

**REPORT**  
**ON**  
**AUDIT & ASSESSMENT OF QUALITY OF SERVICE**  
**OF**  
**CELLULAR MOBILE TELEPHONE SERVICE**  
**WIRELINE BASIC SERVICE**  
**&**  
**BROADBAND SERVICE**  
**FOR**  
**NORTH ZONE – RAJASTHAN CIRCLE**  
*Report Period: July 2011 – September 2011*

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## 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) Emergency (level 1) call testing

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 Rajasthan 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.
- ✓ For Basic Wireline Service, the Network parameter of the QoS TRAI regulations is observed / verified for the 3 days for nearly 5% of the telephone exchanges covering 10% of the SDCA in a Service area.
- ✓ For Broadband Services, audit data were collected from the centralized NOC or through a remote access to the NOC. Network parameters were also checked from the centralized NOC with relevant details. MRTG, Cactii and Sandvine software were used for monitoring link utilization. Smoke Ping and Ping Test were used for monitoring Network Latency.

## CHAPTER 2: EXECUTIVE SUMMARY

### I. Preface

This report highlights the findings for the audit & assessment of Quality of Service of Cellular Mobile Services, Wireline services & Broadband services in Rajasthan Circle in 3rd quarter (July-September 2011). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken for the period January-March 2011.

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

Sl.	Name of Service Provider	Month of Audit	TCBH Hour
<b>GSM Operators</b>			
1	Aircel Ltd	September-2011	2000-2100 Hrs
2	Airtel Ltd	August-2011	2000-2100 Hrs
3	BSNL	August-2011	1900-2000 Hrs
4	Etisalat	August-2011	2000-2100 Hrs
5	Idea	August-2011	2000-2100 Hrs
6	Reliance Communication	July-2011	2000-2100 Hrs
7	Tata Communications	August-2011	2000-2100 Hrs
8	Loop	September-2011	2000-2100 Hrs
9	Videocon	August-2011	2000-2100 Hrs
10	Vodafone	August-2011	2000-2100 Hrs
<b>CDMA Operators</b>			
11	MTS	August-2011	2000-2100 Hrs
12	Reliance Communication	July-2011	2000-2100 Hrs
13	Tata Communications	August-2011	2000-2100 Hrs

All the NSS and BSS systems were considered for audit and assessment for the TCBH hours of individual operators.

## 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	Loop	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
S/N	Name of Parameter														
1	<b>Network Availability</b>														
	a) BTS Accumulated Downtime	<=2%	0.03%	0.13%	1.69%	0.40%	0.13%	0.35%	0.20%	0%	0%	0.20%	0.10%	0.45%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	0%	0%	1.92%	0.00%	0%	0.24%	0%	0%	0%	0%	0%	0%	0%
2	<b>Connection Establishment (Accessibility)</b>														
	a) CSSR (Call Setup Success Rate)	>=95%	97.41%	99.33%	96.70%	99.65%	97.50%	99.84%	97.71%	96.95%	98.84%	99.09%	97.51%	99.72%	98.56%
	b) SDCCH/PAGING congestion	<=1%	0.01%	0.27%	0.91%	0.05%	0.77%	0.14%	0.04%	0.29%	0.33%	0.33%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.03%	0.39%	1.91%	0.00%	1.65%	0.09%	0.09%	0.00%	0.12%	0.26%	0.29%	0.03%	0.09%
3	<b>Connection maintenance (retainability)</b>														
	a) CDR	<=2%	1.15%	1.47%	1.27%	1.21%	1.55%	0.29%	1.31%	0.00%	2.17%	1.14%	0.73%	0.36%	0.00%
	b) Worst affected cells>3% TCH drop	<=3%	9.54%	2.98%	4.92%	6.13%	2.88%	1.43%	11.01%	0.00%	0.00%	2.65%	6.62%	0.19%	0.09%
	c) Good voice quality	>=95%	97.55%	99.09%	98%	97.33%	95.62%	99.05%	97.79%	97.36%	99.09%	97.54%	NP	NP	NP
4	<b>No. of POI having &gt;=0.5% congestion</b>	<0.5%	1	2	2	0	1	0	0	0	0	0	0	0	0
5	<b>Response time to customers for assistance</b>														
	a) Accessibility of call centre/Customer Care	>=95%	100%	92.21%	99%	100%	95%	99%	71%	100%	100%	100%	100%	99%	64.36%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	86.72%	NP	97.50%	100%	18.00%	94.67%	NP	100%	100%	99.34%	96.86%	98%	91.06%

NA: Not Applicable, NP: Not Provided



From the 3 days live data assessment, it is found that most of the operators are meeting the network parameters, except for Aircel, BSNL, Etisalat, Tata GSM & MTS not meeting the benchmark for “Worst affected cells>3% TCH drop”. Videocon is not meeting benchmark for the parameter "Call Drop Rate" with a value of 2.17%. Aircel, Airtel, BSNL & Idea show a few POIs congestion.

Performance related to customer care data is found to be satisfactory for most of the operators for the parameter “calls answered by operators (voice-to-voice)” except for Aircel & Idea. The performance of Idea was found to be extremely poor in this case, i.e. only 18% calls were answered within 60 seconds by the operator. Airtel, Tata GSM & Tata CDMA are having a below benchmark value for “accessibility of call centre” parameter.

One Month Data Audit		Bench- mark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Loop	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
S/N	Name of Parameter														
(A)	<b>Network Service Quality Parameter</b>														
1	<b>Network Availability</b>														
	a) BTS Accumulated Downtime	<=2%	0.07%	0.14%	1.81%	0.99%	0.12%	0.27%	0.04%	0.79%	0.13%	0.13%	0.17%	0.23%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.26%	1.97%	0.00%	0.00%	0.61%	0.07%	0.00%	0.00%	0.92%	0.00%	0.22%	0.00%
2	<b>Connection Establishment (Accessibility)</b>														
	a) CSSR (Call Setup Success Rate)	>=95%	97.96%	99.30%	98.62%	99.63%	97.72%	99.77%	97.77%	98.28%	99.27%	99.00%	97.89%	99.75%	98.70%
	b) SDCCH/PAGING congestion	<=1%	0.02%	0.26%	0.93%	0.09%	0.73%	0.17%	0.08%	0.27%	0.30%	0.38%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.04%	0.43%	1.89%	0.00%	1.53%	0.12%	0.11%	0.00%	0.10%	0.27%	0.18%	0.04%	0.07%
3	<b>Connection maintenance (Retainability)</b>														
	a) CDR	<=2%	1.22%	1.26%	1.34%	1.23%	1.55%	0.29%	1.30%	1.74%	1.87%	1.19%	0.74%	0.37%	0.69%
	b) Worst affected cells>3% TCH drop	<=3%	5.54%	2.98%	4.98%	4.55%	2.96%	1.48%	4.40%	0.00%	0.00%	2.79%	6.79%	0.18%	2.98%
	c) Good voice quality	>=95%	97.36%	98.91%	98.24%	97.28%	95.65%	99.03%	97.86%	97.38%	99.15%	97.44%	NP	NP	NP
4	<b>No. of POI's having &gt;=0.5% POI congestion</b>	<=0.5%	1	4	2	0	5	0	0	0	0	0	0	0	0
(B)	<b>Customer Service Quality Parameters</b>														
5	<b>Metering/billing credibility-Post paid</b>	<= 0.1%	0.15%	0.02%	0.11%	NA	0.02%	0.10%	0.12%	NA	NA	0.09%	0.09%	0.08%	0.22%
6	<b>Metering /billing credibility-Pre paid</b>	<= 0.1%	0.04%	0.01%	0.04%	0.01%	0.03%	0.05%	0.34%	0.00%	0.00%	0.03%	0.01%	0.03%	0.33%
7	<b>Resolution of billing/ charging complaints</b>	100% within 4 weeks	100%	100%	100%	100%	100%	100%	100%	NA	NA	100%	100%	100%	100%
	a) Period of applying credit/waiver/adjustment to the customer's account from the date of resolutions of complaints	<=1 week	100%	100%	100%	100%	100%	100%	100%	NA	NA	100%	100%	100%	100%
8	<b>Response time to customers for assistance</b>														
	a) Accessibility of call centre/Customer Care	>=95%	100%	92.79%	96.17%	98.98%	NP	97.62%	99%	100%	99%	100%	NP	98.28%	98%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	92.67%	90.49%	NP	100%	NP	95.75%	95.40%	100%	97%	96.60%	NP	97.24%	NP
9	<b>Termination/closure of service</b>	<=7days	100%	100%	100%	NA	100%	100%	100%	NA	NA	100%	100%	100%	100%
10	<b>Time taken for refunds of deposits after closures.</b>	100% within 60 days	100%	99.53%	100%	NA	100%	100%	100%	NA	NA	100%	100%	100%	100%

From the month data assessment, it is found that most of the operators are meeting the network parameters, except for Aircel, BSNL, Etisalat, Tata GSM & MTS not meeting the benchmark for "worst affected BTS". Aircel, Airtel, BSNL & Idea show a few POIs congestion.

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

### Operator-Assisted Drive Test

The Operator Assisted Drive Test was conducted at Rajasthan 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 Jaipur, Kota and Bikaner. 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	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators						CDMA Operators			
1.1	Blocked Call Rate (<=3%)	Jaipur	0%	0%	2%	0%	0.93%	NA	0%	0%	0%	1.94%
		Kota	NA	0%	0%	0%	2.67%	0%	0%	0%	0%	0%
		Bikaner	0.58%	0%	1.07%	1.56%	0%	NA	0.64%	0%	0%	0%
1.2	Dropped Call Rate (<=2%)	Jaipur	0%	0%	2%	0%	0%	NA	0%	0%	1.08%	0%
		Kota	NA	0%	3.45%	1.28%	1.33%	1.47%	0%	0%	0%	0%
		Bikaner	0%	0%	0%	0.79%	0%	NA	0%	0%	0%	0%
1.3	Percentage of connections with good voice quality (=>95%)											
	(i) 0-4 (w/o frequency hopping)	Jaipur								99.08%	98.82%	99.23%
		Kota								99.97%	99.66%	99%
		Bikaner								99.36%	98.19%	99%
	(ii) 0-5 ( with frequency hopping)	Jaipur	95.79%	96.35%	96.69%	97.43%	97.34%	NA	95.95%			
		Kota	NA	96.23%	NP	96.18%	97.79%	95.17%	96.2%			
Bikaner		95.26%	96.58%	98.5%	99.8%	96.36%	NA	95.6%				

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators							CDMA Operators		
1.4	Call Setup Success Rate (>=95%)	Jaipur	100%	100%	98%	100%	99.07%	NA	100%	100%	100%	98.06%
		Kota	NA	100%	NP	100%	97.33%	100%	100%	100%	100%	100%
		Bikaner	99.42%	100%	98.93%	98.44%	100%	NA	99.36%	100%	100%	100%

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

- BSNL not meeting benchmark for CDR in Kota.
- Tata Docomo is having ICR with Idea in Jaipur & Bikaner respectively and Aircel is having ICR in Kota with Tata Docomo.
- Loop Telecom, Etisalat & Videocon have no BTS in any of these cities.

#### Independent Drive Test

---- Submitted as a Separate Report

**(B) Basic Telephone Service (Wireline) Providers****3 days Live Data Audit**

SI No.	Parameters	Benchmarks	BSNL	Airtel	Rcom	Sistema
<b>1</b>	<b>Call Completion Ratio (CCR) &amp; Answer to seizure Ratio(ASR)</b>					
	CCR & ASR	> 55% (CCR) & > 75% (ASR)	NP	93.84%	90.78%	87.06%
<b>2</b>	<b>POI Congestion</b>					
	No. of POI's having congestion >0.5%		NP	1	0	0
<b>3</b>	<b>Response Time to customer for assistance</b>					
	Accessibility of Call centre/customer Care within 40 seconds	≥95%	NP	96%	99.00%	NP
	% age of calls answered by operator(voice to voice) within 60 seconds	≥90%	NP	76%	97.00%	NP

**NA – Not Applicable, NP – Not Provided**

**Note:**

- a) For S/N 4 Reliance filed ASR instead of CCR rest of operators filed CCR.
- b) Airtel not meeting benchmark for parameter "voice to voice".

**One Month Data Audit**

S/N	Parameters	Benchmarks	BSNL	Airtel	RCom	Sistema
<b>1</b>	<b>Fault incidences</b>					
	(No. of faults/100 subscribers /month)	< 5%	4.70%	1.41%	0.30%	NP
<b>2</b>	<b>Faults Repair/Restoration Time</b>					
	Fault repair by next working day(Urban Area)	>90%	96.58%	99.00%	100%	100%
	Within 3 days day	100%	99.33%	100%	100%	100%
	Fault repair by next working day(Rural & hilly Area)	>90%	96.58%	NA	NA	99.48%
	Within 5 days	100%	99.82%	NA	NA	100%
	Mean time to Repair(MTTR)	≤8 Hrs	5.91 hrs	3.28 hrs	2.26 hrs	5.82 hrs
<b>3</b>	<b>Rent Rebate</b>					
	Fault pending > 3 days & <7 days	Rebate for 7 days	NP	0	0	2
	Fault Pending > 7 days & < 15 days	Rebate for 15 days	NP	0	0	0
	Fault pending > 15 days	Rebate for 1 month	NP	0	0	0
<b>4</b>	<b>Call Completion Ratio(CCR) &amp; Answer to seizure Ratio(ASR)</b>					
	CCR & ASR	> 55% (CCR) & > 75% (ASR)	70.69%	93.18%	89.47%	87.32%
<b>5</b>	<b>Metering &amp; Billing Performance</b>					
	Disputed Bills over bills issued	< 0.1%	NP	0.14%	0.06%	0.09%
	% of billing complaints resolved within 4 weeks	100%	NP	100%	100%	100%
	Period of all refunds/payments from the date of resolution of complaints within 1 weeks	100%	NP	100%	100%	100%
<b>6</b>	<b>POI Congestion</b>					
	No. of POI's having congestion >0.5%		NP	0	0	0

S/N	Parameters	Benchmarks	BSNL	Airtel	RCom	Sistema
<b>7</b>	<b><i>Response Time to customer for assistance</i></b>					
	Accessibility of Call centre/customer Care within 40 sec.	<b>&gt;=95%</b>	NP	98.06%	96%	97.76%
	% age of calls answered by operator(voice to voice) within 60 seconds	<b>&gt;=90%</b>	NP	90.25%	90%	95.20%
<b>8</b>	<b><i>Customer care(promptness in attending to customers request</i></b>					
	Termination / Closures	<b>100%</b>	NP	100%	100%	100%
	Time taken for refunds of deposit after closures	<b>100%</b>	NP	100%	100%	100%

NA – Not Applicable, NP – Not Provided

**Note:**

- a) For S/N 4 Reliance filed ASR instead of CCR rest of operators filed CCR.
- b) BSNL is not meeting benchmark for the parameter “fault repair/restore within 3 days in urban and 5 days in rural/hilly areas.
- c) Airtel is not meeting metering/billing credibility.

**(C) Broadband Service Providers**  
**3 days Live Data Audit**

S/N	Parameters	Benchmarks	Audit Period	BSNL	Airtel	RCom	TCISL	Sify	Tikona
<b>1</b>	<b>Response time to the customer for assistance % age of calls answered by operator (Voice to Voice)</b>								
	Within 60 sec	>60%	Live	NP	95%	95.85%	95%	99%	NP
	Within 90 sec	>80%	Live	NP	98.8%	97.62%	100%	98%	NP
<b>2</b>	<b>Bandwidth Utilization/ Throughput</b>								
2.1	POP to ISP Gateway Node [Intra-network] Link(s)	< 80%	Live	NP	48%	25.28%	37%	75%	29.96%
2.2	ISP Gateway Node to IGSP / NIXI Node upstream Link(s) for International connectivity	< 80%	Live	NP	NP	NP	49.0%	0%	63.23%
2.3	Broadband Connection Speed (download) - from ISP Node to User	> 80%	Live	NP	100%	99%	96.70%	91.40%	NP
<b>3</b>	<b>Packet loss</b>								
	% of Packet loss	<1%	Live	0%	0%	0%	0%	0%	0%
<b>4</b>	<b>Network latency (for wired broadband access)</b>								
4.1	User reference point at POP/ISP Gateway node to IGSP/NIXI	<120 ms	Live	NP	16	NP	29	35.6	1
4.2	User reference point at ISP Gateway node to International nearest NAP port abroad (terrestrial)	<350 ms	Live	NP	3	59	275	288	267
4.3	User reference point at ISP Gateway node to International nearest NAP port abroad (satellite)** See note below	<800 ms		NA	NA	NA	NA	NA	NA

NA – Not Applicable, NP – Not Provided.

**Note:**

- a) S/N 4.3 None of the operator having satellite connectivity.



**One Month Data Audit**

S/N	Parameters	Benchmarks	Audit Period	BSNL	Airtel	RCom	TCISL	Sify	Tikona
<b>1</b>	<b>Service Provisioning/Activation Time</b>								
1.1	100% cases in 15 days (subject to technical feasibility)	<15 days	Month	100%	100%	100%	100%	100%	100%
1.2	In all cases where payment towards installation charge & SD is taken and the Broadband connection is not provided within 15 working days	credit @ Rs.10/ per day.		100%	100%	100%	100%	100%	100%
<b>2</b>	<b>Faults Repair/Restoration Time</b>								
	By next working day	>90%	Month	95%	99.80%	100%	98%	67.64%	100%
	within 3 working day	≥99%		100%	100%	100%	98%	97%	100%
<b>2.1</b>	<b>Rebate</b>								
	Faults Pending for > 3 working days and < 7 working days: (Rebate equivalent to 7 days of minimum monthly charge or equivalent usage allowance)		Month	0	7	0	471	7	0
	Faults Pending for > 7 working days and < 15 working days: (Rebate equivalent to 15 days of minimum monthly charge or equivalent usage allowance)			0	11	0	96	2	0
	Faults Pending for > 15 working days:(Rebate equivalent to one month of minimum monthly charge or equivalent usage allowance)			0	0	0	12	1	0
<b>3</b>	<b>Billing Performance</b>								
	Billing complaints per 100 bills issued	<2%	Month	0.18%	0.01%	0.11%	NP	NA	NP
	%age of complaints resolved within 4 weeks	100%		100%	100%	100%	NP	NA	NP
	Time taken for refund of deposits after closure (within 60 days)	100%		100%	100%	100%	NP	NA	NP
<b>4</b>	<b>Response time to the customer for assistance % age of calls answered by operator (Voice to Voice)</b>								
	within 60 sec	>60%	Month	87.00%	88.88%	88.79%	97.00%	98.97%	37%
	within 90 sec	>80%	Month	96.00%	93.50%	91.34%	98.00%	90.28%	43%

S/N	Parameters	Benchmarks	Audit Period	BSNL	Airtel	RCom	TCISL	Sify	Tikona
<b>5</b>	<b>Bandwidth Utilization/ Throughput: (If on any link(s) / route bandwidth utilization exceeds 90%, then network is considered to have congestion. For this additional provisioning of Bandwidth on immediate basis, but not later than one month, is mandated.) &lt; 80% link(s) / route bandwidth utilization during peak hours (TCBH).</b>								
5.1	POP to ISP Gateway Node [Intra-network] Link(s)	<80%	Month	NP	48.00%	11.40%	41%	84%	NP
5.2	ISP Gateway Node to IGSP / NIXI Node upstream Link(s) for International connectivity	<80%	Month	NP	NP	NP	70%	0%	NP
5.3	Broadband Connection Speed (download) - from ISP Node to User	>80%	Month	NP	100%	NP	92.44%	91.56%	NP
<b>6</b>	<b>Service Availability/Uptime (for all users) in %age</b>								
	Service Availability(%)	>98%	Month	99.94%	99.99%	99.99%	100%	100%	100%
<b>7</b>	<b>Packet loss</b>								
	% of Packet loss	<1%	Month	0%	0%	0.17%	0.00%	0%	0%
<b>8</b>	<b>Network latency (for wired broadband access)</b>								
8.1	User reference point at POP/ISP Gateway node to IGSP/NIXI	<120 ms	Month	NP	18	88.1	22	35	1
8.2	User reference point at ISP Gateway node to International nearest NAP port abroad (terrestrial)	<350 ms	Month	NP	NP	54	277	289	NP
8.3	User reference point at ISP Gateway node to International nearest NAP port abroad (satellite)** See note below	<800 ms		NA	NA	NA	NA	NA	NA

NA – Not Applicable, NP – Not Provided.

**Note:**

- a) S/N 8.3 None of the operator having satellite connectivity..
- c) S/N 3 For Sify not applicable because operator is under prepaid module.

From the month audit table it is found that the benchmark for 'Response time to the customer for assistance % age of calls answered by operator (Voice to Voice)' parameter is not met by Tikona. Sify is not meeting the benchmark for fault repair/restoration and BW Utilization POP – ISP GW. .

**CHAPTER-3: AUDIT-PMR VERIFICATION****I. Cellular Mobile Telephone Service**

PMR		Bench- mark	Audit	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom	Tata	Loop	Videocon	Vodafone	MTS	Rcom	Tata
S/ N	Name of Parameter															
(A)	<b>Network Service Quality Parameter</b>															
1	<b>Network Availability</b>															
	BTS Accumulated Downtime	<=2%	Reported	0.10%	0.08%	1.79%	0.38%	0.08%	0.39%	0.02%	0.30%	0.37%	0.13%	0.13%	0.42%	0.02%
			Verified	0.10%	0.08%	1.79%	0.38%	0.08%	0.39%	0.02%	0.30%	0.37%	0.13%	0.13%	0.42%	0.02%
	Worst affected BTSs due to downtime	<=2%	Reported	0%	0.13%	6.70%	1.52%	0.03%	1.43%	0.00%	0.00%	0.00%	0.81%	0%	1.43%	0.00%
Verified			0%	0.13%	6.70%	1.52%	0.03%	1.43%	0.00%	0.00%	0.00%	0.81%	0%	1.43%	0.00%	
2	<b>Connection Establishment (Accessibility)</b>															
	CSSR (Call Setup Success Rate)	>=95%	Reported	97.11%	99.41%	99.03%	98.99%	98.07%	99.59%	98.17%	99%	98.35%	99.33%	98.07%	99.37%	99.37%
			Verified	97.11%	99.41%	99.03%	98.99%	98.07%	99.59%	98.17%	99%	98.35%	99.33%	98.07%	99.37%	99.37%
	SDCCH/PAGING congestion	<=1%	Reported	0.03%	0.17%	0.15%	0.09%	0.52%	0.13%	0.04%	0.14%	0.18%	0.22%	0%	0%	0%
			Verified	0.03%	0.17%	0.15%	0.09%	0.52%	0.13%	0.04%	0.14%	0.18%	0.22%	0%	0%	0%
	TCH congestion	<=2%	Reported	0.04%	0.28%	0.73%	0.27%	1.26%	0.15%	0.14%	0%	0.67%	0.22%	0.39%	0.10%	0.04%
Verified			0.04%	0.28%	0.73%	0.27%	1.26%	0.15%	0.14%	0%	0.67%	0.22%	0.39%	0.10%	0.04%	
3	<b>Connection maintenance (Retainability)</b>															
	CDR	<=2%	Reported	1.48%	0.96%	1.54%	1.50%	1.71%	0.38%	0.77%	0.08%	1.32%	0.93%	0.73%	0.74%	0.34%
			Verified	1.48%	0.96%	1.54%	1.50%	1.71%	0.38%	0.77%	0.08%	1.32%	0.93%	0.73%	0.74%	0.34%
	Worst affected cells>3% TCH drop	<=5%	Reported	4.58%	2.65%	8.32%	17.08%	9.94%	4.80%	1.28%	0%	0.00%	3.02%	3.80%	0.58%	1.44%
			Verified	4.58%	2.65%	8.32%	17.08%	9.94%	4.80%	1.28%	0%	0.00%	3.02%	3.80%	0.58%	1.44%
	Good voice quality	>=95%	Reported	48.88%	98.94%	98.14%	98.24%	96.89%	97.48%	98.38%	99.10%	99.28%	98.23%	98.74%	98.38%	99.44%
Verified			48.88%	98.94%	98.14%	98.24%	96.89%	97.48%	98.38%	99.10%	99.28%	98.23%	98.74%	98.38%	99.44%	
4	<b>No. of POI's having congestion &gt;0.5%</b>	Reported	1	0	0	0	0	0	0	0	0	0	0	0	0	
		Verified	1	0	0	0	0	0	0	0	0	0	0	0	0	

S/ N	Name of Parameter	Bench- mark	Audit	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom	Tata	Loop	Videocon	Vodafone	MTS	Rcom	Tata
(B)	<b>Customer Service Quality Parameters</b>															
5	<b>Metering/billing credibility- Post paid</b>	<= 0.1%	Reported	0.08%	0.01%	0.00%	NA	NR	0.00%	0.06%	0%	NA	0.20%	0%	0%	0.10%
			Verified	0.08%	0.01%	0.00%	NA	NR	0.00%	0.06%	0%	NA	0.20%	0%	0%	0.10%
6	<b>Metering /billing credibility-Pre paid</b>	<= 0.1%	Reported	0.58%	0.00%	0.08%	0.4%	NR	0.07%	0.00%	0%	0.03%	0.03%	0.04%	0.08%	0.10%
			Verified	0.58%	0.00%	0.08%	0.4%	NR	0.07%	0.00%	0%	0.03%	0.03%	0.04%	0.08%	0.10%
7	<b>Resolution of billing/ charging complaints</b>	100% within 4 weeks	Reported	100%	100%	99%	100%	NR	100%	100%	NIL	100%	100%	100%	100%	100%
			Verified	100%	100%	99%	100%	NR	100%	100%	NIL	100%	100%	100%	100%	100%
	Period of applying credit/waiver/adjustment to the customer's account from the date of resolutions of complaints	<=1 week	Reported	100%	100%	100%	NA	NR	100%	100%	0%	100%	98.13%	100%	100%	100%
			Verified	100%	100%	100%	NA	NR	100%	100%	0%	100%	98.13%	100%	100%	100%
8	<b>Response time to customers for assistance</b>	>=95%	Reported	100%	100%	100%	98.33%	NR	100%	100%	100%	100%	100%	96%	100%	97%
			Verified	100%	100%	100%	98.33%	NR	100%	100%	100%	100%	100%	96%	100%	97%
	% call answered by operators(voice to voice) within 60 sec.	>=90%	Reported	74.09%	80%	90%	99.16%	NR	94%	36%	100%	100%	75%	90.50%	94%	87%
			Verified	74.09%	80%	90%	99.16%	NR	94%	36%	100%	100%	75%	90.50%	94%	87%
9	<b>Termination/closure of service</b>	<=7days	Reported	100%	100%	100%	NA	NR	100%	100%	NIL	NA	100%	100%	100%	100%
			Verified	100%	100%	100%	NA	NR	100%	100%	NIL	NA	100%	100%	100%	100%
10	<b>Time taken for refunds of deposits after closures.</b>	100% within 60 days	Reported	100%	100%	100%	NA	NR	100%	100%	NIL	NA	100%	100%	100%	86%
			Verified	100%	100%	100%	NA	NR	100%	100%	NIL	NA	100%	100%	100%	86%

The figures provided by all the operators match the figures obtained on verification.

**II. Basic Service (Wire Line) Service (PMR Period : Jan 2011 - Mar 2011)**

S/N	Parameters	Benchmarks	Audit	BSNL	Airtel	TTSL	RCom	Sistema
<b>1</b>	<b>Fault incidences</b>							
	(No. of faults/100 subscribers /month)	< 5%	Reported	4.30%	1.27%	0.20%	0.67%	3.02%
			Verified	4.30%	1.27%	0.20%	0.67%	3.02%
<b>2</b>	<b>Faults Repair/Restoration Time</b>							
	Fault repair by next working day(Urban Area)	>90 %	Reported	95.83%	99.33%	100%	100%	97.49%
			Verified	95.83%	99.33%	100%	100%	97.49%
	Within 3 days	100%	Reported	98.86%	100%	100%	100%	100%
			Verified	98.86%	100%	100%	100%	100%
	Within 5 days (Hilly & Rural Area)	100%	Reported	99.90%	NA	100%	NA	100%
			Verified	99.90%	NA	100%	NA	100%
	Mean time to Repair(MTTR)	≤8 Hrs	Reported	6.20 hrs	4.36 hrs	7.15 hrs	2.18 hrs	5.34 hrs
			Verified	6.20 hrs	4.36 hrs	7.15 hrs	2.18 hrs	5.34 hrs
<b>3</b>	<b>Rent Rebate</b>							
	Rent Rebate		Reported	0	0	0	0	0
			Verified	0	0	0	0	0
<b>4</b>	<b>Call Completion Ratio(CCR) &amp; Answer to seizure Ratio(ASR)</b>							
	CCR & ASR	> 55%(CCR) & > 75%(ASR)	Reported	67.67%	93.16%	100%	90.31%	97.25%
			Verified	67.67%	93.16%	100%	90.31%	97.25%
<b>5</b>	<b>Metering &amp; Billing Performance</b>							
	Metering & Billing Credibility-Post paid	< 0.1 %	Reported	0.04%	0.22%	0.00%	0.04%	0.09%
			Verified	0.04%	0.22%	0.00%	0.04%	0.09%
	Metering & Billing Credibility-Pre paid	100%	Reported	NIL	NA	NA	NR	Nil
			Verified	NIL	NA	NA	NR	Nil
	Resolution of billing charging/validity/Complaints within 4 weeks	100%	Reported	NR	100%	NR	100%	100%
			Verified	NR	100%	NR	100%	100%
	Period of all refunds/payments from the date of resolution of complaints within 1 weeks	100%	Reported	NR	97.92%	100%	100%	NR
			Verified	NR	97.92%	100%	100%	NR
<b>6</b>	<b>POI Congestion</b>							
	No. of POI's having congestion >0.5%		Reported	NR	0	0	0	0
			Verified	NR	0	0	0	0
<b>7</b>	<b>Response Time to customer for assistance</b>							
	Accessibility of Call centre/customer Care within 40 Sec.	≥95%	Reported	95.49%	99.88%	94.99%	97.99%	97%
			Verified	95.49%	99.88%	94.99%	97.99%	97%
	% age of calls answered by operator(voice to voice) within 60 seconds	≥90%	Reported	91.33%	80.52%	87.31%	95.99%	93%
			Verified	91.33%	80.52%	87.31%	95.99%	93%
<b>8</b>	<b>Customer care(promptness in attending to customers request</b>							
	Termination / Closures	100%	Reported	100%	100%	NR	100%	100%
			Verified	100%	100%	NR	100%	100%
	Time taken for refunds of deposit after closures	100%	Reported	NR	42%	100%	100%	100%
			Verified	NR	42%	100%	100%	100%

The figures provided by all the operators match the figures obtained on verification.

### III. Broadband Service (PMR Period : Jan 2011 - Mar 2011)

S/N	Parameters	Benchmarks	Audit Period	BSNL	Airtel	RCom	TCISL	Sify	Tikona
<b>1</b>	<b>Service Provisioning/Activation Time</b>								
1.2	%age of connections provided within 15 days of registration of demand	100%	Reported	100%	100%	100%	NA	100%	100%
			Verified	100%	100%	100%	NA	100%	100%
<b>2</b>	<b>Faults Repair/Restoration Time</b>								
2.2	% of faults repaired by next working day	>90%	Reported	98.10%	100%	100%	95%	90%	86.51%
			Verified	98.10%	100%	100%	95%	90%	86.51%
2.3	% of faults repaired within 3 working day	≥99%	Reported	100%	100%	100%	98%	99%	91.81%
			Verified	100%	100%	100%	98%	99%	91.81%
<b>3</b>	<b>Rent Rebate</b>								
3.1	Rent Rebate		Reported	0	0	0	741	206	7150
			Verified	0	0	0	741	206	7150
<b>4</b>	<b>Billing Performance</b>								
4.1	%age of bills disputed	<2%	Reported	0.10%	0.04%	0.09%	1.00%	NA	5.51%
			Verified	0.10%	0.04%	0.09%	1.00%		5.51%
4.2	%age of complaints resolved within 4 weeks	100%	Reported	100%	100%	100%	100%		98.59%
			Verified	100%	100%	100%	100%		98.59%
4.3	%age of cases to whom refund of deposits is made within 60 days of closures	100%	Reported	100%	100%	100%	100%	100%	
			Verified	100%	100%	100%	100%	100%	
<b>5</b>	<b>Response Time to the Customer for assistance</b>								
5.1	%age of calls answered by operator (Voice to voice) within 60 sec	>60%	Reported	88.90%	78%	96%	93.65%	85%	80.67%
			Verified	88.90%	78%	96%	93.65%	85%	80.67%
5.2	%age of calls answered by operator (Voice to voice) within 90 sec	>80%	Reported	95.70%	89%	98%	94.77%	92%	83%
			Verified	95.70%	89%	98%	94.77%	92%	83%

S/N	Parameters	Benchmarks	Audit Period	BSNL	Airtel	RCom	TCISL	Sify	Tikona
<b>6</b>	<b>Bandwidth utilization/throughput</b>								
6.1	No. of Intra network links having Bandwidth utilization >90% during peak hours (TCBH)		Reported	NR	0	0	0	0	19
			Verified	NR	0	0	0	0	19
6.2	No. of Upstream links for International connectivity having BW utilization >90% Peak Hrs.(TCBH)		Reported	NR	NA	0	0	0	4
			Verified	NR	NA	0	0	0	4
6.3	% International bandwidth utilization during peak hours (TCBH) (Enclose MRTG)	<90%	Reported	NR	NA	43.34%	39.51%	87%	74.66%
			Verified	NR	NA	43.34%	39.51%	87%	74.66%
6.4	Broadband Connection Speed available (download) from ISP node to user	>80%	Reported	89.10%	100%	92	91%	95%	97.00%
			Verified	89.10%	100%	92	91%	95%	97.00%
<b>7</b>	<b>Service Availability/Uptime (for all users) in %age</b>								
7.1	Service availability /uptime (for all users) in %age	>98%	Reported	99.90%	99.99%	99.71%	100%	100%	98.46%
			Verified	99.90%	99.99%	99.71%	100%	100%	98.46%
<b>8</b>	<b>Packet loss</b>								
8.1	% of Packet loss	<1%	Reported	NR	0.00%	-	0.49%	-	NR
			Verified	NR	0.00%	-	0.49%	-	NR
<b>9</b>	<b>Network latency (for wired broadband access)</b>								
9.1	User reference point at POP/ISP Gateway node to IGSP/NIXI	<120 ms	Reported	NR	16 ms	-	50 ms	-	NR
			Verified	NR	16 ms	-	50 ms	-	NR
9.2	User reference point at ISP Gateway node to International nearest NAP port abroad (terrestrial)	<350 ms	Reported	NR	3 ms	-	267 ms	-	NR
			Verified	NR	3 ms	-	267 ms	-	NR
9.3	User reference point at ISP Gateway node to International nearest NAP port abroad (satellite)	<800 ms	Reported	NA					
			Verified	NA					

The figures provided by all the operators match the figures obtained on verification.

## CHAPTER-4: Detailed Findings & Analysis

### I. Cellular Mobile Telephone Service

#### (A) MSC audit

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

S/N	Name of Parameter	Bench mark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Loop	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA	
			GSM Operators										CDMA Operators			
A	<b>Network Service Quality Parameter</b>															
1	<b>Network Availability</b>															
	a) BTS Accumulated Downtime	<=2%	0.03%	0.13%	1.69%	0.40%	0.13%	0.35%	0.20%	0.00%	0.00%	0.20%	0.10%	0.45%	0.01%	
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0%	1.92%	0.00%	0.00%	0.24%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0%	
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		22.47	662.30	4386	6.40	298	616	205	0	0	884	115	587	9.55	
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	0	63	0	0	6	0	0	0	0	0	0	0	
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	18	71	0	0	15	1	0	0	57	0	4	0	
2	<b>Connection establishment</b>															
	a) CSSR	>=95%	97.41%	99.33%	96.70%	99.65%	97.50%	99.84%	97.71%	96.95%	98.84%	99.09%	97.5%	99.72%	98.56%	
	b) SDCCH/PAGING congestion	<=1%	0.01%	0.27%	0.91%	0.05%	0.77%	0.14%	0.04%	0.29%	0.33%	0.33%	0.00%	0.00%	0.00%	
	c) TCH congestion	<=2%	0.03%	0.39%	1.91%	0.00%	1.65%	0.09%	0.09%	0.00%	0.12%	0.26%	0.29%	0.03%	0.09%	
3	<b>Connection maintenance</b>														0.00%	
	a) CDR	<=2%	1.15%	1.47%	1.27%	1.21%	1.55%	0.29%	1.31%	0.00%	2.17%	1.14%	0.73%	0.36%	0.68%	
	b) Cells having > 3% TCH drop	<=3%	9.54%	2.98%	4.92%	6.13%	2.88%	1.43%	11.01%	0.00%	0.00%	2.65%	6.62%	0.19%	2.94%	
	c) Good voice quality	>=95%	97.55%	99.09%	98.00%	97.33%	95.62%	99.05%	97.79%	97.36%	99.09%	97.54%	NP	NP	NP	
	d) No. of cells > 3% TCH drop		297.6	620	523	4	277	106	474	0	0	491	321	3	84	
	e) Total no. of cells in the network		3119	20810	10611	66	9617	7437	4299	18	12	18503	4870	1794	2851	
3	<b>No. of POI's having congestion &gt;0.5%</b>		1	2	2	0	1	0	0	0	0	0	0	0	0	
	a) Name of POI not meeting the benchmark		BSNL MI Road	BTNLG4 I-BTNLG4	L1 MI Road, L1	Nil	Idea NLD Huawei	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	



			O ,BTSL11 - BTSL10	Bajaj Nagar											
	b) Total No. of circuits on POI	28765	129576	38444	4222	57211	43814	NR	452	630	124494	35777	43814	39693	
	c) Avg No. of call attempts on POI	991,522	3,935,21 1	627,453	2,703	1,637,61 2	409,762	251,993	63	3	3,248,53 2	1,279, 500	409,762	662,494	
	d) Avg traffic served on POI (Erlang)	18,393	87,808	22,486	94	32,021	15,233	7,409	2	13	74,018	21,94 8	15,233	18,833	
	e) Total number of working POI Service Area wise	34	92	26	25	78	91	106	18	19	178	60	91	156	
	f) Capacity of POI	27264	125915	NR	3845	54805	40664	13954	263	414	120355	33503	40664	36399	
	f) Equipped Capacity of Network in respect of Traffic in erlang	45298	437778	265400	541	107399	NR	59886	133	5000	229534	76200	NR	120173	
	g) Total traffic handled in TCBH in erlang	14419	321511	115840	105	94742	NR	21487	15	11	182687	39865	NR	31064	
<b>(B)</b>	<b>Customer Service Quality Parameters</b>														
<b>4</b>	<b>Response time to customers for assistance</b>														
	a) Accessibility of call centre	>=95%	100%	92.2%	99.00%	100%	95%	99.00%	71.30%	100%	100%	100%	100%	99%	64.36%
	b) % of call answered by operators(voice to voice) within 60 sec	>=90%	86.72%	NP	97.50%	100%	18%	94.67%	NP	100%	100%	99.34%	96.86 %	98.00%	91.06%
	c) No. of call attempts to call centre / customer care nos. during TCBH (Avg)	197	210,553	200	73	581,520	695,920	292,708	2	46	1,160,30 1	96,78 3	95,016	95,016	
	d) No. of calls connected and answered successfully to call centre / customer care nos. during TCBH (Avg)	185	194,166	198	73	550,266	688,956	208,701	2	46	1,160,30 1	96,78 3	94,082	94,082	

NA: Not Applicable, NP: Not Provided

**Parameter-wise Findings (Live Data Assessment):**

The parameter wise key takeouts for the Cellular Mobile Telephone Services providers in Rajasthan Service Area are as given below:-

- **BTS accumulated downtime (benchmark  $\leq 2\%$ ):** All operators are meeting benchmark with values laying between 0% and 1.69%.
- **Worst affected BTSs due to downtime (benchmark  $\leq 2\%$ ):** All operators are meeting benchmark with values laying between 0% and 1.92%.
- **Call setup success rate (benchmark  $\geq 95\%$ ):** All operators are meeting the benchmark with values laying between 96.70% and 99.84%.
- **SDCCH/PAGING Channel congestion (benchmark  $\leq 1\%$ ):** All operators are meeting the benchmark with values laying between 0% and 0.91%.  
*Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.*
- **TCH congestion (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark with values laying between 0% and 1.91%.
- **Call drop rate (benchmark  $\leq 2\%$ ):** Except Videocon with a value of 2.17%, all other operators are meeting the benchmark with values laying between 0% and 1.55%.
- **Cell exceeding 3% TCH drop (benchmark  $\leq 3\%$ ):** Except for Aircel(9.54%), BSNL(4.92%), Etisalat(6.13%), Tata GSM(11.01%) & MTS(6.62%), rests of the operators are satisfying the benchmark with value in between 0% and 2.98%.
- **Connections with good voice quality (benchmark  $\geq 95\%$ ):** CDMA service providers have declared that the parameter is not system generated. Rest of the GSM operators are meeting the benchmark with values laying between 95.62% and 99.09%.
- **No. of POI's having Congestion (benchmark  $\geq 0.5\%$ ):** Aircel (1), Airtel (2) BSNL (2) & Idea (1) were found to have POIs with  $\geq 0.5\%$  congestion. There was no congestion found overall on the POI, but cases were found where individual POIs are showing high utilization/usage. Some are in the range of over 100% though causing no traffic failure due to overflow technique i.e. the extra traffic is carried over by some other operating POI as has been designed to do so.
- **%age of call answered by operator (electronically) (benchmark  $>95\%$ ):** Except for Airtel, Tata GSM & Tata CDMA, rest of the operators are meeting the benchmark with values laying between 95% to 100%.
- **%age of call answered by operator (Voice to voice) (benchmark  $>90\%$ ): %):** Except for Aircel & Idea, rest of the operator are meeting the benchmark with value in between 91.06% and 100%. Data not received from Airtel & Tata GSM.

**(2) Month Data Assessment & Summarized Findings**

S/ N	Name of Parameter	Benchm ark	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom	Tata	Loop	Video con	Vodafone	MTS	Rcom	Tata	
			GSM Operators										CDMA Operators			
(A)	<b>Network Service Quality Parameter</b>															
1	<b>Network Availability</b>															
	a) BTS Accumulated Downtime	<=2%	0.07%	0.14%	1.81%	0.99%	0.12%	0.27%	0.04%	0.79%	0.13%	0.13%	0.17%	0.23%	0.02%	
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.26%	1.97%	0.00%	0.00%	0.61%	0.07%	0.00%	0.00%	0.92%	0.00%	0.22%	0.00%	
	c) Total no. of BTSs in the licensed service area		1,047	6,982	3,595	22	3,222	2,479	1,436	6	4	6,169	1,585	1,794	930	
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		536.6	7095	48412	161.7	2844	5068	393.63	34.093	3.91	6135	1965.35	3100	129.73	
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	18	71	0	0	15	1	0	0	57	0	4	0	
2	<b>Connection Establishment (Accessibility)</b>															
	a) CSSR (Call Setup Success Rate)	>=95%	97.96%	99.30%	98.62%	99.63%	97.72%	99.77%	97.77%	98.28%	99.27%	99.00%	97.89%	99.75%	98.70%	
	b) SDCCH/PAGING congestion	<=1%	0.02%	0.26%	0.93%	0.09%	0.73%	0.17%	0.08%	0.27%	0.30%	0.38%	0.00%	0.00%	0.00%	
	c) TCH congestion	<=2%	0.04%	0.43%	1.89%	0.00%	1.53%	0.12%	0.11%	0.00%	0.10%	0.27%	0.18%	0.04%	0.07%	
3	<b>Connection maintenance (Retainability)</b>															
	a) CDR	<=2%	1.22%	1.26%	1.34%	1.23%	1.55%	0.29%	1.30%	1.74%	1.87%	1.19%	0.74%	0.37%	0.69%	
	b) Worst affected cells>3% TCH drop	<=3%	5.54%	2.98%	4.98%	4.55%	2.96%	1.48%	4.40%	0.00%	0.00%	2.79%	6.79%	0.18%	2.98%	
	c) Good voice quality	>=95%	97.36%	98.91%	98.24%	97.28%	95.65%	99.03%	97.86%	97.38%	99.15%	97.44%	NP	NP	NP	

S/ N	Name of Parameter	Benchm ark	Aircel	Airtel	BSNL	Etisalat	Idea	RCom	Tata	Loop	Video con	Vodafone	MTS	RCom	Tata
			GSM Operators										CDMA Operators		
	d) Total No. of cells exceeding 3% TCH drop (call drop)		0	620	529	3	284	110	189	0	0	517	330	3	85
	e) Total no. of cells in the network		3119	20810	10611	66	9617	7437	4299	18	12	18503	4870	1794	2851
4	<b>No. of POI's having &gt;=0.5% POI congestion</b>	>=0.5%	1	4	2	0	5	0	0	0	0	0	0	0	0
	a) Name of POI not meeting the benchmark		BSNL MI Road	Idea , Tata,,BT NLG4I- BTNLG4 O ,BTSL1I- BTSL1O	L1 MI Road, L1 Bajaj Nagar	Nil	Idea NLD Huawei GMGWJP1 ,MGW JOD1,MG W JPR1,MG W JPR3,MSC JPR1	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
	b) Total No. of call attempts on POI (Avg.)		1,104,243	4,044,201	626,581	2,938	1,751,197	458,405	240,378	799	3	3,162,124	761,342	458,405	640,074
	c) Total traffic served on POI (Erlang) (Avg.)		21,059	88,861	21,678	96	33,391	15,883	7,093	18	18	71,847	12,697	15,883	18,367
	d) Total No. of circuits on POI		28,765	132,673	38,444	4,222	60,672	43,857	NR	452	630	124,494	35,377	43,857	39,693
	e) Total number of working POI Service Area wise		34	92	26	25	78	91	43	18	19	178	60	91	156
	f) Capacity of POI		27,264	128,931	NP	3,845	58,103	40,716	13,954	263	414	120,355	33,503	40,716	36,399
5	<b>Network Data</b>														
	a) Equipped Capacity of Network Erlang		45298	437778	265400	541	107399	NR	59886	133	5000	229534	76200	NR	120173
	b) Total traffic in TCBH in erlang (Avg.)		14419	321511	115840	105	94742	NR	21487	15	11	182687	39865	NR	31064
	c) Total no. of customers served (as per VLR) on last day of the month		891022	11912746	2678512	6527	3397136	NR	1038396	21	964	6665441	917809	NR	862933

S/ N	Name of Parameter	Benchm ark	Aircel	Airtel	BSNL	Etisalat	Idea	RCom	Tata	Loop	Video con	Vodafone	MTS	RCom	Tata	
			GSM Operators											CDMA Operators		
(B )	<b>Customer Service Quality Parameters</b>															
5	<b>Metering/billing credibility-Post paid</b>	<= 0.1%	0.15%	0.02%	0.11%	NA	0.02%	0.10%	0.12%	NA	NA	0.09%	0.09%	0.08%	0.22%	
	a) No. of bills issued during the period		3434	183229	252959	NA	40762	14077	8348	NA	NA	178905	27417	131928	82322	
	b) No. of bills disputed including billing complaints during the period		5	40	282	NA	8	14	10	NA	NA	161	25	103	179	
6	<b>Metering /billing credibility-Pre paid</b>	<= 0.1%	0.04%	0.01%	0.04%	0.01%	0.03%	0.05%	0.34%	0.00%	0.00%	0.03%	0.01%	0.03%	0.33%	
	a) No. of charging / credit / validity complaints during the quarter		447	668	2462	2	834	2644	4942	0	0	2875	197	698	8477	
	b) Total no. of pre-paid customers at the end of the quarter		1,006,909	12,751,770	6,158,506	25,265	3,015,726	5,194,542	1,441,222	243	10,270	8,620,089	2,152,037	2,204,444	2,600,730	
7	<b>Resolution of billing/ charging complaints</b>	100% within 4 weeks	100%	100%	100%	100%	100%	100%	100%	NA	NA	100%	100%	100%	100%	
	a) No. of billing/(post paid) and charging, credit/validity (pre paid) complaints resolved within 4 weeks during the quarter		452	2711	2744	2	842	2658	4952	0	0	3036	222	801	8656	
	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		452	2711	2744	2	842	2658	4952	0	0	3036	222	801	8656	
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		452	708	2744	0	842	192	4929	0	0	2258	11	120	727	

S/ N	Name of Parameter	Bench mark	Aircel	Airtel	BSNL	Etisalat	Idea	RCom	Tata	Loop	Video con	Vodafone	MTS	RCom	Tata
			GSM Operators										CDMA Operators		
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		0	2003	0	2	0	2466	23	0	0	778	211	681	7929
	e) Period of applying credit/waiver/adjustment to the customer's account from the date of resolutions of complaints	<=1 week	100%	100%	100%	100%	100%	100%	100%	NA	NA	100%	100%	100%	100%
8	<b>Response time to customers for assistance</b>														
	a) Accessibility of call centre/Customer Care	>=95%	100%	92.79%	96.17%	98.98%	NP	97.62%	99%	100%	99%	100%	NP	98.28%	98%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	92.67%	90.49%	NP	100%	NP	95.75%	95.40%	100%	97%	96.60%	NP	97.24%	NP
	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		187,766	1,405,774	3,769	3,919	NP	4,111,990	278,808	4	228	3,649,427	NP	1,051,070	319,372
	d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		187,766	1,304,447	3,625	3,879	NP	4,111,990	276,984	4	228	NP	NP	1,033,066	314,575
9	<b>Termination/closure of service</b>	<=7day s	100%	100%	100%	NA	100%	100%	100%	NA	NA	100%	100%	100%	100%
	a) Total No. of requests for Termination / Closure of service received during the quarter		107	22	642	NA	836	192	145	NA	NA	174	1,218	101	743
	b) No. of requests for Termination / Closure of service complied within 7 days during the quarter		107	22	642	NA	836	192	145	NA	NA	174	1,218	101	743
10	<b>Time taken for refunds of deposits after closures.</b>	100% within 60 days	100%	99.53%	100%	NA	100%	100%	100%	NA	NA	100%	100%	100%	100%

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 Rajasthan Service Area are as given below:-

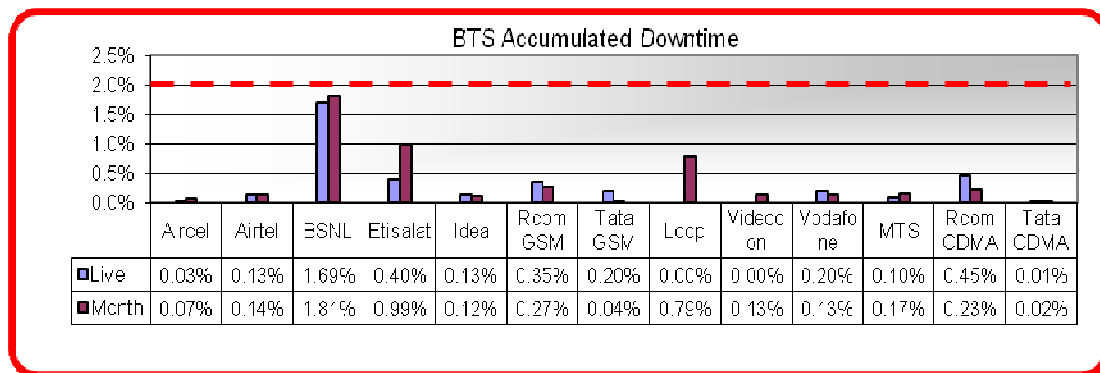
- **BTS accumulated downtime (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark with values laying between 0.02% and 1.81%.
- **Worst affected BTSs due to downtime (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark with values laying between 0% and 1.97%.
- **Call setup success rate (benchmark  $\geq 95\%$ ):** All operators are meeting the benchmark with values laying between 97.72% and 99.77%.
- **SDCCH/PAGING Channel congestion (benchmark  $\leq 1\%$ ):** All operators are meeting the benchmark with values laying between 0% and 0.93%.  
*Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.*
- **TCH congestion (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark with values laying between 0% and 1.89%.
- **Call drop rate (benchmark  $\leq 2\%$ ):** All operators are meeting the benchmark with values laying between 0.29% and 1.87%.
- **Cell exceeding 3% TCH drop (benchmark  $\leq 3\%$ ):** Except for Aircel(5.54%), BSNL(4.98%), Etisalat(4.55%), Tata GSM(4.40%) & MTS(6.79%), rest of the operators are satisfying the benchmark with value in between 0% and 2.98%.
- **Connections with good voice quality (benchmark  $\geq 95\%$ ):** CDMA service providers have declared that the parameter is not system generated. All the GSM operators are meeting the benchmark with values laying between 95.65% and 99.41%.
- **No. of POI's having Congestion (benchmark  $\geq 0.5\%$ ):** Aircel (1), Airtel (4) BSNL (2) & Idea (5) were found to have POIs with  $\geq 0.5\%$  congestion. There was no congestion found overall on the POI, but cases were found where individual POIs are showing high utilization/usage. Some are in the range of over 100% though causing no traffic failure due to overflow technique i.e. the extra traffic is carried over by some other operating POI as has been designed to do so.
- **%age of call answered by operator (electronically) (benchmark  $>95\%$ ):** Except for Airtel, all other operators are meeting the benchmark with values laying between 96.17% to 100%. Data not received from Idea & MTS.
- **%age of call answered by operator (Voice to voice) (benchmark  $>90\%$ ):** All operators are meeting the benchmark with values laying between 90.49% to 100%. Data not received from BSNL, Idea, and MTS & Tata CDMA.
- **Metering and billing credibility-Postpaid (benchmark  $\leq 0.1\%$ ):** Except Aircel, BSNL, Tata GSM & Tata CDMA, rest all operators are meeting the benchmark.
- **Metering and billing credibility-Pre paid (benchmark  $\leq 0.1\%$ ):** Except for Tata GSM & Tata CDMA with value of 0.34% & 0.33% respectively, all the operators are meeting the benchmark with values laying between 0% and 0.04%.
- **Resolution of billing/ charging complaints (benchmark 100% within 4 weeks):** All operators are meeting the benchmark.
- **Termination/Closure of service (Benchmark  $\leq 7$  days):** All operators have satisfied the benchmark.
- **Time taken for refunds of deposits after closures (benchmark 100% within  $\leq 60$  days):** Except for Airtel, all operators have satisfied the benchmark.

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

Sl.	Name of Service Provider	No. of MSC	No. of BSC	No. of BTS
<b>GSM Operators</b>				
1	Aircel Ltd	1	9	1055
2	Airtel Ltd	42	79	6982
3	BSNL	13	50	3595
4	Etisalat	1	1	22
5	Idea	7	21	3222
6	Reliance Communication	4	14	2479
7	Tata Communications	2	12	1436
8	Loop	1	1	6
9	Videocon	1	1	4
10	Vodafone	25	76	6186
<b>CDMA Operators</b>				
11	MTS	2	5	1585
12	Reliance Communication	8	6	1794
13	Tata Communications	7	10	930

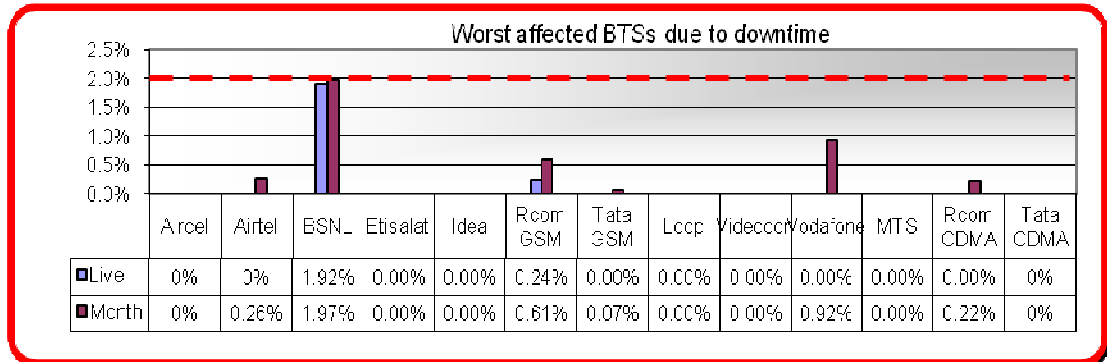
**(4) Performance (Graphical Representation)****Comparison between Live measurements and One month data Audit – Cellular Mobile Telephone Services****A) NETWORK PERFORMANCE**

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

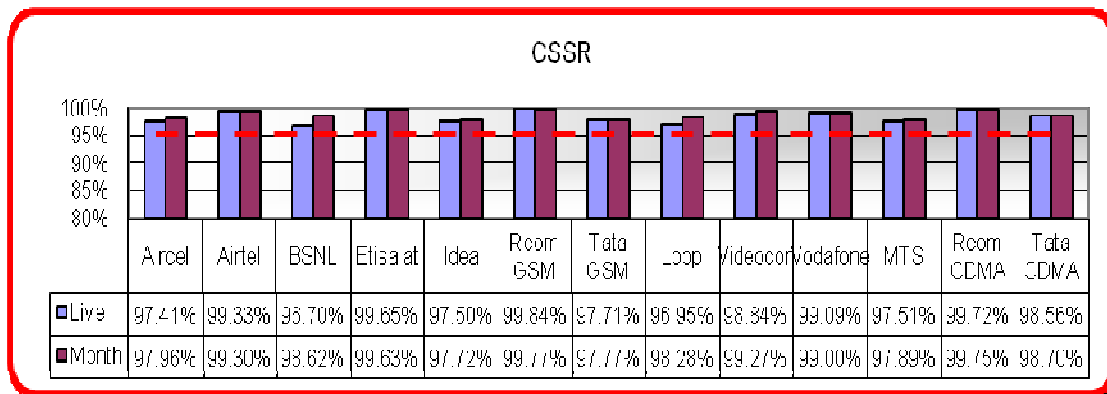




**Worst affected BTSs due to downtime:** All operators are meeting the TRAI benchmarks ( $\geq 2\%$ ) for both one month data and 3 days live data taken in the month of audit.

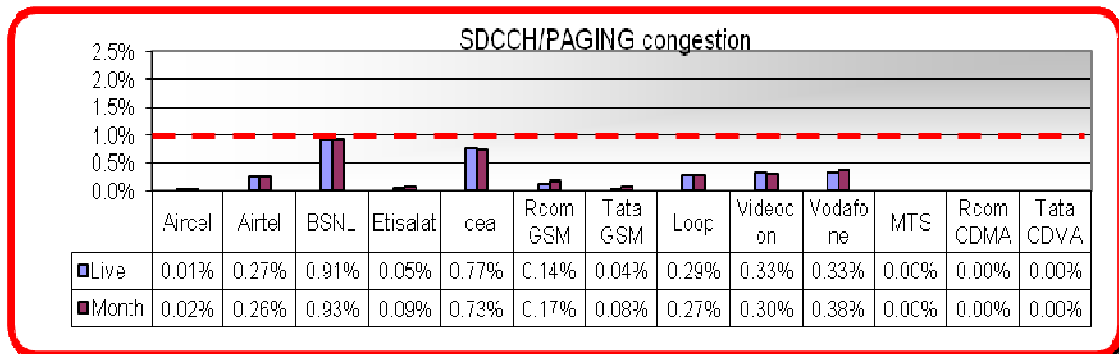


**Call Setup Success Rate (CSSR):** All operators are meeting the TRAI benchmarks ( $\geq 95\%$ ) for both one month data and 3 days live data taken in the month of audit.

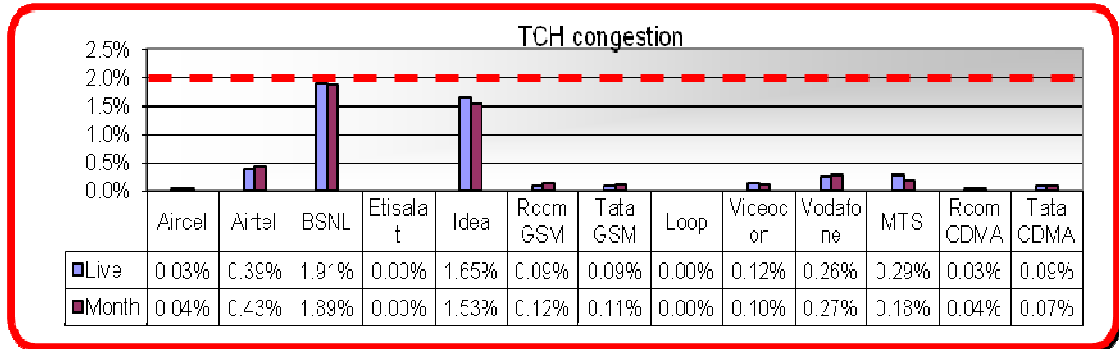


**Blocked call rate:**

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

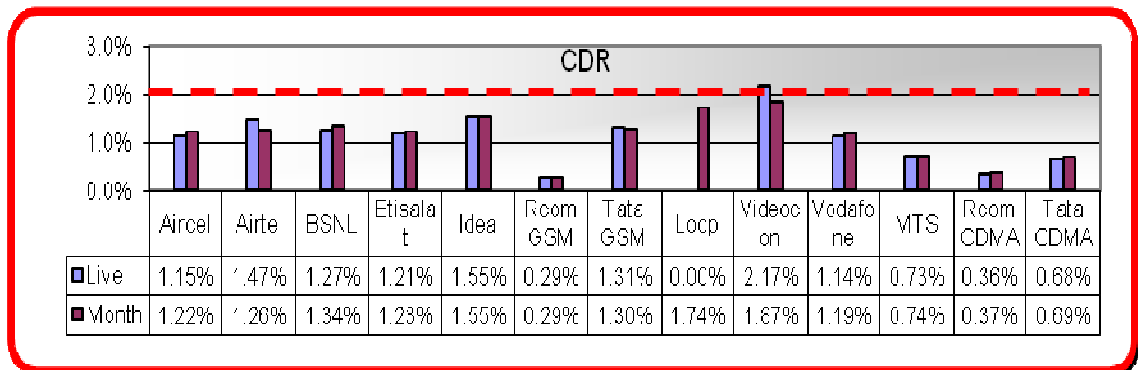


**TCH congestion (%):** All operators are meeting the TRAI benchmarks ( $\leq 2\%$ ) for both one month data and 3 days live data.

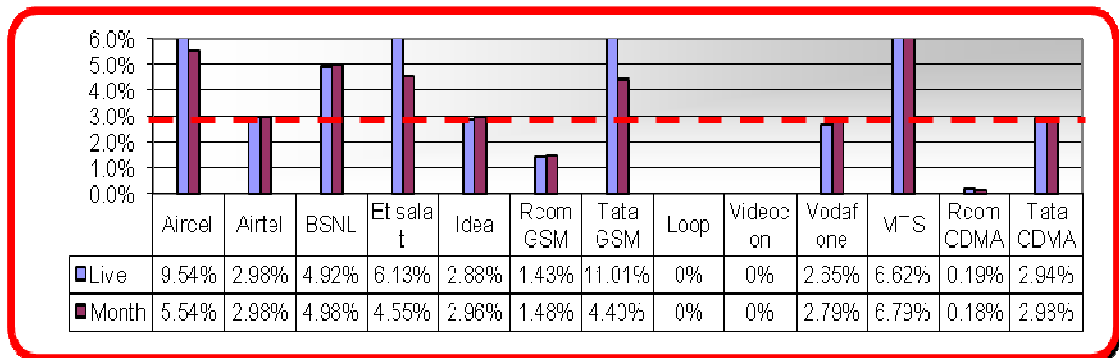


**Connection Maintainability (Retainability):**

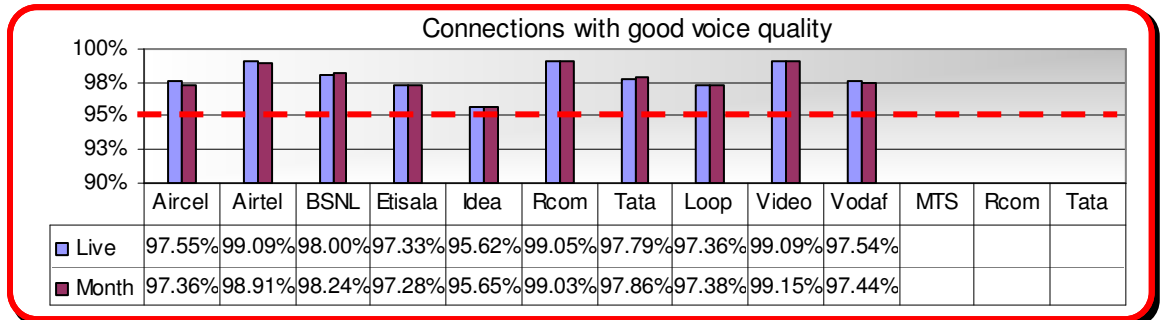
**Call Drop Rate (CDR) (%):** Except Videocon for live data, rests of the operators are meeting the TRAI benchmarks ( $\leq 2\%$ ) for both one month data and 3 days live data.



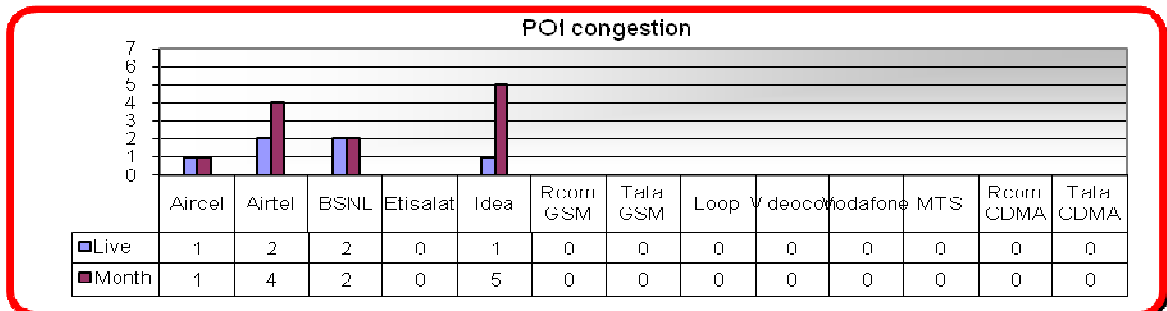
**Worst affected Cell exceeding 3% TCH Drop:** For live and month data, Aircel, BSNL, Etisalat, Tata GSM & MTS with a value of 9.54%, 4.92, 6.13%, 11.01% & 6.62% and 5.54%, 4.98%, 4.55%, 4.40% & 6.79% respectively is found not meeting the benchmark of  $\leq 3\%$ . Rests of the operators are meeting the benchmark for both cases.



**Percentage of connections with good voice quality (benchmark  $\geq 95\%$ ):** All operators are meeting the TRAI benchmarks ( $\Rightarrow 95\%$ ) for both one month data and 3 days live data taken in the month of audit.



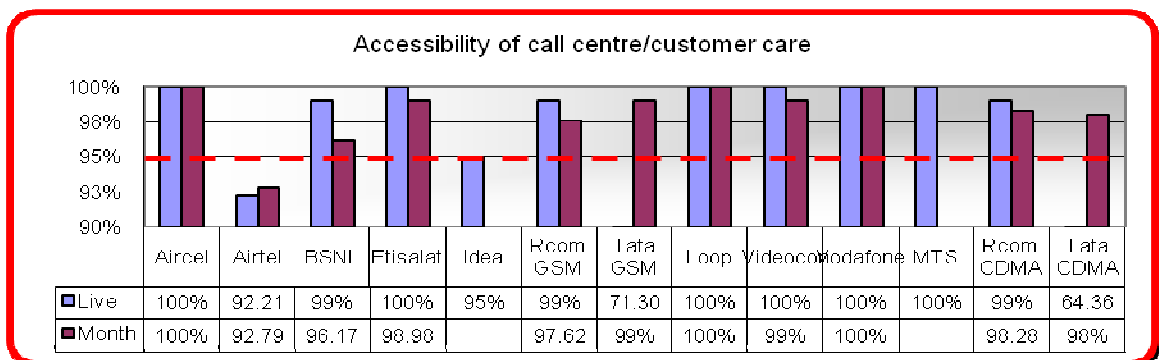
**No of POI's having Congestion  $\geq 0.5\%$ :** Aircel, Airtel, BSNL & Idea were found to have POIs with  $\geq 0.5\%$  congestion.



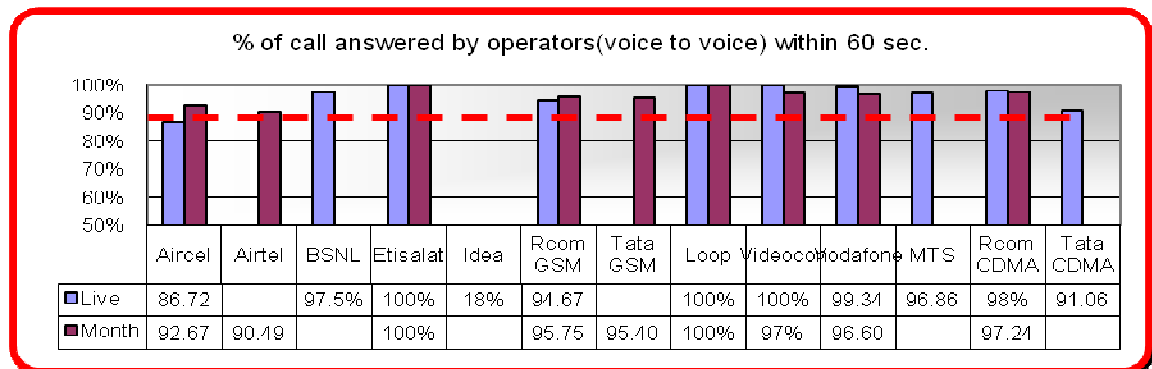
**B) CUSTOMER SERVICE QUALITY PARAMETERS**

**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 Aircel, Tata GSM & Tata CDMA in live data audit and Airtel for both cases.



**Percentage of call answered by operators (Voice to voice) within 60 sec:** For Live data, only Aircel & Idea is not meeting the benchmark. Rest all operators are meeting benchmark for both cases.



### (5) Critical Analysis

From the data table it can be seen that Aircel, BSNL, Etisalat, Tata GSM & MTS are not meeting the benchmark for the parameter of 'Worst affected cells have more than 3% TCH drop rate' and with high margins. This may have happened due to mainly in the change adopted for calculating the parameter considering CBBH instead of TCBH, which reflects more practical way of calculating TCH drop keeping in view customer satisfaction.

Regarding %age of connections with good voice quality all the operators are found to be performing quite well in terms of meeting the benchmark ( $\leq 95\%$ ).

In case of POI congestion all the operators are found to be performing quite well in terms of meeting the benchmark ( $\leq 0.5\%$ ). It is noticed that most of the operators are having individual POI satisfying the benchmark. But in some case overflows on individual POI are noticed causing traffic diversions to obtain the net result for POI congestion.

**(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	Rcom GSM	Tata GSM	Loop	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
Total No. of calls Attempted	100	100	100	2	100	100	100	No Complaints	No Complaints	100	100	100	100
Total No. of calls Answered	96	97	94	2	94	95	94			96	92	94	96
Cases resolved with 4 weeks	96	97	92	2	93	93	92			96	91	92	96
%age of cases resolved	100%	100%	98%	100%	99%	98%	98%			100%	99%	98%	100%

**(3) Live calling to call centre**

Calling Operator	Aircel	Airtel	BSNL	Etisalat	Idea	Rcom GSM	Tata GSM	Loop	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
Total No. of Calls Attempted	100	100	100	100	100	100	100	100	100	100	100	100	100
Total No. of calls connected to IVR	100	100	100	100	100	100	100	100	100	100	100	100	100
Calls got connected to agent within 60 Sec	95	94	92	100	84	94	96	100	100	94	95	93	95
%age of calls got answered	95%	94%	92%	100%	84%	94%	96%	100%	100%	94%	95%	93%	95%

**(4) Level 1 live calling**

Emergency no.	No. of calls made	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
Jaipur											
100	2	2	2	2	2	2	No spectrum in Jaipur	2	2	2	2
101	2	2	2	2	2	2		2	2	2	2
102	2	2	2	2	2	2		2	2	2	2
139	2	2	2	2	2	2		2	2	2	2
Kota											
100	2	2	2	2	2	2	2	2	2	2	2
101	2	2	2	2	2	2	2	2	2	2	2
102	2	2	2	2	2	2	2	2	2	2	2
139	2	2	2	2	2	2	2	2	2	2	2
Bikaner											
100	2	2	2	2	2	2	2	2	2	2	2
101	2	2	2	2	2	2	2	2	2	2	2
102	2	2	2	2	2	2	2	2	2	2	2
139	2	2	2	2	2	2	2	2	2	2	2

**(5) Critical Analysis**

Random numbers were selected (for whom refund were given) 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% in most of the cases as claimed by their records.

For the call centre calling, it was found that all the operators are having the benchmark performance except Idea which is having only 84% calls answered by operator with 60 seconds.

Level-1 emergency calls were also made in Jaipur and the performance of operators was found to be satisfactory.

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

A sample of 2x50 test calls per Service Providers with in the licensed service area (Rajasthan Circle) were made between 1900 to 2000 hrs and between 2000 to 2100 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)	Loop	Videocon	Vodafone	MTS	Reliance (CDMA)	Tata (CDMA)
<b>Aircel</b>	-	100%	99%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
<b>Airtel</b>	100%	-	99%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
<b>BSNL</b>	100%	100%	-	100%	100%	100%	100%	100%	100%	100%	100%	99%	100%
<b>Etisalat</b>	100%	100%	100%	-	100%	100%	100%	100%	100%	100%	100%	97%	100%
<b>Idea</b>	100%	98%	98%	100%	-	100%	100%	100%	100%	100%	100%	100%	100%
<b>Reliance (GSM)</b>	100%	100%	100%	100%	100%	-	100%	100%	100%	100%	100%	100%	100%
<b>Tata (GSM)</b>	99%	96%	100%	100%	100%	97%	-	97%	100%	100%	100%	100%	100%
<b>Loop</b>	100%	100%	99%	100%	100%	100%	100%	-	100%	100%	100%	100%	100%
<b>Videocon</b>	100%	98%	100%	100%	99%	98%	100%	100%	-	99%	100%	100%	99%
<b>Vodafone</b>	100%	100%	100%	100%	100%	100%	100%	100%	100%	-	100%	100%	100%
<b>MTS</b>	100%	98%	99%	100%	100%	100%	100%	100%	100%	98%	-	100%	100%
<b>Reliance (CDMA)</b>	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	-	100%
<b>Tata (CDMA)</b>	98%	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 Rajasthan 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*****JAIPUR***

LOW DENSE: Ganpati Plaza, MI Road, Ajmeri Gate, Ramniwas Bagh, JLN Marg, Jawahar Circle, Sangner, Mansarover, Nirman Nagar, Queens Road, Khatipura, Jhotwara, Sikar Road, VKI, Vidhydharnagar, Ambabari, Panipech, Collectorate Circle

MEDIUM DENSE: Collectorate Circle,Khasa Kothi,Govt Hostel,22 Godown,Tonk Puliya,Gopalpura Bypass,EP

HIGH DENSE: MI Road,Ajmeri Gate,Sanganeri Gate, Johari Bazar,Badi Choupar,Choti Choupar,Busstand,Ganpati Plaza

***KOTA***

LOW DENSE: Vigyan Nagar, dadabari, Talwandi, CAD, Aerodram

MEDIUM DENSE: Kherli Phatak,railway station.collectorate,jdb college

HIGH DENSE: Nayapura,Rampura,Sabjimandi,kethunipole,Dadabari

***BIKANER***

LOW DENSE: Lalgarrh Railway Station.Mdv Colony,Nehru Chowk

MEDIUM DENSE: Bhinasar,New Line,Gangashahr,Rani Bazaar

HIGH DENSE: Railway station,Khem Road,Mugal Palace

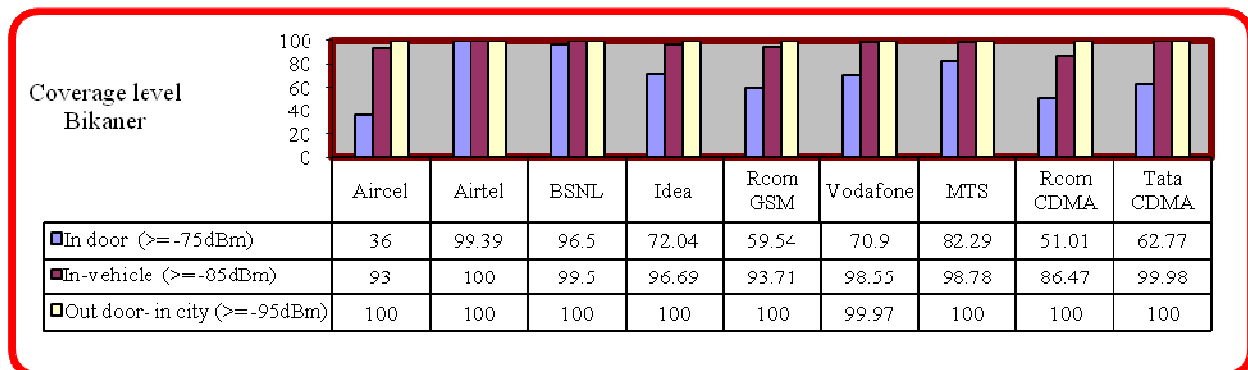
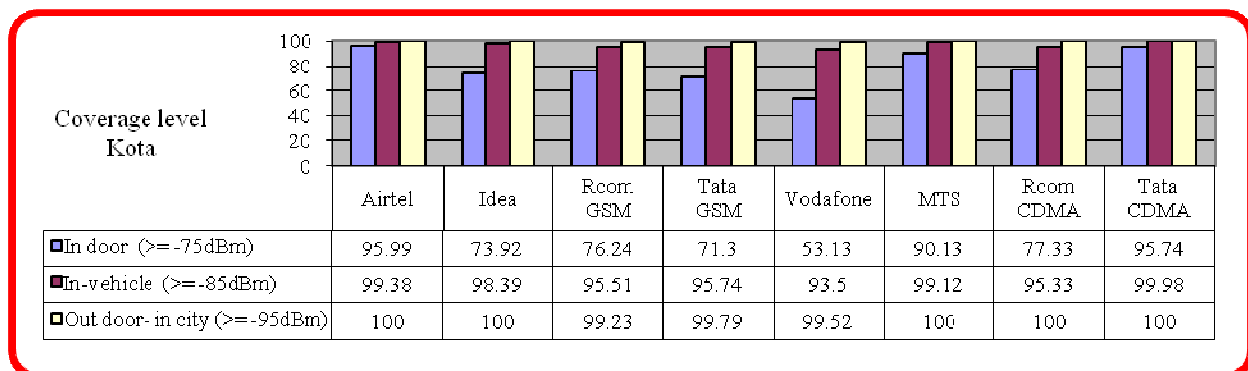
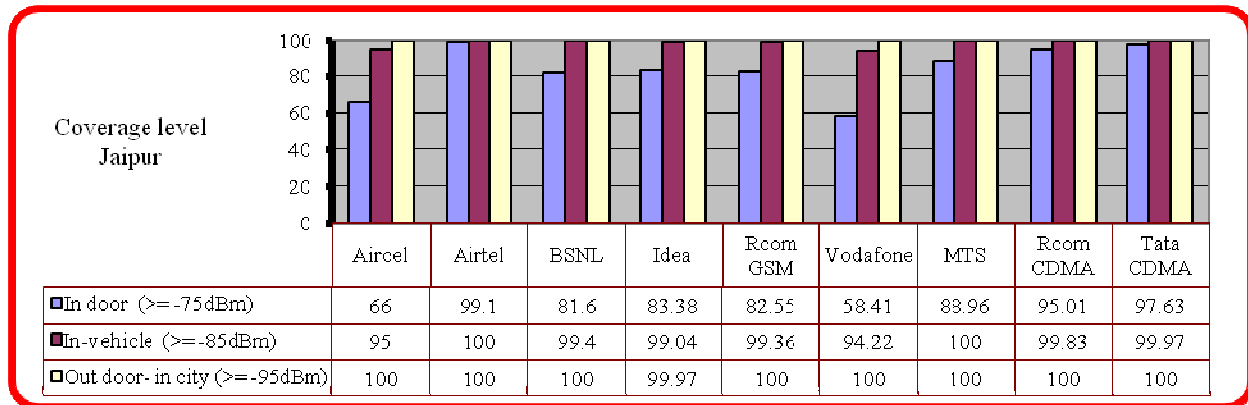


## 2) Drive test report performance dependent(for the respective cities)

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom	Tata	Vodafone	MTS	Rcom	Tata
			GSM Operators						CDMA Operators			
1.1	Call Attempts	Jaipur	89	150	92	114	108		120	88	92	103
		Kota		105	58	78	75	68	80	64	70	71
		Bikaner	171	98	93	128	118		154	97	118	134
1.2	Blocked Call Rate (<=3%)	Jaipur	0%	0%	2%	0%	0.93%		0%	0%	0%	1.94%
		Kota		0%	0%	0%	2.67%	0	0%	0%	0%	0%
		Bikaner	0.58%	0%	1.07%	1.56%	0%		0.64%	0%	0%	0%
1.3	Dropped Call Rate (<=2%)	Jaipur	0%	0%	2%	0%	0%		0%	0%	1.08%	0%
		Kota		0%	3.45%	1.28%	1.33%	1.47	0%	0%	0%	0%
		Bikaner	0%	0%	0%	0.79%	0%		0%	0%	0%	0%
1.4	Percentage of connections with good voice quality (=>95%)											
	(i) 0-4 (w/o frequency hopping)	Jaipur								99.08%	98.82%	99.23%
		Kota								99.97%	99.66%	99%
		Bikaner								99.36%	98.19%	99%
	(ii) 0-5 ( with frequency hopping)	Jaipur	95.79%	96.35%	96.69%	97.43%	97.34%		95.95%			
		Kota		96.23%	NP	96.18%	97.79%	95.17%	96.2%			
Bikaner		95.26%	96.58%	98.5%	99.8%	96.36%		95.6%				
1.5	Service Coverage											
	In door (>= -75dBm)	Jaipur	66%	99.1%	81.6%	83.38%	82.55%		58.41%	88.96%	95.01%	97.63%
		Kota		95.99%	NP	73.92%	76.24%	71.3%	53.13%	90.13%	77.33%	95.74%
		Bikaner	36%	99.39%	96.5%	72.04%	59.54%		70.9%	82.29%	51.01%	62.77%
	In-vehicle (>= -85dBm)	Jaipur	95%	100%	99.4%	99.04%	99.36%		94.22%	100%	99.83%	99.97%
		Kota		99.38%	NP	98.39%	95.51%	95.74%	93.5%	99.12%	95.33%	99.98%
		Bikaner	93%	100%	99.5%	96.69%	93.71%		98.55%	98.78%	86.47%	99.98%
	Outdoor- in city (>= -95dBm)	Jaipur	100%	100%	100%	99.97%	100%		100%	100%	100%	100%
		Kota		100%	NP	100%	99.23%	99.79%	99.52%	100%	100%	100%
Bikaner		100%	100%	100%	100%	100%		99.97%	100%	100%	100%	
1.6	Call Setup Success Rate (>=95%)	Jaipur	100%	100%	98%	100%	99.07%		100%	100%	100%	98.06%
		Kota		100%	100%	100%	97.33%	100%	100%	100%	100%	100%
		Bikaner	99.42%	100%	98.93%	98.44%	100%		99.36%	100%	100%	100%

## Graphical Representation

The Radio coverage level as was found in the operator assisted drive test result is shown graphical below:



### (3) Critical Analysis

The drive test data was found to be satisfactory for most of the operators. Only BSNL is not meeting the parameter "Call Drop rate" with a value of 3.45% in Kota.

**(E) Independent Drive test**

*--- Submitted as a Separate report*

**(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 (Rajasthan) is satisfactory for **Network Parameters**. However, the benchmark of  $\leq 3\%$  for “worst affected cells  $> 3\%$  TCH drop” is not met by Aircel, BSNL, Etisalat, Tata GSM and MTS. Aircel provided the reason for high value in TCH drop as of low call volume and also thunderstorms were also prevalent in circle which has further increased the drop in few cells.

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

Regarding **Metering/Billing Credibility** issues, Aircel, BSNL, Tata GSM, & Tata CDMA show below benchmark value for Post-paid connections and Tata GSM & Tata CDMA for Pre-Paid Connections.

During **Drive Test** only BSNL was found to have a high CDR in Kota.

## II. Basic Telephone Service (Wireline) Providers

### (A) Exchange Audit

#### 1) 3 days live data & One month audit comparative table

S/N	Parameters	Benchmarks	Audit Period	BSNL	Airtel	RCom	Sistema
<b>1</b>	<b>Fault incidences</b>						
	(No. of faults/100 subscribers /month)	< 5%	Month	4.70%	1.41%	0.30%	NP
<b>2</b>	<b>Faults Repair/Restoration Time</b>						
	Fault repair by next working day(Urban Area)	>90%	Month	96.58%	99.00%	100%	99.62%
	Within 3 days day	100%		99.33%	100%	100%	100%
	Fault repair by next working day(Rural & hilly Area)	>90%		96.58%	NA	NA	99.48%
	Within 5 days	100%		99.82%	NA	NA	100%
	Mean time to Repair(MTTR)	≤8 Hrs		5.91 hrs	3.28 hrs	2.26 hrs	5.82 hrs
<b>3</b>	<b>Rent Rebate</b>						
	Fault pending > 3 days & <7 days	Rebate for 7 days	Month	NP	0	0	2
	Fault Pending > 7 days & < 15 days	Rebate for 15 days		NP	0	0	0
	Fault pending > 15 days	Rebate for 1 month		NP	0	0	0
<b>4</b>	<b>Call Completion Ratio(CCR) &amp; Answer to seizure Ratio(ASR)</b>						
	CCR & ASR	> 55%(CCR) & > 75%(ASR)	Live	NP	93.84%	90.78%	87.06%
			Month	70.69%	93.18%	89.47%	87.32%
<b>5</b>	<b>Metering &amp; Billing Performance</b>						
	Disputed Bills over bills issued	< 0.1%	Month	NP	0.14%	0.06%	0.09%
	% of billing complaints resolved within 4 weeks	100%		NP	100%	100%	100%
	Period of all refunds/payments from the date of resolution of complaints within 1weeks	100%		NP	100%	100%	100%
<b>6</b>	<b>POI Congestion</b>						
	No. Of POI's having congestion >0.5%		Live	NP	1	0	0
			Month	NP	0	0	0
<b>7</b>	<b>Response Time to customer for assistance</b>						
	Accessibility of Call centre/customer Care within 40 seconds	≥95%	Live	NP	96%	99%	NP
			Month	NP	98.06%	96%	97.76
	% age of calls answered by operator(voice to voice) within 60 seconds	≥90%	Live	NP	76%	97%	NP
			Month	NP	90.25%	90%	95.2%
<b>8</b>	<b>Customer care(promptness in attending to customers request</b>						
	Termination / Closures	100%	Month	NP	100%	100%	100%
	Time taken for refunds of deposit after closures	100%		NP	100%	100%	100%

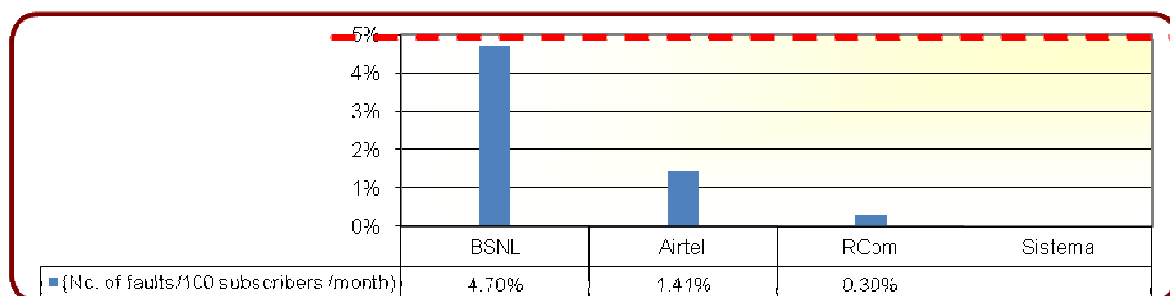
NA – Not Applicable, NP – Not Provided.

Note:

a) For S/N 4 Reliance filed ASR instead of CCR rest of operators filed CCR.

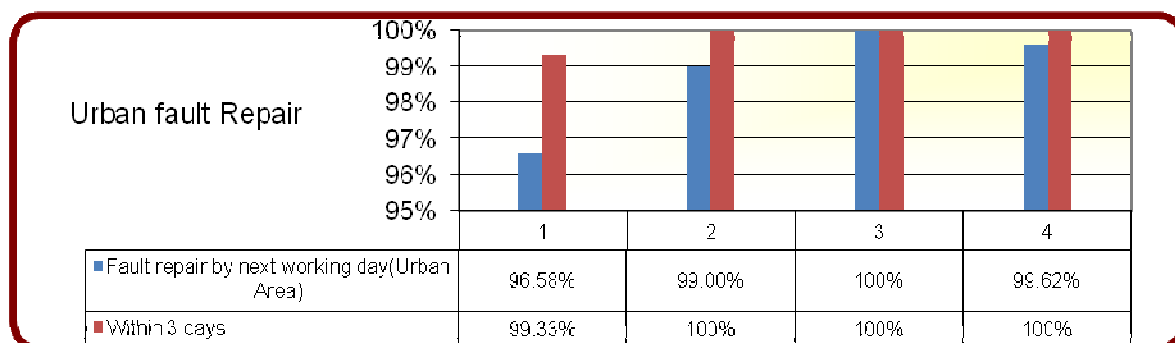
## 2) Performance (Graphical representation)

**Fault incidences (No of faults/100 subscribers/month ( $\leq 5\%$ ):** All the operators are meeting the benchmark set by TRAI.



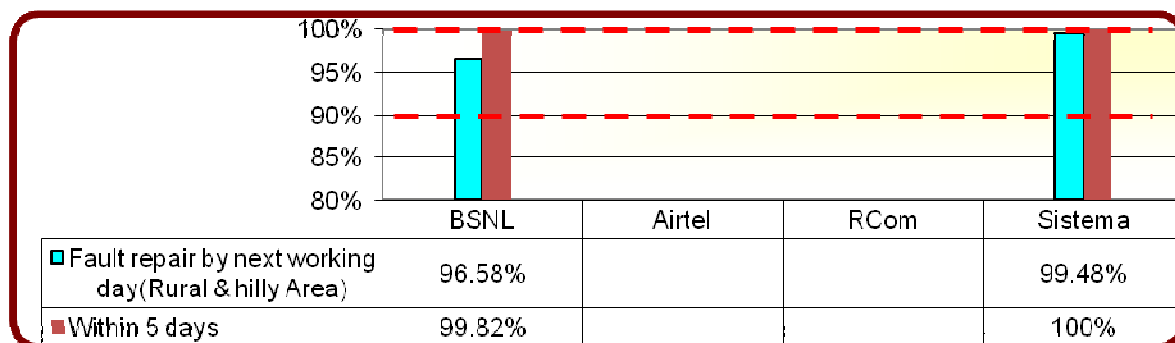
### Fault Repair (Urban Area):

- **By next working day (>90%):** All the operators comply with the TRAI benchmark of 90%.
- **Within 3 days (100%):** All the operators comply with the TRAI benchmark of 100% except for BSNL with a value of 99.33%.



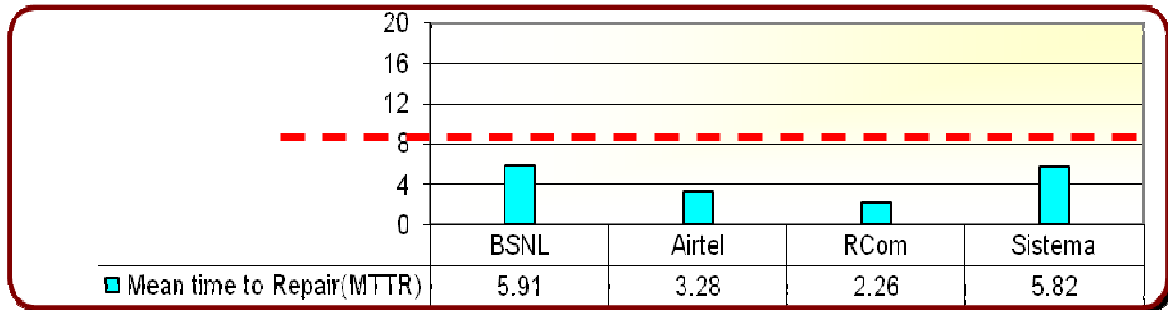
### Fault Repair (Rural/ Hilly Area):

- **By next working day (>90%):** All the operators comply with the TRAI benchmark of 90%.
- **Within 5 days (100%):** All the operators comply with the TRAI benchmark of 100% except for BSNL with a value of 99.82%.

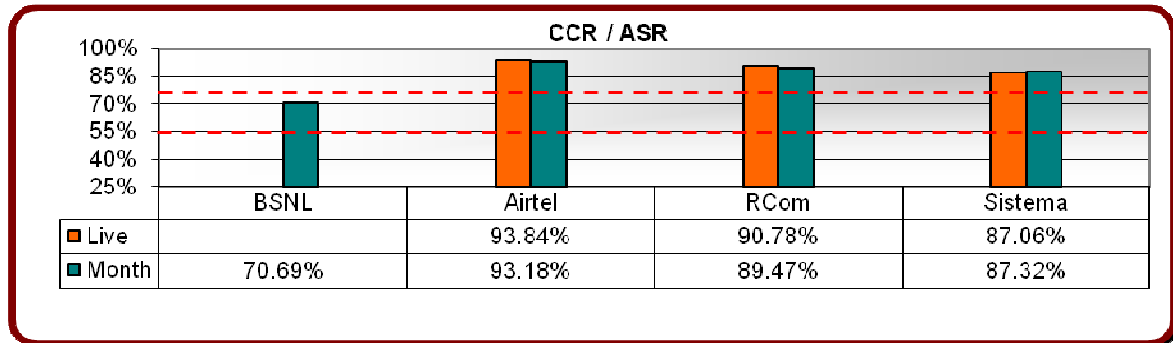


\* Airtel & Rcom is not having services in Rural/Hilly area.

**Mean Time to Repair (MTTR) (<= 8 Hrs):** All the operators comply with the TRAI benchmarks.

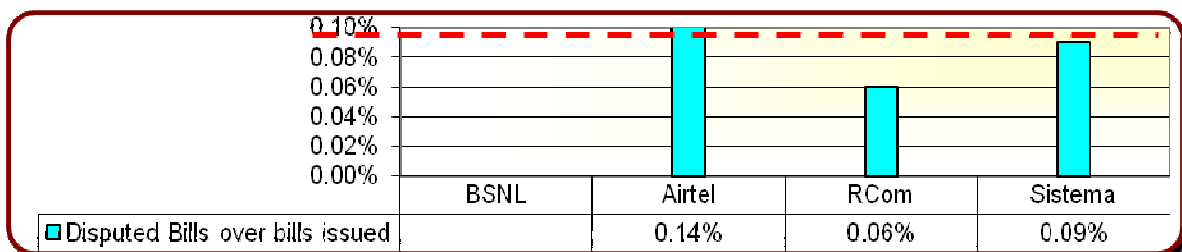


**Call Completion Rate (CCR)/ Answer to Seizure Ratio (ASR) (>55% & > 75%):** All the operators comply with the TRAI standards in both live and one-month data verification. Other than Rcom, which have given ASR rest of the operators, gave CCR value.



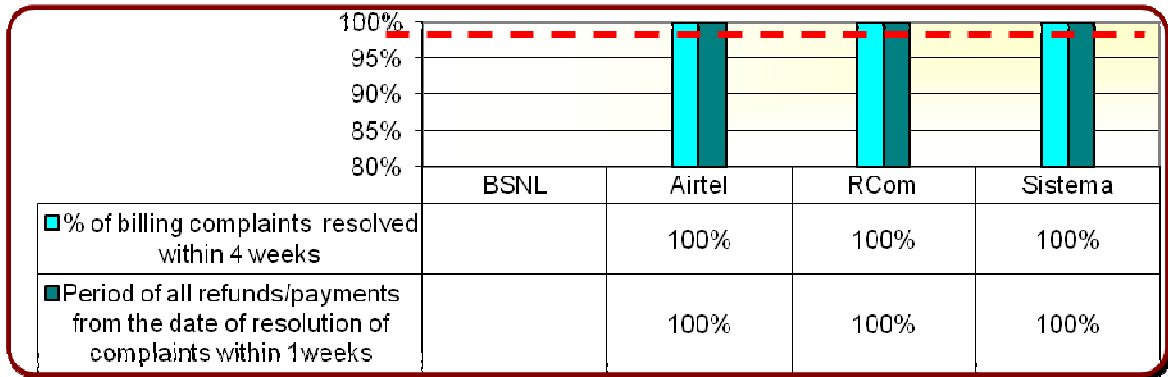
**Metering and Billing Credibility (< 0.1%):**

**Disputed Bills over Bills issued:** - Except for Airtel, All the operators comply with the TRAI standards with a value laying in between 0.06% and 0.09% for one-month data verification.

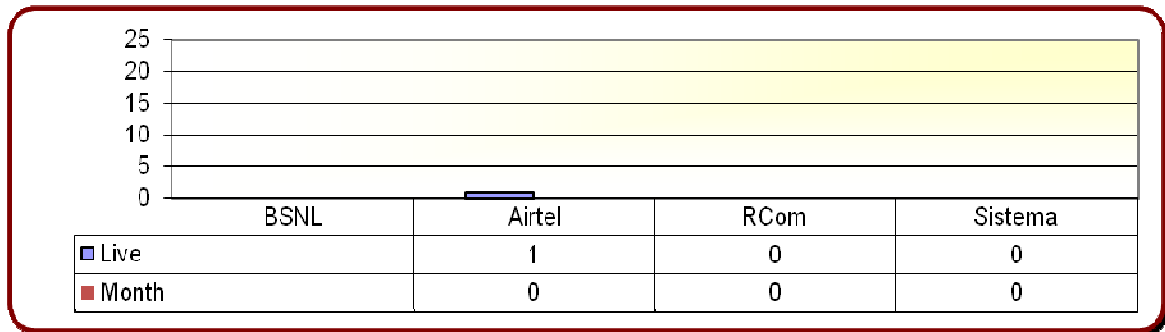


**% of Billing Complaints resolved within 4 Weeks:** All the operators have resolved billing complaints 100% (benchmark) within 4 weeks.

**Period of All refunds / Payments from the date of Complaints Within 1 week:** As far as period of refunds from the date of complaints within 1 week, all the operators are meeting the benchmark of 100%.

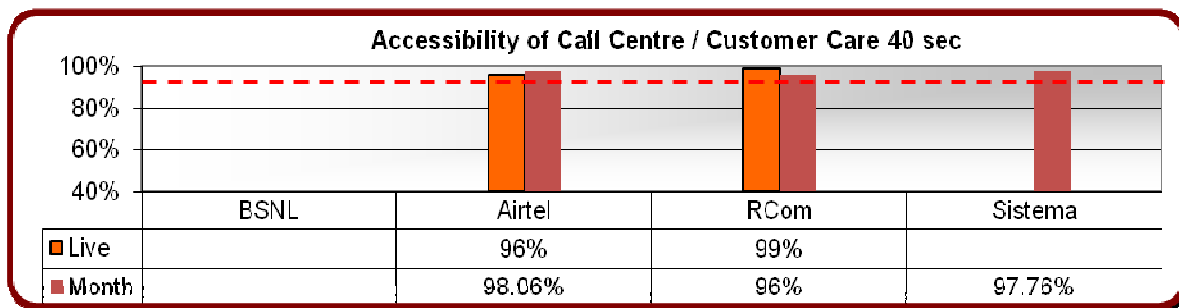


**No. of POI's having  $\geq 0.5\%$  POI Congestion:** All the operators are complying with the TRAI benchmark. In case of Live data, 1 POI of Airtel having congestion  $> 0.5\%$ .

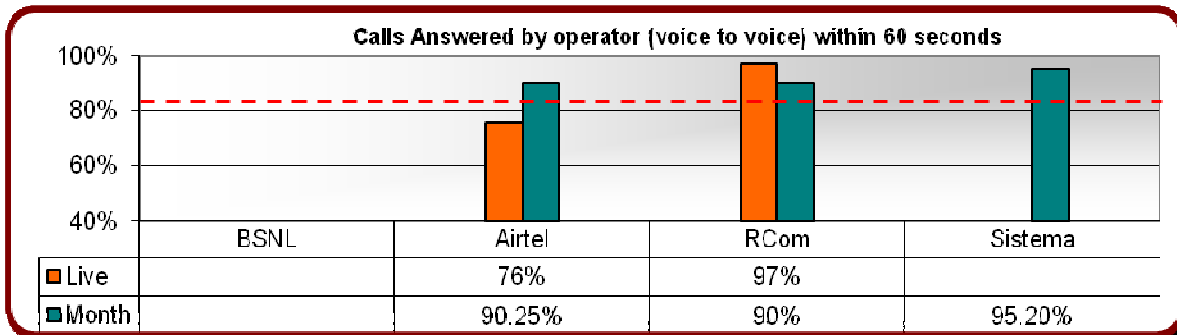


**Response Time to Customer for Assistance:**

**Accessibility of Call centre / customer care (Electronically) within 40 sec ( $> 95\%$ ):** All the operators meeting the benchmark set by TRAI in both live and one-month data verification.



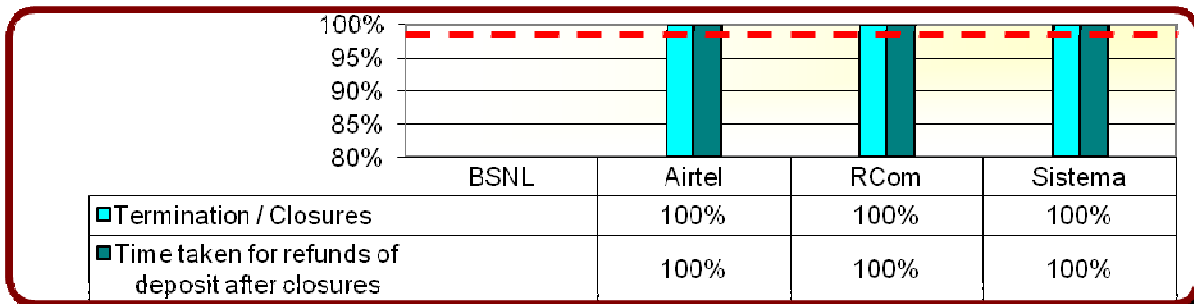
**% age of calls answered by operator (Voice to Voice) within 60 sec (>90%):** All the operators meeting the TRAI benchmark except Airtel with the value of 76% in live data verification



**Customer Care Promptness in Attending Customer Request:**

(i) Termination/Closure: All the operators are meeting the TRAI benchmarks of 100% within ≤ 7 days for closure requests.

ii) Time taken for refund of deposits after closure: The audit finding on ‘time taken for refund of deposit after closure’ is that all the operators are providing the refund to the customers within the benchmark.





### 3) Customer Care & Grievances Redressal

S.N.	Parameters	BSNL	Airtel	Rcom	Sistema
1	Total no of complaints received in the call centre (Tech+ Non Tech)	NP	1234	78	3138
3	<b>Nodal Officer</b>				
3.1	Total no of complaints received by the nodal officers	NP	11	Nil	8
3.2	Percentage of complaints with reference to total no of complaints received at the call centre	NP	0.89%	Nil	0.25%
4	<b>Appellate Authority</b>				
4.1	Total no of appeals received by the appellate authority	NP	10	Nil	0
4.2	Percentage of appeal received with reference to total no of complaints received by the nodal officers	NP	90.91%	Nil	0%

**Note:**

It is found that there are many instances where customers directly approach to Nodal Officer without approaching to Call Center for Redressal. Similarly there are many instances where customers directly approach to Appellate Authority without approaching to Nodal Officer for their grievances Redressal.

### 4) Level 1 live calling

Emergency no.	No. of calls made	At Jaipur				At Ajmer				At Jodhpur			
		BSNL	Airtel	MTS	RCOM	BSNL	Airtel	MTS	RCOM	BSNL	Airtel	MTS	RCOM
100	10	10	10	10	10	10				10			
101	10	10	10	10	10	10				10			
102	10	10	10	10	10	10				10			

### 5) Critical Analysis

The parameter wise key takeouts for the Basic (Wireline) Service providers for the Rajasthan Circle are as under:-

**Fault incidence:**

All operators are meeting the benchmark.

**Fault Repair/Restoration:**

For urban areas, all the operators are meeting the benchmarks set by TRAI except for BSNL for the parameters “fault repair within 3 working days” with the value of 99.33%.

Airtel & Rcom do not have any services in rural areas. Sistema is meeting the TRAI benchmarks for fault repair in rural areas but BSNL has a minor deviation (99.82%) for repairs within 5 days. All the operators are providing rebate to eligible customers as per records.

**Mean time to Repair (MTTR)**

All the operators are meeting the benchmark.

**Call Completion Rate (CCR):**

All the service providers are found to be meeting TRAI benchmark of  $\geq 55\%$  for the parameters Call Completion Rate (CCR) and  $\geq 75\%$  and Answer to Seizure Ratio in both live and one- month data verification.

**Metering and billing credibility:**

Except Airtel, other operators are complying to the benchmark of less than 0.1% billing complaints over the total number of bills issued.

**% of Billing complaints Resolved Within 4 Weeks:**

As per the findings for one-month data audit, all the operators were found 100% resolution of complain within 4 weeks.

**Period of refunds/Payments from the date of resolution within 1 Week:**

As per the findings for one-month data audit, all the operators were found 100% refunds from the date of resolution within 1 week.

**POI Congestion:**

Except Airtel for live data, All the operators are meeting the benchmarks in POI Congestion set by TRAI ( $< 0.5\%$ ) in both live and one- month data verification.

**Response Time to Customer for Assistance:**

**(i) Accessibility of Call Centre/ Customer care within 40 seconds (Electronically)**

For accessibility of call centre i.e. call answered electronic through IVR menu parameter all the operators are meeting the benchmarks of  $\geq 95\%$  in both live and one- month data verification.

**(ii) % of Call answered by operators within 60 seconds (Voice to Voice):**

For the parameter “%age of calls answered by operators within 60 Seconds” all the operators are meeting the benchmark of 90% fixed by TRAI except for Airtel with the value of 76% in live data verification.

**Customer care (Promptness of attending customer request):**

**(i) Termination/Closure: -**

All the operators are meeting the TRAI benchmarks of 100% within  $\leq 7$  days for closure requests.

**ii) Time taken for refund of deposits after closure:**

The audit finding on ‘time taken for refund of deposit after closure’ is that all the operators are providing the refund to the customers within the benchmark.

## **(B) Compliance Report (Status of service providers with respect to the QoS)**

It can be seen from the table and graphical method that in both cases of live performance and month data verification there is consistency in the parameters. Also for each parameter trend's can be analysis comparing both type of data. This may help out the operators in making decision in view of their network performance so as to give customer satisfaction to its highest level, thus helping out TRAI to achieve its goal.

Observation & Findings for the Live and One-Month data measurement for Basic Service (Wireline) are as given below:

### **AIRTEL**

In network QoS parameters section, Airtel is meeting the benchmark in both live and one-month data verification for Call Completion Ratio and POI congestion. But in Customer quality Parameters, Airtel is not meeting benchmark for parameter "Disputed Bills over bills issued" & "% age of calls answered by operator(voice to voice) within 60 seconds" respectively.

### **BSNL**

BSNL has provided data for "Fault incidence & repair" and CCR only. It is meeting the fault repair parameter for urban & rural areas for repairs within next day only. For fault repairs with 3 days for urban areas and within 5 days for rural areas, it has slight deviation from the benchmark.

### **SISTEMA**

Sistema is meeting the benchmark in both live and one-month data verification

### **RCOM**

Reliance is meeting the benchmark in both live and one-month data verification Reliance has provided ASR (Answer to Seizure ratio) value instead of CCR (call completion ratio).

### III. Broadband Service Providers

#### (A) POP Audit

##### (1) 3 days live data & One month audit comparative table

S/N	Parameters	Benchmarks	Audit Period	BSNL	Airtel	Rcom	TCISL	Sify	Tikona
<b>1</b>	<b>Service Provisioning/Activation Time</b>								
1.1	100% cases in 15 days (subject to technical feasibility)	<15 days	Month	100%	100%	100%	100%	100%	100%
1.2	In all cases where payment towards installation charge & SD is taken and the Broadband connection is not provided within 15 working days	credit @ Rs.10/ per day.		100%	100%	100%	100%	100%	100%
<b>2</b>	<b>Faults Repair/Restoration Time</b>								
	By next working day	>90%	Month	95.00%	99.80%	100%	98%	67.64%	100%
	within 3 working day	≥99%		100%	100.00%	100%	98%	97%	100%
<b>2.1</b>	<b>Rebate</b>								
	Faults Pending for > 3 working days and < 7 working days: (Rebate equivalent to 7 days of minimum monthly charge or equivalent usage allowance)		Month	0	7	0	471	7	0
	Faults Pending for > 7 working days and < 15 working days: (Rebate equivalent to 15 days of minimum monthly charge or equivalent usage allowance)			0	11	0	96	2	0
	Faults Pending for > 15 working days:(Rebate equivalent to one month of minimum monthly charge or equivalent usage allowance)			0	0	0	12	1	0
<b>3</b>	<b>Billing Performance</b>								
	Billing complaints per 100 bills issued	<2%	Month	0.18%	0.01%	0.11%	NP	NA	NP
	%age of complaints resolved within 4 weeks	100%		100%	100%	100%	NP	NA	NP
	Time taken for refund of deposits after closure (within 60 days)	100%		100%	100%	100%	NP	NA	NP
<b>4</b>	<b>Response time to the customer for assistance % age of calls answered by operator (Voice to Voice)</b>								
	within 60 sec	>60%	Live	NP	95%	95.85%	95%	99%	NP
			Month	87%	88.88%	88.79%	97%	98.97%	37%
	within 90 sec	>80%	Live	NP	98.8%	97.62%	100%	98%	NP
			Month	96%	93.50%	91.34%	98%	90.28%	43%

S/N	Parameters	Benchmarks	Audit Period	BSNL	Airtel	Rcom	TCISL	Sify	Tikona
<b>5</b>	<b>Bandwidth Utilization/ Throughput: (If on any link(s) / route bandwidth utilization exceeds 90%, then network is considered to have congestion. For this additional provisioning of Bandwidth on immediate basis, but not later than one month, is mandated.) &lt; 80% link(s) / route bandwidth utilization during peak hours (TCBH).</b>								
5.1	POP to ISP Gateway Node [Intra-network] Link(s)	< 80 %	Live	NP	48%	25.28%	37%	75%	29.96%
			Month	NP	48%	11.40%	41%	84%	NP
5.2	ISP Gateway Node to IGSP / NIXI Node upstream Link(s) for International connectivity	< 80 %	Live	NP	NP	NP	49%	Nil	63.23%
			Month	NP	NP	NP	70%	Nil	NP
5.3	Broadband Connection Speed (download) - from ISP Node to User	> 80 %	Live	NP	100%	99%	96.70%	91.40%	NP
			Month	NP	100%	NP	92.44%	91.56%	NP
<b>6</b>	<b>Network latency (for wired broadband access)</b>								
	Service Availability(%)	>98%	Month	99.94%	99.99%	99.99%	100%	100%	100%
<b>7</b>	<b>Packet loss</b>								
	% of Packet loss	<1%	Live	0%	0%	0%	0%	0%	0%
			Month	0%	0%	0.17%	0%	0%	0%
<b>8</b>	<b>Network latency (for wired broadband access)</b>								
8.1	User reference point at POP/ISP Gateway node to IGSP/NIXI	<120 ms	Live	NP	16	NP	29	35.6	1
			Month	NP	18	88.1	22	35	1
8.2	User reference point at ISP Gateway node to International nearest NAP port abroad (terrestrial)	<350 ms	Live	NP	3	59	275	288	267
			Month	NP	NP	54	277	289	NP
8.3	User reference point at ISP Gateway node to International nearest NAP port abroad (satellite)** See note below	<800 ms		NA	NA	NA	NA	NA	NA

NA – Not Applicable, NP – Not Provided.

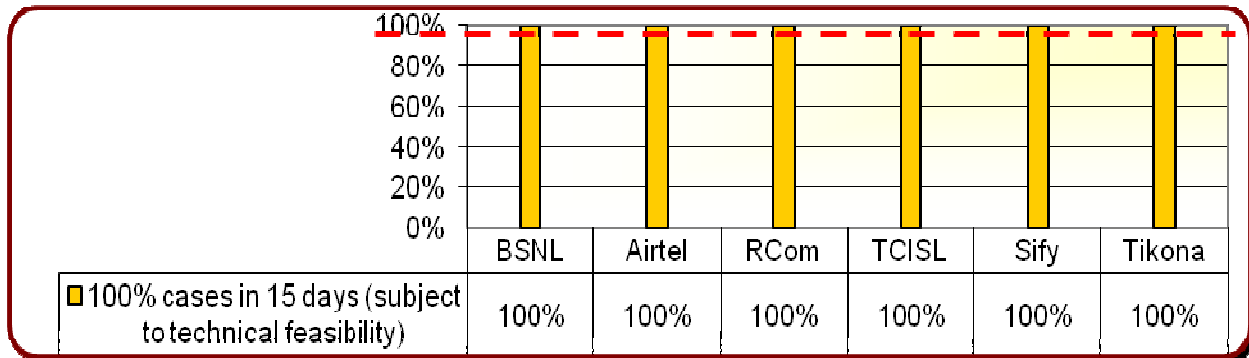
Note:

- S/N 8.3 None of the operator having satellite connectivity.
- S/N 3 For Sify not applicable because they have only prepaid customer.

## 2) Performance (Graphical representation)

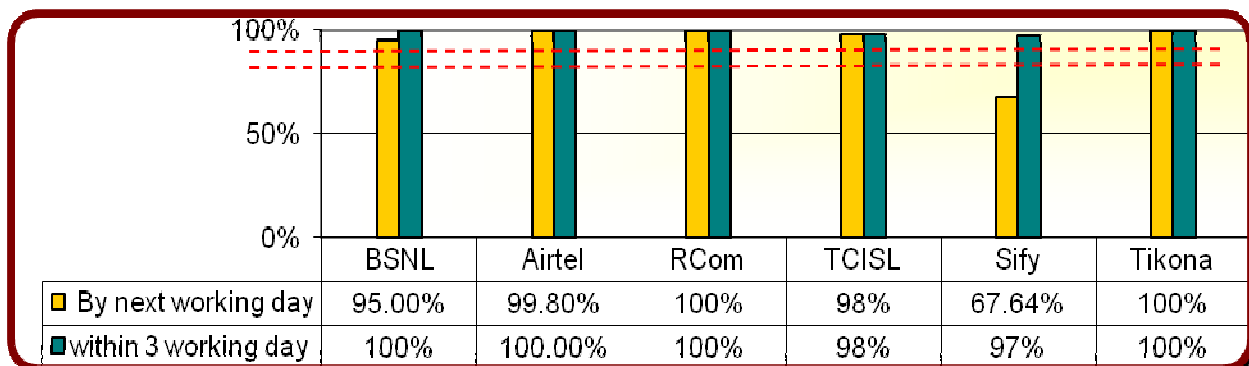
### Service Provisioning /Activation Time: (Should be 100%)

All the operators are complying with the TRAI benchmark of 100% in one-month data verification.



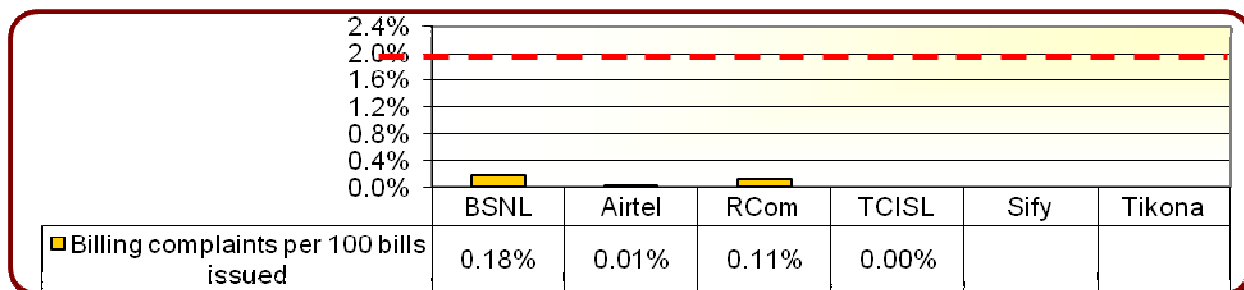
### Fault Repair / Restoration Time:

- **By next working day (>90%):** All the operators are complying with the TRAI benchmark of 90% except Sify with a value of 67.64% in one-month data verification
- **Within 3 working days (>99%):** All the operators are complying with the TRAI benchmark of 99% except TCISL & Sify in one-month data verification.
- **Rebate:** All the operators are giving rebate to the eligible customers.

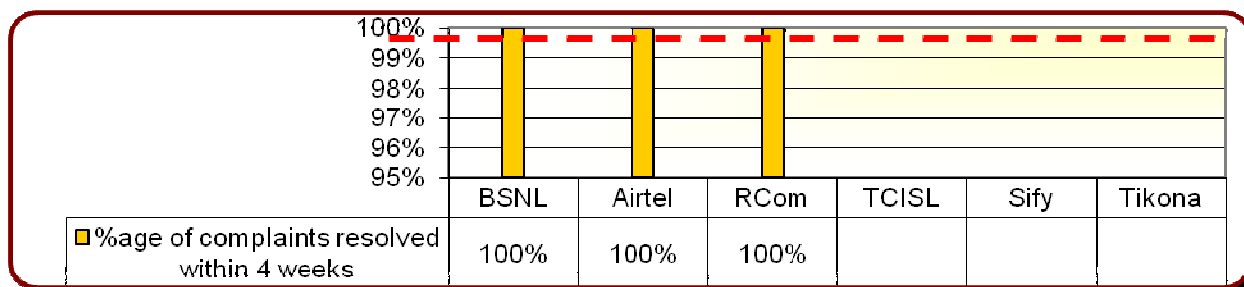


**Billing Performance:**

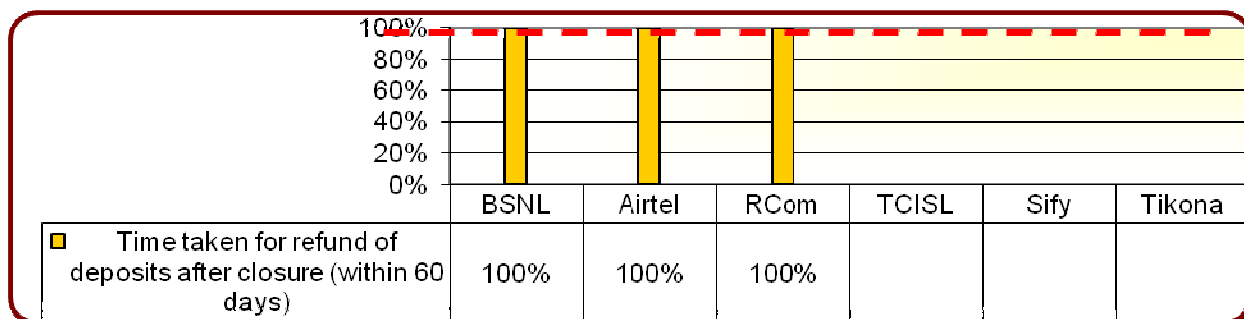
**Billing complaints per 100 bills issued (<2%):** All the operators are complying with the TRAI standards. This parameter is not applicable for Sify as it has prepaid module.



**% age of complaints resolved within 4 weeks (100%):** All operators meeting the benchmark.

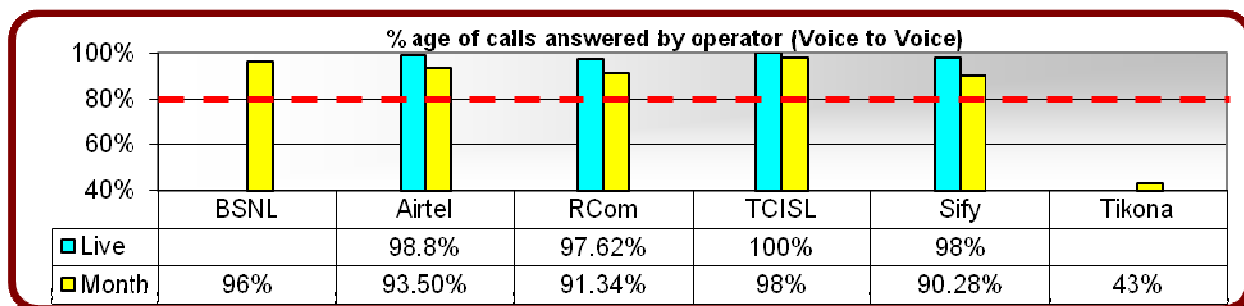
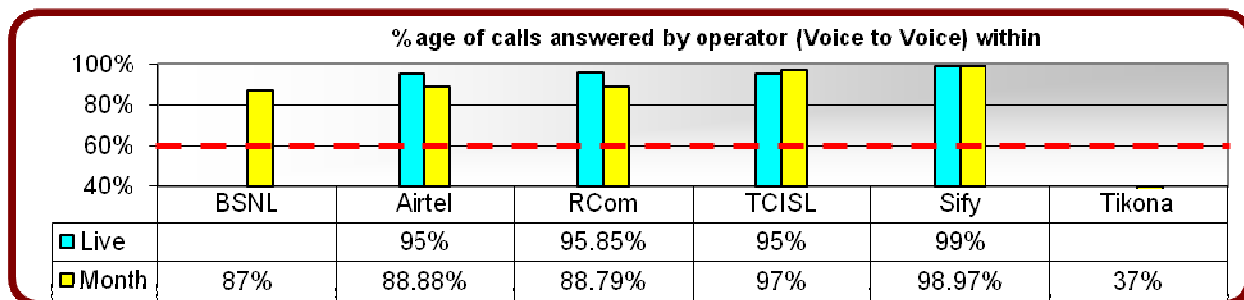


**Time taken for refund of deposits after closure (within 60 days):** All operators are meeting benchmark.

**Response time to the customer for assistance:**

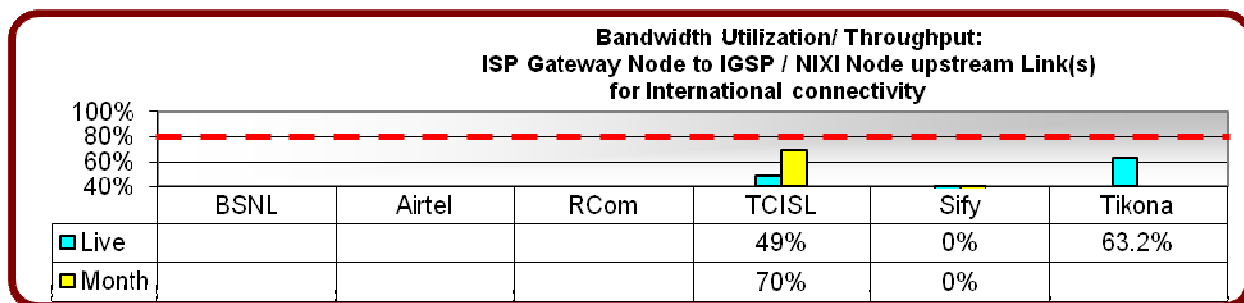
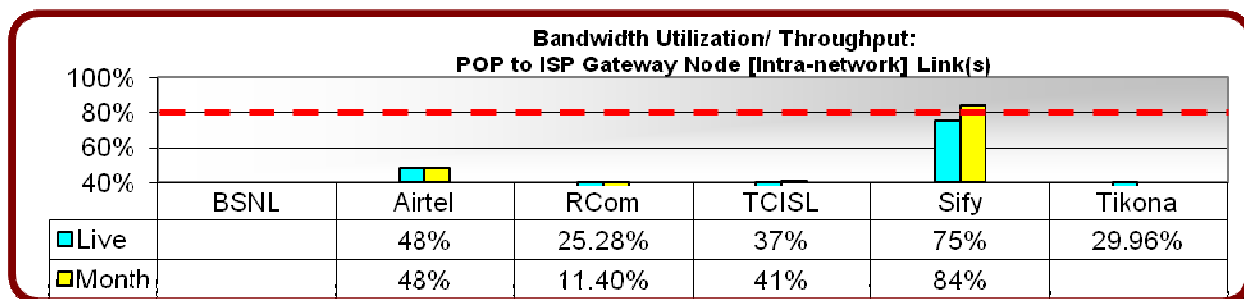
% age of calls answered by operator (Voice to Voice)

- **Within 60 seconds (>60%):** All the operators are meeting the benchmark in both live and one- month data verification except Tikona for one month audit.
- **Within 90 seconds (>80%):** All the operators are meeting the benchmark in both live and one- month data verification except Tikona for one month data audit..



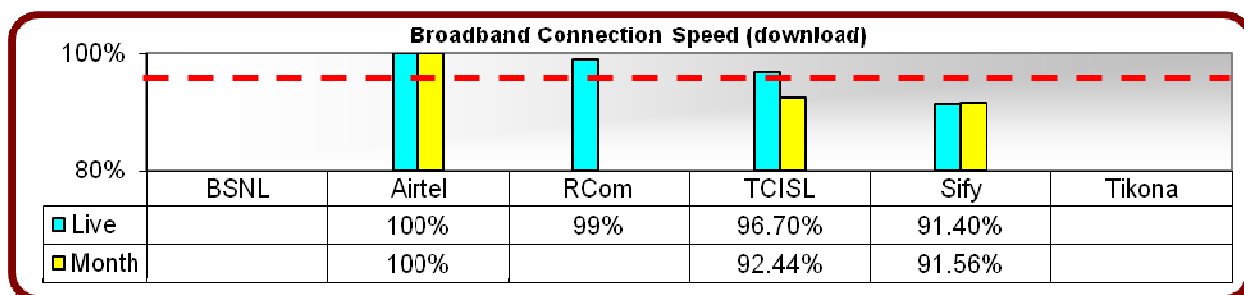
**Bandwidth Utilization/ Throughput:**

- **POP to ISP Gateway Node [Intra-network] Link(s): (Benchmark <80%):** All the operators are meeting the benchmarks in both live and one-month data verification except Sify with the value 84% in month data verification..
- **ISP Gateway Node to IGSP / NIXI Node upstream Link(s) for International connectivity: (Benchmark <80%):** All the operators are meeting the benchmarks in both live and one-month data verification. Airtel and Rcom are not applicable for this parameter. Data not received from BSNL.

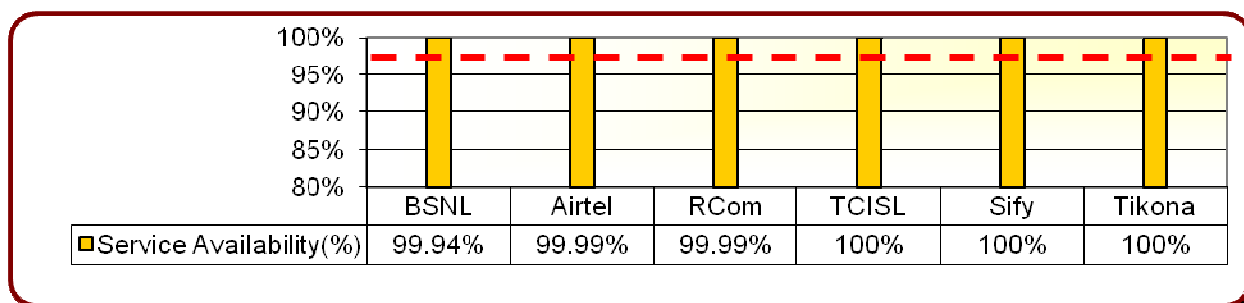




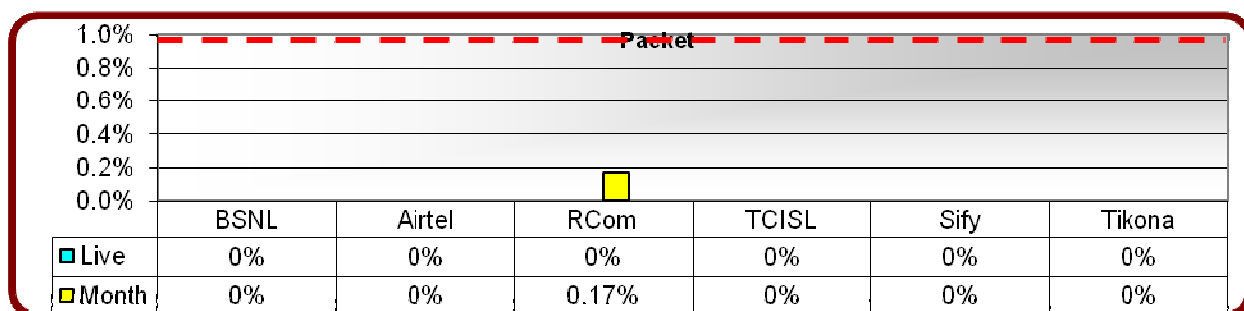
**Broadband Connection Speed (download) (>80%):** All the operators are meeting the TRAI benchmark of greater than 80% connection in both live and one-month data verification. Data not received from BNL & Tikona.



**Service Availability / Uptime (for all users) (better than 98%):** All the operators are meeting the TRAI benchmark of greater than 98% during one-month data verification.

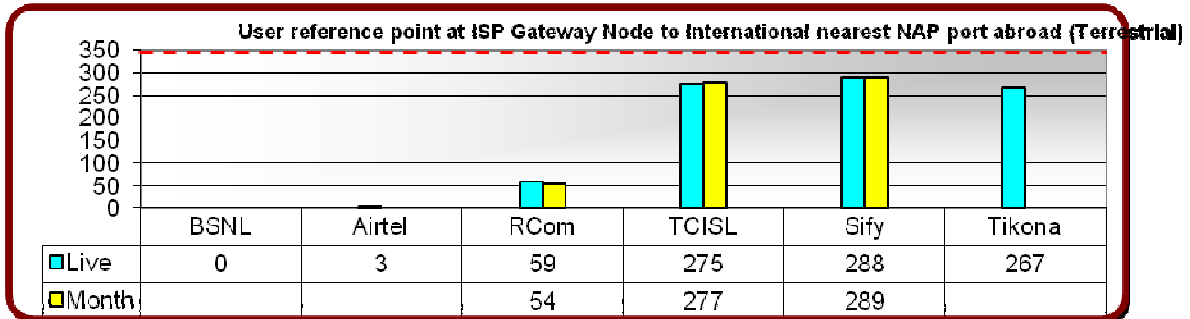
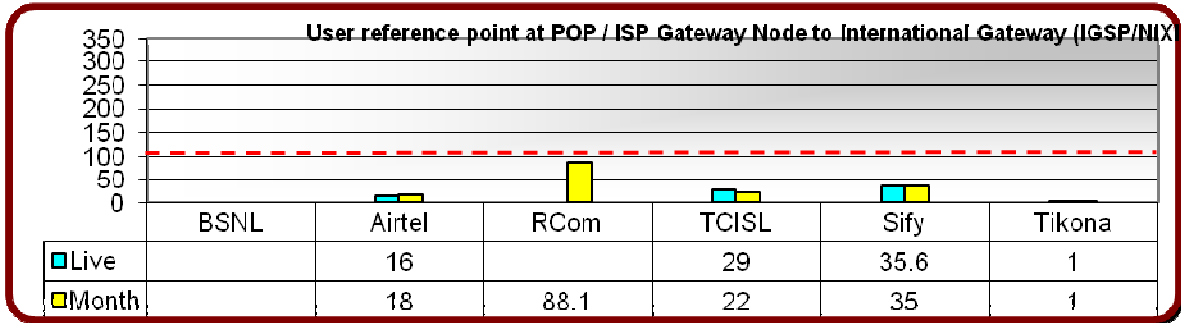


**Packet Loss (Should be less than 1%):** All operators are meeting the benchmark in both live and one-month data verification.



#### Network Latency:

- **User reference point at POP/ISP gateway node to international gateway (IGSP/NIXI) <120 ms:** All operators are meeting the benchmark in both live and one-month data verification.



- User reference point at ISP Gateway Node to International nearest NAP port abroad (Satellite) <850 ms:** The Satellite link does not exist with any of the operator, hence the parameter “User reference point at ISP Gateway Node to International nearest NAP port abroad (Satellite)” is not applicable to the operators

### 3) Customer Care & Grievances Redressal

S.N.	Parameters	Airtel	TCISL	Rcom.	Sify	Tikona
1	Call Centre					
1.1	Total no of complaints received in the call centre	1107	25	85	42	
2	Nodal Officer					
2.1	Total no of complaints received by the nodal officers	5	0	0	0	2747
2.2	Percentage of complaints with reference to total no of complaints received at the call centre	0.45%	0%	0%	0%	
3	Appellate Authority					
3.1	Total no of appeals received by the appellate authority	7	0	0	0	370
3.2	Percentage of appeal received with reference to total no of complaints received by the nodal officers	0.63%	0%	0%	0%	

**Note:**

It is found that there are many instances where customers directly approach to Nodal Officer without approaching to Call Center for Redressal. Similarly there are many instances where customers directly approach to Appellate Authority without approaching to Nodal Officer for their grievances Redressal.

#### 4) Critical Analysis

The key conclusions (Parameter wise) emerging out from the Audit exercise of Broadband service providers are mentioned below

##### **Service provisioning/Activation time:**

All the service providers are performing well and meeting the benchmarks for service provisioning/Activation time in one-month data verification.

##### **Fault Repair/Restoration time & Rebate:**

All the operators are meeting benchmark of more than 90% in one-month data verification except Sify & TCISL. All the service providers are found to provide Rebate as per the guide lines set by TRAI.

##### **Billing performance:**

BSNL, Aircel & Rcom are meeting the benchmark of less than 2% for billing complaints. These operators are also meeting the benchmark of “100% cases 4 weeks” for billing complaint resolution and are providing the refund of deposits after closure as per the benchmark of “100% cases within 60 days”. Sify claims that all its broadband customers are under in prepaid module and hence there are no bills issued.

##### **Customer Care/Helpline Assessment:**

All the service providers are meeting the benchmark for the parameters response time to the customer for assistance (Voice to Voice) within 60 and 90 seconds in both live and one-month data verifications except for Tikona with a value 37% and 43% in month audit.

##### **Bandwidth Utilization:**

##### **POP to ISP Gateway Node (intra-network) links:**

All the operators are meeting all the benchmark during measurements of both live & one-month data Verification except Sify with the value 84% in month data verification.

##### **ISP Gateway Node to IGSP/ NIXI Node upstream links for International connectivity:**

All the operators are meeting all the benchmark during measurements of both live & one-month data Verification.

##### **Broadband Connection speed:**

All the operators are meeting the TRAI benchmark of greater than 80% connection speed during measurements of both live & one-month data.

##### **Service Availability/Uptime:**

All the operators are meeting the TRAI benchmark of greater than 98% during one-month data verification.

**Packet Loss:**

All the operators are meeting the TRAI benchmark of less than 1% during measurements of both live and one-month data verification.

**Network Latency:**

**User reference point at POP/ISP gateway node to international gateway (IGSP/NIXI) <120 ms:**

All operators are meeting the benchmark in both live and one-month data verification

**User reference point at ISP gateway node to international nearest NAP Port abroad (Terrestrial) <350 ms:**

All operators are meeting the benchmark in both live and one-month data verification.

**User reference point at ISP gateway node to international nearest NAP Port abroad (Terrestrial) <850 ms:**

The Satellite link does not exist with any of the operators, hence the parameter “User reference point at ISP Gateway Node to International nearest NAP port abroad (Satellite)” is not applicable to all the operators.

## **B) Compliance report (Status of service providers with respect to the QoS)**

### **BSNL**

BSNL is meeting all the benchmarks in both live and one-month data verification. Bandwidth utilization and network latency data are not provided by BSNL.

### **AIRTEL**

Airtel is meeting all the benchmarks in both live and one-month data verification

### **Rcom**

Reliance is meeting all the benchmark in both live and one-month data verification.

### **TCISL**

TCISL is meeting all of the benchmark in both live and one-month data verification except for the parameter "Fault Repair within 3 working days" with a value of 98%.

### **SIFY**

Sify is meeting benchmarks for all the parameters in both live and one-month data verification except for parameter "Fault Repair by next working day & within 3 working days" with the value of 67.64% and 97% in one-month data verification.

In network section also, it is not meeting the benchmark for the parameter "POP to ISP Gateway Node [Intra-network] Link(s)" with the value 84% in one month data verification.

### **Tikona**

Tikona is meeting the benchmarks for all the parameters in both live and one-month data verification except for the parameter 'Response time to the customer for assistance % age of calls answered by operator (Voice to Voice) within 60 sec and within 90 sec' with a value of 37% & 43% respectively in one month data verification.