

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

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

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*- Not conducted for this quarter*

III. Broadband Service Providers

*- Not conducted for this quarter*

## CHAPTER-1: INTRODUCTION

### I. Background

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

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

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

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

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

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

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

## II. Objectives and Methodology

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

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

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

### Systems audited:-

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

### Facilities audited:-

1. Billing documents.
2. Customer Care records.

### Field data collections carried out:-

1. RF network coverage including KPIs (Key Performance Index)
2. Inter Operator Call Assessment
3. Checking of Customer Billing/Refund Complaints (Random sample)
4. Customer Care efficiency
5. The live calling was made to assess the quality of services for Inter Operator Call Assessment, Customer Billing/Refund Complaints and Customer Care efficiency.

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

- ✓ TCIL auditors visited all the NSS (Network Sub System) and BSS (Base-station Sub System) to check data for all the operators in their respective service area.
- ✓ All the NSS and BSS data for the relevant details were collected either directly from the centralized NOC or through a remote access to the NOC.
- ✓ The Radio parameters were audited/verified from the data collected from OMC-R (Operation and Maintenance Center – Radio, as part of BSS data).
- ✓ The Drive test was conducted in high, low and medium dense areas including highways, commercial complex and residential areas and special attention was paid for the areas for which TRAI has received complaints.
- ✓ The POI and other network related parameters were audited/verified from the data collected from the OMC-S (Operation and Maintenance Center – Switch as part of NSS data).
- ✓ The data related to Billing and Customer care was checked for the previous month and verified with the customers by calling them on random basis. The process of registration and handling of the complaints was also studied for the various operators. Call centre number were called for measuring the efficiency of the call centre.
- ✓ The inter operator call assessment test was carried out during the time period as is specified in the tender document. TCBH (Time Consistent Busy Hour) is taken after observation of the traffic consistently for 3 days prior to the audit activity.
- ✓ Data has been collected for busy hour of network in case of live assessment & month of audit for all service providers & verified that service providers are providing busy hour data only for QoS service. We found that TCBH hour is matching with network busy hour as provided by service providers for Andhra Pradesh 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 Andhra Pradesh Circle in 2<sup>nd</sup> quarter (April–June 2011). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken for the period October-December 2010.

Following are the various operators covered in Andhra Pradesh circle (South Zone) for Cellular Mobile (Wireless) services QoS audit & assessment. The Month of audit & TCBH information is also given below:

Sl.	Name of Service Provider	Month of Audit	TCBH Hour
<b>GSM Operators</b>			
1	Aircel Ltd	April-2011	1900-2000 Hrs
2	Airtel Ltd	April-2011	1900-2000 Hrs
3	BSNL	April-2011	1900-2000 Hrs
4	Etisalat	April-2011	1900-2000 Hrs
5	Idea	April-2011	1900-2000 Hrs
6	Reliance Communication (GSM)	April-2011	1900-2000 Hrs
7	Tata Communications (GSM)	April-2011	1900-2000 Hrs
8	Uninor	April-2011	1900-2000 Hrs
9	Videocon	April-2011	1900-2000 Hrs
10	Vodafone	April-2011	1900-2000 Hrs
<b>CDMA Operators</b>			
11	MTS (CDMA)	April-2011	1900-2000 Hrs
12	Reliance Communication (CDMA)	April-2011	1900-2000 Hrs
13	Tata Communications (CDMA)	April-2011	1900-2000 Hrs

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

### (A) Cellular Mobile Telephone Services

3 days Live Data Audit		Bench- mark	Aircel	Airtel	BSNL	Etisala t	Idea	Rcom GSM	Tata GSM	Uninor	Videoco n	Vodafon e	Rcom CDMA	Tata CDMA	MTS
S/N	Name of Parameter		GSM Operators									CDMA operators			
1	<b>Connection Establishment (Accessibility)</b>														
	a) CSSR (Call Setup Success Rate)	>=95%	99.49%	99.50%	98.97%	99.52%	99.95%	99.73%	98.74%	98.60%	99.63%	99.98%	99.89%	98.84%	99.01%
	b) SDCCH/PAGING congestion	<=1%	0.02%	0.13%	0.49%	0.02%	0.37%	0.05%	0.00%	0.06%	0.00%	0.17%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.02%	0.16%	1.66%	0.00%	0.90%	0.04%	0.00%	0.06%	0.00%	0.87%	0.13%	0.00%	0.00%
2	<b>Connection maintenance (retainability)</b>														
	a) CDR	<=2%	0.35%	0.61%	0.70%	0.48%	0.71%	0.31%	0.74%	0.44%	0.15%	0.53%	0.10%	0.51%	0.18%
	b) Worst affected cells>3% TCH drop	<=3%	2.55%	1.07%	4.66%	4.60%	2.86%	0.85%	5.91%	2.31%	6.67%	2.89%	0%	0%	0.68%
	c) Good voice quality	>=95%	98.23%	99.14%	NA	98.80%	97.61%	99.53%	97.60%	98.80%	100%	98.77%	NA	NA	NA
3	<b>No of POI' having congestion &gt;0.5%</b>		0	0	0	0	0	0	0	2	2	0	0	0	1
4	<b>Response time to customers for assistance</b>														
	a) Accessibility of call centre/Customer Care	>=95%	100%	100%	100%	97.00%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	94.12%	95.00%	65.41%	93.38%	81.59%	100%	82.80%	95.08%	100%	99.34%	100%	92.87%	92.87%

NA: Not Applicable, NP: Data Not Provided

From the 3 days live data assessment, it is found that all the operators are meeting the network parameters by and large, except for Tata GSM, Etisalat, Videocon & BSNL are not meeting the parameter "Worst affected cells>3% TCH drop" and Uninor, Videocon & MTS having POIs with congestion >=0.5%.

BSNL, Idea and Tata GSM are not meeting the benchmark for "% of call answered by operator (Voice to voice)".



One Month Data Audit		Bench- mark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
S/N	Name of Parameter		GSM Operators										CDMA operators		
(A)	<b>Network Service Quality Parameter</b>														
1	<b>Network Availability</b>														
	a) BTS Accumulated Downtime	<=2%	0.02%	0.14%	1.24%	0.27%	0.02%	0.09%	0.03%	0.04%	0.05%	0.02%	0.06%	0.02%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.05%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2	<b>Connection Establishment (Accessibility)</b>														
	a) CSSR (Call Setup Success Rate)	>=95%	99.32%	99.64%	98.67%	99.63%	99.94%	99.73%	98.72%	98.77%	98.93%	99.99%	99.88%	99.07%	98.90%
	b) SDCCH/PAGING congestion	<=1%	0.03%	0.14%	0.88%	0.06%	0.38%	0.09%	0.07%	0.09%	0%	0.31%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.02%	0.12%	2.00%	0%	0.79%	0.06%	0.14%	0.05%	0.50%	0.79%	0.14%	0.60%	0%
3	<b>Connection maintenance (retainability)</b>														
	a) CDR	<=2%	0.39%	0.57%	0.91%	0.34%	0.68%	0.31%	0.80%	0.46%	1.67%	0.51%	0.10%	0.45%	0.24%
	b) Worst affected cells>3% TCH drop	<=3%	1.06%	1.07%	4.81%	3.45%	2.96%	0.85%	3.98%	2.38%	60.00%	2.93%	0%	0.26%	1.56%
	c) Good voice quality	>=95%	98.24%	99.16%	NA	98.82%	97.56%	99.47%	97.40%	98.57%	99.46%	98.80%	NA	NA	NA
4	<b>No of POI's having congestion &gt;0.5%</b>		0	0	0	0	0	0	0	2	2	0	0	0	1
(B)	<b>Customer Service Quality Parameters</b>														
5	<b>Metering/billing credibility-Post paid</b>	<= 0.1%	0.10%	0.26%	0.00%	NA	1.05%	0.10%	0.58%	NA	NA	0.05%	0.04%	0.04%	NA
6	<b>Metering /billing credibility-Pre paid</b>	<= 0.1%	0.04%	0.00%	0.04%	0%	0.00%	0.01%	0.04%	0.06%	0.00%	0.02%	0.01%	0.01%	0.01%
7	<b>Resolution of billing/ charging complaints</b>	100% within 4 weeks	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	a) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
8	<b>Response time to customers for assistance</b>														
	a) Accessibility of call centre/Customer Care	>=95%	100%	96.90%	97.00%	99.49%	99.82%	100%	100%	99.70%	96.00%	76.54%	100%	99.63%	98.69%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	96.82%	95.11%	66.39%	99.87%	44.05%	90.03%	97.22%	97.41%	98.67%	89.68%	91.32%	92.64%	98.70%
9	<b>Termination/closure of service</b>	<=7days	100%	100%	90%	NA	100%	100%	39.92%	NA	NA	100%	100%	100%	NA

One Month Data Audit		Bench- mark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
S/N	Name of Parameter		GSM Operators										CDMA operators		
10	Time taken for refunds of deposits after closures.	100% within 60 days	100%	100%	100%	NA	26.53%	100%	83.72%	NA	NA	100%	100%	100%	NA

NA: Not Applicable, NP: Data Not Provided

From the month data assessment, it is found that all the operators are meeting the network parameters by and large, except for Uninor, Videocon & MTS having POIs with  $\geq 0.5\%$  congestion. BSNL (4.81%), Etisalat (3.45%), Tata GSM (3.98%) & Videocon (60%) are not meeting the benchmark for "Worst effected cells  $> 3\%$  TCH drop"

Performance related to customer care data is not found to be satisfactory for the parameter "calls answered by operators (voice-to-voice)" for Idea, BSNL & Vodafone. A below benchmark performance is observed in case of Vodafone for "accessibility of call centre" parameter. Tata GSM, Idea & Airtel are not meeting the benchmark for "Metering/Billing Credibility (Post-Paid)".

In case of parameter "time taken for refunds of deposits after closures", Idea & Tata GSM is having below benchmark performance. BSNL & Tata GSM are taking more than 7 days' time for "Termination/closure of service".

### Operator-Assisted Drive Test

The Operator Assisted Drive Test was conducted at Andhra Pradesh for all the operators. Route covered was about around 120Km depending on city areas within the speed limit of 30Km/hr. The cities covered were Hyderabad, Vishakhapatnam & Vijaywada. 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	Vodafone	Rcom CDMA	Tata CDMA	MTS
			GSM Operators						CDMA Operators				
1.1	Blocked Call Rate (<=3%)	Hyderabad	0.00%	0.00%	0.00%	0.00%	2.46%	0.55%	0.00%	0.00%	0.70%	0.00%	0.75%
		Visakhapatnam	0.62%	0.00%	2.98%	0.00%	1.55%	0.00%	1.15%	0.00%	1.28%	0.00%	1.13%
		Nellore	0.58%	7.61%	0.59%	0.65%	0.00%	0.00%	0.00%	0.00%	0.04%	0.00%	
1.2	Dropped Call Rate (<=2%)	Hyderabad	0.00%	0.00%	2.56%	0.00%	0.00%	0.55%	1.57%	0.00%	0.00%	0.00%	1.52%
		Visakhapatnam	0.00%	0.00%	2.08%	0.00%	0.45%	0.90%	0.59%	0.00%	1.92%	0.00%	1.71%
		Nellore	0.59%	3.05%	2.38%	0.00%	1.02%	0.00%	0.60%	0.00%	0.00%	0.53%	
1.3	(i) 0-4 (w/o frequency hopping)	Hyderabad									98.81%	98.16%	99.30%
		Visakhapatnam									97.98%	99.54%	92.63%
		Nellore									99.60%	99.69%	
	(ii) 0-5 (with frequency hopping)	Hyderabad	95.31%	97.32%	95.06%	96.69%	94.00%	91.07%	93.13%	95.27%			
		Visakhapatnam	96.50%	97.38%	93.40%	97.15%	96.97%	95.83%	94.94%	96.84%			
		Nellore	94.57%	79.17%	94.40%	95.97%	98.70%	97.77%	95.18%	95.43%			
1.4	Call Setup Success Rate (>=95%)	Hyderabad	100%	100%	100%	100%	97.54%	99.45%	100%	100%	99.30%	100%	99.25%
		Visakhapatnam	99.38%	100.00%	97.02%	100%	98.45%	100%	98.85%	100%	98.72%	100%	98.87%
		Nellore	99.42%	92.39%	99.41%	99.35%	100%	100%	100%	100%	99.96%	100%	

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

- BSNL is not meeting the benchmark of "Drop call rate" for all 3 cities.
- AIRTEL is not meeting any benchmark in Nellore town .
- "Percentage of connection with good voice quality" benchmark is not met by Aircel , Airtel & BSNL in Nellore, Rcom GSM, Tata GSM & Uninor in Hyderabad, Uninor in Hyderabad , BSNL, Uninor and MTS in Visakhapatnam.

**Independent Drive Test** The Independent Drive Test was conducted at Andhra Pradesh in Vishakhapatnam. Here again, zones were selected for covering different density areas (High, Medium & Low dense areas).

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vodafone	Rcom CDMA	Tata CDMA	MTS
			GSM Operators							CDMA Operators			
1.1	Blocked Call Rate (<=3%)	Visakhapatnam	0.62%	0.00%	5.50%	0.00%	2.33%	0.00%	0.00%	0.00%	2.63%	0.00%	1.83%
1.2	Dropped Call Rate (<=2%)	Visakhapatnam	0.00%	0.00%	4.50%	0.00%	0.00%	0.00%	0.59%	0.00%	1.97%	0.00%	0.61%
1.3	Percentage of connections with good voice quality (>=95%)												
	(i) 0-4 (w/o frequency hopping)	Visakhapatnam									95.46%	99.62%	92.82%
	(ii) 0-5 ( with frequency hopping)	Visakhapatnam	91.12%	96.18%	93.90%	96.62%	94.76%	95.58%	94.86%	96.84%			
1.4	Call Setup Success Rate (>=95%)	Visakhapatnam	99.38%	100%	94.50%	100%	97.67%	100%	100%	100%	97.37%	100%	98.17%

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

- BSNL is not meeting any benchmark.
- Good Voice Quality parameter is not met by Aircel, Rcom GSM, Uninor & MTS.

### CHAPTER-3: AUDIT-PMR VERIFICATION

#### I. Cellular Mobile Telephone Service

PMR		Bench- mark	Audit	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videoc on	Vodafon e	Rcom CDMA	Tata CDMA	MTS
S/N	Name of Parameter			GSM Operators										CDMA Operators		
(A)	Network Service Quality Parameter															
1	Network Availability															
	BTS Accumulated Downtime	<=2%	Reported	0.02	0.13	0.98	2	0.01	0.06	0.02	0.03	0.96	0.02	0.09	0.01	NA
			Verified	0.01	0.01	0.98	0.17	0.01	0.06	0.03	0.03	0.96	0.02	0.09	0.01	NA
	Worst affected BTSs due to downtime	<=2%	Reported	0	0.3	0	15.63	0	0	0.02	0.02	0	0	0.04	0	NA
Verified			0	0.07	0	0	0	0	0.02	0.17	0	0	0.04	0	NA	
2	Connection Establishment (Accessibility)															
	CSSR (Call Setup Success Rate)	>=95%	Reported	99.26	99.15	95	99.53	99.92	99.72	98.88	99.34	99.13	99.5	99.52	99.9	NA
			Verified	99.26	99.67	95	99.46	99.91	99.72	99.71	99.3	99.13	99.5	99.52	99.68	NA
	SDCCH/PAGING congestion	<=1%	Reported	0.03	0.18	0.33	0.4	0.23	0.05	0.03	0.08	0.07	0.07	0	0	NA
			Verified	0.03	0.13	0.33	0.28	0.23	0.05	0.017	0.08	0.07	0.07	0	0	NA
	TCH congestion	<=2%	Reported	0.02	0.53	1.03	0	0.51	0.1	0.19	0.05	0.1	0.2	0.05	0.01	NA
Verified			0.02	0.12	1.03	0.01	0.51	0.1	0.05	0.09	0.1	0.2	0.05	0.04	NA	
3	Connection maintenance (retainability)															
	CDR	<=2%	Reported	0.44	0.9	1.34	0.32	0.78	0.31	1.01	0.58	0.89	0.64	0.55	0.19	NA
			Verified	0.44	0.5	1.34	0.34	0.77	0.31	0.97	0.61	0.89	0.64	0.55	0.23	NA
	Worst affected cells>3% TCH drop	<=5%	Reported	1.63	1.34	3.75	2.48	5.28	2.3	3.43	2.79	0	4.34	2.16	0.04	NA
			Verified	1.63	1.19	3.75	3.65	5.28	2.3	3.75	3.03	0	4.34	2.16	0.18	NA
	Good voice quality	>=95%	Reported	97.6	99.13	98.67	96.74	95.91	98.55	96.72	98.55	99.11	98.64	98.9	99.71	NA
Verified			97.6	99.13	98.67	98.55	95.91	98.55	96.97	98.49	99.11	98.64	98.9	99.52	NA	
4	No of POI's having congestion >0.5%		Reported	1	0	0	0	0	0	0	2	0	0	0	0	NA
			Verified	1	0	0	0	0	0	0	4	0	0	0	0	NA

PMR		Benchmark	Audit	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videoc on	Vodafon e	Rcom CDMA	Tata CDMA	MTS
S/N	Name of Parameter			GSM Operators										CDMA Operators		
(B)	<b>Customer Service Quality Parameters</b>															
5	<b>Metering/billing credibility- Post paid</b>	<= 0.1%	Reported	0.18%	0.02%	0.00%	NA	0.03%	0.08%	0.06%	NA	NA	0.06%	0.09%	0.05%	NA
			Verified	0.20%	0.02%	0.00%	NA	0.03%	0.08%	0.06%	NA	NA	0.06%	0.09%	0.06%	NA
6	<b>Metering /billing credibility- Pre paid</b>	<= 0.1%	Reported	0.06%	0.00%	0.00%	0.00%	0.03%	0.05%	0.00%	0%	0.05%	0.01%	0.05%	0.05%	0%
			Verified	0.10%	0.00%	0.00%	0.00%	0.03%	0.05%	0.00%	0.01%	0.05%	0.01%	0.05%	0.16%	0%
7	<b>Resolution of billing/ charging complaints</b>	100% within 4 weeks	Reported	100%	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%	100%
	Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	Reported	100%	100%	100%	NA	100%	100%	100%	NA	100%	100%	100%	100%	100%
			Verified	100%	100%	100%	NA	100%	100%	100%	NA	100%	100%	100%	100%	100%
8	<b>Response time to customers for assistance</b>	>=95%	Reported	100%	88%	98%	98.84%	100%	96.00%	100%	74.60%	100%	100%	94.00%	97.00%	98.45%
			Verified	100%	88%	98%	98.84%	100%	96.00%	100%	99.22%	100%	100%	94.00%	93.00%	98.45%
	% call answered by operators(voice to voice) within 60 sec.	>=90%	Reported	91.48%	72.00%	85%	97.53%	62.00%	78.00%	73.00%	90.30%	100%	90.00%	82.00%	94.00%	90.08%
			Verified	91.48%	72.00%	85%	97.53%	61.00%	78.00%	73.00%	95.94%	100%	90.00%	82.00%	90.00%	90.08%
9	<b>Termination/closure of service</b>	<=7days	Reported	100%	100%	100%	NA	100%	100%	100%	NA	NA	100%	100%	100%	NA
			Verified	100%	100%	100%	NA	100%	100%	100%	NA	NA	100%	100%	100%	NA
10	<b>Time taken for refunds of deposits after closures.</b>	100% within 60 days	Reported	100%	100%	100%	NA	100%	100%	64%	NA	NA	100%	100%	96%	NA
			Verified	100%	100%	100%	NA	100%	100%	64%	NA	NA	100%	100%	99%	NA

**Critical Analysis (PMR Verification):**

- a) Aircel showing variation in "BTS accumulated downtime" and "Metering/ Billing Credibility for Postpaid & prepaid".
- b) Airtel is showing variation in Network related parameters except for "Connections with good quality", "POI congestion".
- c) Etisalat & Tata GSM are showing variation in Network related parameters except for "BTS accumulated downtime" & "POI congestion".
- d) Idea is showing variation in "CDR" and "%call answered by operators (voice to voice)".
- e) Uninor showing variation in "TCH congestion", Connection maintenance parameters, POI congestion & response time to customers for assistance parameters.
- f) Tata CDMA showing variation in "CSSR", "TCH congestion", Connection maintenance parameters, metering/billing credibility for postpaid & prepaid", response time to customers for assistance parameters and "Time taken for refunds of deposits after closures".

## CHAPTER-4: DETAILED FINDINGS &amp; ANALYSIS

## I. Cellular Mobile Telephone Service

## (A) MSC Audit

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

S/ N	Name of Parameter	Bench- mark	Aircel	Airtel	BSNL	Etisala t	Idea	Rcom GSM	Tata GSM	Uninor	Videoc on	Vodafo ne	Rcom CDM A	Tata CDM A	MTS	
			GSM Operators										CDMA operators			
A	<b>Network Service Quality Parameter</b>															
1	<b>Connection Establishment (Accessibility)</b>															
	a) CSSR	>=95%	99.49%	99.50%	98.97%	99.52%	99.95%	99.73%	98.74%	98.60%	99.63 %	99.98%	99.89 %	98.84 %	99.01 %	
	b) SDCCCH/PAGING congestion	<=1%	0.02%	0.13%	0.49%	0.02%	0.37%	0.05%	0.00%	0.06%	0.00%	0.17%	0.00%	0.00%	0.00%	
	c) TCH congestion	<=2%	0.02%	0.16%	1.66%	0.00%	0.90%	0.04%	0.00%	0.06%	0.00%	0.87%	0.13%	0.00%	0.00%	
2	<b>Connection maintenance</b>															
	a) CDR	<=2%	0.35%	0.61%	0.70%	0.48%	0.71%	0.31%	0.74%	0.44%	0.15%	0.53%	0.10%	0.51%	0.18%	
	b) Cells having > 3% TCH drop	<=3%	2.55%	1.07%	4.66%	4.60%	2.86%	0.85%	5.91%	2.31%	6.67%	2.89%	0.36%	0.00%	0.68%	
	c) Good voice quality	>=95%	98.23%	99.14%	NA	98.80%	97.61%	99.53%	97.60%	98.80%	100.00 %	98.77%	NA	NA	NA	
	d) No. of cells > 3% TCH drop		212	305	761	4	557	98	682	164	5	691	9	0	7	
	e) Total no. of cells in the network		8,309	28,492	16,347	87	19,458	11,469	11,545	7,114	75	23,931	2,506	3,915	1,026	
3	<b>No of POI's having congestion &gt;0.5%</b>		0	0	0	0	0	0	0	2	2	0	0	0	1	
	a) Name of POI not meeting the benchmark									VSNL NLD, Vodafo ne	UASL, VTL- Airtel NLD					
	b) Total No. of circuits on POI		29,114	226,296	33,504	1,401	139,299	59,927	21,403	24,462	5,036	154,030	59,927	44,945	8,210	
	c) Avg No. of call attempts on POI		921,35 8	9,768,4 59	1,284,26 4	7,373	4,394,46 8	651,942	946,958	11,072, 751	9,581	5,614,12 7	651,94 2	1,430, 814	561,96 8	
	d) Avg traffic served on POI (Erlang)		15,558	123,742	23,010	51	96,335	32,277	5,608	234,03 9	301	91,259	32,277	24,867	9,706	
	e) Total number of working POI Service Area wise		74	43	30	27	132	73	32	52	56	56	73	69	52	



S/N	Name of Parameter	Bench- mark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videoc on	Vodafon e	Rcom CDMA	Tata CDMA	MTS
			GSM Operators										CDMA operators		
	f) Equipped Capacity of Network in respect of Traffic in erlang		70,377	653,740	269,212	644	274,456	122,000	197,578	73,544	475	152,617	316,000	205,471	27,300
	g) Total traffic handled in TCBH in erlang		20,962	529,722	142,455	77	134,187	66,369	75,481	35,421	115	132,273	111,427	94,091	61,355
<b>(B)</b>	<b>Customer Service Quality Parameters</b>														
<b>4</b>	<b>Response time to customers for assistance</b>														
	a) Accessibility of call centre	>=95%	100%	100%	100%	97%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	b) % of call answered by operators(voice to voice) within 60 sec	>=90%	94.12%	95.00%	65.41%	93%	82%	100.00%	83%	95%	100%	99.34%	100.00%	92.87%	93%
	c) No. of call attempts to call centre / customer care nos. during TCBH (Avg)		41,466	4,124,205	934,587	468	1,545,592	95,577	1,574,232	520,784	124	75,041	1,457,370	931,565	931,565
	d) No. of calls connected and answered successfully to call centre / customer care nos. during TCBH (Avg)		39,026	3,917,800	611,279	437	1,260,982	95,577	1,303,443	495,156	124	74,545	1,457,370	865,113	865,113

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 Andhra Pradesh Service Area are as given below:-

- **Call setup success rate (benchmark  $\geq 95\%$ ):** All operators are meeting the benchmark with values lying between 98.60% and 99.98%.
- **SDCCH/PAGING Channel congestion (benchmark  $\leq 1\%$ ):** All operators are meeting the benchmark with values lying between 0% and 0.49%. CDMA operators have not provided the data for Paging channel congestion.  
*Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.*
- **TCH congestion (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark with values lying between 0% and 1.66%.
- **Call drop rate (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark with values lying between 0.10% and 0.74%.
- **Cell exceeding 3% TCH drop (benchmark  $\leq 5\%$ ):** Except for BSNL, Etisalat, Videocon & Tata GSM, all operators are satisfying the benchmark with value in between 0% and 2.89%.
- **Connections with good voice quality (benchmark  $\geq 95\%$ ):** BSNL has not submitted this data. Rests of the operators are meeting the benchmark with values lying between 97.60% and 100%. CDMA operators have submitted that this value is not system generated.
- **No of POI having congestion  $>0.5\%$ :** Uninor, Videocon and Shyam Sistema (MTS) have 2, 2 and 1 POI respectively with congestion  $\geq 0.5\%$ . 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 operators are meeting the benchmark.
- **%age of call answered by operator (Voice to voice) (benchmark  $>90\%$ ):** Except for BSNL, Idea and Tata GSM, rest of the operators are satisfying the benchmark with value in between 92.87% and 100%.

## (2) Month Data Assessment & Summarized Findings

S/N	Name of Parameter	Bench- mark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videoc on	Vodafon e	Rcom CDMA	Tata CDMA	MTS
			GSM Operators										CDMA operators		
(A)	<b>Network Service Quality Parameter</b>														
1	<b>Network Availability</b>														
	a) BTS Accumulated Downtime	<=2%	0.02%	0.14%	1.24%	0.27%	0.02%	0.09%	0.03%	0.04%	0.05%	0.02%	0.06%	0.02%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.05%	0.00%	0.00%	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		2,809	10,055	5,320	29	6,541	3,823	3,893	2,394	25	7,967	2,506	1,283	342
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		353	10,146	47,329	57	915	2,363	843	767	9	1,322	1,146	197	16
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	5	0	0	0	0	0	0	0	0	0	0	0
2	<b>Connection Establishment (Accessibility)</b>														
	a) CSSR (Call Setup Success Rate)	>=95%	99.32%	99.64%	98.67%	99.63%	99.94%	99.73%	98.72%	98.77%	98.93%	99.99%	99.88%	99.07%	98.90%
	b) SDCCH/PAGING congestion	<=1%	0.03%	0.14%	0.88%	0.06%	0.38%	0.09%	0.07%	0.09%	0.00%	0.31%	NA	NA	NA
	c) TCH congestion	<=2%	0.02%	0.12%	2.00%	0.00%	0.79%	0.06%	0.14%	0.05%	0.50%	0.79%	0.14%	0.60%	0.00%
3	<b>Connection maintenance (retainability)</b>														
	a) CDR	<=2%	0.39%	0.57%	0.91%	0.34%	0.68%	0.31%	0.80%	0.46%	1.67%	0.51%	0.10%	0.45%	0.24%
	b) Worst affected cells>3% TCH drop	<=3%	1.06%	1.07%	4.81%	3.45%	2.96%	0.85%	3.98%	2.38%	60.00%	2.93%	0.40%	0.26%	1.56%
	c) Good voice quality	>=95%	98.24%	99.16%	NA	98.82%	97.56%	99.47%	97.40%	98.57%	99.46%	98.80%	NA	NA	NA
	d) Total No. of cells exceeding 3% TCH drop (call drop)		88	306	786	3	576	98	459	169	45	702	10	10	16
	e) Total no. of cells in the network		8,309	28,492	16,347	87	19,458	11,469	11,545	7,114	75	23,931	2,506	3,915	1,026

S/N	Name of Parameter	Bench- mark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videoc on	Vodafon e	Rcom CDMA	Tata CDMA	MTS
			GSM Operators										CDMA operators		
4	<b>No of POI's having congestion &gt;0.5%</b>	<=0.5%	0	0	0	0	0	0	0	2	2	0	0	0	1
	a) Name of POI not meeting the benchmark									VSNL NLD, Vodafo ne	UASL, VTL- Airtel NLD				VSNL, RCOM
	b) Total No. of call attempts on POI (Avg.)		880,264	10,016,989	1,385,629	69,762	4,400,599	643,384	299,888	905,225	303,671	5,564,909	643,384	1,737,797	5,236,995
	c) Total traffic served on POI (Erlang) (Avg.)		15,044	123,988	27,319	1,553	91,004	31,447	5,331	17,967	9,401	88,015	31,447	28,741	92,615
	d) Total No. of circuits on POI		29,114	226,296	33,504	1,401	139,299	59,927	21,403	24,462	5,036	154,030	59,927	44,945	8,210
	e) Total number of working POI Service Area wise		74	43	30	27	132	73	32	52	56	56	73	69	52
	f) Capacity of POI		27,273	218,816	33,504	1,065	134,187	55,780	18,896	22,352	4,269	153,651	55,780	42,137	7,266
5	<b>Network Data</b>														
	a) Equipped Capacity of Network Erlang		70,377	653,740	269,212	644	274,456	122,000	197,578	73,544	475	152,617	316,000	205,471	27,300
	b) Total traffic in TCBH in erlang (Avg.)		20,962	529,722	142,455	77	134,187	66,369	75,481	35,421	115	132,273	111,427	94,091	61,355
	c) Total no. of customers served (as per VLR) on last day of the month		826,372	15,660,180	4,759,347	4,510	7,520,003	NR	2,835,509	1,085,984	259	3,934,751	NR	1,902,033	248,944
(B)	<b>Customer Service Quality Parameters</b>														
6	<b>Metering/billing credibility- Post paid</b>	<= 0.1%	0.10%	0.26%	0.00%	NA	1.05%	0.10%	0.58%	NA	NA	0.05%	0.04%	0.04%	NA
	a) No. of bills issued during the period		12,314	612,539	144,230	NA	96,043	18,074	24,028	NA	NA	282,801	245,621	163,872	NA
	b) No. of bills disputed including billing complaints during the period		12	1,617	-	NA	1,005	18	140	NA	NA	149	86	68	NA

S/N	Name of Parameter	Bench- mark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videoc on	Vodafon e	Rcom CDMA	Tata CDMA	MTS
			GSM Operators										CDMA operators		
7	<b>Metering /billing credibility- Pre paid</b>	$\leq 0.1\%$	0.04%	0.00%	0.04%	0.04%	0.00%	0.01%	0.04%	0.06%	0.00%	0.02%	0.01%	0.01%	0.01%
	a) No. of charging / credit / validity complaints during the quarter		753	1	2,878	8	222	400	2,485	1,355	-	1,188	450	240	50
	b) Total no. of pre-paid customers at the end of the quarter		1,690,00 0	21,678,6 29	6,842,45 0	18,241	7,527,23 8	3,878,62 7	6,481,11 9	2,287,3 27	9,372	6,974,76 0	4,509,81 4	2,925,1 50	368,62 0
8	<b>Resolution of billing/ charging complaints</b>	<i>100% within 4 weeks</i>	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	a) No. of billing/(post paid) and charging, credit/validity (pre paid) complaints resolved within 4 weeks during the quarter														
	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		765	182,117	2,878	8	5,052	418	2,625	9,029	-	1,337	536	3,398	50
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		364	92	NP	NP	302	62	79	1,355	0	919	273	308	28
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		401	18,025	NP	NP	4,750	356	2,546	7,674	-	418	263	3,090	22
	e) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	$\leq 1$ <i>week</i>	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

S/N	Name of Parameter	Bench- mark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videoc on	Vodafon e	Rcom CDMA	Tata CDMA	MTS
			GSM Operators									CDMA operators			
9	<b>Response time to customers for assistance</b>														
	a) Accessibility of call centre/Customer Care	>=95%	100.00%	96.90%	97.00%	99.49%	99.82%	100.00%	100.00%	99.70%	96.00%	76.54%	100.00%	99.63%	98.69%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	96.82%	95.11%	66.39%	99.87%	44.05%	90.03%	97.22%	97.41%	98.67%	89.68%	91.32%	92.64%	98.70%
	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		24,729	5,470,450	1,378,678	757	192,195	663,987	1,335,437	688,848	375	1,205,557	481,174	860,116	6,368
	d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		23,942	5,202,759	915,318	756	84,660	597,808	1,298,347	670,993	370	1,081,107	439,412	796,833	6,285
10	<b>Termination/closure of service</b>	<=7days	100.00%	100.00%	90%	NA	100.00%	100.00%	39.92%	NA	NA	100.00%	100.00%	100.00%	NA
	a) Total No. of requests for Termination / Closure of service received during the quarter		93	2,557	1,565	NA	1,674	134	263	NA	NA	1,182	1,041	3,311	NA
	b) No.of requests for Termination / Closure of service complied within 7 days during the quarter		93	2,557	-	NA	1,674	134	105	NA	NA	1,182	1,041	3,311	NA
11	<b>Time taken for refunds of deposits after closures.</b>	100% within 60 days	100.00%	100.00%	100.00%	NA	26.53%	100.00%	83.72%	NA	NA	100.00%	100.00%	100.00%	NA

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 Andhra Pradesh 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 1.24%.
- **Worst affected BTSs due to downtime (benchmark  $\leq 2\%$ ):** Except BSNL, Etisalat, Tata GSM, & Videocon, All other operators are meeting the benchmark with values lying between 0% and 0.05%.
- **Call setup success rate (benchmark  $\geq 95\%$ ):** All operators are meeting the benchmark with values lying between 98.67% and 99.99%.
- **SDCCH/PAGING Channel congestion (benchmark  $\leq 1\%$ ):** All operators are meeting the benchmark with values lying between 0% and 0.88%. CDMA operators have not provided data for Paging channel congestion.  
*Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.*
- **TCH congestion (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark with values lying between 0% and 2%.
- **Call drop rate (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark with values lying between 0.10% and 1.67%.
- **Cell exceeding 3% TCH drop (benchmark  $\leq 3\%$ ):** All the operators are satisfying the benchmark with value in between 0% and 2.96%, except for BSNL, Etisalat, Tata GSM & Videocon. Videocon has 60% such cells in the month period.
- **Connections with good voice quality (benchmark  $\geq 95\%$ ):** BSNL has not submitted this data. Rests of the operators are meeting the benchmark with values lying between 97.4% and 99.47%. CDMA operators have submitted that this data is not system generated.
- **No of POI's having congestion  $>0.5\%$ :** Uninor, Videocon and Shyam Sistema (MTS) have 2, 2 and 1 POI respectively with congestion  $\geq 0.5\%$ . There was no congestion found overall on the POI, but cases were found where individual POIs are showing high utilization/usage. Some are in the range of over 100% though causing no traffic failure due to overflow technique i.e. the extra traffic is carried over by some other operating POI as has been designed to do so.
- **%age of call answered by operator (electronically) (benchmark  $>95\%$ ):** Except for Vodafone with a value of 76.54%, all operators are meeting the benchmark with values lying between 96% to 100%.
- **%age of call answered by operator (Voice to voice) (benchmark  $>90\%$ ):** Except for BSNL, Idea & Vodafone, all the operators are meeting the benchmark with values lying between 90.03% to 99.87%.
- **Metering and billing credibility-Post paid (benchmark  $\leq 0.1\%$ ):** Except for Aircel, Airtel, Rcom GSM, Idea & Tata GSM, all operators are meeting the benchmark.
- **Metering and billing credibility-Pre paid (benchmark  $\leq 0.1\%$ ):** All the operators are meeting the benchmark.
- **Resolution of billing/ charging complaints (benchmark 100% within 4 weeks):** All operators are meeting the benchmark.
- **Termination/Closure of service (Benchmark  $\leq 7$  days):** Except for BSNL & Tata GSM, all operators have satisfied the benchmark.
- **Time taken for refunds of deposits after closures (benchmark 100% within  $\leq 60$  days):** Except for Idea & Tata GSM, all operators have satisfied the benchmark.

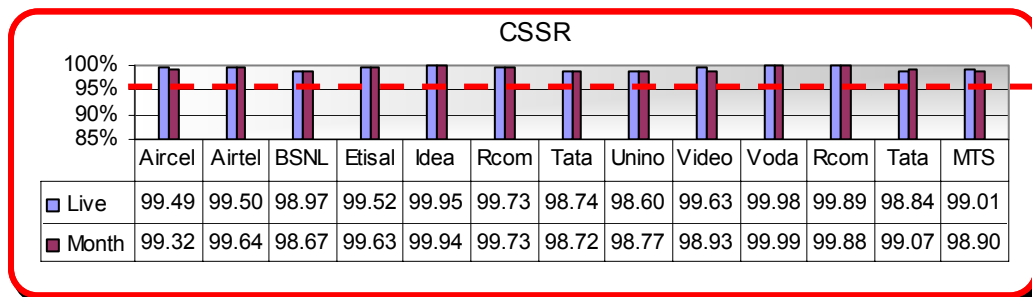
**(1) Sample Coverage**

Switches/BSC/BTS details of operators:

Sl.	Name of Service Provider	No. of MSC	No. of BSC	No. of BTS
<b>GSM Operators</b>				
1	Aircel Ltd	2	21	2809
2	Airtel Ltd	49	116	10055
3	BSNL	18	76	5320
4	Etisalat	1	5	29
5	Idea	8	75	6541
6	Reliance Communication (GSM)			
7	Tata Communications (GSM)	7	30	3892
8	Uninor	2	17	2395
9	Videocon	1	2	25
10	Vodafone	7	100	7967
<b>CDMA Operators</b>				
11	MTS (CDMA)	1	2	342
12	Reliance Communication (CDMA)			
13	Tata Communications (CDMA)	7	9	1283

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

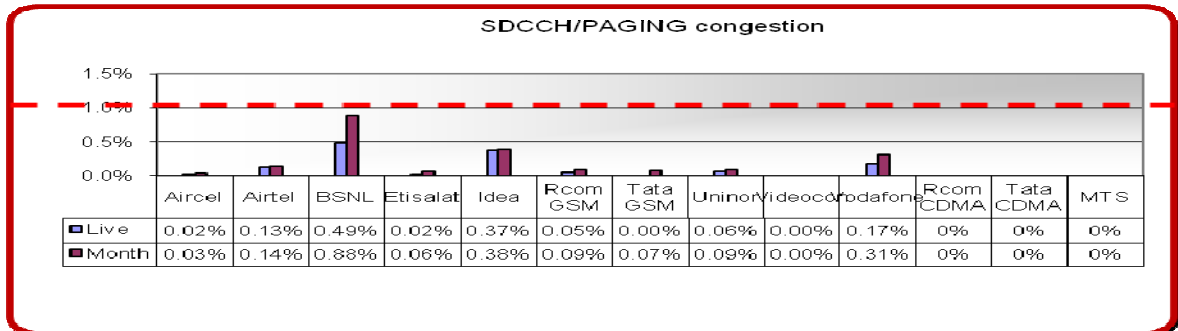
- I. Call setup success rate:** All operators are meeting the TRAI benchmarks ( $\geq 95\%$ ) for both one month data and 3 days live data taken in the month of audit.



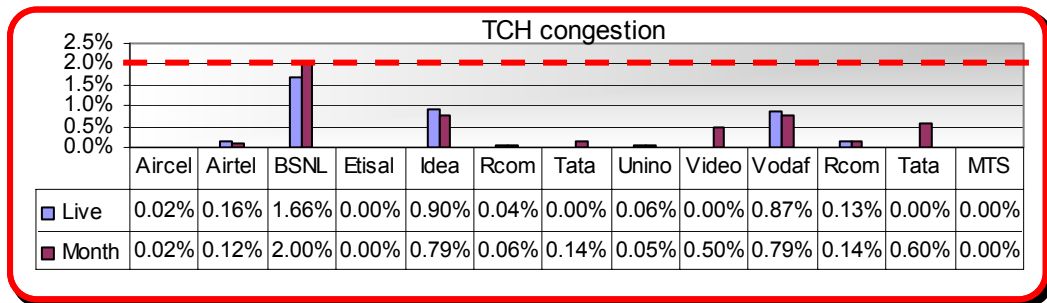


**II. Blocked call rate:**

**SDCCH congestion (%):** All operators are meeting the TRAI benchmarks ( $\leq 1\%$ ) for both one month data and 3 days live data taken in the month of audit.

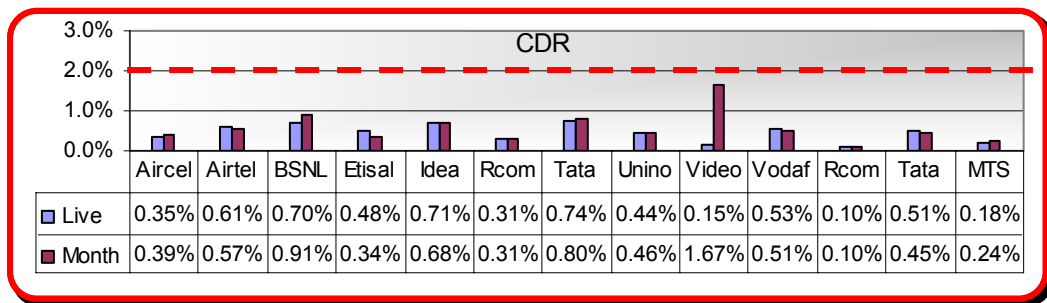


**TCH congestion (%):** All operators are meeting the TRAI benchmarks ( $\leq 2\%$ ) for both one month data and 3 days live data taken in the month of audit.

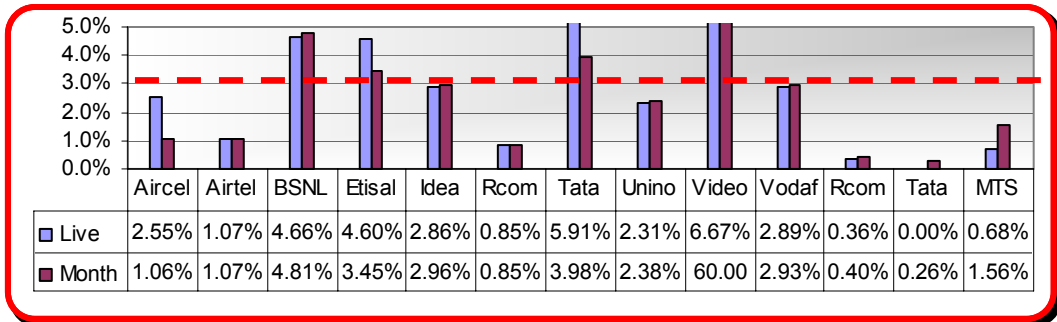


**III. Connection Maintainability (Retainability):**

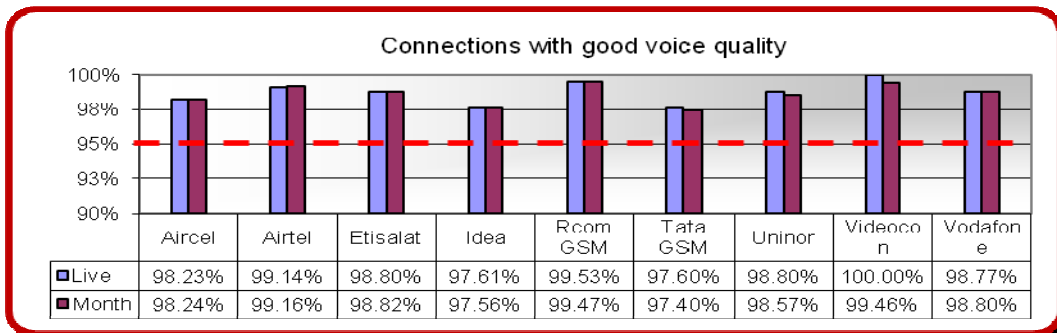
**Call drop rate (%):** All operators are meeting the TRAI benchmarks ( $\leq 2\%$ ) for both one month data and 3 days live data taken in the month of audit.



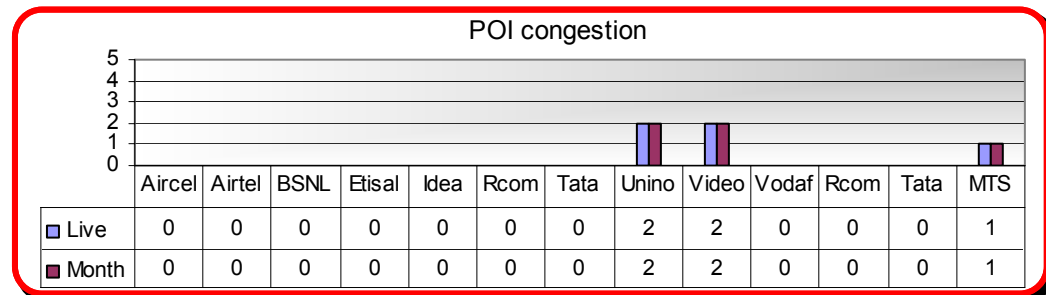
**Worst affected Cell exceeding 3% TCH Drop:** BSNL, Etisalat, Videocon & Tata GSM are not meeting the benchmark in both live & month data. Videocon shows a very high value of 60% in the month data audit.



**Percentage of connections with good voice quality (benchmark >= 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. For BSNL and CDMA operators, values are not system generated.



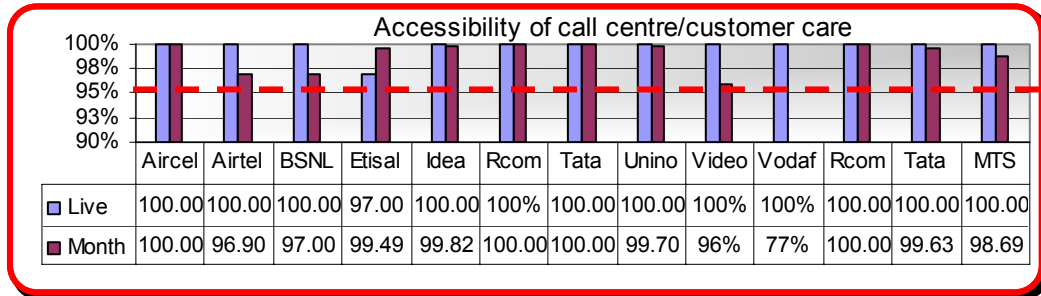
**No of POI's having congestion >0.5%:** Uninor, Videocon and Sistema (MTS) are having 2, 2 & 1 POIs having  $\geq 0.5\%$  congestion. Rests of the operators have no such POIs.



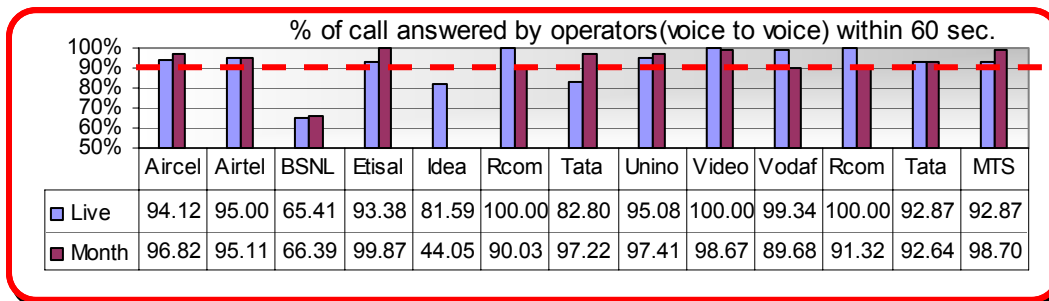
B) CUSTOMER SERVICE QUALITY PARAMETERS

(A) Response time to the customer for assistance:

**Percentage of call answered (Electronically):** All operators are meeting the TRAI benchmarks ( $\geq 95\%$ ) for both one month data and 3 days live data taken in the month of audit except for Vodafone (77%) in month data audit.



**Percentage of call answered by operators (Voice to voice) within 60 sec:** For live data, BSNL, Idea are not meeting the benchmark for both live & month data. Similar deviation is shown by Tata GSM in live data & Vodafone 9n month data.



(3) Critical Analysis

The above comparative study between live data & month data shows similar trends in both the cases. However, inconsistency in live & month data was found for parameters like “SDCCH congestion” by BSNL, “CDR” by Videocon & “worst affected cells >3% TCH drop” by Aircel, Etisalat, Videocon & Tata GSM. , “accessibility of call centre” (Vodafone) , “%age of calls answered by operator” (Idea, Rcom GSM, Tata GSM & Vodafone) & time taken for refunds of deposits after closures(Idea, Tata GSM).

**(B) Redressal****(1) Sample coverage**

A sample of billing complaints was taken for each operator and calls were made for assessing the resolution of billing/charging complaints within 4 weeks as claimed by the respective operators.

**(2) Performance (live calling for billing complaints)**

Calling Operator	Aircel	Airtel	BSNL	Etisalat	Idea	Reliance (GSM)	Tata (GSM)	Uninor	Videocon	Vodafone	Reliance (CDMA)	Tata (CDMA)
<b>Total No. of calls</b>	8	10	-	1	10	5	8	10	5	10	5	5
<b>Cases resolved with 4 weeks</b>	8	10	-	1	10	5	8	10	5	10	5	5
<b>%age of cases resolved</b>	100%	100%	-	100%	100%	100%	100%	100%	100%	100%	100%	100%

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

Fifty nos. of calls were made at Hyderabad in each half and below given no. of calls got connected to the call center within 60 sec.

	OPERATORS NAME												
	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom	Tata	Videocon	Vodafone	Uninor	MTS	Rcom	Tata
	GSM										CDMA		
1ST HALF (10AM to 01 PM)	47	46	41	45	39	44	42	46	33	47	46	47	46
2ND HALF (04PM to 07 PM)	42	39	30	40	20	38	40	44	28	40	40	40	44
In % age	89.00	85.00	71.00	85.00	59.00	82.00	82.00	90.00	61.00	87.00	86.00	87.00	90.00

**(4) Level 1 Calling:** Level 1 calling such as calling at emergency no. (Police, Fire, Hospital), Railway enquiry system etc were made so as to check the service of such short codes. In Hyderabad it was found to be functional.

**(5) Critical Analysis**

Random numbers were selected from the operators' database of billing/metering complaints and calls were made to the customers to get their feedback for complaint Redressal. It was found that the operators had made refunds in 100% cases as claimed by their records.

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

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

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

Calling Operator	Aircel	Airtel	BSNL	Etisalat	Idea	Reliance (GSM)	Tata (GSM)	Uninor	Videocon	Vodafone	Reliance (CDMA)	Tata (CDMA)
<b>Aircel</b>	-	99%	98%	100%	100%	100%	100%	100%	100%	100%	100%	100%
<b>Airtel</b>	100%	-	99%	100%	98%	98%	100%	100%	100%	99%	100%	100%
<b>BSNL</b>	100%	99%	-	100%	100%	98%	100%	100%	100%	97%	100%	100%
<b>Etisalat</b>	100%	100%	100%	-	100%	100%	100%	100%	100%	100%	97%	100%
<b>Idea</b>	100%	98%	100%	100%	-	100%	100%	99%	100%	100%	100%	100%
<b>Reliance (GSM)</b>	100%	100%	100%	100%	100%	-	100%	100%	100%	100%	100%	100%
<b>Tata (GSM)</b>	100%	98%	100%	100%	100%	99%	-	97%	100%	100%	100%	100%
<b>Uninor</b>	100%	98%	100%	100%	100%	100%	100%	-	100%	100%	99%	100%
<b>Videocon</b>	100%	98%	83%	100%	100%	99%	100%	100%	-	99%	100%	99%
<b>Vodafone</b>	100%	99%	100%	100%	100%	100%	100%	100%	100%	-	100%	98%
<b>Reliance (CDMA)</b>	100%	100%	99%	100%	100%	100%	100%	98%	100%	100%	-	99%
<b>Tata (CDMA)</b>	100%	100%	100%	98%	100%	100%	100%	99%	100%	100%	100%	-

**(3) Critical Analysis**

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

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

The Operator Assisted Drive Test was conducted at Andhra Pradesh for all the operators. Route covered was about around 120Km depending on city areas within the speed limit of 30Km/hr.

**Drive Test Locations*****HYDERABAD***

LOW DENSE: Rajendra nagar, Shamshabad,  
 MEDIUM DENSE: Zoo park, Bahadurpura, Rethibowli, Attapur, Katedhan, Adarsh nagar  
 HIGH DENSE: Purana pool, Charminar, Kachiguda, King koti, Nampally, Chaderghat, Abids, Mallepalli, Masabtank

***NELLORE***

LOW DENSE: Nellore bypass road  
 MEDIUM DENSE: Ranga nayakapeta, ZP Colony, Sanjay Gandhi nagar  
 HIGH DENSE: GT road, Chinna bazaar, Ramesh reddy nagar, Moolapet, BV nagar

***VISAKHAPATNAM***

LOW DENSE: Madhurawada, Port quarters, Stadium  
 MEDIUM DENSE: Maddilapalem, Siripuram, Prahaladhapuram, Vepagunta, Arilova  
 HIGH DENSE: Buruju peta, RTC Complex, HB colony, NAD junction, Karasa

## 2) Performance (for the respective cities)

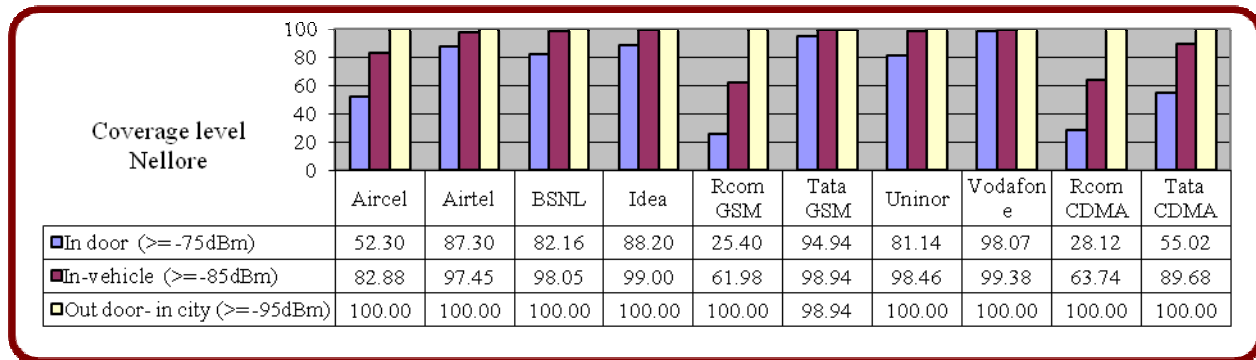
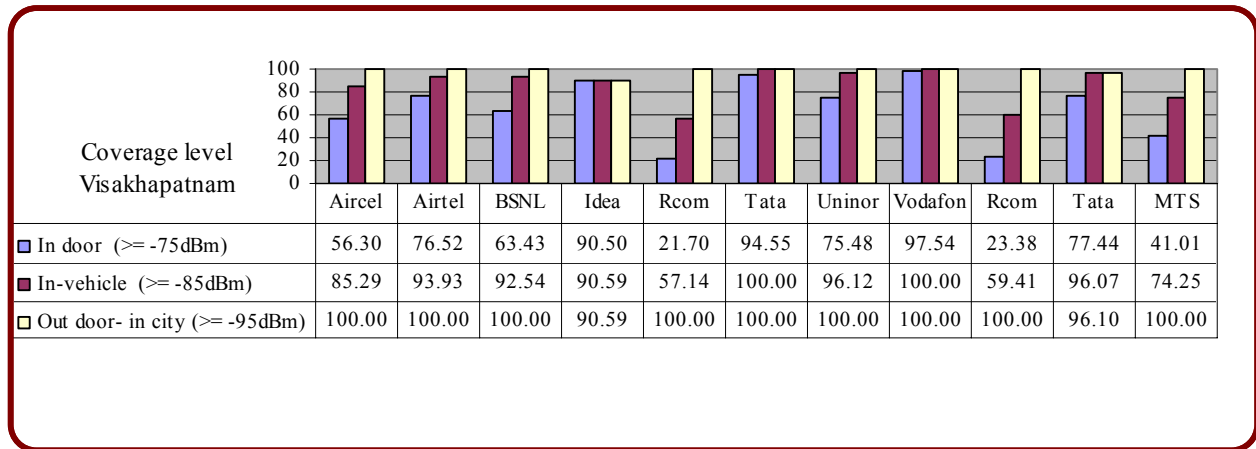
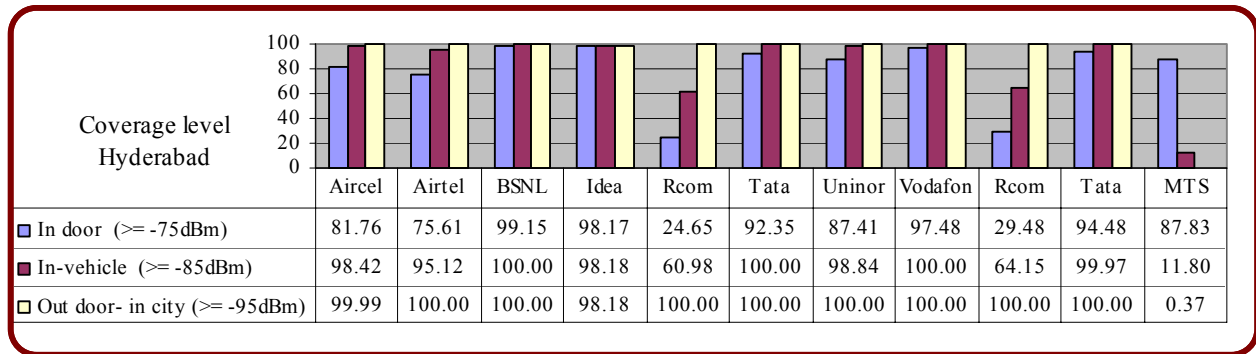
Operator assisted Drive Test

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vodafone	Rcom CDMA	Tata CDMA	MTS
			GSM Operators						CDMA Operators				
1.1	Call Attempts	Hyderabad	144	123	117	109	122	183	131	159	143	139	132
		Visakhapatnam	161	247	134	137	129	110	174	122	156	152	177
		Nellore	171	197	169	155	196	158	168	149	248	187	
1.2	Blocked Call Rate (<=3%)	Hyderabad	0.00%	0.00%	0.00%	0%	2.46%	0.55%	0.00%	0.00%	0.70%	0.00%	0.75%
		Visakhapatnam	0.62%	0.00%	2.98%	0.00%	1.55%	0.00%	1.15%	0.00%	1.28%	0.00%	1.13%
		Nellore	1%	7.61%	0.59%	0.65%	0.00%	0.00%	0.00%	0.00%	0.04%	0.00%	
1.3	Dropped Call Rate (<=2%)	Hyderabad	0.00%	0.00%	2.56%	0.00%	0.00%	0.55%	1.57%	0.00%	0.00%	0.00%	1.52%
		Visakhapatnam	0%	0.00%	2.08%	0.00%	0.45%	0.90%	0.59%	0.00%	1.92%	0.00%	1.71%
		Nellore	1%	3.05%	2.38%	0.00%	1.02%	0.00%	0.60%	0.00%	0.00%	0.53%	
1.4	Percentage of connections with good voice quality (=>95%)												
	(i) 0-4 (w/o frequency hopping)	Hyderabad									98.81%	98.16%	99.30%
		Visakhapatnam									97.98%	99.54%	92.63%
		Nellore									99.60%	99.69%	
	(ii) 0-5 ( with frequency hopping)	Hyderabad	95.31%	97%	95.06%	96.69%	94.00%	91.07%	93.13%	95%			
		Visakhapatnam	96.50%	97.38%	93.40%	97.15%	96.97%	95.83%	94.94%	96.84%			
Nellore		94.57%	79.17%	94.40%	95.97%	98.70%	97.77%	95.18%	95.43%				

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vodafone	Rcom CDMA	Tata CDMA	MTS	
			GSM Operators						CDMA Operators					
1.5	Service Coverage													
	In door ( $\geq -75$ dBm)	Hyderabad	81.76	75.61	99.15	98.17	24.65	92.35	87.41	97.48	29.48	94.48	87.83	
		Visakhapatnam	56.30	76.52	63.43	90.50	21.70	94.55	75.48	97.54	23.38	77.44	41.01	
		Nellore	52.30	87.30	82.16	88.20	25.40	94.94	81.14	98.07	28.12	55.02		
	In-vehicle ( $\geq -85$ dBm)	Hyderabad	98.42	95.12	100.00	98.18	60.98	100.00	98.84	100.00	64.15	99.97	11.80	
		Visakhapatnam	85.29	93.93	92.54	90.59	57.14	100.00	96.12	100.00	59.41	96.07	74.25	
		Nellore	82.88	97.45	98.05	99.00	61.98	98.94	98.46	99.38	63.74	89.68		
	Out door- in city ( $\geq -95$ dBm)	Hyderabad	99.99	100.00	100.00	98.18	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.37
		Visakhapatnam	100.00	100.00	100.00	90.59	100.00	100.00	100.00	100.00	100.00	100.00	96.10	100.00
Nellore		100.00	100.00	100.00	100.00	100.00	98.94	100.00	100.00	100.00	100.00	100.00		
1.6	Call Setup Success Rate ( $\geq 95\%$ )	Hyderabad	100%	100%	100%	100%	97.54%	99.45%	100%	100%	99.30%	100%	99.25%	
		Visakhapatnam	99.38%	100%	97.02%	100%	98.45%	100%	98.85%	100%	98.72%	100%	98.87%	
		Nellore	99.42%	92.39%	99.41%	99.35%	100%	100%	100.0%	100%	99.96%	100%		



## Graphical Representation



**(3) Critical Analysis**

The drive test data was found to be satisfactory for most of the parameters. However, a few deviations found are listed below:

- BSNL is not meeting the benchmark of "Drop call rate" for all 3 cities.
- AIRTEL is not meeting any benchmark in Nellore town.
- "Percentage of connection with good voice quality" benchmark is not met by Aircel & BSNL in Nellore, Rcom GSM, Tata GSM & Uninot in Hyderabad, Uninor in Hyderabad and MTS in Visakhapatnam.

**(E) Independent Drive Test****(1) Sample Coverage**

The Independent Drive Test was conducted at Andhra Pradesh after operators assisted drive test was over for respective operators. Route cover was about around 120 Km depending on city areas within the speed limit of 30Km/hr.

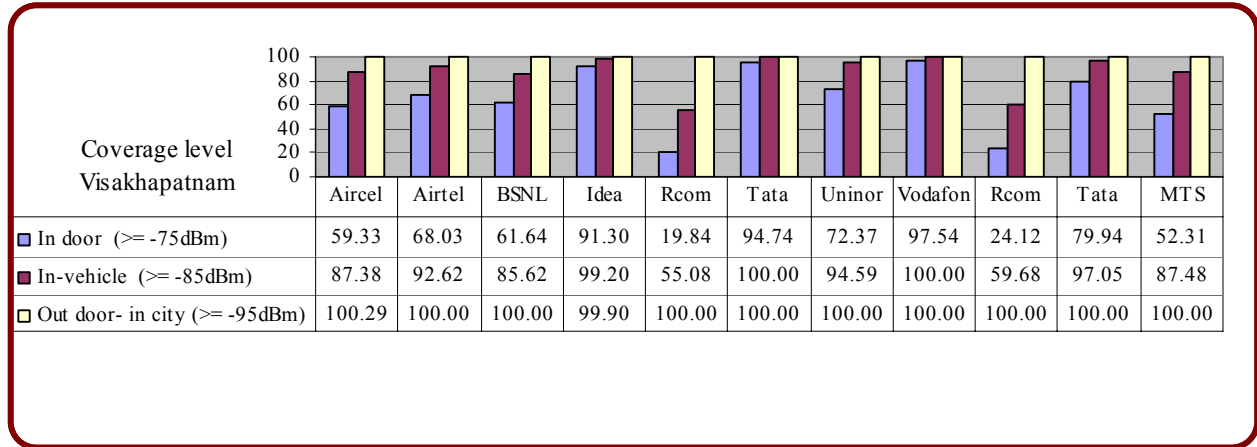
**Drive Test Locations*****VISAKHAPATNAM***

LOW DENSE:	Kailashgiri, Visakha Steels, Samatha nagar
MEDIUM DENSE:	Sagar nagar, Rishikonda, Madhurawada, Kanchara palem
HIGH DENSE:	Gajuwaka, Bus stand, Railway station, Fishing Harbour, KGH Hospital road

2) Performance (for the respective cities)

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vodafone	Rcom CDMA	Tata CDMA	MTS
			GSM Operators								CDMA Operators		
1.1	Call Attempts	Visakhapatnam	161	244	146	151	129	114	174	122	152	153	164
1.2	Blocked Call Rate (<=3%)	Visakhapatnam	0.62%	0.00%	5.50%	0.00%	2.33%	0.00%	0.00%	0.00%	2.63%	0.00%	1.83%
1.3	Dropped Call Rate (<=2%)	Visakhapatnam	0.00%	0.00%	4.50%	0.00%	0.00%	0.00%	0.59%	0.00%	1.97%	0.00%	0.61%
1.4	Percentage of connections with good voice quality (=>95%)												
	(i) 0-4 (w/o frequency hopping)	Visakhapatnam									95.46%	99.62%	92.82%
	(ii) 0-5 ( with frequency hopping)		91.12%	96.18%	93.90%	96.62%	94.76%	95.58%	94.86%	96.84%			
1.5	Service Coverage												
	In door (>= -75dBm)	Visakhapatnam	59.33	68.03	61.64	91.30	19.84	94.74	72.37	97.54	24.12	79.94	52.31
	In-vehicle (>= -85dBm)	Visakhapatnam	87.38	92.62	85.62	99.20	55.08	100.00	94.59	100.00	59.68	97.05	87.48
	Out door- in city (>= -95dBm)	Visakhapatnam	100.29	100.00	100.00	99.90	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1.6	Call Setup Success Rate (>=95%)	Visakhapatnam	99.38%	100%	94.50%	100%	97.67%	100%	100%	100%	97.37%	100%	98.17%

## Graphical Representation



### (3) Critical Analysis

- BSNL is not meeting any benchmark.
- Good Voice Quality parameter is not met by Aircel, Rcom GSM, Uninor & MTS.

**(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 (Andhra Pradesh) is by and large satisfactory for **Network Parameters**. However, the benchmark of  $\leq 3\%$  for “worst affected cells  $> 3\%$  TCH drop” is not met by BSNL, Etisalat, Tata GSM and Videocon.

Regarding the POI Congestion, Uninor, Videocon and Sistema (MTS) are having POIs with  $\geq 0.5\%$  congestion.

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

Regarding **Metering/Billing Credibility** issues, Airtel, Idea & Tata GSM shows below benchmark value for Post-paid connections.

Regarding **Termination/Closure of Service** issues, BSNL is found to take more than 7days for all the cases.

Regarding **Time taken for refund of deposits after closures** issues, Idea & Tata GSM show below benchmark value.

During **Drive Tests**, high Drop Call Rates were found in case of BSNL for all 3cities. Airtel is not meeting any benchmark in Nellore.

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

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

**IV. Broadband Service Providers**

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