

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

Report Period: April 2012 – June 2012

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CHAPTER-1: INTRODUCTION

I. Background

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

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

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

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

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

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

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

II. Objectives and Methodology

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

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

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 2nd quarter (April -June 2012). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken during the period October– December 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	May- 2012	1900-2000 hrs
2	Airtel Ltd	May- 2012	1900-2000 hrs
3	BSNL	May- 2012	1900-2000 hrs
4	Reliance Communication (GSM)	May- 2012	1900-2000 hrs
5	Tata Communications (GSM)	May- 2012	1900-2000 hrs
6	Vodafone	May- 2012	2000-2100 hrs
CDMA Operators			
7	Reliance Communication (CDMA)	May- 2012	1900-2000 hrs
8	Tata Communications (CDMA)	May- 2012	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%	2.81%	0.01%	0.45%	0.43%	0.01%	0.06%	0.39%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%	0.00%	0.00%
2	Connection Establishment (Accessibility)									
	a) CSSR (Call Setup Success Rate)	>=95%	98.21%	99.84%	97.55%	99.89%	99.58%	99.61%	99.03%	99.05%
	b) SDCCH/PAGING congestion	<=1%	0.34%	0.01%	0.98%	0.01%	0.05%	0.12%	0.00%	0.00%
	c) TCH congestion	<=2%	1.44%	0.01%	0.78%	0.01%	0.01%	0.07%	0.00%	0.01%
3	Connection maintenance (retainability)									
	a) CDR	<=2%	0.45%	0.15%	0.64%	0.17%	0.73%	0.49%	0.06%	0.18%
	b) Worst affected cells>3% TCH drop	<=3%	0.92%	0.13%	2.22%	0.00%	3.15%	1.42%	0.00%	0.00%
	c) Good voice quality	>=95%	98.50%	99.66%	97.07%	99.53%	98.48%	98.70%	99.75%	NA
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%	97%	INCLUDED IN TN CIRCLE REPORT	100%	INCLUDED IN TN CIRCLE REPORT	INCLUDED IN TN CIRCLE REPORT	66%	99%	INCLUDED IN TN CIRCLE REPORT
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	66%		99%			90%	93%	
NA: Not Applicable, NP: Data Not Provided										

From the 3 days live data assessment, it is found that all the operators are meeting most of the network parameters.

Deviations in Network Parameters found in following case:

1. "BTS Accumulated Downtime <=2%" with Aircel (2.81%). 2. "Worst affected cells>3% TCH drop" with Tata GSM (3.15%).

Deviations in Customer care Parameters found in following case:

1. "Accessibility of call centre/Customer Care >=95%" with Vodafone (66%). 2. "% call answered by operators (voice to voice) within 60 sec." with Aircel (66%).

One Month Data Audit		Bench- mark	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									
	a) BTS Accumulated Downtime	<=2%	1.67%	0.01%	0.40%	0.49%	0.05%	0.08%	0.51%	0.06%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	0.37%	1.57%	0.80%	0.37%	1.86%	0.00%
	c) Total no. of BTSs in the licensed service area		1952	2425	1906	1018	1506	1934	431	297
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		24195	256	5680	3738	569	1087	1640	131
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	0	7	16	12	7	8	0
2	Connection Establishment (Accessibility)									
	a) CSSR (Call Setup Success Rate)	>=95%	98.20%	99.83%	97.48%	99.89%	99.57%	99.35%	98.78%	99.32%
	b) SDCCH/PAGING congestion	<=1%	0.81%	0.01%	0.78%	0.01%	0.03%	0.23%	0.00%	0.00%
	c) TCH congestion	<=2%	1.41%	0.01%	0.83%	0.01%	0.01%	0.22%	0.01%	0.02%
3	Connection maintenance (retainability)									
	a) CDR	<=2%	0.53%	0.15%	0.81%	0.17%	0.75%	0.51%	0.06%	0.20%
	b) Worst affected cells>3% TCH drop	<=3%	0.99%	0.12%	2.36%	0.00%	3.44%	1.36%	0.00%	0.00%
	c) Good voice quality	>=95%	98.49%	99.66%	95.38%	99.51%	98.45%	98.69%	99.76%	NA
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%	0.05%	0.01%	0.05%			0.02%	0.03%	
6	Metering /billing credibility-Pre paid	<= 0.1%	0.01%	0.01%	0.01%			0.01%	0.04%	
7	Resolution of billing/ charging complaints (within 4 weeks)	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%	INCLUDED IN TN CIRCLE REPORT	INCLUDED IN TN CIRCLE REPORT	100%	100%	INCLUDED IN TN CIRCLE REPORT
8	Response time to customers for assistance									
	a) Accessibility of call centre/Customer Care	>=95%	98%	INCLUDED IN TN CIRCLE REPORT	100%			62%	99%	
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	61%	INCLUDED IN TN CIRCLE REPORT	95%			96%	94%	
9	Termination/closure of service	<=7days	100%	100%	100%			100%	100%	
10	Time taken for refunds of deposits after closures. (within 60 days)	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 most of the network parameters.

Deviation in one Network Parameter found in following cases:

1. "Worst affected cells>3% TCH drop" with Tata GSM (3.44%)

Deviation in Customer care Parameters found in following cases:

1. "Accessibility of call centre/Customer Care $\geq 95\%$ " with Vodafone (62%) & % call answered by operators (voice to voice) within 60 sec. ($\geq 90\%$) with Aircel (61%).

Operator-Assisted Drive Test

The Operator Assisted Drive Test was conducted in and around Chennai for all the operators. Route covered was about around 130Kms 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).

S.No	Parameter	City Name	Aircel	Airtel	BSNL	Idea	RCOM GSM	TATA GSM	Uninor	V-fone	MTS	RCOM CDMA	TATA CDMA
			GSM Operators							CDMA Operators			
1.1	Blocked Call Rate (<=3%)	Chennai	0.52	0	0	0	2.49	0.46	1.44	0.41	0	0	0
1.2	Dropped Call Rate (<=2%)	Chennai	1.57	0	1.28	0	0	0	0	0	0	0	0
1.3	Percentage of connections with good voice quality (>=95%)	Chennai											
	(i) 0-4 (w/o frequency hopping)	Chennai									99.54	97.34	99.19
	(ii) 0-5 (with frequency hopping)	Chennai	97.34	95.00	93.50	95.10	97.00	96.98	94.00	95.88			
1.4	Call Setup Success Rate (>=95%)	Chennai	96.34	99.51	99.81	98.72	97.51	99.54	98.56	99.59	100	100	99.56

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

- "Percentage of connections with good voice quality (>=95%) benchmark is not met by BSNL & UNINOR. All other parameters are found in order. VIDEOCON did not participate in the drive test.

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	1.82%	0.09%	0.47%	0.20%	0.04%	0.00%	0.23%	0.02%
			Verified	1.82%	0.09%	0.47%	0.20%	0.04%	0.00%	0.23%	0.02%
	Worst affected BTSs due to downtime	<=2%	Reported	0.00%	0.47%	1.70%	0.16%	0.02%	0.00%	0.53%	0.00%
			Verified	0.00%	0.47%	1.70%	0.16%	0.02%	0.00%	0.53%	0.00%
2	Connection Establishment (Accessibility)										
	CSSR (Call Setup Success Rate)	>=95%	Reported	98.03%	99.17%	100%	99.61%	97.09%	99.53%	99.39%	99.32%
			Verified	98.03%	99.17%	100%	99.61%	97.09%	99.53%	99.39%	99.32%
	SDCCH/PAGING congestion	<=1%	Reported	0.42%	0.07%	0.17%	0.02%	0.07%	0.11%	0.00%	0.00%
			Verified	0.42%	0.07%	0.17%	0.02%	0.07%	0.11%	0.00%	0.00%
	TCH congestion	<=2%	Reported	0.87%	0.16%	0.30%	0.12%	0.08%	0.14%	0.33%	0.02%
			Verified	0.87%	0.16%	0.30%	0.12%	0.08%	0.14%	0.33%	0.02%
3	Connection maintenance (retainability)										
	CDR	<=2%	Reported	0.48%	0.84%	0.63%	0.49%	0.98%	0.57%	0.40%	0.21%
			Verified	0.48%	0.84%	0.63%	0.49%	0.98%	0.57%	0.40%	0.21%
	Worst affected cells>3% TCH drop	<=3%	Reported	0.61%	0.59%	1.73%	0.23%	1.57%	1.49%	0.35%	0.00%
			Verified	0.61%	0.59%	1.73%	0.23%	1.57%	1.49%	0.35%	0.00%
	Good voice quality	>=95%	Reported	98.48%	97.45%	100%	99.46%	97.94%	98.76%	98.80%	99.00%
			Verified	98.48%	97.45%	100%	99.46%	97.94%	98.76%	98.80%	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	0.03%	0.01%	0.00%	0.00%	0.00%	0.03%	0.07%	0.00%
			Verified	0.03%	0.01%	0.00%	0.00%	0.00%	0.03%	0.07%	0.00%
6	Metering /billing credibility-Pre paid	<= 0.1%	Reported	0.03%	0.02%	0.00%	0.00%	0.00%	0.07%	0.02%	0.00%
			Verified	0.03%	0.02%	0.00%	0.00%	0.00%	0.07%	0.02%	0.00%
7	Resolution of billing/ charging complaints	100% within 4	Reported	100%	100%	100%	0.00%	0.00%	100%	100%	0.00%
			Verified	100%	100%	100%	0.00%	0.00%	100%	100%	0.00%

		<i>weeks</i>										
	Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	≤ 1 week	Reported	100%	100%	100%	0.00%	0.00%	100%	100%	0.00%	
			Verified	100%	100%	100%	0.00%	0.00%	100%	100%	0.00%	
8	Response time to customers for assistance											
	Accessibility of call centre/Customer Care	$\geq 95\%$	Reported	100%	INCLUDE D IN TN REPORTS	100%	0.00%	0.00%	100%	99.56%	0.00%	
			Verified	100%		100%	0.00%	0.00%	100%	99.56%	0.00%	
	% call answered by operators(voice to voice) within 60 sec.	$\geq 90\%$	Reported	90.47%		84%	0.00%	0.00%	95.57%	97.66%	0.00%	
			Verified	90.54%		84%	0.00%	0.00%	95.57%	97.66%	0.00%	
9	Termination/closure of service											
	No.of requests for Termination / Closure of service complied within 7 days during the quarter	≤ 7 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.	<i>100% within 60 days</i>	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	Bench- mark	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%	2.81%	0.01%	0.45%	0.43%	0.01%	0.06%	0.39%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%	0.00%	0.00%
	c) Total no. of BTSs in the licensed service area		1952	2425	1906	1018	1506	1934	431	297
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		3947	24	615	313	13	86	122	2
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	0	1	0	0	0	0	0
1	Connection Establishment (Accessibility)									
	a) CSSR	>=95%	98.21%	99.84%	97.55%	99.89%	99.58%	99.61%	99.03%	99.05%
	b) SDCCH/PAGING congestion	<=1%	0.34%	0.01%	0.98%	0.01%	0.05%	0.12%	0.00%	0.00%
	c) TCH congestion	<=2%	1.44%	0.01%	0.78%	0.01%	0.01%	0.07%	0.00%	0.01%
2	Connection maintenance									
	a) CDR	<=2%	0.45%	0.15%	0.64%	0.17%	0.73%	0.49%	0.06%	0.18%
	b) Cells having > 3% TCH drop	<=3%	0.92%	0.13%	2.22%	0.00%	3.15%	1.42%	0.00%	0.00%
	c) Good voice quality	>=95%	98.50%	99.66%	97.07%	99.53%	98.48%	98.70%	99.75%	NA
	d) No. of cells > 3% TCH drop		49	8	123	0	141	75	0	0
	e) Total no. of cells in the network		5,339	5,936	5,551	3,054	4,477	5,288	1,293	910
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.)		1,597,880	2,994,578	1,340,278	27,064	109,223	1,162,673	143,972	105,789
	c) Total traffic served on POI (Erlang) (Avg.)		30,902	65,481	52,953	446	2,327	51,714	5,236	2,996
	d) Total No. of circuits on POI		57,901	117,487	215,474	2,292	4,302	89,391	15,855	7,364

	e) Total number of working POI Service Area wise		78	142	81	12	3	29	12	41
	f) Equipped Capacity of Network in respect of Traffic in erlang		132,613	192,554	88,763	36,000	61,279	82,259	56,000	90,151
	g) Total traffic handled in TCBH in erlang		62,581	121,090	29,927	NP	20,979	63,250	NP	5,577
(B)	Customer Service Quality Parameters									
4	Response time to customers for assistance									
	a) Accessibility of call centre	>=95%	97%	INCLUDED IN TN CIRCLE REPORT	100%	INCLUDED IN TN CIRCLE REPORT	INCLUDED IN TN CIRCLE REPORT	66%	99%	INCLUDED IN TN CIRCLE REPORT
	b) % of call answered by operators(voice to voice) within 60 sec	>=90%	66%		99%			90%	93%	
	c) No. of call attempts to call centre / customer care nos. during TCBH (Avg)		12,991		6,206			14,890	2,770	
	d) No. of calls connected and answered successfully to call centre / customer care nos. during TCBH (Avg)		8,558		6,143			13,366	2,583	
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:-

- **BTS accumulated downtime (benchmark <=2%):** All operators are meeting the benchmark with values lying between 0.01% and 0.45% except Aircel (2.81%).
- **Worst affected BTSs due to downtime (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 0.05%.
- **Call Setup Success Rate (CSSR) (benchmark >= 95%):** All operators are meeting the benchmark with values lying between 97.55% and 99.89%.
- **SDCCH/PAGING Channel congestion (benchmark <= 1%):** All operators are meeting the benchmark with values lying between 0.01% and 0.98%.
Note: CDMA operators have provided the data for Paging Channel congestion and GSM Operators provided SDCCH Channel congestion.
- **TCH congestion (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0.01% and 1.44%.
- **Call Drop Rate (CDR) (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0.06% and 0.73%.
- **Cell exceeding 3% TCH drop (benchmark <= 3%):** All the operators are satisfying the benchmark except Tata GSM (3.15%) with values lying between 0% and 2.22%.
- **Connections with good voice quality (benchmark >= 95%):** Tata CDMA has declared that the parameter is not system generated. GSM operators are meeting the benchmark with values lying between 97.07% and 99.66%.
- **POI Congestion (benchmark <= 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 (66%) with values lying between 97% and 100%. For Airtel, Rcom GSM, Tata CDMA & GSM 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 (66%) with values lying between 90% and 99%. For Airtel, Rcom GSM, Tata CDMA & GSM it is included in TN reports.

	a) Equipped Capacity of Network Erlang		132,613	192,554	88,763	36,000	61,279	82,259	56,000	90,151
	b) Total traffic in TCBH in Erlang (Avg.) [For Rcom CDMA the values are incl TN]		60,100	114,181	28,077	31,553	21,003	61,855	123,366	4,833
	c) Total no. of customers served (as per VLR) on last day of the month		1,715,375	3,123,921	860,459	2,628,901	736,527	1,720,114	647,854	415,850
(B)	Customer Service Quality Parameters									
6	Metering/billing credibility-Post paid	$\leq 0.1\%$	0.05%	0.01%	0.05%	INCLUDED IN TN CIRCLE REPORT	INCLUDED IN TN CIRCLE REPORT	0.02%	0.03%	INCLUDE D IN TN CIRCLE REPORT
	a) No. of bills issued during the period		350,587	694,210	133,069			349,169	248,955	
	b) No. of bills disputed including billing complaints during the period		177	55	65			67	80	
Metering /billing credibility-Pre paid	$\leq 0.1\%$	0.01%	0.01%	0.01%	0.01%			0.04%		
a) No. of charging / credit / validity complaints during the quarter		438	233	205	154			361		
b) Total no. of pre-paid customers at the end of the quarter		3,352,846	3,645,383	1,508,731	1,804,833			1,003,966		
Resolution of billing/ charging complaints	<i>100% within 4 weeks</i>	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		615	7,496	270	221			441		
b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		615	7,496	270	221			441		
c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		66	288	265	221			107		
d) No. of complaints disposed on account of not considered as valid complaints during the quarter		549	7,208	5	0	334				
e) 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%				
Response time to customers for assistance										
a) Accessibility of call centre/Customer Care	$\geq 95\%$	98%	INCLUDED IN TN CIRCLE REPORT	100%	62%	99%				
b) % call answered by operators(voice to voice) within 60 sec.	$\geq 90\%$	61%		95%	96%	94%				
c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		13,162		6,215	15,284	2,719				

	d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		8,084		5,901			14,681	2,551
10	Termination/closure of service	<i><=7days</i>	100%	100%	100%			100%	100%
	a) Total No. of requests for Termination / Closure of service received during the quarter		2,519	4,531	832			3,863	620
	b) No.of requests for Termination / Closure of service complied within 7 days during the quarter		2,519	4,531	832			3,863	620
11	Time taken for refunds of deposits after closures.	<i>100% within 60 days</i>	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 0.01% and 1.67%.
- **Worst affected BTSs due to downtime (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0% and 1.57%.
- **Call setup success rate (benchmark $\geq 95\%$):** All operators are meeting the benchmark with values lying between 97.48% and 99.89%.
- **SDCCH/PAGING Channel congestion (benchmark $\leq 1\%$):** All operators are meeting the benchmark with values lying between 0.01% and 0.81%.
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 1.41%.
- **Call drop rate (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0.06% and 0.81%.
- **Cell exceeding 3% TCH drop (benchmark $\leq 3\%$):** All the operators are satisfying the benchmark with value in between 0% and 2.36% except Tata GSM with values (3.44%).
- **Connections with good voice quality (benchmark $\geq 95\%$):** Tata CDMA has declared that the parameter is not system generated. All operators are meeting the benchmark with values lying between 95.38% and 99.66%.
- **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 $>95\%$):** Vodafone (62%) is not meeting the benchmark. For Airtel, Rcom GSM, Tata CDMA & GSM it is included in TN reports.
- **%age of call answered by operator (Voice to voice) (benchmark $>90\%$):** Airtel (62%) is not meeting the benchmark. For Airtel, Rcom GSM, Tata CDMA & GSM it is included in TN reports.
- **Metering and billing credibility-Post paid (benchmark $\leq 0.1\%$):** All the operators are meeting the 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):** All operators have satisfied the benchmark.

(1) Sample Coverage

Switches/BSC/BTS details of operators:

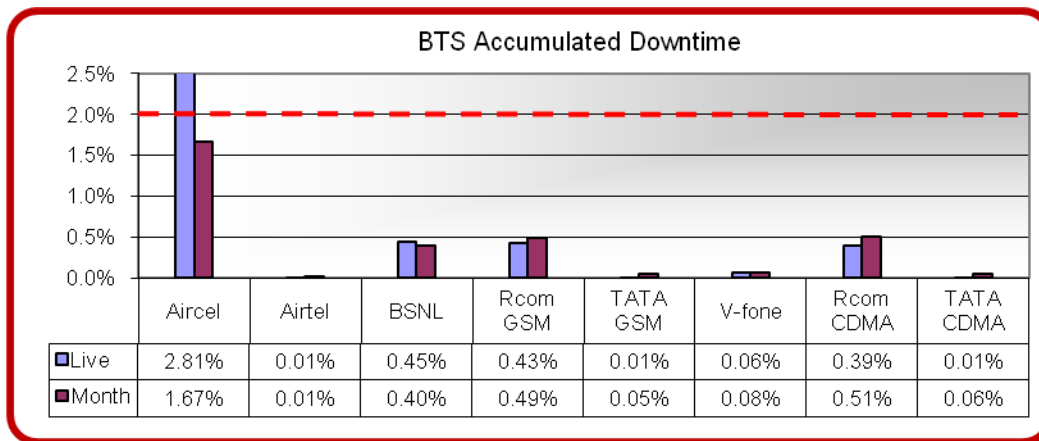
Sl.	Name of Service Provider	No. of MSC/GMSC	No. of BSC	No. of BTS
GSM Operators				
1	Aircel Ltd	12	16	1952
2	Airtel Ltd	17	25	2425
3	BSNL	6	28	1906
4	Reliance Communication (GSM)	1	4	1018
5	Tata Communications (GSM)	1	13	1506
6	Vodafone	4	34	1934
CDMA Operators				
7	Reliance Communication (CDMA)	3	-	431
8	Tata Communications (CDMA)	1	2	297

(2) Performance (Graphical Representation)

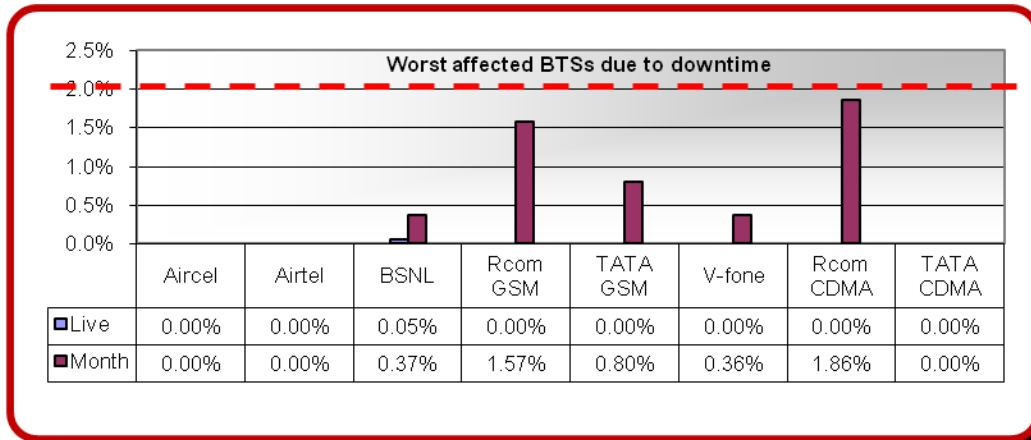
Comparison between Live measurements and One month data Audit – Cellular Mobile Telephone Services

A) NETWORK PERFORMANCE

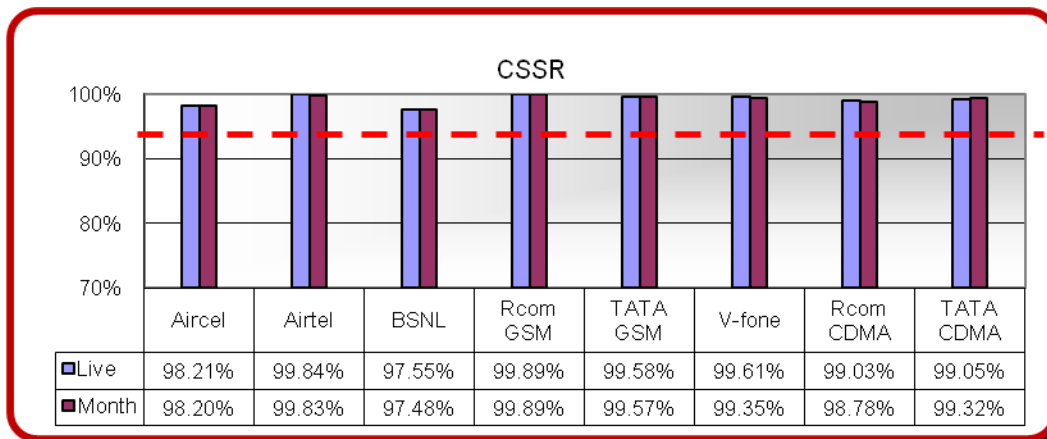
- I. **BTS Accumulated Downtime:** All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data taken in the month of audit except for Aircel (2.81%) in live audit.



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..

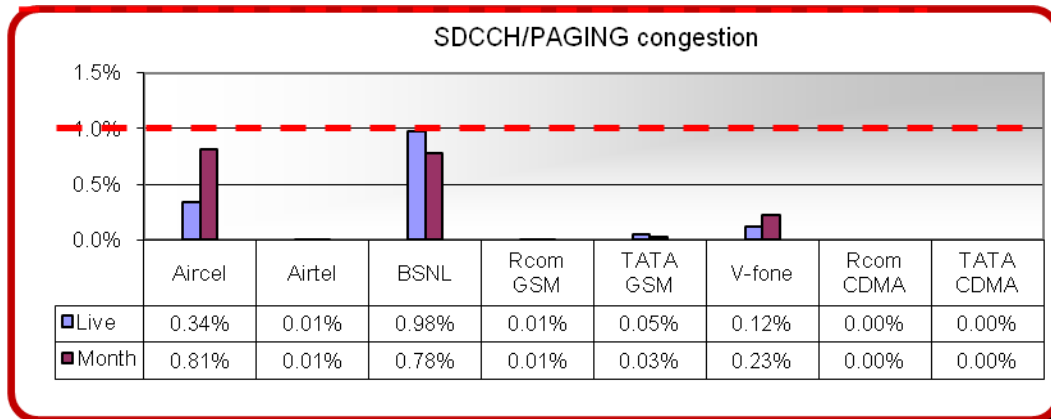


II. Call Setup Success Rate (CSSR): All operators are meeting the TRAI benchmarks ($\geq 95\%$) for both one month data and 3 days live data taken in the month of audit

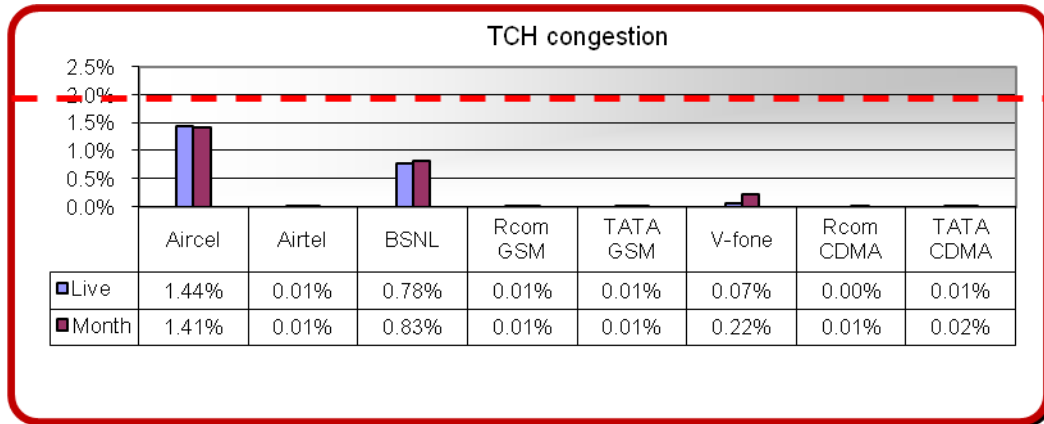


Blocked call rate:

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.

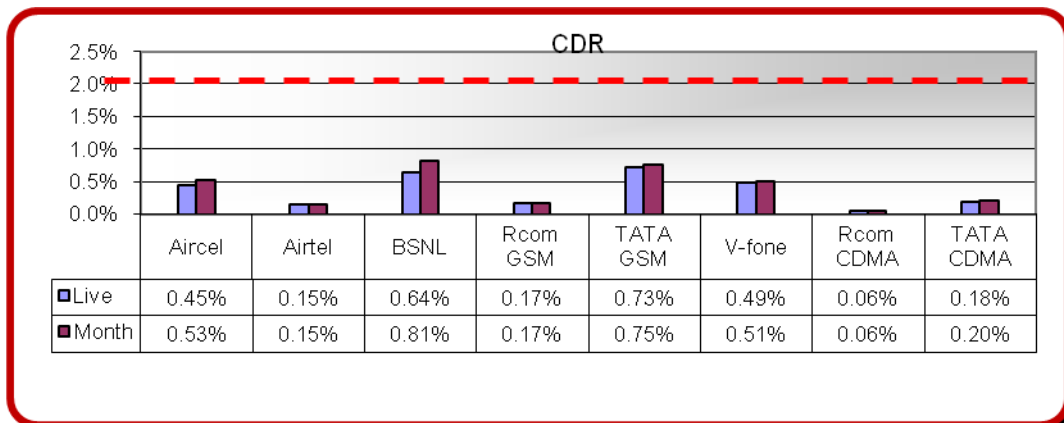


TCH congestion: All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data taken in the month of audit.

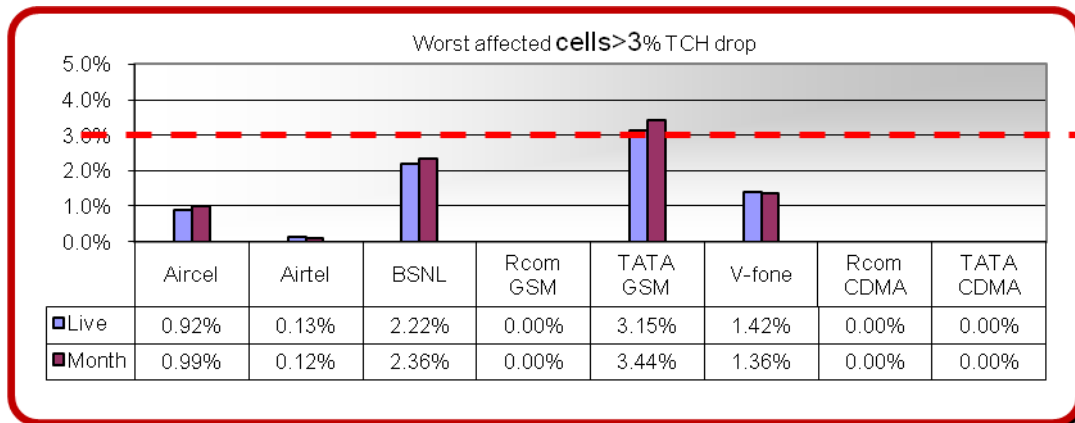


III. Connection Maintainability (Retainability):

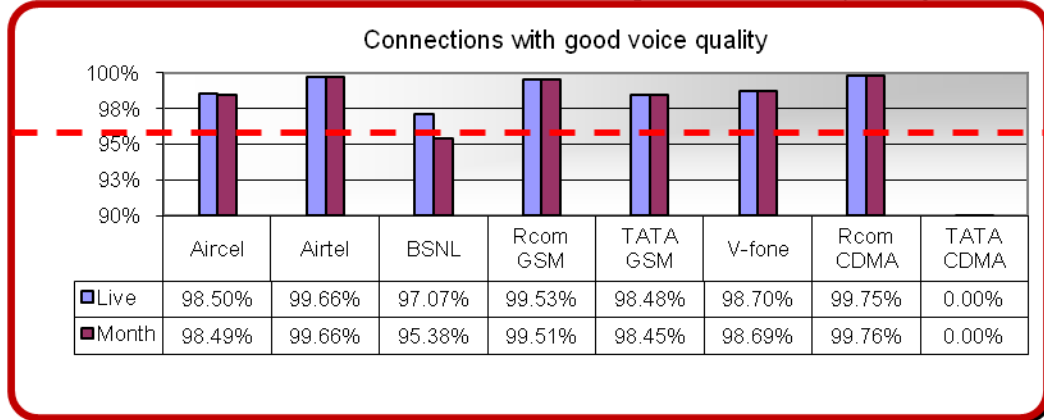
Call Drop Rate (CDR): All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data taken in the month of audit.



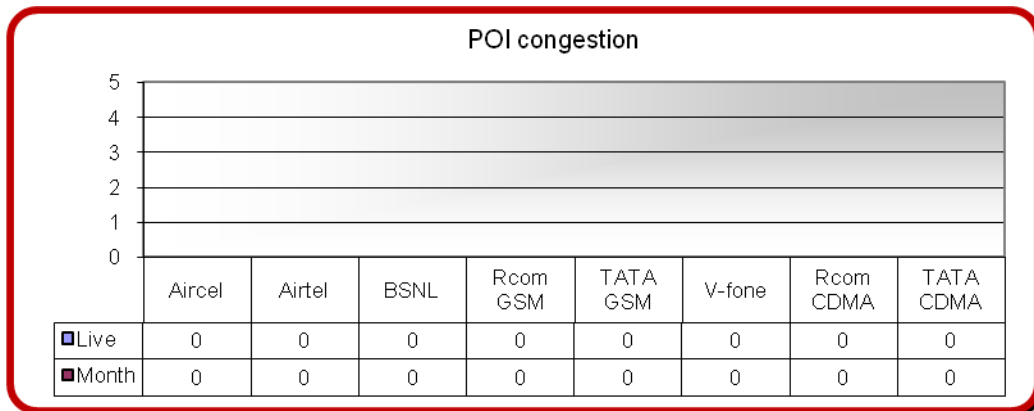
Worst affected Cell exceeding 3% TCH Drop: For both live and month data, all the operators are meeting the benchmark except Tata GSM.



Percentage of connections with good voice quality (benchmark $\geq 95\%$): 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. Tata CDMA has declared that the parameter is not system generated.



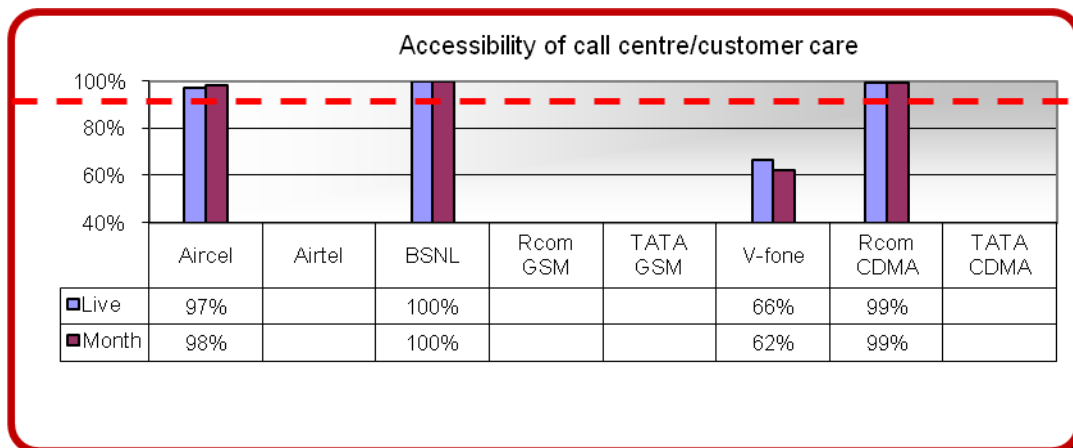
IV. **POI Congestion:** All operators are meeting the TRAI benchmarks ($\Rightarrow 0.5\%$) in both live & month data.



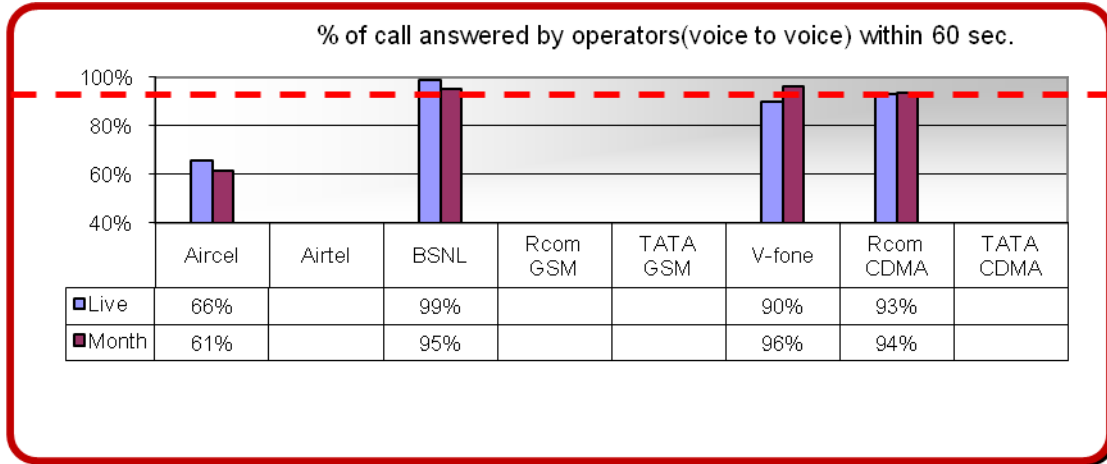
B) CUSTOMER SERVICE QUALITY PARAMETERS

Response time to the customer for assistance:

Percentage of call answered (Electronically): Vodafone for live & month is not meeting the benchmark. Reports of Airtel, Rcom GSM, Tata CDMA & GSM are 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 both live & month data taken in the month of audit. Reports of Airtel, Rcom GSM, Tata CDMA & GSM are included in TN circle.



(3) Critical Analysis

From the data tables it is found that all the operators are meeting most of the network parameters 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”.

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

Performance related to customer care data is found to be satisfactory.

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

For the parameter “% call answered by operators (voice to voice) within 60 sec” Aircel for 3 days live and month data audit not meeting the benchmark. Reports of Airtel, Rcom GSM, Tata CDMA & GSM are included in TN circle

(B) Redressal**i. 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.

ii. Performance: Live calling for billing complaints / Call Centre Calling / Level 1 Calling)

Q1-2012 Chennai Circle Billing Complaints Customer Feedback Calls								
Calling Operator	Aircel	Airtel	BSNL	Rcom GSM	Tata GSM	Vodafone	Rcom CDMA	Tata CDMA
Total No. of Calls Attempted	128	115	119	NA	NA	124	118	NA
Total No. of calls Answered	100	100	100	NA	NA	100	100	NA
Cases resolved with 4 weeks	100	100	100	NA	NA	100	100	NA
%age of cases resolved	100%	100%	100%	NA	NA	100%	100%	NA
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, Tata CDMA and Tata GSM complaints included in Tamil Nadu.								

Q2 - 2012 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	200	200	200	200	200	200
Calls got connected to agent within 60 Sec	200	200	180	200	197	200	200	200
%age of calls got answered	100%	100%	90%	100%	99%	100%	100%	100%
NOTE: Calls were made from the Operators place. Except BSNL (90%) & Tata GSM (99%) for all other operators 100% cases connected within 60seconds. 200 calls total made i.e. 100 each for Prepaid and Post paid.								

Q2-2012 Chennai Circle Level 1 calling										
Emergency Test calls were made at Operators Office at Chennai for each category and for 100 & 101 calls made from different part of Chennai. 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	3	ok	ok	ok	ok	ok	ok	ok	ok	Police
101	3	ok	ok	ok	ok	ok	ok	ok	ok	Fire service
102	1	ok	ok	ok	ok	ok	ok	ok	ok	Ambulance
108	2	ok	ok	ok	ok	ok	ok	ok	ok	Emergency Ambulance
139	5	ok	ok	ok	ok	ok	ok	ok	ok	Railway Enquiry
1961	2	ok	ok	ok	ok	ok	ok	ok	ok	Tax related Enquiry
1091	2	ok	ok	ok	ok	ok	ok	ok	ok	Women helpline
1098	2	ok	ok	ok	ok	ok	ok	ok	ok	Child Help line
TOTAL NUMBER OF CALLS = 160 (8* 20)										

iii. 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 confirmed that the operators had made refunds / adjustments to subscribers in 100% cases as claimed by their records.

Call centre test calls were made 100 numbers for each service Pre paid and Post paid from operator's office in Chennai. It was found that all the operators are achieving 100% except BSNL (90%).

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

(C) 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%	100%	100%	100%	100%	100%	100%
Airtel	100%	-	100%	100%	100%	100%	100%	100%
BSNL	100%	100%	-	100%	100%	100%	100%	100%
Rcom GSM	100%	100%	100%	-	100%	100%	100%	100%
Tata GSM	100%	100%	100%	100%	-	100%	100%	100%
V-fone	100%	100%	100%	100%	100%	-	100%	100%
Rcom CDMA	100%	100%	100%	100%	100%	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 no congestion on the operator networks.

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

1. Sample Coverage

The Operator Assisted Drive Test was conducted at Chennai for all the operators. Route covered was 130Km on city areas within the speed limit of 30Km/hr.

DRIVE TEST LOCATIONS

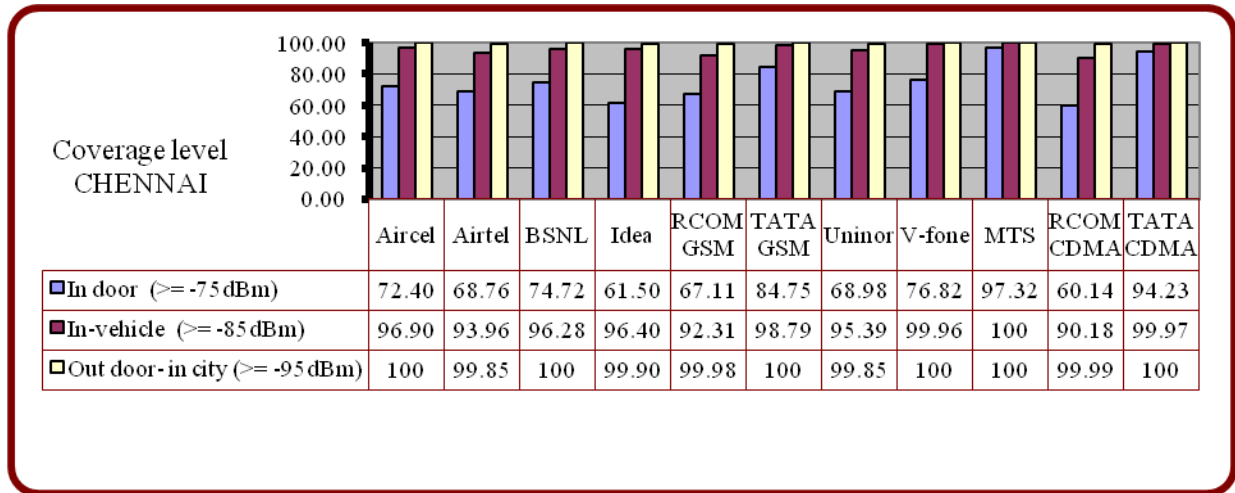
CHENNAI CIRCLE:

High Dense:	KILPAUK, NEW AVADI ROAD, PADI, AMBATTUR EXCHANGE, VALASARAVAKAM, VADAPALANI, MOUNT ROAD, RK SALAI, MYLAPPOOR, OMR ROAD, AIRPORT, TAMBARAM SANTORIUM
Medium Dense:	KATTUPAKAM, VALASAVAKAM, MANDAVELI, ADAYAR, KOTTIVAKAM, ARCOT ROAD, GREAMS ROAD
Low Dense:	AVADI, JB ESTATE, POONAMALEE BYPASS ROAD, KARAYAN CHAVADI, NEELANKARAI, INJAMBAKKAM, SHOLINGANALLUR

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

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	RCOM GSM	TATA GSM	Uninor	V-fone	MTS	RCOM CDMA	TATA CDMA
			GSM Operators							CDMA Operators			
1.1	Call Attempts	Chennai	191	205	234	235	241	219	209	243	221	243	227
1.2	Blocked Call Rate (<=3%)	Chennai	0.52	0	0	0.43	2.49	0.46	1.44	0.41	0	0	0.44
1.3	Dropped Call Rate (<=2%)	Chennai	1.57	0	1.28	0.43	0.41	0	0	0	0	0.41	0
1.4	Percentage of connections with good voice quality (=>95%)	Chennai											
	(i) 0-4 (w/o frequency hopping)	Chennai									99.54	97.34	99.19
	(ii) 0-5 (with frequency hopping)	Chennai	97.34	95.00	93.50	95.10	97.00	96.98	94.00	95.88			
1.5	Service Coverage	Chennai											
	In door (>= -75dBm)	Chennai	72.40	68.76	74.72	61.50	67.11	84.75	68.98	76.82	97.32	60.14	94.23
	In-vehicle (>= -85dBm)	Chennai	96.90	93.96	96.28	96.40	92.31	98.79	95.39	99.96	100	90.18	99.97
	Out door- in city (>= -95dBm)	Chennai	100	99.85	100	99.90	99.98	100	99.85	100	100	99.99	100
1.6	Call Setup Success Rate (>=95%)	Chennai	96.34	99.51	99.81	98.72	97.51	99.54	98.56	99.59	100	100	99.56

Graphical Representation



(3) Critical Analysis

The drive test data was found to be satisfactory for most of the parameters. However, in parameter “Percentage of connections with good voice quality ($\geq 95\%$)” BSNL & UNINOR did not meet the bench mark

(F) 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 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, for the parameter “Accessibility of call centre / Customer Care” it is found that except for Vodafone others are meeting the benchmark. Aircel is not meeting the benchmark for the parameter “% call answered by operators (voice to voice) within 60 sec.” All the operators have been requested to maintain effective call centre response to customers.

From the **Drive Test report**, it is noticed that the overall performance of the operators is **good**. However, only in parameter “Percentage of connections with good voice quality ($\geq 95\%$)” BSNL & Uninor did not meet the benchmark.