REPORT

ON

AUDIT & ASSESSMENT OF QUALITY OF SERVICE

OF

CELLULAR MOBILE TELEPHONE SERVICES

FOR

ANDHRA PRADESH CIRCLE
(SOUTH ZONE)

Report Period: Apr 2012 – June 2012

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- *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 2nd quarter (Apr – June 2012). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken during the period Oct – Dec 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
	GSM Operators		
1	Aircel Ltd	May-2012	1900-2000 Hrs
2	Airtel Ltd	May-2012	1900-2000 Hrs
3	BSNL	May-2012	1900-2000 Hrs
4	Idea	May-2012	1900-2000 Hrs
5	Reliance Communication (GSM)	May-2012	1900-2000 Hrs
6	Tata Communications (GSM)	May-2012	1900-2000 Hrs
7	Uninor	May-2012	1900-2000 Hrs
8	Videocon	May-2012	1900-2000 Hrs
9	Vodafone	May-2012	1900-2000 Hrs
	CDMA Operators		
10	MTS (CDMA)	May-2012	1900-2000 Hrs
11	Reliance Communication (CDMA)	May-2012	1900-2000 Hrs
12	Tata Communications (CDMA)	May-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

S/N	Name of Parameter (3 days Live Data Audit)	Bench-mark	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
			GSM Operators									CDMA		
1	**Network Availability**													
	a) BTS accumulated downtime	<= 2%	0.01%	0.01%	1.26%	0.04%	0.07%	0.04%	0.05%	0.31%	0.07%	0.11%	0.05%	0.11%
	b) Worst affected BTSs due to downtime	<= 2%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.43%	0.00%	0.00%	0.00%	0.00%
2	**Connection Establishment (Accessibility)**													
	a) CSSR (Call Setup Success Rate)	>=95%	99.33%	99.86%	98.40%	99.93%	99.72%	98.81%	99.19%	100.00%	100.00%	99.06%	99.32%	99.29%
	b) SDCCH/PAGING congestion	<=1%	0.08%	0.08%	0.50%	0.39%	0.01%	0.05%	0.10%	0.19%	0.07%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.03%	0.07%	1.37%	0.39%	0.02%	0.14%	0.10%	0.00%	0.40%	0.01%	0.01%	0.00%
3	**Connection maintenance (retainability)**													
	a) CDR	<=2%	0.75%	0.33%	0.89%	0.89%	0.35%	0.57%	1.18%	0.00%	0.53%	0.05%	0.33%	0.30%
	b) Worst affected cells>3% TCH drop	<=3%	4.79%	0.71%	2.73%	2.76%	0.02%	5.07%	1.62%	0.00%	2.69%	0.01%	0.00%	1.20%
	c) Good voice quality	>=95%	97.92%	99.85%	NR	97.48%	99.09%	98.23%	98.73%	99.32%	98.92%	99.69%	NR	100%
4	**POI congestion**	<=0.5%	0	0	0	0	0	0	0	0	0	0	0	0
5	**Response time to customers for assistance**													
	a) Accessibility of call centre/Customer Care	>=95%	100.00%	100.00%	100.00%	99.00%	99.00%	100.00%	98.00%	100.00%	100.00%	99.00%	100.00%	100.00%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	80.00%	93.00%	98.00%	75.00%	97.00%	97.00%	98.00%	100.00%	100.00%	97.00%	93.00%	96.00%

NA: Not Applicable, NR: Not Received

Observations:

From the 3 days live data assessment, it is found that the operators are meeting most of the network parameters, except the following:
a) For the parameter "Worst affected cells>3% TCH drop" Aircel, TATA GSM are found not meeting the benchmark
b) For the parameter "% of call answered by operator (Voice to voice)" Aircel, Idea are found not meeting the benchmark.

One Month data Assessment:

S/N	Name of Parameter	Bench-mark	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
	One Month Data Audit								GSM Operators				CDMA	
(A)	**Network Service Quality Parameter**													
1	**Network Availability**													
	a) BTS Accumulated Downtime	<=2%	0.01%	0.02%	1.28%	0.03%	0.08%	0.07%	0.13%	0.00%	0.07%	0.10%	0.04%	0.26%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.02%	0.00%	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2	**Connection Establishment (Accessibility)**													
	a) CSSR (Call Setup Success Rate)	>=95%	99.32%	99.86%	97.00%	99.95%	99.72%	98.84%	99.14%	98.82%	99.99%	99.04%	99.19%	99.20%
	b) SDCCH/PAGING congestion	<=1%	0.12%	0.08%	0.89%	0.44%	0.01%	0.13%	0.17%	0.30%	0.10%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.02%	0.07%	1.86%	0.41%	0.02%	0.15%	0.11%	0.00%	0.40%	0.01%	0.05%	0.00%
3	**Connection maintenance (retainability)**													
	a) CDR	<=2%	0.72%	0.34%	1.10%	0.86%	0.36%	0.57%	1.23%	0.00%	0.52%	0.07%	0.51%	0.40%
	b) Worst affected cells>3% TCH drop	<=3%	1.24%	0.71%	2.75%	2.97%	0.01%	2.51%	1.70%	0.00%	2.77%	0.01%	0.25%	1.14%
	c) Good voice quality	>=95%	97.94%	99.85%	NA	97.50%	99.08%	98.24%	98.73%	99.80%	98.96%	99.70%	NA	100%
4	**POI congestion**	<=0.5%	0	0	0	0	0	0	0	0	0	0	0	0
(B)	**Customer Service Quality Parameters**													
5	**Metering/billing credibility-Post paid**	<= 0.1%	0.04%	0.01%	0.00%	0.07%	0.10%	0.00%	NA	NA	0.06%	0.07%	0.00%	0.02%
6	**Metering /billing credibility-Pre paid**	<= 0.1%	0.09%	0.00%	0.02%	0.01%	0.10%	0.05%	0.00%	0.00%	0.10%	0.03%	0.17%	0.01%
7	**Resolution of billing/ charging complaints**	*100% within 4 weeks*	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	a) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	100% within 1 week	100% within 1 week	100% within 1 week	100% within 1 week	100% within 1 week	100% within 1 week	100% within 1 week	100% within 1 week	100% within 1 week	100% within 1 week	100% within 1 week	100% within 1 week
8	**Response time to customers for assistance**													
	a) Accessibility of call centre/Customer Care	>=95%	100.00%	100.00%	100.00%	99.00%	99.00%	100.00%	96.00%	100.00%	100.00%	99.00%	100.00%	97.00%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	75.00%	91.00%	95.00%	87.00%	95.00%	96.00%	98.00%	86.00%	100%	96%	96%	95%
9	**Termination/closure of service**	<=7days	100%	100%	100%	100%	100%	97.55%	NA	NA	100%	100%	97.50%	100%
10	**Time taken for refunds of deposits after closures.**	*100% within 60 days*	100%	100%	100%	40.00%	100%	96.80%	NA	NA	100%	100%	98.54%	100%

NA: Not Applicable, NR: Not Received

Observations:

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

Performance related to customer care data is not found to be satisfactory for the parameter "calls answered by operators (voice-to-voice)" for Aircel, Idea, and Videocon are below benchmark performance is observed in case of Aircel (75%), Idea (87%), and Videocon (86%) respectively.

The "Metering/billing credibility -prepaid" benchmark is not meeting by Rcom GSM with a value of 0.1% respectively.

Similarly the "Metering/billing credibility -postpaid" benchmark is not meeting by Rcom GSM, Tata CDMA & Vodafone with a values of 0.1%, 0.17% & 0.1% respectively.

The benchmark for the parameter "Termination/Closure of service" is not meeting by Tata GSM & Tata CDMA with values of 97.55%, 97.5% respectively.

The benchmark for the parameter "Time taken for refunds of deposits after closures" is not meeting by Idea, Tata GSM & Tata CDMA with values of 40%, 96.8% & 98.54% 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%)	Hyderabad	0%	0.00%	2.86%	0.00%	1.6%	1.29%	0.60%	0.00%	0.00%	2.26%	0%
		Nellore	0.00%	0.00%	0.65%	0.00%	1.58%	0.00%	0.59%	0.00%	1.78%	0.00%	0.00%
		Kurnool	1.61%	0.00%	1.37%	0.00%	0.00%	0.00%	1.53%	0.83%	1.26%	1.88%	0.00%
1.2	Dropped Call Rate (<=2%)	Hyderabad	0.58%	0.00%	3.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.85%
		Nellore	0.00%	0.00%	0.66%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		Kurnool	0.00%	0.00%	0.69%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.91%	0.00%
1.3	Percentage of connections with good voice quality (=>95%)												
	(i) 0-4 (w/o frequency hopping)	Hyderabad									99%	99.76%	98.06%
		Nellore									98%	99.91%	99.99%
		Kurnool									99%	99.95%	99.95%
	(ii) 0-5 (with frequency hopping)	Hyderabad	95.08%	98.10%	94.77%	95.80%	94%	92.1%	95.20%	94.9%			
		Nellore	95.39%	95.50%	85.24%	97.40%	96%	95.10%	96.80%	96.7%			
		Kurnool	95.03%	97.90%	96..23%	96.90%	96%	95.50%	95.30%	97.30%			
1.4	Call Setup Success Rate (>=95%)	Hyderabad	98.84	100	94.28	95.19	98.92	98.06	95.75	96.12	100	97.74	98
		Nellore	100	100	99.34	98.26	98.41	99.03	97..02	95.45	98.21	100	100
		Kurnool	98.38	100	98.62	89.16	100	100	95.89	98.33	98.73	97.17	100

Observations:

• BSNL is not meeting the benchmark of "Dropped call rate" in Hyderabad city and TTSL(CDMA) in Kurnool city.

• "Percentage of connection with good voice quality" benchmarks is concerned, BSNL (Hyderabad, Nellore) , RCOM(GSM) , TTSL(GSM) & Vodafone in Hyderabad are deviating from the benchmarks.

• In Call Setup Success rate , BSNL is in Hyderabad and Idea is in Kurnool are not meeting the benchmark set by TRAI.

Remarks:-- As far as Kurnool Drive Test is concerned , TTSL(GSM) has not provided CDR regarding call status during drive in that city, however it is in process to provide. All this data given above in operators drive test table has been taken from that system used during drive test as well as given by the operators, occurred in those 3 cities.

Independent Drive Test

SN	Parameter	IDEA	VODAFONE	AIRCEL	RCOM	AIRTEL
		Anathapur		Srikakulam	Cudapah	Chittoor
1.1	Call Attempts	76	101	94	78	92
1.2	Block Call Rate (<= 3%)	0.00%	0.00%	0.00%	0.00%	0.00%
1.3	Drop Call Rate (<= 2%)	0.00%	0.00%	0.00%	0.00%	0.00%
1.4	Percentage of Connections with good voice quality (>= 95%)	97.50%	98.52%	96.28%	97.01%	96.44%
1.5	Service Coverage					
	Indoor (>= -75dbm)	95	92.83	50.9	56.51	77
	In-Vehicle (>= -85dbm)	99.78	99.16	94.47	92.03	96.48
	Outdoor -in City (>= -95dbm)	100	99.96	100	100	99.82
1.6	Call Setup Success Rate (>= 95%)	100	100	100	100	100
1.7	Handover Success Rate	99.58	100	100	98.41	100

Observations:
 All operators are meeting all the benchmarks of TRAI.

CHAPTER-3: PMR Data Verification Results

I. Cellular Mobile Telephone Services

S/N	PMR Name of Parameter	Bench-mark	Audit	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
				GSM Operators									CDMA Operators		
(A)	**Network Service Quality Parameter**														
1	**Network Availability**														
	BTS Accumulated Downtime	<=2%	Reported	0.02	0.12	1.57	0.02	0.09	0.07	0.07	0.49	0.03	0.07	0.03	0.12
			Verified	0.02	0.12	1.57	0.02	0.09	0.07	0.07	0.49	0.03	0.07	0.03	0.12
	Worst affected BTSs due to downtime	<=2%	Reported	0.02	0.04	0	0	0.02	0.43	0	0	0.04	0.04	0	0
			Verified	0.02	0.04	0	0	0.02	0.43	0	0	0.04	0.04	0	0
2	**Connection Establishment (Accessibility)**														
	CSSR (Call Setup Success Rate)	>=95%	Reported	99.36	99.61	98	99.96	99.61	98.36	99	99.1	99.4	99.3	99.33	99.09
			Verified	99.36	99.61	98	99.96	99.61	98.36	99	99.1	99.4	99.3	99.33	99.09
	SDCCH/PAGING congestion	<=1%	Reported	0.05	0.14	0.7	0.28	0.06	0.11	0.13	0.13	0.06	0	0	0
			Verified	0.05	0.14	0.7	0.28	0.06	0.11	0.13	0.13	0.06	0	0	0
	TCH congestion	<=2%	Reported	0.01	0.14	1.97	0.47	0.11	0.21	0.2	0	0.32	0.2	0.08	0
			Verified	0.01	0.14	1.97	0.47	0.11	0.21	0.2	0	0.32	0.2	0.08	0
3	**Connection maintenance (retainability)**														
	CDR	<=2%	Reported	0.70	0.59	1	0.79	0.51	0.76	1.27	1.31	0.57	0.49	0.45	0.39
			Verified	0.70	0.59	1	0.79	0.51	0.76	1.27	1.31	0.57	0.49	0.45	0.39
	Worst affected cells>3% TCH drop	<=3%	Reported	1.60	1.09	3.6	2.97	0.41	3.52	2.07	0	2.9	0.26	0.54	0.53
			Verified	1.60	1.09	3.6	2.97	0.41	3.52	2.07	0	2.9	0.26	0.54	0.53
	Good voice quality	>=95%	Reported	98.36	99.14	98	97.54	99.13	97.86	98.91	99.42	98.86	98.41	99.26	100
			Verified	98.36	99.14	98	97.54	99.13	97.86	98.91	99.42	98.86	98.41	99.26	100

Audit and Assessment of QoS (Q2-2012): Andhra Pradesh Circle

S/N	PMR Name of Parameter	Bench-mark	Audit	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
4	POI congestion	<=0.5%	Reported	0.00	0	0	0	0	0	5	0	0	0	0	0
			Verified	0.00	0	0	0	0	0	5	0	0	0	0	0
(B)	Customer Service Quality Parameters														
5	Metering/billing credibility-Post paid	<= 0.1%	Reported	0.02	0.01	0	0.13	0.1	0	0	0	0.09	0.07	0	0
			Verified	0.02	0.01	0	0.13	0.1	0	0	0	0.09	0.07	0	0
6	Metering /billing credibility-Pre paid	<= 0.1%	Reported	0.02	0	0	0.01	0.09	0	0.05	0	0.05	0.08	0	0
			Verified	0.02	0	0	0.01	0.09	0	0.05	0	0.05	0.08	0	0
7	Resolution of billing/ charging complaints	100% within 4 weeks	Reported	100	100	99	100	100	100	100	100	100	100	100	100
			Verified	100	100	99	100	100	100	100	100	100	100	100	100
	Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	Reported	100	100	100	100	100	100	0	100	100	100	100	100
			Verified	100	100	100	100	100	100	0	100	100	100	100	100
8	Response time to customers for assistance														
	Accessibility of call centre/Customer Care	>=95%	Reported	100	99.94	98	99.53	99.44	100	96.92	98.44	100	99.1	99	97.31
			Verified	100	99.94	98	99.53	99.44	100	96.92	98.44	100	99.1	99	97.31
	% call answered by operators(voice to voice) within 60 sec.	>=90%	Reported	94.37	85.84	72	52.36	83.37	86	70.73	99.26	96.39	86.58	98	95.74
			Verified	94.37	85.84	72	52.36	83.37	86	70.73	99.26	96.39	86.58	98	95.74
9	Termination/closure of service														
	No.of requests for Termination / Closure of service complied within 7 days during the quarter	<=7days	Reported	100	100	100	100	100	100	0	0	100	100	100	0
			Verified	100	100	100	100	100	100	0	0	100	100	100	0
10	Time taken for refunds of deposits after closures.	100% within 60 days	Reported	100	100	100	100	100	67	0	0	100	100	99	0
			Verified	100	100	100	100	100	67	0	0	100	100	99	0

Critical Analysis (PMR Verification):
A).All the operator's data is almost matching with the PMR data.

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Chapter -4 Detailed Findings & Analysis

1. Cellular Mobile Telephone Service
(A) MSC Audit
(1) 3days live data assessment & 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		
A	Network Service Quality Parameter													
1	Network Availability													
	a). BTS accumulated downtime	<= 2%	0.01%	0.01%	1.26%	0.04%	0.07%	0.04%	0.05%	0.31%	0.07%	0.11%	0.05%	0.11%
	b). Worst affected BTSs due to downtime	<= 2%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.43%	0.00%	0.00%	0.00%	0.00%
	c). Total no of BTSs in the licensed service area		2920	10605	5802	7193	4005	4429	2638	25	8241	2572	1335	538
	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		14.9	62	5248	214.47	212	116	91.5	5.56	435.94	199	51.22	43.01
	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
2	Connection Establishment (Accessibility)													
	a) CSSR	>=95%	99.33%	99.86%	98.40%	99.93%	99.72%	98.81%	99.19%	100.00%	100.00%	99.06%	99.32%	99.29%
	b) SDCCH/PAGING congestion	<=1%	0.08%	0.08%	0.50%	0.39%	0.01%	0.05%	0.10%	0.19%	0.07%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.03%	0.07%	1.37%	0.39%	0.02%	0.14%	0.10%	0.00%	0.40%	0.01%	0.01%	0.00%
3	Connection maintenance													
	a) CDR	<=2%	0.75%	0.33%	0.89%	0.89%	0.35%	0.57%	1.18%	0.00%	0.53%	0.05%	0.33%	0.30%
	b) Cells having > 3% TCH drop	<=3%	4.79%	0.71%	2.73%	2.76%	0.02%	5.07%	1.62%	0.00%	2.69%	0.01%	0.00%	1.20%
	c) Good voice quality	>=95%	97.92%	99.85%	NR	97.48%	99.09%	98.23%	98.73%	99.32%	98.92%	99.69%	NR	100%

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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	
	d) No. of cells > 3% TCH drop		399	212	470	593	3	665	128	0	675	1	0	20
	e) Total no. of cells in the network		8325	29954	17215	21453	12015	13106	7887	75	25092	7716	4079	1660
4	POI congestion	<=0.5%	0	0	0	0	0	0	0	0	0	0	0	0
	a) Name of POI not meeting the benchmark													
	b) Total No. of circuits on POI		40285	244635	36541	166458	10664	10828	71502	427	180055	64875	104353	15428
	c) Avg No. of call attempts on POI		572119.67	7651180	1585960	4799181	227342.03	309413	2534890.33	5	5928970	745765.67	1689729.7	80500
	d) Avg traffic served on POI (Erlang)		21329.51	140916.13	26601	106084	6251.71	6275	42561.58	10.85	98574	29701.3	44932.47	1331.5
	e) Total number of working POI Service Area wise		88	170	29	125	33	33	117	14	54	33	263	48
	f) Equipped Capacity of Network in respect of Traffic in erlang		92738.2	696049	269212	266736.95	102000	236022.29	91869.69	48000	222450	230000	339254	27300
	g) Total traffic handled in TCBH in erlang		35626	507806	188051	256434.45	47313	87599.36	77469.1	0.05	161607	76674	69137	8595
(B)	Customer Service Quality Parameters													
5	Response time to customers for assistance													
	a) Accessibility of call centre	>=95%	100.00%	100.00%	100.00%	99.00%	99.00%	100.00%	98.00%	100.00%	100.00%	99.00%	100.00%	100.00%
	b) % of call answered by operators(voice to voice) within 60 sec	>=90%	80.00%	93.00%	98.00%	75.00%	97.00%	97.00%	98.00%	100.00%	100.00%	97.00%	93.00%	96.00%

NA: Not Applicable, NR: Not Received

Audit and Assessment of QoS (Q2-2012): Andhra Pradesh Circle

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 <=2%):** All operators are meeting the benchmark with values laying between 0% and 1.26%
- **Worst affected BTSs due to downtime (benchmark <=2%):** All the operators are meeting the benchmark which is specified by TRAI.
- **Call setup success rate (benchmark >=95%):** All operators are meeting the benchmark with values laying between 98.4% and 100%.
- **SDCCH/PAGING Channel congestion (benchmark <= 1%):** All operators are meeting the benchmark with values laying between 0% and 0.5%.
  Note: CDMA operators are provided the data for Paging Channel congestion.
- **TCH congestion (benchmark <= 2%):** All operators are meeting the benchmark with values laying between 0% and 1.37%.
- **Call drop rate (benchmark <= 2%):** All operators are meeting the benchmark with values laying between 0.05% and 1.18%.
- **Cell exceeding 3% TCH drop (benchmark <= 3%):** Except for Aircel, Tata GSM with a values of 4.79%, 5.07% rest of the operators are satisfying the benchmark with value in between 0% and 2.76%.
- **Connections with good voice quality (benchmark >= 95%):** Tata CDMA & BSNL has declared that the parameter is not system generated. Rests of the operators are meeting the benchmark with values laying between 97.48% and 99.85%.
- **POI Congestion (benchmark <= 0.5%):** All operators are meeting the benchmark. There was no congestion found overall on the POI. 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 98% and 100%.
- **%age of call answered by operator (Voice to voice) (benchmark >90%):** Except for Aircel, Idea with a values of 80%, 75% respectively, rest of the operators are satisfying the benchmark with value in between 93% and 100% respectively.

(2) One Month data assessment & 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 Operators		
(A)	**Network Service Quality Parameter**													
1	**Network Availability**													
	a) BTS Accumulated Downtime	*<=2%*	0.01%	0.02%	1.28%	0.03%	0.08%	0.07%	0.13%	0.00%	0.07%	0.10%	0.04%	0.26%
	b) Worst affected BTSs due to downtime	*<=2%*	0.00%	0.02%	0.00%	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	c) Total no. of BTSs in the licensed service area		2920	10605	5802	7193	4005	4429	2638	25	8241	2572	1335	538
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		263	1821	55280	1811	2519	2315.68	2580.15	80.67	4300.67	1879	366.21	1031
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	2	0	0	0	2	0	0	0	0	0	0
2	**Connection Establishment (Accessibility)**													
	a) CSSR (Call Setup Success Rate)	*>=95%*	99.32%	99.86%	97.00%	99.95%	99.72%	98.84%	99.14%	98.82%	99.99%	99.04%	99.19%	99.20%
	b) SDCCH/PAGING congestion	*<=1%*	0.12%	0.08%	0.89%	0.44%	0.01%	0.13%	0.17%	0.30%	0.10%	0.00%	0.00%	0.00%
	c) TCH congestion	*<=2%*	0.02%	0.07%	1.86%	0.41%	0.02%	0.15%	0.11%	0.00%	0.40%	0.01%	0.05%	0.00%
3	**Connection maintenance (retainability)**													
	a) CDR	*<=2%*	0.72%	0.34%	1.10%	0.86%	0.36%	0.57%	1.23%	0.00%	0.52%	0.07%	0.51%	0.40%
	b) Worst affected cells>3% TCH drop	*<=3%*	1.24%	0.71%	2.75%	2.97%	0.01%	2.51%	1.70%	0.00%	2.77%	0.01%	0.25%	1.14%
	c) Good voice quality	*>=95%*	97.94%	99.85%	NR	97.50%	99.08%	98.24%	98.73%	99.80%	98.96%	99.70%	NR	100%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		103	213	474	637	1	329	134	0	694	1	10	19
	e) Total no. of cells in the network		8325	29954	17215	21453	12015	13106	7887	75	25092	7716	4079	1660

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 Operators		
4	POI congestion	<=0.5%	0	0	0	0	0	0	0	0	0	0	0	0
	a) Name of POI not meeting the benchmark		NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
	b) Total No. of call attempts on POI (Avg.)		626304	8607506	1602919	4512332	227342.03	292886.9	2570114	7	5834007	739805.21	1795948.6	78222
	c) Total traffic served on POI (Erlang) (Avg.)		21369.77	134512	31172	109332	6005.05	5383.61	42705.16	11.36	97307.39	29321.45	47037.68	1291.6
	d) Total No. of circuits on POI		40285	244635	36541	166458	10664	10828	71502	427	180055	64875	104353	15428
	e) Total number of working POI Service Area wise		88	170	29	125	33	33	117	14	54	33	263	48
	f) Capacity of POI		39387.99	236945	36541	161229	9821.72	9999	66310.77	272.23	169172.74	60900.42	95458.44	14263.55
5	Network Data													
	a) Equipped Capacity of Network Erlang		92738.2	696049	269212	266736.95	102000	236022.29	91869.69	48000	222450	230000	339254	27300
	b) Total traffic in TCBH in erlang (Avg.)		35626	507806	188051	256434.45	47313	87599.36	77469.1	0.05	161607	76674	69137	8595
	c) Total no. of customers served (as per VLR) on last day of the month		1153851	17225412	6479699	9358139	2573825	3199373	2150476	12	4579242	2773051	1601263	365430
(B)	Customer Service Quality Parameters													
6	Metering/billing credibility-Post paid	<= 0.1%	0.04%	0.01%	0.00%	0.07%	0.10%	0.00%	NA	NA	0.06%	0.07%	0.00%	0.02%
	a) No. of bills issued during the period		11199	1236424	135810	172851	35384	86892	NA	NA	322599	253733	370425	9681
	b) No. of bills disputed including billing complaints during the period		4	69	1	117	35	1	NA	NA	191	177	6	2

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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 Operators		
7	Metering /billing credibility-Pre paid	<= 0.1%	0.09%	0.00%	0.02%	0.01%	0.10%	0.05%	0.00%	0.00%	0.10%	0.03%	0.17%	0.01%
	a) No. of charging / credit / validity complaints during the quarter		1619	18	1441	830	4562	141	57	0	6147	1335	121	51
	b) Total no. of pre-paid customers at the end of the quarter		1749541	21575774	8587418	9897678	4562714	2637592	3941629	9877	5947856	4604889	693242	665647
8	Resolution of billing/ charging complaints	100% within 4 weeks	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	a) No. of billing/(post paid) and charging, credit/validity (pre paid) complaints resolved within 4 weeks during the quarter		1623	87	739	947	4597	3039	57	0	6338	1512	946	53
	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		1623	87	739	947	4597	3039	57	0	6338	1512	946	53
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		1224	87	739	223	3679	142	57	0	5742	795	127	22
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		399	0	0	724	918	2897	0	0	596	717	819	31
	e) 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	100% with in 1 week	100% with in 1 week	100% with in 1 week	100% with in 1 week	100% with in 1 week	100% with in 1 week	100% with in 1 week	100% with in 1 week	100% with in 1 week	100% with in 1 week

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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 Operators		
9	Response time to customers for assistance													
	a) Accessibility of call centre/Customer Care	>=95%	100.00%	100.00%	100.00%	99.00%	99.00%	100.00%	96.00%	100.00%	100.00%	99.00%	100.00%	97.00%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	75.00%	91.00%	95.00%	87.00%	95.00%	96.00%	98.00%	86.00%	100.00%	96.00%	96.00%	95.00%
	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		38648	4480662	137150	2836546	527243	13074658	735785	7	76482	331332	296351	171776
	d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		28954	4091000	130849	2457631	502873	1259261	719104	6	76195	316637	284152	163548
10	Termination/closure of service	<=7days	100.00%	100.00%	100%	100.00%	100.00%	97.55%	NA	NA	100.00%	100.00%	97.50%	100.00%
	a) Total No. of requests for Termination / Closure of service received during the quarter		66	2937	3364	991	263	899	NA	NA	2567	1090	5261	277
	b) No.of requests for Termination / Closure of service complied within 7 days during the quarter		66	2937	3364	991	263	877	NA	NA	2567	1090	5130	277
11	Time taken for refunds of deposits after closures.	100% within 60 days	100.00%	100.00%	100%	40.00%	100.00%	96.80%	NA	NA	100.00%	100.00%	98.54%	100.00%

NA: Not Applicable, NR: Not Received

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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 <=2%):** All operators are meeting the benchmark with values laying between 0.01% and 1.28%.
- **Worst affected BTSs due to downtime (benchmark <= 2%):** All operators are meeting the benchmark with values laying between 0% and 0.05%.
- **Call setup success rate (benchmark >= 95%):** All operators are meeting the benchmark with values laying between 97.00% and 99.95%.
- **SDCCH/PAGING Channel congestion (benchmark <= 1%):** All operators are meeting the benchmark wit values laying between 0% and 0.89%.
  Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.
- **TCH congestion (benchmark <= 2%):** All operators are meeting the benchmark with values laying between 0% and 1.86%.
- **Call drop rate (benchmark <= 2%):** All operators are meeting the benchmark with values laying between 0% and 1.23%.
- **Cell exceeding 3% TCH drop (benchmark <= 3%):** All the operators are satisfying the benchmark with value in between 0% and 2.97%.
- **Connections with good voice quality (benchmark >= 95%):** Tata CDMA & BSNL are declared that the parameter is not system generated. Rests of the operators are meeting the benchmark with values lying between 97.5% and 99.85%.
- **POI Congestion (benchmark <= 0.5%):** All the operators are meeting the benchmark provided by TRAI. There was no congestion found overall on the POI. 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 Aircel, Idea, Videocon with a values of 75%, 87%, 86% respectively rest of all operators are meeting the benchmark with values lying between 91% to 100%.
- **Metering and billing credibility-Post paid (benchmark <= 0.1%):** Except for Vodafone, Rcom GSM, Tata CDMA with a values of 0.1%, 0.1%, 0.17% rest of all the operators are meeting the benchmark.
- **Metering and billing credibility-Pre paid (benchmark <= 0.1%):** Except for Rcom GSM with a value of 0.1% rest of all the operators are meeting the benchmark with values laying between 0% and 0.07%.
- **Resolution of billing/ charging complaints (benchmark 100% within 4 weeks):** All the operators are meeting the benchmark.
- **Termination/Closure of service (Benchmark <= 7 days):** Except for Tata GSM & Tata CDMA, rests of all operators have satisfied the benchmark.
- **Time taken for refunds of deposits after closures (benchmark 100% within <=60 days):** Except for Idea, Tata GSM, Tata CDMA rest of the all operators has 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
GSM Operators				
1	Aircel Ltd	3	21	2920
2	Airtel Ltd	57	118	10597
3	BSNL	24	106	5802
4	Idea	14	76	7192
5	Reliance Communication (GSM)	4	21	4005
6	Tata Tele Services (GSM)	7	32	4304
7	Uninor	3	19	2628
8	Videocon	2	2	25
9	Vodafone	7	96	8238
CDMA Operators				
10	MTS (CDMA)	1	2	538
11	Reliance Communication (CDMA)	11	6	2572
12	Tata Teleservices (CDMA)	12	6	1335

(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 (<= 2 %) for both one month data and 3 days live data taken in the month of audit.

	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
Live	0.01%	0.01%	1.26%	0.04%	0.07%	0.04%	0.05%	0.31%	0.07%	0.11%	0.05%	0.11%
Month	0.01%	0.02%	1.28%	0.03%	0.08%	0.07%	0.13%	0.00%	0.07%	0.10%	0.04%	0.26%

II. **Worst affected BTSs due to downtime:** All operators are meeting the TRAI benchmarks (<= 2 %) for both one month data and 3 days live data taken in the month of audit.

III. **Call setup success rate:** All operators are meeting the TRAI benchmarks (>= 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 (<= 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 (<= 2%) for both one month data and 3 days live data taken in the month of audit.

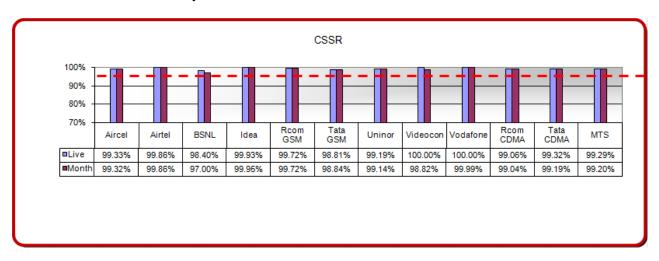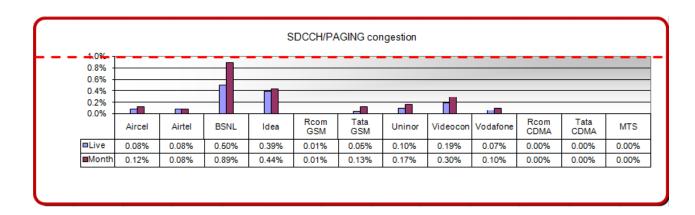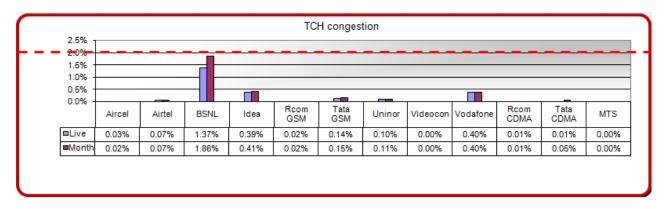| TCH congestion	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
Live	0.03%	0.07%	1.37%	0.39%	0.02%	0.14%	0.10%	0.00%	0.40%	0.01%	0.01%	0.00%
Month	0.02%	0.07%	1.86%	0.41%	0.02%	0.15%	0.11%	0.00%	0.40%	0.01%	0.05%	0.00%

V. Connection Maintainability (Retainability):

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

CDR	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
Live	0.75%	0.33%	0.89%	0.89%	0.35%	0.57%	1.18%	0.00%	0.53%	0.05%	0.33%	0.30%
Month	0.72%	0.34%	1.10%	0.86%	0.36%	0.57%	1.23%	0.00%	0.52%	0.07%	0.51%	0.40%

Worst affected Cell exceeding 3% TCH Drop: Aircel, Tata GSM are not meeting the benchmark in live data with a value of 4.79%, 5.07% respectively. Rests of the operators are meeting the benchmark for both cases.

Worst affected cells > 3% TCH drop	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
Live	4.79%	0.71%	2.73%	2.76%	0.02%	5.07%	1.62%	0.00%	2.69%	0.01%	0.00%	1.20%
Month	1.24%	0.71%	2.75%	2.97%	0.01%	2.51%	1.70%	0.00%	2.77%	0.01%	0.25%	1.14%

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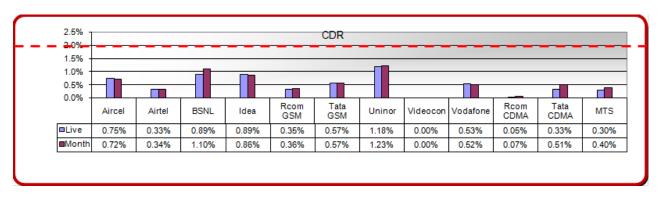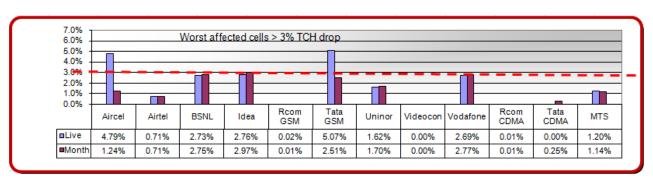month data and 3 days live data taken in the month of audit. TTSL (CDMA) & BSNL has declared that this parameter is not system generated.

Connections with good voice quality

	Aircel	Airtel	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	MTS
Live	97.92%	99.85%	97.48%	99.09%	98.23%	98.73%	99.32%	98.92%	99.69%	100%
Month	97.94%	99.85%	97.50%	99.08%	98.24%	98.73%	99.80%	98.96%	99.70%	100%

No. of POI having > 0.5% Congestion:

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.

POI congestion

	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
Live	0	0	0	0	0	0	0	0	0	0	0	0
Month	0	0	0	0	0	0	0	0	0	0	0	0

B)   CUSTOMER SERVICE QUALITY PARAMETERS

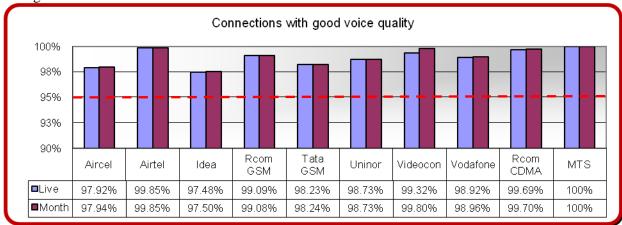**(I) Response time to the customer for assistance:**

Percentage of call answered (Electronically): All operators are meeting the TRAI benchmarks (>= 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%

Accessibility of call centre/customer care

	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
Live	100.00%	100.00%	100.00%	99.00%	99.00%	100.00%	98.00%	100%	100%	99.00%	100.00%	100.00%
Month	100.00%	100.00%	100.00%	99.00%	99.00%	100.00%	96.00%	100%	100%	99.00%	100.00%	97.00%

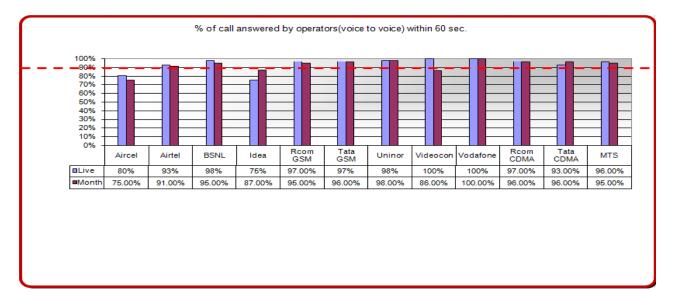**Percentage of call answered by operators (Voice to voice) within 60 sec:** Aircel, Idea are not meeting the benchmark for both live & month audit data   Rests of the operators are meeting the benchmark.

% of call answered by operators(voice to voice) within 60 sec.

	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
Live	80%	93%	98%	75%	97.00%	97%	98%	100%	100%	97.00%	93.00%	96.00%
Month	75.00%	91.00%	95.00%	87.00%	95.00%	96.00%	98.00%	86.00%	100.00%	96.00%	96.00%	95.00%

(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 prepaid" benchmark is not meeting by Rcom GSM.
- Similarly "Metering/billing credibility for postpaid" benchmark is not meeting by Rcom GSM, Vodafone, Tata CDMA.
- "%age of calls answered by operator" benchmark is not meeting by Aircel, Idea, and Videocon.
- "Termination/Closure of service" benchmark is not meeting by Tata GSM, Tata CDMA.
- And "time taken for refunds of deposits after closures" benchmark is not meeting by Idea, Tata GSM and 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)
Total No. of calls attempted	21	38	NR	27	20	26	16	35	10	20	9
Total No. of calls answered	9	14	NR	10	8	12	6	12	6	9	4
Cases resolved with 4 weeks	9	14	NR	10	8	12	6	12	6	9	4
%age of cases resolved	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	2	100	100	100
Total No. of calls connected to IVR	100	100	100	99	100	98	2	100	96	100
Calls got connected to agent within 60 Sec	80	93	98	75	97	98	2	100	96	93
%age of calls got answered	80%	93%	98%	75%	97%	98%	100%	100%	100%	93%

4. Level 1 live calling

	Emergency no.	No.of Calls	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	UNINOR	RCOM CDMA	TATA CDMA	MTS
Andhra Pradesh Circle							HYDERABAD TOWN						
	100	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
	108 (instead of 102 now 108 is available in AP)	3	3	3	3	3	3	3	3	3	3	3	3
							NELLORE TOWN						
	100	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
	108 (instead of 102 now 108 is available in AP)	3	3	3	3	3	3	3	3	3	3	3	3
							KURNOOL TOWN						
	100	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
	108 (instead of 102 now 108 is available in AP)	3	3	3	3	3	3	3	3	3	3	3	3

5. Critical Analysis

Random numbers were selected from the operator's 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 Aircel & 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)
Aircel	-	100%	100%	100%	99%	100%	99%	100%	99%	100%	100%	99%
Airtel	100%	-	99%	100%	99%	98%	100%	100%	100%	99%	100%	100%
BSNL	100%	99%	-	100%	99%	97%	97%	100%	100%	100%	100%	100%
Idea	99%	100%	97%	-	97%	100%	100%	100%	100%	99%	100%	100%
Reliance (GSM)	100%	100%	96%	100%	-	100%	100%	99%	97%	100%	100%	100%
Tata (GSM)	99%	100%	96%	100%	99%	-	100%	99%	100%	100%	100%	100%
Uninor	100%	100%	98%	99%	99%	100%	-	100%	100%	100%	100%	100%
Videocon	100%	98%	100%	100%	99%	100%	100%	-	100%	100%	100%	98%
Vodafone	100%	100%	98%	99%	100%	100%	100%	100%	-	100%	99%	100%
Reliance (CDMA)	100%	100%	97%	100%	100%	100%	99%	100%	100%	-	100%	100%
Tata (CDMA)	100%	100%	99%	98%	100%	100%	99%	100%	100%	100%	-	100%
Sistema (MTS)	100%	100%	97%	100%	98%	100%	100%	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

HYDERABAD

LOW DENSE: Midhani quarters, Kanchanbagh, Gachibowli road

MEDIUM DENSE: Balapur, Shivarampally, Umalguda, Meerpet.

HIGH DENSE: Chandrayangutta, Golkonda, Attapur, Shaikpet, Gachibowli, Kondapur, Hitech city, Madhapur, Jubilee hills, Tolichowki, Banjara hills, Masabtank, Assembly road, Nampally, Afzulgunj, Malakpet, Santosh nagar,Champapet.

NELLORE

LOW DENSE: Bujabuja Nellore, Mini bypass road, highway.

MEDIUM DENSE: Santhapeta, Balaji nagar, AC nagar, Padarupalli, BV nagar, Ayyappa temple circle.

HIGH DENSE: Brindavam colony, Railway station, Madras bus station, Nawabpeta, Sunday market, Nehru statue, kondayapalem, Harinathpuram, Chinna bazaar, Atmakur bus stand, Collectrate office, Vengala rao nagar, Auto nagar, Vedayapalem, VRC centre, GNT road, Padmavathi centre

KURNOOL

LOW DENSE: Bangalore highway, Hyderabad highway, Nandyala road.

MEDIUM DENSE: B-camp centre, Bellary X roads, Nandyala checks post.

HIGH DENSE: Railway station road, Venkatramana colony, Old C town, Park road, RTC bus stand, Maruthi nagar, Market area, Konda reddy buruju, One town area, Rajvihar chowrastha, SV complex.
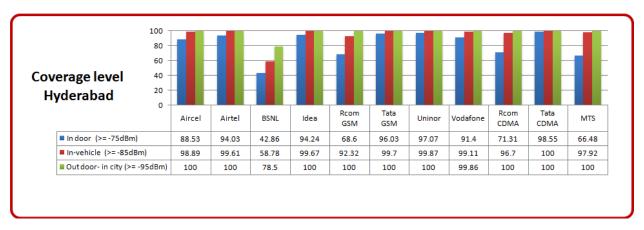
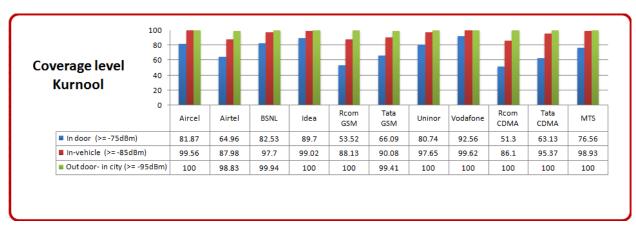## 2. Performance of Operated assisted Drive test measurements:

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	Hyderabad	173	133	105	104	186	155	165	129	138	132	110
		Nellore	136	127	152	115	126	103	168	110	112	127	107
		Kurnool	124	95	145	120	153	97	195	120	158	109	120
1.2	Blocked Call Rate (<=3%)	Hyderabad	0%	0.00%	2.86%	0.00%	1.6%	1.29%	0.60%	0.00%	0.00%	2.26%	0%
		Nellore	0.00%	0.00%	0.65%	0.00%	1.58%	0.00%	0.59%	0.00%	1.78%	0.00%	0.00%
		Kurnool	1.61%	0.00%	1.37%	0.00%	0.00%	0.00%	1.53%	0.83%	1.26%	1.88%	0.00%
1.3	Dropped Call Rate (<=2%)	Hyderabad	0.58%	0.00%	3.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.85%
		Nellore	0.00%	0.00%	0.66%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		Kurnool	0.00%	0.00%	0.69%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.91%	0.00%
1.4	Percentage of connections with good voice quality (=>95%)												
	(i) 0-4 (w/o frequency hopping)	Hyderabad									99%	99.76%	98.06%
		Nellore									98%	99.91%	99.99%
		Kurnool									99%	99.95%	99.95%
	(ii) 0-5 (with frequency hopping)	Hyderabad	95.08%	98.10%	94.77%	95.80%	94%	92.1%	95.20%	94.9%			
		Nellore	95.39%	95.50%	85.24%	97.40%	96%	95.10%	96.80%	96.7%			
		Kurnool	95.03%	97.90%	96..23%	96.90%	96%	95.50%	95.30%	97.30%			
1.5	Service Coverage												
	In door (>= -75dBm)	Hyderabad	88.53	94.03	42.86	94.24	68.6	96.03	97.07	91.4	71.31	98.55	66.48
		Nellore	86.56	65.07	66.88	86.9	51.36	64.19	68.91	96.45	91.1	69.94	78.57
		Kurnool	81.87	64.96	82.53	89.7	53.52	66.09	80.74	92.56	51.3	63.13	76.56
	In-vehicle (>= -85dBm)	Hyderabad	98.89	99.61	58.78	99.67	92.32	99.7	99.87	99.11	96.7	100	97.92
		Nellore	99.48	86.71	94.53	99.13	89.77	93.67	93.63	99.29	99.98	96.86	99.79
		Kurnool	99.56	87.98	97.7	99.02	88.13	90.08	97.65	99.62	86.1	95.37	98.93
	Out door- in city (>= -95dBm)	Hyderabad	100	100	78.5	100	100	100	100	99.86	100	100	100
		Nellore	100	98.15	99.93	100	100	99.89	100	99.93	100	100	100
		Kurnool	100	98.83	99.94	100	100	99.41	100	100	100	100	100
1.6	Call Setup Success Rate (>=95%)	Hyderabad	98.84	100	94.28	95.19	98.92	98.06	95.75	96.12	100	97.74	98
		Nellore	100	100	99.34	98.26	98.41	99.03	97..02	95.45	98.21	100	100
		Kurnool	98.38	100	98.62	89.16	100	100	95.89	98.33	98.73	97.17	100

Remarks:-- As far as Kurnool Drive Test is concerned , TTSL(GSM) has not provided CDR regarding call status during drive in that city, however it is in process to provide. All this data given above in operators drive test table has been taken from that system used during drive test as well as given by the operators, occurred in those 3 cities

Graphical Representation:

Coverage level Hyderabad	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vodafone	Rcom CDMA	Tata CDMA	MTS
In door (>= -75dBm)	88.53	94.03	42.86	94.24	68.6	96.03	97.07	91.4	71.31	98.55	66.48
In-vehicle (>= -85dBm)	98.89	99.61	58.78	99.67	92.32	99.7	99.87	99.11	96.7	100	97.92
Out door- in city (>= -95dBm)	100	100	78.5	100	100	100	100	99.86	100	100	100

Coverage level Nellore	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vodafone	Rcom CDMA	Tata CDMA	MTS
In door (>= -75dBm)	86.56	65.07	66.88	86.9	51.36	64.19	68.91	96.45	91.1	69.94	78.57
In-vehicle (>= -85dBm)	99.48	86.71	94.53	99.13	89.77	93.67	93.63	99.29	99.98	96.86	99.79
Out door- in city (>= -95dBm)	100	98.15	99.93	100	100	99.89	100	99.93	100	100	100

Coverage level Kurnool	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vodafone	Rcom CDMA	Tata CDMA	MTS
In door (>= -75dBm)	81.87	64.96	82.53	89.7	53.52	66.09	80.74	92.56	51.3	63.13	76.56
In-vehicle (>= -85dBm)	99.56	87.98	97.7	99.02	88.13	90.08	97.65	99.62	86.1	95.37	98.93
Out door- in city (>= -95dBm)	100	98.83	99.94	100	100	99.41	100	100	100	100	100

Audit and Assessment of QoS (Q2-2012): Andhra Pradesh Circle

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 "dropped call rate" parameter in Hyderabad with a value of 2.83% and TTSL(CDMA) in Kurnool with a value of 2.91%.
- "Connections with good quality" benchmark is not meeting by BSNL in Hyderabad, Nellore towns with values of 92.67%, 85.24% , Rcom GSM& TTSL (GSM) in Hyderabad town with a value of 93.94% & 92.1 as well as in Vodafone it is also not meeting in Voice Quality parameter with a value of 94.9% in Hyderabad respectively.
- As far as Call Setup Success Rate is concerned , BSNL in Hyderabad and Idea is in Kurnool are deviating from the benchmark respectively.

(E). Independent Drive Test:

The Independent Drive Test was conducted in Andhra Pradesh for 4 different Cities namely *"Ananthapur, Srikakulam, Cudapah, Chittoor"*. 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 Ananthapur (Idea, Vodafone), 80kms for Srikakulam (Aircel), 70kms for Cudapah (RCOM) and 80kms for Chittoor (Airtel) depending on city areas within the speed limit of 30Km/hr.

Drive Test Locations and Service provider's name:

1) Ananthapur   :   IDEA, VODAFONE
2) Srikakulam   :   AIRCEL
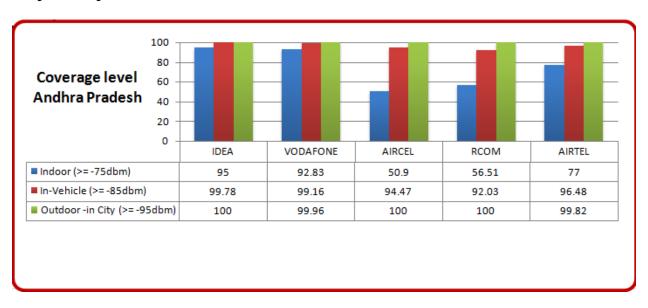3) Cudapah   :   RCOM GSM
4) Chittoor   :   AIRTEL

Area Coverage details:

1) ANANTHAPUR: Vijayanagar Colony, Sharada nagar, Adarsh nagar, Rudrampeta, Kovur nagar, Sirkandam Circle, Kalyandurga road, Thapovanam Circle, Gooty road, Venugopal nagar, Bellary road, Uravakonda road, Old town, Ambedkar nagar.

2) SRIKAKULAM: Palakonda road, Balaga, Govt degree college, Gujarathipeta, PN colony, Ram laxman junction, Main market, Bus stand area, Mangamarri thota, New colony, Sri visakha colony, Arasavelli road, APHB colony.

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, Gandi, Mariapuram.

4) CHITTOOR: Railway station road, Kattamanchi, Doddipalli, Murukambattu, Jyothi reddy nagar, Gandhi road, Collectrate office, Iruvaram, Vaddi palli, Ram nagar colony, Church street, Thota palem, Santhapeta.

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

SN	Parameter	IDEA	VODAFONE	AIRCEL	RCOM	AIRTEL
		Anathapur		Srikakulam	Cudapah	Chittoor
1.1	Call Attempts	75	101	94	78	92
1.2	Block Call Rate (<= 3%)	0.00%	0.00%	0.00%	0.00%	0.00%
1.3	Drop Call Rate (<= 2%)	0.00%	0.00%	0.00%	0.00%	0.00%
1.4	Percentage of Connections with good voice quality (>= 95%)	97.50%	98.52%	96.28%	97.10%	96.44%
1.5	Service Coverage					
	Indoor (>= -75dbm)	95	92.83	50.9	56.51	77
	In-Vehicle (>= -85dbm)	99.78	99.16	94.47	92.03	96.48
	Outdoor -in City (>= -95dbm)	100	99.96	100	100	99.82
1.6	Call Setup Success Rate (>= 95%)	100	100	100	100	100
1.7	Handover Success Rate	99.58	100	100	98.41	100

Graphical Representation:

	IDEA	VODAFONE	AIRCEL	RCOM	AIRTEL
■ Indoor (>= -75dbm)	95	92.83	50.9	56.51	77
■ In-Vehicle (>= -85dbm)	99.78	99.16	94.47	92.03	96.48
■ Outdoor -in City (>= -95dbm)	100	99.96	100	100	99.82

Audit and Assessment of QoS (Q2-2012): Andhra Pradesh Circle

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	IDEA	VODAFONE	AIRCEL	RCOM	AIRTEL
Name of the City	Anathapur		Srikakulam	Cudapah	Chittoor
No. of Sites covering the City	19	32	13	22	13

In Ananthapur town, Idea & Vodafone are meeting all the benchmarks of TRAI. The Ananthapur town is covered with 19 no. of BTSs by Idea & 32 no. of BTSs by Vodafone.

In Srikakulam town, Aircel is meeting all the benchmarks. 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. The Srikakulam town is covered with 13 no.of sites by Aircel.

RCOM GSM is meeting all the benchmarks in Cudapah town. Rcom GSM is covering the Cudapah town with 22 no.of sites.

Similarly Airtel is meeting all the benchmarks in Chittoor town. Airtel is covering the Chittoor town with 13 no.of sites.

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 Airtel, Idea & Vodafone 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 <=3% for "worst affected cells >3% TCH drop" is not met by Aircel (4.79% for live audit data), Tata GSM (5.07% for live audit data).

Under **Customer Service Quality Parameter, "operator answered calls (voice-to-voice) within 60 seconds"** parameter it is found that Aircel, Idea, Videocon are not fulfilling TRAI benchmark of >=90%.

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

Similarly Rcom GSM showing below benchmark value for Post-paid connections.

Regarding **Termination/Closure of Service** issues, Tata GSM & Tata CDMA are showing below benchmark value.

Regarding **Time taken for refunds of deposits after closure**, Idea, Tata GSM & Tata CDMA is showing below benchmark value.

During **Operated assisted Drive Tests**, the BSNL is showing below benchmark for "dropped call rate" parameter in Hyderabad and TTSL(CDMA) in Kurnool respectively.

"%age of connections with good voice quality" benchmark is not meeting by BSNL (Hyderabad, Nellore) , RCOM (GSM) , TTSL (GSM) as well as Vodafone in Hyderabad City respectively.

Remarks:-- As far as Kurnool Drive Test is concerned , TTSL(GSM) has not provided CDR regarding call status during drive in that city, however it is in process to provide. All this data given above in operators drive test table has been taken from that system used during drive test as well as given by the operators, occurred in those 3 cities