

REPORT

ON

AUDIT & ASSESSMENT OF QUALITY OF SERVICE

OF

CELLULAR MOBILE TELEPHONE SERVICE

FOR

NORTH ZONE – HIMACHAL PRADESH CIRCLE
(North Zone)

Report Period: April 2012 - June 2012

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

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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 Himachal Pradesh circle. But for parameters such as 'Worst affected cell exceeding 3% TCH drop' and 'BTSs accumulated down time' CBBH (Cell Bouncing Busy Hour) was taken instead of TCBH (Time Consistent Busy Hours) as per the TRAI new regulation 2009.

CHAPTER-2: EXECUTIVE SUMMARY

I. Preface

This report highlights the findings for the audit & assessment of Quality of Service of Cellular Mobile Services in Himachal Pradesh Circle in 2nd quarter (April 2012 - June 2012). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken during the period Oct - Dec 2011.

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

S/N	Name of Service Provider	Month of Audit	TCBH Hour
GSM Operators			
1	Aircel Ltd	May-2012	2000-2100 Hrs
2	Airtel Ltd	May-2012	1900-2000 Hrs
3	BSNL	May-2012	1900-2000 Hrs
4	Idea	May-2012	2000-2100 Hrs
5	Tata Communications (GSM)	May-2012	2000-2100 Hrs
6	Vodafone	May-2012	2000-2100 Hrs
7	Reliance Communication (GSM)	May-2012	1900-2000 Hrs
8	Videocon	May-2012	1900-2000 Hrs
CDMA Operators			
9	MTS (CDMA)	May-2012	1900-2000 Hrs
10	Reliance Communication (CDMA)	May-2012	2000-2100 Hrs
11	Tata Communications (CDMA)	May-2012	2000-2100 Hrs

Note: Etisalat has stopped its operation in Himachal Pradesh Circle.

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

(A) Cellular Mobile Telephone Services

3 days Live Data Audit			B-mark	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Videocon	V-fone	MTS	Rcom CDMA	Tata CDMA
S/N	Name of Parameter		GSM Operators						CDMA Operators					
1	Network Availability								ICR (Aircel)					
	a) BTS Accumulated Downtime	≤2%	0.19%	0.00%	1.88%	0.33%	0.18%	0.00%		0.08%	0.00%	0.13%	0.00%	
	b) Worst affected BTSs due to downtime	≤2%	0.00%	0.00%	4.51%	0.00%	0.00%	0.00%		0.00%	0.00%	0.00%	0.00%	
2	Connection Establishment (Accessibility)													
	a) CSSR (Call Setup Success Rate)	≥95%	98.42%	99.29%	98.79%	98.57%	98.67%	99.29%		98.94%	95.88%	99.23%	98.32%	
	b) SDCCH/PAGING congestion	≤1%	0.01%	0.06%	0.57%	0.11%	0.02%	0.00%		0.17%	0.00%	0.01%	0.02%	
	c) TCH congestion	≤2%	0.32%	0.11%	1.21%	0.69%	0.02%	0.00%		1.06%	0.00%	0.01%	0.22%	
3	Connection maintenance (retainability)													
	a) CDR	≤2%	0.90%	0.78%	1.88%	1.06%	0.66%	0.00%		0.93%	0.00%	0.04%	0.23%	
	b) Worst affected cells>3% TCH drop	≤3%	8.96%	2.16%	2.75%	2.07%	0.03%	0.00%		2.66%	1.01%	0.00%	2.03%	
	c) Good voice quality	≥95%	95.87%	98.90%	NA	95.25%	98.21%	99.05%	96.79%	99.29%	99.78%	NA		
4	Number of POI having ≥0.5% POI congestion		0	0	0	0	0	0	0	0	0	0	0	
5	Response time to customers for assistance													
	a) Accessibility of call centre/Customer Care	≥95%	100.0%	100.0%	100.0%	100.0%	98.98%	100.0%	100.0%	100.0%	100.0%	99.96%	100.0%	
	b) % call answered by operators(voice to voice) within 60 sec.	≥90%	64.04%	97.91%	96.43%	97.69%	95.41%	97.37%	100.0%	97.86%	100.0%	95.91%	92.32%	

NA: Not Applicable, **NP:** Not Provided

From the above 3 days live data assessment table, it is found that all operators are meeting most of the network parameters. Exception is for “Worst affected cells >3% TCH drop”, as seen for Aircel is not satisfying the benchmark. Among the Technical Parameters it is also found that for parameter “Worst affected BTSs due to downtime” BSNL is not satisfying the benchmark. In case of “Good voice quality” Tata (CDMA) & BSNL reported that the data is not system generated. Rests of the operators are satisfying the benchmark successfully.

In case of performance related to Customer Care data it is seen that for the parameter “call answered by operators (voice to voice) within 60 sec” Aircel performance is showing values below benchmark.

One Month Data Audit		Bench- mark	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Videoc on	V-fone	MTS	RCom CDMA	Tata CDMA
S/N	Name of Parameter		GSM Operators							CDMA Operators			
8	Response time to customers for assistance												
	a) Accessibility of call centre/Customer Care	≥95%	100.0%	100.0%	100.0%	100.0%	99.0%	100.0%	98.79%	100.0%	100.0%	99.89%	100.0%
	b) % call answered by operators(voice to voice) within 60 sec.	≥90%	51.10%	93.50%	96.45%	93.45%	83.27%	94.59%	97.20%	92.64%	100.0%	95.40%	96.52%
9	Termination/closure of service	≤7days	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	NA	100.0%	NA	100.0%	100.0%
10	Time taken for refunds of deposits after closures (within 60 days).	100%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	NA	100.0%	NA	100.0%	100.0%

NA: Not Applicable, **NP:** Not Provided

From the above month data assessment table, it is found that the operators are meeting most of the Network Parameters except for, the parameter “*Worst affected cells>3% TCH drop*” Aircel is found not satisfying the benchmark. In case of “*Good voice quality*” Tata (CDMA) & BSNL reported that the data is not system generated. Rests of the operators are satisfying the benchmark successfully.

For parameters “*Metering/billing credibility-Post paid*” benchmark value is not met by Vodafone. “*% calls answered by operators (voice-to-voice) within 60 sec*” it is found that Aircel & RCom-GSM are not satisfying the benchmark.

Operator-Assisted Drive Test

The Operator assisted Drive Test was conducted at Himachal Pradesh for all the operators. Route covered was around 80-100Km depending on city areas within the speed limit of 25Km/hr. The cities covered were Shimla, Nahan & Bilaspur. In all the cities, zones were selected for covering different density areas (High, Medium & Low).

S/N	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	V-fone	MTS	RCom CDMA	Tata CDMA
			GSM Operators						CDMA Operators		
1.1	Blocked Call Rate ($\leq 3\%$)	Shimla	2.00%	0.00%	1.32%	7.27%	0.00%	2.00%	No Service	0.00%	0.00%
		Nahan	0.00%	0.00%	4.00%	0.00%	0.00%	0.00%	No Service	0.00%	0.00%
		Bilaspur	0.00%	0.00%	2.27%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1.2	Dropped Call Rate ($\leq 2\%$)	Shimla	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%	0.00%
		Nahan	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%	0.00%
		Bilaspur	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1.3	% of connections with good voice quality ($\geq 95\%$)										
	(i) 0-4 (w/o frequency hopping)	Shimla							No Service	100.0%	96.29%
		Nahan							No Service	97.00%	97.17%
		Bilaspur							98.37%	99.00%	99.29%
	(ii) 0-5 (with frequency hopping)	Shimla	97.50%	95.80%	94.90%	96.90%	96.00%	95.50%			
		Nahan	97.20%	96.80%	95.00%	97.20%	95.00%	97.70%			
Bilaspur		95.10%	96.40%	95.90%	97.30%	95.00%	98.10%				
1.4	Call Setup Success Rate ($\geq 95\%$)	Shimla	98.00%	100.0%	98.68%	92.73%	100.0%	98.00%	No Service	100.0%	100.0%
		Nahan	100.0%	100.0%	96.00%	100.0%	100.0%	100.0%	No Service	100.0%	100.0%
		Bilaspur	100.0%	100.0%	97.73%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

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

- “Blocked Call Rate” benchmark is not met by BSNL (Nahan) & Idea (Shimla).
- “% of connection with good voice quality” benchmark is not met by BSNL (Shimla).
- “Call Setup Success Rate” benchmark is not met by Idea (Shimla).

Note: Videocon & Tata-GSM is on ICR with Aircel in Shimla, Nahan & Bilaspur Towns and MTS has no service (Spectrum) in Shimla & Nahan towns.

Independent Drive Test

The Independent Drive Test was conducted at Himachal Pradesh in Solan & Bilaspur Towns. Route covered was about around 40 -60 Km depending on city area within the speed limit of 25Km/hr. Here again, zones were selected for covering different density areas (High, Medium & Low dense areas).

Operators Name	City	Blocked Call Rate (≤3%)	Dropped Call Rate (≤2%)	% of connections with good voice quality (≥95%)		Call Setup Success Rate (≥95%)
				(i) 0-4 (w/o frequency hopping)	(ii) 0-5 (with frequency hopping)	
Videocon	Solan	5.00%	0.00%		96.20%	95.00%
BSNL		3.23%	0.00%		93.00%	96.77%
Idea	Bilaspur	0.00%	0.00%		97.00%	100.0%

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

- “Blocked Call Rate” is not met by Videocon (Solan) & BSNL (Solan).
- “% of connection with good voice quality” benchmark is not met by BSNL (Solan).

PMR		B-mark	Audit	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Videocoin	Vodafone	MTS	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	0.09%	0.03%	1.90%	0.09%	0.21%	ICR (Aircel)	0.51%	0.02%	0.43%	0.16%	0.00%
			Verified	0.09%	0.03%	1.90%	0.09%	0.21%		0.51%	0.02%	0.43%	0.16%	0.00%
	Worst affected BTSs due to downtime	≤2%	Reported	0.27%	0.17%	1.87%	0.00%	0.78%		0.00%	0.00%	0.00%	0.09%	0.00%
		Verified	0.27%	0.17%	1.87%	0.00%	0.78%	0.00%		0.00%	0.00%	0.09%	0.00%	
2	Connection Establishment (Accessibility)													
	CSSR (Call Setup Success Rate)	≥95%	Reported	99.29%	99.12%	95.67%	98.43%	98.90%	ICR (Aircel)	99.33%	99.19%	99.71%	99.43%	98.69%
			Verified	99.29%	99.12%	95.67%	98.43%	98.90%		99.33%	99.19%	99.71%	99.43%	98.69%
	SDCCH/PAGING congestion	≤1%	Reported	0.68%	0.13%	0.77%	0.39%	0.02%		0.08%	0.08%	0.00%	0.00%	0.00%
			Verified	0.68%	0.13%	0.77%	0.39%	0.02%		0.08%	0.08%	0.00%	0.00%	0.00%
	TCH congestion	≤2%	Reported	0.39%	0.19%	1.83%	1.06%	0.26%		0.01%	0.81%	0.00%	0.15%	0.19%
		Verified	0.39%	0.19%	1.83%	1.06%	0.26%	0.01%		0.81%	0.00%	0.15%	0.19%	
3	Connection maintenance (retainability)													
	CDR	≤2%	Reported	0.95%	1.04%	1.83%	1.10%	0.69%	ICR (Aircel)	0.85%	0.90%	0.10%	1.03%	0.25%
			Verified	0.95%	1.04%	1.83%	1.10%	0.69%		0.85%	0.90%	0.10%	1.03%	0.25%
	Worst affected cells>3% TCH drop	≤3%	Reported	12.06%	2.63%	4.83%	2.41%	0.35%		0.00%	2.82%	0.00%	0.72%	1.91%
			Verified	12.06%	2.63%	4.83%	2.41%	0.35%		0.00%	2.82%	0.00%	0.72%	1.91%
	Good voice quality	≥95%	Reported	96.39%	98.63%	95.47%	95.94%	98.02%		98.69%	97.28%	100%	98.27%	99.65%
		Verified	96.39%	98.63%	95.47%	95.94%	98.02%	98.69%		97.28%	100%	98.27%	99.65%	
4	Number of POI having ≥ 0.5% POI congestion		Reported	0	0	0	0	0	ICR (Aircel)	0	0	0	0	0
			Verified	0	0	0	0	0		0	0	0	0	0
(B)	Customer Service Quality Parameters													
5	Metering/billing credibility-Post paid	≤0.1%	Reported	0.00%	0.01%	0.00%	0.00%	0.07%	0.00%	NA	0.03%	NA	0.05%	0.01%
			Verified	0.00%	0.01%	0.00%	0.00%	0.07%	0.00%		0.03%		0.05%	0.01%
6	Metering /billing credibility-Pre paid	≤0.1%	Reported	0.01%	0.00%	0.00%	0.02%	0.04%	0.00%	0.01%	0.02%	0.00%	0.01%	0.00%
			Verified	0.01%	0.00%	0.00%	0.02%	0.04%	0.00%	0.01%	0.02%	0.00%	0.01%	0.00%

PMR		Bench- mark	Audit	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA	
S/N	Name of Parameter			GSM Operators								CDMA Operators			
7	Resolution of billing/ charging complaints (within 4 weeks)	100%	Reported	100%	100%	100%	100%	100%	100%	100%	100%	NR	100%	100%	
			Verified	100%	100%	100%	100%	100%	100%	100%	100%	NR	100%	100%	
	Period of applying credit/waiver/adjustment to the customer's A/C from the date of resolutions of complaints	≤1week	Reported	100%	100%	100%	100%	100%	100%	100%	100%	NR	100%	100%	
			Verified	100%	100%	100%	100%	100%	100%	100%	100%	NR	100%	100%	
8	Response time to customers for assistance														
	Accessibility of call centre/Customer Care	≥95%	Reported	100%	99.28%	100%	98.65%	98.96%	99.00%	97.62%	100%	NR	99.38%	98.00%	
			Verified	100%	99.28%	100%	98.65%	98.96%	99.00%	97.62%	100%	NR	99.38%	98.00%	
	% call answered by operators(voice to voice) within 60 sec.	≥90%	Reported	89.34%	98.93%	94.00%	95.89%	91.51%	94.00%	97.62%	97.41%	NR	96.67%	97.00%	
Verified			89.34%	98.93%	94.00%	95.89%	91.51%	94.00%	97.62%	97.41%	NR	96.67%	97.00%		
9	Termination/closure of service														
	No. of requests for Termination / Closure of service complied within 7 days during the quarter	≤7days	Reported	100%	100%	100%	100%	100%	100%	NA	100%	NR	100%	100%	
			Verified	100%	100%	100%	100%	100%	100%		100%	NR	100%	100%	
	Time taken for refunds of deposits after closures.(within 60 days)	100%	Reported	100%	100%	100%	100%	100%	100%		100%	100%	NR	100%	100%
Verified			100%	100%	100%	100%	100%	100%	100%		100%	NR	100%	100%	

Critical Analysis (PMR Verification):

No deviations were found in compare to operators reported data.

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	B-mark	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Videocon	V-fone	MTS	Rcom CDMA	Tata CDMA	
			GSM Operators							CDMA Operators				
A	Network Service Quality Parameter													
	Network Availability													
1	a) BTS Accumulated Downtime	≤2%	0.19%	0.00%	1.88%	0.33%	0.18%	ICR (Aircel)	0.00%	0.08%	0.00%	0.13%	0.00%	
	b) Worst affected BTSs due to downtime	≤2%	0.00%	0.00%	4.51%	0.00%	0.00%		0.00%	0.00%	0.00%	0.00%	0.00%	
	c) Total no. of BTSs in the licensed service area		645	1246	953	596	731		8	698	11	371	186	
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		88	0	1287	140	93		0	42	0	36	0	
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	0	17	0	1		0	0	0	0	0	
2	Connection Establishment (Accessibility)													
	a) CSSR	≥95%	98.42%	99.29%	98.79%	98.57%	98.67%		99.29%	98.94%	95.88%	99.23%	98.32%	
	b) SDCCCH/PAGING congestion	≤1%	0.01%	0.06%	0.57%	0.11%	0.02%		0.00%	0.17%	0.00%	0.01%	0.02%	
	c) TCH congestion	≤2%	0.32%	0.11%	1.21%	0.69%	0.02%		0.00%	1.06%	0.00%	0.01%	0.22%	
3	Connection maintenance													
	a) CDR	≤2%	0.90%	0.78%	1.88%	1.06%	0.66%	0.00%	0.93%	0.00%	0.04%	0.23%		
	b) Cells having > 3% TCH drop	≤3%	8.96%	2.16%	2.75%	2.07%	0.03%	0.00%	2.66%	1.01%	0.00%	2.03%		
	c) Good voice quality	≥95%	95.87%	98.90%	NA	95.25%	98.21%	99.05%	96.79%	99.29%	99.78%	NA		
	d) No. of cells > 3% TCH drop		517	233	225	110	2	0	168	1	0	35		
	e) Total no. of cells in the network		1923	3600	2725	1774	2193	24	2104	33	1113	575		
4	Number of POI having ≥0.5% POI congestion		0	0	0	0	0	0	0	0	0	0		
	a) Name of POI not meeting the benchmark		Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil		
	b) Total No. of circuits on POI		12414	36854	17554	15196	11188	794	15504	719	7563	9844		

S/N	Name of Parameter	Bench mark	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Videocon	V-fone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators							CDMA Operators			
	c) Avg No. of call attempts on POI		1986401	636689	241706	259518	193194	ICR (Aircel)	366	500976	16	11443	84876
	d) Avg traffic served on POI (Erlang)		6108	22547	10758	8528	5429		15	7097	10	1476	1502
	e) Total number of working POI Service Area wise		40	36	42	30	16		10	43	19	15	65
	f) Equipped Capacity of Network in respect of Traffic in erlang		35014	73851	42000	21094	40000		9000	18312	4200	28000	33866
	g) Total traffic handled in TCBH in erlang		11677	55018	40340	12449	29707		22	13095	18	48030	3167
(B)	Customer Service Quality Parameters												
5	Response time to customers for assistance												
	a) Accessibility of call centre	≥95%	100.0%	100.0%	100.0%	100.0%	98.98%	100.0%	100.0%	100.0%	100.0%	99.96%	100.0%
	b) % of call answered by operators(voice to voice) within 60 sec	≥90%	64.04%	97.91%	96.43%	97.69%	95.41%	97.37%	100.0%	97.86%	100.0%	95.91%	92.32%
	c) No. of call attempts to call centre / customer care nos. during TCBH (Avg)		29517	38825	701	11579	34627	2051	9	934	0	2080	1055
d) No. of calls connected and answered successfully to call centre / customer care nos. during TCBH (Avg)		18902	38015	676	11312	33036	1997	9	914	0	1995	974	

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 Himachal Pradesh Service Area is as given below:-

- ***BTS accumulated downtime (benchmark $\leq 2\%$):***
All operators are satisfying the benchmark Value.
- ***Worst affected BTSs due to downtime (benchmark $\leq 2\%$):***
Except BSNL, all operators are satisfying the benchmark value.
- ***Call setup success rate (benchmark $\geq 95\%$):*** All operators are satisfying the benchmark value.
- ***SDCCH/PAGING Channel congestion (benchmark $\leq 1\%$):*** All operators are satisfying the benchmark .
Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.
- ***TCH congestion (benchmark $\leq 2\%$):*** All the operators are satisfying the benchmark value.
- ***Call drop rate (benchmark $\leq 2\%$):*** All operators are satisfying the benchmark value.
- ***Cell exceeding 3% TCH drop (benchmark $\leq 3\%$):*** Except Aircel, rest of the operators are satisfying the benchmark value.
- ***Connections with good voice quality (benchmark $\geq 95\%$):*** All operators are satisfying the benchmark value. Tata (CDMA) service providers have declared that the parameter is not system generated. Rests of operators are satisfying the benchmark value.
- ***Number of POI having $\geq 0.5\%$ POI congestion:*** All the operators satisfying the benchmark.
- ***%age of call answered by operator (electronically) (benchmark $> 95\%$):*** All of the operators are satisfying the benchmark value.
- ***%age of call answered by operator (Voice to voice) (benchmark $> 90\%$):*** Except Aircel, rest of the operators are satisfying the benchmark value.

(2) Month Data Assessment & Summarized Findings

S/N	Name of Parameter	Bench mark	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Videocon	V-fone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators							CDMA Operators			
(A)	Network Service Quality Parameter												
1	Network Availability												
	a) BTS Accumulated Downtime	≤2%	0.16%	0.004%	1.89%	0.13%	0.18%	ICR (Aircel)	0.50%	0.08%	0.00%	0.10%	0.003%
	b) Worst affected BTSs due to downtime	≤2%	0.00%	0.00%	1.78%	0.00%	0.14%		0.00%	0.00%	0.00%	0.00%	0.00%
	c) Total no. of BTSs in the licensed service area		645	1246	953	596	731		8	698	11	371	186
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		789	37	13380	563	977		30	407	0	286	4
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	0	17	0	1		0	0	0	0	0
2	Connection Establishment (Accessibility)												
	a) CSSR (Call Setup Success Rate)	≥95%	98.41%	99.22%	98.13%	98.61%	98.64%	99.28%	98.96%	98.44%	99.27%	98.67%	
	b) SDCCH/PAGING congestion	≤1%	0.02%	0.06%	0.80%	0.18%	0.01%	0.05%	0.23%	0.00%	0.02%	0.01%	
	c) TCH congestion	≤2%	0.31%	0.08%	1.82%	0.68%	0.03%	0.00%	1.02%	0.00%	0.00%	0.18%	
3	Connection maintenance (retainability)												
	a) CDR	≤2%	0.93%	0.76%	1.89%	1.13%	0.67%	0.28%	0.90%	0.46%	0.03%	0.22%	
	b) Worst affected cells>3% TCH drop	≤3%	9.08%	2.09%	2.83%	2.46%	0.09%	0.00%	2.66%	0.10%	0.00%	2.20%	
	c) Good voice quality	≥95%	95.78%	98.91%	NA	95.27%	98.20%	98.47%	96.79%	99.34%	99.79%	NA	
	d) Total No. of cells exceeding 3% TCH drop (call drop)		5,412	2,330	2,394	1,352	59	0	1,736	1	0	393	
	e) Total no. of cells in the network		1923	3600	2725	1774	2193	24	2104	33	1113	575	
4	Number of POI having ≥0.5% POI congestion		0	0	0	0	0	0	0	0	0	0	0
	a) Name of POI not meeting the benchmark		Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
	b) Total No. of call attempts on POI (Avg.)		2014077	834844	243712	256063	199107	370	482610	22	11817	82792	
	c) Total traffic served on POI (Erlang) (Avg.)		5928	22447	10700	8432	5641	12	7256	11	1478	1439	
	d) Total No. of circuits on POI		12414	36854	17554	15196	11188	794	15504	719	7563	9844	
	e) Total number of working POI Service Area wise		40	36	42	30	16	10	43	19	15	65	
	f) Capacity of POI		10000	35295	15799	14328	10354	631	14649	503	6153	8977	

S/N	Name of Parameter	Bench mark	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Videocon	V-fone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators							CDMA Operators			
5	Network Data												
	a) Equipped Capacity of Network Erlang		35014	73851	42000	21094	40000	ICR (Aircel)	9000	18312	4200	28000	33866
	b) Total traffic in TCBH in erlang (Avg.)		11677	55018	40340	12449	29707		22	13095	18	48030	3167
	c) Total no. of customers served (as per VLR) on last day of the month		437462	1812325	1067377	464221	1120370		33	490679	95	165306	51058
(B)	Customer Service Quality Parameters												
5	Metering/billing credibility-Post paid	≤0.1%	0.00%	0.01%	0.002%	0.00%	0.00%	0.00%	NA	0.76%	NA	0.00%	0.00%
	a) No. of bills issued during the period		2413	36599	51119	392	2822	1655		1308		7203	12978
	b) No. of bills disputed including billing complaints during the period		0	4	1	0	0	1		10		0	0
6	Metering /billing credibility-Pre paid	≤0.1%	0.003%	0.001%	0.018%	0.001%	0.04%	0.01%	0.00%	0.01%	0.000%	0.01%	0.00%
	a) No. of charging / credit / validity complaints during the quarter		23	27	248	5	607	19	1	32	0	39	0
	b) Total no. of pre-paid customers at the end of the quarter		764923	2395828	1383456	466552	1577217	294724	77151	299640	96	297722	84387
7	Resolution of billing/ charging complaints(within 4 weeks)	100%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	a) No. of billing/(post paid) and charging, credit/validity (pre paid) complaints resolved within 4 weeks during the quarter		23	31	249	5	607	20	1	42	0	39	0
	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		23	31	249	5	607	20	1	42	0	39	0
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		23	31	249	5	607	20	1	42	0	39	0
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		0	0	0	0	0	0	0	0	0	0	0
	e) Period of applying credit/waiver/adjustment to the customer's account from the date of resolutions of complaints (≤1week)		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

S/N	Name of Parameter	Bench mark	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators								CDMA Operators		
(B)	Customer Service Quality Parameters												
8	Response time to customers for assistance												
	a) Accessibility of call centre/Customer Care	≥95%	100.0%	100.0%	100.0%	100.0%	99.0%	100.0%	98.79%	100.0%	100.0%	99.89%	100.0%
	b) % call answered by operators(voice to voice) within 60 sec.	≥90%	51.10%	93.50%	96.45%	93.45%	83.27%	94.59%	97.20%	92.64%	100.0%	95.40%	96.52%
	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		287056	624049	8188	121101	320752	24022	107	119896	6	17832	13478
	d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		146687	583499	7897	113165	267079	22722	104	111077	6	17011	13009
9	Termination/closure of service	≤7days	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	NA	100.0%		100.0%	100.0%
	a) Total No. of requests for Termination / Closure of service received during the quarter		38	271	255	12	11	19		77		16	279
	b) No. of requests for Termination / Closure of service complied within 7 days during the quarter		38	271	255	12	11	19		77		16	279
10	Time taken for refunds of deposits after closures.(within 60 days)	100%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%			100.0%		100.0%

NA: Not Applicable, NP: Not Provided

Parameter-wise Findings (Month Data Assessment):

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

Network Parameters:

- **BTS accumulated downtime (benchmark $\leq 2\%$):**
All operators are satisfying the benchmark value.
- **Worst affected BTSs due to downtime (benchmark $\leq 2\%$):**
All the operators are satisfying the benchmark value.
- **Call setup success rate (benchmark $\geq 95\%$):**
All operators are satisfying the benchmark value.
- **SDCCH/PAGING Channel congestion (benchmark $\leq 1\%$):**
All operators are satisfying the benchmark value.
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 satisfying the benchmark value.
- **Call drop rate (benchmark $\leq 2\%$):**
All operators are satisfying the benchmark value.
- **Cell exceeding 3% TCH drop (benchmark $\leq 5\%$):**
Except Aircel, rest of the operators are satisfying the benchmark value.
- **Connections with good voice quality (benchmark $\geq 95\%$):**
All operators are satisfying the benchmark value.
Tata (CDMA) service providers have declared that the parameter is not system generated. Rest of the operators are satisfying the benchmark value.
- **Number of POI having $\geq 0.5\%$ POI congestion:**
All the operators satisfying the benchmark.

Customer care and billing parameters:

- **%age of call answered by operator (electronically) (benchmark $>95\%$):**
All the operators are satisfying the benchmark value.
- **%age of call answered by operator (Voice to voice) (benchmark $>90\%$):**
Except Aircel & RCom-GSM, rest of the operators are satisfying the benchmark value.
- **Metering and billing credibility-Post paid (benchmark $\leq 0.1\%$):**
Except Vodafone, All the operators are satisfying the benchmark.
- **Metering and billing credibility-Pre paid (benchmark $\leq 0.1\%$):**
All the operators are satisfying the benchmark.
- **Resolution of billing/ charging complaints (benchmark 100% within 4 weeks):**
All the operators are satisfying the benchmark.
- **Termination/Closure of service (Benchmark ≤ 7 days):**
All the operators are satisfying the benchmark.
- **Time taken for refunds of deposits after closures (benchmark 100% within ≤ 60 days):**
All the operators are satisfying the benchmark.

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

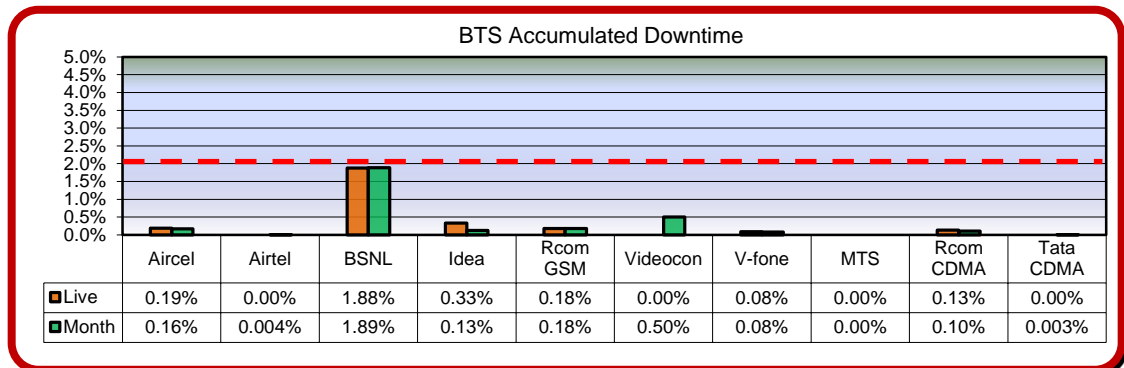
S/N	Name of Service Provider	No. of MSC	No. of BSC	No. of BTS
GSM Operators				
1	Aircel Ltd	1	8	645
2	Airtel Ltd	5	15	1246
3	BSNL	1	14	953
4	Idea	1	5	596
5	Reliance Communication (GSM)	3	12	731
6	Vodafone	1	9	698
7	Videocon	1	1	8
8	Etisalat	Service Closed		
CDMA Operators				
9	MTS	1	1	11
10	Reliance Communication (CDMA)	1	4	371
11	Tata Communications (CDMA)	1	1	186

(2) Performance (Graphical Representation)

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

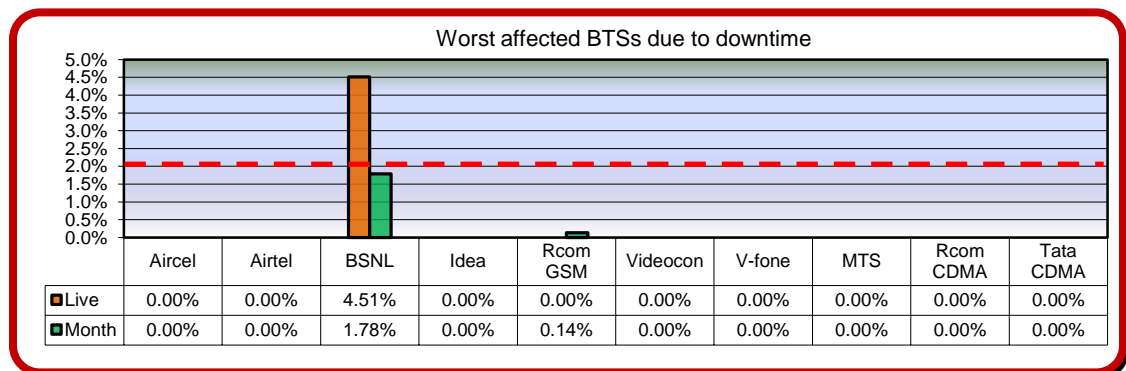
A) NETWORK PERFORMANCE

I. (a) *BTS Accumulated Downtime*: All operators are satisfying the TRAI benchmarks ($\leq 2\%$) for both live & month audit.

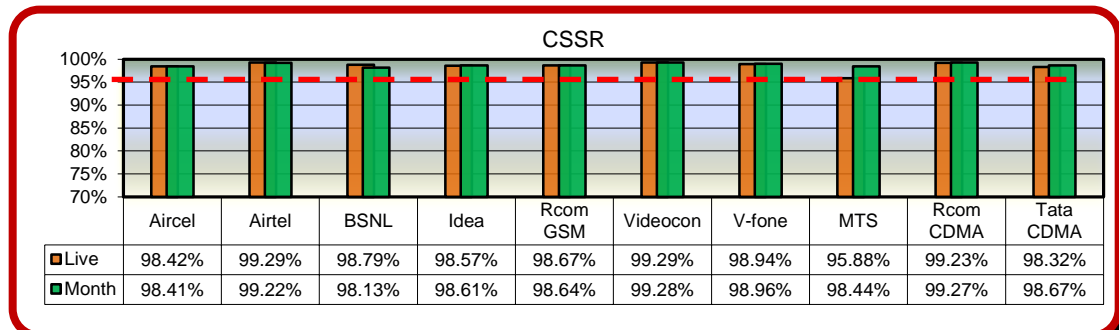


(b) *Worst affected BTSs due to downtime (benchmark $\leq 2\%$):*

Except BSNL in 3 days live audit, all operators are satisfying the TRAI benchmarks ($\leq 2\%$) for both live & month audit.

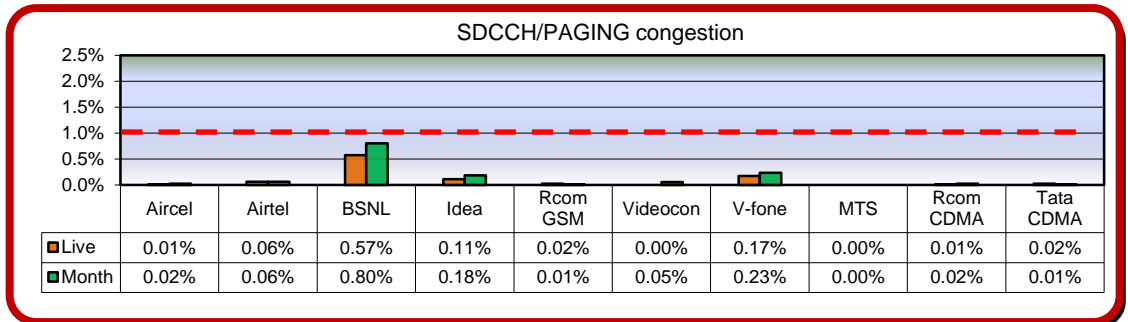


II. *Call setup success rate*: All operators are satisfying the TRAI benchmarks ($\geq 95\%$) for both live & month audit.

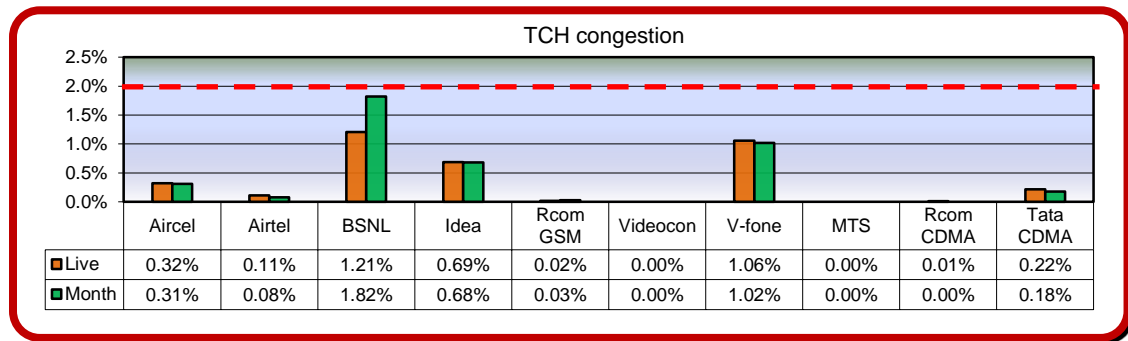


III. Blocked call rate:

SDCCH congestion: All operators are satisfying the TRAI benchmarks ($\leq 1\%$) for both live & month audit.

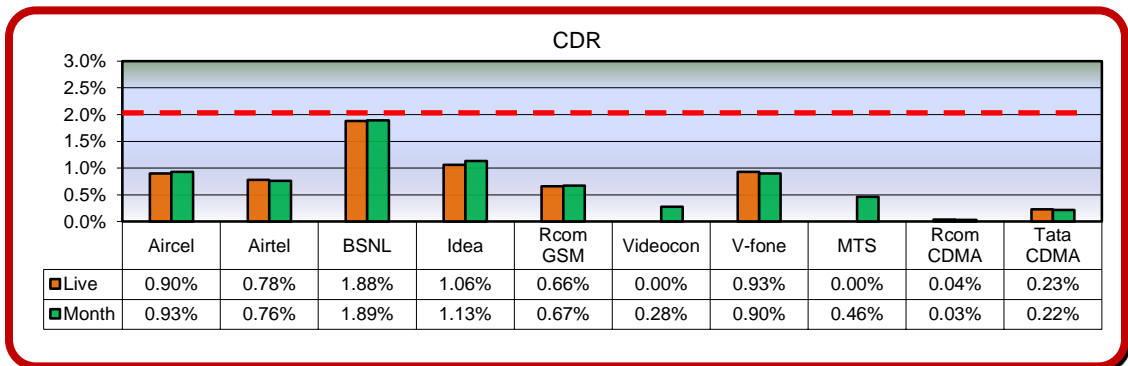


TCH congestion: All operators are satisfying the TRAI benchmarks ($\leq 2\%$) for both live & month audit.

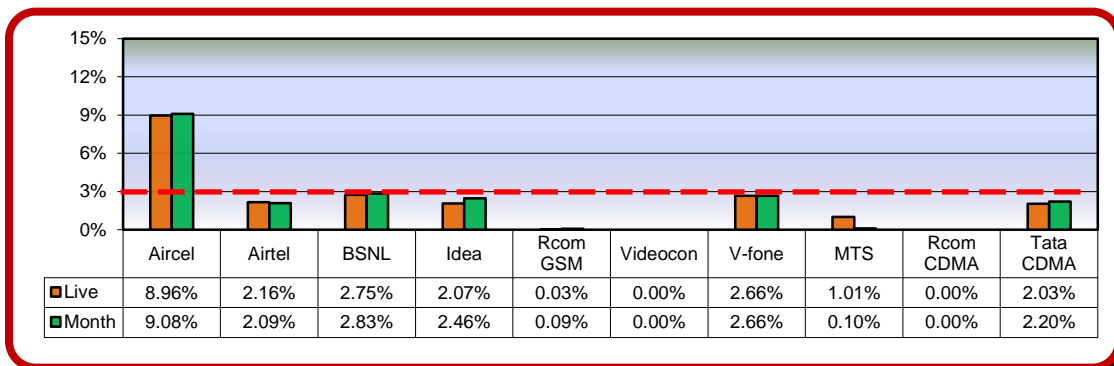


IV. Connection Maintainability (Retainability):

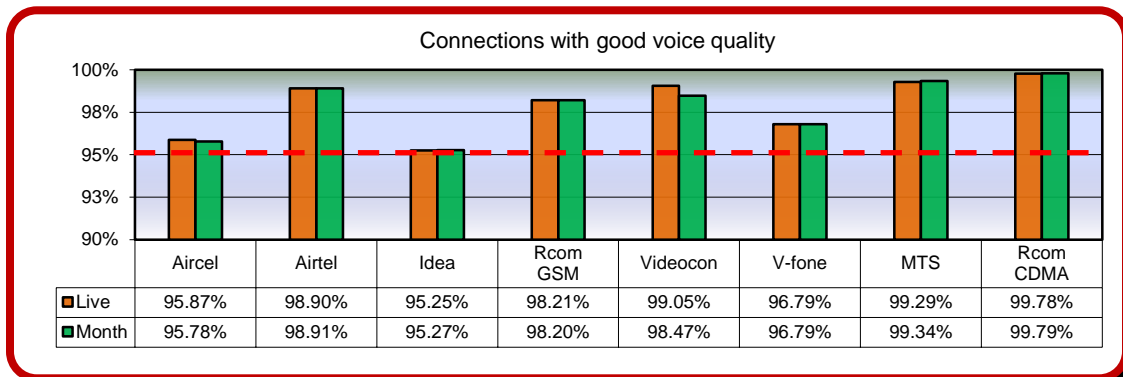
Call drop rate: All operators are satisfying the TRAI benchmarks ($\leq 2\%$) for both live & month audit.



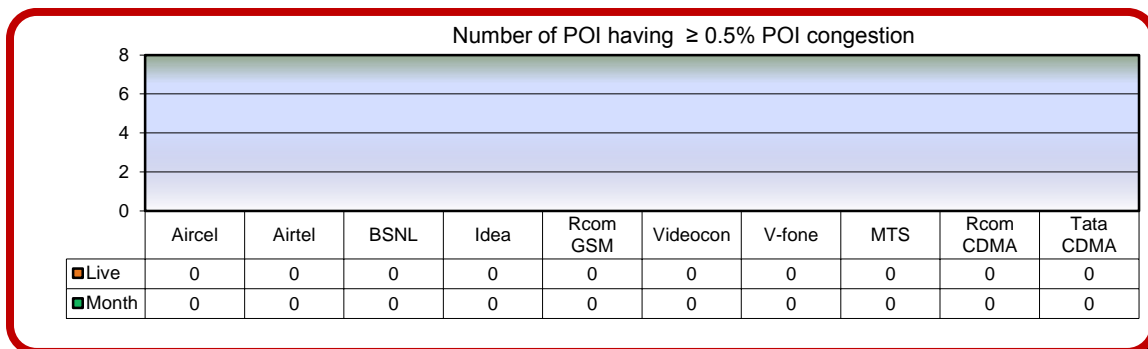
Worst affected Cell exceeding 3% TCH Drop: Aircel is found not satisfying the benchmark of $\leq 3\%$. Rests of the operators are satisfying the benchmark for both cases.



Percentage of connections with good voice quality: All operators are satisfying the TRAI benchmarks ($\geq 95\%$) for both live & month of audit. BSNL & Tata (CDMA) reported that the data is not system generated.



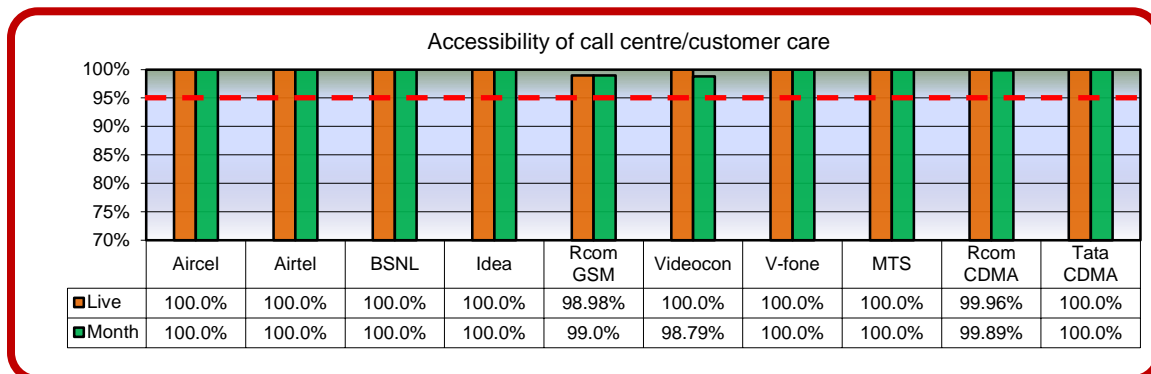
Number of POI having $\geq 0.5\%$ POI Congestion: All operators are satisfying the TRAI benchmarks for both live & month of audit.



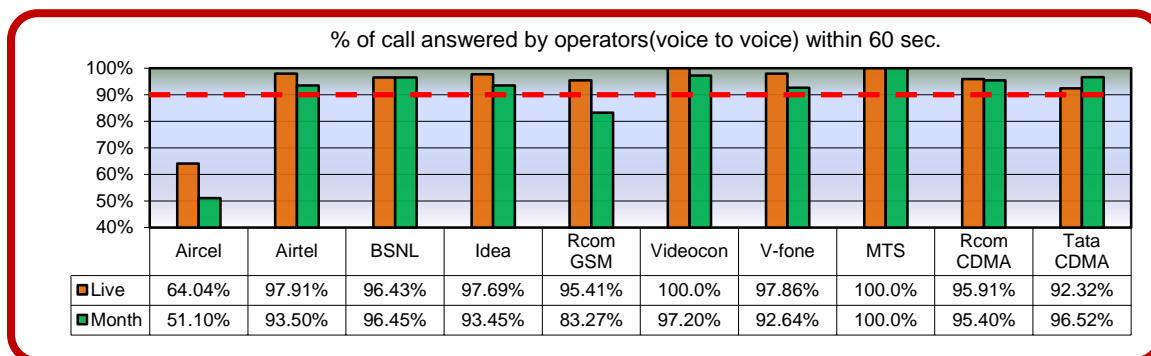
B) CUSTOMER SERVICE QUALITY PARAMETERS

(A) Response time to the customer for assistance:

Percentage of call answered (Electronically): All operators are satisfying the TRAI benchmarks ($\geq 95\%$) for both live & month of audit.



Percentage of call answered by operators (Voice to voice) within 60 sec: Aircel & RCom-GSM do not meet the 90% benchmark against this parameter.



(3) Critical Analysis

The above comparative study between live data & month data shows mostly similar trends & consistency in live and month data. However, inconsistency in live & month data was found for parameter “*percentage of calls answered by operator*” for Aircel & RCom-GSM.

Under the network parameters except for the parameter “*Worst affected cells > 3% TCH drop*”, where it is found that Aircel is not satisfying the benchmark, rest of the operators are found having satisfactory performance.

(B) Redressal**(1) Sample coverage**

A sample of billing complaints was taken for each operator and calls were made for assessing the resolution of billing/charging complaints within 4 weeks as claimed by the respective operators.

(2) Performance (live calling for billing complaints)

Calling Operator	Aircel	Airtel	BSNL	Idea	RCom GSM	Tata GSM	Videoccon	V-fone	RCom CDMA
Total No. of Calls Attempted	23	31	100	5	100	20	1	42	39
Total No. of calls Answered	22	30	89	4	92	19	1	40	38
Cases resolved with 4 weeks	22	30	89	4	92	19	1	40	38
%age of cases resolved	100%	100%	100%	100%	100%	100%	100%	100%	100%

Note: The difference between call attempts and call answer is because of either Number busy, No response, or out of reach in the Network.

(3) Live calling to Call center

Calling Operator	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA
Call Centre No.	121	121	1503	198/12345	333	121	111	155	*333	121
Total No. of Calls Attempted	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
Calls got connected to agent within 60 Sec	98	96	91	96	99	100	99	100	99	100
%age of calls got answered	98.00%	96.00%	91.00%	96.00%	99.00%	100.0%	99.00%	100.0%	99.00%	100.0%

(4) Level 1 live calling

HP Circle	Emergency no.	No. of calls made	Aircel	Airtel	BSNL	Idea	RCom GSM	Vodafone	MTS	Rcom CDMA	Tata CDMA	
	Shimla											
	100	2	2	2	2	2	2	2	No Service	2	2	
	101	2	2	2	2	2	2	2		2	2	
	102	2	2	2	2	2	2	2		2	2	
	139	5	5	5	5	5	5	5		5	5	
	Nahan											
	100	2	2	2	2	2	2	2	No Service	2	2	
	101	2	2	2	2	2	2	2		2	2	
	102	2	2	2	2	2	2	2		2	2	
	139	5	5	5	5	5	5	5		5	5	
	Bilaspur											
	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	5	5	5	5	5	5	5	5	5	5	5	

(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 in their records.

As per test Call result of operator's Call Center it was found all operators performance are not satisfactory.

Level 1 calling i.e. emergency call are getting connected in Himachal Pradesh circle, in Meerut, Shimla, Nahan & Bilaspur cities

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

A sample of 2x50 test calls per Service Providers with in the licensed service area (Himachal Pradesh Circle) were made between 1100 to 1400 hrs and between 1600 to 1900 hrs.

(2) Performance based on live measurement

Calling Operator	Aircel	Airtel	BSNL	Idea	Rcom GSM	V-fone	Rcom CDMA	Tata CDMA
Aircel	-	99%	100%	100%	100%	100%	100%	100%
Airtel	100%	-	100%	100%	100%	100%	100%	100%
BSNL	100%	97%	-	96%	97%	100%	99%	97%
Idea	100%	100%	100%	-	100%	100%	100%	100%
Reliance (GSM)	98%	99%	97%	100%	-	100%	100%	100%
Vodafone	100%	100%	100%	100%	100%	-	100%	100%
Reliance (CDMA)	96%	100%	97%	100%	100%	100%	-	96%
Tata (CDMA)	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 Himachal Pradesh for all the operators. Route covered was around 80-100 Km depending on city areas within the speed limit of 25Km/hr.

Drive Test Locations**Shimla**

HIGH DENSE:	Khalini, Vikas Nagar, Kasumpt, Panthaghati
MEDIUM DENSE:	Malyana, Kamla Nagar, Bhatta Kufar, Sanjauli
LOW DENSE:	Lakkar Bazar, Tara Hall, Victory Tunnel, Bus Stand

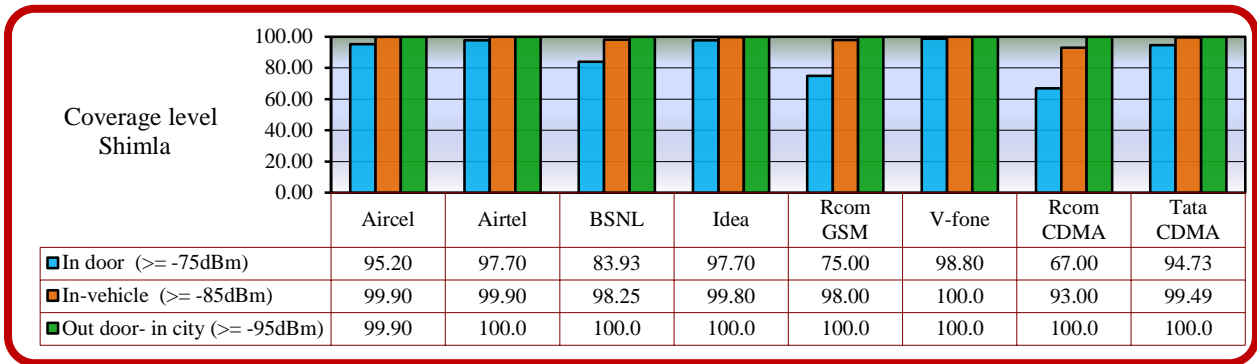
Nahan

HIGH DENSE:	Ponta Chowk, Delhi Gate, Gurudwara Road
MEDIUM DENSE:	ITI, Mount Carnal School, Villa Round, Choughan
LOW DENSE:	Gunnu Ghat, Bus Stand, Kacha Tank

Bilaspur

HIGH DENSE:	College Road, Sagarview, Main Market
MEDIUM DENSE:	Hamirpur Road, Bilaspur Busstand
LOW DENSE:	Lakhanpur Road, Shimla Highway, Manali Highway

Graphical Representation (Shimla):

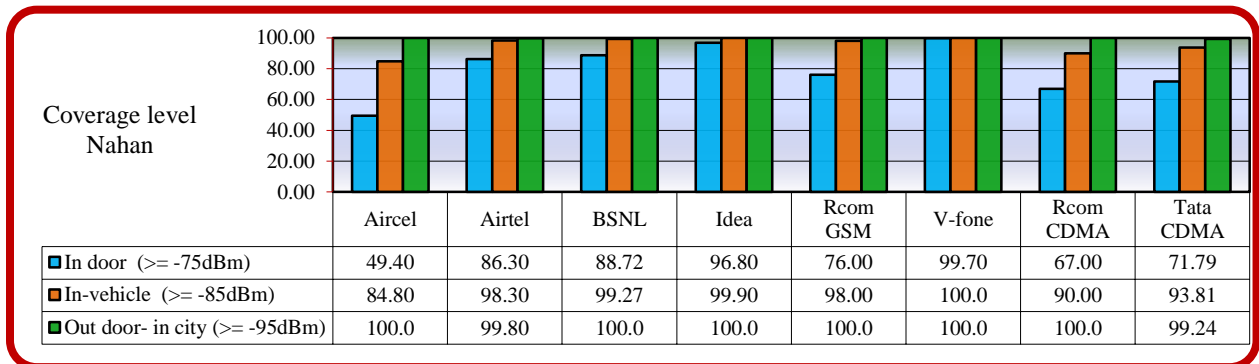


Critical Analysis

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

- For parameter “Blocked Call Rate” Idea is not satisfying the benchmark.
- For parameter “Percentage of connections with good voice quality” BSNL is not satisfying the benchmark.
- For parameter “CSSR” Idea is not satisfying the benchmark.

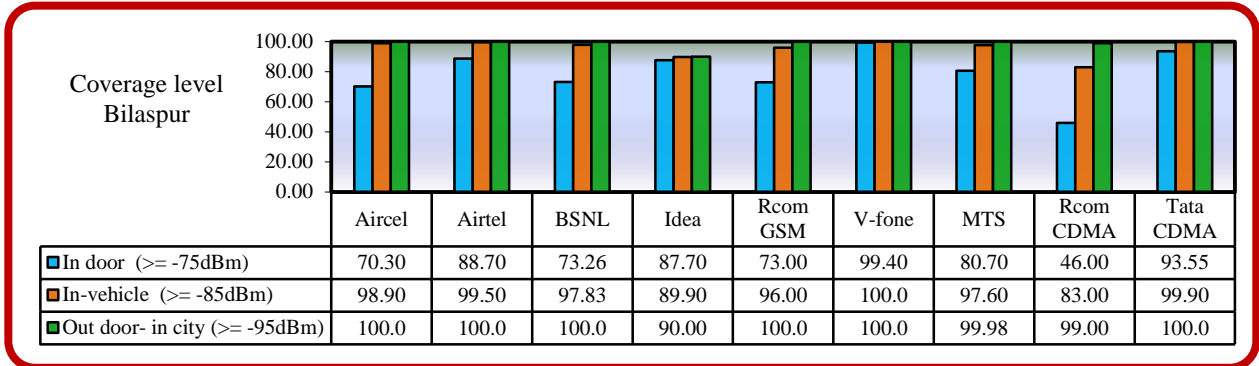
Graphical Representation (Nahan):



Critical Analysis

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

- For parameter “Blocked Call Rate” BSNL is not satisfying the benchmark.

Graphical Representation (Bilaspur):**Critical Analysis**

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

- For parameter “*Blocked Call Rate*” all the operators are satisfying the benchmark.
- For parameter “*Dropped Call Rate*” all the operators are satisfying the benchmark.
- For parameter “*Percentage of connections with good voice quality*” all the operators are satisfying the benchmark.

Note: Videocon & Tata-GSM is on ICR with Aircel in Shimla, Nahan & Bilaspur Towns and MTS has no service (Spectrum) in Shimla & Nahan towns.

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

The Operator Assisted Drive Test was conducted at Himachal Pradesh for all the operators. Route covered was about around 30-50 Km depending on city areas within the speed limit of 25Km/hr.

Drive Test Locations**Solan**

HIGH DENSE: Saraswati Niwas, Jawahar park
MEDIUM DENSE: Mall road, Pine Estate
LOW DENSE: Bypass Kumarhatti, Solan Bypass

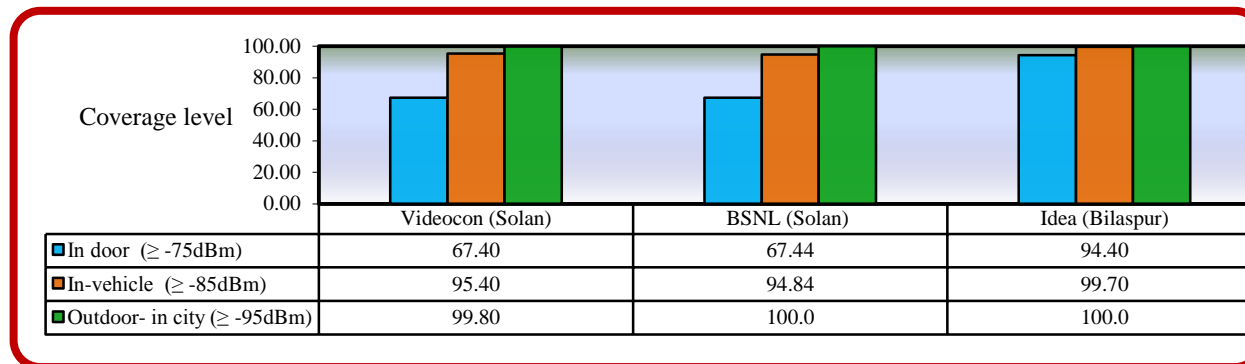
Bilaspur

HIGH DENSE: College Road, Sagarview, Main Market
MEDIUM DENSE: Hamirpur Road, Bilaspur Busstand
LOW DENSE: Lakhanpur Road, Shimla Highway, Manali Highway

2) Performance (for the Independent respective city)

Operators Name	City	Call Attempts	Blocked Call Rate ($\leq 3\%$)	Dropped Call Rate ($\leq 2\%$)	% of connections with good voice quality ($\geq 95\%$)		Service Coverage			CSSR ($\geq 95\%$)
					(i) 0-4 (w/o frequency hopping)	(ii) 0-5 (with frequency hopping)	In door ($\geq -75\text{dBm}$)	In-vehicle ($\geq -85\text{dBm}$)	Outdoor- in city ($\geq -95\text{dBm}$)	
Videocon	Solan	20	5.00%	0.00%		96.20%	67.40	95.40	99.80	95.00%
BSNL		31	3.23%	0.00%		93.00%	67.44	94.84	100.0	96.77%
Idea	Blaspur	33	0.00%	0.00%		97.00%	94.40	99.70	100.0	100.0%

Graphical Representation



Critical Analysis

The drive test data was found to be satisfactory.

- For parameter “Blocked Call Rate” is met by Videocon (Solan) & BSNL (Solan).
- For parameter “Percentage of connections with good voice quality” is met by BSNL (Solan).

(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, Himachal Pradesh is satisfactory for **Network Parameters**.

Only exception is found for the parameter "*Worst affected cells > 3% TCH drop*" as operators like Aircel performance is found below benchmark. Similar trend is also reflected in live data measurement & for parameter "*Worst affected BTSs due to downtime*" it is found that BSNL is not meeting the benchmark.

Under **Customer Service Quality Parameter** "*operator answered calls (voice-to-voice) within 60 sec*" parameter Aircel & RCom-GSM are not fulfilling TRAI benchmark of $\geq 90\%$.

During Drive Tests

High "*Blocked Call Rates*" were found in case of Idea, BSNL & Videocon.

"*%age of connections with good voice quality*" parameter is not met by BSNL.

"*CSSR*" parameter is not satisfying by Idea.

