

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

Report Period: Jan 2011 – March 2011

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- Not conducted for this quarter

III. Broadband Service Providers

- Not conducted for this quarter

CHAPTER-1: INTRODUCTION

I. Background

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

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

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

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

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

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

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

II. Objectives and Methodology

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

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

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

Systems audited:-

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

Facilities audited:-

1. Billing documents.
2. Customer Care records.

Field data collections carried out:-

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

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

- ✓ TCIL auditors visited all the NSS (Network Sub System) and BSS (Base-station Sub System) to check data for all the operators in their respective service area.

- ✓ All the NSS and BSS data for the relevant details were collected either directly from the centralized NOC or through a remote access to the NOC.
- ✓ The Radio parameters were audited/verified from the data collected from OMC-R (Operation and Maintenance Center – Radio, as part of BSS data).
- ✓ The Drive test was conducted in high, low and medium dense areas including highways, commercial complex and residential areas and special attention was paid for the areas for which TRAI has received complaints.
- ✓ The POI and other network related parameters were audited/verified from the data collected from the OMC-S (Operation and Maintenance Center – Switch as part of NSS data).
- ✓ The data related to Billing and Customer care was checked for the previous month and verified with the customers by calling them on random basis. The process of registration and handling of the complaints was also studied for the various operators. Call centre number were called for measuring the efficiency of the call centre.
- ✓ The inter operator call assessment test was carried out during the time period as is specified in the tender document. TCBH (Time Consistent Busy Hour) is taken after observation of the traffic consistently for 3 days prior to the audit activity.
- ✓ Data has been collected for busy hour of network in case of live assessment & month of audit for all service providers & verified that service providers are providing busy hour data only for QoS service. We found that TCBH hour is matching with network busy hour as provided by service providers for Andhra Pradesh circle. But for parameters such as ‘Worst affected cell exceeding 3% TCH drop’ and ‘BTSs accumulated down time’ CBBH (Cell Bouncing Busy Hour) was taken instead of TCBH (Time Consistent Busy Hours) as per the TRAI new regulation 2009. This has resulted in high value for ‘Cell exceeding 3% TCH drop’ parameter for some of the service providers.

CHAPTER-2: EXECUTIVE SUMMARY

I. Preface

This report highlights the findings for the audit & assessment of Quality of Service of Cellular Mobile Services in Andhra Pradesh Circle in 1st quarter (January – March 2011). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken for the period July – September 2010.

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

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

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

(A) Cellular Mobile Telephone Services

3 days Live Data Audit		Bench-mark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA
S/N	Name of Parameter													
1	Connection Establishment (Accessibility)													
	a) CSSR (Call Setup Success Rate)	>=95 %	99.32%	99.66%	95.40%	99.51%	99.50%	99.78%	98.45%	99.42%	99.07%	99.99%	99.56%	99.82%
	b) SDCCH/PAGING congestion	<=1%	0.02%	0.13%	0.19%	0.00%	0.23%	0.11%	0.06%	0.09%	0.01%	0.05%	NA	NA
	c) TCH congestion	<=2%	0.02%	0.12%	1.44%	0.00%	0.48%	0.09%	0.18%	0.05%	0.00%	0.29%	0.05%	0.00%
2	Connection maintenance (retainability)													
	a) CDR	<=2%	0.44%	0.55%	1.27%	0.43%	0.72%	0.24%	0.98%	0.44%	0.00%	0.50%	0.49%	0.18%
	b) Worst affected cells>3% TCH drop	<=5%	1.99%	1.24%	3.96%	0.04%	4.66%	0.64%	7.74%	2.09%	0.00%	4.88%	1.75%	0.00%
	c) Good voice quality	>=95 %	97.95%	99.16%	NA	98.76%	96.67%	98.68%	96.79%	98.43%	99.97%	98.79%	NA	NA
3	No of POIs having congestion >0.5%	<=0.5 %	0	0	0	0	0	0	0	0	3	0	0	0
4	Response time to customers for assistance													
	a) Accessibility of call centre/Customer Care	>=95 %	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90 %	99.00%	99.00%	58.00%	99.00%	97.00%	96.69%	98.00%	99.00%	100.00%	98.00%	89.02%	94.50%

NA: Not Applicable, NR: Not Received

From the 3 days live data assessment, it is found that all the operators are meeting the network parameters by and large, except for Tata GSM meeting the parameter "Worst affected cells>3% TCH drop" and Videocon meeting "POI congestion".

BSNL and Reliance CDMA are not meeting the benchmark for "% of call answered by operator (Voice to voice)" with the values of 58% and 89.02% respectively.

One Month Data Audit		Bench-mark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDM A	Tata CDMA
S/N	Name of Parameter		GSM Operators										CDMA	
(A)	Network Service Quality Parameter													
1	Network Availability													
	a) BTS Accumulated Downtime	<=2%	0.02%	0.07%	0.90%	0.17%	0.01%	0.03%	0.03%	0.03%	0.38%	0.01%	0.04%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	0.00%	0.24%	0.05%	0.00%	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%
2	Connection Establishment (Accessibility)													
	a) CSSR (Call Setup Success Rate)	>=95%	99.17%	99.66%	95.04%	99.52%	99.94%	99.76%	98.62%	99.40%	99.86%	98.99%	99.52%	99.84%
	b) SDCCH/PAGING congestion	<=1%	0.03%	0.14%	0.36%	0.01%	0.24%	0.11%	0.15%	0.07%	0.03%	0.12%	NA	NA
	c) TCH congestion	<=2%	0.03%	0.13%	0.99%	0.00%	0.43%	0.07%	0.33%	0.03%	0.03%	0.30%	0.06%	0.00%
3	Connection maintenance (retainability)													
	a) CDR	<=2%	0.45%	0.55%	1.28%	0.40%	0.75%	0.26%	0.92%	0.46%	0.76%	0.52%	0.51%	0.16%
	b) Worst affected cells>3% TCH drop	<=5%	1.15%	1.24%	3.71%	0.05%	4.86%	1.56%	4.44%	2.44%	0.06%	3.27%	1.86%	0.00%
	c) Good voice quality	>=95%	97.78%	99.15%	NA	98.90%	96.61%	98.61%	96.83%	98.42%	99.33%	98.76%	NA	NA
4	No of POIs having congestion >0.5%		0	0	0	0	0	0	0	6	0	0	0	0
(B)	Customer Service Quality Parameters													
5	Metering/billing credibility-Post paid	<= 0.1%	0.23%	0.00%	0.00%	NA	0.01%	0.07%	0.47%	NA	NA	0.06%	0.06%	0.06%
6	Metering /billing credibility-Pre paid	<= 0.1%	0.03%	0.00%	0.10%	0.01%	0.03%	0.09%	0.02%	0.06%	0.40%	0.05%	0.10%	0.00%
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%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
8	Response time to customers for assistance													
	a) Accessibility of call centre/Customer Care	>=95%	100.00%	95.00%	42.00%	98.92%	99.00%	100.00%	100.00%	99.60%	100.00%	78.00%	100.00%	90.00%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	94.11%	94.99%	59.00%	93.37%	81.58%	80.06%	82.79%	95.00%	100.00%	99.33%	86.47%	92.80%
9	Termination/closure of service	<=7days	100%	100%	100%	NA	100%	100%	49.61%	NA	NA	100%	100%	100%
10	Time taken for refunds of deposits after closures.	100% within 60 days	100%	100%	100%	NA	26.50%	100%	93.65%	NA	NA	100%	100%	99.35%

NA: Not Applicable, NR: Not Received

From the month data assessment, it is found that all the operators are meeting the network parameters by and large, except for Uninor not meeting the benchmark for "NO of POI not meeting benchmark with having 6 poi.

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, Rcom GSM, Tata GSM & Rcom CDMA. A below benchmark performance is observed in case of BSNL (42%) & Vodafone (78%) for "accessibility of call centre" parameter. Aircel, Rcom Cdma, Bsnl, Tata GSM & Videocon are not meeting the benchmark for "Metering/Billing Credibility (Post/Pre-Paid)".

In case of parameter "time taken for refunds of deposits after closures", Idea, Tata GSM & Tata CDMA are having below benchmark performance. Similar results are found for Tata GSM for taking more than 7 days for termination/closure of service.

Operator-Assisted Drive Test

The Operator Assisted Drive Test was conducted at Andhra Pradesh for all the operators. Route covered was about around 80-100Km depending on city areas within the speed limit of 30Km/hr. The cities covered were Hyderabad, Vishakhapatnam & Vijayawada. In all the cities, zones were selected for covering different density areas (High, Medium & Low dense areas).

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vodafone	Rcom CDMA	Tata CDMA
			GSM Operators							CDMA Operators		
1.1	Blocked Call Rate (<=3%)	Hyderabad	0.63%	0.38%	8.16%	1.00%	2.03%	4.84%	1.94%	0.38%	0.56%	0.00%
		Visakhapatnam	0.00%	0.00%	9.70%	0.78%	1.97%	3.99%	0.43%	0.00%	0.67%	0.61%
		Vijayawada	0.00%	0.00%	9.37%	1.35%	0.77%	4.89%	0.42%	0.00%	0.00%	0.00%
1.2	Dropped Call Rate (<=2%)	Hyderabad	0.00%	0.00%	5.33%	0.67%	1.78%	0.90%	1.19%	0.00%	0.28%	0.38%
		Visakhapatnam	1.00%	0.00%	2.00%	0.39%	0.66%	0.89%	1.31%	0.00%	0.00%	0.31%
		Vijayawada	1.00%	0.00%	2.06%	0.00%	0.39%	0.00%	0.42%	0.00%	0.00%	0.50%
1.3	Percentage of connections with good voice quality (=>95%)											
	(i) 0-4 (w/o frequency hopping)	Hyderabad									96.21%	98.63%
		Visakhapatnam									97.41%	99.29%
		Vijayawada									99.04%	99.17%
	(ii) 0-5 (with frequency hopping)	Hyderabad	93.86%	97.00%	92.56%	95.88%	85.76%	93.85%	93.05%	97.00%		
		Visakhapatnam	95.28%	97.20%	90.44%	96.64%	94.00%	95.24%	95.45%	97.20%		
Vijayawada		99.50%	97.01%	84.20%	96.36%	95.48%	93.56%	95.71%	97.01%			
1.4	Call Setup Success Rate (>=95%)	Hyderabad	99.37%	99.62%	91.84%	99.00%	97.97%	95.16%	98.06%	99.62%	99.44%	100.00%
		Visakhapatnam	100.00%	100.00%	90.30%	99.22%	98.03%	96.01%	99.57%	100.00%	99.33%	99.39%
		Vijayawada	100.00%	100.00%	90.63%	98.65%	99.23%	95.11%	99.58%	100.00%	100.00%	100.00%

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

- BSNL is meeting none of the benchmarks for all 3 cities.
- Blocked Call Rate benchmark is not met by Tata GSM for all 3 cities.
- "Percentage of connection with good voice quality" benchmark is not met by Aircel, Rcom GSM, Tata GSM & Uninor for Hyderabad and Rcom GSM for Visakhapatnam & Tata GSM for Vijayawada.

Independent Drive Test

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

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vodafone	Rcom CDMA	Tata CDMA
			GSM Operators								CDMA Operators	
1.1	Blocked Call Rate (<=3%)	Hyderabad	0.63%	0.38%	8.16%	1.00%	1.99%	5.01%	1.76%	0.38%	1.32%	0.00%
		Visakhapatnam	0.00%	0.00%		0.78%	0.00%	3.99%	0.40%	0.00%	1.39%	0.00%
		Vijayawada	0.00%	0.00%	12.38%	1.35%	0.81%	2.38%	0.36%	0.00%	0.40%	0.00%
1.2	Dropped Call Rate (<=2%)	Hyderabad	0.00%	0.00%	5.33%	0.67%	2.37%	1.17%	1.08%	0.00%	1.67%	0.78%
		Visakhapatnam	1.00%	0.00%		0.39%	1.39%	0.89%	1.21%	0.00%	1.06%	0.47%
		Vijayawada	1.00%	0.00%	2.67%	0.00%	0.41%	1.46%	1.80%	0.00%	0.00%	0.41%
1.3	Percentage of connections with good voice quality (=>95%)											
	(i) 0-4 (w/o frequency hopping)	Hyderabad									96.83%	97.87%
		Visakhapatnam									97.64%	98.43%
		Vijayawada									98.61%	99.08%
	(ii) 0-5 (with frequency hopping)	Hyderabad	93.86%	97.00%	92.56%	95.88%	89.93%	92.05%	93.06%	97.00%		
		Visakhapatnam	95.28%	97.20%		96.64%	93.66%	95.24%	95.35%	97.20%		
Vijayawada		99.50%	97.01%	84.93%	96.36%	94.59%	93.78%	95.49%	97.01%			
1.4	Call Setup Success Rate (>=95%)	Hyderabad	99.37%	99.62%	91.84%	99.00%	98.01%	94.99%	98.24%	99.62%	98.68%	100.00%
		Visakhapatnam	100.00%	100.00%		99.22%	100.00%	96.01%	99.60%	100.00%	98.61%	100.00%
		Vijayawada	100.00%	100.00%	87.62%	98.65%	99.19%	97.62%	99.64%	100.00%	99.60%	100.00%

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

- BSNL is meeting none of the benchmarks for Hyderabad & Vijayawada.
- Good Voice Quality parameter is not met by Aircel in Hyderabad (93.86%), Rcom GSM in all 3 cities, Tata GSM in Hyderabad (92.05%) & Vijayawada (93.78%) and Uninor in Hyderabad (93.06%).
- Rcom GSM is deviating from the benchmarks for Dropped Call Rate in Hyderabad with the value of 2.37%.
- Tata GSM is not meeting the benchmarks for Blocked call rate in Hyderabad (5.01%) & Vishakhapatnam (3.99%) and CSSR in Hyderabad (94.99%).

III. PMR Verification

I. Cellular Mobile Telephone Service

PMR		Bench- mark	Audit	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA
S/N	Name of Parameter			GSM Operators										CDMA Operators	
(A)	Network Service Quality Parameter														
1	Network Availability														
	BTS Accumulated Downtime	<=2%	Reported	0.02%	0.01%	0.79%	0.76%	0.01%	0.09%	0.04%	0.06%	0.23%	0.02%	0.08%	0.02%
			Verified	0.02%	0.01%	0.79%	0.76%	0.01%	0.09%	0.04%	0.06%	0.23%	0.02%	0.08%	0.02%
	Worst affected BTSs due to downtime	<=2%	Reported	0.00%	0.07%	0.00%	3.90%	0.00%	0.02%	0.01%	0.05%	0.00%	0.02%	0.02%	0.02%
Verified			0.00%	0.07%	0.00%	3.90%	0.00%	0.02%	0.01%	0.05%	0.00%	0.02%	0.02%	0.02%	0.00%
2	Connection Establishment (Accessibility)														
	CSSR (Call Setup Success Rate)	>=95%	Reported	99.40%	99.67%	95.54%	99.06%	99.95%	99.60%	99.70%	99.43%	97.84%	99.43%	99.50%	99.82%
			Verified	99.40%	99.67%	95.54%	99.06%	99.95%	99.60%	99.70%	99.43%	97.84%	99.43%	99.50%	99.82%
	SDCCH/PAGING congestion	<=1%	Reported	0.03%	0.12%	0.29%	0.02%	0.22%	0.07%	0.03%	0.09%	0.00%	0.09%	0.00%	0.00%
			Verified	0.03%	0.12%	0.29%	0.02%	0.22%	0.07%	0.03%	0.09%	0.00%	0.09%	0.00%	0.00%
	TCH congestion	<=2%	Reported	0.04%	0.20%	0.88%	0.01%	0.34%	0.09%	0.07%	0.04%	0.00%	0.23%	0.05%	0.02%
Verified			0.04%	0.20%	0.88%	0.01%	0.34%	0.09%	0.07%	0.04%	0.00%	0.23%	0.05%	0.02%	
3	Connection maintenance (retainability)														
	CDR	<=2%	Reported	0.41%	0.54%	1.28%	0.31%	0.80%	0.43%	0.98%	0.42%	1.09%	0.69%	0.58%	0.22%
			Verified	0.41%	0.54%	1.28%	0.31%	0.80%	0.43%	0.98%	0.42%	1.09%	0.69%	0.58%	0.22%
	Worst affected cells>3% TCH drop	<=5%	Reported	2.61%	1.14%	3.81%	0.07%	5.06%	2.54%	4.35%	3.65%	0.00%	4.74%	2.15%	0.29%
			Verified	2.61%	1.14%	3.81%	0.07%	5.06%	2.54%	4.35%	3.65%	0.00%	4.74%	2.15%	0.29%
	Good voice quality	>=95%	Reported	97.82%	99.15%	98.33%	98.77%	95.97%	98.59%	96.96%	98.53%	99.18%	98.56%	98.81%	99.65%
Verified			97.82%	99.15%	98.33%	98.77%	95.97%	98.59%	96.96%	98.53%	99.18%	98.56%	98.81%	99.65%	
4	POI congestion	<=0.5%	Reported	0	0	0	0	0	0	0	1	0	0	0	0
			Verified	0	0	0	0	0	0	0	0	1	0	0	0

(B)	Customer Service Quality Parameters														
5	Metering/billing credibility-Post paid	<= 0.1%	Reported	0.24%	0.03%	0.10%	NA	0.03%	0.06%	0.02%	NA	NA	0.09%	0.06%	0.01%
			Verified	0.24%	0.03%	0.10%	NA	0.03%	0.06%	0.02%	NA	NA	0.09%	0.06%	0.01%
6	Metering /billing credibility-Pre paid	<= 0.1%	Reported	0.06%	0.00%	0.00%	0.00%	0.01%	0.04%	0.001%	0.15%	0.00%	0.02%	0.02%	0.03%
			Verified	0.06%	0.00%	0.00%	0.00%	0.01%	0.04%	0.001%	0.15%	0.00%	0.02%	0.02%	0.03%
7	Resolution of billing/ charging complaints	100% within 4 weeks	Reported	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%
			Verified	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%
	Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	Reported	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	NA	NA	100.00%	100.00%	100.00%
			Verified	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	NA	NA	100.00%	100.00%	100.00%
8	Response time to customers for assistance	>=95%	Reported	100.00%	100.00%	98.00%	98.46%	100.00%	100.00%	100.00%	87.48%	100.00%	100.00%	95.00%	98.00%
			Verified	100.00%	100.00%	98.00%	98.46%	100.00%	100.00%	100.00%	87.48%	100.00%	100.00%	95.00%	98.00%
	% call answered by operators(voice to voice) within 60 sec.	>=90%	Reported	94.80%	95.70%	85.00%	99.11%	96.63%	90.00%	73.28%	97.87%	100.00%	88.33%	89.00%	95.51%
			Verified	94.80%	95.70%	85.00%	99.11%	96.63%	90.00%	73.28%	97.87%	100.00%	88.33%	89.00%	95.51%
9	Termination/closure of service	<=7days	Reported	99.14%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	NA	NA	100.00%	100.00%	10000.00%
			Verified	99.14%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	NA	NA	100.00%	100.00%	10000.00%
			No.of requests for Termination / Closure of service complied within 7 days during the quarter												
10	Time taken for refunds of deposits after closures.	100% within 60 days	Reported	100.00%	100.00%	100.00%	NA	100.00%	100.00%	NR	NA	NA	100.00%	100.00%	96.00%
			Verified	100.00%	100.00%	100.00%	NA	100.00%	100.00%	NR	NA	NA	100.00%	100.00%	96.00%

Critical Analysis (PMR Verification):

- The figures proved by all the operators match the figures obtained on verification.
- Only Idea is not meeting the benchmark for the parameter "Worst affected cells>3% TCH drop" with high margins.
- In case of POI congestion only Uninor (1%) is not meeting the benchmark with high margins.
- Aircel & BSNL are not meeting the benchmark for "Metering/Billing Credibility-Postpaid", while Aircel & Uninor are not meeting the benchmark for "Metering/Billing Credibility-Prepaid".
- Accessibility of Uninor's Customer Care Centre is very poor (88.1%).
- "% call answered by operators (voice to voice) within 60 sec." benchmark is not met by BSNL, Tata-GSM, Vodafone & Rcom cdma.
- Tata-GSM don't meet the 7-days' benchmark for "Resolution of complaints". Tata-CDMA is not meeting the 60 days' benchmark for "Refund of deposits after closure of connection".

IV. DETAILED FINDINGS & ANALYSIS

I. Cellular Mobile Telephone Service

(A) MSC Audit

(1) 3 Days Live 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
			GSM Operators										CDMA	
A	Network Service Quality Parameter													
1	Connection Establishment (Accessibility)													
	a) CSSR	>=95%	99.32%	99.66%	95.40%	99.51%	99.50%	99.78%	98.45%	99.42%	99.07%	99.99%	99.56%	99.82%
	b) SDCCH/PAGING congestion	<=1%	0.02%	0.13%	0.19%	0.00%	0.23%	0.11%	0.06%	0.09%	0.01%	0.05%	NA	NA
	c) TCH congestion	<=2%	0.02%	0.12%	1.44%	0.00%	0.48%	0.09%	0.18%	0.05%	0.00%	0.29%	0.05%	0.00%
2	Connection maintenance													
	a) CDR	<=2%	0.44%	0.55%	1.27%	0.43%	0.72%	0.24%	0.98%	0.44%	0.00%	0.50%	0.49%	0.18%
	b) Cells having > 3% TCH drop	<=5%	1.99%	1.24%	3.96%	0.04%	4.66%	0.64%	7.74%	2.09%	0.00%	4.88%	1.75%	0.00%
	c) Good voice quality	>=95%	97.95%	99.16%	NA	98.76%	96.67%	98.68%	96.79%	98.43%	99.97%	98.79%	NA	NA
	d) No. of cells > 3% TCH drop		160	345	606	0	891	65	873	129	0	1,139	44	0
	e) Total no. of cells in the network		8,089	28,048	15,193	75	19,180	10,143	11,274	6,166	75	23,261	2,499	3,839
3	No of POIs not meeting benchmark	<=0.5%	0	0	0	0	0	0	0	0	3	0	0	0
	a) Name of POI not meeting the benchmark										BSNL/Rcom			
	b) Total No. of circuits on POI		26,696	223,702	23,898	1,370	141,574	59,824	2,707	20,470	3,476	150,667	59,824	44,918
	c) Avg No. of call attempts on POI		812,595	7,724,853	822,973	62,858	4,311,085	1,624,386	489,352	132,481	18,391	5,207,907	1,624,386	1,438,143
	d) Avg traffic served on POI (Erlang)		14,305	116,267	13,986	57	415,981	49,986	7,541	7,317	368	85,411	49,986	25,309
	e) Total number of working POI Service Area wise		66	48	22	26	135	73	3	58	40	56	73	59
	f) Equipped Capacity of Network in respect of Traffic in erlang		69,299	635,593	269,212	555	270,497	97,072	195,771	65,900	487	142,415	362,436	223,994
	g) Total traffic handled in TCBH in erlang		21,637	444,524	132,529	43	206,057	31,736	73,869	24,817	1	13,001	96,910	73,580
(B)	Customer Service Quality Parameters													
4	Response time to customers for assistance													
	a) Accessibility of call centre	>=95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	b) % of call answered by operators(voice to voice) within 60 sec	>=90%	99.00%	99.00%	58.00%	99.00%	97.00%	96.69%	98.00%	99.00%	100.00%	98.00%	89.02%	94.50%
	c) No. of call attempts to call centre / customer care nos. during TCBH (Avg)		41,466	4,124,205	934,587	468	1,545,592	95,577	1,574,232	520,784	124	75,041	1,457,370	931,565
	d) No. of calls connected and answered successfully to call centre / customer care nos. during TCBH (Avg)		39,026	3,917,800	611,279	437	1,260,982	95,577	1,303,443	495,156	124	74,545	1,457,370	865,113

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:-

- **Call setup success rate (benchmark $\geq 95\%$):** All operators are meeting the benchmark with values lying between 95.40% and 99.99%.
- **SDCCH/PAGING Channel congestion (benchmark $\leq 1\%$):** All operators are meeting the benchmark with values lying between 0% and 0.23%.
Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.
- **TCH congestion (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0% and 1.44%.
- **Call drop rate (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0.00% and 1.27%.
- **Cell exceeding 3% TCH drop (benchmark $\leq 5\%$):** Except for Tata GSM with a value of 7.74%, rest of the operators are satisfying the benchmark with value in between 0% and 4.88%.
- **Connections with good voice quality (benchmark $\geq 95\%$):** Rcom CDMA has declared that the parameter is not system generated. Rests of the operators are meeting the benchmark with values lying between 96.67% and 99.97%.
- **No of POI not meeting (benchmark $\leq 0.5\%$):** Except to Videocon with a value of 3, all the operators are meeting the benchmark. 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 value of 100%.
- **%age of call answered by operator (Voice to voice) (benchmark $>90\%$): %):** Except for BSNL & Rcom CDMA with a values of 58% & 89.02% respectively, rest of the operators are satisfying the benchmark with value in between 94.5% and 100%.

(2) Month Data Assessment & Summarized Finding

S/N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	Rcom CDMA	Tata CDMA
			GSM Operators											CDMA Operators
(A)	Network Service Quality Parameter													
1	Network Availability													
	a) BTS Accumulated Downtime	<=2%	0.02%	0.07%	0.90%	0.17%	0.01%	0.03%	0.03%	0.03%	0.38%	0.01%	0.04%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	0.00%	0.24%	0.05%	0.00%	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%
	c) Total no. of BTSs in the licensed service area		2,752	9,718	5,069	29	6,429	3,381	3,803	2,142	25	7,763	2,499	1,262
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		323	9,698	33,070	35:53	374	720	718	508	71	716	720	125
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	0	0	0	0	0	1	0	0	0	0	0
2	Connection Establishment (Accessibility)													
	a) CSSR (Call Setup Success Rate)	>=95%	99.17%	99.66%	95.04%	99.52%	99.94%	99.76%	98.62%	99.40%	99.86%	98.99%	99.52%	99.84%
	b) SDCCH/PAGING congestion	<=1%	0.03%	0.14%	0.36%	0.01%	0.24%	0.11%	0.15%	0.07%	0.03%	0.12%	NA	NA
	c) TCH congestion	<=2%	0.03%	0.13%	0.99%	0.00%	0.43%	0.07%	0.33%	0.03%	0.03%	0.30%	0.06%	0.00%
3	Connection maintenance (retainability)													
	a) CDR	<=2%	0.45%	0.55%	1.28%	0.40%	0.75%	0.26%	0.92%	0.46%	0.76%	0.52%	0.51%	0.16%
	b) Worst affected cells>3% TCH drop	<=5%	1.15%	1.24%	3.71%	0.05%	4.86%	1.56%	4.44%	2.44%	0.06%	3.27%	1.86%	0.00%
	c) Good voice quality	>=95%	97.78%	99.15%	NA	98.90%	96.61%	98.61%	96.83%	98.42%	99.33%	98.76%	NR	NA
	d) Total No. of cells exceeding 3% TCH drop (call drop)		92	347	563	3	929	158	501	149	1	761	47	-
	e) Total no. of cells in the network		8,089	28,048	15,193	75	19,180	10,143	11,274	6,166	75	23,261	2,499	3,839
4	No of POIs not meeting benchmark	<=0.5%	0	0	0	0	0	0	0	6	0	0	0	0
	a) Name of POI not meeting the benchmark									BSNL/RCom				
	b) Total No. of call attempts on POI (Avg.)		885,023	7,651,856	628,114	493,546	4,068,343	884,408	162,385	598,147	578,960	5,377,225	884,408	1,464,414
	c) Total traffic served on POI (Erlang) (Avg.)		15,053	114,409	14,044	427	91,166	36,573	2,410	13,702	12,145	85,444	36,573	23,801
	d) Total No. of circuits on POI		26,696	223,702	23,898	1,370	141,574	59,824	2,707	20,470	3,476	150,667	59,824	44,918
	e) Total number of working POI Service Area wise		66	48	22	26	135	73	3	58	40	56	73	59
	f) Capacity of POI		25,931	221,965	18,068	1,045	135,653	56,308	2,587	18,401	2,638	137,264	56,308	42,106
5	Network Data													
	a) Equipped Capacity of Network Erlang		69,299	635,593	269,212	555	270,497	97,072	195,771	65,900	487	142,415	362,436	223,994
	b) Total traffic in TCBH in erlang (Avg.)		21,637	444,524	132,529	43	206,057	31,736	73,869	24,817	1	13,001	96,910	73,580
	c) Total no. of customers served (as per VLR) on last day of the month		826,130	15,154,277	0	2,892	7,108,121	NR	2,908,782	791,965	2,483	4,005,448	NR	2,068,207
(B)	Customer Service Quality Parameters													
6	Metering/billing credibility-	<= 0.1%	0.23%	0.00%	0.00%	NA	0.01%	0.07%	0.47%	NA	NA	0.06%	0.06%	0.06%

	b) No. of bills disputed including billing complaints during the period		21	1,342	-	NA	1,005	12	78	NA	NA	162	161	95
7	Metering /billing credibility- Pre paid	$\leq 0.1\%$	0.03%	0.00%	0.10%	0.01%	0.03%	0.09%	0.02%	0.06%	0.40%	0.05%	0.10%	0.00%
	a) No. of charging / credit / validity complaints during the quarter		577	18,268	9,872	1	222	342	1,236	1,222	4	353	432	935
	b) Total no. of pre-paid customers at the end of the quarter		1,832,070	15,798,947	6,842,363	8,356	7,527,238	3,530,095	6,510,911	1,990,934	9,001	6,736,474	4,495,476	1,024,226
8	Resolution of billing/ charging complaints	<i>100% within 4 weeks</i>	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	a) No. of billing/(post paid) and charging, credit/validity (pre paid) complaints resolved within 4 weeks during the quarter													
	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		598	19,610	9,873	1	5,052	354	1,314	1,222	4	515	593	1,160
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		215	264	0	1	302	41	23	1,222	0	448	367	1,154
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		383	19,346	9,872	0	2,095	313	1,303	0	4	67	226	130
	e) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	≤ 1 week	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
9	Response time to customers for assistance													
	a) Accessibility of call centre/Customer Care	$\geq 95\%$	100.00%	95.00%	42.00%	98.92%	99.00%	100.00%	100.00%	99.60%	100.00%	78.00%	100.00%	90.00%
	b) % call answered by operators(voice to voice) within 60 sec.	$\geq 90\%$	94.11%	94.99%	59.00%	93.37%	81.58%	80.06%	82.79%	95.00%	100.00%	99.33%	86.47%	92.80%
	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		41,466	4,124,205	934,587	468	1,545,592	973,502	1,574,232	520,784	124	75,041	299,684	931,565
	d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		39,026	3,917,800	611,279	437	1,260,982	973,502	1,303,443	495,156	124	74,545	299,684	865,113
10	Termination/closure of service	≤ 7 days	100.00%	100.00%	100.00%	NA	100.00%	100.00%	49.61%	NA	NA	100.00%	100.00%	100.00%
	a) Total No. of requests for Termination / Closure of service received during the quarter		81	2,226	4,370	NA	1,674	196	258	NA	NA	815	1,258	3,019
	b) No.of requests for Termination / Closure of service complied within 7 days during the quarter		81	2,226	4,370	NA	1,674	196	128	NA	NA	815	1,258	3,019
11	Time taken for refunds of deposits after closures.	<i>100% within 60 days</i>	100.00%	100.00%	100.00%	NA	26.50%	100.00%	93.65%	NA	NA	100.00%	100.00%	99.35%

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 0.01% and 0.90%.
- **Worst affected BTSs due to downtime (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 0.24%.
- **Call setup success rate (benchmark >= 95%):** All operators are meeting the benchmark with values lying between 95.04% and 99.99%.
- **SDCCH/PAGING Channel congestion (benchmark <= 1%):** All operators are meeting the benchmark with values lying between 0.01% and 0.36%.
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 0.99%.
- **Call drop rate (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0.16% and 1.28%.
- **Cell exceeding 3% TCH drop (benchmark <= 5%):** All the operators are satisfying the benchmark with value in between 0% and 4.86%.
- **Connections with good voice quality (benchmark >= 95%):** Rcom CDMA has declared that the parameter is not system generated. Rests of the operators are meeting the benchmark with values lying between 96.61% and 99.71%.
- **No of POI not meeting (benchmark <= 0.5%):** Except for Uninor , All the operators are meeting the benchmark with value in . There was no congestion found overall on the POI, but cases were found where individual POIs are showing high utilization/usage. Some are in the range of over 100% though causing no traffic failure due to overflow technique i.e. the extra traffic is carried over by some other operating POI as has been designed to do so.
- **%age of call answered by operator (electronically) (benchmark >95):** Except for BSNL & Vodafone, all operators are meeting the benchmark with values lying between 95% to 100%.
- **%age of call answered by operator (Voice to voice) (benchmark >90%): %):** Only Aircel, Airtel, Etisalat, Uninor, Videocon, Vodafone & Tata-CDMA are meeting the benchmark with values of 94.11, 94.99, 93.37%, 95%, 100%, 99.33% & 92.8% respectively. Values range from 59% to 86.47% for other operators.
- **Metering and billing credibility-Post paid (benchmark <= 0.1%):** Except for Aircel & Tata-GSM with values of 0.23% & 0.47% respectively, all other operators are meeting the benchmark.
- **Metering and billing credibility-Pre paid (benchmark <= 0.1%):** Except for Videocon with value of 0.4%, all the operators are meeting the benchmark with values lying between 0% and 0.1%.
- **Resolution of billing/ charging complaints (benchmark 100% within 4 weeks):** All operators are meeting the benchmark.
- **Termination/Closure of service (Benchmark <= 7 days):** Except for Tata GSM, 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, All operators have satisfied the benchmark.

(1) Sample Coverage

Switches/BSC/BTS details of operators:

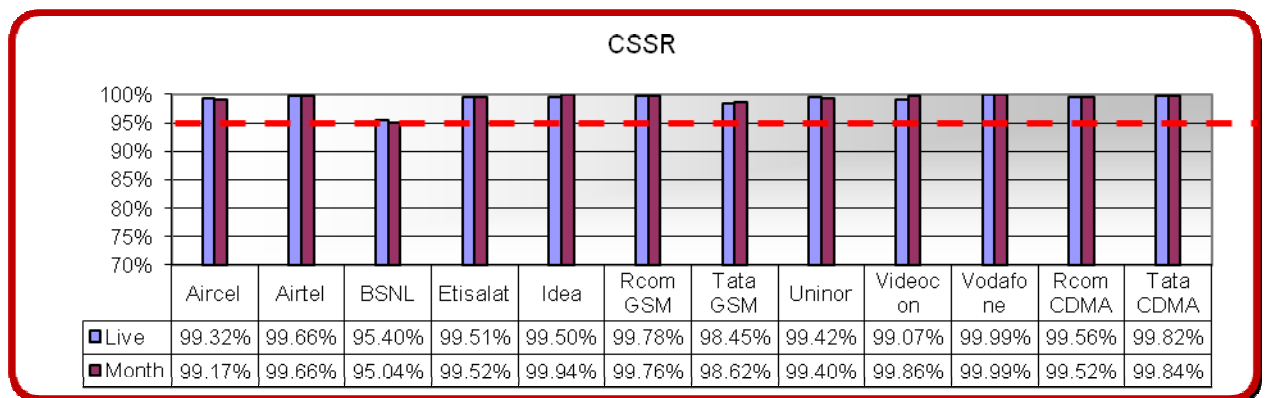
Sl.	Name of Service Provider	No. of MSC	No. of BSC	No. of BTS
GSM Operators				
1	Aircel Ltd	2	20	2752
2	Airtel Ltd	45	112	9718
3	BSNL	18	76	5069
4	Etisalat	1	5	29
5	Idea	8	75	6429
6	Reliance Communication (GSM)			
7	Tata Communications (GSM)	7	30	3803
8	Uninor	2	17	2142
9	Videocon	1	1	25
10	Vodafone	7	99	7763
CDMA Operators				
11	MTS (CDMA)	-	-	-
12	Reliance Communication (CDMA)			
13	Tata Communications (CDMA)	7	9	1262

(2) Performance (Graphical Representation)

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

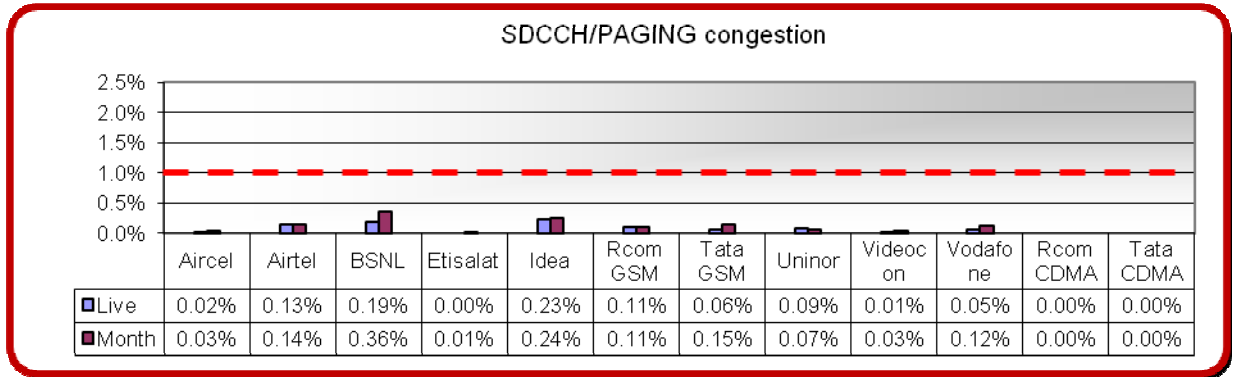
A) NETWORK PERFORMANCE

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

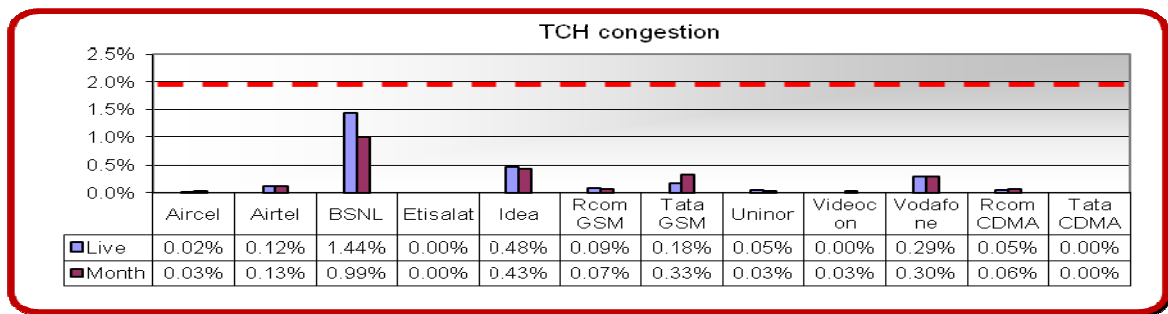


II. Blocked call rate:

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

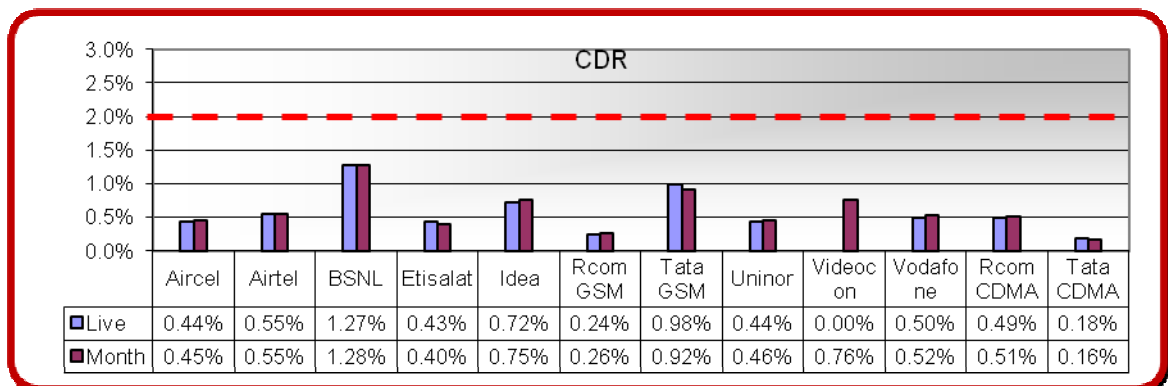


TCH congestion (%): All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data taken in the month of audit.

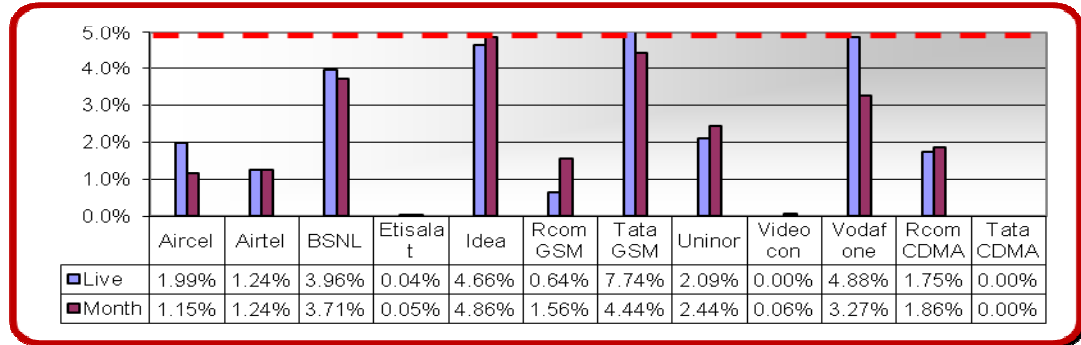


III. Connection Maintainability (Retainability):

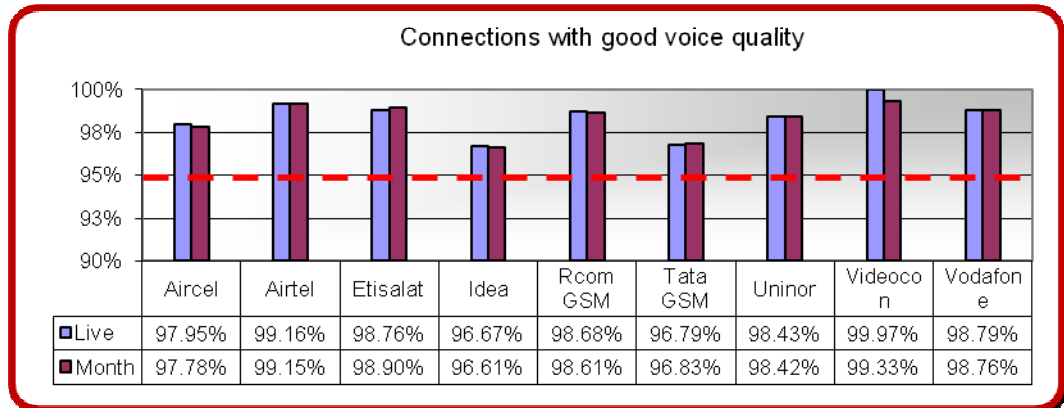
Call drop rate (%): All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data taken in the month of audit.



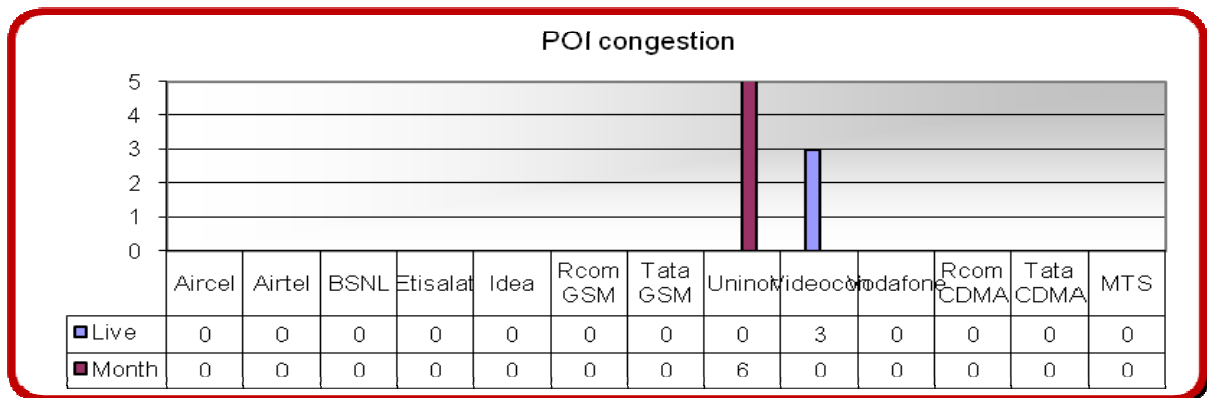
Worst affected Cell exceeding 3% TCH Drop: Tata GSM is not meeting the benchmark in live data with a value of 7.74%, which is deviating a lot from its month data value of 4.44%. Rests of the operators are meeting the benchmark for both cases.



Percentage of connections with good voice quality (benchmark >= 95%): All operators are meeting the TRAI benchmarks ($\Rightarrow 95\%$) for both one month data and 3 days live data taken in the month of audit. CDMA operators like TATA and Rcom have not reported the data as its not system generated.



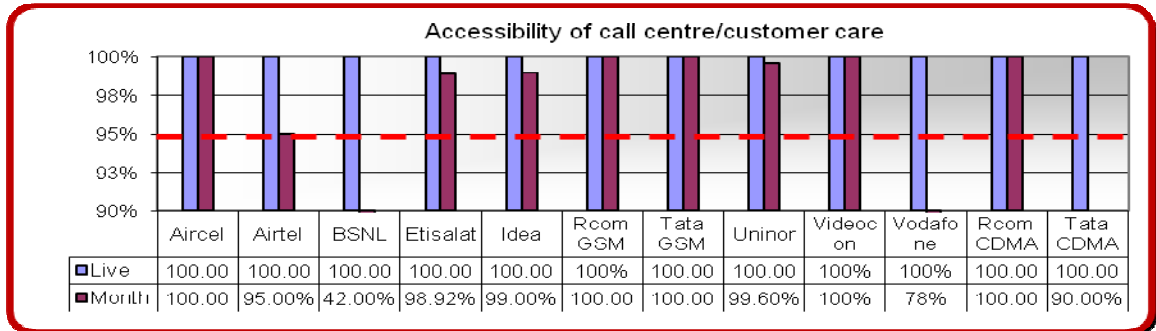
No of POI not meeting : Videocon is not meeting the benchmark for live measurement & month of audit and Uninor also not meeting the benchmark for month of audit. All other operators are meeting the TRAI benchmarks ($\leq 0.5\%$) for both one month data and 3 days live data taken in the month of audit.



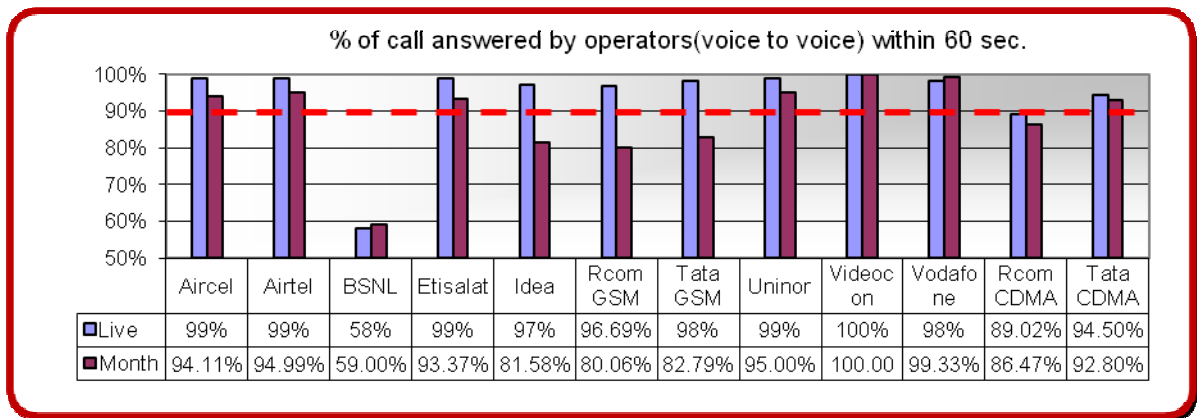
B) CUSTOMER SERVICE QUALITY PARAMETERS

(A) Response time to the customer for assistance:

Percentage of call answered (Electronically): All operators are meeting the TRAI benchmarks ($\geq 95\%$) for both one month data and 3 days live data taken in the month of audit except for BSNL (42%), Vodafone(78%) & Tata-CDMA(90%) in month data audit



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



(3) Critical Analysis

The above comparative study between live data & month data shows similar trends in both the cases. However, inconsistency in live & month data was found for parameters like “worst affected cells >3% TCH drop” (Tata GSM), POI congestion (Uninor & Videocon), metering/billing credibility for postpaid & prepaid (Aircel, Tata GSM & Videocon) “accessibility of call centre” (BSNL, Vodafone & Tata-CDMA) , “%age of calls answered by operator” (BSNL, Idea, Rcom GSM, Tata GSM & Rcom CDMA) & time taken for refunds of deposits after closures(Idea, Tata GSM & 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	Etisalat	Idea	Reliance (GSM)	Tata (GSM)	Uninor	Videocon	Vodafone	Reliance (CDMA)	Tata (CDMA)
Total No. of calls	5	10	-	-	10	5	5	-	-	10	5	5
Cases resolved with 4 weeks	5	10	-	-	10	5	5	-	-	10	5	5
%age of cases resolved	100%	100%	-	-	100%	100%	100%	-	-	100%	100%	100%

(3) Live calling to call center:

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

	OPERATORS NAME											
	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom	Tata	Uninor	Videocon	Vodafone	Rcom	Tata
	GSM										CDMA	
1ST HALF (10AM TO 01 PM)	46	46	40	46	46	47	48	48	46	47	48	45
2ND HALF (04PM TO 07 PM)	42	41	25	40	40	43	45	44	45	44	39	37
In % age	88.00	87.00	65.00	86.00	86.00	90.00	93.00	92.00	91.00	91.00	87.00	82.00

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

(5) Critical Analysis

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

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

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

(2) Performance based on live measurement

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

(3) Critical Analysis

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

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

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

Drive Test Locations***HYDERABAD***

LOW DENSE: Kukatpalli, Madhapur, Gachibowli, Sanath nagar
 MEDIUM DENSE: Bowenpally, Nampally, Rahmath nagar, Yousufguda, Gandhi nagar
 HIGH DENSE: Ameerpet, Lakdikapool, Secretriat, Secunderabad, IT Park, Jubile bus station, Jubilee hills, RTC X roads

VIJAYAWADA

LOW DENSE: Gannavaram Airport, Brindavanam Colony, Currency nagar
 MEDIUM DENSE: Prakasham Barriage, Varadhi, Bhavani puram, Gollapudi
 HIGH DENSE: Auto nagar, Bandar road, Madhura nagar, Ajit Singh Nagar, Kaleshwar rao market

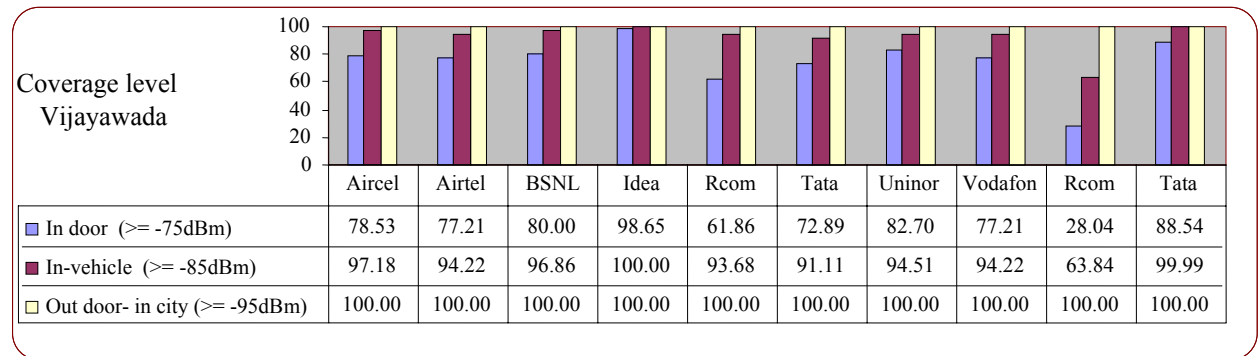
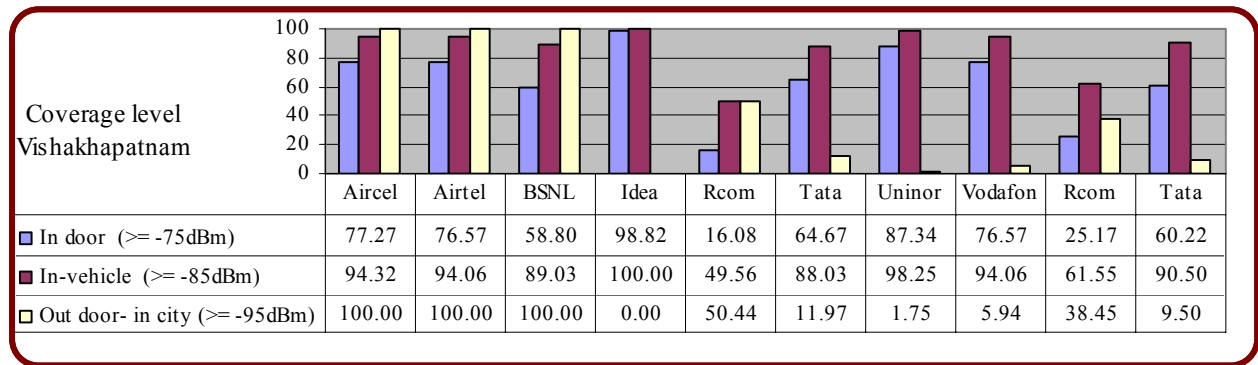
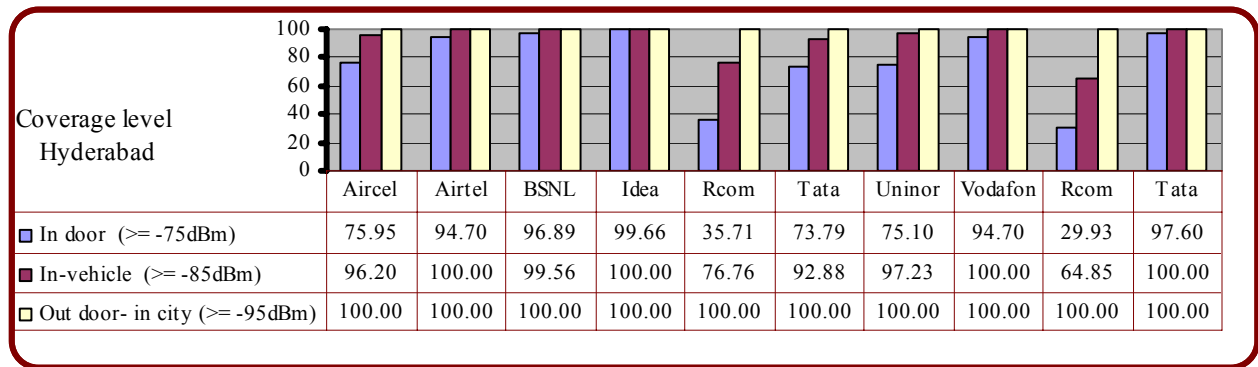
VISAKHAPATNAM

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

2) Performance (For the respective cities)

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vodafone	Rcom CDMA	Tata CDMA
			GSM Operators								CDMA Operators	
1.1	Call Attempts	Hyderabad	316	264	225	298	344	351	253	264	357	263
		Visakhapatnam	176	286	277	255	304	351	229	286	300	326
		Vijayawada	177	294	255	222	260	225	237	294	249	200
1.2	Blocked Call Rate (<=3%)	Hyderabad	0.63%	0.38%	8.16%	1%	2.03%	4.84%	1.94%	0.38%	0.56%	0.00%
		Visakhapatnam	0%	0.00%	9.70%	0.78%	1.97%	3.99%	0.43%	0.00%	0.67%	0.61%
		Vijayawada	0%	0.00%	9.37%	1.35%	0.77%	4.89%	0.42%	0.00%	0%	0.00%
1.3	Dropped Call Rate (<=2%)	Hyderabad	0.00%	0.00%	5.33%	0.67%	1.78%	0.90%	1.19%	0.00%	0.28%	0.38%
		Visakhapatnam	1%	0.00%	2.00%	0.39%	0.66%	0.89%	1.31%	0.00%	0.00%	0.31%
		Vijayawada	1%	0.00%	2.06%	0.00%	0.39%	0.00%	0.42%	0.00%	0.00%	0.50%
1.4	Percentage of connections with good voice quality (=>95%)											
	(i) 0-4 (w/o frequency hopping)	Hyderabad									96.21%	98.63%
		Visakhapatnam									97.41%	99.29%
		Vijayawada									99.04%	99.17%
	(ii) 0-5 (with frequency hopping)	Hyderabad	93.86%	97%	92.56%	95.88%	85.76%	93.85%	93.05%	97%		
		Visakhapatnam	95.28%	97.20%	90.44%	96.64%	94%	95.24%	95.45%	97.20%		
Vijayawada		99.50%	97.01%	84.20%	96.36%	95.48%	93.56%	95.71%	97.01%			
1.5	Service Coverage											
	In door (>= -75dBm)	Hyderabad	75.95	94.70	96.89	99.66	35.71	73.79	75.10	94.70	29.93	97.60
		Visakhapatnam	77.27	76.57	58.80	98.82	16.08	64.67	87.34	76.57	25.17	60.22
		Vijayawada	78.53	77.21	80.00	98.65	61.86	72.89	82.70	77.21	28.04	88.54
	In-vehicle (>= -85dBm)	Hyderabad	96.20	100.00	99.56	100.00	76.76	92.88	97.23	100.00	64.85	100.00
		Visakhapatnam	94.32	94.06	89.03	100.00	49.56	88.03	98.25	94.06	61.55	90.50
		Vijayawada	97.18	94.22	96.86	100.00	93.68	91.11	94.51	94.22	63.84	99.99
	Out door- in city (>= -95dBm)	Hyderabad	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
		Visakhapatnam	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Vijayawada		100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
1.6	Call Setup Success Rate (>=95%)	Hyderabad	99.37%	99.62%	91.84%	99.00%	97.97%	95.16%	98.06%	99.62%	99.44%	100.00%
		Visakhapatnam	100.00%	100.00%	90.30%	99.22%	98.03%	96.01%	99.57%	100.00%	99.33%	99.39%
		Vijayawada	100.00%	100.00%	90.63%	98.65%	99.23%	95.11%	99.58%	100.00%	100.00%	100.00%

Graphical Representation



(3) Critical Analysis

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

- BSNL is showing deviation in all parameters for all 3 cities except to call drop rate for Vishakhapatnam.
- Aircel is meeting all the benchmark except showing deviation in percentage of connections with good voice quality (93.86%) in Hyderabad.
- Tata GSM is showing deviation in Block rate for all Hyderabad, Vijayawada, Visakhapatnam cities as well as Connections with good quality for Hyderabad, Vijayawada.
- Rcom GSM is showing deviation in Connections with good quality for Hyderabad and Visakhapatnam
- Uninor is meeting all the benchmarks for Andhra Pradesh circle except showing deviation in Connections with good quality for Hyderabad.

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

The Independent Drive Test was conducted at Andhra Pradesh after operators assisted drive test was over for respective operators. Route cover was about around 80-100Km depending on city areas within the speed limit of 30Km/hr.

Drive Test Locations***HYDERABAD***

LOW DENSE: Kukatpalli, Madhapur, Gachibowli, Sanath nagar
 MEDIUM DENSE: Bowenpally, Nampally, Rahmath nagar, Yousufguda, Gandhi nagar
 HIGH DENSE: Ameerpet, Lakdikapool, Secretriat, Secunderabad, IT Park, Jubile bus station, Jubilee hills, RTC X roads

VIJAYAWADA

LOW DENSE: Gannavaram Airport, Brindavanam Colony, Currency nagar
 MEDIUM DENSE: Prakasham Barriage, Varadhi, Bhavani puram, Gollapudi
 HIGH DENSE: Auto nagar, Bandar road, Madhura nagar, Ajit Singh Nagar, Kaleshwar rao market

VISAKHAPATNAM

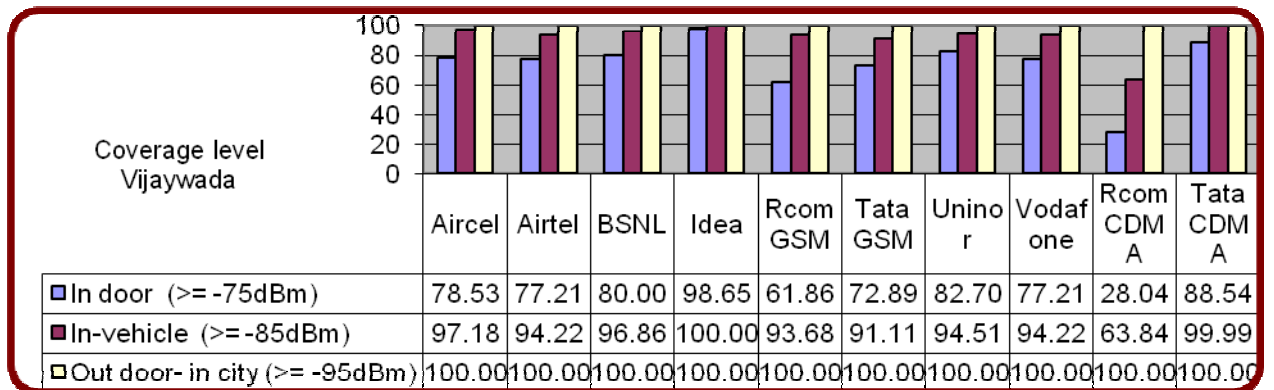
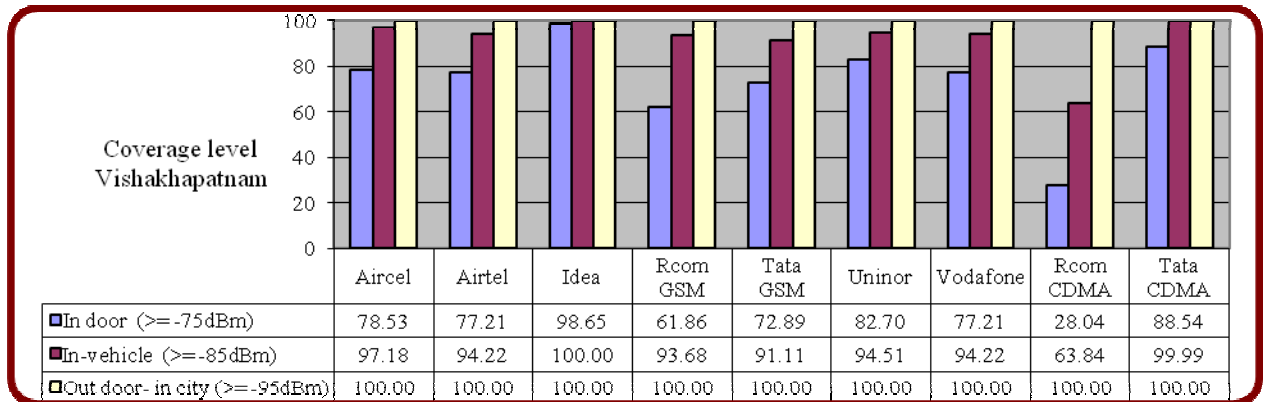
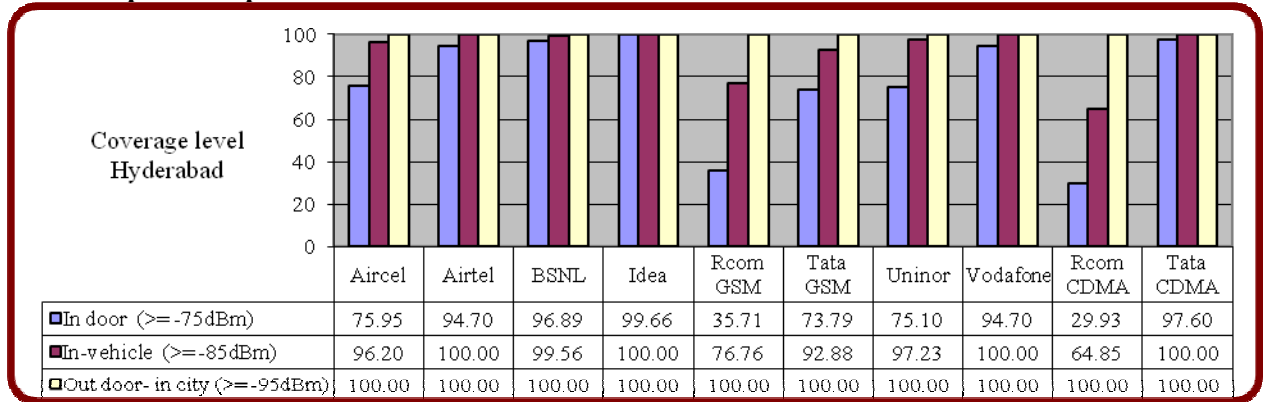
LOW DENSE: Kailashgiri, Visakha Steels, Samatha nagar
 MEDIUM DENSE: Sagar nagar, Rishikonda, Madhurawada, Kanchara palem
 HIGH DENSE: Gajuwaka, Bus stand, Railway station, Fishing Harbour, KGH Hospital road

2) Performance(For the respective cities)

pendent Drive Test

Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vodafone	Rcom CDMA	Tata CDMA
		GSM Operators								CDMA Operators	
Call Attempts	Hyderabad	316	264	225	298	301	359	279	264	303	258
	Visakhapatnam	176	286		255	288	351	248	286	288	211
	Vijayawada	177	294	264	222	247	210	278	294	248	244
Blocked Call Rate (<=3%)	Hyderabad	0.63%	0.38%	8.16%	1%	1.99%	5.01%	1.76%	0.38%	1.32%	0.00%
	Visakhapatnam	0%	0.00%		0.78%	0.00%	3.99%	0.40%	0.00%	1.39%	0.00%
	Vijayawada	0%	0.00%	12.38%	1.35%	0.81%	2.38%	0.36%	0.00%	0.40%	0.00%
Dropped Call Rate (<=2%)	Hyderabad	0.00%	0.00%	5.33%	0.67%	2.37%	1.17%	1.08%	0.00%	1.67%	0.78%
	Visakhapatnam	1%	0.00%		0.39%	1.39%	0.89%	1.21%	0.00%	1.06%	0.47%
	Vijayawada	1%	0.00%	2.67%	0.00%	0.41%	1.46%	1.80%	0.00%	0.00%	0.41%
Percentage of connections with good voice quality (=>95%)											
(i) 0-4 (w/o frequency hopping)	Hyderabad									96.83%	97.87%
	Visakhapatnam									97.64%	98.43%
	Vijayawada									98.61%	99.08%
(ii) 0-5 (with frequency hopping)	Hyderabad	93.86%	97%	92.56%	95.88%	89.93%	92.05%	93.06%	97%		
	Visakhapatnam	95.28%	97.20%		96.64%	93.66%	95.24%	95.35%	97.20%		
	Vijayawada	99.50%	97.01%	84.93%	96.36%	94.59%	93.78%	95.49%	97.01%		
Service Coverage											
In door (>= -75dBm)	Hyderabad	75.95	94.70	96.89	99.66	35.71	73.79	75.10	94.70	29.93	97.60
	Visakhapatnam	77.27	76.57		98.82	16.08	64.67	87.34	76.57	25.17	60.22
	Vijayawada	78.53	77.21	80.00	98.65	61.86	72.89	82.70	77.21	28.04	88.54
In-vehicle (>= -85dBm)	Hyderabad	96.20	100.00	99.56	100.00	76.76	92.88	97.23	100.00	64.85	100.00
	Visakhapatnam	94.32	94.06		100.00	49.56	88.03	98.25	94.06	61.55	90.50
	Vijayawada	97.18	94.22	96.86	100.00	93.68	91.11	94.51	94.22	63.84	99.99
Out door- in city (>= -95dBm)	Hyderabad	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	Visakhapatnam	100.00	100.00		100.00	100.00	100.00	100.00	100.00	100.00	100.00
	Vijayawada	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Call Setup Success Rate (>=95%)	Hyderabad	99.37%	99.62%	91.84%	99.00%	98.01%	94.99%	98.24%	99.62%	98.68%	100.00%
	Visakhapatnam	100.00%	100.00%		99.22%	100.00%	96.01%	99.60%	100.00%	98.61%	100.00%
	Vijayawada	100.00%	100.00%	87.62%	98.65%	99.19%	97.62%	99.64%	100.00%	99.60%	100.00%

Graphical Representation



(3) Critical Analysis

- Aircel is meeting all the benchmarks for Andhra Pradesh circle except showing deviation in Connections with good quality for Hyderabad.
- BSNL is showing deviation in Block Call Rate, Drop Call Rate, Call setup success rate, Connections with good quality for Hyderabad & Vijayawada.

- Docomo is showing deviation in Block rate for all Hyderabad, Visakhapatnam cities and Connections with good quality for Hyderabad, Vijayawada as well as CSSR for Hyderabad
- RCom is showing deviation in Drop call rate for Hyderabad as well as Connections with good quality for all 3 cities Hyderabad, Visakhapatnam and Vijayawada
- Uninor is meeting all the benchmarks for Andhra Pradesh circle except showing deviation in Connections with good quality for Hyderabad.

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

From live, month, PMR and Drive Tests findings, it can be concluded that on an average, performance of the operators in the service area (Andhra Pradesh) is by and large satisfactory for **Network Parameters**. However, the benchmark of $\leq 5\%$ for “worst affected cells $> 3\%$ TCH drop” is not met by Tata GSM (7.74% for live data).

Regarding the POI Congestion, Videocon is not meeting the benchmark for live measurement & month of audit and Uninor also not meeting the benchmark for month of audit. All other operators are meeting the TRAI benchmarks ($\leq 0.5\%$) for both one month data and 3 days live data taken in the month of audit.

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

Regarding **Metering/Billing Credibility** issues, Aircel & Tata shows below benchmark value for Post-paid connections. Similar result is found for Videocon for pre-paid connections.

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

During **Drive Tests**, high Blocked Call Rates were found in case of BSNL (Hyderabad & Vijayawada), & Tata GSM (all 3 cities). Similarly, dropped call rate benchmark was not met by BSNL (Hyderabad & Vijayawada). Most of the GSM operators have below benchmark %age of connections with good voice quality. BSNL is seen to have 91.84% CSSR in Hyderabad with is less than the TRAI benchmark of 95%.

III. Basic Telephone Service (Wireline) Providers

.....Audit not done for this quarter

IV. Broadband Service Providers

.....Audit not done for this quarter