

REPORT
ON
AUDIT & ASSESSMENT OF QUALITY OF SERVICE
OF
CELLULAR MOBILE TELEPHONE SERVICE,
FOR
SOUTH ZONE – TAMILNADU 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 Tamilnadu circle. But for parameters such as 'Worst affected cell exceeding 3% TCH drop' and 'BTSs accumulated down time' CBBH (Cell Bouncing Busy Hour) was taken instead of TCBH (Time Consistent Busy Hours) as per the TRAI new regulation 2009. This has resulted in high value for 'Cell exceeding 3% TCH drop' parameter for some of the service providers.

CHAPTER 2: EXECUTIVE SUMMARY

I. Preface

This report highlights the findings for the audit & assessment of Quality of Service of Cellular Mobile Services in Tamil Nadu 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 Mumbai circle (West 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	Idea	May - 2012	1900-2000 hrs
5	Reliance Communication (GSM)	May - 2012	1900-2000 hrs
6	Tata Communications (GSM)	May - 2012	1900-2000 hrs
7	Uninor	May - 2012	2000-2100 hrs
8	Videocon	May - 2012	1900-2000 hrs
9	Vodafone	May - 2012	1900-2000 hrs
CDMA Operators			
10	MTS	May - 2012	1900-2000 hrs
11	Reliance Communication (CDMA)	May - 2012	2000-2100 hrs
12	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		Bench- mark	Aircel	Airtel	BSNL	Idea	Rcom GSM	TATA GSM	Uninor	Vi- con	V- fone	MTS	Rcom CDMA	TATA CDMA
S/N	Name of Parameter													
1	Network Availability													
	a) BTS Accumulated Downtime	<=2%	1.45%	0.01%	1.86%	0.02%	0.10%	0.02%	0.08%	0.30%	0.08%	0.10%	0.11%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	0.87%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2	Connection Establishment (Accessibility)													
	a) CSSR (Call Setup Success Rate)	>=95%	97.72%	99.86%	98.54%	99.70%	99.90%	99.59%	99.17%	98.15%	98.40%	99.03%	99.28%	98.21%
	b) SDCCH/PAGING congestion	<=1%	0.76%	0.02%	0.13%	0.06%	0.00%	0.04%	0.09%	0.01%	0.45%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	1.82%	0.01%	1.65%	0.07%	0.01%	0.05%	0.12%	0.01%	0.85%	0.00%	0.00%	0.16%
3	Connection maintenance (retainability)													
	a) CDR	<=2%	0.51%	0.15%	1.07%	0.39%	0.20%	0.55%	1.14%	0.65%	0.83%	0.97%	0.01%	0.96%
	b) Worst affected cells>3% TCH drop	<=3%	2.70%	0.41%	1.53%	0.70%	0.00%	4.37%	1.97%	1.13%	3.56%	2.22%	0.00%	1.66%
	c) Good voice quality	>=95%	95.20%	99.44%	97.75%	98.00%	99.58%	98.11%	98.72%	98.18%	97.19%	100.00%	99.77%	NA
4	No of POI having congestion	>=0.5%	0	0	0	0	0	0	0	0	0	0	0	0
5	Response time to customers for assistance													
	a) Accessibility of call centre/Customer Care	>=95%	84%	100%	100%	99%	100%	99%	97%	98%	70%	100%	98%	99%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	48%	78%	94%	57%	86%	76%	97%	95%	86%	95%	93%	94%

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 cases: TATA GSM & VODAFONE in respect of parameter "worst affected cells >3% TCH drop".

Deviations in Customer care Parameters found in following cases:

1. AIRCEL & VODAFONE in respect of the parameter "Accessibility of call centre/Customer Care".

2. AIRCEL, AIRTEL, IDEA, RCOM GSM, TATA GSM & VODAFONE in respect of the parameter "% calls answered by operators (voice-to-voice)".

One Month Data Audit		B-mark	Aircel	Airtel	BSNL	Idea	Rcom GSM	TATA GSM	Uninor	Vi-con	V-fone	MTS	Rcom CDMA	TATA CDMA
S/N	Name of Parameter													
(A)	Network Service Quality Parameter													
1	Network Availability													
	a) BTS Accumulated Downtime	<=2%	1.39%	0.01%	0.48%	0.01%	0.09%	0.02%	0.01%	0.27%	0.06%	0.10%	0.08%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	0.83%	0.01%	1.83%	0.00%	0.04%	0.00%	0.00%	1.13%	0.23%	0.00%	0.06%	0.00%
	c) Total no. of BTSs in the licensed service area		6142	8855	5292	3383	2834	3191	2373	2910	6948	1267	1718	736
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		63480	821	18802	246	1835	509	172	5752	2958	949	1051	69
	e) No. of BTSs having accumulated downtime of >24 hours in a month		51	1	97	0	1	0	0	33	16	0	1	0
2	Connection Establishment (Accessibility)													
	a) CSSR (Call Setup Success Rate)	>=95%	98.25%	99.85%	98.69%	99.65%	99.90%	99.60%	99.21%	98.35%	98.41%	99.09%	99.28%	98.76%
	b) SDCCH/PAGING congestion	<=1%	0.70%	0.02%	0.14%	0.05%	0.01%	0.04%	0.22%	0.03%	0.44%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	1.34%	0.01%	1.12%	0.05%	0.01%	0.05%	0.10%	0.04%	0.87%	0.00%	0.00%	0.16%
3	Connection maintenance (retainability)													
	a) CDR	<=2%	0.52%	0.14%	1.02%	0.39%	0.19%	0.55%	1.04%	0.62%	0.81%	0.91%	0.01%	1.04%
	b) Worst affected cells>3% TCH drop	<=3%	2.69%	0.41%	0.10%	0.77%	0.00%	4.32%	1.75%	1.01%	3.42%	2.17%	0.00%	1.48%
	c) Good voice quality	>=95%	95.31%	99.42%	97.85%	97.99%	99.57%	98.05%	98.70%	98.22%	97.16%	100%	99.77%	NA
4	No of POI having congestion	>=0.5%	0	0	0	0	0	0	0	0	0	0	0	0
(B)	Customer Service Quality Parameters													
5	Metering/billing credibility-Post paid	<= 0.1%	0.06%	0.01%	0.04%	0.09%	0.10%	0.18%	NA	NA	0.02%	NA	0.08%	0.15%
6	Metering /billing credibility-Pre paid	<= 0.1%	0.05%	0.01%	0.05%	0.01%	0.04%	0.01%	0.00%	0.02%	0.01%	0.00%	0.03%	0.02%
7	Resolution of billing/ charging complaints	100% within 4 weeks	100%	100%	100%	100%	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%	100%	100%	100%	100%
8	Response time to customers for assistance													
	a) Accessibility of call centre/Customer Care	>=95%	95%	100%	100%	98%	97%	99%	96%	95%	70%	100%	97%	99%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	58%	86%	91%	77%	90%	83%	95%	90%	94%	91%	94%	95%
9	Termination/closure of service	<=7days	100%	100%	100%	100%	100%	100%	NA	NA	100%	NA	100%	100%
10	Time taken for refunds of deposits after closures.(within 60 days)	100%	100%	100%	100%	100%	100%	100%	NA	NA	100%	NA	100%	98%

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.

Deviations in Network Parameters found in following cases:

TATA GSM & VODAFONE in respect of parameter "worst affected cells >3% TCH drop".

Deviations in Customer care Parameters found in following cases:

1. TATA CDMA & GSM in respect of the parameter "Metering/billing credibility-Post paid".
2. VODAFONE in respect of the parameter "Accessibility of call centre/Customer Care".
3. AIRCEL, AIRTEL, IDEA & TATA GSM in respect of the parameter "% calls answered by operators (voice-to-voice)".
4. TATA CDMA in respect of the parameter "Time taken for refunds of deposits after closures.(within 60 days)".

Operator-Assisted Drive Test

The Operator Assisted Drive Test was conducted at Tamilnadu for all the operators. Route covered was about around 100-130 Kms depending on city areas within the speed limit of 30Km/hr. The cities covered were Coimbatore, Dharmapuri and Madurai . In all the cities, zones were selected for covering different density areas (High, Medium & Low dense areas).

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	V-fone	MTS	Rcom CDMA	Tata CDMA	
			GSM Operators						CDMA Operators					
1.1	Blocked Call Rate (<=3%)	Coimbatore	0	0	0	0	0	0.97	1.08	0.49	0	0	0.98	
		Dharmapuri	0	0	4.55	0	0.93	1.84	3.27	1.07	0	0	1.04	
		Madurai	0.49	0.96	0	0	0	1.38	0.48	0	0.45	0	0	
1.2	Dropped Call Rate (<=2%)	Coimbatore	0	0	0	0.50	0	0.49	0	0	0	0	0.49	
		Dharmapuri	0	0	1.01	0.59	0.93	0	2.80	0	0	0	1.38	1.56
		Madurai	0.49	0.00	0.51	0.00	0	0.46	0	0	0	0	0	0
1.3	Percentage of connections with good voice quality (>=95%)													
	(i) 0-4 (w/o frequency hopping)	Coimbatore	0	0	0	0	0	0	0	0	0	98.49	99.50	99.23
		Dharmapuri	0	0	0	0	0	0	0	0	0	99.47	98.12	98.34
		Madurai	0	0	0	0	0	0	0	0	0	98.79	98.60	97.66
	(ii) 0-5 (with frequency hopping)	Coimbatore	95.70	97.70	96.79	91.50	98.69	95.87	95.67	95.30	0	0	0	0
		Dharmapuri	95.00	97.50	95.32	95.20	96.79	96.93	95.20	96.10	0	0	0	0
Madurai		95.00	96.90	95.98	93.80	97.00	95.69	95.30	91.20	0	0	0	0	
1.4	Call Setup Success Rate (>=95%)	Coimbatore	100	100	100	100	100	99.03	98.91	99.51	100	100	99.03	
		Dharmapuri	100	100	95.45	98.22	99.06	98.16	96.62	98.93	100	100	98.96	
		Madurai	99.51	99.04	100	100	100	98.62	99.52	100	99.50	100	100	

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

1. Blocked Call Rate (<=3%) is not met by BSNL and UNINOR in Dharmapuri
 2. Dropped Call Rate (<=2%) is not met by UNINOR in Dharmapuri
 3. Good Voice Quality parameter is not met by IDEA in Coimbatore & Madurai and VODAFONE in Madurai.
- All other parameters are found in order. VIDEOCON did not participate for the drive test in all the cities.

Independent Drive Test

The Independent Drive Test was conducted in three cities / towns in Tamilnadu for the Q2 - 2012 as directed by TRAI. The cities/ towns covered were Rameshwaram (MTS), Sivaganga (BSNL & Videocon), Virudunagar (Vodafone) & Tuticorin (Tata GSM). In Rameshwaram IDEA is having connectivity through ICR. Route covered varies from place to place varying 75 Kms to 117 Kms depending on city area within the speed limit of 30Km/hr. In all the cities / towns, zones were selected for covering different density areas (High, Medium & Low dense areas).

SN	Parameter	MTS (Rameshwaram)	BSNL (Sivaganga)	Videocon (Sivaganga)	TATA GSM (Tuticorin)	Vodafone (Virudunagar)
1.1	Call Attempts	71	98	89	169	146
1.2	Blocked Call Rate (<=3%)	0	0	0	0.59	0
1.3	Dropped Call Rate (<=2%)	0	0	0	0	0
	Percentage of connections with good voice quality (=>95%)					
1.4	(i) 0-4 (w/o frequency hopping)	99.82				
	(ii) 0-5 (with frequency hopping)		99.50	98.18	96.51	93.3
	Service Coverage					
1.5	In door (>= -75dBm)	60.46	62.50	56.95	51.54	84.16
	In-vehicle (>= -85dBm)	91.31	93.40	88.64	99.69	99.20
	Outdoor- in city (>= -95dBm)	100	100	99.03	100	100
1.6	Call Setup Success Rate (>=95%)	100	100	100	99.41	100

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

All the operators are meeting the benchmarks.

CHAPTER-3: AUDIT-PMR VERIFICATION

I. Cellular Mobile Telephone Service

PMR		Bench- mark	Audit	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	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	0.66%	0.08%	0.47%	0.01%	0.05%	0.03%	0.06%	0.12%	0.12%	0.11%	0.06%	0.01%	
			Verified	0.66%	0.08%	0.47%	0.01%	0.05%	0.03%	0.06%	0.12%	0.12%	0.11%	0.06%	0.01%	
	Worst affected BTSs due to downtime	<=2%	Reported	0.46%	0.23%	1.73%	0.00%	0.01%	0.00%	0.00%	0.42%	1.35%	0.64%	0.00%	0.00%	
			Verified	0.46%	0.23%	1.73%	0.00%	0.01%	0.00%	0.00%	0.42%	1.35%	0.64%	0.00%	0.00%	
2	Connection Establishment (Accessibility)															
	CSSR (Call Setup Success Rate)	>=95%	Reported	98.85%	98.13%	98.67%	99.62%	99.84%	97.98%	99.26%	98.91%	98.20%	99.57%	99.41%	98.58%	
			Verified	98.85%	98.13%	98.67%	99.62%	99.84%	97.98%	99.26%	98.91%	98.20%	99.57%	99.41%	98.58%	
	SDCCH/PAGING congestion	<=1%	Reported	0.57%	0.58%	0.10%	0.04%	0.09%	0.15%	0.08%	0.05%	0.45%	0.00%	0.00%	0.00%	
			Verified	0.57%	0.58%	0.10%	0.04%	0.09%	0.15%	0.08%	0.05%	0.45%	0.00%	0.00%	0.00%	
	TCH congestion	<=2%	Reported	0.68%	0.38%	0.23%	0.07%	0.02%	0.29%	0.02%	0.07%	1.10%	0.00%	0.19%	0.63%	
Verified			0.68%	0.38%	0.23%	0.07%	0.02%	0.29%	0.02%	0.07%	1.10%	0.00%	0.19%	0.63%		
3	Connection maintenance (retainability)															
	CDR	<=2%	Reported	0.59%	1.17%	1.23%	0.45%	0.46%	0.66%	1.20%	0.97%	0.87%	0.67%	0.56%	0.80%	
			Verified	0.59%	1.17%	1.23%	0.45%	0.46%	0.66%	1.20%	0.97%	0.87%	0.67%	0.56%	0.80%	
	Worst affected cells>3% TCH drop	<=3%	Reported	1.51%	2.84%	3.00%	1.10%	0.34%	2.01%	1.82%	1.43%	1.98%	2.15%	0.38%	1.16%	
			Verified	1.51%	2.84%	3.00%	1.10%	0.34%	2.01%	1.82%	1.43%	1.98%	2.15%	0.38%	1.16%	
	Good voice quality	>=95%	Reported	95.16%	96.69%	99%	97.99%	99.36%	98.52%	98.71%	97.94%	97.09%	99.78%	98.89%	99.57%	
Verified			95.16%	96.69%	99%	97.99%	99.36%	98.52%	98.71%	97.94%	97.09%	99.78%	98.89%	99.57%		
4	POI congestion	<=0.5 %	Reported	0	0	0	0	0	0	2	0	0	0	0	0	
			Verified	0	0	0	0	0	0	0	2	0	0	0	0	0
(B)	Customer Service Quality Parameters															
5	Metering/billing credibility-Post paid	<= 0.1%	Reported	0.06%	0.01%	0.00%	0.06%	0.10%	0.00%	0.00%	0.00%	0.03%	0.00%	0.09%	0.00%	
			Verified	0.06%	0.01%	0.00%	0.06%	0.10%	0.00%	0.00%	0.00%	0.00%	0.03%	0.00%	0.09%	0.00%
6	Metering /billing credibility-Pre paid	<= 0.1%	Reported	0.13%	0.03%	0.00%	0.02%	0.07%	0.00%	0.04%	0.09%	0.03%	0.02%	0.01%	0.00%	
			Verified	0.13%	0.03%	0.00%	0.02%	0.07%	0.00%	0.04%	0.09%	0.03%	0.02%	0.01%	0.00%	
7	Resolution of billing/ charging complaints	100% within 4 weeks	Reported	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
			Verified	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
	Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	Reported	100%	100%	100%	100%	100%	100%	0.00%	100%	100%	100%	100%	100%	
			Verified	100%	100%	100%	100%	100%	100%	100%	0.00%	100%	100%	100%	100%	

8	Response time to customers for assistance														
	Accessibility of call centre/Customer Care	>=95%	Reported	100%	99.91%	100%	98.11%	98.61%	99.00%	97.89%	97.81%	100%	99.16%	97.89%	99%
			Verified	100%	99.91%	100%	98.11%	98.61%	99.00%	97.89%	97.81%	100%	99.16%	97.89%	99%
	% call answered by operators(voice to voice) within 60 sec.	>=90%	Reported	86.11%	91.45%	83%	56.58%	90.83%	99.00%	86.42%	90.51%	91.35%	90.18%	97.66%	98%
Verified			86.11%	91.45%	83%	56.58%	90.83%	99.00%	86.42%	90.51%	91.35%	90.18%	97.66%	98%	
9	Termination/closure of service														
	No.of requests for Termination / Closure of service complied within 7 days during the quarter	<=7days	Reported	100%	100%	100%	100%	100%	100%	0.00%	0.00%	100%	0.00%	100%	100%
			Verified	100%	100%	100%	100%	100%	100%	100%	0.00%	NA	100%	0.00%	100%
10	Time taken for refunds of deposits after closures.	100% within 60 days	Reported	100%	100%	100%	100%	100%	0%	0.00%	0.00%	100%	0.00%	100%	99%
			Verified	100%	100%	100%	100%	100%	100%	0%	0.00%	NA	100%	0.00%	100%

Critical Analysis (PMR Verification):

- The figures proved to be by and large matching with the data obtained from all the operators for verification.
- UNINOR (2) is not meeting the benchmark in case of POI congestion.
- AIRCEL is not meeting the benchmark for "Metering/Billing Credibility-Pre-paid".
- AIRCEL & BSNL are not meeting the benchmark of "% call answered by operators(voice to voice) within 60 sec.
- TATA-GSM & CDMA both are not meeting the 60 days' benchmark for "Refund of deposits after closure of connection".

CHAPTER-4: DETAILED FINDINGS & ANALYSIS.														
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	Idea	Rcom GSM	TATA GSM	Uninor	Vi-con	V-fone	MTS	Rcom CDMA	TATA CDMA
			GSM Operators										CDMA Operators	
A	Network Service Quality Parameter													
1	Network Availability													
	a) BTS Accumulated Downtime	<=2%	1.45%	0.01%	1.86%	0.02%	0.10%	0.02%	0.08%	0.30%	0.08%	0.10%	0.11%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	0.87%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	c) Total no. of BTSs in the licensed service area		6142	8855	5292	3383	2834	3191	2373	2910	6948	1267	1718	736
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		6400	78	7106	37	210	50	139	635	402	91	131	3
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	0	46	0	0	0	0	0	0	0	0	0
	Connection Establishment (Accessibility)													
	a) CSSR	>=95%	97.72%	99.86%	98.54%	99.70%	99.90%	99.59%	99.17%	98.15%	98.40%	99.03%	99.28%	98.21%
	b) SDCCH/PAGING congestion	<=1%	0.76%	0.02%	0.13%	0.06%	0.00%	0.04%	0.09%	0.01%	0.45%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	1.82%	0.01%	1.65%	0.07%	0.01%	0.05%	0.12%	0.01%	0.85%	0.00%	0.00%	0.16%
2	Connection maintenance													
	a) CDR	<=2%	0.51%	0.15%	1.07%	0.39%	0.20%	0.55%	1.14%	0.65%	0.83%	0.97%	0.01%	0.96%
	b) Cells having > 3% TCH drop	<=3%	2.70%	0.41%	1.53%	0.70%	0.00%	4.37%	1.97%	1.13%	3.56%	2.22%	0.00%	1.66%
	c) Good voice quality	>=95%	95.20%	99.44%	97.75%	98.00%	99.58%	98.11%	98.72%	98.18%	97.19%	100%	99.77%	NA
	d) No. of cells > 3% TCH drop		489	109	241	72	0	409	140	99	742	92	0	37
	e) Total no. of cells in the network		18,135	26,269	15,722	10,256	8,502	9,369	7,102	8,729	20,821	4,153	5,154	2,223
3	No of POI having congestion	>=0.5%	0	0	0	0	0	0	0	0	0	0	0	0
	a) Name of POI not meeting the benchmark		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	b) Total No. of call attempts on POI (Avg.)		4,532,835	4,282,684	1,594,501	969,942	405,949	291,397	647,921	293,838	8,831,346	359,284	397,085	542,162
	c) Total traffic served on POI (Erlang) (Avg.)		77,647	168,781	58,615	22,609	10,407	5,527	14,701	6,969	174,276	6,393	12,039	10,025

	d) Total No. of circuits on POI		160,985	276,980	81,868	44,855	29,803	9,605	26,328	13,492	307,690	18,571	38,154	17,454
	e) Total number of working POI Service Area wise		41	119	37	79	27	9	83	51	62	58	27	33
	f) Equipped Capacity of Network in respect of Traffic in erlang		402,134	436,904	228,323	77,993	60,000	126,051	77,804	60,980	319,211	86,000	116,000	102,281
	g) Total traffic handled in TCBH in erlang		330,874	310,511	144,680	39,839	NP	34,585	28,970	18,278	290,168	24,230	NP	8,784
(B)	Customer Service Quality Parameters													
4	Response time to customers for assistance													
	a) Accessibility of call centre	>=95%	84%	100%	100%	99%	100%	99%	97%	98%	70%	100%	98%	99%
	b) % of call answered by operators(voice to voice) within 60 sec	>=90%	48%	78%	94%	57%	86%	76%	97%	95%	86%	95%	93%	94%
	c) No. of call attempts to call centre / customer care nos. during TCBH (Avg)		7,383	82,634	21,395	915	4,139	2,027	501	546	37,359	656	2,770	1,741
	d) No. of calls connected and answered successfully to call centre / customer care nos. during TCBH (Avg)		3,565	64,241	20,214	525	3,579	1,547	486	518	32,080	623	2,583	1,631
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 Tamilnadu Service Area are as given below:-

- **BTS accumulated downtime (benchmark <=2%):** All operators are meeting the benchmark with values lying between 0.01% and 1.45%.
- **Worst affected BTSs due to downtime (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 0.87%.
- **Call setup success rate (benchmark >= 95%):** All operators are meeting the benchmark with values lying between 97.71% and 99.90%.
- **SDCCH/PAGING Channel congestion (benchmark <= 1%):** All operators are meeting the benchmark with values lying between 0.01% and 0.76%.
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% and 1.82%.
- **Call drop rate (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0.01% and 1.14%.
- **Cell exceeding 3% TCH drop (benchmark <= 3%):** Tata GSM & Vodafone with a value of 4.37% & 3.56% respectively are not meeting the benchmark. Other operators are satisfying the benchmark with values lying between 0.0% and 2.70%.
- **Connections with good voice quality (benchmark >= 95%):** Tata CDMA has declared that the parameter is not system generated. Rest of the GSM operators are meeting the benchmark with values lying between 95.20% and 99.44%.
- **POI Congestion (benchmark <= 0.5%):** All the operators are meeting the benchmark with value of 0%. There was no congestion found overall on the POI, but cases were found where individual POIs are showing high utilization/usage. Some are in the range of over 100% though causing no traffic failure due to overflow technique i.e. the extra traffic is carried over by some other operating POI as has been designed to do so.
- **%age of call answered by operator (electronically) (benchmark >95):** Aircel (84%) & Vodafone (70%) are not meeting the benchmark. All other operators are meeting the benchmark with values lying between 97% and 100%.
- **%age of call answered by operator (Voice to voice) (benchmark >90%):** Aircel (48%), Airtel (78%), Idea (57%), Rcom GSM (86%), Tata GSM (76%) & Vodafone (86%) are not meeting the benchmark. All other operators are meeting the benchmark with values lying between 93% and 97%

	meeting the benchmark													
	b) Total No. of call attempts on POI (Avg.)		4,628,417	4,333,917	1,537,351	974,539	397,586	285,795	595,669	271,469	8,879,186	346,553	362,828	537,971
	c) Total traffic served on POI (Erlang) (Avg.)		77,248	169,177	56,956	22,439	10,167	5,693	14,138	6,469	172,906	6,194	11,660	10,010
	d) Total No. of circuits on POI		160,985	276,980	81,868	44,163	29,803	9,633	26,327	13,460	307,690	18,571	38,062	17,454
	e) Total number of working POI Service Area wise		41	119	37	80	27	9	83	51	62	58	27	33
5	Network Data													
	a) Equipped Capacity of Network Erlang		402,134	436,904	228,323	77,993	60,000	126,051	77,804	60,980	319,211	86,000	116,000	102,281
	b) Total traffic in TCBH in erlang (Avg.)		327,249	302,387	113,396	39,128	45,539	34,379	28,216	17,231	289,250	23,542	103,247	8,116
	c) Total no. of customers served (as per VLR) on last day of the month		9,869,071	9,605,934	3,621,690	1,426,142	2,628,901	1,368,842	965,967	475,101	9,357,282	809,026	1,454,455	415,850
(B)	Customer Service Quality Parameters													
6	Metering/billing credibility-Post paid	<= 0.1%	0.06%	0.01%	0.04%	0.09%	0.10%	0.18%	NA	NA	0.02%	NA	0.08%	0.15%
	a) No. of bills issued during the period		291,388	270,931	153,512	25,197	64,497	54,126	NA	NA	231,106	NA	131,596	174,420
	b) No. of bills disputed including billing complaints during the period		163	23	62	23	64	96	NA	NA	53	NA	103	253
7	Metering /billing credibility-Pre paid	<= 0.1%	0.05%	0.01%	0.05%	0.01%	0.04%	0.01%	0.00%	0.02%	0.01%	0.00%	0.03%	0.02%
	a) No. of charging / credit / validity complaints during the quarter		8,446	913	3,049	207	1,774	311	39	203	754	24	752	78
	b) Total no. of pre-paid customers at the end of the quarter		18,516,402	13,400,795	6,000,011	2,152,593	4,514,346	4,834,268	2,371,433	1,313,761	9,968,475	1,627,859	2,783,334	470,912
8	Resolution of billing/ charging complaints	100% within 4 weeks	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	a) No. of billing/(post paid) and charging, credit/validity (pre paid)		8,609	13,146	3,111	230	1,838	407	39	203	807	24	855	331

	complaints resolved within 4 weeks during the quarter													
	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter	8,609	13,146	3,111	230	1,838	407	39	203	807	24	855	331	
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter	1,218	936	2,301	230	817	59	39	172	807	9	204	331	
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter	7,391	12,210	810	1,252	1,021	348	0	31	0	15	651	0	
	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%	100%	100%	100%	
9	Response time to customers for assistance													
	a) Accessibility of call centre/Customer Care	≥ 95 %	95%	100%	100%	98%	97%	99%	96%	95%	70%	100%	97%	99%
	b) % call answered by operators(voice to voice) within 60 sec.	≥ 90 %	58%	86%	91%	77%	90%	83%	95%	90%	94%	91%	94%	95%
	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		6,693	67,092	19,871	687	3,902	1,759	478	448	35,917	648	2,719	1,676
	d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		3,867	57,382	18,121	530	3,522	1,459	456	405	33,590	588	2,551	1,591
10	Termination/closure of service	$\leq 7d$ ays	100%	100%	100%	100%	100%	100%	NA	NA	100%	NA	100%	100%
	a) Total No. of requests for Termination / Closure of		849	688	3,167	156	334	0	NA	NA	948	NA	384	0

	service received during the quarter													
	b) No.of requests for Termination / Closure of service complied within 7 days during the quarter		849	688	3,167	155	334	0	NA	NA	948	NA	384	0
11	Time taken for refunds of deposits after closures.	<i>100% within 60 days</i>	100%	100%	100%	100%	100%	100%	NA	NA	100%	NA	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 Tamilnadu Service Area are as given below:-

- **BTS accumulated downtime (benchmark <=2%):** All operators are meeting the benchmark with values lying between 0.01% and 1.39%.
- **Worst affected BTSs due to downtime (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 1.83%.
- **Call setup success rate (benchmark >= 95%):** All operators are meeting the benchmark with values lying between 98.25% and 99.90%.
- **SDCCH/PAGING Channel congestion (benchmark <= 1%):** All operators are meeting the benchmark with values lying between 0.01% and 0.70%.
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% and 1.34%.
- **Call drop rate (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0.01% and 1.04%.
- **Cell exceeding 3% TCH drop (benchmark <= 3%):** Tata GSM & Vodafone with a value of 4.32% & 3.42% respectively are not meeting the benchmark. Other operators are satisfying the benchmark with values lying between 0.0% and 2.69%.
- **Connections with good voice quality (benchmark >= 95%):** Tata CDMA has declared that the parameter is not system generated. Rest of the GSM operators are meeting the benchmark with values lying between 95.31% and 99.42%.
- **POI Congestion (benchmark <= 0.5%):** All the operators are meeting the benchmark with value of 0%. There was no congestion found overall on the POI, but cases were found where individual POIs are showing high utilization/usage. Some are in the range of over 100% though causing no traffic failure due to overflow technique i.e. the extra traffic is carried over by some other operating POI as has been designed to do so.
- **%age of call answered by operator (electronically) (benchmark >95):** Except Vodafone (70%) all other operators are meeting the benchmark with values lying between 95% and 100%.
- **%age of call answered by operator (Voice to voice) (benchmark >90%):** Aircel (58%), Airtel (86%), Idea (77%) & Tata GSM (83%) are not meeting the benchmark. Other operators are meeting the benchmark with values lying between 90% and 95%.
- **Metering and billing credibility-Post paid (benchmark <= 0.1%):** Tata CDMA (0.15%) & Tata GSM (0.18%) are not meeting the benchmark.
- **Metering and billing credibility-Pre paid (benchmark <= 0.1%):** All the operators are meeting the benchmark with values lying between 0% and 0.05%.
- **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 except Tata CDMA (98%).

Sample Coverage

Switches/BSC/BTS details of operators:

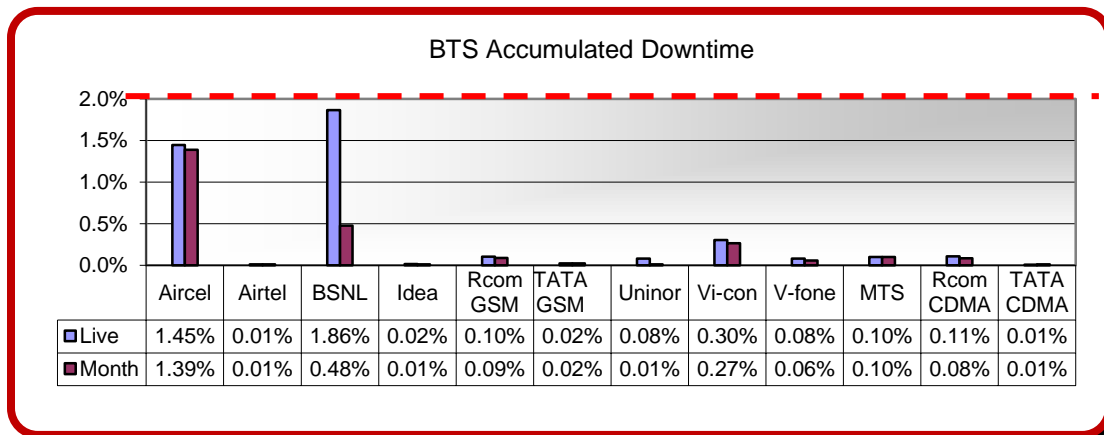
Sl.	Name of Service Provider	No. of MSC/GMSC	No. of BSC	No. of BTS
GSM Operators				
1	Aircel Ltd	10	62	6142
2	Airtel Ltd	34	88	8855
3	BSNL	21	76	5292
4	Idea	2	17	3383
5	Reliance Communication (GSM)	3	14	2834
6	Tata Communications (GSM)	4	18	3191
7	Uninor	3	16	2373
8	Videocon	1	17	2910
9	Vodafone	14	98	6948
CDMA Operators				
10	MTS (CDMA)	2	5	1267
11	Reliance Communication (CDMA)	6	5	1718
12	Tata Communications (CDMA)	3	14	736

(1) Performance (Graphical Representation)

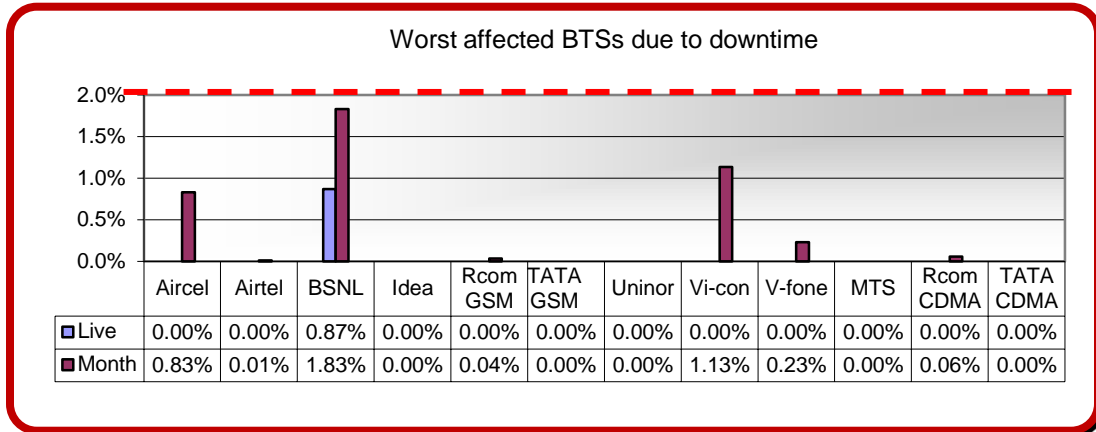
Comparison between Live measurements and One month data Audit – Cellular Mobile Telephone Services

A) NETWORK PERFORMANCE

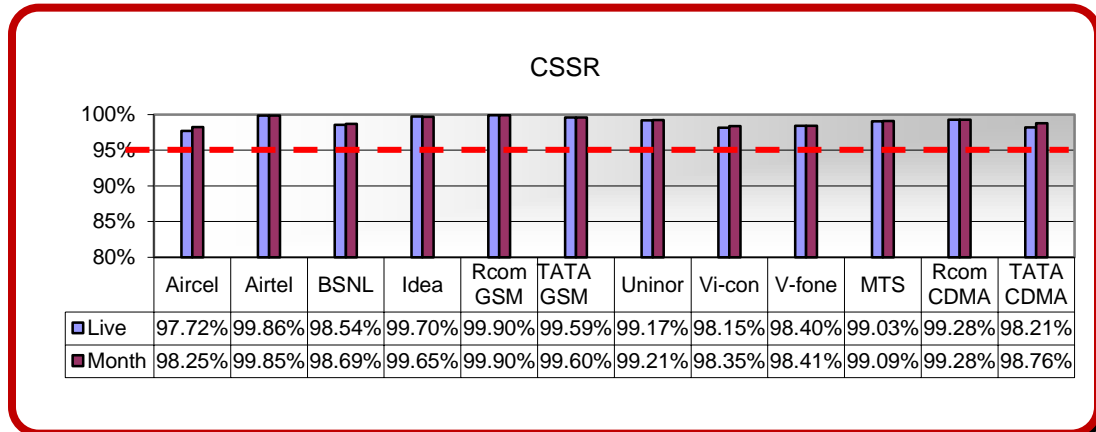
I. BTS Accumulated Downtime: All operators are meeting the TRAI benchmarks (<= 2 %) for both one month data and 3 days live data taken in the month of audit.



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

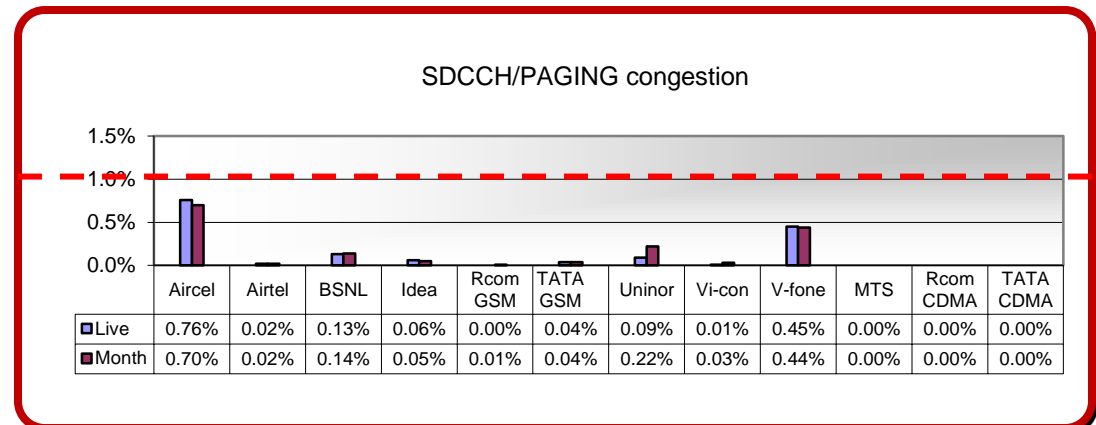


II. Call setup success rate ($\geq 95\%$): All operators are meeting the TRAI benchmarks ($\geq 95\%$) for both one month data and 3 days live data taken in the month of audit.

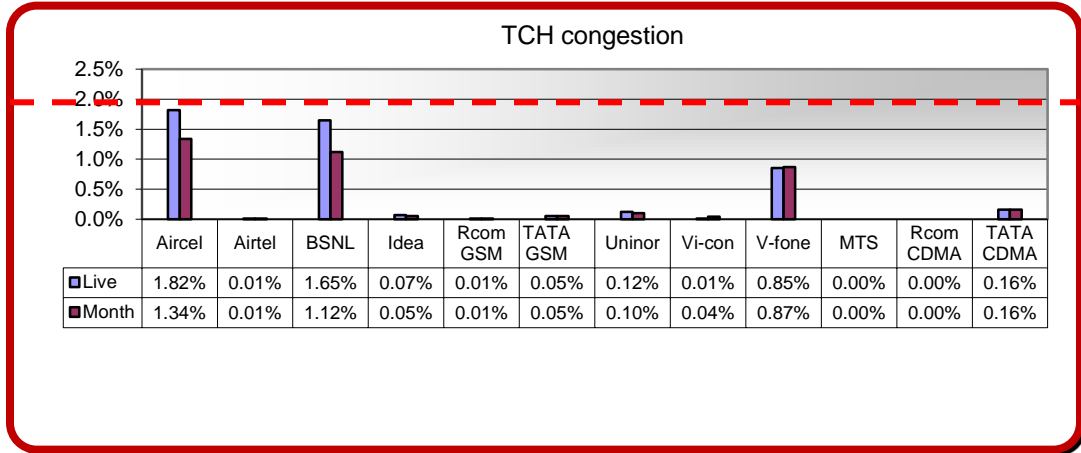


III. Blocked call rate:

SDCCH congestion (1%): 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.

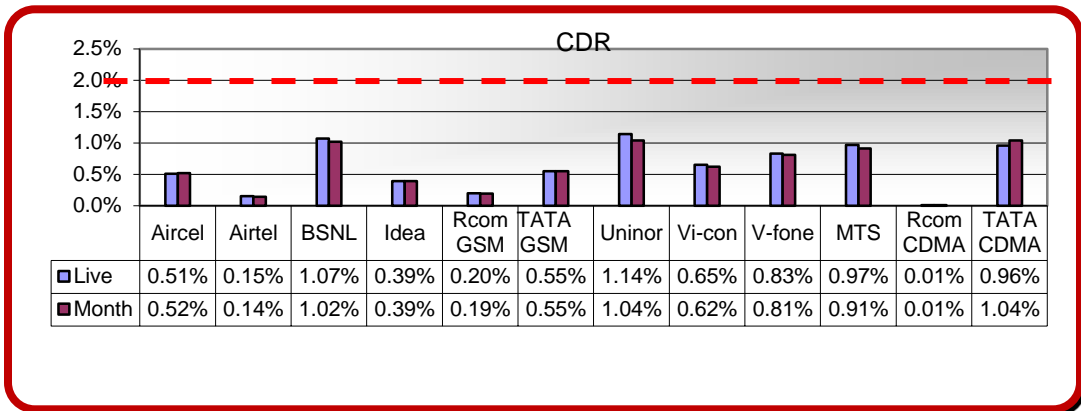


TCH congestion (2%): All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data taken in the month of audit.

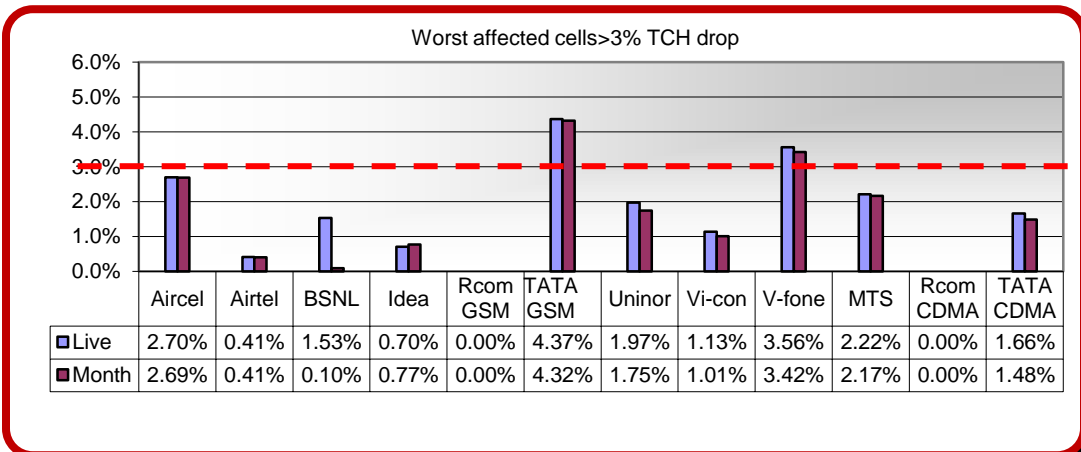


IV. Connection Maintainability (Retainability):

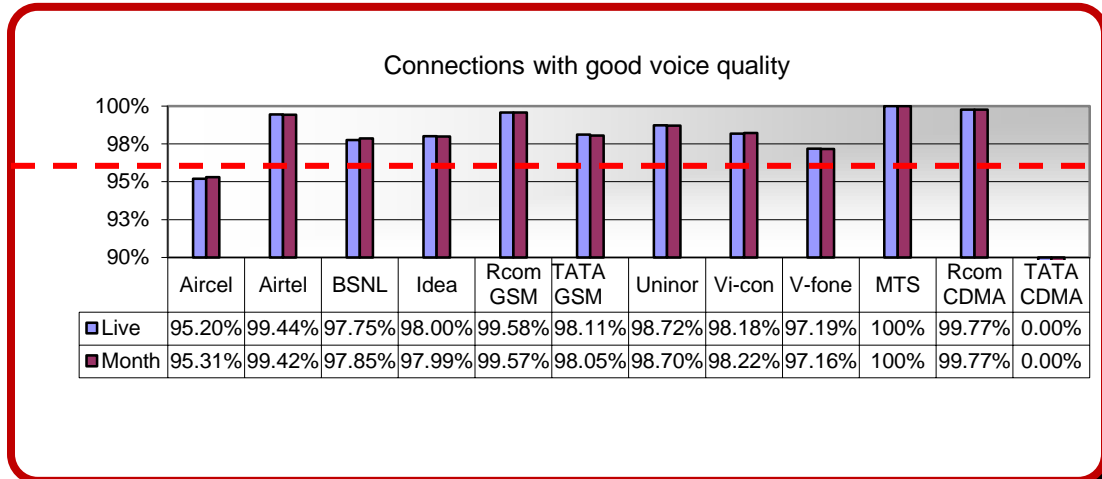
Call drop rate (2%): All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data taken in the month of audit.



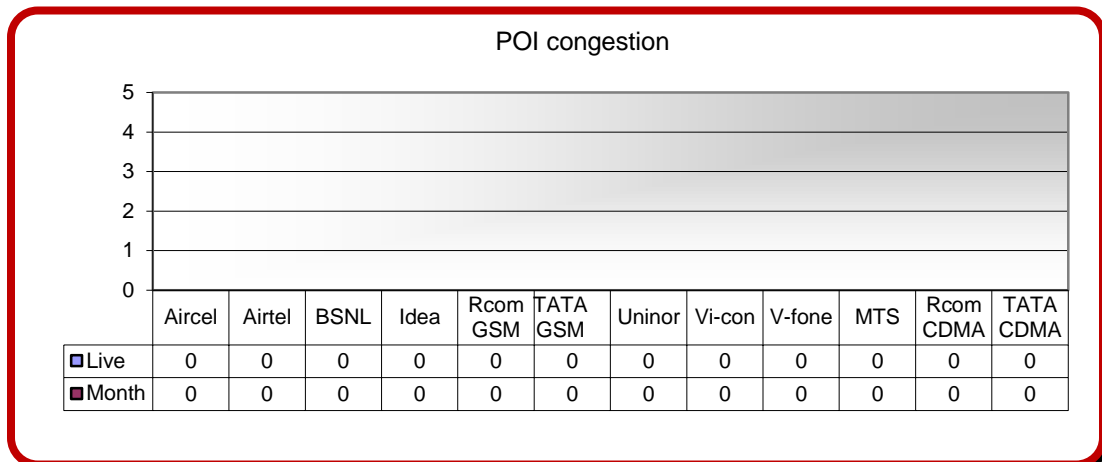
Worst affected Cell exceeding 3% TCH Drop: Tata GSM & Vodafone for both live and month data are found not meeting the benchmark of $\leq 3\%$.



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



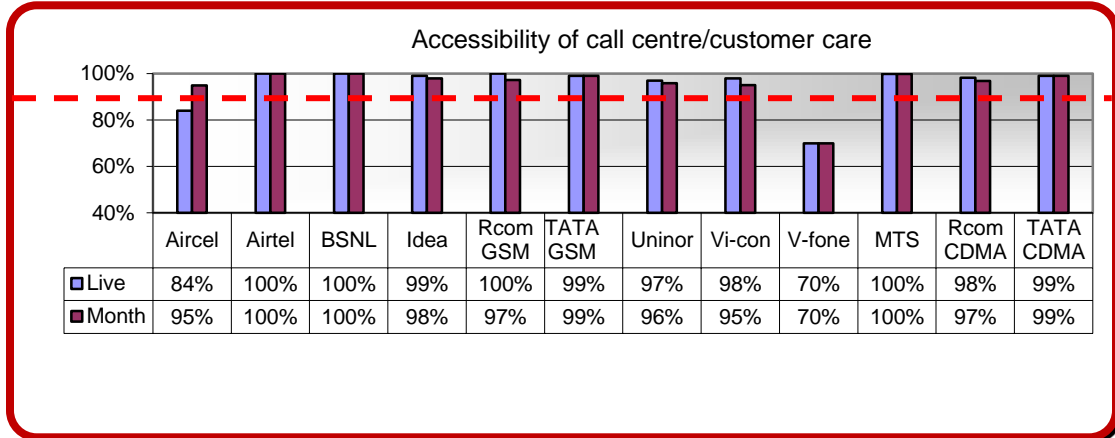
POI Congestion: All operators are meeting the benchmark ($\geq 0.5\%$) for both one month data and 3 days live data taken in the month of audit.



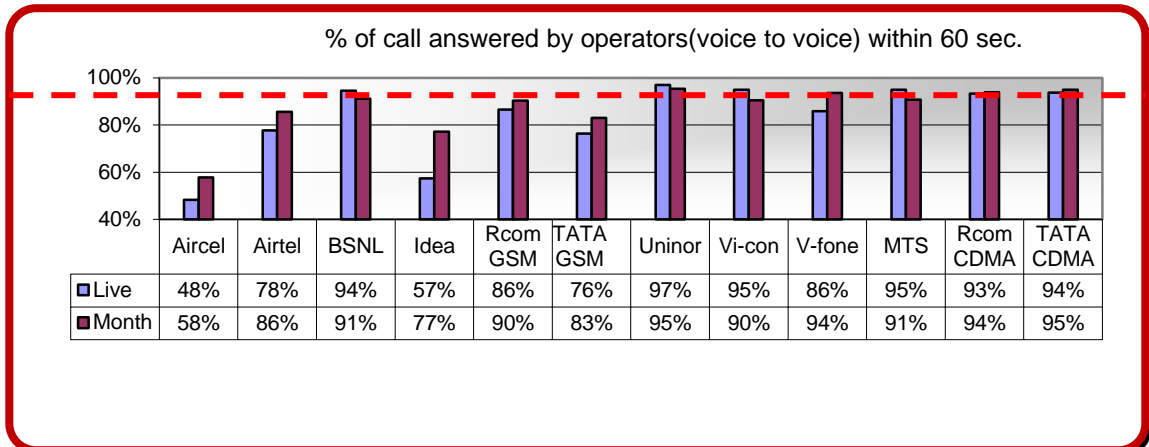
CUSTOMER SERVICE QUALITY PARAMETERS

(A) Response time to the customer for assistance:

Percentage of call answered (Electronically): All operators are meeting the benchmark ($\geq 95\%$) for both 3 days live data & one month data and taken in the month of audit, except for Aircel for live audit and Vodafone for both live and month data audit.



Percentage of call answered by operators (Voice to voice) within 60 sec: Aircel, Airtel, Idea & Tata GSM for both live and month audit & Rcom GSM for live audit are not meeting the benchmark.



(2) Critical Analysis

The above comparative study between live data & month data shows similar trends in both the cases. However, inconsistency in live & month data was found for certain parameters like “Worst affected cells>3% TCH drop” (Tata GSM & Vodafone), “Accessibility of call centre/Customer Care (Aircel & Vodafone) & “% call answered by operators (voice to voice) within 60 sec.” (Aircel, Airtel, Idea, Tata GSM & Vodafone).

B) Redressal**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.

I. Performance (live calling for billing complaints)

Q2 - 2012 Tamil Nadu Circle Billing Complaints Customer Feedback Calls												
Calling Operator	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
Total No. of Calls Attempted	127	133	109	120	131	135	39	115	130	107	109	121
Total No. of calls Answered	100	100	100	100	100	100	31	100	100	94	100	100
Cases resolved with 4 weeks	100	100	100	100	100	100	31	100	100	94	100	100
%age of cases resolved	100%	100%	100%	100%	100%	100%	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.												

II. Performance (live calling to Call Centre)

Q2 - 2012 Tamil Nadu Circle Call Centre Test Calls												
Calling Operator	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
Call Centre No.	121	121	1503	12345	333	*121	198	121	111	155	*333	*121
Total No. of Calls Attempted	200	200	200	200	200	200	100	100	200	100	200	200
Total No. of calls connected to IVR	200	200	200	200	200	200	100	100	200	100	200	200
Calls got connected to agent within 60 Sec	200	200	199	200	200	200	95	100	200	100	200	200
%age of calls got answered	100%	100%	100%	100%	100%	100%	95%	100%	100%	100%	100%	100%
Note: Calls were made from the Operators place. All the calls were connected within 60 seconds except BSNL (199). 200 calls total made i.e. 100 each for Prepaid and Post paid except Uninor, Videocon & MTS who have only Prepaid services.												

III. Performance (level 1 calling)

Q2-2012 Tamil Nadu Circle Level 1 calling														
Emergency calls were made at Chennai and Coimbatore at Operators office for all the category. However, 100 & 101 were taken in Coimbatore, Dharmapuri & Madurai also and below given is the success rate.														
Mobile														
Emergency no.	No. of calls made	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA	
100	3	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	Police
101	3	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	Fire service
102	1	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	Ambulance
108	1	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	Emergency Ambulance
139	4	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	Railway Enquiry
1961	1	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	Tax related Enquiry
1091	1	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	Women helpline
1098	1	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	ok	Child Help line
TOTAL NUMBER OF CALLS :180 (12*15)														

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. For Tata CDMA and Tata GSM it is already included in Chennai.

Calls were made from Operators office at Chennai and Coimbatore for Call Centre test calls. 200 calls total made i.e. 100 each for Prepaid and Post paid except Uninor, Videocon & MTS as these operators are having prepaid services only. Call centre calls were successfully connected within the 60 seconds time for all the operators.

All the level 1 calls were also answered by the agent and found as per requirement. It was confirmed from the called party that the location was nearer to the calling place. However there were occasion calls were not answered in case of Level-1 calling for emergency nos. 100 & 101.

C) Inter- Operator Call Assessment

Sample coverage

A sample of 2x50 test calls per Service Providers with in the licensed service area (Tamilnadu Circle) were made between 1100 to 1400 hrs and between 1600 to 1900 hrs so that TCBH hours for all the operators were covered.

(1) Performance based on live measurement

Calling Operator	Aircel	Airtel	BSNL	Idea	Reliance (GSM)	Tata (GSM)	Uninor	Videocon	Vodafone	MTS	Reliance (CDMA)	Tata (CDMA)
Aircel	-	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Airtel	100%	-	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
BSNL	100%	100%	-	100%	100%	100%	100%	98%	100%	100%	100%	100%
Idea	100%	100%	100%		100%	100%	100%	100%	100%	100%	100%	100%
Reliance (GSM)	100%	100%	100%	100%	-	100%	100%	100%	100%	100%	100%	100%
Tata (GSM)	100%	100%	100%	100%	100%	-	100%	100%	100%	100%	100%	100%
Uninor	100%	100%	100%	100%	100%	100%	-	99%	100%	100%	100%	100%
Videocon	100%	100%	100%	99%	100%	100%	100%	-	100%	100%	100%	100%
Vodafone	100%	100%	100%	100%	100%	100%	100%	100%	-	100%	100%	100%
MTS	100%	100%	100%	100%	100%	100%	100%	100%	100%	-	100%	100%
Reliance (CDMA)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	-	100%
Tata (CDMA)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	-

(2) Critical Analysis

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

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

The Operator Assisted Drive Test was conducted at Tamilnadu for all the operators. Route covered was about around 100-130 Kms depending on city areas within the speed limit of 30Km/hr.

Drive Test Locations***COIMBATORE***

LOW DENSE: TRICHY ROAD, PALAKAD ROAD, SIVANANDHA COLONY, GCT, SARAVANAMPATTI, EDAYARPALAYAM

MEDIUM DENSE: KG THEATRE, ANNA STATUE, VADAVALLI, GP SIGNAL, WOMEN'S POLYTECHNIC, AVINASHI ROAD, ONDIPUDUR, AIRPORT, KOUNDAMPALAYAM, THUDIYALUR.

HIGH DENSE: SINGANALLUR, RAMANATHAPURAM, SUNGAM, G.H, TOWNHALL, OPPANAKARA STREET, SAIBABA KOIL, 100 FEET ROAD, RS PURAM, AVARAMPALAYAM, RAILWAY STATION, GANDHIPURAM BUSSTAND

DHARMAPURI

LOW DENSE: N.H ROAD, HOGANAKAL ROAD, GOVT ARTS COLLEGE, THIRUPATTUR ROAD, KRISHNAGIRI ROAD, PALACODE ROAD

MEDIUM DENSE: ADHIYAMAN KOTTAI, TOLL PLAZA, AATUKARAN PATTI, KUMARASAMI PETTAI, NETHAJI ROAD, SUB JAIL, ADHIYAMAN HOTEL, BUSSTAND, BSNL OFFICE, GOVT MEDICAL COLLEGE,

HIGH DENSE: BHARATHINAGAR BSNL OFFICE, SALEM ROAD, DSP OFFICE, COLLECTORATE, NALLAMPALLI, ANNA STATUE, TAULAK OFFICE, G.H, BSNL ROAD SALEM ROAD, BUS STAND, RAILWAY STATION,,

MADURAI

LOW DENSE: PASUMALAI, THIRUPARANGUNDRAM, THIRU NAGAR, MADURAI KAMARAJ UNIVERSITY, YADHAV COLLEGE, MAHATMA GANDHI NAGAR, AIRPORT

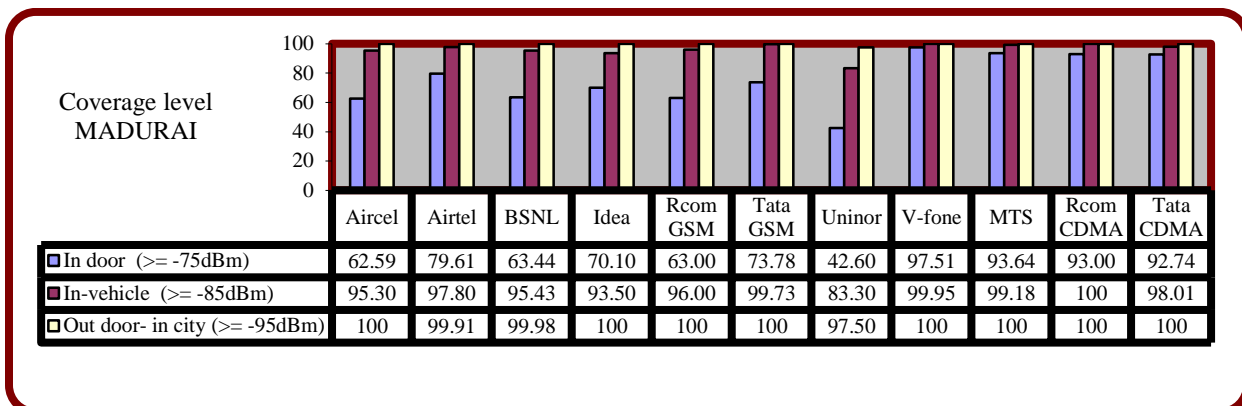
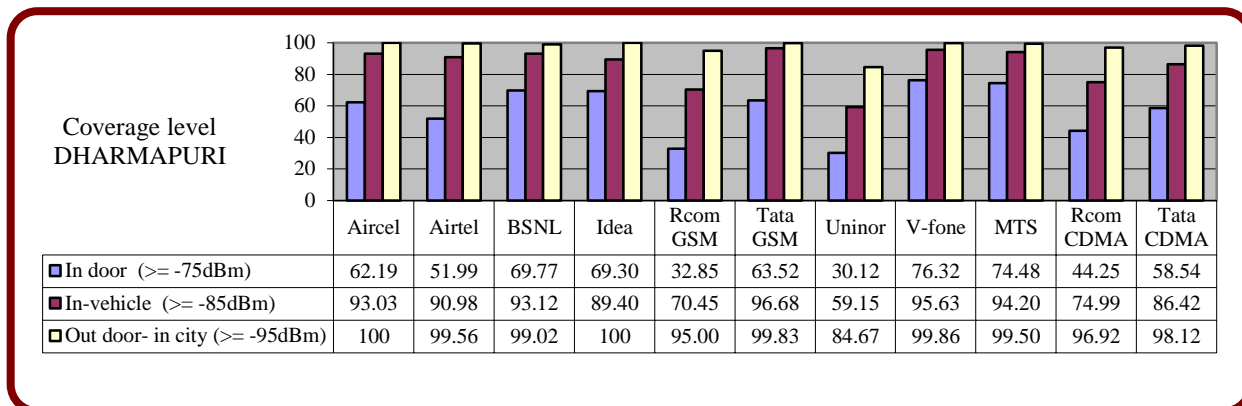
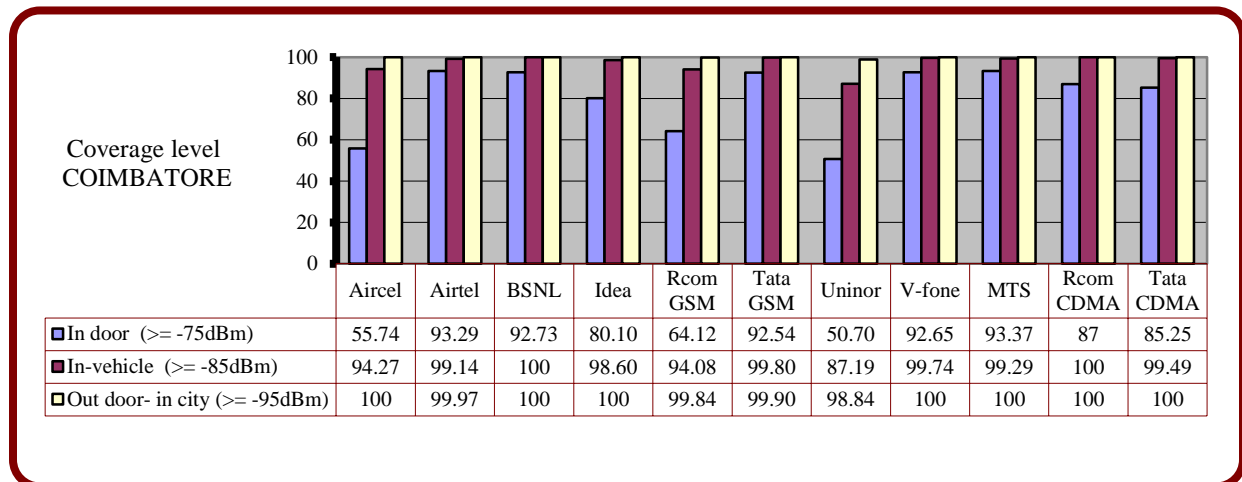
MEDIUM DENSE: PUDUR, COURT, NATHAM ROAD, NARAYANPURAM, NARIMEDU, GANDHI MUSEUM, KK NAGAR, ANNA NAGAR, AVANIAPURAM, B.B KULAM, KAMARAJ SALAI

HIGH DENSE: THALAKULAM BSNL OFFICE, G.H, GORIPALAYAM, ANNA BUSSTAND, SOUTHMASI STREET, WESTMASI STREET, PERIYAR BUSSTAND, VILLAPURAM, MATTUTHAVANI, ARILWAY STATION

2) Performance (for the respective cities) OPERATED 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	Coimbatore	198	186	193	202	202	206	185	205	197	214	205
		Dharmapuri	187	196	198	169	215	163	214	187	179	217	192
		Madurai	204	208	196	202	210	217	207	213	221	216	210
1.2	Blocked Call Rate (<=3%)	Coimbatore	0	0	0	0	0	0.97	1.08	0.49	0	0	0.98
		Dharmapuri	0	0	4.55	0	0.93	1.84	3.27	1.07	0	0	1.04
		Madurai	0.49	0.96	0	0	0	1.38	0.48	0	0.45	0	0
1.3	Dropped Call Rate (<=2%)	Coimbatore	0	0	0	0.50	0	0.49	0	0	0	0	0.49
		Dharmapuri	0	0	1.01	0.59	0.93	0	2.80	0	0	1.38	1.56
		Madurai	0.49	0	0.51	0	0	0.46	0	0	0	0	0
1.4	Percentage of connections with good voice quality (=>95%)												
	(i) 0-4 (w/o frequency hopping)	Coimbatore									98.49	99.50	99.23
		Dharmapuri									99.47	98.12	98.34
		Madurai									98.79	98.60	97.66
	(ii) 0-5 (with frequency hopping)	Coimbatore	95.70	97.70	96.79	91.50	98.69	95.87	95.67	95.30			
		Dharmapuri	95.00	97.50	95.32	95.20	96.79	96.93	95.20	96.10			
Madurai		95.00	96.90	95.98	93.80	97.00	95.69	95.30	91.20				
1.5	Service Coverage												
	In door (>= -75dBm)	Coimbatore	55.74	93.29	92.73	80.10	64.12	92.54	50.70	92.65	93.37	87	85.25
		Dharmapuri	62.19	51.99	69.77	69.30	32.85	63.52	30.12	76.32	74.48	44.25	58.54
		Madurai	62.59	79.61	63.44	70.10	63.00	73.78	42.60	97.51	93.64	93.00	92.74
	In-vehicle (>= -85dBm)	Coimbatore	94.27	99.14	100	98.60	94.08	99.80	87.19	99.74	99.29	100	99.49
		Dharmapuri	93.03	90.98	93.12	89.40	70.45	96.68	59.15	95.63	94.20	74.99	86.42
		Madurai	95.30	97.80	95.43	93.50	96.00	99.73	83.30	99.95	99.18	100	98.01
	Outdoor- in city (>= -95dBm)	Coimbatore	100	99.97	100	100	99.84	99.90	98.84	100	100	100	100
		Dharmapuri	100	99.56	99.02	100	95.00	99.83	84.67	99.86	99.50	96.92	98.12
Madurai		100	99.91	99.98	100	100	100	97.50	100	100	100	100	
1.6	Call Setup Success Rate (>=95%)	Coimbatore	100	100	100	100	100	99.03	98.91	99.51	100	100	99.03
		Dharmapuri	100	100	95.45	98.22	99.06	98.16	96.62	98.93	100	100	98.96
		Madurai	99.51	99.04	100	100	100	98.62	99.52	100	99.50	100	100

Graphical Representation



(3) Critical Analysis

The drive test data are found to be good for most of the parameters for all the operators. However, deviations found with some operators in certain parameters. They are listed below:

1. Blocked Call Rate ($\leq 3\%$) is not met by BSNL and UNINOR in Dharmapuri
2. Dropped Call Rate ($\leq 2\%$) is not met by UNINOR in Dharmapuri
3. Good Voice Quality parameter is not met by IDEA in Coimbatore & Madurai and VODAFONE in Madurai.
4. VIDEOCON did not participate in the drive test for all the three cities.

E) Independent Drive test of the mobile network of service providers

Sample Coverage

The Independent Drive Test was conducted in four cities / towns in Tamilnadu for the Q2 - 2012 as directed by TRAI. The cities/ towns covered were Rameshwaram (MTS), Sivaganga (BSNL & Videocon), Virudunagar (Vodafone) & Tuticorin (Tata GSM). In Rameshwaram IDEA is having connectivity through ICR. Route covered varies from place to place varying 75 Kms to 117 Kms depending on city area within the speed limit of 30Km/hr. In all the cities / towns, zones were selected for covering different density areas (High, Medium & Low dense areas).

Drive Test Locations and Service provider's name:

- | | | |
|----------------|---|-------------------------------------|
| 1) Rameshwaram | - | MTS |
| 2) Sivaganga | - | BSNL & Videocon |
| 3) Virudunagar | - | Vodafone |
| 4) Tuticorin | - | Tata GSM |

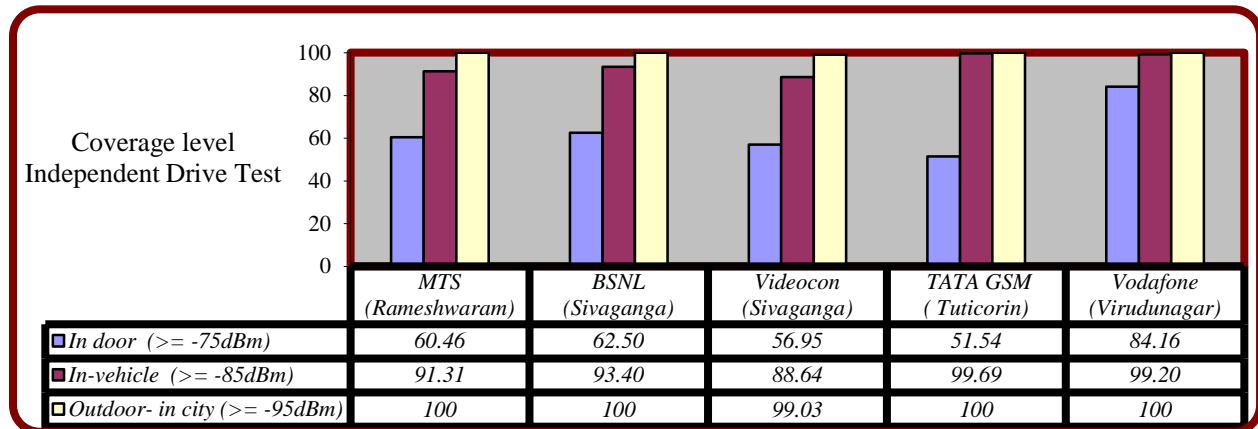
Area Coverage details:

- | | | |
|----------------|---|--|
| 1) Rameshwaram | - | RAMANATHASWAMY TEMPLE NORTH, EAST, WEST & SOUTH CAR STREET, THANUSHKODI ROAD, RAMESHWARAM MAIN ROAD, POLICE STATION, PARAVUTHAM ROAD, CINNAVAN PILLAI STREET |
| 2) Sivaganga | - | UDIYARKULAM, BOSS ROAD, POLICE QUARTERS, MADURAI ROAD, MARUTHUPANDIAR NAGAR. DISTRICT COURT, COLLECTOR OFFICE, MELUR ROAD, SIVAGANGA MEDICAL COLLAGE, JUSTIN MATRIC SCHOOL, KAMRAJ NAGAR, SIVGANGA RAILWAY STATION, MARUTHUPANDIAR NAGAR, GOV'T WOMEN,S COLLEGE |
| 3) Virudunagar | - | OLD BUS STAND, BSNL OFFICE, KAMARAJ NAGAR, RAMAMOORTHY ROAD, BIG STREET, KATCHERY ROAD, UZHAVAR SANDHAI, RAILWAY FEEDER ROAD, TKSP NAGAR, RAMACHANDRA NAGAR, NANDHAVAN SALAI, ROSHALPATTY ROAD, LAKSHMI NAGAR, RADHAKRISHNAN ROAD, PARALI ROAD, ROSHALPATTY, KKSSN NAGAR, NPPV NAGAR, PANDIAN NAGAR |
| 4) Tuticorin | | ANNA NAGAR, OLD BUS STAND, R. S. CORPORATION OFFICE, BEACH ROAD, MATTAKADAI, KRISHNAPURAM, BAZAR, SINNAMANI NAGAR, BRYAN NAGAR, CGE COLONY, MILLERPURAM, GEORGE ROAD, VVD JUNCTION, RAMAICHIYAPURAM, THALAMUTHU NAGAR, MAPILAIYURANI, SIPCOT, MADURAI BYE-PASS ROAD, MUTTHYAPURAM, SPIC FACTORY, SPIC NAGAR, HARBOUR, HARBOUR ROAD, ANALMILL NAGAR, TIRUNELVELI BYE-PASS, TIRUCHENDUR ROAD |

Independent Drive Test (Performance)

S.N	Parameter	MTS (Rameshwaram)	BSNL (Sivaganga)	Videocon (Sivaganga)	TATA GSM (Tuticorin)	Vodafone (Virudunagar)
1.1	Call Attempts	71	98	89	169	146
1.2	Blocked Call Rate (<=3%)	0	0	0	0.59	0
1.3	Dropped Call Rate (<=2%)	0	0	0	0	0
	Percentage of connections with good voice quality (>=95%)					
1.4	(i) 0-4 (w/o frequency hopping)	99.82				
	(ii) 0-5 (with frequency hopping)		99.50	98.18	96.51	93.30
	Service Coverage					
	In door (>= -75dBm)	60.46	62.50	56.95	51.54	84.16
	In-vehicle (>= -85dBm)	91.31	93.40	88.64	99.69	99.20
1.5	Outdoor- in city (>= -95dBm)	100	100	99.03	100	100
1.6	Call Setup Success Rate (>=95%)	100	100	100	99.41	100

Graphical Representation



Critical Analysis

On verifying the data from the Independent drive test conducted in Tamil Nadu it is found that all the operators are meeting the benchmark in all the four places.

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

From live, month, PMR and Drive Tests findings, it can be concluded that on an average, performance of the operators in the service area (Tamilnadu) is for **Network Parameters**. However, the benchmark of $\leq 3\%$ for “worst affected cells $> 3\%$ TCH drop” is not met by **Tata GSM & Vodafone** for both live and month data.

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

Regarding **Metering/Billing Credibility** issues, it is noticed improvement with all the operators. All the operators are meeting the benchmark for both Pre Paid and Post Paid except Tata CDMA & GSM in Post paid.

During **Drive Tests (Operator Assisted)** it is noticed that most of the parameters were found to be in order in all the three cities for all the Operators. However slight deviation was found in Blocked Call with BSNL and UNINOR in Dharmapuri, in Dropped Call with UNINOR in Dharmapuri and in Good Voice Quality with IDEA in Coimbatore & Madurai and VODAFONE in Madurai.

In the case of **Independent Drive Test** it is noticed that all the parameters were met by all those operators to whom the test was carried out within that city / town limit.