

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

***Report Period: Jan 2012 – Mar 2012***

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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.
- vii) Level 1 (Emergency nos.) calling

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.

## 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 1<sup>st</sup> quarter (Jan – Mar 2012). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken for the period July – Sept 2011.

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	Jan-2012	1900-2000 Hrs
2	Airtel Ltd	Jan-2012	1900-2000 Hrs
3	BSNL	Jan-2012	1900-2000 Hrs
4	Idea	Jan-2012	1900-2000 Hrs
5	Reliance Communication (GSM)	Jan-2012	1900-2000 Hrs
6	Tata Communications (GSM)	Jan-2012	1900-2000 Hrs
7	Uninor	Jan-2012	1900-2000 Hrs
8	Videocon	Jan-2012	1900-2000 Hrs
9	Vodafone	Jan-2012	1900-2000 Hrs
<b>CDMA Operators</b>			
10	MTS (CDMA)	Jan-2012	1900-2000 Hrs
11	Reliance Communication (CDMA)	Jan-2012	1900-2000 Hrs
12	Tata Communications (CDMA)	Jan-2012	1900-2000 Hrs

**Note:** Etisalat has stopped their operations in Andhra Pradesh circle. Hence their reports are not considered.

## 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	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
S/N	Name of Parameter													
1	<b>Network Availability</b>													
	a) BTS accumulated downtime	<= 2%	0.01%	0.10%	0.83%	0.02%	0.06%	0.03%	0.10%	0.00%	0.02%	0.06%	0.03%	0.13%
	b) Worst affected BTSs due to downtime	<= 2%	0.00%	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%	99.40%	99.64%	98.50%	99.98%	99.69%	98.97%	99.05%	98.63%	99.99%	99.25%	99.27%	99.09%
	b) SDCCH/PAGING congestion	<=1%	0.03%	0.15%	0.48%	0.55%	0.01%	0.04%	0.16%	0.41%	0.09%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.01%	0.11%	1.24%	0.85%	0.02%	0.27%	1.50%	0.00%	0.40%	0.09%	0.04%	0.00%
3	<b>Connection maintenance (retain ability)</b>													
	a) CDR	<=2%	0.68%	0.59%	0.82%	0.85%	0.39%	0.61%	0.61%	1.20%	0.53%	0.39%	0.43%	0.47%
	b) Worst affected cells>3% TCH drop	<=3%	4.48%	1.07%	2.66%	2.97%	0.02%	5.21%	1.58%	0.00%	2.92%	0.40%	0.00%	1.26%
	c) Good voice quality	>=95%	98.21%	99.08%	NA	97.59%	99.09%	98.18%	98.89%	99.97%	98.92%	98.45%	NA	NA
4	<b>POI congestion</b>	<=0.5%	0	0	0	0	0	5	3	0	0	0	0	0
5	<b>Response time to customers for assistance</b>													
	a) Accessibility of call centre/Customer Care	>=95%	100.00%	100.00%	100.00%	99.50%	99.10%	100.00%	98.00%	100.00%	100.00%	99.20%	100.00%	96.00%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	97.00%	91.90%	61.00%	50.0%	81.00%	90.00%	98.00%	100.00%	98.00%	84.00%	94.00%	96.00%

### Observations:

From the 3 days live data assessment, it is found that the operators are meeting most of the network parameters, except the following:

- For the parameter "Worst affected cells>3% TCH drop" Aircel, TATA GSM are found not meeting the benchmark
- For the parameter "% of call answered by operator (Voice to voice)" BSNL, Idea, Rcom GSM & Rcom CDMA are found not meeting the benchmark.
- In case of POI parameter, TATA GSM, Uninor has found to have individual POIs with congestions as shown in the table.



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**One Month data Assessment:**

One Month Data Audit		Bench- mark	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
S/N	Name of Parameter		GSM Operators									CDMA		
(A)	<b>Network Service Quality Parameter</b>													
1	<b>Network Availability</b>													
	a) BTS Accumulated Downtime	<=2%	0.01%	0.06%	0.81%	0.02%	0.08%	0.02%	0.03%	0.38%	0.01%	0.06%	0.02%	0.10%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	0.00%	0.00%	0.15%	0.00%	0.00%	0.00%	0.00%	0.08%	0.00%	0.00%
2	<b>Connection Establishment (Accessibility)</b>													
	a) CSSR (Call Setup Success Rate)	>=95%	99.40%	99.63%	97.77%	99.97%	99.69%	98.96%	99.03%	99.67%	99.99%	99.25%	99.26%	99.00%
	b) SDCCH/PAGING congestion	<=1%	0.03%	0.15%	0.80%	0.45%	0.01%	0.19%	0.16%	0.66%	0.14%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.01%	0.12%	1.89%	0.74%	0.03%	0.42%	1.38%	0.00%	0.41%	0.10%	0.03%	0.00%
3	<b>Connection maintenance (retainability)</b>													
	a) CDR	<=2%	0.70%	0.60%	0.94%	0.86%	0.39%	0.63%	0.61%	1.15%	0.56%	0.40%	0.04%	0.40%
	b) Worst affected cells>3% TCH drop	<=3%	1.19%	1.07%	2.87%	2.95%	0.02%	2.82%	1.69%	0.00%	2.92%	0.33%	0.25%	1.14%
	c) Good voice quality	>=95%	98.24%	99.11%	NA	97.54%	99.09%	98.12%	98.89%	99.76%	98.90%	98.45%	NA	NA
4	<b>POI congestion</b>	<=0.5%	0	0	0	0	0	4	3	0	0	0	0	0
(B)	<b>Customer Service Quality Parameters</b>													
5	<b>Metering/billing credibility-Post paid</b>	<= 0.1%	0.02%	0.01%	0.00%	0.08%	0.10%	0.61%	NA	NA	0.16%	0.09%	0.16%	0.00%
6	<b>Metering /billing credibility-Pre paid</b>	<= 0.1%	0.01%	0.00%	NR	0.01%	0.10%	0.05%	0.01%	0.00%	0.01%	0.04%	0.08%	0.02%
7	<b>Resolution of billing/ charging complaints</b>	100% within 4 weeks	100%	100%	100%	100%	100%	100%	100%	NA	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% with in 1 week	100% with in 1 week	NR	100% with in 1 week	100% with in 1 week	100% with in 1 week	100% with in 1 week	NA	100% with in 1 week	100% with in 1 week	100% with in 1 week	100% with in 1 week
8	<b>Response time to customers for assistance</b>													
	a) Accessibility of call centre/Customer Care	>=95%	100.00%	100.00%	97.00%	100.00%	99.30%	100.00%	97.00%	100.00%	97.00%	99.30%	100.00%	96.00%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	98.00%	86.00%	70.00%	51.00%	81.00%	75.00%	98.00%	100.00%	97.00%	85.00%	95.00%	95.00%
9	<b>Termination/closure of service</b>	<=7days	100.00%	100.00%	NR	100.00%	100.00%	100.00%	NA	NA	100.00%	100.00%	100.00%	100.00%
10	<b>Time taken for refunds of deposits after closures.</b>	100% within 60 days	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	NA	100.00%	100.00%	99.00%	NA

## **Observations:**

From the month data assessment, it is found that the operators are meeting most of the network parameters.

In case of Tata GSM, Uninor 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.

Performance related to customer care data is not found to be satisfactory for the parameter “calls answered by operators (voice-to-voice)” for Airtel, BSNL, Idea, Tata GSM, Rcom GSM & Rcom CDMA .

The “Metering/billing credibility -postpaid” benchmark is not meeting by Tata GSM, Tata CDMA & Vodafone with a values of 0.61%, 0.16% & 0.16% respectively.

The benchmark for the parameter “Time taken for refunds of deposits after closures” is not meeting by Tata CDMA with value of 99% respectively.

## 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	Blocked Call Rate (<=3%)	Nalgonda	0.00%	0.00%	3.33%	2.00%	1.00%	0.00%	0.00%	0.00%	0.87%	0.00%	0.00%	
		Eluru	0.00%	0.00%	3.91%	1.00%	1.00%	1.03%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Ananthapur	0.00%	0.00%	0.96%	0.00%	1.00%	0.00%	0.00%	0.00%	0.00%	0.63%	0.74%	1.83%
1.2	Dropped Call Rate (<=2%)	Nalgonda	0.00%	0.00%	0.00%	0.85%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Eluru	0.00%	0.00%	0.78%	0.56%	0.00%	1.03%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Ananthapur	0.00%	0.00%	0.96%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
1.3	Percentage of connections with good voice quality (>=95%)													
	(i) 0-4 (w/o frequency hopping)	Nalgonda										99.56%	98.66%	99.63%
		Eluru										98.87%	99.82%	99.63%
		Ananthapur										98.96%	99.99%	99.90%
	(ii) 0-5 ( with frequency hopping)	Nalgonda	96.25%	96.45%	92.61%	97.60%	96.42%	98.00%	96.07%	97.58%				
		Eluru	97.19%	96.68%	92.21%	96.10%	95.55%	95.00%	95.76%	98.20%				
Ananthapur		95.05%	97.55%	93.35%	98.10%	98.54%	97.39%	95.13%	98.00%					
1.4	Call Setup Success Rate (>=95%)	Nalgonda	100	100	96.67	98.3	99.14	100	100	100	99.13	100	100	
		Eluru	100	100	96.09	99.44	99.17	98.97	100	100	100	100	100	
		Ananthapur	100	100	99.04	100	99.37	100	100	100	99.37	99.26	98.17	

### Observations:

- BSNL is not meeting the benchmark of "Blocked call rate" in Nalgonda, Eluru cities.
- "Percentage of connection with good voice quality" benchmark is not meeting by BSNL (Nalgonda, Eluru and Ananthapur).

**Independent Drive Test**

SN	Parameter	BSNL	UNINOR	AIRCEL	IDEA	MTS	RCOM	AIRTEL	IDEA
		Khammam		Mahabubnagar		Cudapah	Adilabad	Karimnagar	
1.1	Call Attempts	142	141	63	57	100	95	128	111
1.2	Block Call Rate (<= 3%)	7.04%	0.00%	1.59%	3.51%	0.00%	0.00%	0.78%	0.00%
1.3	Drop Call Rate (<= 2%)	3.00%	0.71%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1.4	Percentage of Connections with good voice quality (>= 95%)	91.22%	94.66%	95.71%	96.90%	99.95%	98.20%	97.30%	96.30%
1.5	Service Coverage								
	Indoor (>= -75dbm)	82.27	72.72	67.02	91.2	78.82	32.05	83.6	97
	In-Vehicle (>= -85dbm)	98.63	97.68	96.02	99.6	99.93	66.99	96.8	99.7
	Outdoor -in City (>= -95dbm)	100	100	100	100	100	100	100	100
1.6	Call Setup Success Rate (>= 95%)	92.96	100	98.41	96.49	100	100	99.22	100
1.7	Handover Success Rate (in percentage)	97.28	98.96	100	92.21	100	100	99.15	99.74

**Observations:**

- BSNL is not meeting the benchmark of "Blocked call rate", "Drop call rate", "Good voice quality" & CSSR parameters in Khammam city.
- Uninor is not meeting the benchmark of "Good voice quality".
- Idea is not meeting the benchmark of "Block call rate".

## CHAPTER-3: PMR Data Verification Results

## I. Cellular Mobile Telephone Service

PMR		Bench- mark	Audit	Aircel	Airtel	BSNL	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>														
	BTS Accumulated Downtime	<=2%	Reported	0.03	0.12	1.03	0.02	0.09	0.03	0.06	0.57	0.02	0.06	0.02	0.12
			Verified	0.03	0.12	1.03	0.02	0.09	0.03	0.06	0.57	0.02	0.06	0.02	0.12
	Worst affected BTSs due to downtime	<=2%	Reported	0.00	0.04	0.00	0.00	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00
Verified			0.00	0.04	0.00	0.00	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	
2	<b>Connection Establishment (Accessibility)</b>														
	CSSR (Call Setup Success Rate)	>=95%	Reported	99.33	99.62	95.18	99.93	99.67	98.48	99.08	98.65	99.35	99.87	99.30	99.14
			Verified	99.33	99.62	95.18	99.93	99.67	98.48	99.08	98.65	99.35	99.87	99.30	99.14
	SDCCH/PAGING congestion	<=1%	Reported	0.05	0.15	0.20	0.27	0.07	0.09	0.11	0.31	0.06	0.03	0.00	0.00
			Verified	0.05	0.15	0.20	0.27	0.07	0.09	0.11	0.31	0.06	0.03	0.00	0.00
	TCH congestion	<=2%	Reported	0.02	0.12	1.43	0.40	0.05	0.12	0.14	0.00	0.38	0.10	0.05	0.00
Verified			0.02	0.12	1.43	0.40	0.05	0.12	0.14	0.00	0.38	0.10	0.05	0.00	
3	<b>Connection maintenance (retainability)</b>														
	CDR	<=2%	Reported	0.40	0.53	1.53	0.72	0.86	0.78	1.18	1.07	0.57	0.07	0.39	0.42
			Verified	0.40	0.53	1.53	0.72	0.86	0.78	1.18	1.07	0.57	0.07	0.39	0.42
	Worst affected cells>3% TCH drop	<=3%	Reported	0.95	1.12	3.71	2.98	0.95	3.34	2.29	0.89	2.94	0.35	0.36	0.72
			Verified	0.95	1.12	3.71	2.98	0.95	3.34	2.29	0.89	2.94	0.35	0.36	0.72
	Good voice quality	>=95%	Reported	98.36	99.12	98.00	97.62	99.51	97.77	98.96	99.54	98.81	99.20	99.10	100.00
Verified			98.36	99.12	98.00	97.62	99.51	97.77	98.96	99.54	98.81	99.20	99.10	100.00	
4	<b>POI congestion</b>	<=0.5%	Reported	0.00	0.00	0.00	0.00	0.00	0.00	3.67	0.00	0.00	0.00	0.00	

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			Verified	0.00	0.00	0.00	0.00	0.00	0.00	3.67	0.00	0.00	0.00	0.00	0.00
(B)	<b>Customer Service Quality Parameters</b>														
5	<b>Metering/billing credibility-Post paid</b>	<= 0.1%	Reported	0.03	0.01	0.10	0.07	0.10	0.00	0.00	0.00	0.04	0.05	0.01	0.00
			Verified	0.03	0.01	0.10	0.07	0.10	0.00	0.00	0.00	0.04	0.05	0.01	0.00
6	<b>Metering /billing credibility-Pre paid</b>	<= 0.1%	Reported	0.02	0.00	0.00	0.03	0.09	0.00	0.05	0.00	0.01	0.03	0.01	0.00
			Verified	0.02	0.00	0.00	0.03	0.09	0.00	0.05	0.00	0.01	0.03	0.01	0.00
7	<b>Resolution of billing/ charging complaints</b>	100% within 4 weeks	Reported	100.00	100.00	99.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
			Verified	100.00	100.00	99.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	Reported	100.00	100.00	100.00	100.00	100.00	100.00	0.00	100.00	100.00	100.00	100.00	100.00
			Verified	100.00	100.00	100.00	100.00	100.00	100.00	0.00	100.00	100.00	100.00	100.00	100.00
8	<b>Response time to customers for assistance</b>		Reported												
			Verified												
	Accessibility of call centre/Customer Care	>=95%	Reported	100.00	100.00	97.00	99.21	99.12	100.00	96.92	100.00	100.00	98.91	98.00	96.32
			Verified	100.00	100.00	97.00	99.21	99.12	100.00	96.92	100.00	100.00	98.91	98.00	96.32
% call answered by operators(voice to voice) within 60 sec.	>=90%	Reported	94.87	87.00	80.00	85.65	36.00	85.00	70.73	98.37	81.49	54.42	96.00	93.18	
		Verified	94.87	87.00	80.00	85.65	36.00	85.00	70.73	98.37	81.49	54.42	96.00	93.18	
9	<b>Termination/closure of service</b>														
	No.of requests for Termination / Closure of service complied within 7 days during the quarter	<=7days	Reported	100.00	100.00	100.00	100.00	100.00	100.00	0.00	0.00	100.00	100.00	100.00	0.00
			Verified	100.00	100.00	100.00	100.00	100.00	100.00	0.00	0.00	100.00	100.00	100.00	0.00
10	<b>Time taken for refunds of deposits after closures.</b>	100% within 60 days	Reported	100.00	100.00	100.00	84.33	100.00	93.00	0.00	0.00	100.00	100.00	98.00	0.00
			Verified	100.00	100.00	100.00	84.33	100.00	93.00	0.00	0.00	100.00	100.00	98.00	0.00

**Critical Analysis (PMR Verification):**

A).All the operator's data is almost matching with the PMR data.

## Chapter -4 Detailed Findings &amp; Analysis

## 1. Cellular Mobile Telephone Service

## (A) MSC Audit

## (1) 3days live data assessment &amp; summarized findings

S/N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
			GSM Operators										CDMA	
<b>A</b>	<b>Network Service Quality Parameter</b>													
<b>1</b>	<b>Network Availability</b>													
	a). BTS accumulated downtime	<= 2%	0.01%	0.10%	0.83%	0.02%	0.06%	0.03%	0.10%	0.00%	0.02%	0.06%	0.03%	0.13%
	b). Worst affected BTSs due to downtime	<= 2%	0.00%	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		2867	10248	5671	7067	4004	4304	2635	25	8205	2561	1326	521
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during the 3days Live		16.83	758	3379	106	176	87	182.6	0	108.53	102	24.58	46.9
	e) No. of BTSs having accumulated downtime of >24 hours in 3days Live		0	0	0	0	0	0	0	0	0	0	0	0
<b>2</b>	<b>Connection Establishment (Accessibility)</b>													
	a) CSSR	>=95%	99.40%	99.64%	98.50%	99.98%	99.69%	98.97%	99.05%	98.63%	99.99%	99.25%	99.27%	99.09%
	b) SDCCH/PAGING congestion	<=1%	0.03%	0.15%	0.48%	0.55%	0.01%	0.04%	0.16%	0.41%	0.09%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.01%	0.11%	1.24%	0.85%	0.02%	0.27%	1.50%	0.00%	0.40%	0.09%	0.04%	0.00%
<b>3</b>	<b>Connection maintenance</b>													
	a) CDR	<=2%	0.68%	0.59%	0.82%	0.85%	0.39%	0.61%	0.61%	1.20%	0.53%	0.39%	0.43%	0.47%
	b) Cells having > 3% TCH drop	<=3%	4.48%	1.07%	2.66%	2.97%	0.02%	5.21%	1.58%	0.00%	2.92%	0.40%	0.00%	1.26%
	c) Good voice quality	>=95%	98.21%	99.08%	NA	97.59%	99.09%	98.18%	98.89%	99.97%	98.92%	98.45%	NA	NA
	d) No. of cells > 3% TCH drop		373	310	449	624	2	664	124	0	725	31	0	20
	e) Total no. of cells in the network		8321	28976	16874	21021	12012	12735	7868	75	24800	7683	4050	1583

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<b>4</b>	<b>POI congestion</b>	$\leq 0.5\%$	0	0	0	0	0	5	3	0	0	0	0	0
	a) Name of POI not meeting the benchmark													
	b) Total No. of circuits on POI		31728	227938	31619	160312	303789	10763	42357	549	177792	1895511	503745	10830
	c) Avg No. of call attempts on POI		555828.67	7882901	1391008	4493857	6746453	322659.67	1293794	556	5545545	23705990	5747339.7	214185
	d) Avg traffic served on POI (Erlang)		18470.23	136002.73	23446.4	102942.46	148151	5858.9	27965.38	15.49	97502.88	946178	172582.58	3816.79
	e) Total number of working POI Service Area wise		13	167	23	125	19	34	61	15	57	80	920	48
	f) Equipped Capacity of Network in respect of Traffic in erlang		89298	680175	391130	256951.71	102000	224100.13	87004.53	5000	200934	258000	325531	27300
	g) Total traffic handled in TCBH in erlang		31208	528399	184172	246066.65	50784	86587.76	72090.9	0.22	164689	93599	81561	9056
<b>(B)</b>	<b>Customer Service Quality Parameters</b>													
<b>5</b>	<b>Response time to customers for assistance</b>													
	a) Accessibility of call centre	$\geq 95\%$	100.00%	100.00%	100.00%	99.50%	99.10%	100.00%	98.00%	100.00%	100.00%	99.20%	100.00%	96.00%
	b) % of call answered by operators(voice to voice) within 60 sec	$\geq 90\%$	97.00%	91.90%	61.00%	5.00%	81.00%	90.00%	98.00%	100.00%	98.00%	84.00%	94.00%	96.00%

NA: Not Applicable, NR: Not Received



## 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:-

- **BTS Accumulated downtime (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark with values laying between 0% and 0.83%
- **Worst affected BTSs due to downtime (benchmark  $\leq 2\%$ ):** All the operators are meeting the benchmark which is specified by TRAI.
- **Call setup success rate (benchmark  $\geq 95\%$ ):** All operators are meeting the benchmark with values laying between 98.5% and 99.99%.
- **SDCCH/PAGING Channel congestion (benchmark  $\leq 1\%$ ):** All operators are meeting the benchmark with values laying between 0% and 0.55%.  
*Note: CDMA operators are provided the data for Paging Channel congestion.*
- **TCH congestion (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark with values laying between 0% and 1.5%.
- **Call drop rate (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark with values laying between 0.39% and 1.2%.
- **Cell exceeding 3% TCH drop (benchmark  $\leq 3\%$ ):** Except for Aircel, Tata GSM with a values of 4.48%, 5.21% rest of the operators are satisfying the benchmark with value in between 0% and 2.97%.
- **Connections with good voice quality (benchmark  $\geq 95\%$ ):** Tata CDMA, MTS & BSNL has declared that the parameter is not system generated. Rests of the operators are meeting the benchmark with values laying between 97.59% and 99.97%.
- **POI Congestion (benchmark  $\leq 0.5\%$ ):** All operators are meeting the benchmark. There was no congestion found overall on the POI, but Tata GSM, Uninor case 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 with values in between 95% and 100%.
- **%age of call answered by operator (Voice to voice) (benchmark  $>90\%$ ):** Except for BSNL, Idea, Rcom Gsm, Rcom CDMA with a values of 61%, 5%, 81% & 84% respectively, rest of the operators are satisfying the benchmark with value in between 95% and 100% respectively.



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	b) Total No. of call attempts on POI (Avg.)		513323	8247144	1301116	4649044	6746453	308323.93	1217118	548.52	5528574	23705990	5563214.2	206282
	c) Total traffic served on POI (Erlang) (Avg.)		19189.79	142968.19	26988	100269.36	148151	5524.64	26663.54	15.68	98393.5	946178	169947.05	3680.05
	d) Total No. of circuits on POI		31728	227938	31619	160312	303789	10763	42357	549	177792	1895511	503745	10830
	e) Total number of working POI Service Area wise		13	167	23	125	19	34	61	15	57	80	920	48
	f) Capacity of POI		30900.07	219890	31619	152871.98	281406	9900	39399.67	371.6	168754.45	22190.94	470780.41	9876.98
<b>5</b>	<b>Network Data</b>													
	a) Equipped Capacity of Network Erlang		89298	680175	391130	256951.71	102000	224100.13	87004.53	5000	200934	258000	325531	27300
	b) Total traffic in TCBH in erlang (Avg.)		31208	528399	184172	246066.65	50784	86587.76	72090.9	0.22	164689	93599	81561	9056
	c) Total no. of customers served (as per VLR) on last day of the month		1119471	16977275	5886715	8854450	2516849	3127106	1559610	421	3837472	2899707	1698902	363524
<b>(B)</b>	<b>Customer Service Quality Parameters</b>													
<b>6</b>	<b>Metering/billing credibility-Post paid</b>	$\leq 0.1\%$	0.02%	0.01%	0.00%	0.08%	0.10%	0.61%	NA	NA	0.16%	0.09%	0.16%	0.00%
	a) No. of bills issued during the period		10178	621913	137051	164752	31452	65535	NA	NA	312892	271533	387247	418
	b) No. of bills disputed including billing complaints during the period		2	86	0	134	31	399	NA	NA	504	248	624	0
<b>7</b>	<b>Metering /billing credibility-Pre paid</b>	$\leq 0.1\%$	0.01%	0.00%	NR	0.01%	0.10%	0.05%	0.01%	0.00%	0.01%	0.04%	0.08%	0.02%
	a) No. of charging / credit / validity complaints during the quarter		96	538	NR	597	4440	3298	279	0	1354	1857	1238	112
	b) Total no. of pre-paid customers at the end of the quarter		1952967	21446180	NR	9300805	4468601	6108135	2823204	10934	6471437	4575676	1637390	604703
<b>8</b>	<b>Resolution of billing/ charging complaints</b>	<i>100% within 4 weeks</i>	100%	100%	100%	100%	100%	100%	100%	NA	100%	100%	100%	100%
	a) No. of billing/(post paid) and charging, credit/validity (pre paid) complaints resolved within 4 weeks during the quarter		98	624	2	731	4471	3697	279	NA	1858	2105	1238	112

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	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		98	624	2	731	4471	3697	279	NA	1858	2105	1238	115
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		11	624	NR	92	4449	3273	236	NA	1279	882	583	58
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		87	7090	NR	5103	22	424	0	NA	579	1223	655	57
	e) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<i>&lt;=1 week</i>	100% with in 1 week	100% with in 1 week	NR	100% with in 1 week	100% with in 1 week	100% with in 1 week	100% with in 1 week	NA	100% with in 1 week	100% with in 1 week	100% with in 1 week	100% with in 1 week
<b>9</b>	<b>Response time to customers for assistance</b>													
	a) Accessibility of call centre/Customer Care	<i>&gt;=95%</i>	100.00%	100.00%	97.00%	100.00%	99.30%	100.00%	97.00%	100.00%	97.00%	99.30%	100.00%	96.00%
	b) % call answered by operators(voice to voice) within 60 sec.	<i>&gt;=90%</i>	98.10%	86.00%	70.00%	51.00%	81.00%	75.00%	98.00%	100.00%	97.00%	85.00%	95.00%	95.00%
	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		29286	4658244	1306355	230071	546900	1824236	740425	121	94805	394551	443776	171765
	d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		28731	3996207	913153	116689	442429	1363197	725960	121	92367	335717	422562	163391
<b>10</b>	<b>Termination/closure of service</b>	<i>&lt;=7days</i>	100.00%	100.00%	NR	100.00%	100.00%	100.00%	NA	NA	100.00%	100.00%	100.00%	100.00%
	a) Total No. of requests for Termination / Closure of service received during the quarter		33	2601	1412	1441	80	664	NA	NA	363	736	2073	251
	b) No.of requests for Termination / Closure of service complied within 7 days during the quarter		33	2601	0	1441	80	664	NA	NA	363	736	2073	251
<b>11</b>	<b>Time taken for refunds of deposits after closures.</b>	<i>100% within 60 days</i>	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	NA	100.00%	100.00%	99.00%	NA

NA: Not Applicable, NR: Not Received

## 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 laying between 0.01% and 0.81%.
- **Worst affected BTSs due to downtime (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark with values laying between 0% and 0.15%.
- **Call setup success rate (benchmark  $\geq 95\%$ ):** All operators are meeting the benchmark with values laying between 97.77% and 99.97%.
- **SDCCH/PAGING Channel congestion (benchmark  $\leq 1\%$ ):** All operators are meeting the benchmark wit values laying between 0% and 0.8%.  
*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 laying between 0% and 1.89%.
- **Call drop rate (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark with values laying between 0.04% and 1.15%.
- **Cell exceeding 3% TCH drop (benchmark  $\leq 3\%$ ):** All the operators are satisfying the benchmark with value in between 0% and 2.95%.
- **Connections with good voice quality (benchmark  $\geq 95\%$ ):** Tata CDMA, MTS & BSNL are declared that the parameter is not system generated. Rests of the operators are meeting the benchmark with values lying between 97.54% and 99.76%.
- **POI Congestion (benchmark  $\leq 0.5\%$ ):** All the operators are meeting the benchmark provided by TRAI. There was no congestion found overall on the POI, but Tata GSM, Uninor 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 with values laying between 96% to 100%.
- **%age of call answered by operator (Voice to voice) (benchmark  $>90\%$ ):** Except for Airtel, BSNL, Idea, Tata GSM, Rcom GSM, Rcom CDMA with a values of 86%, 70%, 51%, 75%, 81% & 85% respectively rest of all operators are meeting the benchmark with values lying between 95% to 100%.
- **Metering and billing credibility-Post paid (benchmark  $\leq 0.1\%$ ):** Except for Vodafone, TATA GSM, Tata CDMA with a values of 0.16%, 0.61%, 0.16% rest of all the operators are meeting the benchmark.
- **Metering and billing credibility-Pre paid (benchmark  $\leq 0.1\%$ ):** All the operators are meeting the benchmark with values laying between 0% and 0.1%.
- **Resolution of billing/ charging complaints (benchmark 100% within 4 weeks):** All operators are meeting the benchmark.
- **Termination/Closure of service (Benchmark  $\leq 7$  days):** All operators have satisfied the benchmark.
- **Time taken for refunds of deposits after closures (benchmark 100% within  $\leq 60$  days):** Except for Tata CDMA rest of the all operators have satisfied the benchmark.

**(3) Sample Coverage**

Switches/BSC/BTS details of operators:

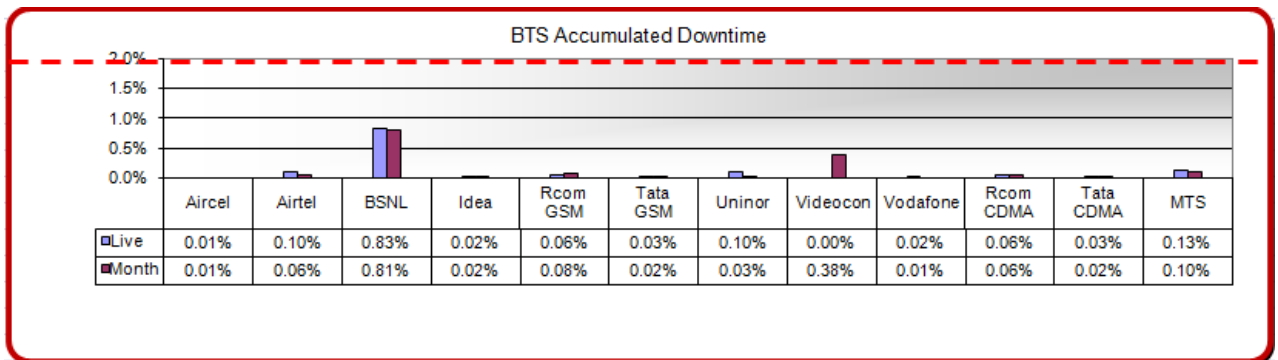
Sl.	Name of Service Provider	No. of MSC+GMSC	No. of BSC	No. of BTS
<b>GSM Operators</b>				
1	Aircel Ltd	3	21	2867
2	Airtel Ltd	57	118	10245
3	BSNL	18	91	5671
4	Idea	15	76	7067
5	Reliance Communication (GSM)	5	21	4004
6	Tata Communications (GSM)	7	32	4304
7	Uninor	3	19	2593
8	Videocon	2	2	25
9	Vodafone	12	95	8205
<b>CDMA Operators</b>				
10	MTS (CDMA)	1	2	521
11	Reliance Communication (CDMA)	12	6	2561
12	Tata Communications (CDMA)	13	5	1326

**(4) Performance (Graphical Representation)**

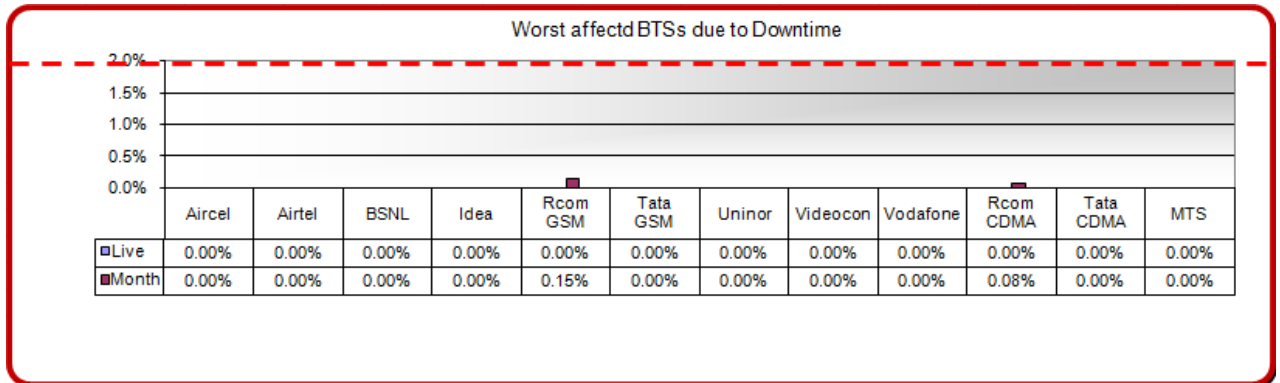
**Comparison between Live measurements and One month data Audit – Cellular Mobile Telephone Services**

**A) NETWORK PERFORMANCE**

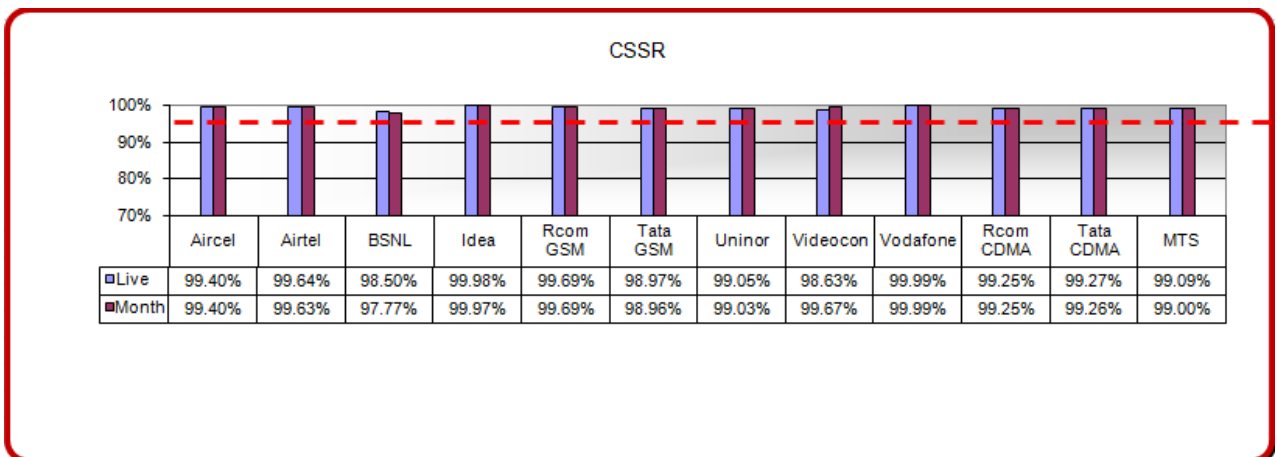
**I. BTS accumulated downtime:** All operators are meeting the TRAI benchmarks ( $\leq 2\%$ ) for both one month data and 3 days live data taken in the month of audit.



**II. 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.

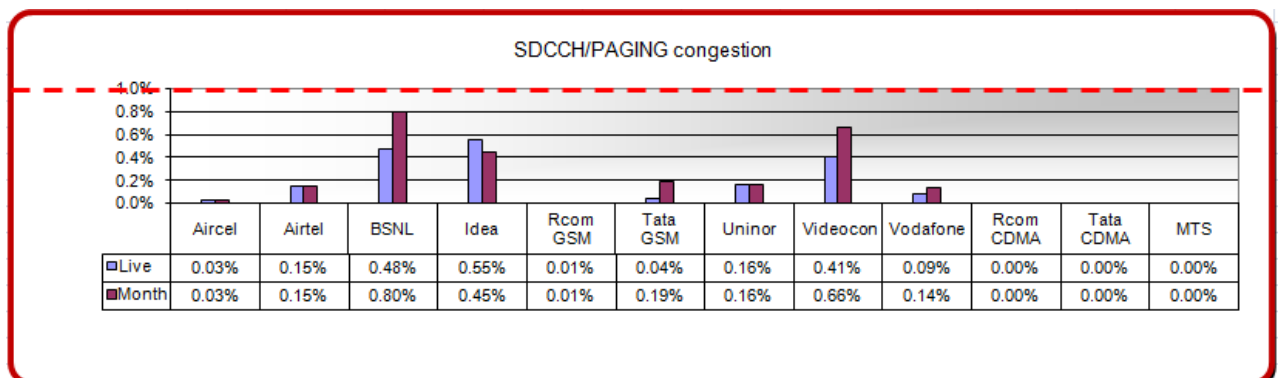


**III. Call setup success rate:** All operators are meeting the TRAI benchmarks ( $\geq 95\%$ ) for both one month data and 3 days live data taken in the month of audit.

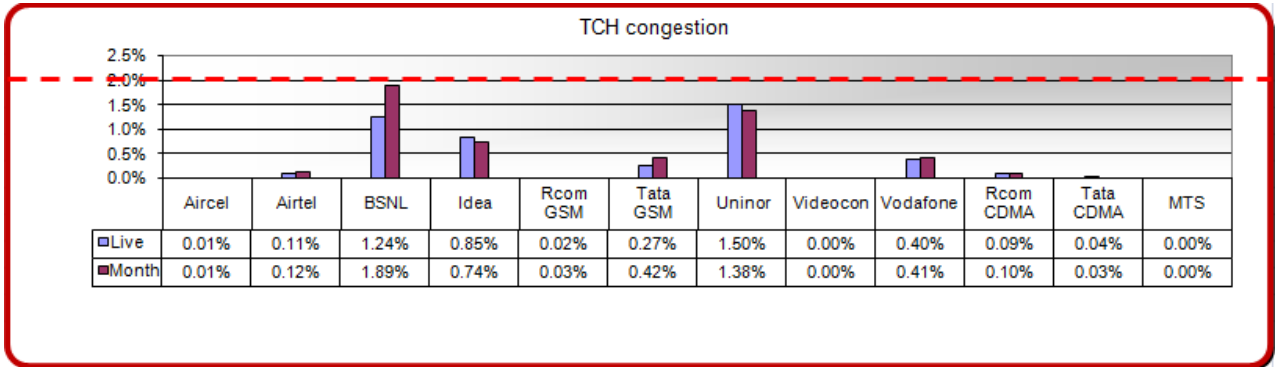


**IV. Blocked call rate:**

**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.

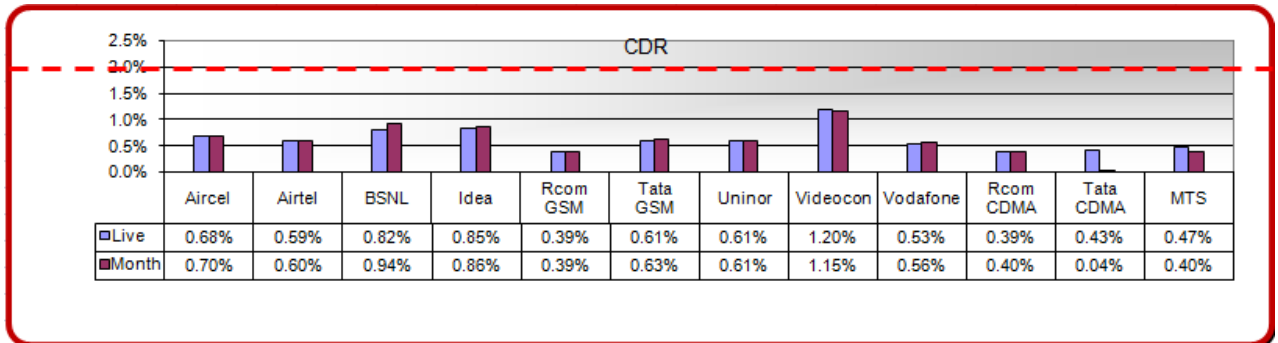


**TCH congestion (%):** All operators are meeting the TRAI benchmarks ( $\leq 2\%$ ) for both one month data and 3 days live data taken in the month of audit.

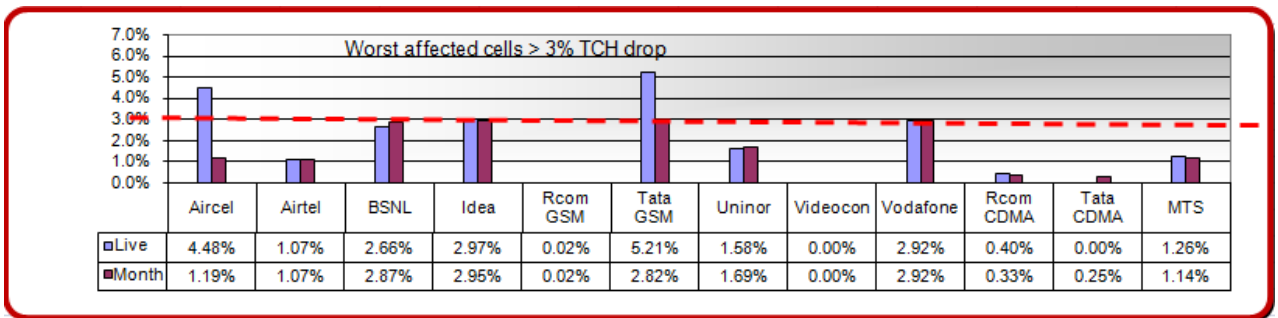


**V. Connection Maintainability (Retainability):**

**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.

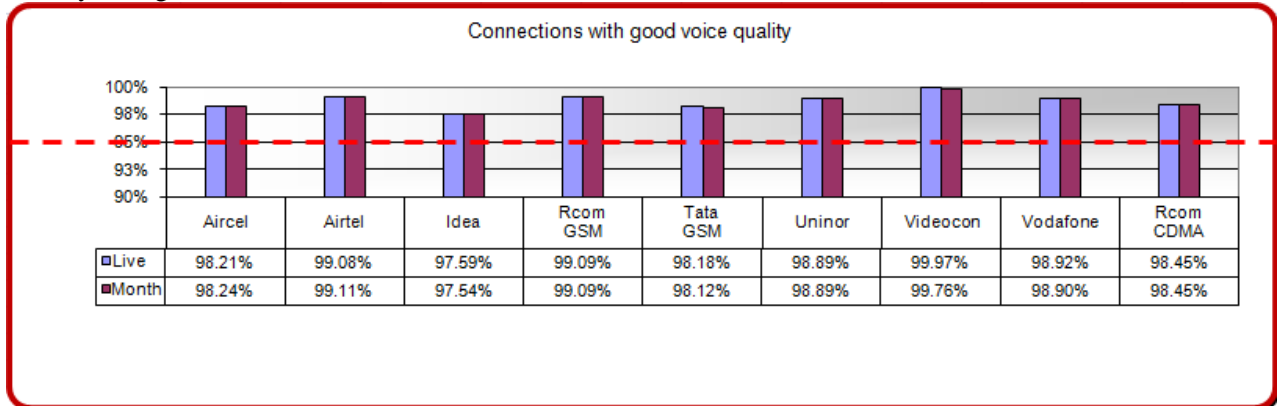


**Worst affected Cell exceeding 3% TCH Drop:** Aircel, Tata GSM are not meeting the benchmark in live data with a value of 4.48%, 5.21% respectively. Rests of the operators are meeting the benchmark for both cases.



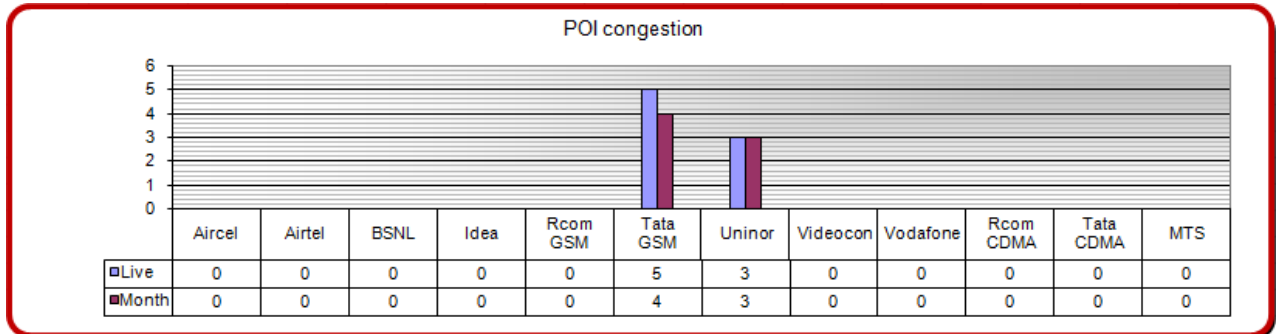


**Percentage of connections with good voice quality (benchmark  $\geq 95\%$ ):** All operators are meeting the TRAI benchmarks ( $\geq 95\%$ ) for both one month data and 3 days live data taken in the month of audit. The CDMA operators & BSNL has declared that this parameter is not system generated.



**No. of POI having  $> 0.5\%$  Congestion:**

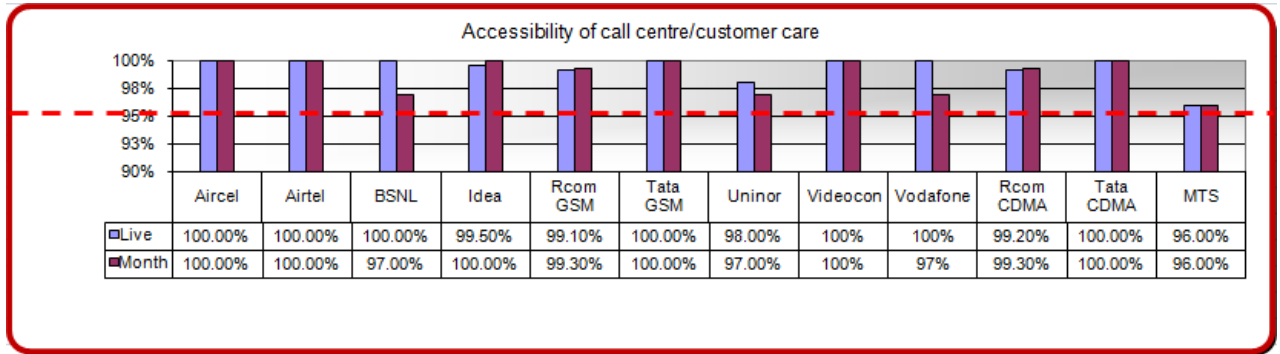
In case of Tata GSM, Uninor there was no congestion found overall on the POI, but cases were found where individual POIs are showing high utilization/usage. Some are in the range of over 100% though causing no traffic failure due to overflow technique i.e. the extra traffic is carried over by some other operating POI as has been designed to do so.



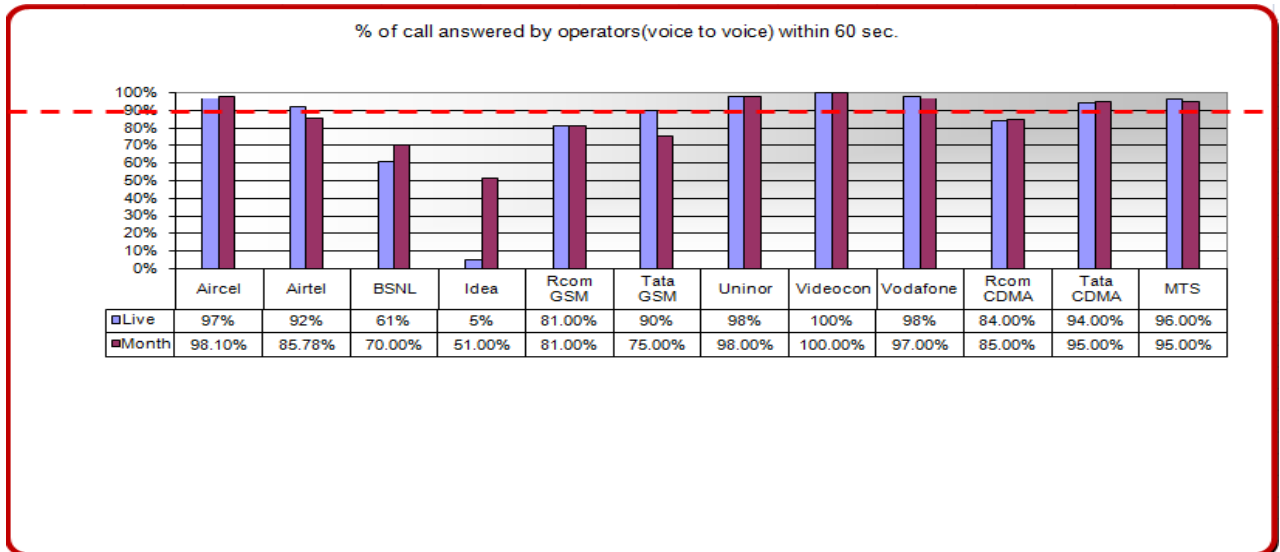
B) CUSTOMER SERVICE QUALITY PARAMETERS

(I) 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 with a values in between 96% to 100%



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



**(5) 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

- “Worst affected cells >3% TCH drop” benchmark is not meeting by Aircel, Tata GSM for live audit data.
- “Metering/billing credibility for postpaid” benchmark is not meeting by Tata GSM, Vodafone, Tata CDMA.
- “%age of calls answered by operator” benchmark is not meeting by Airtel, BSNL, Idea, Tata GSM, Rcom GSM, Rcom CDMA.
- And “time taken for refunds of deposits after closures” benchmark is not meeting by Tata CDMA.

**(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	Idea	Reliance (GSM)	Tata (GSM)	Uninor	Vodafone	Reliance (CDMA)	Tata (CDMA)	Sistema (MTS)
<b>Total No. of calls attempted</b>	17	28	NR	16	12	18	9	18	10	12	8
<b>Total No. of calls answered</b>	10	16	NR	9	7	10	3	10	6	7	3
<b>Cases resolved with 4 weeks</b>	10	16	NR	9	7	10	3	10	6	7	3
<b>%age of cases resolved</b>	100%	100%	NR	100%	100%	100%	100%	100%	100%	100%	100%

Note: The difference between call attempts and call answer is because of either Switch off, Number busy, No response or out of reach in the Network.

## 3. Live calling to call centre

Calling Operator	Aircel	Airtel	BSNL	Idea	Tata GSM	Uninor	Videocon	Vodafone	MTS	Tata CDMA
Total No. of Calls Attempted	100	100	100	100	100	100	20	100	100	100
Total No. of calls connected to IVR	100	100	97	99	100	98	20	100	96	100
Calls got connected to agent within 60 Sec	97	92	61	50	90	98	20	98	96	94
%age of calls got answered	97%	92%	63%	50%	90%	100%	100%	98%	100%	94%

## 4. Level 1 live calling

Andhra Pradesh Circle	Emergency no.	No. of Calls	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	UNINOR	RCOM CDMA	TATA CDMA	MTS	
	<b>NALGONDA TOWN</b>													
	100	3	3	3	3	3	3	3	3	3	3	3	3	3
	101	3	3	3	3	3	3	3	3	3	3	3	3	3
	108 (instead of 102 now 108 is available in AP)	3	3	3	3	3	3	3	3	3	3	3	3	3
	<b>ELURU TOWN</b>													
	100	3	3	3	3	3	3	3	3	3	3	3	3	3
	101	3	3	3	3	3	3	3	3	3	3	3	3	3
	108 (instead of 102 now 108 is available in AP)	3	3	3	3	3	3	3	3	3	3	3	3	3
	<b>ANANTHAPUR TOWN</b>													
	100	3	3	3	3	3	3	3	3	3	3	3	3	3
	101	3	3	3	3	3	3	3	3	3	3	3	3	3
	108 (instead of 102 now 108 is available in AP)	3	3	3	3	3	3	3	3	3	3	3	3	3

## 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 all the operators had made refunds in 100% cases as claimed by their records.

In case of Call centre live calling all operators IVR calls are mostly get connected. The call answered by operators with in 60sec is not meeting the benchmark in case of BSNL & Idea.

For emergency, Level 1 calling is done in all 3 drive test cities. All the operators are found to be functional in the respective towns.

**(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	Idea	Reliance (GSM)	Tata (GSM)	Uninor	Videocon	Vodafone	Reliance (CDMA)	Tata (CDMA)	Sistema (MTS)
<b>Aircel</b>	-	99%	99%	100%	99%	100%	100%	100%	99%	100%	100%	100%
<b>Airtel</b>	100%	-	98%	96%	97%	99%	100%	100%	100%	100%	100%	97%
<b>BSNL</b>	100%	99%	-	100%	97%	96%	98%	100%	98%	100%	100%	100%
<b>Idea</b>	99%	98%	97%	-	98%	100%	95%	100%	98%	99%	100%	100%
<b>Reliance (GSM)</b>	99%	99%	96%	99%	-	100%	100%	99%	100%	100%	100%	100%
<b>Tata (GSM)</b>	100%	99%	97%	100%	99%	-	99%	100%	100%	100%	100%	100%
<b>Uninor</b>	100%	100%	96%	97%	98%	100%	-	100%	100%	100%	100%	100%
<b>Videocon</b>	100%	98%	100%	96%	99%	100%	100%	-	100%	100%	100%	98%
<b>Vodafone</b>	100%	100%	98%	96%	100%	100%	100%	100%	-	100%	99%	100%
<b>Reliance (CDMA)</b>	100%	100%	97%	100%	100%	100%	99%	100%	100%	-	100%	100%
<b>Tata (CDMA)</b>	100%	100%	99%	98%	100%	100%	99%	100%	98%	100%	-	100%
<b>Sistema (MTS)</b>	100%	100%	96%	97%	98%	99%	98%	100%	100%	99%	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 in Andhra Pradesh for all the operators. Route covered was about around 80-100Km depending on city areas within the speed limit of 30Km/hr.

**Drive Test Locations**

***NALGONDA***

LOW DENSE: APHB Colony, Eid gah, Dist jail area, DVK road, Haliya road, Munugode road, Dhuppallapalli road.

MEDIUM DENSE: Miriyalaguda road, Panagal road, GV gudem X roads, Mammillagudem, Marringudem road, Prakasham bazaar.

HIGH DENSE: Bus stand, Clock tower circle, Collectorate, Old city, Hyderabad road, Ramagiri centre, Post office, Padma nagar, Raghavendra colony, BSNL bhavan, RTC colony, Government Hospital area, meerbagh, Old venkatestwara colony, Balaji colony.

***ELURU***

LOW DENSE: NH5, Chodimella, Mini bypass road, Madhepally road, Jangareddygudem highway, .

MEDIUM DENSE: Santharampadu, Kandhirika gudem, Tangillamudi, Pumpula cheruvu, Kothuru, Bodledupalem, Raithupeta, Vatluru.

HIGH DENSE: Eluru bus stand, railway station, Market road, Shanthi nagar, NR peta, Ambica hall centre, Chatapparu, Shanivarapupeta, Colletorate area, RR peta, Old bus stand, Vatluru, Gun bazaar, Vasanth mahal centre, Fire station road, Power peta, Ashok nagar, Mastan manyam colony.

***ANANTHAPUR***

LOW DENSE: Uravakonda road, Kalyanadurgam road, NH-7, Gooty road, Thadipatri road, Kakkalapalle road.

MEDIUM DENSE: Syndicate nagar, Rudrampet road, JNTU university, Sarada nagar, CN Kottala, Ram nagar gate, Sai nagar, Vidyuth nagar, TV tower, Bellary bypass, Kovur nagar, HLC colony.

HIGH DENSE: Ananthapur bus stand, Ambedkar nagar, Nama residency, George peta, Azad nagar, Bhagyanagar colony, Tapovanam junction, Venugopala nagar, Aravind nagar, Ambedkar nagar, Court road, Ashok nagar, Adarsh nagar, Vijay nagar colony, Old town, Srikantam Circle, Saptagiri Circle, Clock Tower, Revenue nagar,

**2. Performance of Operated assisted Drive test measurements:**

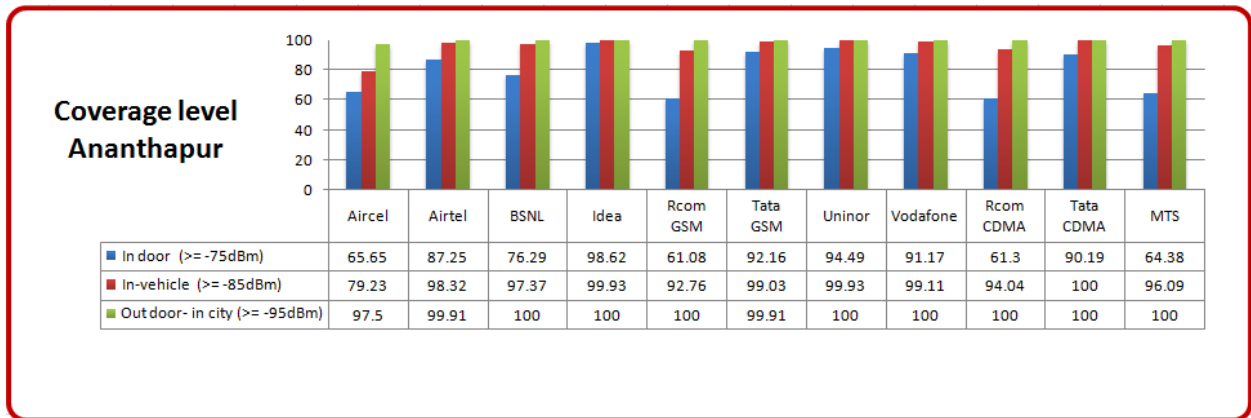
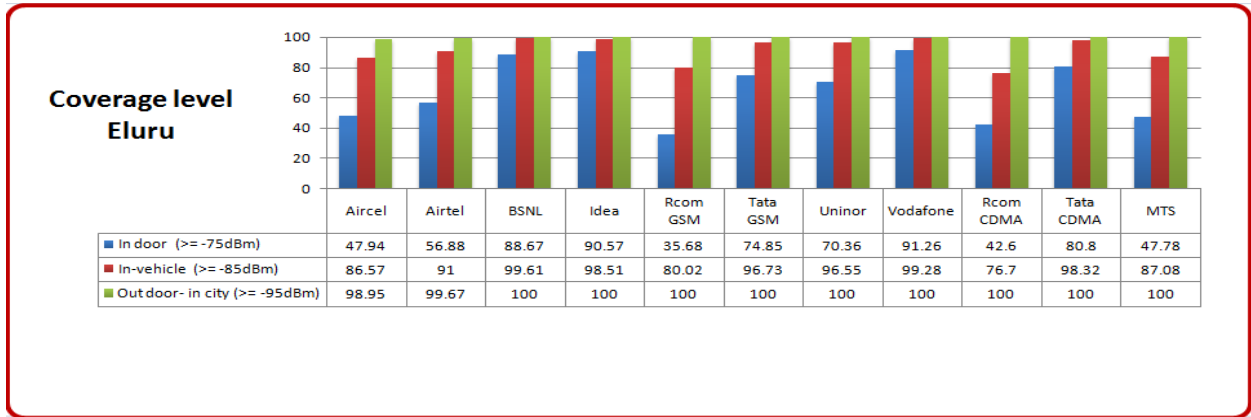
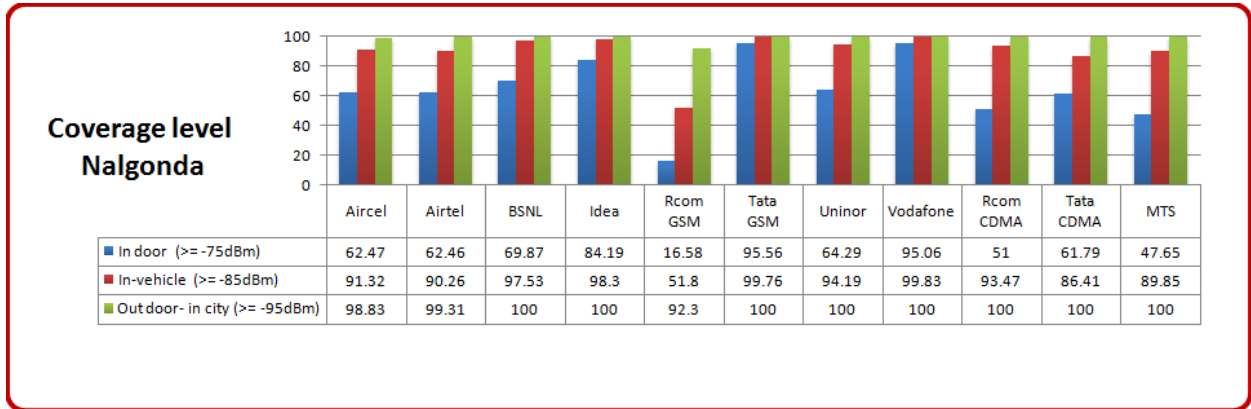
SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vodafone	Rcom CDMA	Tata CDMA	MTS
			GSM Operators						CDMA Operators				
1.1	Call Attempts	Nalgonda	100	141	120	118	116	98	116	94	115	75	116
		Eluru	104	123	128	180	120	97	115	130	118	126	108
		Ananthapur	119	96	104	121	158	122	136	156	158	135	119
1.2	Blocked Call Rate (<=3%)	Nalgonda	0.00%	0.00%	3.33%	2%	0.86%	0.00%	0.00%	0.00%	0.87%	0.00%	0.00%
		Eluru	0.00%	0.00%	3.91%	0.56%	0.83%	1.03%	0.00%	0.00%	0.00%	0.00%	0.00%
		Ananthapur	0.00%	0.00%	0.96%	0.00%	0.63%	0.00%	0.00%	0.00%	0.63%	0.74%	1.83%
1.3	Dropped Call Rate (<=2%)	Nalgonda	0.00%	0.00%	0.00%	0.85%	0.00%	0.00%	0.00%	0.00%	0.00%	0%	0.00%
		Eluru	0.00%	0.00%	0.78%	0.56%	0.00%	1.03%	0.00%	0.00%	0.00%	0.00%	0.00%
		Ananthapur	0.00%	0.00%	0.96%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0%	0.00%
1.4	(i) 0-4 (w/o frequency hopping)	Nalgonda									99.56%	98.66%	99.63%
		Eluru									98.87%	99.82%	99.63%
		Ananthapur									98.96%	99.99%	99.90%
	(ii) 0-5 (with frequency hopping)	Nalgonda	96.25%	96%	92.61%	97.60%	96.42%	98.00%	96.07%	98%			
		Eluru	97.19%	96.68%	92.21%	96.10%	95.55%	95.00%	95.76%	98.20%			
		Ananthapur	95.05%	97.55%	93.35%	98.10%	98.54%	97.39%	95.13%	98.00%			
1.5	Service Coverage	Nalgonda											
		Eluru											
		Ananthapur											
	In-door (>= -75dBm)	Nalgonda	62.47	62.46	69.87	84.19	16.58	95.56	64.29	95.06	51.0	61.79	47.65
		Eluru	47.94	56.88	88.67	90.57	35.68	74.85	70.36	91.26	42.6	80.8	47.78
		Ananthapur	65.65	87.25	76.29	98.62	61.08	92.16	94.49	91.17	61.3	90.19	64.38
In-vehicle (>= -85dBm)	Nalgonda	91.32	90.26	97.53	98.3	51.8	99.76	94.19	99.83	93.47	86.41	89.85	
	Eluru	86.57	91	99.61	98.51	80.02	96.73	96.55	99.28	76.7	98.32	87.08	
	Ananthapur	79.23	98.32	97.37	99.93	92.76	99.03	99.93	99.11	94.04	100	96.09	



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	Out door- in city ( $\geq -95\text{dBm}$ )	Nalgonda	98.83	99.31	100	100	92.3	100	100	100	100	100	100	
		Eluru	98.95	99.67	100	100	100	100	100	100	100	100	100	100
		Ananthapur	97.5	99.91	100	100	100	99.91	100	100	100	100	100	100
<b>1.6</b>	Call Setup Success Rate ( $\geq 95\%$ )	Nalgonda	100	100	96.67	98.3	99.14	100	100	100	99.13	100	100	
		Eluru	100	100	96.09	99.44	99.17	98.97	100	100	100	100	100	
		Ananthapur	100	100	99.04	100	99.37	100	100	100	99.37	99.26	98.17	

**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 showing below benchmark value for “Block call rate” parameter in Nalgonda (3.33%), Eluru (3.91%).

- “Connections with good quality” benchmark is not meeting by BSNL in Nalgonda, Eluru and Ananthapur towns with values of 92.61%, 92.21%, 93.35% respectively.

**(E). Independent Drive Test:**

The Independent Drive Test was conducted in Andhra Pradesh for 5 different Cities namely “*Khammam, Mahabubnagar, Cudapah, Adilabad, , Karimnagar*”. All the service providers city wise radio coverage with call testings were performed individually through drive test activity on different days. Route covered was about around 90kms for Khammam (BSNL, Uninor), 50kms for Mahabubnagar (Idea, Airtel), 70kms for Cudapah (MTS), 70kms for Adilabad (Rcom) and 100kms for Karimnagar (Idea, Airtel) depending on city areas within the speed limit of 30Km/hr.

**Drive Test Locations and Service provider’s name:**

- |                 |   |                                     |
|-----------------|---|-------------------------------------|
| 1) Khammam      | : | <a href="#"><u>BSNL, UNINOR</u></a> |
| 2) Mahabubnagar | : | <a href="#"><u>AIRCEL, IDEA</u></a> |
| 3) Cudapah      | : | <a href="#"><u>MTS</u></a>          |
| 4) Adilabad     | : | <a href="#"><u>RCOM GSM</u></a>     |
| 5) Karimnagar   | : | <a href="#"><u>AIRTEL, IDEA</u></a> |

**1) Sample Coverage:**

**Area Coverage details:**

**1).KHAMMAM:** Khammam busstand, Bonakal x roads, Mustafa nagar, Jamibanda, Station road, Market area, College road, Rotary nagar, Cotton market, Collectorate office, Bus depot area, Ballepalli road, Edulapalli road.

**2) MAHABUBNAGAR:** Bus stand, Padmavathi colony, Laxminagar, Marlu, Teachers Colony, Shashebgutta, Pathur, Raichur road, Bhoothpur road, Tarapalli road, Koilkunta road, Rajendra nagar, Railway station road, Payammathota road, Premnagar, Pillalamarri road.

**3) CUDAPAH:** YV Street,Namaste Board Street,Almaspet,Nehru Park,Kadapa Circle,New Bus Stand Road,Sankara puram, LIC Quarters, Arvind Nagar, APHB colony, New Bus stand Road, Cooperative Colony, Chinna Chowk, Chinna chowk bye pass, Utkur, Ravindra Nagar, NH-18, SBI Colony, Ramaraju Palli, Gandhi, Mariapuram.

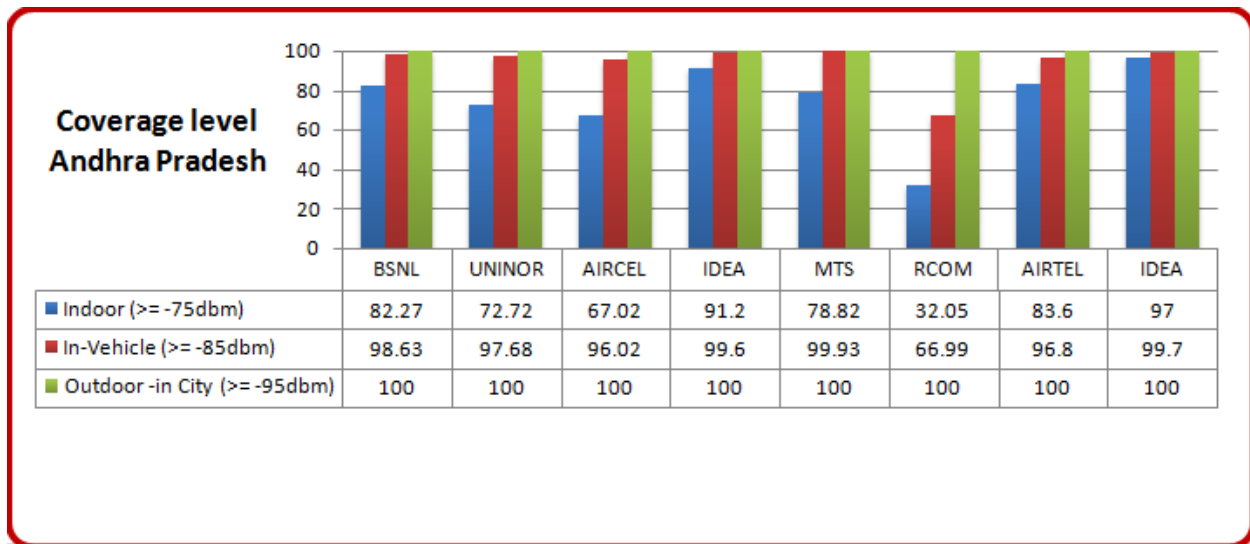
**4) ADILABAD:** Adilabad RTC Bus stand, Nagpur Road, Gandhi Nagar, Bheemsari Road, Market Yard, Bypass road, Vidya Nagar, Bypass Road, Chaitanyapuri colony, Teachers Colony, Dasnapur, Agriculture Reaserch Centre, Nirmal Road, Dasnapur, Shanti Nagar, Brahmanwadi, Railway Staion, Khanapur, Anukunta Road, Gandhi Park Road, Collector chowrasta.

**4) KARIMNAGAR:** Adarsh nagar, Alugnoor, Bharath nagar, Chaitanyapuri, Jyothi nagar, Kharkhana gadda, Kisan nagar, Bank Colony, Clock tower, Ganesh nagar, Hussainpura, Kapuwada, Laxmi nagar, Mankamma Thota, Mukrampura, Old bazaar, RTC colony, Malkapur, Ram nagar, Vidya nagar, Rayakurthi, Saptagiri colony, Vavillapally, Collectrate area, Stadium area, HB colony, Subhash nagar.

**2) Performance measurement of Independent Drive test in Andhra Pradesh circle**

SN	Parameter	BSNL	UNINOR	AIRCEL	IDEA	MTS	RCOM	AIRTEL	IDEA
		Khammam		Mahabubnagar		Cudapah	Adilabad	Karimnagar	
1.1	Call Attempts	142	141	63	57	100	95	128	111
1.2	Block Call Rate (<= 3%)	7.04%	0.00%	1.59%	3.51%	0.00%	0.00%	0.78%	0.00%
1.3	Drop Call Rate (<= 2%)	3.00%	0.71%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1.4	Percentage of Connections with good voice quality (>= 95%)	91.22%	94.66%	95.71%	96.90%	99.95%	98.20%	97.30%	96.30%
1.5	Service Coverage								
	Indoor (>= -75dbm)	82.27	72.72	67.02	91.2	78.82	32.05	83.6	97
	In-Vehicle (>= -85dbm)	98.63	97.68	96.02	99.6	99.93	66.99	96.8	99.7
	Outdoor -in City (>= -95dbm)	100	100	100	100	100	100	100	100
1.6	Call Setup Success Rate (>= 95%)	92.96	100	98.41	96.49	100	100	99.22	100
1.7	Handover Success Rate	97.28	98.96	100	92.21	100	100	99.15	99.74

**Graphical Representation:**



### 3). Critical Analysis

All the operators meeting the benchmark according to the guidelines given by TRAI, the service coverage is also found satisfactory. In the drive test, we considered high preference to railway stations, bus stations, Govt hospitals, crowded areas like market, Highways & major roads with in the town.

Name of Operator	BSNL	UNINOR	AIRCEL	IDEA	MTS	Rcom	AIRTEL	IDEA
Name of the City	Khammam		Mahabubnagar		Cudapah	Adilabad	Karimnagar	
No. of Sites covering the City	18	14	15	19	8	5	47	33

In Khammam town, BSNL is not meeting any of the benchmarks & the Uninor is not meeting the benchmark for “connections with good quality”. The Khammam town is covered with 18 no. of BTSs by BSNL & 14 no.of BTSs by Uninor.

In Mahabubnagar town, the Idea is not meeting the benchmark for “block call rate”. Aircel is meeting all the benchmarks. The Mahabubnagar town is covered with 15 no.of sites by Aircel & 19 no.of sites by Idea.

MTS is meeting all the benchmarks in Cudapah town. The drive test is done with in municipal boundary & when we are moving out from the boundary, the coverage levels are going weak as they don’t have any continuity sites. MTS is covering the Cudapah town with 8 no.of sites.

Similarly Rcom is meeting all the benchmarks in Adilabad town & the drive test is done with in municipal boundary. Rcom is covering the Adilabad town with 5 no.of sites.

While in Karimnagar town, both Airtel & Idea are meeting all the benchmarks provided by TRAI. Airtel is covering the town with 47 no. of sites & Idea is covering with 33 no. of sites. The Coverage levels are found satisfactory for both operators.

In Andhra Pradesh circle, all operators are providing the satisfactory coverage levels within the town municipal premises. When we going the outside the boundary, the coverage levels are becoming poor because there is no continuity sites other than BSNL, Airtel & Idea in their respective cities..

#### (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 satisfactory for **Network Parameters**. However, the benchmark of  $\leq 3\%$  for “worst affected cells  $> 3\%$  TCH drop” is not met by Aircel (4.48% for live audit data), Tata GSM (5.21% for live audit data).

Under **Customer Service Quality Parameter**, “operator answered calls (voice-to-voice) within 60 seconds” parameter it is found that Airtel, BSNL, Idea, Rcom GSM, Rcom CDMA are not fulfilling TRAI benchmark of  $\geq 90\%$ ..

Regarding **Metering/Billing Credibility** issues, Vodafone, Tata GSM & Tata CDMA are showing below benchmark values for Post-paid connections.

Regarding **Termination/Closure of Service** issues, BSNL has not reported the data.

During **Operated assisted Drive Tests**, the BSNL is showing below benchmark for “blocked call rate”, “Good voice quality”.

During **Independent drive tests**, the BSNL is showing below benchmark for “Block Call rate”, “drop call rate”, “%age of connections with Good voice quality”.

Uninor is showing below benchmark value of “%age of connections with good voice quality” parameter.

Idea is showing below benchmark value of “Block call rate” parameter.

II. Basic Telephone Service (Wireline) Providers

- *Not conducted for this quarter*

III. Broadband Service Providers

- *Not conducted for this quarter*