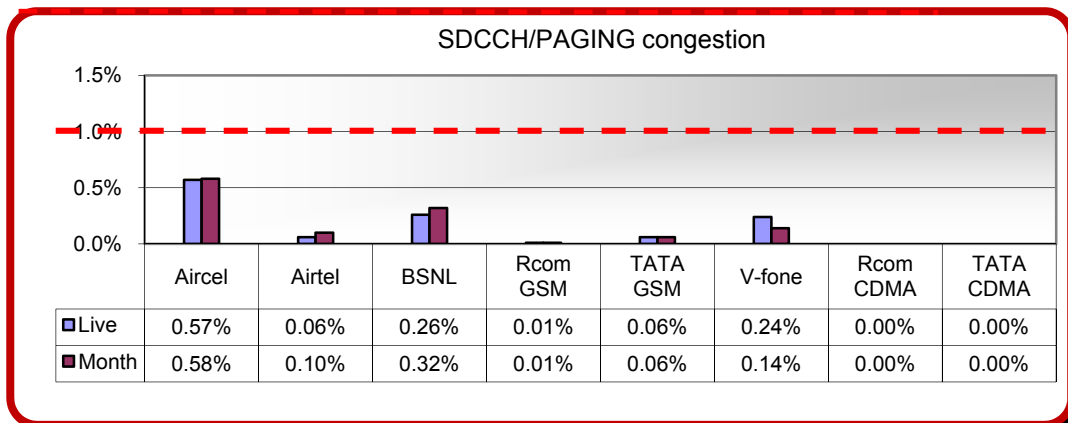


II. **Call Setup Success Rate (CSSR):** All operators are meeting the TRAI benchmarks ($\geq 95\%$) for both one month data and 3 days live data taken in the month of audit

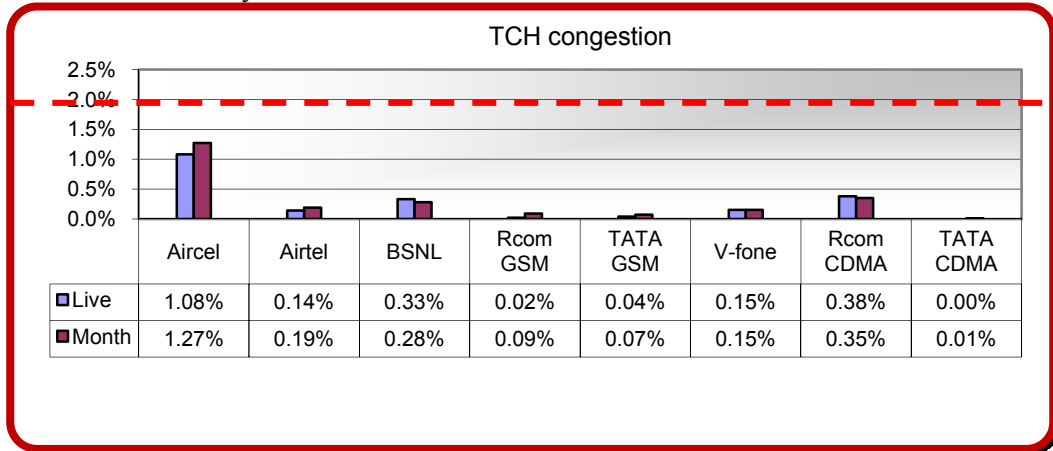


Blocked call rate:

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.

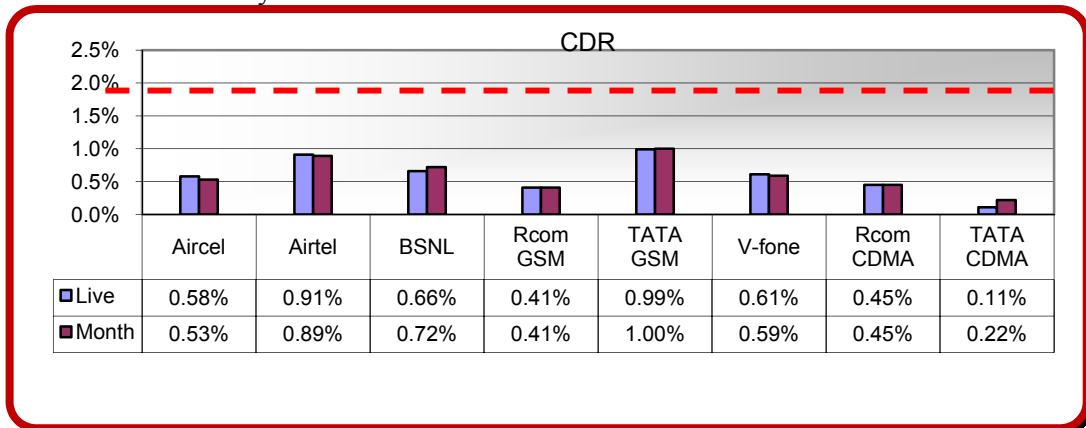


TCH congestion: All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data taken in the month of audit.

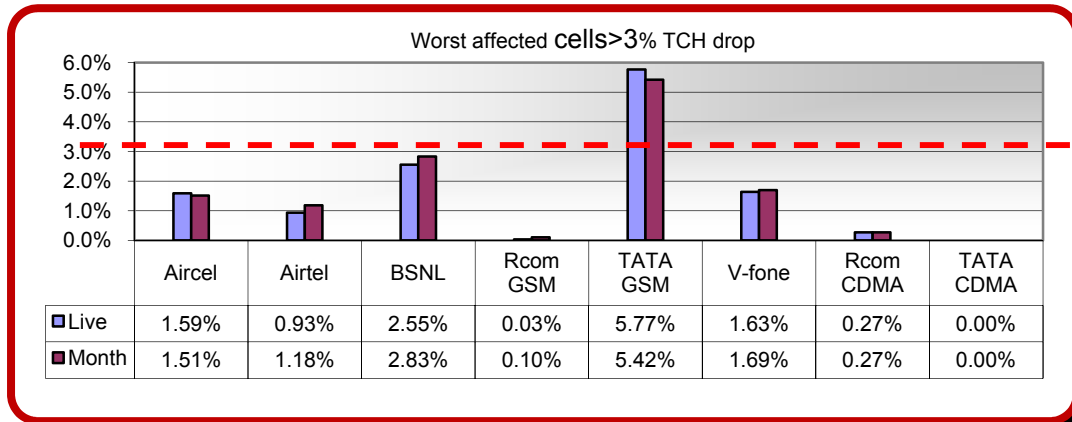


III. Connection Maintainability (Retainability):

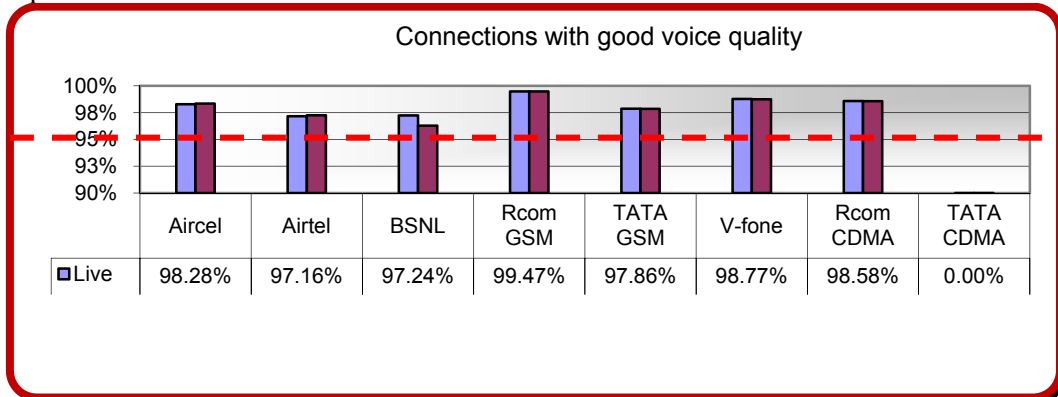
Call Drop Rate (CDR): All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data taken in the month of audit.



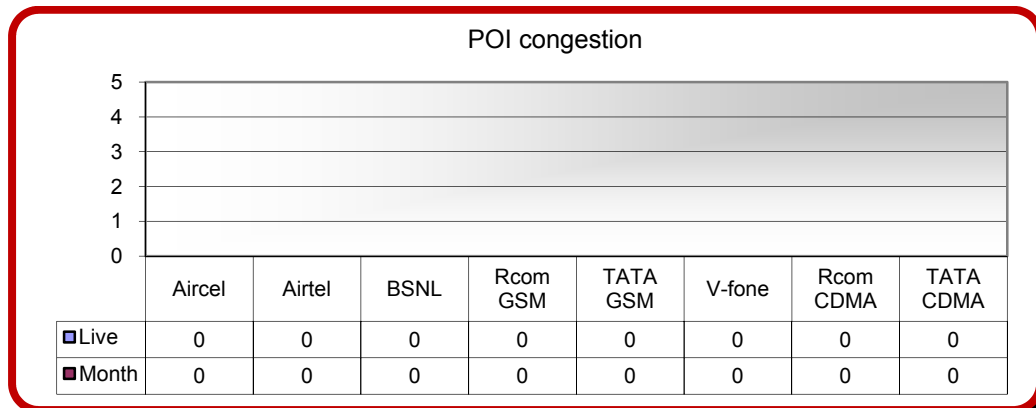
Worst affected Cell exceeding 3% TCH Drop: For both live and month data, all the operators are meeting the benchmark except Tata GSM. In all cases data shows consistency for both live measurement and month data audit.



Percentage of connections with good voice quality (benchmark $\geq 95\%$): 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. RCOM CDMA and TATA CDMA are not having system generated reports.



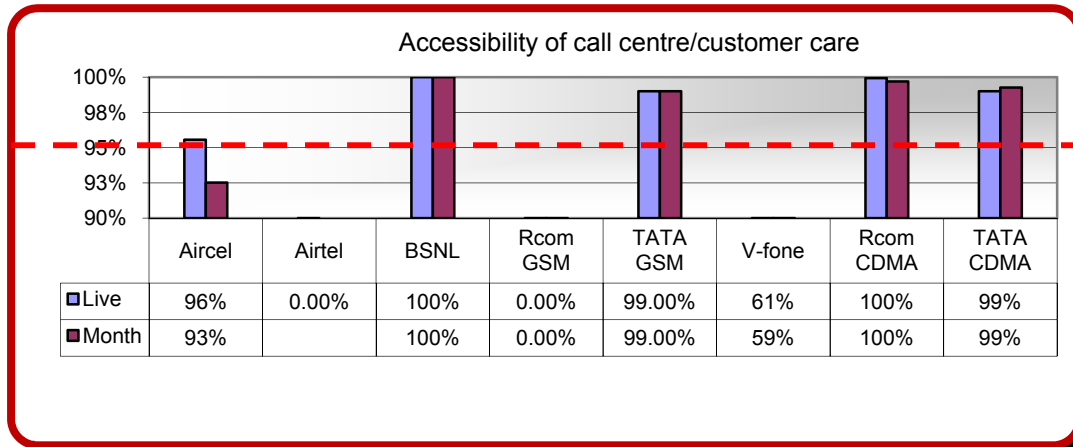
IV. **POI Congestion:** All operators are meeting the TRAI benchmarks ($\leq 0.5\%$) in both live & month data.



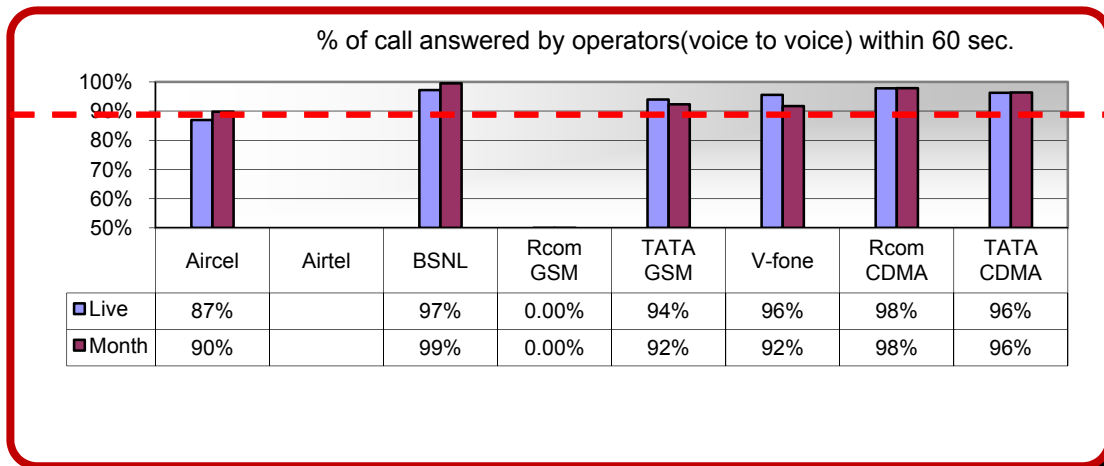
B) CUSTOMER SERVICE QUALITY PARAMETERS

Response time to the customer for assistance:

Percentage of call answered (Electronically): Vodafone for live & month and Aircel for month audit are not meeting the benchmark. Report of Airtel is included in TN circle.



Percentage of call answered by operators (Voice to voice) within 60 sec: AIRCEL is not meeting the benchmark ($\geq 90\%$) for 3 days live data taken in the month of audit. Report of Airtel is included in TN circle.



(3) Critical Analysis

From the data tables it is found that all the operators are meeting the network parameters by and large except for Aircel in “BTS Accumulated Downtime” for live data audit and Tata GSM for both live and month in “Worst affected cells>3% TCH drop”.

Performance related to customer care data is not found to be satisfactory.

For the parameter “accessibility of call centre” Vodafone for 3 days live and month data audit and Airtel for month data audit are not meeting the benchmark.

For the parameter “% call answered by operators(voice to voice) within 60 sec” except for Aircel in 3 days live data audit all other operators are meeting the. Report of Airtel is included in TN circle.

In case of POI congestion, all the operators are found to be performing very well in terms of meeting the benchmark ($\leq 0.5\%$).

(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/ Call Centre Calling / Level 1 Calling)

Q4-2011 Chennai Circle Billing Complaints Customer Feedback Calls						
Calling Operator	Aircel	Airtel	BSNL	Tata GSM	Vodafone	Tata CDMA
Total No. of Calls Attempted	55	120	10	68	105	70
Total No. of calls Answered	50	100	10	60	100	69
Cases resolved with 4 weeks	50	100	10	60	100	69
%age of cases resolved	100%	100%	100%	100%	100%	100%
Note: During the verification in some cases we could not get answer from subscriber; however those whom we contacted have confirmed their complaint and subsequently solved by the operator. Rcom GSM and CDMA data not provided for verification.						

3. Live calling to call centre

Q4 - 2011 Chennai Circle Call Centre Test Calls								
Calling Operator	Aircel	Airtel	BSNL	Rcom GSM	Tata GSM	Vodafone	Rcom CDMA	Tata CDMA
Call Centre No.	121	121	1503	333	*121	111	*333	*121
Total No. of Calls Attempted	200	200	200	200	200	200	200	200
Total No. of calls connected to IVR	200	200	192	200	200	200	200	200
Calls got connected to agent within 60 Sec	200	200	192	200	200	200	200	200
%age of calls got answered	100%	100%	96%	100%	100%	100%	100%	100%
NOTE: Calls were made from the Operators place. Except BSNL (96%) all other 100% cases connected within 60seconds. 200 calls total made i.e. 100 each for Prepaid and Post paid .								

4. Level 1 calling

Q4-2011 Chennai Circle Level 1 calling											
Emergency service numbers calls were made in Operators Office for each category and below given is the success rate.											
Emergency no.	No. of calls made	Aircel	Airtel	BSNL	Rcom GSM	Tata GSM	Vodafone	Rcom CDMA	Tata CDMA		
100	1	1	1	1	1	1	1	1	1	1	Police
101	1	1	1	1	1	1	1	1	1	1	Fire service
102	1	1	1	1	1	1	1	1	1	1	Ambulance
108	1	1	1	1	1	1	1	1	1	1	Emergency Ambulance
139	10	10	10	10	10	10	10	10	10	10	Railway Enquiry
1961	2	2	2	2	2	2	2	2	2	2	Tax related Enquiry
1091	2	2	2	2	2	2	2	2	2	2	Women helpline
1098	2	2	2	2	2	2	2	2	2	2	Child Help line
TOTAL NUMBER OF CALLS = 160 (8* 20)											

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.

Call centre test calls were made 100 numbers for each services pre paid and post paid from operator's office in Chennai. It was found that all the operators are achieving 100% except BSNL (96%).

Level 1 service calls were made from operator's office in Chennai. It was found that these numbers were active and working as per requirement.

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

A sample of 2x50 test calls per Service Providers with in 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	V-fone	Rcom GSM	Tata CDMA
Aircel	-	100%	97%	100%	100%	100%	100%	99%
Airtel	100%	-	100%	100%	100%	97%	100%	100%
BSNL	100%	98%	-	100%	100%	99%	99%	98%
Rcom GSM	100%	100%	100%	-	100%	100%	100%	100%
Tata GSM	97%	100%	100%	100%	-	100%	100%	100%
V-fone	98%	100%	99%	100%	100%	-	100%	100%
Rcom CDMA	100%	100%	100%	100%	99%	100%	-	100%
Tata CDMA	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.

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

i) Sample Coverage

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

DRIVE TEST LOCATIONS

CHENNAI CIRCLE:

High Dense: KILPAUK, VEPERY, PUSAIWALKAM, PULIANTHOPE, BESINBRIDGE, ROYAPURAM, TONDIARPET, NEWWASHERMANPET, ANNA NAGAR, ICF, VILLIVAKKAM, AYENAVARAM, PERAMBUR, TVK NAGAR, PERIYAR NAGAR, CHINTAMANI,

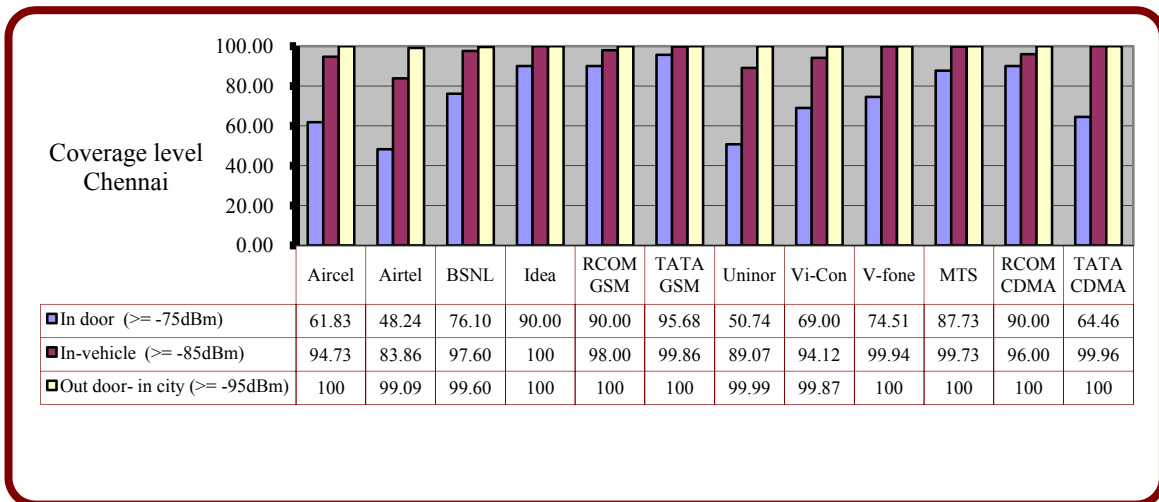
Medium Dense: TONDIARPET, THIRUVOTTIYUR, ENNORE, AMBATTUR, KOLATHUR, PADI, ANNANAGAR,

Low Dense: ENNORE, MANALI, CHINNAMATHUR, MANJAMBAKKAM, MADHAVARAM, PUZHAI, KALLIKUPPAM

Performance (for the respective city) - Operator Assisted Drive Test

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	RCOM	TATA	Uninor	Vi-Con	V-fone	MTS	RCOM	TATA
			GSM Operators						CDMA Operators					
1.1	Call Attempts	Chennai	175	199	196	190	209	186	179	208	175	198	194	186
1.2	Blocked Call Rate (<=3%)	Chennai	1.71	0	5.61	1.05	0	0	0.56	3.85	3.43	0	0	0
1.3	Dropped Call Rate (<=2%)	Chennai	0.57	0	3.57	0.53	0	0	0.56	0.96	0.57	0	0	0.54
1.4	Percentage of connections with good voice quality (=>95%)	Chennai												
	(i) 0-4 (w/o frequency hopping)	Chennai	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.39	96.00	98.68
	(ii) 0-5 (with frequency hopping)	Chennai	96.63	95.00	97.60	95.00	95.26	95.13	96.88	95.00	96.47	NA	NA	NA
1.5	Service Coverage	Chennai												
	In door (>= -75dBm)	Chennai	61.83	48.24	76.10	90.00	90.00	95.68	50.74	69.00	74.51	87.73	90.00	64.46
	In-vehicle (>= -85dBm)	Chennai	94.73	83.86	97.60	100	98.00	99.86	89.07	94.12	99.94	99.73	96.00	99.96
	Outdoor- in city (>= -95dBm)	Chennai	100	99.09	99.60	100	100	100	99.99	99.87	100	100	100	100
1.6	Call Setup Success Rate (>=95%)	Chennai	98.29	100	94.39	97.89	100	100	99.43	96.15	97.44	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:

- “Blocked Call Rate” benchmark is not met by BSNL, VIDEOCON & VODAFONE.
- “Dropped Call Rate” benchmarks is not met by BSNL.

(C) 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**. Operators have been requested to be very effective in parameters like BTS Accumulated Downtime & Worst affected cells > 3% TCH drop.

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

Under **Customer Service Quality** section, benchmark for the parameter “operator answered calls (voice-to-voice) within 60 seconds” it is found satisfying except for Aircel. All the operators have been requested to maintain effective call centre response to customers.

Regarding **Metering/Billing Credibility** most of the operators are meeting the benchmark except TATA GSM & CDMA 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 Rate** BSNL, VIDEOCON & VODAFONE and in **Dropped Call Rate** BSNL did not meet the required benchmark.