

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

Report Period: Jan 2011 – March 2011

Telecommunications Consultants India Ltd.
TCIL Bhawan, Greater Kailash Part – I
New Delhi – 110048
Phone: +91-11-26202020 Fax: +91-1126242266
Internet: <http://www.tcil-india.com>

Table of Contents

CHAPTER-1: Introduction

- I. Background
- II. Objectives and Methodology

CHAPTER-2: Executive Summary

- I. Preface
- II. Findings from Quality of Service Audit (Operator wise for each parameter)
 - (A) Cellular Mobile Telephone Service Providers
 - 3 days Live Data Audit
 - One Month Data Audit
 - Operator Assisted Drive Test
 - Independent Drive Test
 - (B) Basic Telephone Service (Wireline) Providers
 - 3 days Live Data Audit
 - One Month Data Audit
 - (C) Broadband Service Providers
 - 3 days Live Data Audit
 - One Month Data Audit

CHAPTER-3: Audit-PMR data verification results

- I. Cellular Mobile Telephone Service
- II. Basic Service (Wire Line) Service
- III. Broadband Service

CHAPTER-4: Detailed Findings & Analysis

- I. Cellular Mobile Telephone Service
 - (A) MSC audit**
 - 1) 3 days live measurement data assessment & summarized findings
 - 2) One month audit data report & summarized findings
 - 3) Sample coverage
 - 4) Performance (Graphical Representation)
 - 5) Critical Analysis
 - (B) Redressal**
 - 1) Sample coverage
 - 2) Performance based on live measurement for three days
 - 3) Live calling to call center
 - 4) Level 1 calling
 - 5) Critical Analysis

(C) Inter operator call assessment

- 1) Sample coverage
- 2) Performance based on live measurement
- 3) Critical Analysis

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

- 1) Sample Coverage
- 2) Performance (for the respective cities)
- 3) Critical Analysis

(E) Independent Drive Test

- 1) Sample coverage
- 2) Performance (for the respective cities)
- 3) Critical Analysis

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

II. Basic Telephone Service (Wireline) Providers

(A) Exchange Audit

- 1) 3 days live data & One month audit comparative table
- 2) Performance (Graphical representation)
- 3) Customer Care & Grievances Redressal
- 4) Live calling to call center
- 5) Level 1 calling
- 6) Critical Analysis

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

III. Broadband Service Providers

(A) POP Audit

- 1) 3 days live data & One month audit comparative table
- 2) Performance (Graphical representation)
- 3) Customer Care & Grievances Redressal
- 4) Live calling to call center
- 5) Critical Analysis

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

CHAPTER-1: INTRODUCTION

I. Background

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

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

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

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

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

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

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

II. Objectives and Methodology

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

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

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

Systems audited:-

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

Facilities audited:-

1. Billing documents.
2. Customer Care records.

Field data collections carried out:-

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

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

- ✓ TCIL auditors visited all the NSS (Network Sub System) and BSS (Base-station Sub System) to check data for all the operators in their respective service area.
- ✓ All the NSS and BSS data for the relevant details were collected either directly from the centralized NOC or through a remote access to the NOC.
- ✓ The Radio parameters were audited/verified from the data collected from OMC-R (Operation and Maintenance Center – Radio, as part of BSS data).
- ✓ The Drive test was conducted in high, low and medium dense areas including highways, commercial complex and residential areas and special attention was paid for the areas for which TRAI has received complaints.
- ✓ The POI and other network related parameters were audited/verified from the data collected from the OMC-S (Operation and Maintenance Center – Switch as part of NSS data).
- ✓ The data related to Billing and Customer care was checked for the previous month and verified with the customers by calling them on random basis. The process of registration and handling of the complaints was also studied for the various operators. Call centre number were called for measuring the efficiency of the call centre.
- ✓ The inter operator call assessment test was carried out during the time period as is specified in the tender document. TCBH (Time Consistent Busy Hour) is taken after observation of the traffic consistently for 3 days prior to the audit activity.
- ✓ Data has been collected for busy hour of network in case of live assessment & month of audit for all service providers & verified that service providers are providing busy hour data only for QoS service. We found that TCBH hour is matching with network busy hour as provided by service providers for Chennai 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.
- ✓ Also, for Broadband Services, 5% of the POPs (Point Of Presence) in 10% of the SDCA were audited for the relevant details from the centralized NOC or through a remote access to the NOC. The network parameter was also checked from the centralized NOC. 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 in Chennai Circle in 1st quarter (January – March 2011). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken for the period July – September 2010.

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

Sl.	Name of Service Provider	Month of Audit	TCBH Hour
GSM Operators			
1	Aircel Ltd	Jan-2011	1900-2000 hrs
2	Airtel Ltd	Jan-2011	1900-2000 hrs
3	BSNL	Jan-2011	1900-2000 hrs
4	Reliance Communication (GSM)	Jan-2011	1900-2000 hrs
5	Tata Communications (GSM)	Jan-2011	1900-2000 hrs
6	Vodafone	Jan-2011	1900-2000 hrs
CDMA Operators			
7	Reliance Communication (CDMA)	Jan-2011	1900-2000 hrs
8	Tata Communications (CDMA)	Jan-2011	1900-2000 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

<u>3 days Live Data Audit</u>		Bench- mark	Aircel	Airtel	BSNL	Rcom GSM	Tata GSM	V-fone	Rcom CDMA	Tata CDMA
S/N	Name of Parameter		GSM Operators						CDMA Operators	
1	Connection Establishment (Accessibility)									
	a) CSSR (Call Setup Success Rate)	>=95%	99.09%	98.95%	98.22%	99.77%	99.46%	99.49%	99.53%	99.50%
	b) SDCCH/PAGING congestion	<=1%	0.39%	0.18%	0.15%	0.02%	0.03%	0.24%	0.0%	0.0%
	c) TCH congestion	<=2%	0.49%	0.21%	0.17%	0.04%	0.02%	0.09%	0.30%	0.00%
2	Connection maintenance (retainability)									
	a) CDR	<=2%	0.44%	0.66%	0.90%	0.30%	0.42%	0.61%	0.51%	0.02%
	b) Worst affected cells>3% TCH drop	<=5%	0.77%	0.94%	2.35%	0.94%	1.08%	1.67%	0.77%	0.00%
	c) Good voice quality	>=95%	98.44%	97.49%	94.85%	NR	98.43%	98.89%		
3	No of POIs not meeting benchmark	<=0.5%	0	0	0	0	0	0	0	0
4	Response time to customers for assistance									
	a) Accessibility of call centre/Customer Care	>=95%	98.0%	97.0%	100.0%	100.0%	97.0%	68.0%	100.0%	NR
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	80.0%	97.0%	91.0%	96.9%	97.0%	96.0%	95.4%	NR

NA: Not Applicable, NR: Not Received

From the 3 days live data assessment it is found that all the operators are meeting the network parameters by and large, except for BSNL not meeting the benchmark for “Good Voice Quality” with the value of 94.85%. Network Parameter “Good voice quality” for RCOM CDMA & TATA CDMA are not system generated.

Vodafone is found to be deviating from the benchmark for "accessibility of call centre" and Aircel is not meeting the benchmark for "calls answered by operators within 60 sec".

One Month Data Audit		Bench- mark	Aircel	Airtel	BSNL	Rcom GSM	Tata GSM	V-fone	Rcom CDMA	Tata CDMA
S/N	Name of Parameter									
(A)	Network Service Quality Parameter									
1	Network Availability									
	a) BTS Accumulated Downtime	<=2%	0.00%	0.03%	0.25%	0.00%	0.02%	0.00%	0.00%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	0.54%	0.08%	0.00%	0.00%	0.06%	0.00%
2	Connection Establishment (Accessibility)									
	a) CSSR (Call Setup Success Rate)	>=95%	99.07%	98.99%	97.76%	99.78%	99.49%	99.38%	99.56%	99.60%
	b) SDCCH/PAGING congestion	<=1%	0.61%	0.16%	0.14%	0.02%	0.03%	0.26%	0.0%	0.0%
	c) TCH congestion	<=2%	0.55%	0.16%	0.21%	0.19%	0.03%	0.18%	0.24%	0.00%
3	Connection maintenance (retainability)									
	a) CDR	<=2%	0.41%	0.62%	1.00%	0.28%	0.43%	0.57%	0.56%	0.03%
	b) Worst affected cells>3% TCH drop	<=5%	0.73%	0.42%	2.56%	0.87%	1.01%	1.63%	0.84%	0.00%
	c) Good voice quality	>=95%	98.50%	98.01%	96.10%	NR	98.42%	98.91%		
4	No of POIs not meeting benchmark	<=0.5%	0	0	0	0	0	0	0	0
(B)	Customer Service Quality Parameters									
5	Metering/billing credibility-Post paid	<= 0.1%	0.09%	0.19%	0.05%	0.10%	NR	0.08%	0.05%	0.32%
6	Metering /billing credibility-Pre paid	<= 0.1%	0.06%	3.25%	NR	0.10%	NR	0.20%	0.10%	0.00%
7	Resolution of billing/ charging complaints	100% within 4 weeks	100%	100%	100%	100%	NR	100%	100%	NR
	a) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	100%	100%	100%	100%	NR	100%	100%	NR
8	Response time to customers for assistance									
	a) Accessibility of call centre/Customer Care	>=95%	98.00%	93.00%	51.27%	100.00%	93.00%	68.00%	100.00%	96.00%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	71.00%	93.00%	46.73%	87.79%	93.00%	93.82%	87.31%	98.00%
9	Termination/closure of service	<=7days	100%	100%	100%	100%	NR	100%	100%	100%
10	Time taken for refunds of deposits after closures.	100% within 60 days	100%	100%	100%	100%	NR	100%	100%	100%

NA: Not Applicable, NR: Not Received

From the month data assessment, it is found that all the operators are meeting the network parameters. Network Parameter “Good voice quality” for RCOM CDMA & TATA CDMA are not system generated.

Performance related to customer care data is not found to be satisfactory for Aircel, BSNL, Reliance GSM & CDMA for the parameter “calls answered by operators (voice-to-voice)”. A below benchmark performance is observed in case of Airtel (93%), BSNL (51.27%), Tata GSM (93%) and Vodafone (68%) for “accessibility of call centre” parameter. Airtel is not meeting the benchmark for "Metering/Billing Credibility" for both Pre-paid & Post-paid connections. Similar result is found in case of Vodafone for Pre-paid & Tata CDMA for Post-paid connections.

Operator-Assisted Drive Test

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

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	V-fone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators									CDMA Operators		
1.1	Blocked Call Rate (<=3%)	CHENNAI	2.96	1.95	2.78	0.00	1.03	3.82	3.59	3.85	2.84	0.00	0.00	0.00
1.2	Dropped Call Rate (<=2%)	CHENNAI	0.74	1.95	2.78	1.48	0.52	1.53	3.59	3.85	1.42	1.36	0.49	0.00
1.3	Percentage of connections with good voice quality (>=95%)													
	(i) 0-4 (w/o frequency hopping)	CHENNAI										99.24	95.45	99.60
	(ii) 0-5 (with frequency hopping)	CHENNAI	97.30	93.00	94.85	95.70	94.42	95.14	93.48	92.39	92.56			
1.4	Call Setup Success Rate (>=95%)	CHENNAI	97.04	98.05	97.22	100.00	98.97	96.18	96.41	96.15	97.16	100.00	100.00	100.00

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

- Blocked Call Rate benchmark is not met by Tata GSM, Uninor & Videocon.
- Dropped Call Rate benchmark is not met by BSNL, Uninor & Videocon.
- "%age of Good Voice Quality connections" benchmark is not met by Airtel, BSNL, Reliance GSM, Uninor, Videocon & Vodafone.

Independent Drive Test

The Independent Drive Test was conducted at Chennai. Here again, zones were selected for covering different density areas (High, Medium & Low dense areas).

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	V-fone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators										CDMA Operators	
1.1	Blocked Call Rate (<=3%)	CHENNAI	0.76	3.42	1.64	1.47	1.72	6.19	3.17	19.88	0.65	0.00	0.00	0.64
1.2	Dropped Call Rate (<=2%)	CHENNAI	3.79	3.42	3.83	2.21	3.45	5.31	0.79	2.34	3.87	0.70	0.48	0.00
1.3	Percentage of connections with good voice quality (>=95%)													
	(i) 0-4 (w/o frequency hopping)	CHENNAI										99.88	96	99.62
	(ii) 0-5 (with frequency hopping)	CHENNAI	94.21	88.54	86.37	95.77	95.76	95.75	93.97	82.38	94.93			
1.4	Call Setup Success Rate (>=95%)	CHENNAI	99.24	96.58	98.36	98.53	98.28	93.81	96.83	80.12	99.35	100.00	100.00	99.36

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

- CDMA operators have no deviation from the TRAI benchmarks.
- Good Voice Quality parameter is met by Idea (95.77%), Reliance GSM (95.75%) & Tata GSM (95.75%) only.
- Dropped call parameter is met by Uninor (0.79%) only among GSM operators.
- Blocked Call parameter is not met by Airtel (3.42%), Tata GSM (6.19%), Uninor (3.17%) and Vodafone (19.88%).
- CSSR is not met by Tata GSM (93.81%) and Videocon (80.12%).

II. AUDIT- PMR Verification

I. Cellular Mobile Telephone Service

PMR		Bench- mark	Audit	Aircel	Airtel	BSNL	Rcom GSM	Tata GSM	V-fone	Rcom CDMA	Tata CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators	
(A)	Network Service Quality Parameter										
1	Network Availability										
	BTS Accumulated Downtime	<=2%	Reported	0.18%	0.08%	0.20%	0.11%	0.08%	0.08%	0.14%	0.02%
			Verified	0.18%	0.08%	0.20%	0.11%	0.08%	0.08%	0.14%	0.02%
	Worst affected BTSs due to downtime	<=2%	Reported	0.12%	0.00%	0.40%	0.00%	0.10%	0.38%	0.00%	0.00%
Verified			0.12%	0.00%	0.40%	0.00%	0.10%	0.38%	0.00%	0.00%	
2	Connection Establishment (Accessibility)										
	CSSR (Call Setup Success Rate)	>=95%	Reported	98.23%	99.23%	100.00%	99.65%	99.15%	99.71%	99.56%	99.63%
			Verified	98.23%	99.23%	100.00%	99.65%	99.15%	99.71%	99.56%	99.63%
	SDCCH/PAGING congestion	<=1%	Reported	0.33%	0.11%	0.23%	0.06%	0.07%	0.07%	0.00%	0.00%
			Verified	0.33%	0.11%	0.23%	0.06%	0.07%	0.07%	0.00%	0.00%
	TCH congestion	<=2%	Reported	0.22%	0.11%	0.43%	0.30%	0.05%	0.07%	0.15%	0.02%
			Verified	0.22%	0.11%	0.43%	0.30%	0.05%	0.07%	0.15%	0.02%
	3	Connection maintenance (retainability)									
CDR		<=2%	Reported	0.42%	0.57%	0.77%	0.44%	0.46%	0.58%	0.68%	0.21%
			Verified	0.42%	0.57%	0.77%	0.44%	0.46%	0.58%	0.68%	0.21%
Worst affected cells>3% TCH drop		<=5%	Reported	0.29%	0.38%	2.10%	1.01%	0.99%	1.18%	1.28%	0.00%
			Verified	0.29%	0.38%	2.10%	1.01%	0.99%	1.18%	1.28%	0.00%
Good voice quality		>=95%	Reported	97.61%	98.61%	100.00%	98.95%	98.57%	98.98%	98.95%	99.64%
			Verified	97.61%	98.61%	100.00%	98.95%	98.57%	98.98%	98.95%	99.64%
4		No of POIs not meeting benchmark	<=0.5%	Reported	0	0	0	0	0	0	0

			Verified	0	0	0	0	0	0	0	0
(B)	Customer Service Quality Parameters										
5	Metering/billing credibility-Post paid	<= 0.1%	Reported	0.57%	0.04%	0.00%	NR	0.00%	0.02%	0.04%	0.01%
			Verified	0.57%	0.04%	0.00%	NR	0.00%	0.02%	0.04%	0.01%
6	Metering /billing credibility-Pre paid	<= 0.1%	Reported	0.02%	0.07%	0.10%	NR	0.002%	0.056%	0.02%	0.06%
			Verified	0.02%	0.07%	0.10%	NR	0.002%	0.056%	0.02%	0.06%
7	Resolution of billing/ charging complaints	100% within 4 weeks	Reported	100%	100%	100%	NR	100.0%	100%	100%	100%
			Verified	100%	100%	100%	NR	100.0%	100%	100%	100%
	Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	Reported	100%	100%	100%	NR	100%	100%	100%	100%
			Verified	100%	100%	100%	NR	100%	100%	100%	100%
8	Response time to customers for assistance	>=95%	Reported	100.00%	Incl in TN	95.00%	NR	98%	100%	100.00%	NA
			Verified	100.00%		95.00%	NR	98%	100%	100.00%	NA
	% call answered by operators(voice to voice) within 60 sec.	>=90%	Reported	72.70%		97.50%	NR	70.90%	91.72%	91.00%	NA
			Verified	72.70%		97.50%	NR	70.90%	91.72%	91.00%	NA
9	Termination/closure of service										
	No.of requests for Termination / Closure of service complied within 7 days during the quarter	<=7days	Reported	100%	100%	100%	NR	100%	100%	100%	NA
			Verified	100%	100%	100%	NR	100%	100%	100%	NA
10	Time taken for refunds of deposits after closures.	100% within 60 days	Reported	100%	100%	100%	NR	NA	100%	100%	NA
			Verified	100%	100%	100%	NR	NA	100%	100%	NA

Critical Analysis (PMR Verification):

- The figures proved by all the operators match the figures obtained on verification.
- Only Aircel is not meeting the benchmark for the parameter "Metering/Billing Credibility-Postpaid" with a value of 0.57%.
- "% call answered by operators (voice to voice) within 60 sec." benchmark is not met by Aircel and Tata-GSM.

CHAPTER-4: DETAILED FINDINGS & ANALYSIS**I. Cellular Mobile Telephone Service****(A) MSC Audit****(1) 3 Days Live Data Assessment & Summarized Findings**

S/N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Rcom GSM	Tata GSM	V-fone	Rcom CDMA	Tata CDMA
			GSM Operators						CDMA Operators	
A	Network Service Quality Parameter									
1	Connection Establishment (Accessibility)									
	a) CSSR	>=95%	99.09%	98.95%	98.22%	99.77%	99.46%	99.49%	99.53%	99.50%
	b) SDCC/PAGING congestion	<=1%	0.39%	0.18%	0.15%	0.02%	0.03%	0.24%	0.0%	0.0%
	c) TCH congestion	<=2%	0.49%	0.21%	0.17%	0.04%	0.02%	0.09%	0.30%	0.00%
2	Connection maintenance									
	a) CDR	<=2%	0.44%	0.66%	0.90%	0.30%	0.42%	0.61%	0.51%	0.02%
	b) Cells having > 3% TCH drop	<=5%	0.77%	0.94%	2.35%	0.94%	1.08%	1.67%	0.77%	0.00%
	c) Good voice quality	>=95%	98.44%	97.49%	94.85%	NR	98.43%	98.89%		
	d) No. of cells > 3% TCH drop		41	52	114	76	42	85	8	0
	e) Total no. of cells in the network		5,268	5,500	5,031	2,691	3,862	5,102	1,041	793
3	No of POIs not meeting benchmark	<=0.5%	0	0	0	0	0	0	0	0
	a) Name of POI not meeting the benchmark									
	b) Total No. of circuits on POI		58,714	99,474	158,108	15,290	1,635	82,355	15,290	7,751
	c) Avg No. of call attempts on POI		1,945,304	20,366	13,110	201,044	6,935	44,507	201,044	101,181
	d) Avg traffic served on POI (Erlang)		33,699	767	365	6,894	127	1,064	6,894	2,338
	e) Total number of working POI Service Area wise		68	125	83	56	6	29	56	41
	f) Equipped Capacity of Network in respect of Traffic in erlang		134,787	177,303	95,604	22,127	60,313	94,074	52,879	20,935
	g) Total traffic handled in TCBH in erlang		64,493	120,750	25,415	7,620	12,876	60,159	19,472	4,443
(B)	Customer Service Quality Parameters									
4	Response time to customers for assistance									
	a) Accessibility of call centre	>=95%	98.00%	97.00%	100.00%	100.00%	97.00%	68.00%	100.00%	NR
	b) % of call answered by operators(voice to voice) within 60 sec	>=90%	80.00%	97.00%	91.00%	96.91%	97.00%	96.00%	95.35%	NR
	c) No. of call attempts to call centre / customer care nos. during TCBH (Avg)		21,333	75	8,130	4,532	91,230	43,204	18,958	136,199
	d) No. of calls connected and answered successfully to call centre / customer care nos. during TCBH (Avg)		15,361	73	4,147	4,392	73	41,478	18,958	NR

NA: Not Applicable, NR: Not Received

Parameter-wise Findings (Live Data Assessment):

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

- **Call Setup Success Rate (CSSR) (benchmark $\geq 95\%$):** All operators are meeting the benchmark with values lying between 98.22% and 99.77%.
- **SDCCH/PAGING Channel congestion (benchmark $\leq 1\%$):** All operators are meeting the benchmark with values lying between 0.02% and 0.39%.
Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.
- **TCH congestion (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0.00% and 0.49%.
- **Call Drop Rate (CDR) (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0.02% and 0.90%.
- **Cell exceeding 3% TCH drop (benchmark $\leq 5\%$):** All the operators are satisfying the benchmark with value in between 0% and 2.35%.
- **Connections with good voice quality (benchmark $\geq 95\%$):** CDMA service providers have declared that the parameter is not system generated. GSM operators, except for BSNL (94.85%), are meeting the benchmark with values lying between 97.49% and 98.89%.
- **POI Congestion (benchmark $\leq 0.5\%$):** All the operators are meeting the benchmark. There was no congestion found overall on the POI, but cases were found where individual POIs are showing high utilization/usage. Some are in the range of over 100% though causing no traffic failure due to overflow technique i.e. the extra traffic is carried over by some other operating POI as has been designed to do so.
- **%age of call answered by operator (electronically) (benchmark >95):** Except for Vodafone (68%), all operators are meeting the benchmark with values lying between 97% to 100%.
- **%age of call answered by operator (Voice to voice) (benchmark $>90\%$): %):** Except for Aircel with value 80%, all other operators are meeting the benchmark with values 91% to 97%.

	b) Total No. of call attempts on POI (Avg.)		1,739,561	18,204	55,284	198,441	39,184	79,257	198,441	716,466
	c) Total traffic served on POI (Erlang) (Avg.)		31,636	412	1,539	6,644	704	1,629	6,644	16,806
	d) Total No. of circuits on POI		58,714	99,474	158,108	15,290	1,635	82,355	15,290	7,751
	e) Total number of working POI Service Area wise		68	125	83	56	6	29	56	41
	f) Capacity of POI		54,926	99,474	158,108	13,565	1,502	82,355	13,565	6,700
5	Network Data									
	a) Equipped Capacity of Network Erlang		134,787	177,303	95,604	22,127	60,313	94,074	52,879	20,935
	b) Total traffic in TCBH in erlang (Avg.)		59,512	123,936	25,415	7,620	12,876	60,159	19,472	4,443
	c) Total no. of customers served (as per VLR) on last day of the month		1,770,241	2,842,232	973,372	NR	505,639	1,478,264	NR	214,500
(B)	Customer Service Quality Parameters									
5	Metering/billing credibility-Post paid	$\leq 0.1\%$	0.09%	0.19%	0.05%	0.10%	NR	0.08%	0.05%	0.32%
	a) No. of bills issued during the period		328016	447321	145390	33722	NR	258669	353878	110439
	b) No. of bills disputed including billing complaints during the period		960	848	69	33	NR	216	175	349
6	Metering /billing credibility-Pre paid	$\leq 0.1\%$	0.06%	3.25%	NR	0.10%	NR	0.20%	0.10%	0.00%
	a) No. of charging / credit / validity complaints during the quarter		208	8,376	NR	342	NR	3,865	378	763
	b) Total no. of pre-paid customers at the end of the quarter		3,549,883	2,572,466	167,718	3,477,197	NR	1,728,469	3,746,049	292,107
7	Resolution of billing/ charging complaints	<i>100% within 4 weeks</i>	100%	100%	100%	100%	NR	100%	100%	NR
	a) No. of billing/(post paid) and charging, credit/validity (pre paid) complaints resolved within 4 weeks during the quarter									
	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		1,168	9,224		375	NR		553	NR

	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		139	2,152		68	NR		300	NR
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		1,029	7,072		307	NR		253	NR
	e) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<i><=1 week</i>	100%	100%	100%	100%	NR	100%	100%	NR
8	Response time to customers for assistance									
	a) Accessibility of call centre/Customer Care	<i>>=95%</i>	98.00%	93.00%	51.27%	100.00%	93.00%	68.00%	100.00%	96.00%
	b) % call answered by operators(voice to voice) within 60 sec.	<i>>=90%</i>	71.00%	93.00%	46.73%	87.79%	93.00%	93.82%	87.31%	98.00%
	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		39,539	91,230	7,791	4,995	84,745	394,470	18,302	133,210
	d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		26,557	84,745	3,797	4,418	84,745	370,085	18,958	133,210
9	Termination/closure of service	<i><=7days</i>	100%	100%	100%	100%	NR	100%	100%	100%
	a) Total No. of requests for Termination / Closure of service received during the quarter		2,399	3,094	608	629	NR	3,245	2,128	0
	b) No.of requests for Termination / Closure of service complied within 7 days during the quarter		2,399	3,094	608	629	NR	3,245	2,128	0
10	Time taken for refunds of deposits after closures.	<i>100% within 60 days</i>	100%	100%	100%	100%	NR	100%	100%	100%

NA: Not Applicable, NR: Not Received

3) Parameter-wise Findings (Month Data Assessment):

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

- **BTS accumulated downtime (benchmark <=2%):** All operators are meeting the benchmark with values lying between 0.00% and 0.25%.
- **Worst affected BTSs due to downtime (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 0.54%.
- **Call setup success rate (benchmark >= 95%):** All operators are meeting the benchmark with values lying between 97.76% and 99.78%.
- **SDCCH/PAGING Channel congestion (benchmark <= 1%):** All operators are meeting the benchmark with values lying between 0.02% and 0.61%.
Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.
- **TCH congestion (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0.00% and 0.55%.
- **Call drop rate (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0.03% and 1%.
- **Cell exceeding 3% TCH drop (benchmark <= 5%):** All the operators are satisfying the benchmark with value in between 0% and 2.56%.
- **Connections with good voice quality (benchmark >= 95%):** All operators are meeting the benchmark with values lying between 96.1% and 98.91%.
- **POI Congestion (benchmark <= 0.5%):** All the operators are meeting the benchmark. There was no congestion found overall on the POI, but cases were found where individual POIs are showing high utilization/usage. Some are in the range of over 100% though causing no traffic failure due to overflow technique i.e. the extra traffic is carried over by some other operating POI as has been designed to do so.
- **%age of call answered by operator (electronically) (benchmark >95%):** Except for Airtel (93%), BSNL (51.27%), Tata GSM (93%) and Vodafone (68%), all operators are meeting the benchmark.
- **%age of call answered by operator (Voice to voice) (benchmark >90%):** Except for Airtel, BSNL, Reliance GSM & CDMA with 71%, 46.73%, 87.79% & 87.31% respectively, all the operators are meeting the benchmark with values lying between 93% and 98%.
- **Metering and billing credibility-Post paid (benchmark <= 0.1%):** All operators, except Airtel & Tata CDMA, are meeting the benchmark.
- **Metering and billing credibility-Pre paid (benchmark <= 0.1%):** Except for Airtel & Vodafone, all operators are meeting the benchmark.
- **Resolution of billing/ charging complaints (benchmark 100% within 4 weeks):** All operators are meeting the benchmark.
- **Termination/Closure of service (Benchmark <= 7 days):** All operators have satisfied the benchmark.
- **Time taken for refunds of deposits after closures (benchmark 100% within <=60 days):** All operators have satisfied the benchmark.

(1) Sample Coverage

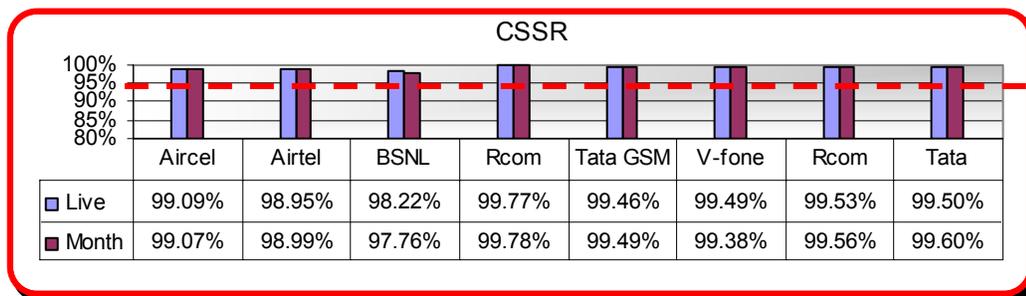
Switches/BSC/BTS details of operators:

Sl.	Name of Service Provider	No. of MSC/GMSC	No. of BSC	No. of BTS
GSM Operators				
1	Aircel Ltd	7	15	1933
2	Airtel Ltd	10	24	2249
3	BSNL	4	28	1677
4	Reliance Communication (GSM)	1	7	1064
5	Tata Communications (GSM)	1	10	1343
6	Vodafone	4	34	1862
CDMA Operators				
7	Reliance Communication (CDMA)	3	-	353
8	Tata Communications (CDMA)	1	-	260

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

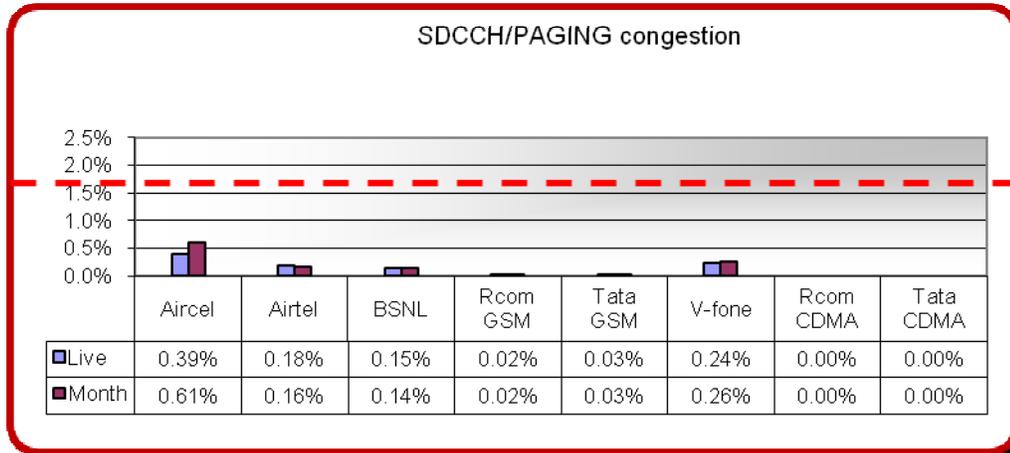
A) NETWORK PERFORMANCE

- I. **Call Setup Success Rate (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

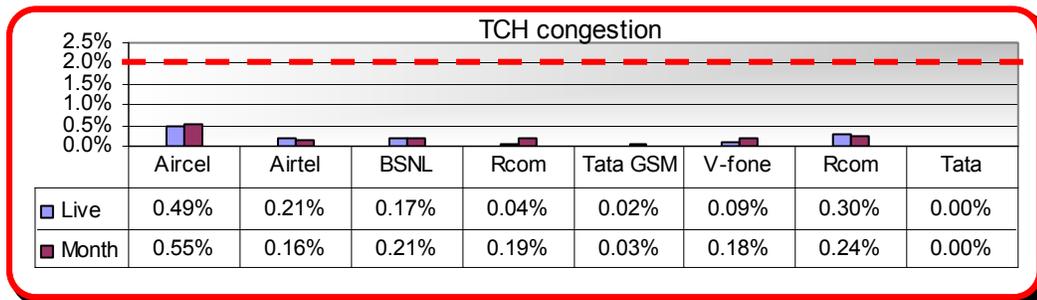


II. Blocked call rate:

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

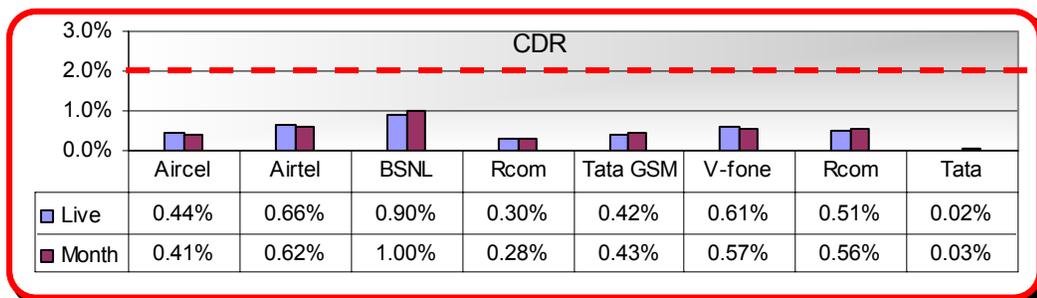


TCH congestion (%): All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data taken in the month of audit.

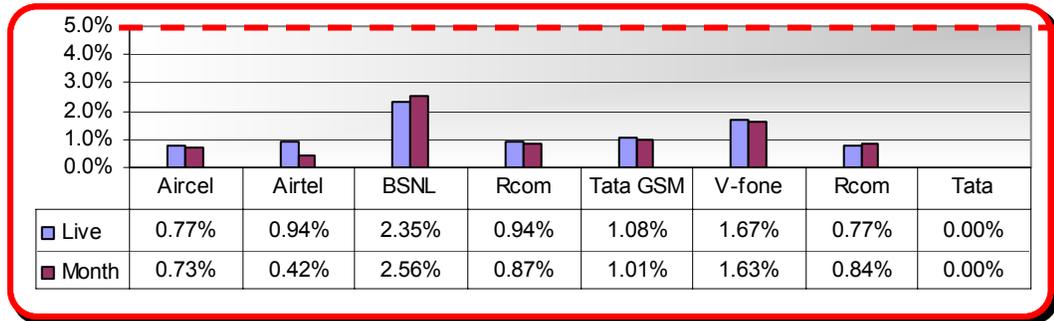


III. Connection Maintainability (Retainability):

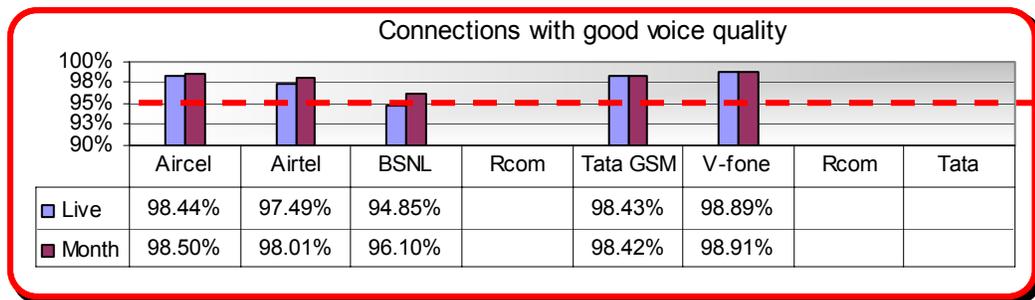
Call Drop Rate (CDR) (%): All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data taken in the month of audit.



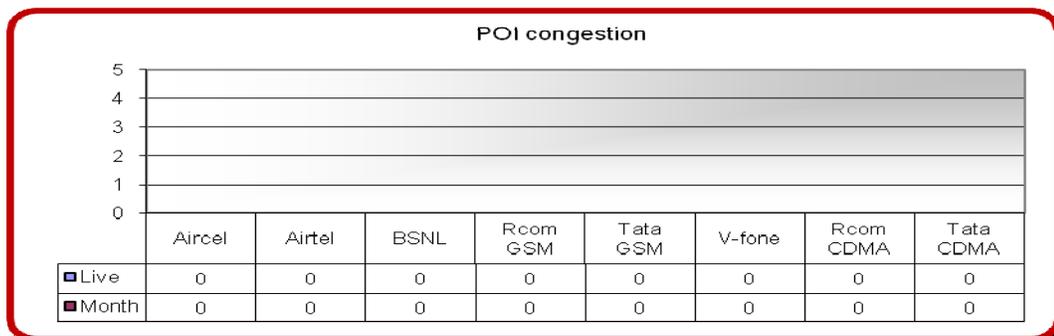
Worst affected Cell exceeding 3% TCH Drop: For both live and month data, all the operators are meeting the benchmark. In all cases data shows consistency for both live measurement and month data audit.



Percentage of connections with good voice quality (benchmark >= 95%): Except for BSNL in 3 days live audit, 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. Reliance (GSM & CDMA) and Tata CDMA have not provided the data.



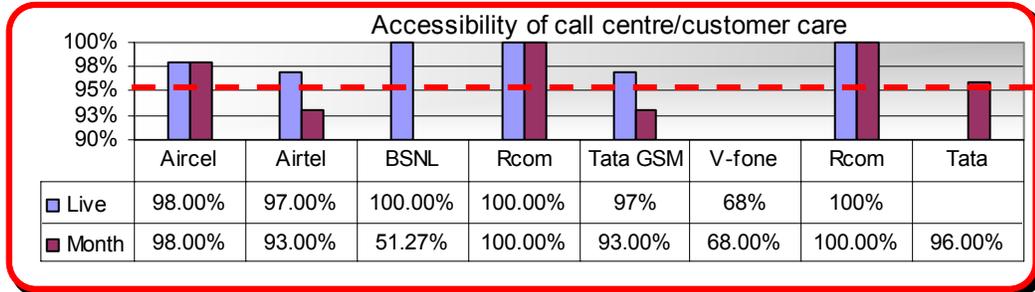
POI Congestion: All operators are meeting the TRAI benchmarks (\leq 0.5%) for both one month data and 3 days live data taken in the month of audit.



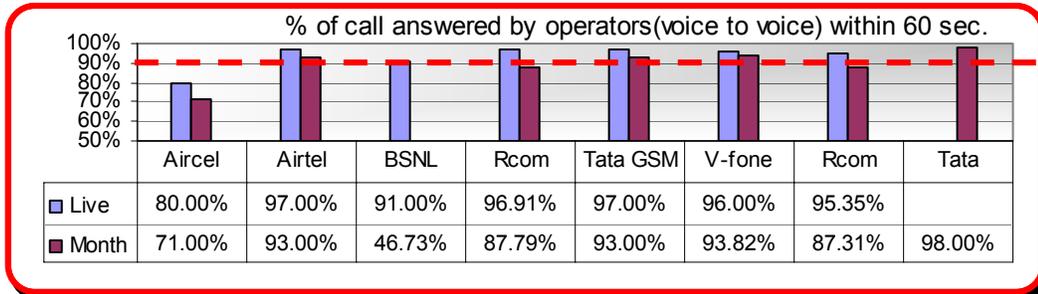
B) CUSTOMER SERVICE QUALITY PARAMETERS

Response time to the customer for assistance:

Percentage of call answered (Electronically): Vodafone is not meeting the benchmark for both live & month data audit. In the month data audit, Airtel, BSNL, Tata GSM & Vodafone don't meet the benchmark. Tata CDMA has not provided data for live data audit



Percentage of call answered by operators (Voice to voice) within 60 sec: Aircel does not meet the benchmark ($\geq 90\%$) for both one month data and 3 days live data taken in the month of audit. In case of BSNL, Reliance GSM & CDMA, the operator is not satisfying the benchmark in case of month data audit. Tata CDMA has not provided data for live data audit.



(3) Critical Analysis

From the data tables it is found that all the operators are meeting the network parameters by and large, except for BSNL not meeting the benchmark for “Good Voice Quality” with the value of 94.85% for live data audit.

Performance related to customer care data is not found to be satisfactory for Aircel, BSNL, Reliance GSM & CDMA for the parameter “calls answered by operators (voice-to-voice)” in case of month data audit and for Aircel in live data audit. A below benchmark performance is observed in case of Airtel, BSNL, Tata GSM and Vodafone for “accessibility of call centre” parameter in month data and Vodafone in live data audit. Airtel is not meeting the benchmark for "Metering/Billing Credibility" for both Pre-paid & Post-paid connections. Similar result is found in case of Vodafone for Pre-paid & Tata CDMA for Post-paid connections.

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	Rcom GSM	Tata GSM	Vodafone	Rcom GSM	Tata CDMA
Total No. of calls	13	8	14	8	9	9	12	10
Cases resolved with 4 weeks	13	8	14	8	9	9	12	10
%age of cases resolved	100%	100%	100%	100%	100%	100%	100%	100%

(3) Live calling to Call center:

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

	OPERATORS NAME							
	Aircel	Airtel	BSNL	Rcom	Tata	Vodafone	Rcom	Tata
	GSM					CDMA		
1ST HALF (10AM TO 01 PM)	46	43	50	46	46	31	48	48
2ND HALF (04PM TO 07 PM)	35	40	48	49	47	40	49	50
In % age	91.00	83.00	98.00	95.00	93.00	71.00	97.00	98.00

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

(5) Critical Analysis:

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

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

A sample of 2x50 test calls per Service Providers with in the licensed service area (Chennai Circle) were made between 1900 to 2000 hrs so that TCBH hours for all the operators were covered.

(2) Performance based on live measurement

Calling Operator	Aircel	Airtel	BSNL	Rcom GSM	Tata GSM	Vodafone	Rcom GSM	Tata CDMA
Aircel	-	100%	100%	100%	100%	100%	100%	99%
Airtel	100%	-	100%	100%	100%	97%	100%	100%
BSNL	100%	99%	-	100%	100%	100%	99%	100%
Rcom GSM	100%	100%	100%	-	100%	100%	100%	100%
Tata GSM	100%	100%	100%	100%	-	100%	100%	100%
Vodafone	98%	100%	100%	100%	100%	-	100%	100%
Rcom CDMA	100%	100%	100%	100%	99%	100%	-	100%
Tata CDMA	100%	100%	98%	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 Chennai 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

CHENNAI CIRCLE :

High Dense: Santhi colony, Virugambakkam, Triplican, Zam bazzar, Choolai, Purasaiwalkkam, Ashok Nagar, K.K Nagar, Chepauk, Nungambakkam, Mount road Greams road, Central Rly.Station, Valluvarkottam, Saidapet , Old & New Secretariat.

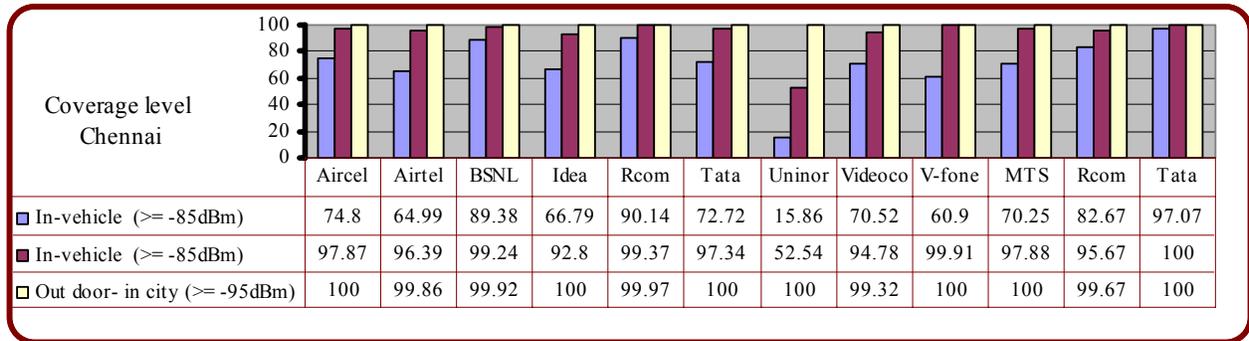
Medium Dense: Mannurpet, Koyambedu Bus Stand, Ekkaduthangal, Air port and Taylor's road, Aminjakarai, Anna Nagar

Low Dense: Air port, Tambaram and Virugambakkam.

2) Performance (for the respective cities)

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Video con	V-fone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators										CDMA Operators	
1.1	Call Attempts	CHENNAI	135	154	144	135	194	131	195	130	141	221	204	149
1.2	Blocked Call Rate (<=3%)	CHENNAI	2.96	1.95	2.78	0.00	1.03	3.82	3.59	3.85	2.84	0.00	0.00	0.00
1.3	Dropped Call Rate (<=2%)	CHENNAI	0.74	1.95	2.78	1.48	0.52	1.53	3.59	3.85	1.42	1.36	0.49	0.00
1.4	Percentage of connections with good voice quality (>=95%)													
	(i) 0-4 (w/o frequency hopping)	CHENNAI										99.24	95.45	99.6
	(ii) 0-5 (with frequency hopping)	CHENNAI	97.3	93	94.85	95.7	94.42	95.14	93.48	92.39	92.56			
1.5	Service Coverage													
	In door (>= -75dBm)	CHENNAI	74.8	64.99	89.38	66.79	90.14	72.72	15.86	70.52	60.9	70.25	82.67	97.07
	In-vehicle (>= -85dBm)	CHENNAI	97.87	96.39	99.24	92.8	99.37	97.34	52.54	94.78	99.91	97.88	95.67	100
	Out door- in city (>= -95dBm)	CHENNAI	100	99.86	99.92	100	99.97	100	100	99.32	100	100	99.67	100
1.6	Call Setup Success Rate (>=95%)	CHENNAI	97.04	98.05	97.22	100.00	98.97	96.18	96.41	96.15	97.16	100.00	100.00	100.00

Graphical Representation



(3) Critical Analysis

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

- a. Blocked Call Rate benchmark is not met by Tata GSM, Uninor & Videocon.
- b. Dropped Call Rate benchmark is not met by BSNL, Uninor & Videocon.
- c. "%age of Good Voice Quality connections" benchmark is not met by Airtel, BSNL, Reliance GSM, Uninor, Videocon & Vodafone.

(E) Independent Drive Test

(1) Sample Coverage

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

DRIVE TEST LOCATIONS

CHENNAI CIRCLE :

High Dense: Santhi colony, Virugambakkam, Triplican, Zam bazzar, Choolai, Purasaiwalkkam, Ashok Nagar, K.K Nagar, Chepauk, Nungambakkam, Mount road Greams road, Central Rly.Station, Valluvarkottam, Saidapet , Old & New Secretariat.

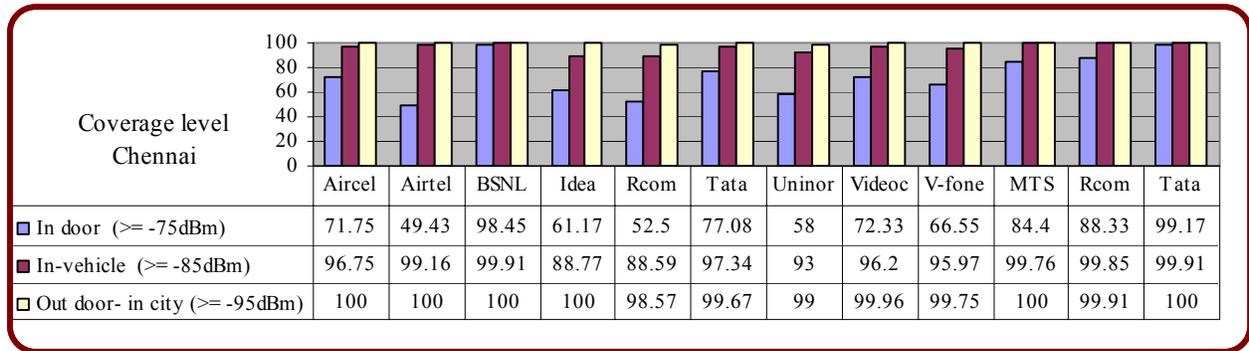
Medium Dense: Mannurpet, Koyambedu Bus Stand, Ekkaduthangal, Air port and Taylor's road, Aminjakarai, Anna Nagar

Low Dense: Air port, Tambaram and Virugambakkam.

2) Performance (for the respective cities)

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Video con	V-fone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators									CDMA Operators		
1.1	Call Attempts	Chennai	132	146	183	136	174	113	126	171	155	286	209	156
1.2	Blocked Call Rate (<=3%)	Chennai	0.76	3.42	1.64	1.47	1.72	6.19	3.17	19.88	0.65	0.00	0.00	0.64
1.3	Dropped Call Rate (<=2%)	Chennai	3.79	3.42	3.83	2.21	3.45	5.31	0.79	2.34	3.87	0.70	0.48	0.00
1.4	Percentage of connections with good voice quality (>=95%)													
	(i) 0-4 (w/o frequency hopping)	Chennai										99.88	96	99.62
	(ii) 0-5 (with frequency hopping)	Chennai	94.21	88.54	86.37	95.77	95.76	95.75	93.97	82.38	94.93			
1.5	Service Coverage													
	In door (>= -75dBm)	Chennai	71.75	49.43	98.45	61.17	52.5	77.08	58	72.33	66.55	84.4	88.33	99.17
	In-vehicle (>= -85dBm)	Chennai	96.75	99.16	99.91	88.77	88.59	97.34	93	96.2	95.97	99.76	99.85	99.91
	Out door- in city (>= -95dBm)	Chennai	100	100	100	100	98.57	99.67	99	99.96	99.75	100	99.91	100
1.6	Call Setup Success Rate (>=95%)	Chennai	99.24	96.58	98.36	98.53	98.28	93.81	96.83	80.12	99.35	100.00	100.00	99.36

Graphical Representation



(3) Critical Analysis

- CDMA operators have no deviation from the TRAI benchmarks.
- Good Voice Quality parameter is met by Idea (95.77%), Reliance GSM (95.75%) & Tata GSM (95.75%) only.
- Dropped call parameter is met by Uninor (0.79%) only among GSM operators.
- Blocked Call parameter is not met by Airtel (3.42%), Tata GSM (6.19%), Uninor (3.17%) and Vodafone (19.88%).
- CSSR is not met by Tata GSM (93.81%) and Videocon (80.12%).

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

From live, month and PMR findings, it can be concluded that on an average, performance of the operators in the service area (Chennai) is by and large satisfactory for **Network Parameters**.

POI congestion is found to be satisfying for all the operators for both month and live measurement.

Under **Customer Service Quality** section, benchmark for the parameter “operator answered calls (voice-to-voice) within 60 seconds” it is found not satisfying for a no. of operators. All the operators need to take care so that there is positive improvement in this regard.

Regarding **Metering/Billing Credibility** issues, Airtel, Vodafone & Tata CDMA are found not meeting the benchmark for Pre-paid services.

During **Drive Tests**, high Blocked Call Rates were found for Airtel, Tata GSM, Uninor & Vodafone. Whereas for Idea, Tata GSM & Reliance GSM performance against ‘Good voice quality’ was found not to be of much satisfaction.

III. Basic Telephone Service (Wireline) Providers

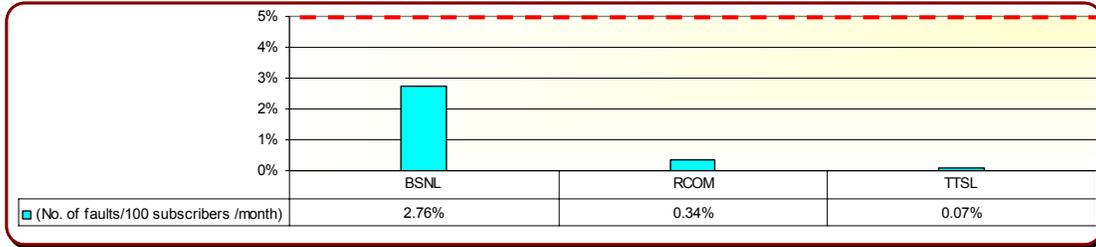
(A) Exchange Audit

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

S/N	Name of Parameter	Bench mark	Audit	BSNL	RCOM	TTSL
1	(No. of faults/100 subscribers /month)	< 5%	Month	2.76%	0.34%	0.07%
2	Fault repair by next working day(Urban Area)		Month			
a	By next working day	>90%	Month	96.88%	100.00%	100.00%
b	Within 3 days	100%	Month	98.55%	100.00%	100.00%
3	Fault repair by next working day(Rural & hilly Area)		Month			
a	By next working day	>90%	Month	96.83%	NA	NA
b	Within 5 days	100%	Month	99.83%	NA	NA
4	Rent rebate		Month			
a	Fault pending > 3 days & <7 days	Rebate for 7 days	Month	319	0	0
b	Fault Pending > 7 days & < 15 days	Rebate for 15 days	Month	998	0	0
c	Fault pending > 15 days	Rebate for one month	Month	291	0	0
5	Mean time to Repair(MTTR)	<= 8 Hrs	Month	7.01	2.2	4.15
6	Call Completion Ratio(CCR) & Answer to seizure Ratio(ASR)	> 55%(CCR) & > 75%(ASR)	Live	78.65%	89.89%	98.27%
			Month	77.88%	89.60%	98.47%
7	Metering and billing credibility(post paid)		Month			
a	Disputed Bills over bills issued	< 0.1%	Month	0.01%	0.02%	0.01%
8	% of billing complaints resolved within 4 weeks	Within 4 weeks	Month	100%	100%	100%
a	Period of refunds after resolution of complaints within 1 weeks	Within 1 weeks	Month	100%	100%	100%
9	No of POIs not meeting benchmark	<=0.5%	Live	0%	0%	0%
			Month	0%	0%	0%
10	Response Time to customer for assistance		Month			
a	Accessibility of Call centre within 40 sec.	>= 95%	Live	95.65%	98.00%	97.00%
			Month	95.65%	98.19%	97.00%
b	% age of calls answered by operator(voice to voice) within 60 sec.	>= 90%	Live	92.43%	96.00%	94.00%
			Month	92.43%	96.00%	94.00%
11	Customer care(promptness in attending to customers request		Month			
a	Termination / Closures	<= 7 Days	Month	100%	100%	100%
b	Time taken refunds deposit after closures	100% within 60 days	Month	100%	100%	100%

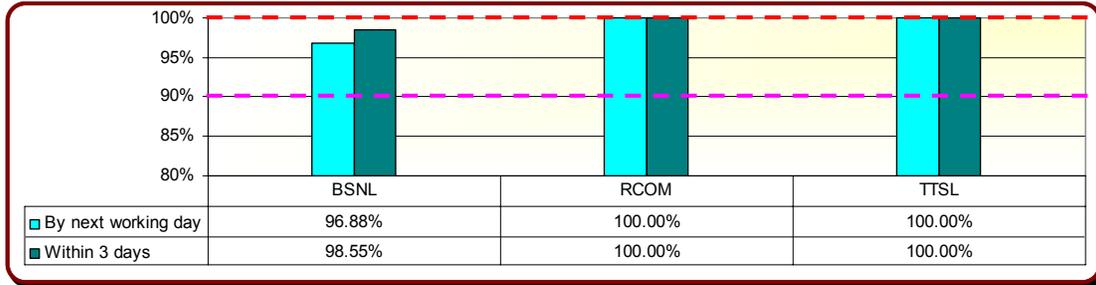
2) Performance (Graphical representation)

Fault incidences (No of faults/100 subscribers/month (<= 5): All the three operators are meeting the benchmarks of 5%.



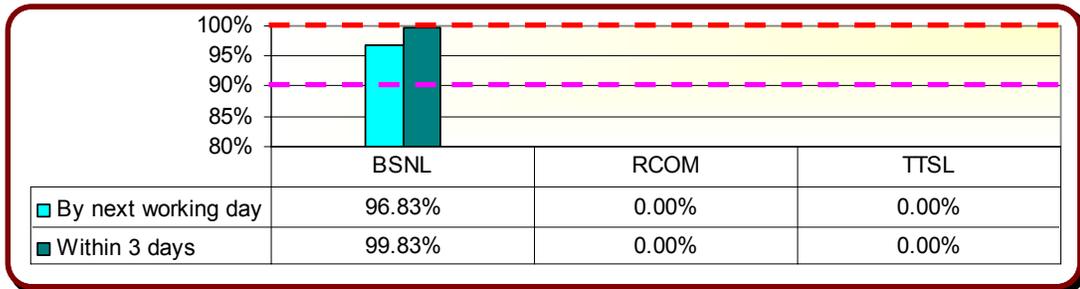
Fault Repair (Urban Area):

- **By next working day (>90%):** All the operators comply with the TRAI benchmark of 90%.
- **Within 3 days (100%):** RCOM & TTSL is complying with the TRAI benchmark of 100%. BSNL (98.55%) show minor deviation in benchmark.



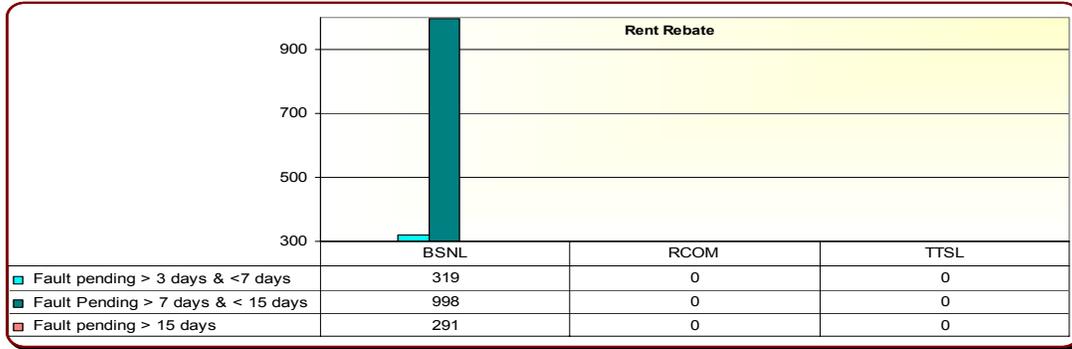
Fault Repair (Rural & Hilly Area):

- **By next working day (>90%):** This parameter is not applicable for RCOM & TTSL in Chennai circle.
- **Within 5 days (100%):** BSNL is deviating from benchmarks.

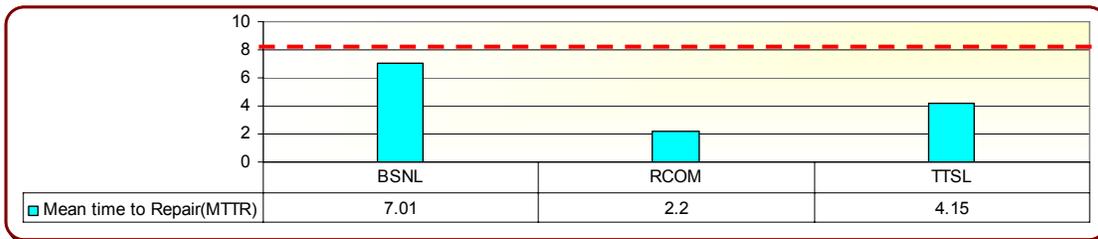


Rent Rebate

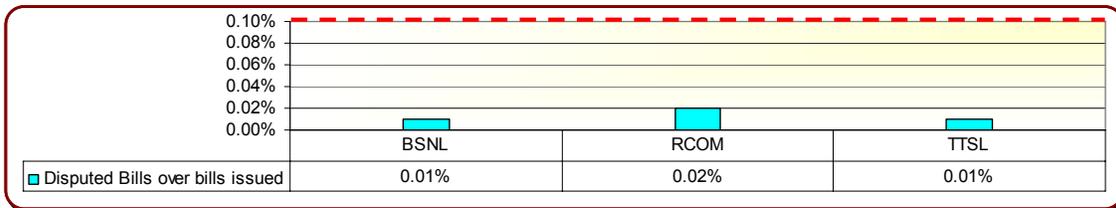
- Faults pending for > 3 days & < 7 days (Rebate 7 days)—As far as rebate is concerned, BSNL has given rebate to 319 customers. RCOM & TTSL do not have any rebate case.
- Faults pending for > 7 days & < 15 days (Rebate 15 days) — As far as rebate is concerned, BSNL has given rebate to 998 customers. RCOM & TTSL do not have any rebate case.
- Faults pending for > 15 days (Rebate one month)--. As far as rebate is concerned, BSNL has given rebate to 291customers. RCOM & TTSL do not have any rebate case.



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

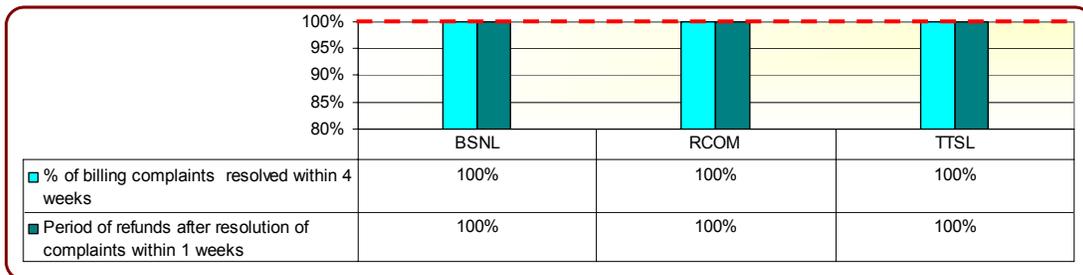


Metering and Billing Credibility (< 0.1%): Disputed Bills over Bills issued: - All the operators comply with the TRAI standard.



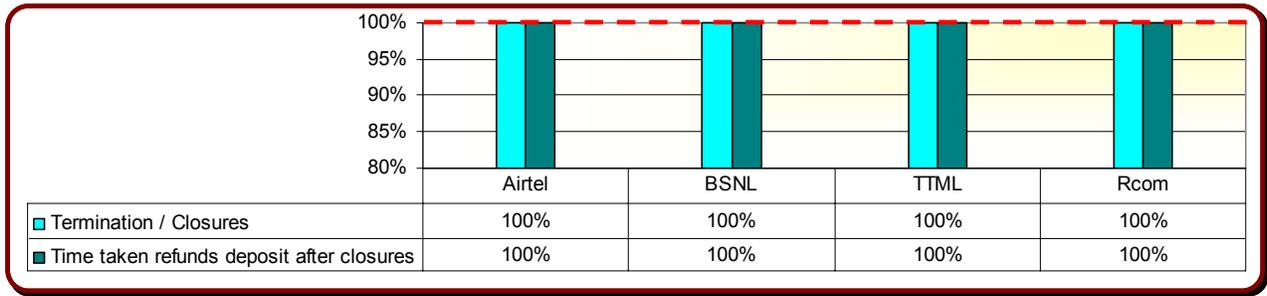
% of Billing Complaints resolved within 4 Weeks: All the operators have resolved billing complaints 100% (benchmark) within 4 weeks.

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%.



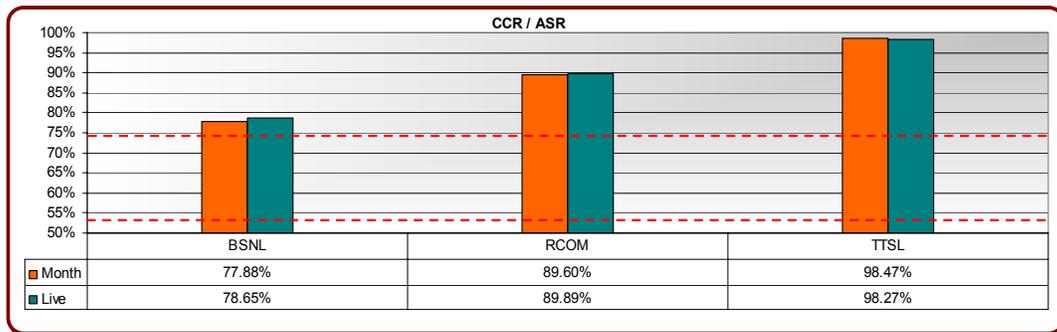
Customer Care Promptness in Attending Customer Request:

Termination / Closures : (<= 7 Days): All the operators are meeting the benchmarks except BSNL (83.33%) provided by TRAI within 7 Days.



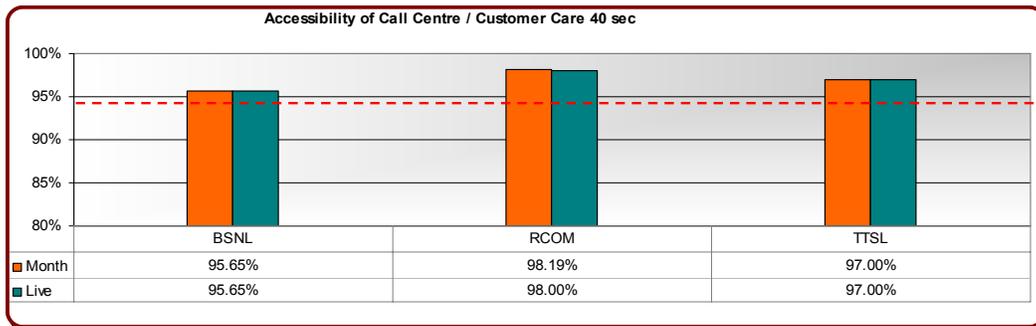
Comparison between Live measurements and One month data Audit – Basic Service (Wireline).

Call Completion Rate (>55%) & Answer to Seizure (>75%): The performance based on live measurement as well as One-Month Data match for all operators and they meet the benchmarks.

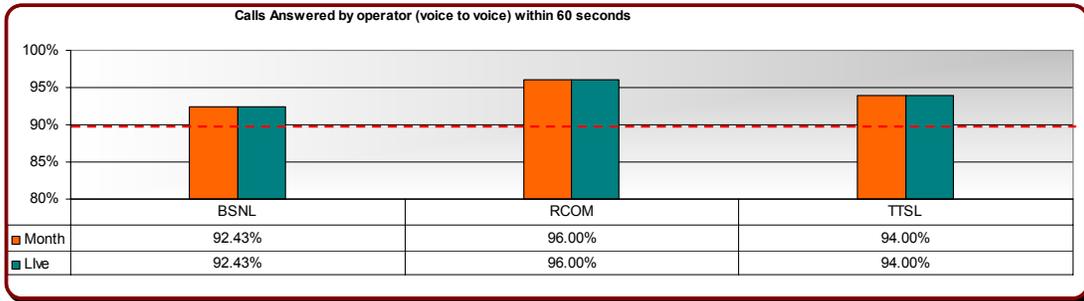


Response time to the customer for assistance:

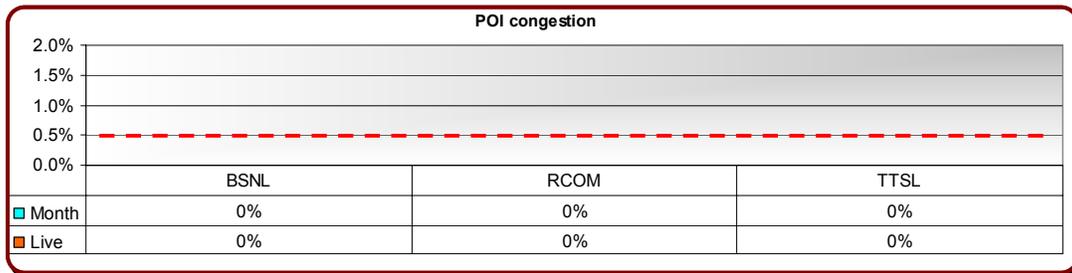
- Accessibility of Call Centre / Customer Care 40 sec (> 95 %):** All the operators are meeting the benchmark in live audit.



2. **(ii) Calls Answered by operator within 60 seconds (>90%) (Voice to Voice):** The performance based on live measurement as well as One-Month data are matching and all the operators are meeting the benchmark.



POI Congestion (< 0.5%): The performance based on Live measurement as well as One-Month Data are similar for all the operators and meeting the benchmarks.



3) Customer Care & Grievances Redressal

S.N.	Parameters	BSNL	RCOM	TTSL
1	Total no of complaints received in the call centre (Tech+ Non Tech)	82886	NR	526
2	Total no of complaints redressed by the call centre within the specified time limit	NR	NR	NA
3	Nodal Officer			
3.1	Total no of complaints received by the nodal officers	NR	NR	0
3.2	Percentage of complaints with reference to total no of complaints received at the call centre	NR	NR	0%
3.3	Total no of complaints redressed within the specified time limit	NR	NR	NA
4	Appellate Authority			
4.1	Total no of appeals received by the appellate authority	NR	NR	0
4.2	Percentage of appeal received with reference to total no of complaints received by the nodal officers	NR	NR	0%

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) Live calling to Call center:

Fifty nos. of calls were made in each half and below given nos. of call got connected to the call center within 60 Sec (Voice to Voice).

	OPERATORS NAME		
	BSNL	Rcom	TTSL
1ST HALF (10AM TO 01 PM)	44	46	44
2ND HALF (04PM TO 07 PM)	40	43	40
In % age	84.00	89.00	84.00

5) Level 1 Calling:

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

6) Critical Analysis

Fault incidence: All the three operators are meeting the benchmarks of 5%.

Fault Repair (Urban Area): It is found that all the operators are meeting the benchmarks of $\geq 90\%$ set by TRAI for faults repair by the next working day and in case of fault repair within 3 working days BSNL is found to miss the benchmark of 100% marginally with the value of 98.55% . Through live calling the fault repair within 24 hours data was verified and found that almost all the operators are better than 95% in customer satisfaction. While verification of records of service providers it was found that all the service providers are providing rebates as per TRAI norms.

Fault Repair (Rural & Hilly Area): In Chennai Circle, BSNL is deviating from the benchmarks in faults repaired within 5 days in Rural & hilly area. Other operators have no services in these areas.

Rent Rebate: Only BSNL is providing Rent Rebate and for TTSL and RCOM having no rebate cases in the month of audit. For BSNL rebate cases are 319, 998 & 291 respectively for each type of rebate cases.

Mean Time to Repair (MTTR): All the operators are meeting the benchmark of < 8 hrs fixed by TRAI during one month audit.

Call Completion Rate (CCR): All the service providers are found to be meeting TRAI benchmark of $> 55\%$ for Call Completion Rate (CCR) and $> 75\%$ for Answer to Seizure Ratio for the month of audit data verification. However in the case of Reliance, the Answer Seizure Ratio (ASR) is measured in place of Call Completion Rate (CCR) and the firm claims that the same is a better indicator for the kind of network owned by the Reliance.

Metering and billing credibility: All the operators are meeting 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 All 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 respectively.

POI Congestion: ll the operators are meeting the benchmarks in POI Congestion set by TRAI ($< 0.5\%$) in one month data Audit.

Response Time to Customer for Assistance:

1. **Accessibility of Call Centre/ Customer care within 40 seconds (Electronically):** All the operators are meeting the benchmarks of $\geq 95\%$.
2. **% of Call answered by operators within 60 seconds (Voice to Voice):** All the operators are meeting the benchmark of 90% fixed by TRAI.

Customer care (Promptness of 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:** All the operators are providing the refund to the customers within the benchmark time limit.

(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.

BSNL

For BSNL, there are 38 Exchanges covering Chennai. BSNL is meeting the benchmarks provided by TRAI during the live assessment for Call Completion Rate (CCR) as well as for POI congestion under Network section parameters. BSNL is also meeting the benchmark for Response Time to Customer for Assistance for the parameters %age Calls answered electronically within 40 Seconds and %age Calls answered Voice to Voice within 60 Seconds during the live measurement.

RCOM

In the Network Section, both the network parameters of Reliance are meeting the benchmark with a value of 89.89% and 0% for Call Completion Ratio and POI congestion respectively within the local network. Please note that Reliance have provided with ASR (Answer to Seizure ratio) value in case of call completion ratio. Reliance is meeting the benchmark for Response Time to Customer for Assistance for the parameters %age Calls answered electronically within 40 Seconds and %age Calls answered Voice to Voice within 60 Seconds during the live measurement.

TTSL

In the Network Section, both the network parameters of TTSL are meeting the benchmark with a value of 98.27% and 0% for Call Completion Ratio and POI congestion respectively within the local network. TTSL is also meeting the benchmark for 'Response Time to Customer for Assistance' for the parameters %age Calls answered electronically within 40 Seconds and %age Calls answered Voice to Voice within 60 Seconds during the live measurement

IV. Broadband Service Providers

(B) POP Audit

1. 3 days live and One month audit comparative table

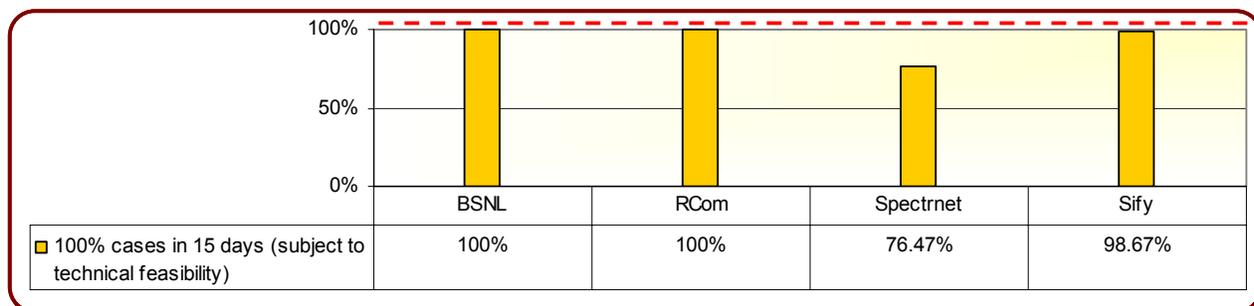
S/N	Parameters	Bench- marks	Audit	BSNL	RCom	Spectrne t	Sify
1	<i>Service Provisioning/Activation Time</i>						
1.1	in 15 days	<15 days	Month	100%	100%	76.47%	98.67%
1.2	In all cases where payment towards installation charge & SD is taken and the Broadband connection is not provided within 15 working days	credit @ Rs.10/ per day.		100%	100%	100%	100%
2	<i>Faults Repair/Restoraion Time</i>						
	By next working day	>90%	Month	93.03%	100%	98.66%	85.92%
	within 3 working day	≥99%		100%	100%	100%	100%
2.1	<i>Rebate</i>						
	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	0	0	15
	Faults Pending for > 7 working days and < 15 working days: (Rebate equivalent to 15 days of minimum monthly charge or equivalent usage allowance)			0	0	0	6
	Faults Pending for > 15 working days:(Rebate equivalent to one month of minimum monthly charge or equivalent usage allowance)			0	0	0	0
3	<i>Billing Performance</i>						
	Billing complaints per 100 bills issued	<2%	Month	0.25%	0.07%	0%	
	Billing complaints per 100 bills issued	100%		100%	100%	100%	
	Time taken for refund of deposits after closure (within 60 days)	100%		100%	100%	100%	
4	<i>Response time to the customer for assistance % age of calls answered by operator (Voice to Voice)</i>						

	within 60 sec	>60%	Live	100%	100%	100%	91.33%
			Month	100%	94%	100%	84.78%
	within 90 sec	>80%	Live	100%	100%	100%	100%
			Month	100%	96%	100%	100%
5	<i>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.) < 80% link(s) / route bandwidth utilization during peak hours (TCBH).</i>						
5.1	POP to ISP Gateway Node [Intra-network] Link(s)	< 80%	Live	65.33%	17.26%	54.16%	42%
			Month	52%	4.93%	69%	42%
5.2	ISP Gateway Node to IGSP / NIXI Node upstream Link(s) for International connectivity	< 80%	Live	83.75%	61.90%		58%
			Month	74.20%	57.46%		58%
5.3	Broadband Connection Speed (download) - from ISP Node to User	> 80%	Live	85%	100%	92.29%	88.68%
			Month	85.50%			88.13%
6	<i>Service Availability/Uptime (for all users)</i>						
	Service Availability(%)	>98%	Month	100%	99.99%	99.83%	100%
7	<i>Packet loss</i>						
	% of Packet loss	<1%	Live	0%	0.23%	0%	0%
			Month	0%	0.19%		0%
8	<i>Network latency (for wired broadband access)</i>						
8.1	User reference point at POP/ISP Gateway node to IGSP/NIXI	<120 ms	Live	49			52
			Month	24	57.8		88
8.2	User reference point at ISP Gateway node to International nearest NAP port abroad (terrestrial)	<350 ms	Live	274	40.03	228	284
			Month	110	55.4		285
8.3	User reference point at ISP Gateway node to International nearest NAP port abroad (satellite)	<800 ms	Month	NA	NA	NA	NA

2) Performance (Graphical representation)

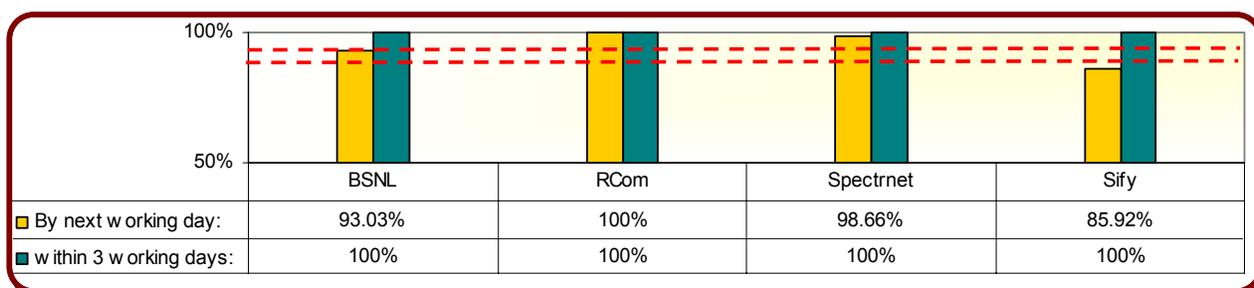
Service Provisioning /Activation Time: (Should be 100%)

All the operators are complying with the TRAI benchmark of 100% except Sify & Sprctranet with the value of 98.67% & 76.47% respectively.



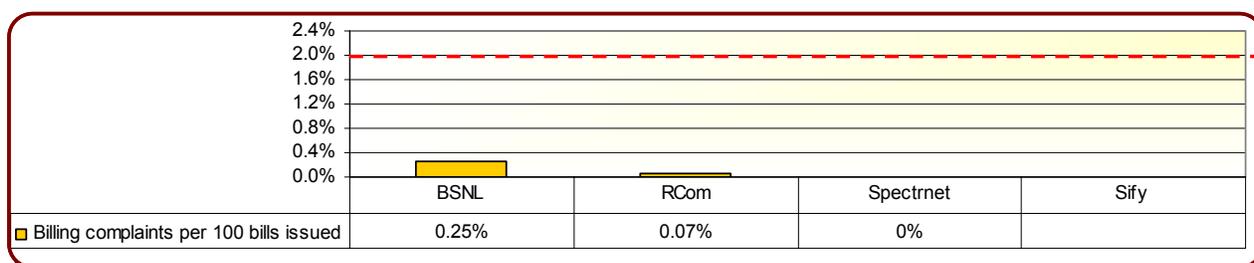
Fault Repair / Restoration Time:

- **By next working day (>90%):** All the operators are complying with the TRAI benchmark of 90%.
- **Within 3 working days (>99%):** All the operators are complying with the TRAI benchmark.
- **Rebate:** All the operators are giving rebate to the eligible customers.



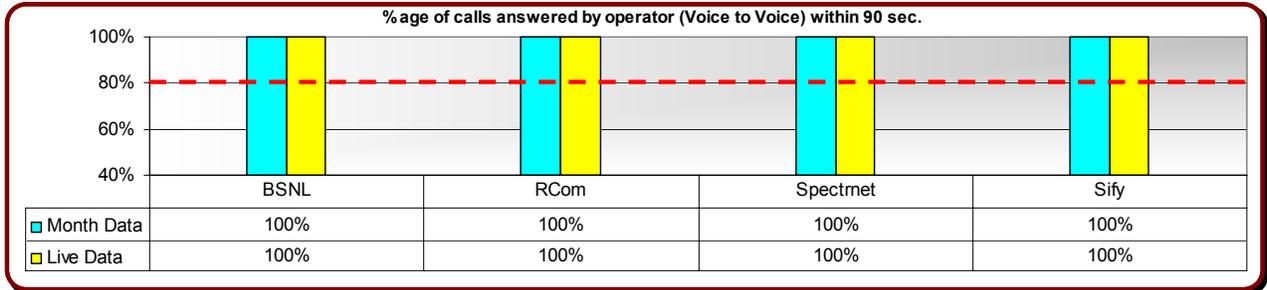
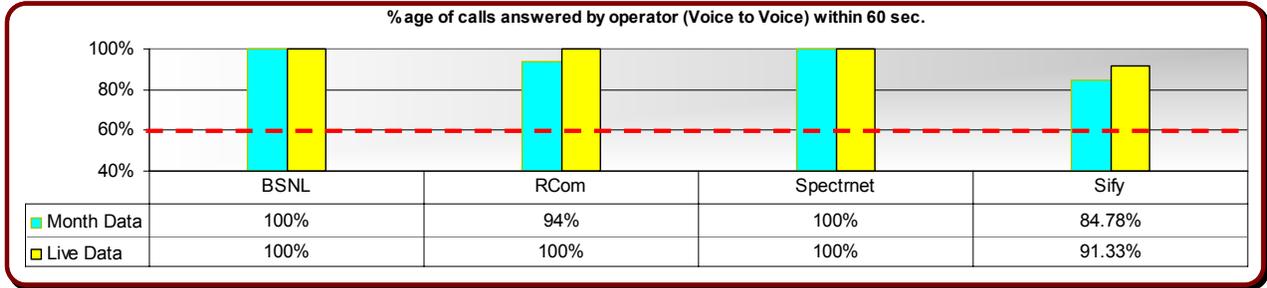
Billing Performance: (Benchmark <2%)

All the operators are complying with the TRAI standards, Except Sify which has only prepaid module.



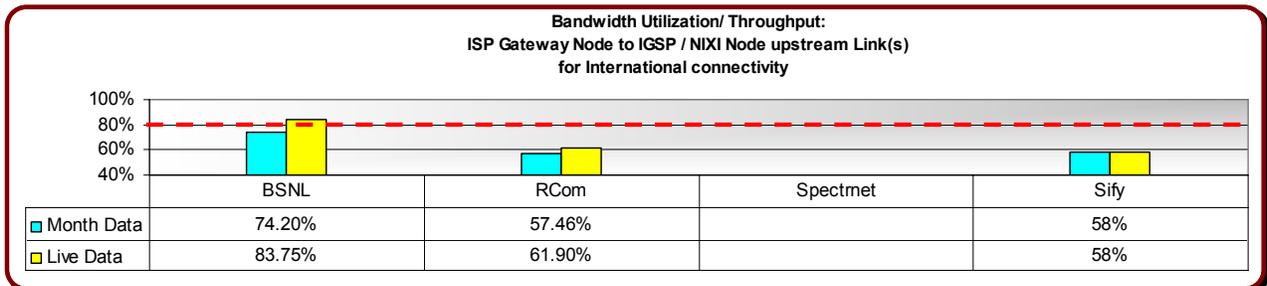
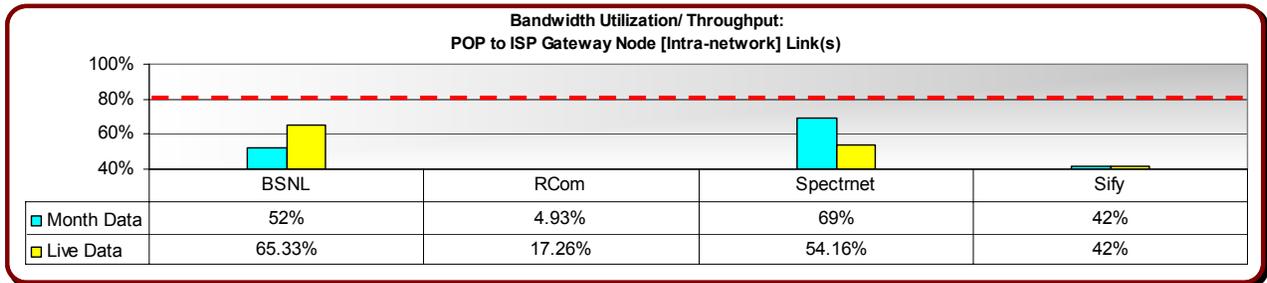
Response time to the customer for assistance: % age of calls answered by operator (Voice to Voice)

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



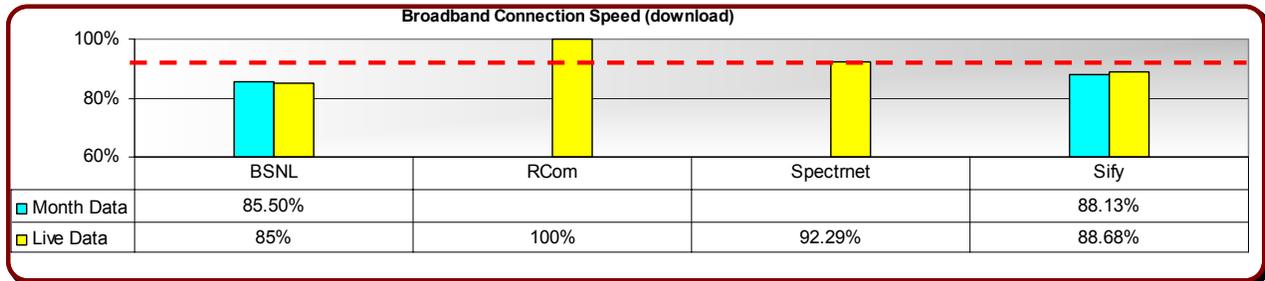
Bandwidth Utilization/ Throughput:

- **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.
- **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 except BSNL with the value of 83.75% in 3 days live verification . for Spectranet; Operator is not having any NIXI upstream links.

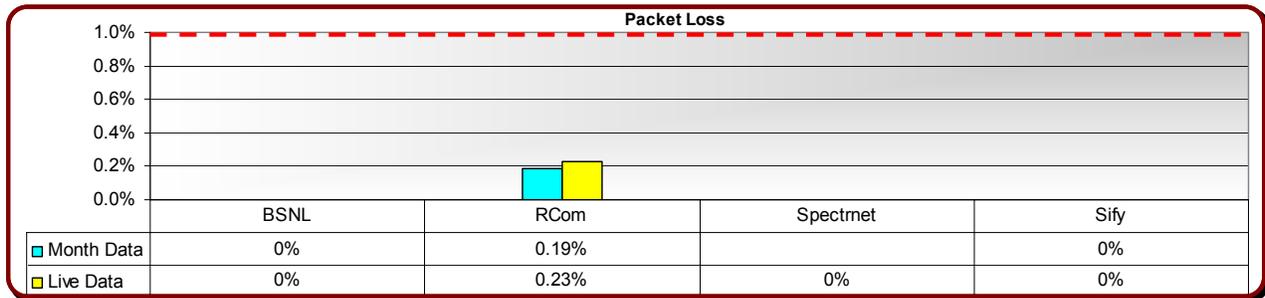


Broadband Connection Speed (download) (>80%): All the operators are meeting the TRAI benchmark of greater than 80% connection in both live and one-month data verification except RCom and Spectranet have not provided the month data.

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.

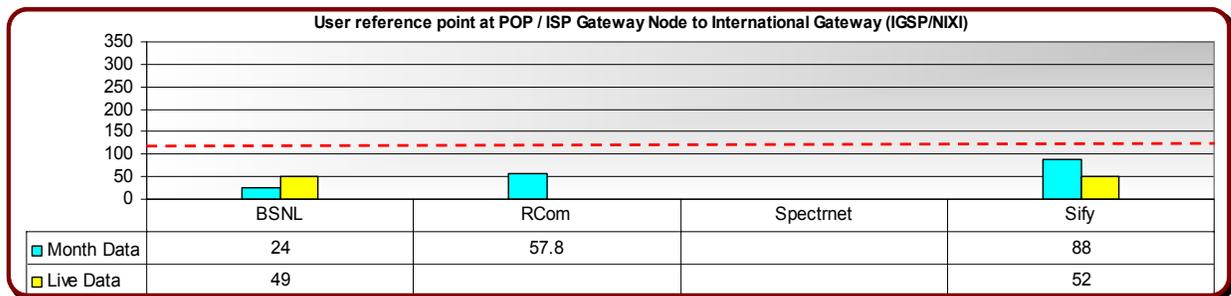


Packet Loss (Should be less than 1%): All operators are meeting the benchmark in both live and one-month data verification except for Spectranet have not provided the month data.

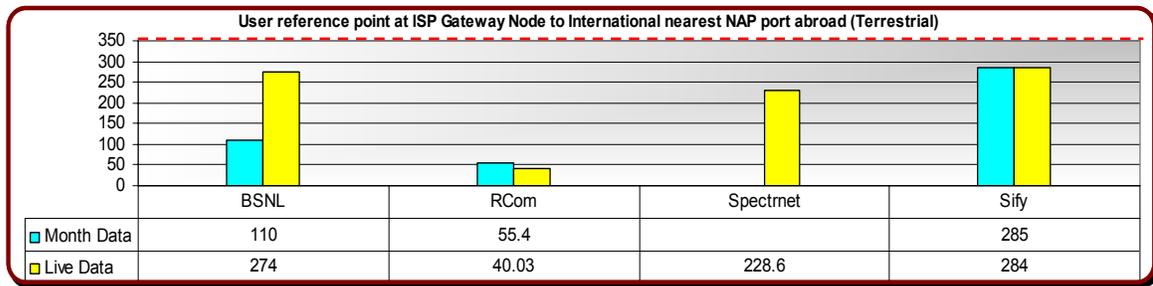


Network Latency:

- **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 except for Spectranet have not provided the data.



- **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	BSNL	RCom.	Spectranet	Sify
1	Call Centre				
1.1	Total no of complaints received in the call centre	14335	287	105	2303
1.2	Complaints per 100 customers per months	0.25%	0.07%	0%	0%
1.3	Total no of complaints redressed by the call centre within the specified time limit	14299	286	105	2303
2	Nodal Officer				
2.1	Total no of complaints received by the nodal officers	1	0	0	4
2.2	Percentage of complaints with reference to total no of complaints received at the call centre	0.01%	0%	0%	0%
2.3	Total no of complaints redressed within the specified time limit	0	0	0	4
3	Appellate Authority				
3.1	Total no of appeals received by the appellate authority	1	0	0	2
3.2	Percentage of appeal received with reference to total no of complaints received by the nodal officers	0.01%	0%	0%	0.09%
3.3	Total no of appeals decided within 3 months	0	0	0	1

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) Live calling to Call Center:

Fifty nos. of calls were made in each half and below given nos. of call got connected to the call center within 60 Sec (Voice to Voice).

	Calls made	OPERATORS NAME			
		BSNL	Rcom	Sify	Spectranet
1ST HALF (10AM TO 01 PM)	50	46	42	37	44
2ND HALF (04PM TO 07 PM)	50	47	39	41	43
In % age		93.00	81.00	78.00	87.00

5) Critical Analysis

- ◆ Reliance, Spectranet & Sify are submitting the PMR on all India bases; hence data is verified on All India basis not for particularly for Chennai Circle.
- ◆ The Satellite link do 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 the Operator.

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 except Sify & Spectranet with the value of 98.67% & 76.47% respectively.

Fault Repair/Restoration time & Rebate: All the operators are meeting benchmark of more than 90% except Sify with the value of 85.92% (by next working day). All the service providers are found to provide Rebate as per the guide lines set by TRAI except Sify, having no rebate case because the operator currently is having only prepaid module.

Billing performance: All the operators are meeting the benchmark of Less than 2% for billing complaints. Also all the operators are meeting the benchmark of “100% cases 4 weeks” for billing complaint resolution for on-month data verifications. Also all the operators 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

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.
- **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 except BSNL with the value of 83.75% in 3 days live verification. For Spectranet, the operator is not having any NIXI upstream links.

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 Verification except RCom & Spectranet have not provided the 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 except Spectranet have not provided the month data.

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 except for Spectranet have not provided the data.
- **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.

R Com

Reliance is meeting all the benchmark.

Reliance submits the PMR on all India bases; hence data is verified on all India basis not for Chennai Circle particularly.

SIFY

Sify is meeting all the benchmarks.

SPECTRANET

Spectranet is meeting all the benchmarks except for parameter %age of connections provided within 15 days of registration of demand with the value of 98.47%.