REPORT
ON

AUDIT & ASSESSMENT OF QUALITY OF SERVICE
OF

CELLULAR MOBILE TELEPHONE SERVICES
FOR

ANDHRA PRADESH CIRCLE
(SOUTH ZONE)

Report Period: Oct 2011 – Dec 2011

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- Not done 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 4th quarter (Oct – Dec 2011). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken during the period April – June 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	Nov-2011	1900-2000 Hrs
2	Airtel Ltd	Nov-2011	1900-2000 Hrs
3	BSNL	Nov-2011	1900-2000 Hrs
4	Etisalat	Nov-2011	1900-2000 Hrs
5	Idea	Nov-2011	1900-2000 Hrs
6	Reliance Communication (GSM)	Nov-2011	1900-2000 Hrs
7	Tata Communications (GSM)	Nov-2011	1900-2000 Hrs
8	Uninor	Nov-2011	1900-2000 Hrs
9	Videocon	Nov-2011	1900-2000 Hrs
10	Vodafone	Nov-2011	1900-2000 Hrs
CDMA Operators			
11	MTS (CDMA)	Nov-2011	1900-2000 Hrs
12	Reliance Communication (CDMA)	Nov-2011	1900-2000 Hrs
13	Tata Communications (CDMA)	Nov-2011	1900-2000 Hrs

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

(A) Cellular Mobile Telephone Services

S/N	3 days Live Data Audit / Name of Parameter	Bench-mark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
								GSM Operators						CDMA	
	Network Availability														
1	a) BTS accumulated downtime	<= 2%	0.02%	0.18%	1.34%	0.00%	0.03%	0.08%	0.10%	0.02%	0.72%	0.02%	0.06%	0.00%	0.05%
	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%	0.00%
2	**Connection Establishment (Accessibility)**														
	a) CSSR (Call Setup Success Rate)	>=95%	99.34%	99.63%	98.35%	99.57%	99.97%	99.68%	98.64%	98.87%	100.00%	99.99%	99.39%	98.99%	99.17%
	b) SDCCH/PAGING congestion	<=1%	0.05%	0.16%	0.55%	0.00%	0.24%	0.05%	0.03%	0.13%	0.00%	0.10%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.01%	0.12%	1.44%	0.00%	0.61%	0.12%	0.17%	0.25%	0.00%	0.50%	0.11%	0.04%	0.31%
3	**Connection maintenance (Retainability)**														
	a) CDR	<=2%	0.68%	0.57%	0.70%	0.31%	0.88%	0.36%	0.76%	0.56%	0.00%	0.59%	0.44%	0.46%	0.35%
	b) Worst affected cells>3% TCH drop	<=3%	4.89%	1.08%	2.93%	2.68%	2.88%	0.18%	6.00%	2.07%	0.00%	2.93%	0.12%	0.00%	0.14%
	c) Good voice quality	>=95%	98.45%	99.12%	NA	98.85%	97.04%	99.19%	97.97%	98.90%	99.61%	98.85%	NA	NA	NA
4	**No. of POI having congestion >0.5%**	<=0.5%	2	0	0	0	0	0	4	4	0	0	0	0	0
5	**Response time to customers for assistance**														
	a) Accessibility of call centre/Customer Care	>=95%	100%	94.80%	100%	97.28%	99.50%	100%	100%	97.00%	100%	100%	99.00%	100%	96.00%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	97.00%	97.00%	67.00%	100.00%	19.16%	91.00%	97.00%	95.00%	100%	96.00%	96.00%	96.00%	98.00%

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)" BSNL, Idea are found not meeting the benchmark.
  c) In case of POI parameter Uninor & Tata GSM were found to have 4 No's of POI's congestion over >0.5%. However Aircel found to have 2 No's of POI's congestion >0.5%.

S/N	Name of Parameter	Bench-mark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	V-fone	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%	0.03%	0.12%	1.20%	0.35%	0.03%	0.08%	0.07%	0.10%	0.33%	0.02%	0.06%	0.02%	0.08%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.03%	0.00%	0.00%	0.00%	0.00%	0.36%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2	**Connection Establishment (Accessibility)**														
	a) CSSR (Call Setup Success Rate)	>=95%	99.33%	99.62%	97.60%	99.50%	99.97%	99.67%	98.95%	99.00%	98.57%	99.99%	99.30%	99.16%	99.04%
	b) SDCCH/PAGING congestion	<=1%	0.06%	0.16%	0.74%	0.01%	0.31%	0.03%	0.07%	0.13%	0.01%	0.13%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.01%	0.12%	1.96%	0.00%	0.64%	0.10%	0.18%	0.22%	0.00%	0.50%	0.26%	0.03%	0.31%
3	**Connection maintenance (Retainability)**														
	a) CDR	<=2%	0.71%	0.59%	0.80%	0.38%	0.86%	0.41%	0.75%	0.57%	1.61%	0.61%	0.49%	0.46%	0.37%
	b) Worst affected cells>3% TCH drop	<=3%	1.70%	1.08%	2.98%	2.60%	2.94%	0.23%	3.68%	2.14%	0.00%	2.98%	0.13%	0.52%	0.07%
	c) Good voice quality	>=95%	98.43%	99.12%	NA	98.87%	97.10%	99.21%	97.93%	98.92%	99.11%	98.85%	NA	NA	NA
4	**No. of POI's having congestion >0.5%**	<=0.5%	2	0	0	0	0	0	4	11	0	0	0	0	0
(B)	**Customer Service Quality Parameters**														
5	**Metering/billing credibility-Post paid**	<= 0.1%	0.04%	0.01%	0.00%	NA	0.12%	0.10%	0.70%	NA	NA	0.06%	0.06%	0.14%	0.00%
6	**Metering /billing credibility-Pre paid**	<= 0.1%	0.01%	0.00%	NR	0.00%	0.01%	0.10%	0.07%	0.01%	0.00%	0.05%	0.03%	0.11%	0.02%
7	**Resolution of billing/ charging complaints**	100% within 4 weeks	100%	100%	100%	100%	100%	100%	100%	100%	NA	100%	100%	99%	100%
	a) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	100%	100%	NR	100%	100%	100%	100%	100%	NA	100%	100%	100%	100%
8	**Response time to customers for assistance**														
	a) Accessibility of call centre/Customer Care	>=95%	100.00%	100%	97.00%	96.67%	100%	99.00%	100%	96.90%	96.50%	100%	99.00%	100%	96.00%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	95.00%	100%	66.40%	100%	14.21%	81.00%	93.50%	99.30%	100.00%	96.00%	54.00%	95.60%	97.58%
9	**Termination/closure of service**	<=7days	100%	100%	0.00%	NA	100%	100%	36.13%	NA	NA	100%	100%	5.42%	100%
10	**Time taken for refunds of deposits after closures.**	100% within 60 days	100%	100%	100%	NA	100%	100%	99.00%	NA	NA	100%	100%	97.35%	NA

NA: Not Applicable, NR: Not Received

Audit and Assessment of QoS (Q4-2011): Andhra Pradesh Circle

Observations:

From the month data assessment, it is found that the operators are meeting most of the network parameters with some exceptional cases as given below:

For the parameter "Worst affected cells having >3% TCH drop" it is found that Tata GSM is not meeting the benchmark with a value of 3.68% respectively.

In case of POI parameter Uninor & Tata GSM were found to have 4 & 11 No's of POI's congestion over >0.5%. However Aircel found to have 2 No's of POI's congestion >0.5%.

Performance related to customer care data is not found to be satisfactory for the parameter "calls answered by operators (voice-to-voice)" for BSNL, Idea, and Rcom GSM.

The "Metering/billing credibility –postpaid/prepaid" benchmark is not meeting by Idea, Tata GSM & Tata CDMA.

The benchmark "Resolution of billing/ charging complaints" is not meeting by Tata CDMA.

The benchmark for the parameter "termination/closure of service" was not met by BSNL, Tata GSM and Tata CDMA.

The benchmark for the parameter "Time taken for refunds of deposits after closures" was not meet by Tata GSM & Tata CDMA.

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%)	Vijayawada	0.00%	0.00%	4.58%	1%	2%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		Visakhapatnam	0.59%	0.00%	2.62%	0%	1%	0.00%	0.51%	0.00%	1.12%	0.54%	0.00%
		Tirupathi	2.38%	0.00%	4.86%	1%	1%	0.63%	0.00%	0.00%	0.00%	0.00%	1.83%
1.2	Dropped Call Rate (<=2%)	Vijayawada	0.00%	0.00%	2.40%	0.00%	0.00%	0.00%	0.00%	0.00%	1.48%	0.79%	0.00%
		Visakhapatnam	0.00%	0.00%	2.01%	0.00%	0.00%	0.00%	0.51%	0.00%	0.00%	1.07%	0.00%
		Tirupathi	0.81%	0.00%	2.08%	0.00%	0.00%	0.64%	0.00%	0.00%	0.00%	0.00%	0.73%
1.3	Percentage of connections with good voice quality (=>95%)												
	(i) 0-4 (w/o frequency hopping)	Vijayawada									99.17%	98.92%	99.21%
		Visakhapatnam									99.15%	98.62%	99.16%
		Tirupathi									96.80%	99.86%	99.72%
	(ii) 0-5 (with frequency hopping)	Vijayawada	96.36%	96.06%	89.43%	95.10%	95.48%	95.40%	96.60%	97.00%			
		Visakhapatnam	94.66%	96.42%	89.62%	96.50%	97.00%	95.46%	95.60%	97.00%			
		Tirupathi	92.98%	96.25%	87.05%	97.60%	95.60%	96.81%	95.93%	95.81%			
1.4	Call Setup Success Rate (>=95%)	Vijayawada	100	100	95.42	99.35	98.39	100	100	100	100	100	100
		Visakhapatnam	99.41	100	97.38	100	99.33	100	99.49	100	98.88	99.46	100
		Tirupathi	0	100	95.14	98.69	97.62	99.37	100	100	100	100	98.17

Observations:
• "Blocked call rate" parameter was not meet by BSNL in Vijayawada & Tirupathi, & "Drop call rate" in Vijayawada, Visakhapatnam, Tirupathi cities.
• "Good voice quality" parameter was not met by Aircel in Visakhapatnam, Tirupathi & BSNL in Vijayawada, Visakhapatnam, Tirupathi.

Independent Drive Test:

SN	Parameter	UNINOR	AIRCEL	TATA GSM	AIRTEL	BSNL	RCOM GSM
		Srikakulam	Chittoor		Ananthapur	Mahabubnagar	
1.2	Block Call Rate (<= 3%)	0.00%	1.59%	0.00%	0.00%	3.31%	1.41%
1.3	Drop Call Rate (<= 2%)	0.00%	0.00%	0.00%	0.00%	2.65%	0.00%
1.4	Percentage of Connections with good voice quality (>= 95%)	95.94%	95.96%	95.16%	96.94%	93.28%	97.70%
1.5	Service Coverage						
	Indoor (>= -75dbm)	74.95	48.5	80.5	92	64.1	28.15
	In-Vehicle (>= -85dbm)	98.22	88.54	98.09	100	92.86	62.27
	Outdoor -in City (>= -95dbm)	100	99.65	99.95	100	100	90.62
1.6	Call Setup Success Rate (>= 95%)	100	98.41	100	100	96.69	98.59

- "Blocked call Rate", "Dropped Call Rate" & "Good Voice Quality" parameter is not met by BSNL in Mahabubnagar town.

(B)   Basic Telephone Service (Wireline) Providers
- Not done for this quarter

(C)   Broadband Service Providers
- Not done for this quarter

CHAPTER-3: Audit PMR data Verification

1. Cellular Mobile Telephone Service

S/N	PMR Name of Parameter	Bench-mark	Audit	Aircel	Airtel	BSNL	Etisalat	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	0.14	1.23	0.09	0.02	0	0.04	0.05	0.21	0.02	0	0.02	0.18
			Verified	0.02	0.14	1.23	0.23	0.02	0	0.04	0.05	0.21	0.02	0	0.02	0.18
	Worst affected BTSs due to downtime	<=2%	Reported	0	0.05	0	0	0	0	0	0	0	0	0	0	0
			Verified	0	0	0	0	0	0	0	0	0	0	0	0	0
2	**Connection Establishment (Accessibility)**															
	CSSR (Call Setup Success Rate)	>=95%	Reported	99%	100%	98%	99%	100%	100%	98%	99%	99%	99%	100%	99%	99%
			Verified	99.50%	99.70%	98%	99.48%	100%	100%	98%	99%	99.35%	99%	100%	99.25%	99%
	SDCCH/PAGING congestion	<=1%	Reported	0.02	0.14	0.67	0.02	0.22	0	0.08	0.1	0.22	0	0	0	0
			Verified	0.02	0.14	0.67	0.34	0.22	0	0.08	0.1	0.21	0	0	0	0
	TCH congestion	<=2%	Reported	0.02	0.13	1.76	0	0.48	0	0.17	0.07	0	0.01	0	0.26	0
			Verified	0.02	0.1	1.76	0	0.48	0	0.17	0.07	0	0.01	0	0.26	0
3	**Connection maintenance (Retainability)**															
	CDR	<=2%	Reported	0.37	0.55	1.07	0.12	0.63	0	0.75	0.71	0.72	0.01	0	0.38	0.29
			Verified	0.37	0.55	1.07	0.36	0.63	0	0.75	0.71	0.72	0.01	0	0.38	0.29
	Worst affected cells>3% TCH drop	<=3%	Reported	0.01	0.01	4.11	1.29	2.97	0	2.86	1.14	0	0.03	0	0.31	0.91
			Verified	0.86	1.1	4.11	3.97	2.97	0	2.86	1.14	0	0.03	0	0.31	0.91
	Good voice quality	>=95%	Reported	98%	99%	98%	99%	98%	99%	98%	99%	100%	99%	99%	99%	100%
			Verified	98%	99.20%	98%	98.85%	98%	99%	97.77%	99%	99.51%	99%	99%	99%	100%
4	**No. of POI's having congestion >0.5%**	<=0.5%	Reported	0	0	0	0	0	0	0	2.33	0	0	0	0	0
			Verified	0	0	0	0	0	0	0	2.33	0	0	0	0	0
(B)	**Customer Service Quality Parameters**															

#	Parameter	Benchmark															
5	Metering/billing credibility-Post paid	<= 0.1%	Reported	0	0	0.1	0	0	0	0	0	0	0	0	0	0
			Verified	0	0.02	0.1	0	0	0	0	0	0	0	0	0	0
6	Metering /billing credibility-Pre paid	<= 0.1%	Reported	0	0	0	0	0	0	0	0	0	0	0	0	0.02
			Verified	0	0	0	0	0	0	0	0.1	0	0	0	0	0.02
7	Resolution of billing/ charging complaints	100% within 4 weeks	Reported	100	100	100	100	100	100	100	0	100	100	100	100	100
			Verified	100	100	100	100	100	100	100	100	100	100	100	100	100
	Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	Reported	100	100	100	0	100	100	100	0	100	100	100	100	100
			Verified	100	100	100	0	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	99.92	97	100	99	100	100	98	97	100	100	98	97
			Verified	100	100	97	98.92	99	100	100	98	97	100	100	98	97
	% call answered by operators(voice to voice) within 60 sec.	>=90%	Reported	95	85	53	100	92	88	96	97	95	86	90	87	93
			Verified	95	85	53	99.75	92	88	96	97	95	86	90	87	93
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	0	100	100	100	0	0	100	100	100	NA
			Verified	100	100	100	0	100	100	100	0	0	100	100	100	NA
10	Time taken for refunds of deposits after closures.	100% within 60 days	Reported	100	100	100	0	80	100	90	0	0	100	100	99	NA
			Verified	100	100	100	0	80	100	90	0	0	100	100	99	NA

Critical Analysis:
- Deviation found for some operators for such parameters "Worst affected cells >3% drop", "SDCCH congestion".

    II. Basic Telephone Service (Wireline) Providers
           -    Not done for this quarter
   III. Broadband Service Providers
           -    Not done for this quarter

Chapter -4
Detailed Findings & Analysis

1. Cellular Mobile Telephone Service

(A) MSC audit

1) 3 days live measurement data assessment & summarized findings

S/N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Etisalat	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%	0.02%	0.18%	1.34%	0.00%	0.03%	0.08%	0.10%	0.02%	0.72%	0.02%	0.06%	0.00%	0.05%
	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%	0.00%
	c). Total no of BTSs in the licensed service area		2835	10226	5589	29	6877	3993	4146	2593	25	8130	2507	1323	472
	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		44	1349	5404.7	0	157	230	285	42	13	98.96	108	11.5	15.4
	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	0
2	Connection Establishment (Accessibility)														
	a) CSSR	>=95%	99.34%	99.63%	98.35%	99.57%	99.97%	99.68%	98.64%	98.87%	100.00%	99.99%	99.39%	98.99%	99.17%
	b) SDCCH/PAGING congestion	<=1%	0.05%	0.16%	0.55%	0.00%	0.24%	0.05%	0.03%	0.13%	0.00%	0.10%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.01%	0.12%	1.44%	0.00%	0.61%	0.12%	0.17%	0.25%	0.00%	0.50%	0.11%	0.04%	0.31%
3	Connection maintenance														
	a) CDR	<=2%	0.68%	0.57%	0.70%	0.31%	0.88%	0.36%	0.76%	0.56%	0.00%	0.59%	0.44%	0.46%	0.35%
	b) Cells having > 3% TCH drop	<=3%	4.89%	1.08%	2.93%	2.68%	2.88%	0.18%	6.00%	2.07%	0.00%	2.93%	0.12%	0.00%	0.14%

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		Benchmark													
	c) Good voice quality	>=95%	98.45%	99.12%	NA	98.85%	97.04%	99.19%	97.97%	98.90%	99.61%	98.85%	NA	NA	NA
	d) No. of cells > 3% TCH drop		406	311	489	2.33	586	21	730	160	0	717	9	0	2
	e) Total no. of cells in the network		8307	28890	16691	87	20380	11979	12281	7742	75	24499	7521	4047	1416
4	**No. of POI's having congestion >0.5%**	<=0.5%	2	0	0	0	0	0	4	4	0	0	0	0	0
	a) Name of POI not meeting the benchmark														
	b) Total No. of circuits on POI		31000	7187	34354	1481	149863	11010	11340	35036	549	162550	1723159	59102	9993
	c) Avg No. of call attempts on POI		561386	8107011	1471326	2723	4261479	213663	341597	1296878	0	5207603	893661	1502711	221118
	d) Avg traffic served on POI (Erlang)		18600	145060	25832	52.6	95903	4926	6341	27452	12	94069	33867	27980	4003
	e) Total number of working POI Service Area wise		13	19	29	27	117	19	33	66	15	56	82	155	47
	f) Equipped Capacity of Network in respect of Traffic in erlang		89457	677890	391130	644	253237	122000	212270	85720	5000	220000	316000	324855	27300
	g) Total traffic handled in TCBH in erlang		29534	510170	175041	59	234887	48757	80566	68553	0.26	129481	98222	85205	9216
(B)	**Customer Service Quality Parameters**														
5	**Response time to customers for assistance**														
	a) Accessibility of call centre	>=95%	100%	94.80%	100%	97.28%	99.50%	100%	100%	97.00%	100%	100%	99.00%	100%	96.00%
	b) % of call answered by operators(voice to voice) within 60 sec	>=90%	97.00%	97.00%	67.00%	100%	19.16%	91.00%	97.00%	95.00%	100%	96.00%	32.00%	96.00%	98.00%

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 <=2%):** All operators are meeting the benchmark with values lying between 0% and 1.34%
➢ **Worst affected BTSs due to downtime (benchmark <=2%):** All the operators are meeting the benchmark as specified by TRAI. It was observed that none of the BTS outage was more than 24 hours in 3 days.
➢ **Call setup success rate (benchmark >=95%):** All operators are meeting the benchmark with values lying between 98.35% and 100%. Videocon is showing 100% CSSR as it has very low subscriber base.
➢ **SDCCH/PAGING Channel congestion (benchmark <= 1%):** All operators are meeting the benchmark with values lying between 0% and 0.55%.
Note: CDMA operators are provided the data for Paging Channel congestion.
➢ **TCH congestion (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 1.44%.
➢ **Call drop rate (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 0.88%.
➢ **Cell exceeding 3% TCH drop (benchmark <= 3%):** Except for Aircel, Tata GSM, rest of the operators are satisfying the benchmark with value in between 0% and 2.93%.
➢ **Connections with good voice quality (benchmark >= 95%):** CDMA operators & BSNL has declared that the parameter is not system generated. Rests of the operators are meeting the benchmark with values lying between 97.97% and 99.19%.
➢ **No. of POI's having Congestion >0.5%:** Aircel, Tata GSM & Uninor were found to have 2, 4 & 4 nos. of POI with congestion over 0.5% in the individual POIs. For rest of the there was no congestion found overall on the POI, but cases were found where individual POIs are showing high utilization/usage. Some are in the range of over 100% though causing no traffic failure due to overflow technique i.e. the extra traffic is carried over by some other operating POI as has been designed to do so.
➢ **%age of call answered by operator (electronically) (benchmark >95):** Except Airtel, rest of the operators are meeting the benchmark with values in between 96% and 100%.
➢ **%age of call answered by operator (Voice to voice) (benchmark >90%): %):** Except for BSNL, Idea and RCOM CDMA, rest of the operators are satisfying the benchmark with value in between 91% and 100%.

(2) One month audit data report & summarized findings

S/N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Etisalat	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%*	0.03%	0.12%	1.20%	0.35%	0.03%	0.08%	0.07%	0.10%	0.33%	0.02%	0.06%	0.02%	0.08%
	b) Worst affected BTSs due to downtime	*<=2%*	0.00%	0.03%	0.00%	0.00%	0.00%	0.00%	0.36%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	c) Total no. of BTSs in the licensed service area		2835	10226	5589	29	6877	3993	4146	2593	25	8130	2507	1323	472
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		566	8652	47791	73.52	1260	2304	1942	1794.5	59	1239.35	1142	205.96	263.5
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	3	0	0	0	0	15	0	0	0	0	0	0
2	**Connection Establishment (Accessibility)**														
	a) CSSR (Call Setup Success Rate)	*>=95%*	99.33%	99.62%	97.60%	99.50%	99.97%	99.67%	98.95%	99.00%	98.57%	99.99%	99.30%	99.16%	99.04%
	b) SDCCH/PAGING congestion	*<=1%*	0.06%	0.16%	0.74%	0.01%	0.31%	0.03%	0.07%	0.13%	0.01%	0.13%	0.00%	0.00%	0.00%
	c) TCH congestion	*<=2%*	0.01%	0.12%	1.96%	0.00%	0.64%	0.10%	0.18%	0.22%	0.00%	0.50%	0.26%	0.03%	0.31%
3	**Connection maintenance (Retainability)**														
	a) CDR	*<=2%*	0.71%	0.59%	0.80%	0.38%	0.86%	0.41%	0.75%	0.57%	1.61%	0.61%	0.49%	0.46%	0.37%
	b) Worst affected cells>3% TCH drop	*<=3%*	1.70%	1.08%	2.98%	2.60%	2.94%	0.23%	3.68%	2.14%	0.00%	2.98%	0.13%	0.52%	0.07%
	c) Good voice quality	*>=95%*	98.43%	99.12%	NA	98.87%	97.10%	99.21%	97.93%	98.92%	99.11%	98.85%	NA	NA	NA
	d) Total No. of cells exceeding 3% TCH drop (call drop)		141	312	497	2.26	600	27	452	166	0	729	10	21	1
	e) Total no. of cells in the network		8307	28890	16691	87	20380	11979	12281	7742	75	24499	7521	4047	1416
4	**No. of POI's having congestion >0.5%**	*<=0.5%*	2	0	0	0	0	0	4	11	0	0	0	0	0
	a) Name of POI not meeting the benchmark														

		Benchmark													
	b) Total No. of call attempts on POI (Avg.)		550805	8187988	1473101	2645.7	4195644	192986	333910	1136143	7.57	5393707	741502	1489217	214010
	c) Total traffic served on POI (Erlang) (Avg.)		18271	143165	28846	48.18	96202	4904.56	6335	26156.4	12.82	92752.07	30182	27868.28	3874.62
	d) Total No. of circuits on POI		31000	7187	34354	1481	149863	11010	11340	35036	549	162550	1723159	59102	9993
	e) Total number of working POI Service Area wise		13	19	29	27	117	19	33	66	15	56	82	155	47
	f) Capacity of POI		7990	215580	34354	1128.35	142796	10229.8	10563	31803	371.6	162550	1613279	54380.32	9077.5
5	**Network Data**														
	a) Equipped Capacity of Network Erlang		89457	677890	391130	644	253237	122000	212270	85720	5000	220000	316000	324855	27300
	b) Total traffic in TCBH in erlang (Avg.)		29534	510170	175041	59.16	234887	48757	80566	68553.8	0.26	129481	98222	85205	9216
	c) Total no. of customers served (as per VLR) on last day of the month		1079688	16514362	6029590	3771	8429219	NR	2969125	1758102	168	4237658	NR	1729577	365224
(B)	**Customer Service Quality Parameters**														
6	**Metering/billing credibility-Post paid**	<= 0.1%	0.04%	0.01%	0.00%	NA	0.12%	0.10%	0.70%	NA	NA	0.06%	0.06%	0.14%	0.00%
	a) No. of bills issued during the period		10670	591745	136458	NA	153570	28219	51003	NA	NA	302970	254659	383859	6868
	b) No. of bills disputed including billing complaints during the period		4	54	0	NA	182	28	357	NA	NA	173	148	526	0
7	**Metering /billing credibility-Pre paid**	<= 0.1%	0.01%	0.00%	NR	0.00%	0.01%	0.10%	0.07%	0.01%	0.00%	0.05%	0.03%	0.11%	0.02%
	a) No. of charging / credit / validity complaints during the quarter		149	99	NR	0	707	4106	1611	236	0	3230	1332	849	101
	b) Total no. of pre-paid customers at the end of the quarter		1778237	21221359	NR	31501	8970492	4106136	2446657	2863210	11059	6894640	4574841	796097	630884
8	**Resolution of billing/ charging complaints**	100% within 4 weeks	100%	100%	100%	100%	100%	100%	100%	100%	NA	100%	100%	99%	100%
	a) No. of billing/(post paid) and charging, credit/validity (pre paid) complaints resolved within 4 weeks during the quarter		153	153	0	0	841	4134	1967	236	0	3403	1480	1363	101

	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		153	153	0	0	889	4134	1968	236	0	3403	1480	1375	101
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		45	153	0	0	162	1416	3	236	0	2565	849	2	17
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		108	0	0	0	679	2718	1965	0	0	838	631	1373	84
	e) Period of applying credit/waiver/adjustment to the customer's account from the date of resolutions of complaints	<=1 week	100%	100%	NR	100%	100%	100%	100%	100%	NA	100%	100%	100%	100%
9	**Response time to customers for assistance**														
	a) Accessibility of call centre/Customer Care	>=95%	100%	100%	97.00%	96.67%	100%	99.00%	100%	96.90%	96.50%	100%	99.00%	100%	96.00%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	95.00%	100%	66.40%	100%	14.21%	81.00%	93.50%	99.30%	100.00%	96.00%	92.00%	95.60%	97.58%
	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		37032	32396	1378678	877	212771	546900	1742255	719871	11	107114	224716	474679	163977
	d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		35310	32396	915318	877	30232	442429	1628895	714756	11	102478	206832	454012	160007
10	**Termination/closure of service**	<=7days	100%	100%	0.00%	NA	100%	100%	36.13%	NA	NA	100%	100%	5.42%	100%
	a) Total No. of requests for Termination / Closure of service received during the quarter		53	2659	1644	NA	1782	98	274	NA	NA	641	630	1365	208
	b) No. of requests for Termination / Closure of service complied within 7 days during the quarter		53	2659	0	NA	1782	98	99	NA	NA	641	630	74	208
11	**Time taken for refunds of deposits after closures.**	*100% within 60 days*	100%	100%	100%	NA	100%	100%	99.00%	NA	NA	100%	100%	97.35%	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 <=2%):** All operators are meeting the benchmark with values lying between 0.02% and 1.2%.

➢ **Worst affected BTSs due to downtime (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 0.36%.

➢ **Call setup success rate (benchmark >= 95%):** All operators are meeting the benchmark with values lying between 97.6% and 99.99%.

➢ **SDCCH/PAGING Channel congestion (benchmark <= 1%):** All operators are meeting the benchmark wit values lying between 0% and 0.74%.
   Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.

➢ **TCH congestion (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 1.96%.

➢ **Call drop rate (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0.37% and 1.61%.

➢ **Cell exceeding 3% TCH drop (benchmark <= 3%):** Except for Tata GSM, remaining operators are satisfying the benchmark with value in between 0.07% and 2.98%.

➢ **Connections with good voice quality (benchmark >= 95%):** CDMA operators & BSNL have declared that the parameter is not system generated. Rests of the operators are meeting the benchmark with values lying between 97.1% and 99.21%.

➢ **No. of POI's having Congestion >0.5%:** Aircel, Tata GSM & Uninor were found to have 2, 4 & 11 nos. of POI with congestion over 0.5% in the individual POIs. For rest of the there was no congestion found overall on the POI, but cases were found where individual POIs are showing high utilization/usage. Some are in the range of over 100% though causing no traffic failure due to overflow technique i.e. the extra traffic is carried over by some other operating POI as has been designed to do so.

➢ **%age of call answered by operator (electronically) (benchmark >95):** All operators are meeting the benchmark with values lying between 96% to 100%.

➢ **%age of call answered by operator (Voice to voice) (benchmark >90%):** Except for BSNL, Idea & Rcom GSM, rest of the operators are meeting the benchmark with values lying between 93.5% to 100%.

➢ **Metering and billing credibility-Post paid (benchmark <= 0.1%):** Except for Idea, TATA GSM & Tata CDMA, rest of the operators are meeting the benchmark.

➢ **Metering and billing credibility-Pre paid (benchmark <= 0.1%):** Except for TATA CDMA with a value of 0.11% rest of the operators are meeting the benchmark with values lying between 0% and 0.1%.

➢ **Resolution of billing/ charging complaints (benchmark 100% within 4 weeks):** Except for Tata GSM with values of 99% remaining operators are meeting the benchmark.

➢ **Termination/Closure of service (Benchmark <= 7 days):** Except for BSNL, Tata GSM & Tata CDMA rest of the operators has satisfied the benchmark.

➢ **Time taken for refunds of deposits after closures (benchmark 100% within <=60 days):** Except for Tata GSM & Tata CDMA rest of the operators have satisfied the benchmark.

(3) Sample Coverage
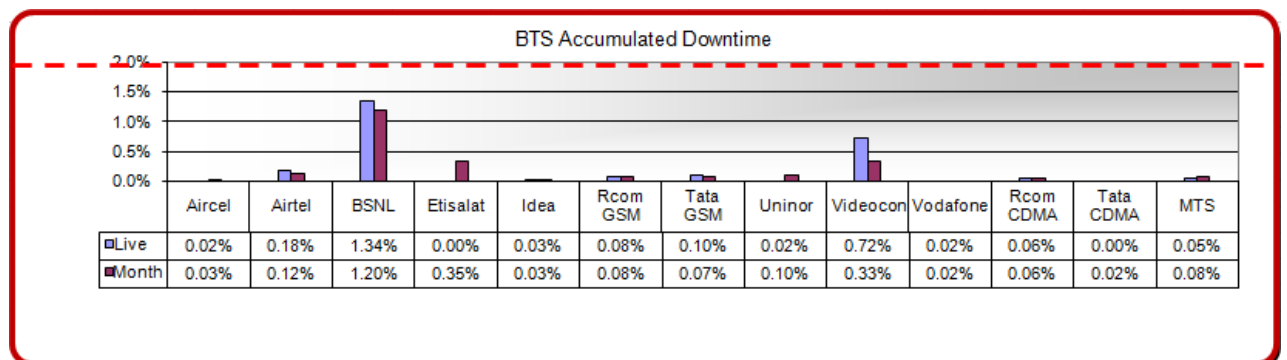
Switches/BSC/BTS details of operators:

Sl.	Name of Service Provider	No. of MSC+GMSC	No. of BSC	No. of BTS
		GSM Operators		
1	Aircel Ltd	3	21	2835
2	Airtel Ltd	56	118	10226
3	BSNL	18	91	5589
4	Etisalat	3	1	29
5	Idea	15	74	6877
6	Reliance Communication (GSM)	5	21	3993
7	Tata Communications (GSM)	7	35	4146
8	Uninor	3	19	2593
9	Videocon	2	2	25
10	Vodafone	8	96	8149
		CDMA Operators		
11	MTS (CDMA)	1	2	472
12	Reliance Communication (CDMA)	12	6	2507
13	Tata Communications (CDMA)	13	5	1323

(4) Performance (Graphical Representation)

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

A)   NETWORK PERFORMANCE

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

BTS Accumulated Downtime

	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
Live	0.02%	0.18%	1.34%	0.00%	0.03%	0.08%	0.10%	0.02%	0.72%	0.02%	0.06%	0.00%	0.05%
Month	0.03%	0.12%	1.20%	0.35%	0.03%	0.08%	0.07%	0.10%	0.33%	0.02%	0.06%	0.02%	0.08%

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

Worst affectd BTSs due to Downtime

	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
Live	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Month	0.00%	0.03%	0.00%	0.00%	0.00%	0.00%	0.36%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
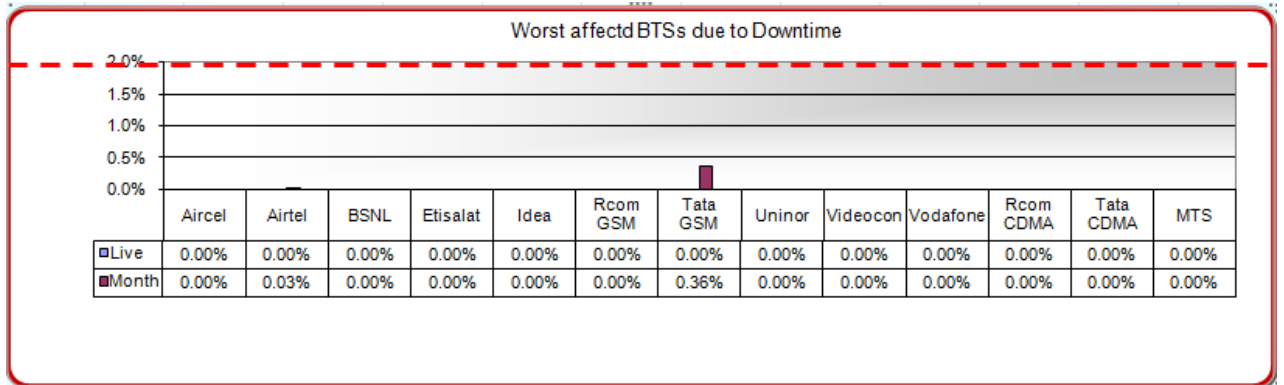
Call setup success rate: All operators are meeting the TRAI benchmarks (>= 95 %) for both one month and 3 days live data taken in the month of audit.
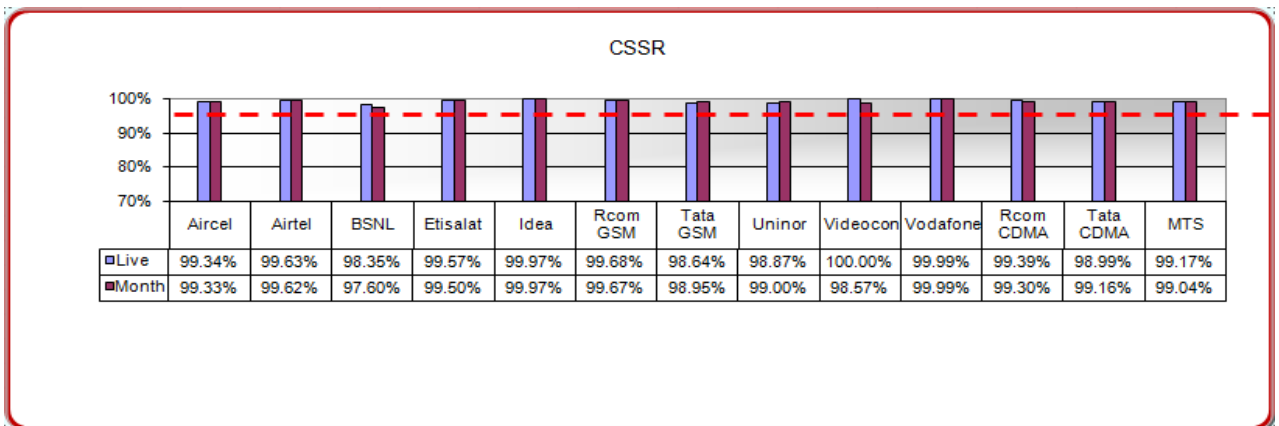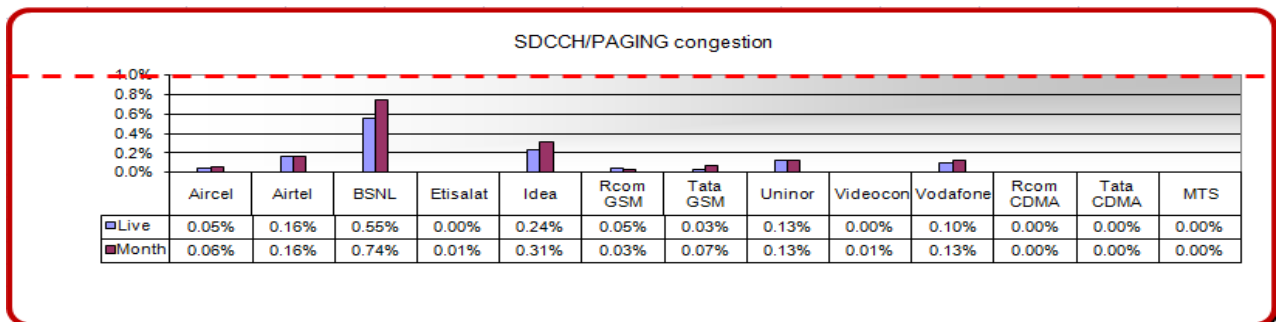

CSSR

	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
Live	99.34%	99.63%	98.35%	99.57%	99.97%	99.68%	98.64%	98.87%	100.00%	99.99%	99.39%	98.99%	99.17%
Month	99.33%	99.62%	97.60%	99.50%	99.97%	99.67%	98.95%	99.00%	98.57%	99.99%	99.30%	99.16%	99.04%

 Blocked call rate:
SDCCH congestion (%): All operators are meeting the TRAI benchmarks (<= 1 %) for both one month and 3 days live data taken in the month of audit.

SDCCH/PAGING congestion

	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
Live	0.05%	0.16%	0.55%	0.00%	0.24%	0.05%	0.03%	0.13%	0.00%	0.10%	0.00%	0.00%	0.00%
Month	0.06%	0.16%	0.74%	0.01%	0.31%	0.03%	0.07%	0.13%	0.01%	0.13%	0.00%	0.00%	0.00%

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

	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
Live	0.01%	0.12%	1.44%	0.00%	0.61%	0.12%	0.17%	0.25%	0.00%	0.50%	0.11%	0.04%	0.31%
Month	0.01%	0.12%	1.96%	0.00%	0.64%	0.10%	0.18%	0.22%	0.00%	0.50%	0.26%	0.03%	0.31%

Connection Maintainability (Retainability):

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

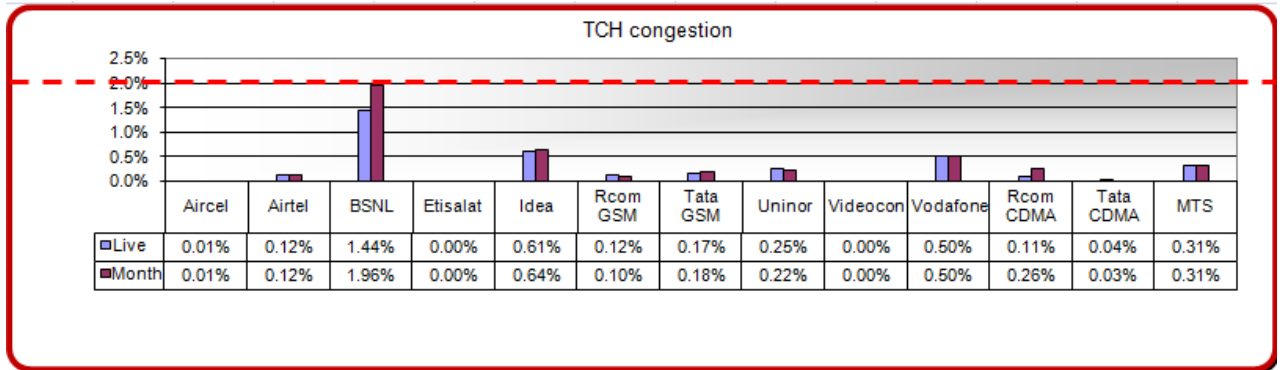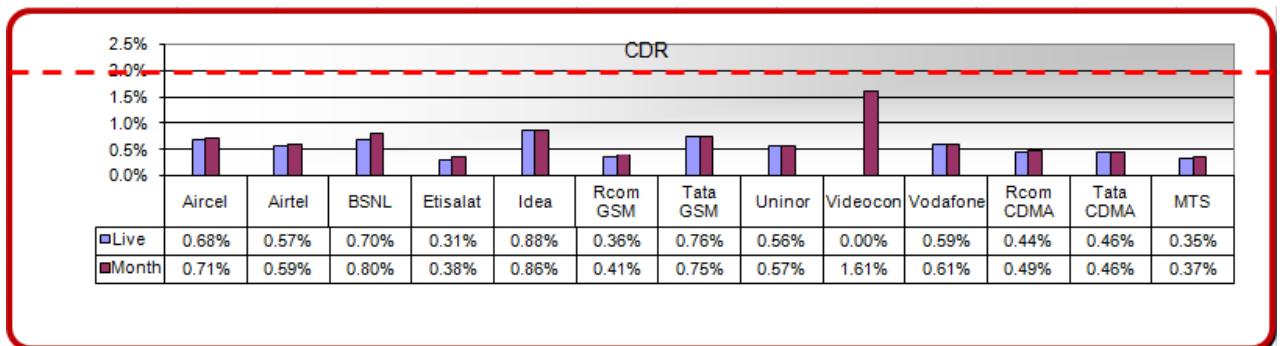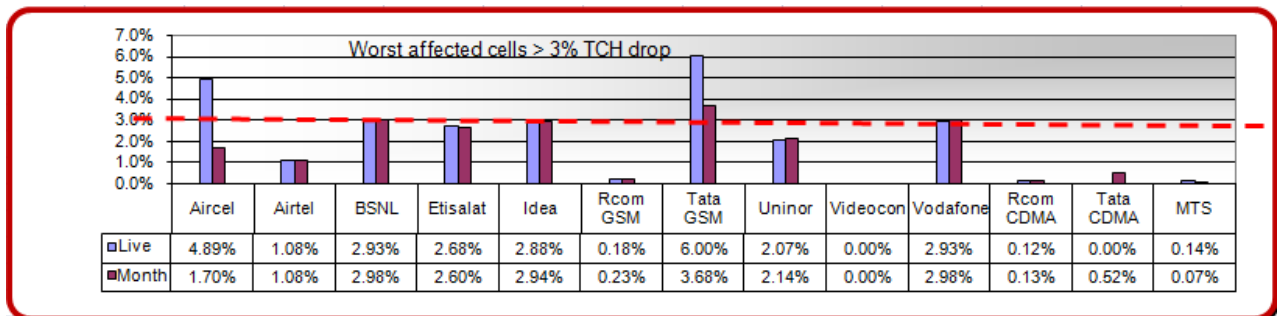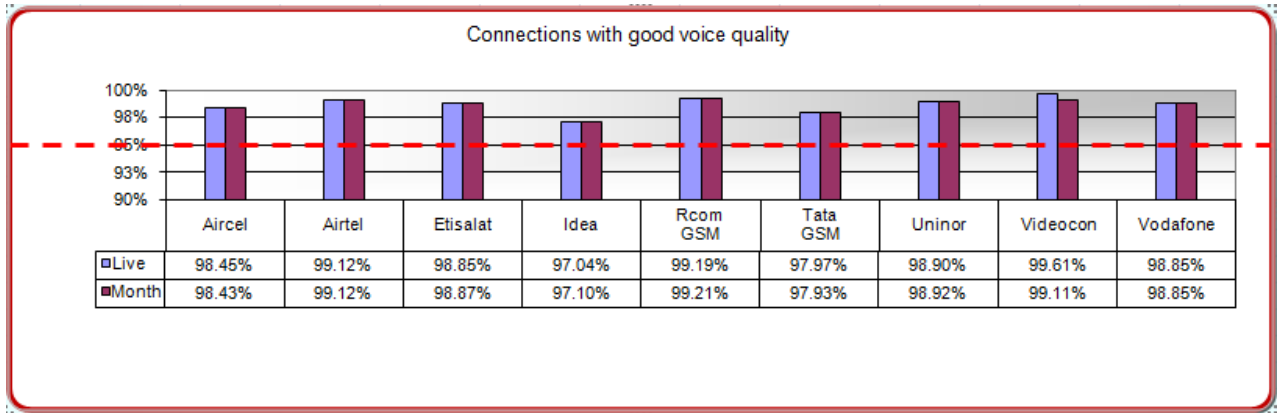|	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
Live	0.68%	0.57%	0.70%	0.31%	0.88%	0.36%	0.76%	0.56%	0.00%	0.59%	0.44%	0.46%	0.35%
Month	0.71%	0.59%	0.80%	0.38%	0.86%	0.41%	0.75%	0.57%	1.61%	0.61%	0.49%	0.46%	0.37%

Worst affected Cell exceeding 3% TCH Drop: Tata GSM is not meeting the benchmark for live & month audit data. Aircel is not meeting the benchmark for live data.

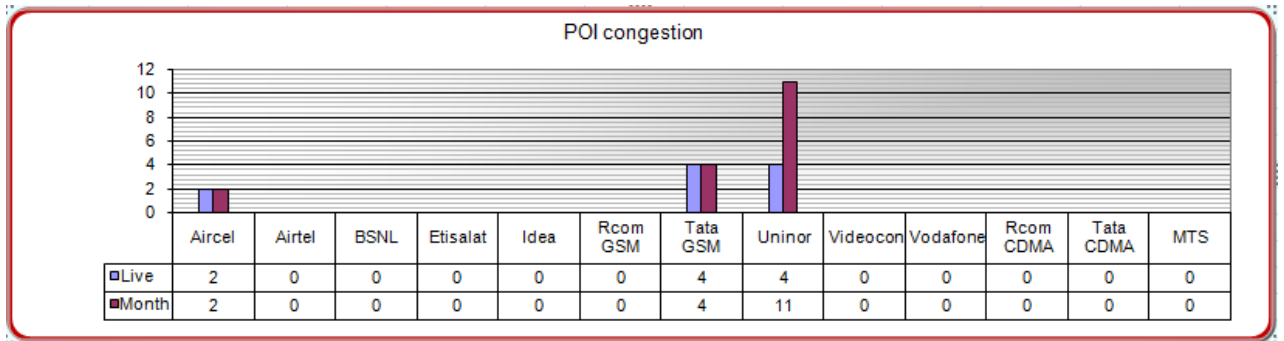|	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
Live	4.89%	1.08%	2.93%	2.68%	2.88%	0.18%	6.00%	2.07%	0.00%	2.93%	0.12%	0.00%	0.14%
Month	1.70%	1.08%	2.98%	2.60%	2.94%	0.23%	3.68%	2.14%	0.00%	2.98%	0.13%	0.52%	0.07%

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. The CDMA operators & BSNL has declared that this parameter is not system generated.

Connections with good voice quality

	Aircel	Airtel	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone
Live	98.45%	99.12%	98.85%	97.04%	99.19%	97.97%	98.90%	99.61%	98.85%
Month	98.43%	99.12%	98.87%	97.10%	99.21%	97.93%	98.92%	99.11%	98.85%

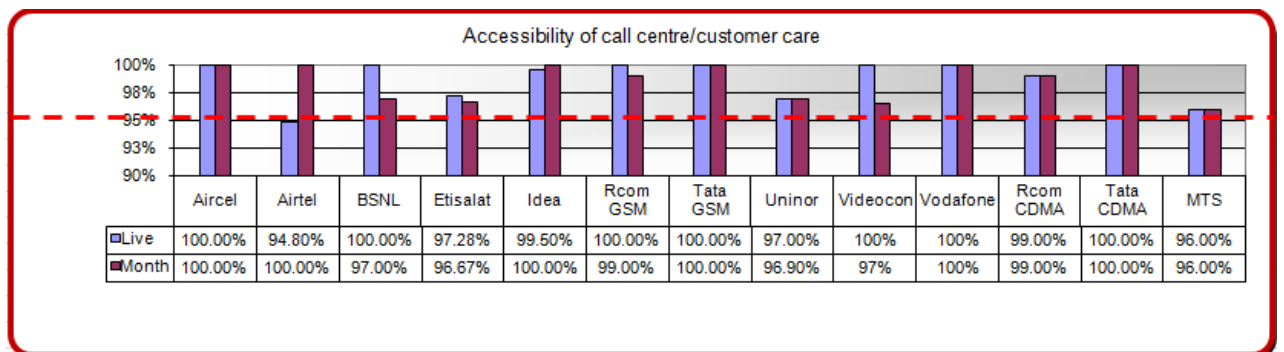**No. of POI having > 0.5% Congestion:**
Aircel, Tata GSM & Uninor is not meeting the benchmark on their individual POI's in both Live & month audit. There is no congestion found for other operators during the time of audit.
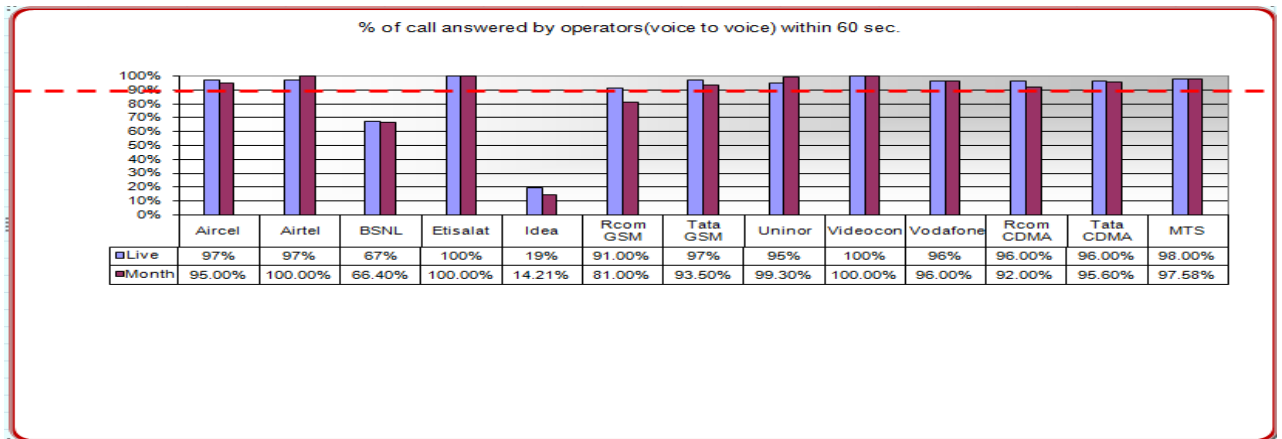

POI congestion

	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
Live	2	0	0	0	0	0	4	4	0	0	0	0	0
Month	2	0	0	0	0	0	4	11	0	0	0	0	0

B)   CUSTOMER SERVICE QUALITY PARAMETERS

Response time to the customer for assistance:

Percentage of call answered (Electronically): All operators are meeting the TRAI benchmarks (>= 95%) for both one month 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	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
Live	100.00%	94.80%	100.00%	97.28%	99.50%	100.00%	100.00%	97.00%	100%	100%	99.00%	100.00%	96.00%
Month	100.00%	100.00%	97.00%	96.67%	100.00%	99.00%	100.00%	96.90%	97%	100%	99.00%	100.00%	96.00%

Percentage of call answered by operators (Voice to voice) within 60 sec: BSNL, Idea are not meeting the benchmark for both live & month audit data and Rcom GSM is not meeting for 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	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA	MTS
Live	97%	97%	67%	100%	19%	91.00%	97%	95%	100%	96%	96.00%	96.00%	98.00%
Month	95.00%	100.00%	66.40%	100.00%	14.21%	81.00%	93.50%	99.30%	100.00%	96.00%	92.00%	95.60%	97.58%

(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 Tata GSM for both month & live audit data, Aircel for live audit data.
- "POI congestion" benchmark is not meeting by Uninor for Live audit data.
- "Metering/billing credibility for postpaid" benchmark is not meeting by Idea, Tata GSM, Tata CDMA.
- "Metering/billing credibility for pre paid" benchmark is not meeting by Tata CDMA
- "Resolution of billing/ charging complaints" benchmark is not meeting by Tata GSM.
- "%age of calls answered by operator" benchmark is not meeting by BSNL, Idea, and Rcom GSM.
- "Termination/ closure of service" benchmark is not meeting by BSNL, Tata GSM, Tata CDMA.
- And "time taken for refunds of deposits after closures" benchmark is not meeting by Tata GSM, Tata CDMA.

(A) 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 based on live calling for billing complaints

Calling Operator	Aircel	Airtel	Idea	Reliance (GSM)	Tata (GSM)	Uninor	Vodafone	Reliance (CDMA)	Tata (CDMA)	Sistema (MTS)
Total No. of calls attempted	14	18	10	9	15	8	16	8	8	8
Total No. of calls answered	10	12	6	6	10	3	10	6	6	3
Cases resolved with 4 weeks	10	12	2	6	10	3	10	6	6	3
%age of cases resolved	100%	100%	33%	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 center

Calling Operator	Aircel	Airtel	BSNL	Etisalat	Idea	Tata GSM	Uninor	Videocon	Vodafone	MTS	Tata CDMA
Total No. of Calls Attempted	100	100	100	100	100	100	100	20	100	100	100
Total No. of calls connected to IVR	100	97	96	100	98	100	100	19	99	98	99
Calls got connected to agent within 60 Sec	97	97	67	100	19	97	95	20	96	98	96
%age of calls got answered	97%	97%	67%	100%	19%	97%	95%	100%	96%	98%	96%

(4)   Level 1 calling

Emergency no.	No. of calls made	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	VODAF ONE	UNINOR	MTS	RCOM CDMA	TATA CDMA
						Vijayawada						
100	1	1	1	1	1	1	1	1	1	1	1	1
101	1	1	1	1	1	1	1	1	1	1	1	1
102/ 108	1	1	1	1	1	1	1	1	1	1	1	1
139	2	2	2	2	2	2	2	2	2	2	2	2

Emergency no.	No. of calls made	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	VODAF ONE	UNINOR	MTS	RCOM CDMA	TATA CDMA
						Visakhapatnam						
100	1	1	1	1	1	1	1	1	1	1	1	1
101	1	1	1	1	1	1	1	1	1	1	1	1
102/ 108	1	1	1	1	1	1	1	1	1	1	1	1
139	2	2	2	2	2	2	2	2	2	2	2	2

Emergency no.	No. of calls made	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	VODAF ONE	UNINOR	MTS	RCOM CDMA	TATA CDMA
						Tirupathi						
100	1	1	1	1	1	1	1	1	1	1	1	1
101	1	1	1	1	1	1	1	1	1	1	1	1
102/ 108	1	1	1	1	1	1	1	1	1	1	1	1
139	2	2	2	2	2	2	2	2	2	2	2	2

(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 except Idea, rest of 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. However Congestion is found in BSNL and Idea after the IVR level, that is when the calls are routed to the call center agent.

For emergency, Level 1 calling all the operators are found to be functional.

(B) 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 calling

Calling Operator	Aircel	Airtel	BSNL	Etisalat	Idea	Reliance (GSM)	Tata (GSM)	Uninor	Videocon	Vodafone	Reliance (CDMA)	Tata (CDMA)	Sistema (MTS)
Hyderabad													
Aircel	-	100%	99%	100%	100%	99%	100%	100%	99%	100%	100%	100%	100%
Airtel	99%	-	96%	100%	98%	96%	99%	96%	100%	99%	100%	100%	99%
BSNL	100%	99%	-	100%	100%	98%	98%	97%	100%	98%	100%	100%	100%
Etisalat	100%	100%	100%	-	100%	100%	100%	100%	100%	100%	97%	100%	100%
Idea	100%	98%	97%	100%	-	100%	97%	95%	100%	97%	99%	100%	100%
Reliance (GSM)	100%	98%	96%	100%	97%	-	100%	98%	100%	100%	99%	100%	99%
Tata (GSM)	100%	99%	98%	100%	100%	99%	-	99%	100%	100%	100%	99%	100%
Uninor	99%	96%	99%	100%	95%	98%	100%	-	97%	100%	100%	100%	100%
Videocon	100%	100%	97%	100%	98%	99%	100%	99%	-	100%	100%	100%	98%
Vodafone	100%	97%	98%	100%	99%	100%	100%	100%	100%	-	100%	99%	100%
Reliance (CDMA)	100%	100%	99%	100%	100%	100%	96%	100%	99%	100%	-	100%	100%
Tata (CDMA)	99%	100%	99%	100%	98%	100%	100%	99%	100%	98%	100%	-	100%
Sistema (MTS)	100%	100%	96%	99%	99%	98%	99%	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.

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

(1) Sample Coverage

The Operator Assisted Drive Test was conducted at Andhra Pradesh for all the operators. Route covered was about around 80-100Km depending on city areas within the speed limit of 30Km/hr.

Drive Test Locations

VIJAYAWADA

LOW DENSE:	Ramalingeshwarapet, Ashok nagar, Poranki, Ramapuram Colony, Goshala, Padamata lanka, Vidhyadharapuram, Gollapudi, RTC colony, Chitti nagar, Milk project, Nunna, kanuru.
MEDIUM DENSE:	Payakapuram, Ajit singh nagar, PNT colony, Ramakrishnapuram, Currency nagar, Ramachandra nagar, Veterinary colony, Bharathi nagar, State bank colony, Kishore nagar, Bhavani puram, Penumaluru
HIGH DENSE:	Madhura nagar, Satyanaranapuram, Bavajipet, Arandalpeta, Governerpeta, Hanumanpet, Krishnalanka, Kasturi bai nagar, Machavaram, Benz circle, RTC bus stand, Siddartha Circle, Durga temple, A S nagar, Besant road

VISAKHAPATNAM

LOW DENSE:	Coastal Battery Gate, Ayyapa nagar, Visakha dairy, Jogavanipalem, Bala cheruvu, Steel Plant road, Vepagunta, Airport
MEDIUM DENSE:	Kirlampudi layout, Tenneti Park, Newresavani palem, Aslimetta junction, CPM compound, Sea horse junction, Sangam Office, Narsimha nagar, Gopalapatnam, 104 area, Auto nagar.
HIGH DENSE:	Poorna market, Old post office, One town, Vishalakshi nagar, MVP colony, Pedda waltair, 3 town polica station road, Satyam junction, Siripuram, Taj hotel, Jagadamba, Railway station road, New railway colony, Thatichettipalem, Diamond park, sitammadhara, Marripalem, NAD kotha road, Gajuwaka.

TIRUPATHI

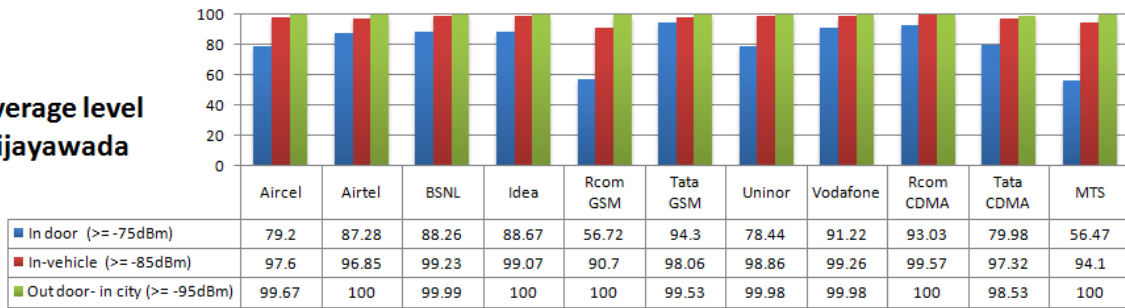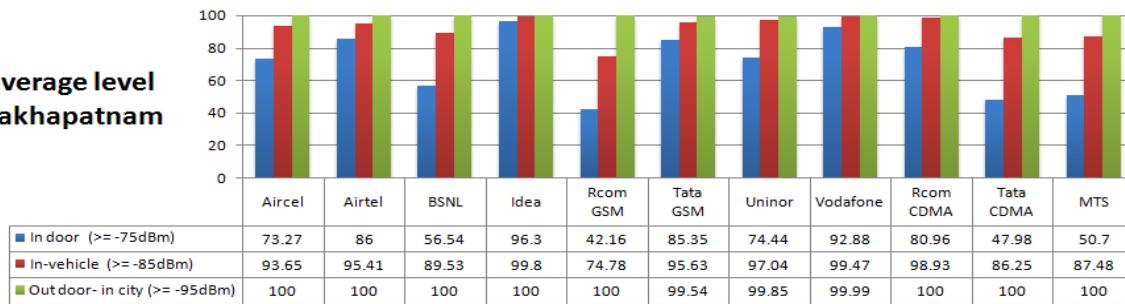|	
LOW DENSE:	Airport road, town club, Renigunta bypass road, Chittoor road,
MEDIUM DENSE:	Mangalam, Padmavathipuram, Kapila theerdam, karakambadi road, MR palli, Biragipeta, Thummaragunta, Vaikuntapuram, Hare rama Hare krishna temple road, Leela mahal Junction, santhi nagar
HIGH DENSE:	Tiruchanoor, Yedu kondalu bus stand, Leela mahala circle, Railway station, Bhavani nagar,Allipiri, SV university area, TTD administrative office, Padmavathi University area, Annamaya circle, Gandhi road, Municipal road, Tilak road, TK street, Bazar street, KT road, SVMS road, Khadi colony, Korlakunta road

(2) Performance (for the respective cities)

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vodafone	Rcom CDMA	Tata CDMA	MTS
						GSM Operators					CDMA Operators		
1.1	Call Attempts	Vijayawada	116	247	134	155	124	121	146	135	135	126	119
		Visakhapatnam	171	166	191	188	150	154	199	141	179	187	154
		Tirupathi	126	174	144	153	126	158	149	126	125	146	136
1.2	Blocked Call Rate (<=3%)	Vijayawada	0.00%	0.00%	4.58%	1%	1.61%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		Visakhapatnam	0.59%	0.00%	2.62%	0.00%	0.67%	0.00%	0.51%	0.00%	1.12%	0.54%	0.00%
		Tirupathi	2.38%	0.00%	4.86%	1.31%	0.79%	0.63%	0.00%	0.00%	0.00%	0.00%	1.83%
1.3	Dropped Call Rate (<=2%)	Vijayawada	0.00%	0.00%	2.40%	0.00%	0.00%	0.00%	0.00%	0.00%	1.48%	1%	0.00%
		Visakhapatnam	0%	0.00%	2.01%	0.00%	0.00%	0.00%	0.51%	0.00%	0.00%	1.07%	0.00%
		Tirupathi	0.81%	0.00%	2.08%	0.00%	0.00%	0.64%	0.00%	0.00%	0.00%	0%	0.73%
1.4	Percentage of connections with good voice quality (=>95%)												
	(i) 0-4 (w/o frequency hopping)	Vijayawada									99.17%	98.92%	99.21%
		Visakhapatnam									99.15%	98.62%	99.16%
		Tirupathi									96.80%	99.86%	99.72%
	(ii) 0-5 (with frequency hopping)	Vijayawada	96.36%	96%	89.43%	95.10%	95.48%	95.40%	96.60%	97%			
		Visakhapatnam	94.66%	96.42%	89.62%	96.50%	97.00%	95.46%	95.60%	97.00%			
		Tirupathi	92.98%	96.25%	87.05%	97.60%	95.60%	96.81%	95.93%	95.81%			
1.5	Service Coverage												
	In door (>= -75dBm)	Vijayawada	79.2	87.28	88.26	88.67	56.72	94.3	78.44	91.22	93.03	79.98	56.47
		Visakhapatnam	73.27	86	56.54	96.3	42.16	85.35	74.44	92.88	80.96	47.98	50.7
		Tirupathi	69.87	67.2	87	95.58	56.7	93.7	72.21	93.23	70.03	57.04	96.6
	In-vehicle (>= -85dBm)	Vijayawada	97.6	96.85	99.23	99.07	90.7	98.06	98.86	99.26	99.57	97.32	94.1
		Visakhapatnam	93.65	95.41	89.53	99.8	74.78	95.63	97.04	99.47	98.93	86.25	87.48
		Tirupathi	97.62	91.14	98.9	99.66	88.78	99.3	96.99	98.92	96.26	97.72	99.82
	Out door- in city (>= -95dBm)	Vijayawada	99.67	100	99.99	100	100	99.53	99.98	99.98	100	98.53	100
		Visakhapatnam	100	100	100	100	100	99.54	99.85	99.99	100	100	100
		Tirupathi	99.91	99.54	99.98	100	100	99.99	99.98	100	100	100	100
1.6	Call Setup Success Rate (>=95%)	Vijayawada	100	100	95.42	99.35	98.39	100	100	100	100	100	100
		Visakhapatnam	99.41	100	97.38	100	99.33	100	99.49	100	98.88	99.46	100
		Tirupathi	97.62	100	95.14	98.69	97.62	99.37	100	100	100	100	98.17

Graphical Representation:

Coverage level Vijayawada

	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vodafone	Rcom CDMA	Tata CDMA	MTS
■ In door (>= -75dBm)	79.2	87.28	88.26	88.67	56.72	94.3	78.44	91.22	93.03	79.98	56.47
■ In-vehicle (>= -85dBm)	97.6	96.85	99.23	99.07	90.7	98.06	98.86	99.26	99.57	97.32	94.1
■ Out door- in city (>= -95dBm)	99.67	100	99.99	100	100	99.53	99.98	99.98	100	98.53	100

Coverage level Visakhapatnam

	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vodafone	Rcom CDMA	Tata CDMA	MTS
■ In door (>= -75dBm)	73.27	86	56.54	96.3	42.16	85.35	74.44	92.88	80.96	47.98	50.7
■ In-vehicle (>= -85dBm)	93.65	95.41	89.53	99.8	74.78	95.63	97.04	99.47	98.93	86.25	87.48
■ Out door- in city (>= -95dBm)	100	100	100	100	100	99.54	99.85	99.99	100	100	100

Coverage level Tirupathi

	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vodafone	Rcom CDMA	Tata CDMA	MTS
■ In door (>= -75dBm)	69.87	67.2	87	95.58	56.7	93.7	72.21	93.23	70.03	57.04	96.6
■ In-vehicle (>= -85dBm)	97.62	91.14	98.9	99.66	88.78	99.3	96.99	98.92	96.26	97.72	99.82
■ Out door- in city (>= -95dBm)	99.91	99.54	99.98	100	100	99.99	99.98	100	100	100	100

Telecommunications Consultants India Ltd.
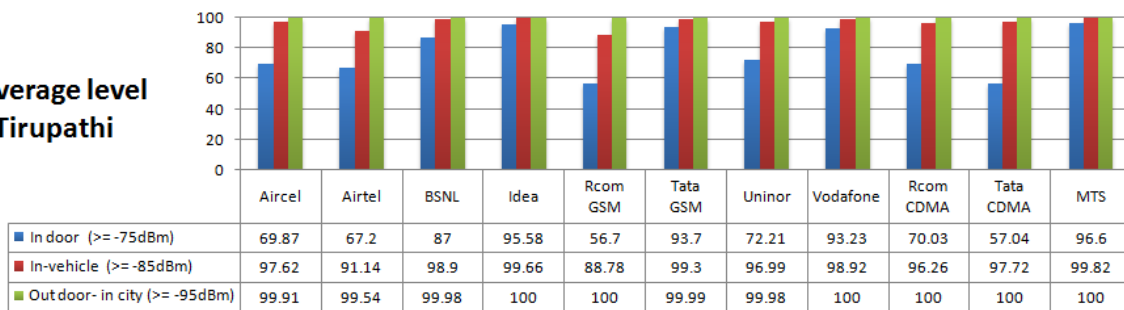
(3)   Critical Analysis
The drive test data was found to be satisfactory for most of the parameters. However, a few deviations found are listed below:

- BSNL is showing deviation in "Block call rate" parameter in Vijayawada (4.58%),, Tirupathi (4.86%).
- BSNL is showing deviation in "Drop call rate" parameter in Vijayawada (2.4%),, Visakhapatnam (2.01%), Tirupathi (2.08%).
- "Connections with good quality" benchmark is not meeting by Aircel (Visakhapatnam, Tirupathi) with a values of 94.66%, 92.98% and by BSNL (Vijayawada, Visakhapatnam, Tirupathi) with a values of 89.43%, 89.62%, 87.05% respectively.

Audit and Assessment of QoS (Q4-2011): Andhra Pradesh Circle

(E) Independent Drive Test

1) Sample Coverage

The Independent Drive Test was conducted in Andhra Pradesh for 4 different Cities namely **"Srikakulam, Chittoor, Ananthapur and Mahabubnagar"**. All the service providers' city wise radio coverage with call testing was performed individually through drive test activity on different days. Route covered was about around 80kms for Srikakulam (Uninor), 80kms for Chittoor (Aircel, Tata GSM), 70kms for Ananthapur (Airtel) and 40kms for Mahabubnagar (BSNL, RCOM GSM) depending on city areas within the speed limit of 30Km/hr.

Drive Test Locations and Service provider's name:

1) Srikakulam	:	UNINOR
2) Chittoor	:	AIRCEL, TATA GSM
3) Ananthapur	:	AIRTEL
4) Mahabubnagar	:	BSNL, RCOM GSM

Area Coverage details:

1).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.

2).CHITTOOR: New Collector Office, Naayi brahmana colony, Industrial Estate, Kanipakam road, Market area, Ramanagar colony, Santhapet, Gandhi circle, Tirupathi road, Dhoddapalli, RTC bus stand.

3).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.

4).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.

(2)Performance (for the respective cities)

SN	Parameter	UNINOR	AIRCEL	TATA GSM	AIRTEL	BSNL	RCOM GSM
		Srikakulam	Chittoor		Ananthapur	Mahabubnagar	
1.1	Call Attempts	107	63	76	71	151	71
1.2	Block Call Rate (<= 3%)	0.00%	1.59%	0.00%	0.00%	3.31%	1.41%
1.3	Drop Call Rate (<= 2%)	0.00%	0.00%	0.00%	0.00%	2.65%	0.00%
1.4	Percentage of Connections with good voice quality (>= 95%)	95.94%	95.96%	95.16%	96.94%	93.28%	97.70%
1.5	Service Coverage						
	Indoor (>= -75dbm)	74.95	48.5	80.5	92	64.1	28.15
	In-Vehicle (>= -85dbm)	98.22	88.54	98.09	100	92.86	62.27
	Outdoor -in City (>= -95dbm)	100	99.65	99.95	100	100	90.62
1.6	Call Setup Success Rate (>= 95%)	100	98.41	100	100	96.69	98.59

Graphical Representation

Coverage level Andhra Pradesh	UNINOR	AIRCEL	TATA DOCOMO	AIRTEL	BSNL	RCOM
Indoor (>= -75dbm)	74.95	48.5	80.5	92	64.1	28.15
In-Vehicle (>= -85dbm)	98.22	88.54	98.09	100	92.86	62.27
Outdoor -in City (>= -95dbm)	100	99.65	99.95	100	100	90.62
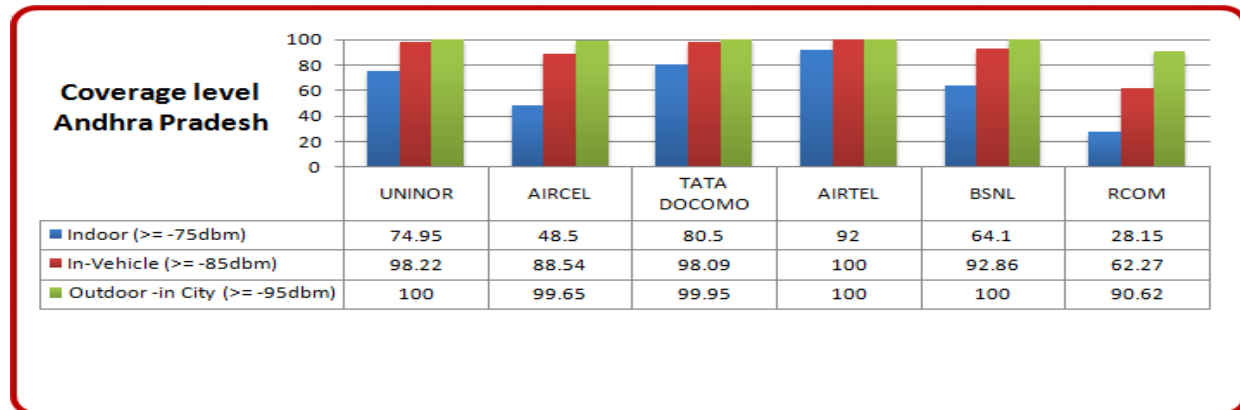
Critical Analysis:

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, and Govt hospitals, crowded areas like market, Highways & major roads with in the town.

Name of Operator	Uninor	Aircel	Tata GSM	Airtel	BSNL	Rcom
Name of the City	Srikakulam		Chittoor	Ananthapur	Mahabubnagar	
No. of BTS covering the City	9	14	29	33	16	9

- Uninor is meeting all the benchmarks in Srikakulam town. The drive test is done with in municipal boundary & when 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 9 no. of BTSs by Uninor.

- While in Chittoor town, both Aircel & Tata GSM are meeting all the benchmarks provided by TRAI. Tata GSM is covering the town with 29 no. of sites & Aircel is covering with 14 no. of sites. When moving out from the boundary, the coverage levels are going weak as they don't have any continuity sites.

- Airtel is meeting all the benchmarks in Ananthapur town. The Coverage levels are also found satisfactory. Airtel is covering the Ananthapur town with 33 no. of sites.

- In Mahabubnagar town, the BSNL is not meeting any of the benchmark as specified by TRAI where as Rcom is meeting all the benchmarks. The Mahabubnagar town is covered with 16 no. of sites by BSNL & 9 no. of sites by Rcom.

In Andhra Pradesh circle, all operators are providing the satisfactory coverage levels within the town municipal premises. When going outside the boundary, the coverage levels are becoming poor because there are no continuity sites other than BSNL & Airtel in 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 found satisfactory for most of the **Network Parameters**.

However, the benchmark of <=3% for "worst affected cells >3% TCH drop" is not met by Aircel for live audit data, Tata GSM for live & month audit data.

Regarding the POI Congestion, the Uninor, TATA GSM & AIRCEL were found not meeting the benchmark on some of their individual POI's.

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

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

Regarding **Resolution of billing/charging complaints,** Tata CDMA is showing the value below benchmark.

Regarding **Termination/Closure of Service** issues, BSNL, Tata GSM and Tata CDMA are showing below benchmark i.e., beyond 7days.

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

In case of Live Calling of billing audit, Idea was the only operators whose 67% of subscriber is not satisfied with their performance & same found in their records also.

During **Operator assisted Drive Tests**, the BSNL is showing below benchmark for "blocked call rate", "drop call rate". The Aircel & BSNL are not meeting the benchmark for "good voice quality".

II. Basic Telephone Service (Wireline) Providers

- **Not done for this quarter**

III. Broadband Service Providers
- **Not done for this quarter**