REPORT

ON

AUDIT & ASSESSMENT OF QUALITY OF SERVICE

OF

CELLULAR MOBILE TELEPHONE SERVICE

FOR

NORTH ZONE – PUNJAB CIRCLE

Report Period: July 2011 – Sept 2011

Table of Contents

(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
           - *Not conducted for this quarter*

III. Broadband Service Providers
           - Not conducted for this quarter

CHAPTER-1: INTRODUCTION

I.   Background

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

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

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

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

i)   Create conditions for consumer satisfaction by making known the quality of service, which the service provider is required to provide, and the user has a right to expect.

ii)   Measure the Quality of Service provided by the Service Providers from time to time and to compare them with the norms so as to assess the level of performance.

iii)   Generally protect the interests of consumers of telecommunication services.

TRAI has been carrying out regular reviews of the status of quality of service of the networks of all operators. In continuation to these efforts, TRAI has selected through bidding process TCIL as the Audit Agency to audit and assess the Quality of Service rendered by the service providers' namely Basic (Wire line) 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 lay 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 Punjab circle. But for parameters such as 'Worst affected cell exceeding 3% TCH drop' and 'BTSs accumulated down time' CBBH (Cell Bouncing Busy Hour) was taken instead of TCBH (Time Consistent Busy Hours) as per the TRAI new regulation 2009. This has resulted in high value for 'Cell exceeding 3% TCH drop' parameter for some of the service providers.

CHAPTER-2: EXECUTIVE SUMMARY

I.   Preface

This report highlights the findings for the audit & assessment of Quality of Service of Cellular Mobile Services in Punjab Circle in 3rd quarter (July – Sept 2011). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken during the period Jan – Mar 2011.

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

Sl.	Name of Service Provider	Month of Audit	TCBH Hour
GSM Operators			
1	Aircel Ltd	July-2011	2000-2100 Hrs
2	Airtel Ltd	July-2011	2000-2100 Hrs
3	Etisalat	July-2011	1900-2000 Hrs
4	Idea	July-2011	2100-2200 Hrs
5	Loop	July-2011	1000-1100 Hrs
6	BSNL	July-2011	1900-2000 Hrs
7	Reliance Communication (GSM)	July-2011	1900-2000 Hrs
8	Tata Communications (GSM	July-2011	2000-2100 Hrs
9.	Videocon	July-2011	2100-2200 Hrs
10	Vodafone	July-2011	1900-2000 Hrs
CDMA Operators			
11	HFCL (CDMA)	July-2011	1900-2000 Hrs
12	MTS	July-- 2011	1900-2000 Hrs
13	Reliance Communication (CDMA)	July-2011	1900-2000 Hrs
14	Tata Communications (CDMA)	July-2011	1900-2000 Hrs

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

(A) Cellular Mobile Telephone Services
3 days Live Data Audit

S/N	Name of Parameter	Bench-mark	Aircel	Airtel	Etisalat	Idea	Loop	BSNL	Rcom GSM	TTSL GSM	Videocon	Vodafone	MTS	HFCL	Rcom CDMA	Tata CDMA
	3 days Live Data Audit						GSM Operators						CDMA Operators			
(A)-1	**Network Service Quality Parameter**															
	BTS Accumulated Downtime	<=2%	0.01%	0.00%	0.02%	0.00%	0.00%	0.01%	0.08%	0.00%	0.01%	0.00%	0.00%	0.00%	0.05%	0.00%
	Worst affected BTS due to downtime	<=2%	0.00%	0.05%	0.00%	0.00%	0.00%	0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2	**Connection Establishment (Accessibility)**															
	a) CSSR (Call Setup Success Rate)	>=95%	99.94%	99.63%	99.94%	98.54%	99.90%	98.33%	99.54%	99.55%	99.77%	99.60%	96.55%	98.63%	99.84%	99.62%
	b) SDCCH/PAGING congestion	<=1%	0.05%	0.16%	0.01%	0.31%	0.10%	1.06%	0.05%	0.10%	0.06%	0.20%	0%	0.37%	0.01%	0.00%
	c) TCH congestion	<=2%	0.01%	0.21%	0.05%	1.15%	0.00%	0.61%	0.41%	0.35%	0.17%	0.20%	0%	1.00%	0.15%	0.38%
3	**Connection maintenance (Retainability)**															
	a) CDR	<=2%	0.76%	0.72%	1.95%	1.45%	0.00%	1.52%	0.30%	1.06%	1.57%	0.94%	0.00%	1.34%	0.76%	0.72%
	b) Worst affected cells>3% TCH drop	<=3%	1.87%	1.37%	12.96%	2.67%	0.00%	5.72%	0.76%	8.79%	2.89%	6.57%	0.00%	2.17%	0.30%	0.41%
	c) Good voice quality	>=95%	97.23%	98.83%	98.27%	97.01%	99.09%	95.06%	99.25%	96.07%	98.14%	97.66%	NA	NA	NA	NA
4	**No of POI having > 0.5% congestion**	<=0.5%	0	0	0	0	0	0	0	0	0	0	0	0	0	0

S/N	3 days Live Data Audit / Name of Parameter	Bench-mark	Aircel	Airtel	Etisalat	Idea	Loop	BSNL	Rcom GSM	TTSL GSM	Videocon	Vodafone	MTS	HFCL	Rcom CDMA	Tata CDMA
			GSM Operators										CDMA Operators			
5	Response time to customers for assistance															
	a) Accessibility of call centre/Customer Care	>=95%	100%	NP	97%	100%	100%	100%	99%	100%	96.00%	100%	100%	100%	100%	100%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	93.01%	87.37%	100%	50.55%	100%	95.67%	98.86%	93.52%	96.40%	96.96%	100%	97.51%	95.64%	98.92%

From the 3 days live data assessment, it is found that most of the operators are meeting the network parameters in SDCCH / PAGING Congestion except BSNL which is slightly deviating from the benchmark with a value of 1.06%. As far as worst affected cells > 3% TCH drop is concerned, few operators like Etisalat, BSNL, TTSL GSM & Vodafone are not meeting the benchmark with the value of 12.96%, 5.72%, 8.79% & 6.57% , rest all operators meet the benchmark. Airtel has not provided the data for Accessibility of call centre parameter.

Performance related to customer care data is found to be satisfactory for most of the operators especially for the parameter "calls answered by operators (voice-to-voice), except Airtel (87.37%) & Idea (50.55%) which are having low value from the benchmark respectively.

Month data assessment:

[ ]	One Month Data Audit / Name of Parameter	Bench-mark	Aircel	Airtel	Etisalat	Idea	Loop	BSNL	Rcom GSM	TTSL GSM	Videocon	Vodafone	MTS	HFCL	Rcom CDMA	Tata CDMA
			GSM Operators										CDMA Operators			
(A)	**Network Service Quality Parameter**															
1	**Network Availability**															
	a) BTS Accumulated Downtime	<=2%	0.19%	0.09%	0.10%	0.04%	0.00%	0.02%	0.08%	0.02%	0.16%	0.01%	0.00%	0.05%	0.05%	0.46%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.40%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2	**Connection Establishment (Accessibility)**															
	a) CSSR (Call Setup Success Rate)	>=95%	99.92%	99.64%	99.96%	98.21%	99.83%	98.79%	99.14%	99.46%	99.75%	99.70%	100%	99.46%	99.94%	99.95%
	b) SDCCH/PAGING congestion	<=1%	0.07%	0.15%	0.03%	0.26%	0.17%	0.63%	0.17%	0.23%	0.05%	0.10%	0.00%	0.54%	0.01%	0.00%
	c) TCH congestion	<=2%	0.01%	0.21%	0.01%	1.53%	0.00%	0.58%	0.69%	0.31%	0.20%	0.20%	0.00%	0.00%	0.05%	0.05%
3	**Connection maintenance (retain ability)**															
	a) CDR	<=2%	0.84%	0.72%	1.26%	1.52%	0.00%	1.72%	0.30%	1.03%	1.54%	0.93%	0.00%	0.82%	0.57%	0.82%
	b) Worst affected cells>3% TCH drop	<=3%	2.15%	1.39%	5.56%	2.85%	0.00%	11.79%	0.74%	8.43%	2.91%	6.47%	0.00%	2.37%	0.30%	0.56%
	c) Good voice quality	>=95%	97.29%	98.91%	98.56%	96.91%	98.50%	95.05%	99.18%	96.02%	98.07%	97.63%	NA	NA	NA	NA
4	**No of POI having > 0.5% congestion**	<=0.5%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(B)	**Customer Service Quality Parameters**															
5	**Metering/billing credibility-Post paid**	<= 0.1%	0.00%	0.03%	NA	0.05%	NA	0.07%	0.10%	0.33%	NA	0.04%	NA	0.01%	0.05%	0.42%
6	**Metering /billing credibility-Pre paid**	<= 0.1%	0.01%	0.01%	0.00%	0.00%	0.00%	0.01%	0.03%	0.03%	0.00%	0.01%	0.00%	0.00%	0.02%	0.04%
7	**Resolution of billing/ charging complaints**	100% within 4 weeks	100%	100%	100%	100%	NA	100%	100%	100%	100%	100%	NA	100%	100%	100%
	a) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	100%	100%	NA	100%	NA	100%	100%	100%	100%	100%	NA	100%	100%	100%
8	**Response time to customers for assistance**															
	a) Accessibility of call centre/Customer Care	>=95%	100%	NP	99%	100%	100%	100%	99%	100%	95.00%	100%	100%	100%	99%	100%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	92.56%	78.87%	100%	70.96%	100%	92.38%	98.77%	99.46%	98.49%	91.14%	98.15%	90.00%	95.54%	99.42%
9	**Termination/closure of service**	<=7days	100%	100%	100%	98.60%	NA	100%	100%	100%	NA	100%	NA	100%	100%	100%
10	**Time taken for refunds of deposits after closures.**	100% within 60 days	100%	100%	NA	100%	NA	100%	100%	100%	NA	100%	NA	NA	100%	100%

NA: Not Applicable, NP: Data Not Provided

From the month data assessment, it is found that most of the operators are meeting the network parameters, except Etisalat ,BSNL, TTSL GSM & Vodafone which are not meeting the benchmark for "Worst affected cells>3% TCH drop" with the value of 5.56% , 11.79% , 8.43% & 6.47%.

In Metering & Billing parameter for post-paid services, only TTSL (GSM & CDMA) is deviating from the benchmark in comparison with other operators respectively.

Performance related to customer care data is found to be satisfactory for the parameter Accessibility of call centre except Airtel which has not provided the data .As far as % of calls answered by operators (voice-to-voice)" is concerned, Airtel & Idea are not meeting the benchmark.
For Termination & Closures cases Idea is deviating from the benchmark with a value of 98.60% respectively.

Operator-Assisted Drive Test

SN	Parameter	City Name	Aircel	Airtel	Idea	BSNL	Rcom GSM	Tata GSM	Videocon	Vodafone	Rcom CDMA	Tata CDMA
			GSM Operators									
1.1	Blocked Call Rate (<=3%)	Amritsar	2.15%	0.00%	0.00%	1.13%	0.00%	2.15%	1.41%	0.00%	0.00%	0.00%
		Patiala	0.00%	0.00%	0.00%	3.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		Bhatinda	0.00%	0.00%	0.00%	5.08%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1.2	Dropped Call Rate (<=2%)	Amritsar	0.00%	0.00%	0.00%	1.13%	0.00%	0.00%	0.70%	0.00%	0.00%	0.00%
		Patiala	0.00%	0.00%	0.00%	4.59%	0.00%	0.00%	1.01%	0.00%	0.00%	1.16%
		Bhatinda	2.00%	0.00%	0.00%	3.38%	0.00%	2.00%	0.00%	0.00%	0.00%	1.20%
1.3	Percentage of connections with good voice quality (=>95%)											
	(i) 0-4 (w/o frequency hopping)	Amritsar									97.70%	98.11%
		Patiala									99.50%	97.69%
		Bhatinda									99.35%	97.40%
	(ii) 0-5 (with frequency hopping)	Amritsar	95%	96%	95%	93.80%	98.82%	95%	96%	97.70%		
		Patiala	96%	95%	96%	94%	98.79%	96%	95%	97.20%		
		Bhatinda	97%	96%	97%	91%	97.8%	97%	95.45%	97.40%		
1.4	Call Setup Success Rate (>=95%)	Amritsar	97.85%	100%	100%	98.87%	100%	97.85%	98.59%	100%	100%	100%
		Patiala	100%	100%	100%	96.97%	100%	100%	100%	100%	100%	100%
		Bhatinda	100%	100%	100%	94.92%	100%	100%	100%	100%	100%	100%

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

• Blocked Call Rate & Drop call rate benchmark are not meet by BSNL in Patiala & Bhatinda.

• Good voice quality parameter is not meet by BSNL in all the 3 cities respectively.

• Call set up success Rate is not meet by BSNL in Bhatinda

Independent Drive Test-

        ------------------------ *Submitted as separate report*

CHAPTER-3: AUDIT-PMR VERIFICATION

I. Cellular Mobile Telephone Service
PMR Verification:

	PMR	Bench-mark	Audit	Aircel	Airtel	ETISALAT	Idea	LOOP	BSNL	Rcom GSM	Tata GSM	Videocon	Vodafone	MTS	HFCL	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	0.35%	0.05%	0.10%	0.06%	0.00%	0.46%	0.07%	0.01%	0.12%	0.04%	0.00%	0.03%	0.11%	0.01%
			Verified	0.35%	0.05%	0.10%	0.06%	0.00%	0.46%	0.07%	0.01%	0.12%	0.04%	0.00%	0.03%	0.11%	0.01%
	Worst affected BTSs due to downtime	<=2%	Reported	0.04%	0.07%	0.00%	0.71%	0.00%	3.55%	0.00%	0.00%	0.11%	0.07%	0.00%	0.00%	0.03%	0.00%
			Verified	0.04%	0.07%	0.00%	0.71%	0.00%	3.55%	0.00%	0.00%	0.11%	0.07%	0.00%	0.00%	0.03%	0.00%
2	Connection Establishment (Accessibility)																
	CSSR (Call Setup Success Rate)	>=95%	Reported	98.36%	99.12%	98.83%	97.74%	97.71%	98.49%	99.67%	96.83%	97.89%	99.03%	97.84%	99.44%	99.24%	99.79%
			Verified	98.36%	99.12%	98.83%	97.74%	97.71%	98.49%	99.67%	96.83%	97.89%	99.03%	97.84%	99.44%	99.24%	99.79%
	SDCCH/PAGING congestion	<=1%	Reported	0.22%	0.12%	0.02%	0.55%	0.02%	0.75%	0.05%	0.48%	0.15%	0.11%	0.00%	0.12%	0.00%	0.00%
			Verified	0.22%	0.12%	0.02%	0.55%	0.02%	0.75%	0.05%	0.48%	0.15%	0.11%	0.00%	0.12%	0.00%	0.00%
	TCH congestion	<=2%	Reported	0.34%	0.16%	0.00%	1.75%	0.00%	1.95%	0.08%	0.75%	0.61%	0.29%	0.00%	0.00%	0.10%	0.00%
			Verified	0.34%	0.16%	0.00%	1.75%	0.00%	1.95%	0.08%	0.75%	0.61%	0.29%	0.00%	0.00%	0.10%	0.00%
3	Connection maintenance (retainability)																
	CDR	<=2%	Reported	1.02%	0.67%	1.65%	1.56%	0.07%	1.08%	0.35%	1.18%	0.94%	0.82%	0.16%	0.81%	0.56%	0.19%
			Verified	1.02%	0.67%	1.65%	1.56%	0.07%	1.08%	0.35%	1.18%	0.94%	0.82%	0.16%	0.81%	0.56%	0.19%
	Worst affected cells>3% TCH drop	<=5%	Reported	4.73%	1.28%	19.42%	10.29%	0.00%	12.82%	3.11%	3.51%	0.97%	3.26%	0.78%	3.12%	0.37%	0.08%
			Verified	4.73%	1.28%	19.42%	10.29%	0.00%	12.82%	3.11%	3.51%	0.97%	3.26%	0.78%	3.12%	0.37%	0.08%
	Good voice quality	>=95%	Reported	97.30%	98.95%	98.72%	97.38%	97.40%	95.34%	97.49%	96.01%	97.17%	98.25%	98.97%	97.29%	98.54%	99.82%
			Verified	97.30%	98.95%	98.72%	97.38%	97.40%	95.34%	97.49%	96.01%	97.17%	98.25%	98.97%	97.29%	98.54%	99.82%
4	No of POI having > 0.5% congestion	>=0.5%	Reported	0	0	0	0	0	0	0	0	1	0	0	0	0	0
			Verified	0	0	0	0	0	0	0	0	1	0	0	0	0	0
(B)	Customer Service Quality Parameters																
5	Metering/billing credibility-Post paid	<= 0.1%	Reported	0.01%	0.03%	NA	NR	0.00%	0.00%	0.00%	0.03%	0.00%	0.00%	0.00%	0.01%	0.00%	0.09%
			Verified	0.01%	0.03%	NA	NR	0.00%	0.00%	0.00%	0.03%	0.00%	0.00%	0.00%	0.01%	0.00%	0.09%
6	Metering /billing credibility-Pre paid	<= 0.1%	Reported	0.02%	0.01%	0.20%	NR	0.00%	0.04%	0.03%	0.00%	0.01%	0.00%	0.00%	0.00%	0.05%	0.03%
			Verified	0.02%	0.01%	0.20%	NR	0.00%	0.04%	0.03%	0.00%	0.01%	0.00%	0.00%	0.00%	0.05%	0.03%
7	Resolution of billing/ charging complaints	100% within 4 weeks	Reported	100%	100%	100%	NR	NIL	100.0%	100.0%	100.0%	100.0%	100.00%	100%	100%	100%	100%
			Verified	100%	100%	100%	NR	NIL	100.0%	100.0%	100.0%	100.0%	100.00%	100%	100%	100%	100%
	Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	Reported	100%	100%	NA	NR	0%	100%	100%	100%	100%	100%	100%	100%	100%	100%
			Verified	100%	100%	NA	NR	0%	100%	100%	100%	100%	100%	100%	100%	100%	100%
8	Response time to customers for assistance																
	Accessibility of call centre/Customer Care	>=95%	Reported	100.00%	95.00%	98.42%	NR	100%	100%	96%	100%	97%	100%	100.00%	81.00%	100.00%	92.00%
			Verified	100.00%	95.00%	98.42%	NR	100%	100%	96%	100%	97%	100%	100.00%	81.00%	100.00%	92.00%

S/N	PMR Name of Parameter	Bench-mark	Audit	Aircel	Airtel	ETISALAT	Idea	LOOP	BSNL	Rcom GSM	Tata GSM	Videocon	Vodafone	MTS	HFCL	Rcom CDMA	Tata CDMA
	% call answered by operators(voice to voice) within 60 sec.	>=90%	Reported	64.38%	67.00%	99.04%	NR	100.00%	96.00%	88.00%	88.00%	91.00%	84.00%	100.00%	90.00%	95.00%	72.00%
			Verified	64.38%	67.00%	99.04%	NR	100.00%	96.00%	88.00%	88.00%	91.00%	84.00%	100.00%	90.00%	95.00%	72.00%
9	Termination/closure of service																
	No.of requests for Termination / Closure of service complied within 7 days during the quarter	<=7days	Reported	100.00%	100.00%	NA	NR	NIL	100.00%	100.00%	100.00%	NIL	100.00%	0.00%	100.00%	100.00%	100.00%
			Verified	100.00%	100.00%	NA	NR	NIL	100.00%	100.00%	100.00%	NIL	100.00%	0.00%	100.00%	100.00%	100.00%
10	Time taken for refunds of deposits after closures.	100% within 60 days	Reported	100%	100%	NA	NR	NIL	100%	100%	100%	NIL	100%	0%	100%	100%	85%
			Verified	100%	100%	NA	NR	NIL	100%	100%	100%	NIL	100%	0%	100%	100%	85%

Critical Analysis (PMR Verification):

a. . The figures proved by all the operators match the figures obtained on verification hence there is no discrepancy found.

b. Under Network Parameter Section only BSNL is found not meeting the benchmark for 'Worst affected BTSs due to downtime' and for the parameter worst affected cell >3% TCH drop , few operators like Etisalat , Idea & BSNL are not meeting the benchmarks.

c. Idea is not reporting the parameter for "Metering/Billing Credibility-Postpaid" & Prepaid" and for POI only Videocon is having only 1.nos of POI >0.5% congestion found respectively.

d. Accessibility of call centre/Customer Care parameter is not meet by HFCL & TTSL CDMA.

e. For % call answered by operator (voice to voice) parameter, some operators are deviating from the benchmark like Aircel , Airtel , Rcom GSM , TTSL GSM , Vodafone & TTSL CDMA .

f. TTSL (CDMA) is found not meeting the 60 days' benchmark for "Refund of deposits after closure .Idea is not reporting this parameter respectively.

CHAPTER-4: Detailed Findings & Analysis

I. Cellular Mobile Telephone Service:
   (A) MSC Audit--

1) Live measurement data assessment & summarized findings

S/N	Name of Parameter	Bench mark	Aircel	Airtel	Etisalat	Idea	Loop	BSNL	Rcom GSM	TTSL GSM	Videocon	Vodafone	MTS	HFCL	Rcom CDMA	Tata CDMA
			GSM Operators										CDMA Operators			
(A)-1	**Network Service Quality Parameter**															
	BTS Accumulated Downtime	<=2%	0.01%	0.00%	0.02%	0.00%	0.00%	0.01%	0.08%	0.00%	0.01%	0.00%	0.00%	0.00%	0.05%	0.00%
	Worst affected BTS due to downtime	<=2%	0.00%	0.05%	0.00%	0.00%	0.00%	0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		32	95	3	42	0	346	1022	14	73	15	0	0	401	1
	No. of BTSs having accumulated downtime of >24 hours in a month		0	2	0	0	0	2	0	0	0	0	0	0	0	0
2	**Connection Establishment (Accessibility)**															
	a) CSSR	>=95%	99.94%	99.63%	99.94%	98.54%	100%	98.33%	99.54%	99.55%	99.77%	99.60%	96.55%	98.63%	99.84%	99.62%
	b) SDCCH/PAGING congestion	<=1%	0.05%	0.16%	0.01%	0.31%	0.10%	1.06%	0.05%	0.10%	0.06%	0.20%	0.00%	0.37%	0.01%	0.00%
	c) TCH congestion	<=2%	0.01%	0.21%	0.05%	1.15%	0.00%	0.61%	0.41%	0.35%	0.17%	0.20%	0.00%	1.00%	0.15%	0.38%
3	**Connection maintenance**															
	a) CDR	<=2%	0.76%	0.72%	1.95%	1.45%	0.00%	1.52%	0.30%	1.06%	1.57%	0.94%	0.00%	1.34%	0.76%	0.72%
	b) Cells having > 3% TCH drop	<=5%	1.87%	1.37%	12.96%	2.67%	0.00%	5.72%	0.76%	8.79%	2.89%	6.57%	0.00%	2.17%	0.30%	0.41%
	c) Good voice quality	>=95%	97.23%	98.83%	98.27%	97.01%	99.09%	95.06%	99.25%	96.07%	98.14%	97.66%	NA	NA	NA	NA

S/N	Name of Parameter	Benchmark	Aircel	Airtel	Etisalat	Idea	Loop	BSNL	Rcom GSM	TTSL GSM	Videocon	Vodafone	MTS	HFCL	Rcom CDMA	Tata CDMA
			GSM Operators										CDMA Operators			
	d) No. of cells > 3% TCH drop		34	161	7	285	0	481	38	415	142	855	0	11	3	8
	e) Total no. of cells in the network		1,815	11,767	54	10,661	12	8,408	5,022	4,720	4,906	13,023	39	507	1,004	1,958
4	No of POI having > 0.5% congestion	<=0.5%	0	0	0	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	Nil	Nil	Nil
	b) Total No. of circuits on POI		13,877	98,380	1,579	96,740	390	183,834	28,365	9,493	434	108,851	1239	214	28,365	42,843
	c) Avg No. of call attempts on POI		193,735	32,809	1,284	1,499,528	15	16,808	322,532	37,943	3,294	37,944	26	2,993	322,532	6,583
	d) Avg traffic served on POI (Erlang)		3,510	1,003	46	23,796	1	622	10,747	1,136	111	1,303	0.90	113	10,747	256
	e) Total number of working POI Service Area wise		25	52	51	33	14	49	NP	19	50	45	25	28	NP	120
	f) Equipped Capacity of Network in respect of Traffic in erlang		22,243	261,670	443	146,307	89	272,010	NP	92,533	61,959	129,417	4,200	25,994	NP	58,000
	g) Total traffic handled in TCBH in erlang		3010	220728	29	124228	6	81951	NP	25288	15108	115057	1.61	1818	NP	23782

			GSM Operators										CDMA Operators			
(B)	**Customer Service Quality Parameters**															
5	**Response time to customers for assistance**															
	a) Accessibility of call centre	>=95%	100%	NP	97%	100%	100%	100%	99%	100%	96.00%	100%	100%	100%	100%	100%
	b) % of call answered by operators(voice to voice) within 60 sec	>=90%	93.01%	87.37%	100.00%	50.55%	100%	95.67%	98.86%	93.52%	96.40%	96.96%	100%	97.51%	95.64%	98.92%
	c) No. of call attempts to call centre / customer care nos. during TCBH (Avg)		37,235	266,462	43	139,656	1	44,756	141,765	56,944	21,884	13,959	4	562	6,514	17,662
	d) No. of calls connected and answered successfully to call centre / customer care nos. during TCBH (Avg)		34,631	232,809	43	112,679	1	42,817	140,147	53,255	21,097	13,534	4	548	6,230	17,471

NA: Not Applicable, NP: Data Not Provided

Parameter-wise Findings (Live Data Assessment):

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

- **BTS Accumulated Downtime (benchmark <= 2%):** All operators are meeting the benchmark with values laying between 0% and 0.08%.
- **Worst Affected BTS Due to Downtime (benchmark <= 2%):** All operators are meeting the benchmark with values laying between 0% and 0.06%.
- **Call setup success rate (benchmark >= 95%):** All operators are meeting the benchmark with values laying between 98.33% and 100%.
- **SDCCH/PAGING Channel congestion (benchmark <= 1%):** All operators are meeting the benchmark with values laying between 0% and 0.37%., except BSNL with a value 1.06%.
  Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.
- **TCH congestion (benchmark <= 2%):** All the operators are complying the benchmark with values laying between 0% and 1.15%.
- **Call drop rate (benchmark <= 2%):** All operators are meeting the benchmark with values laying between 0% and 1.95%.
- **Cell exceeding 3% TCH drop (benchmark <= 5%):** Except Etisalat, BSNL, TTSL GSM & Vodafone with a value of 12.96%, 5.72%, 8.79% & 6.57% respectively, rest of the operators are satisfying the benchmark .
- **Connections with good voice quality (benchmark >= 95%):** CDMA service providers have declared that the parameter is not system generated. Rest of the GSM operators are meeting the benchmark with values laying between 95.06% and 99.25%.
- **No of POI >0.5% Congestion (benchmark >= 0.5%):** None of operators are having POI > 0.5% congestion. Some cases were found where individual POIs are showing high utilization/usage , few are in the range of over 100% though causing no traffic failure due to overflow technique i.e. the extra traffic is carried over by some other operating POI as has been designed to do so.
- **%age of call answered by operator (electronically) (benchmark >95):** All operators are meeting the benchmark. Airtel has not provided the data for this parameter.
- **%age of call answered by operator (Voice to voice) (benchmark >90%): %):** All operators are meeting the benchmark, except Airtel & Idea which is showing low value i.e. not meeting the benchmark.

2) Month data assessment & summarized findings:

S/N	Name of Parameter	Benchmark	Aircel	Airtel	Etisalat	Idea	Loop	BSNL	Rcom GSM	TTSL GSM	Videocon	Vodafone	MTS	HFCL	Rcom CDMA	Tata CDMA
			GSM Operators										CDMA Operators			
(A)	Network Service Quality Parameter															
1	Network Availability															
	a) BTS Accumulated Downtime	<=2%	0.19%	0.09%	0.10%	0.04%	0.00%	0.02%	0.08%	0.02%	0.16%	0.01%	0.00%	0.05%	0.05%	0.46%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.40%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	c) Total no. of BTSs in the licensed service area		605	3,969	18	3,546	4	3,526	1,674	1,664	1,635	4,212	13	169	1,004	638
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		862	2,793	14	1,178	0	446	1,022	283	1,991	397	0	57	401	2,173
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	16	0	0	0	0	0	0	0	0	0	0	0	0
2	Connection Establishment (Accessibility)															
	a) CSSR (Call Setup Success Rate)	>=95%	99.92%	99.64%	99.96%	98.21%	99.83%	98.79%	99.14%	99.46%	99.75%	99.70%	100%	99.46%	99.94%	99.95%
	b) SDCCH/PAGING congestion	<=1%	0.07%	0.15%	0.03%	0.26%	0.17%	0.63%	0.17%	0.23%	0.05%	0.10%	0.00%	0.54%	0.01%	0.00%
	c) TCH congestion	<=2%	0.01%	0.21%	0.01%	1.53%	0.00%	0.58%	0.69%	0.31%	0.20%	0.20%	0.00%	0.00%	0.05%	0.05%
3	Connection maintenance (retain ability)															
	a) CDR	<=2%	0.84%	0.72%	1.26%	1.52%	0.00%	1.72%	0.30%	1.03%	1.54%	0.93%	0.00%	0.82%	0.57%	0.82%
	b) Worst affected cells>3% TCH drop	<=3%	2.15%	1.39%	5.56%	2.85%	0.00%	11.79%	0.74%	8.43%	2.91%	6.47%	0.00%	2.37%	0.30%	0.56%
	c) Good voice quality	>=95%	97.29%	98.91%	98.56%	96.91%	98.50%	95.05%	99.18%	96.02%	98.07%	97.63%	NA	NA	NA	NA
	d) Total No. of cells exceeding 3% TCH drop (call drop)		39	163	3	304	0	991	37	398	143	843	0	12	3	11
	e) Total no. of cells in the network		1,815	11,767	54	10,661	12	8,408	5,022	4,720	4,906	13,023	39	507	1,004	1,958
4	No of POI having > 0.5% congestion	<=0.5%	0	0	0	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	NIL	NIL	NIL
	b) Total No. of call attempts on POI (Avg.)		201,885	34,092	1,335	1,617,513	189	410,787	322,730	396,529	3,413	43,616	96	35,829	322,730	72,001
	c) Total traffic served on POI (Erlang) (Avg.)		3,614	1,030	47	24,983	5	14,515	10,422	11,595	112	1,522	2.73	1,318	10,422	2,838
	d) Total No. of circuits on POI		13,877	98,380	1,579	96,740	390	183,834	28,365	9,493	434	108,851	1239	214	28,365	42,843
	e) Total number of working POI Service Area wise		25	52	51	33	14	49	NP	NP	50	45	25	28	NP	0
	f) Capacity of POI		13,161	96,093	1,220	92,664	348	NP	25,754	9,003	369	108,274	35	171	25,754	38,939

S/N	Name of Parameter	Benchmark	Aircel	Airtel	Etisalat	Idea	Loop	BSNL	Rcom GSM	TTSL GSM	Videocon	Vodafone	MTS	HFCL	Rcom CDMA	Tata CDMA
								GSM Operators						CDMA Operators		
5	**Network Data**															
	a) Equipped Capacity of Network Erlang		22,243	261,670	443	146,307	89	272,010	NP	NP	61,959	129,417	4200	25,994	NP	58,000
	b) Total traffic in TCBH in erlang (Avg.)		3,010	220,728	29	124,228	6	81,951	NP	25,288	15,108	115,057	1.61	1,818	NP	23,782
	c) Total no. of customers served (as per VLR) on last day of the month		354,811	6,089,898	2,493	4,307,215	16	2,280,669	NP	1,059,365	489,946	3,493,020	133	24,350	NP	561,722
(B)	**Customer Service Quality Parameters**															
5	**Metering/billing credibility-Post paid**	*<= 0.1%*	0.00%	0.03%	NA	0.05%	NA	0.07%	0.10%	0.33%	NA	0.04%	NA	0.01%	0.05%	0.42%
	a) No. of bills issued during the period		11,081	422,025	NA	337,595	NA	35,029	17,501	16,461	NA	269,706	NA	25,276	93,712	102,975
	b) No. of bills disputed including billing complaints during the period		0	124	NA	167	NA	24	17	54	NA	105	NA	2	49	432
6	**Metering /billing credibility-Pre paid**	*<= 0.1%*	0.01%	0.01%	0.00%	0.00%	0.00%	0.01%	0.03%	0.03%	0.00%	0.01%	0.00%	0.00%	0.02%	0.04%
	a) No. of charging / credit / validity complaints during the quarter		93	693	0	148	0	372	946	532	0	396	0	0	189	250
	b) Total no. of pre-paid customers at the end of the quarter		718,545	7,789,252	12,514	4,207,941	125	4,590,350	3,616,085	1,734,535	1,326,856	3,960,878	382	48,700	889,862	608,097
7	**Resolution of billing/ charging complaints**	*100% within 4 weeks*	100%	100%	100%	100%	NA	100%	100%	100%	100%	100%	NA	100%	100%	100%
	a) No. of billing/(post paid) and charging, credit/validity (pre paid) complaints resolved within 4 weeks during the quarter		193	13194	0	4,771	NA	396	963	586	2,270	501	NA	2	238	682
	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		193	13,194	0	4,771	NA	396	963	586	2,270	501	NA	2	238	682

#	Parameter	Benchmark														
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		190	817	0	1,143	NA	396	58	2	2,270	195	NA	2	48	22
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		3	12,377	0	3,628	NA	0	905	584	0	306	NA	0	190	660
	e) Period of applying credit/waiver/adjustment to the customer's account from the date of resolutions of complaints	<=1 week	100%	100%	NA	100%	NA	100%	100%	100%	100%	100%	NA	100%	100%	100%
8	**Response time to customers for assistance**															
	a) Accessibility of call centre/Customer Care	>=95%	100%	NP	99%	100%	100%	100%	99%	100%	95%	100%	100%	100%	99%	100%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	92.56%	78.87%	100%	70.96%	100%	92.38%	98.77%	99.46%	98.49%	91.14%	98.15%	90.00%	95.54%	99.42%
	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		358,969	266,462	403	139,656	154	44,756	141,765	56,944	21,884	149,794	154	5620	6,5140	82,366
	d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		332,271	2,184,75	402	1,054,689	154	429,531	145,325	141,897	11,966	136,520	153	5,785	62234	82,366
9	**Termination/closure of service**	<=7days	100%	100%	NA	98.60%	NA	100%	100%	100%	NA	100%	NA	100%	100%	100%
	a) Total No. of requests for Termination / Closure of service received during the quarter		94	4,714	NA	2,730	NA	274	186	497	NA	1,091	NA	1,260	670	2,067
	b) No. of requests for Termination / Closure of service complied within 7 days during the quarter		94	4,714	NA	2,692	NA	274	186	497	NA	1,091	NA	1,260	670	2,067
10	**Time taken for refunds of deposits after closures.**	100% within 60 days	100%	100%	NA	100%	NA	100%	100%	100%	NA	100%	NA	NA	100%	100%

NA: Not Applicable ,NP: Data Not Provided

➢ **Parameter-wise Findings (Month Data Assessment):**

The parameter wise key takeouts for the Cellular Mobile Telephone Services providers in Punjab Service Area are as given below:-
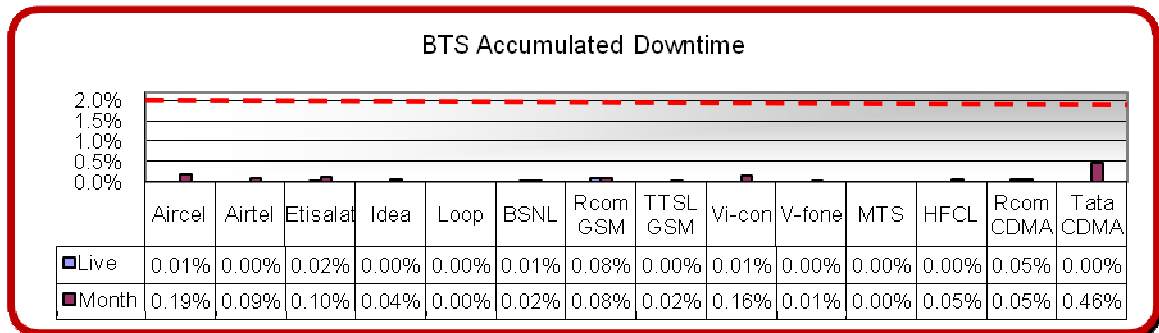
➢ **BTS accumulated downtime (benchmark <=2%):** All operators are meeting the benchmark with values laying between 0% and 0.46%.

➢ **Worst affected BTSs due to downtime (benchmark <= 2%):** All operators are meeting the benchmark with values laying between 0% and 0.40% respectively

➢ **Call setup success rate (benchmark >= 95%):** All operators are meeting the benchmark with values laying between 98.21% and 100%.

➢ **SDCCH/PAGING Channel congestion (benchmark <= 1%):** All operators are meeting the benchmark with values laying between 0% and 0.63%.
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 laying between 0% and 1.53%.

➢ **Call drop rate (benchmark <= 2%):** All operators are meeting the benchmark with values laying between 0% and 1.72%.

➢ **Cell exceeding 3% TCH drop (benchmark <= 5%):** Except Etisalat , BSNL, TTSL GSM & Vodafone with a value of 5.56% ,11.79%, 8.43% & 6.47% , rest all the operators are satisfying the benchmark.

➢ **Connections with good voice quality (benchmark >= 95%):** CDMA service providers have declared that the parameter is not system generated. Rest of the GSM operators are meeting the benchmark with values laying between 95.05% and 99.18%.

➢ **No of POI > 0.5% Congestion (benchmark <= 0.5%):** It is found that none of the operators are having any POI more than 0.5% congestion 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.

➢ **Metering and billing credibility-Post paid (benchmark <= 0.1%):** Except TTSL GSM & TTSL CDMA are not meeting with a value 0.33% & 0.42% , rest all other operators are satisfying the benchmark.

➢ **Metering and billing credibility-Pre paid (benchmark <= 0.1%):** All the operators are meeting the benchmark with values laying between 0% and 0.04%.

➢ **Response time to customers for assistance- Accessibility of call centre/Customer Care (benchmark >=95%):** All operators are meeting the benchmark with a value laying between 96% and 100% respectively. Airtel has not provided the data.

➢ *% call answered by operators(voice to voice) within 60 sec (benchmark >=90%):* Only Airtel & Idea are not meeting the benchmark with values of 78.87% & 70.96% rest all operators are satisfying the benchmark respectively.

➢ **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, except Idea with a value 98.60%. Etisalat, Loop & Videocon has no cases of termination.

➢ **Time taken for refunds of deposits after closures (benchmark 100% within <=60 days):** All operators have satisfied the benchmark respectively.

(3) Sample Coverage

Switches/BSC/BTS details of operators:

Sl.	Name of Service Provider	No. of MSC	No. of BSC	No. of BTS
	GSM Operators			
1	Aircel Ltd	1	6	605
2	Airtel Ltd	22	50	3983
3	BSNL	13	45	3526
4	Etisalat	1	1	18
5	Idea	7	71	3538
6	Reliance Communication (GSM)	6	7	1674
7	Tata Communications (GSM)	2	11	1573
8	Videocon	1	9	1635
9.	Loop	1	1	4
10	Vodafone	9	47	4232
	CDMA Operators			
11.	HFCL (CDMA)	1	2	169
12.	MTS	1	1	13
13	Reliance Communication (CDMA)	10	5	1004
14.	Tata Communications (CDMA)	5	5	638

(4) Performance (Graphical Representation)

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

A)   NETWORK PERFORMANCE

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

	Aircel	Airtel	Etisalat	Idea	Loop	BSNL	Rcom GSM	TTSL GSM	Vi-con	V-fone	MTS	HFCL	Rcom CDMA	Tata CDMA
Live	0.01%	0.00%	0.02%	0.00%	0.00%	0.01%	0.08%	0.00%	0.01%	0.00%	0.00%	0.00%	0.05%	0.00%
Month	0.19%	0.09%	0.10%	0.04%	0.00%	0.02%	0.08%	0.02%	0.16%	0.01%	0.00%	0.05%	0.05%	0.46%

Worst Affected BTS Due to Downtime: All operators are meeting the TRAI benchmarks (<= 2 %) for both one month data and 3 days live data taken in the month of audit

	Aircel	Airtel	Etisalat	Idea	Loop	BSNL	Rcom GSM	TTSL GSM	Vi-con	V-fone	MTS	HFCL	Rcom CDMA	Tata CDMA
Live	0.00%	0.05%	0.00%	0.00%	0.00%	0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Month	0.00%	0.40%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
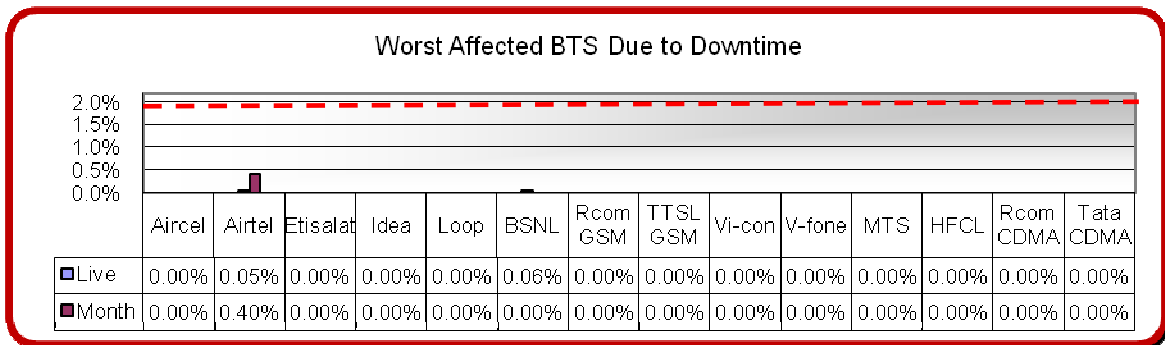
Call setup success rate: All operators are meeting the TRAI benchmarks (>= 95 %) for both one month data and 3 days live data taken in the month of audit.

	Aircel	Airtel	Etisalat	Idea	Loop	BSNL	Rcom GSM	TTSL GSM	Vi-con	V-fone	MTS	HFCL	Rcom CDMA	Tata CDMA
Live	99.94	99.63	99.94	98.54	99.90	98.33	99.54	99.55	99.77	99.60	100%	98.63	99.84	99.62
Month	99.92	99.64	99.96	98.21	99.83	98.79	99.14	99.46	99.75	99.70	100%	99.46	99.94	99.95

I. Blocked call rate:

SDCCH congestion (%): All operators are meeting the TRAI benchmarks (<= 1 %) for both one month data and 3 days live data , except BSNL which is deviating with a value 1.06% in live data respectively.

SDCCH/PAGING congestion

	Aircel	Airtel	Etisalat	Idea	Loop	BSNL	Rcom GSM	TTSL GSM	Vi-con	V-fone	MTS	HFCL	Rcom CDMA	Tata CDMA
Live	0.05%	0.16%	0.01%	0.31%	0.10%	1.06%	0.05%	0.10%	0.06%	0.20%	0.00%	0.37%	0.01%	0.00%
Month	0.07%	0.15%	0.03%	0.26%	0.17%	0.63%	0.17%	0.23%	0.05%	0.10%	0.00%	0.54%	0.01%	0.00%

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

TCH congestion

	Aircel	Airtel	Etisalat	Idea	Loop	BSNL	Rcom GSM	TTSL GSM	Vi-con	V-fone	MTS	HFCL	Rcom CDMA	Tata CDMA
Live	0.01%	0.21%	0.05%	1.15%	0.00%	0.61%	0.41%	0.35%	0.17%	0.20%	0.00%	1.00%	0.15%	0.38%
Month	0.01%	0.21%	0.01%	1.53%	0.00%	0.58%	0.69%	0.31%	0.20%	0.20%	0.00%	0.00%	0.05%	0.05%

II. Connection Maintainability (Retain ability):

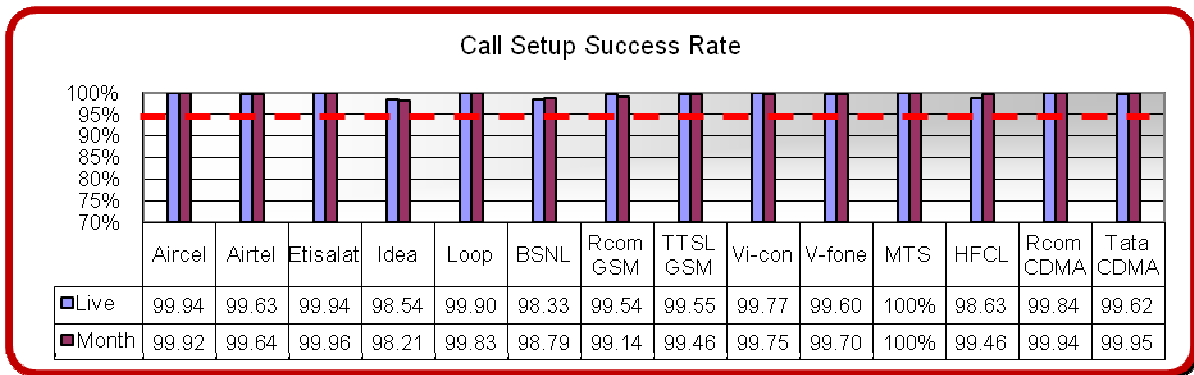**Call drop rate (%):** All operators are meeting the TRAI benchmarks (<=2%) for both one month data and 3 days live data taken in the month of audit.
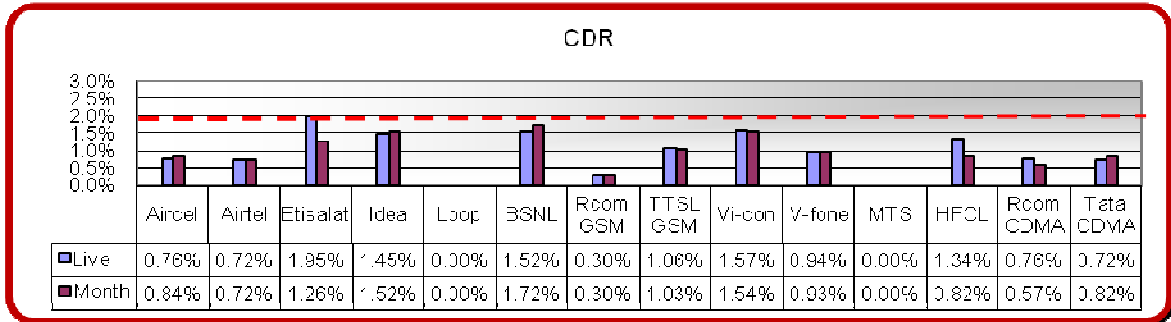
Worst affected Cell exceeding 3% TCH Drop: For both live and month data, Etisalat with a value of 12.96% and 5.56%, BSNL with a value 5.72% and 11.79%, TTSL GSM with a value of 8.79% and 8.43% & Vodafone with a value 6.57% and 6.47% respectively are found not meeting the benchmark of <=5%. Rests of the operators are meeting the benchmark for both cases.
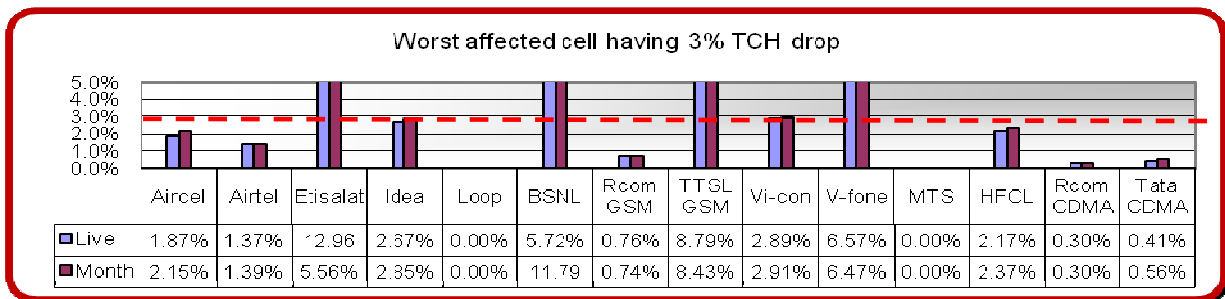
Percentage of connections with good voice quality (benchmark >= 95%): All operators are meeting the TRAI benchmarks (=> 95%) for both one month data and 3 days live data taken in the month of audit.CDMA operators have not provided the data for both cases.
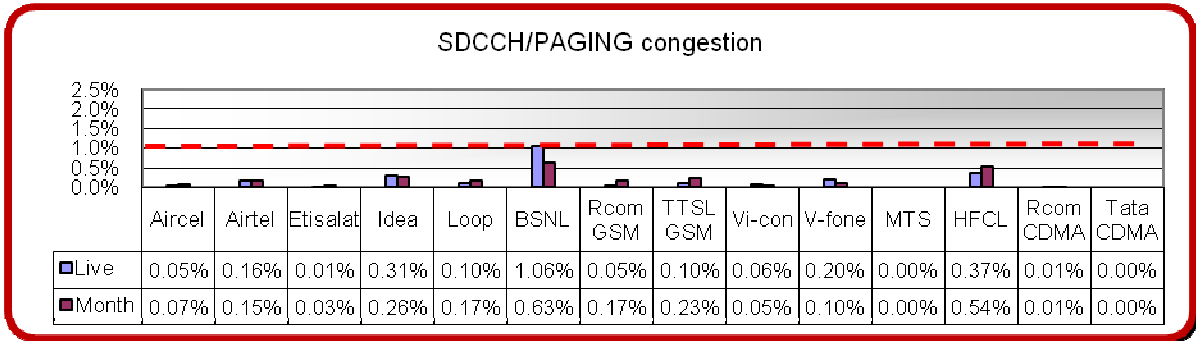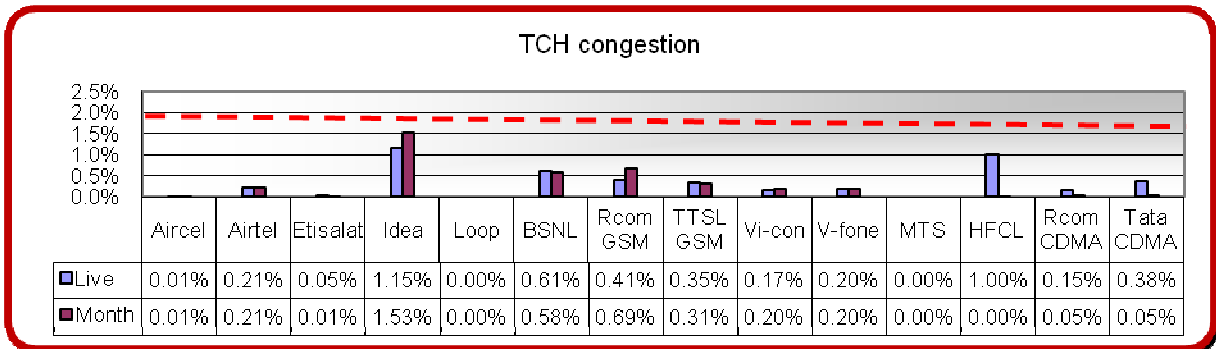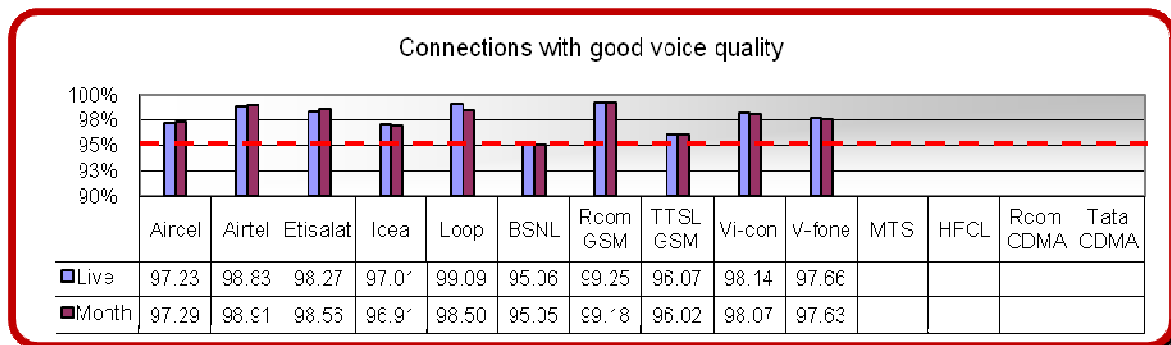
No of POI > 0.5% Congestion: None of the operators are having individual POI > 0.5% congestion for both one month data and 3 days live data, taken in the month of audit.
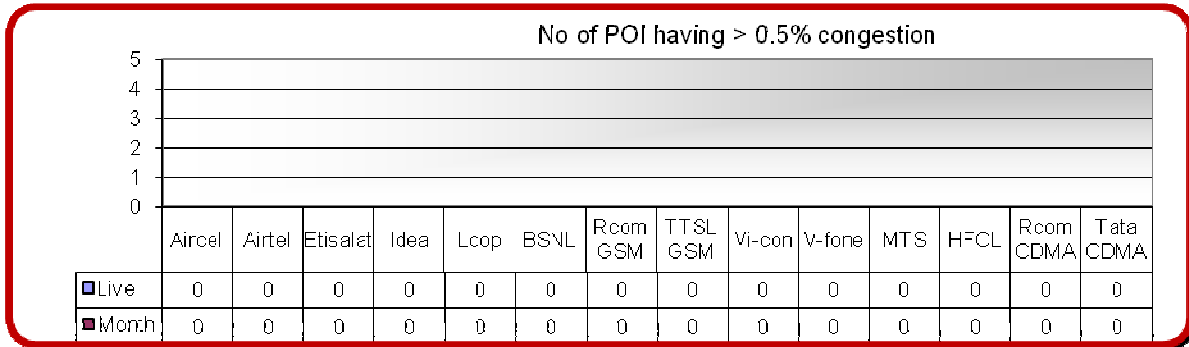
B)   CUSTOMER SERVICE QUALITY PARAMETERS

(A)   Response time to the customer for assistance:

Percentage of call answered (Electronically): All operators are meeting the TRAI benchmarks (>= 95%) for both one month data and 3 days live data. Data has not been provided by Airtel for Month & live data audit.
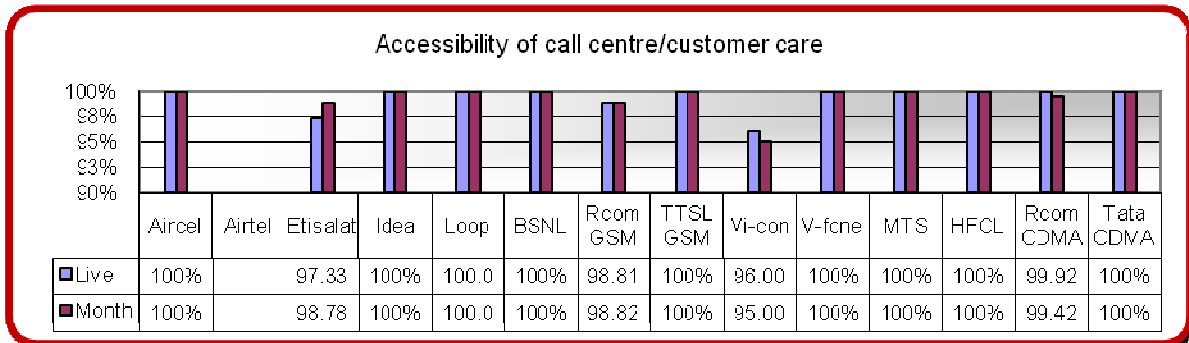
Percentage of call answered by operators (Voice to voice) within 60 sec: For Month & Live data, all operators are meeting the benchmark, except Airtel & Idea which are not meeting the benchmark in both. Rest all operators are satisfying in both cases.
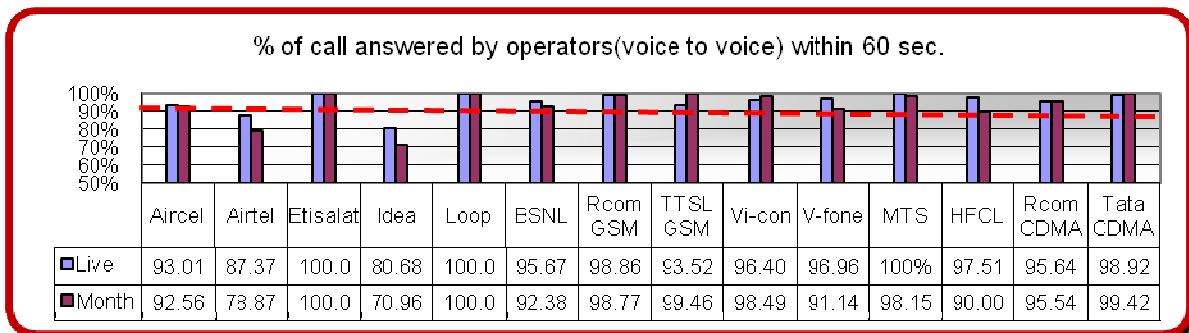
(5) Critical Analysis

The above comparative study between live data & month data shows similar trends in both the cases. However, it is found inconsistency for few operators like Etisalat, BSNL , TTSL GSM & Vodafone in live & month data for the parameter "worst affected cells having >3% TCH drop" with high margin . This may have happened due to mainly in the change adopted for calculating the parameter considering CBBH instead of TCBH, which reflects more practical way of calculating TCH drop keeping in view customer satisfaction. For SDCCH /PAGING congestion parameter, only BSNL is not meeting the benchmark in respect from other operators. As far as Metering & billing cases for post-paid services is concerned only TTSL (GSM & CDMA both) is slightly deviating from the benchmark". The parameter "%age of calls answered by operator" (voice to voice) is not meet by Airtel & Idea for both month & live data assessment. Airtel has not provided the data for Accessibility of call centre parameter in both Live & month part. In Termination & Closures, only Idea is deviating from the benchmark with a value of 98.60% in comparison with other operators in Punjab circle respectively.

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

(3) Live calling to call centre

Calling Operator	Aircel	Airtel	BSNL	Etisalat	Idea	Loop	Rcom GSM	Tata GSM	Videocon	Vodafone	HFCL	MTS	Rcom CDMA	Tata CDMA
Call Centre No.	121/198	121/198	1503	121	198/12345	121/198	*222/*333	121	121	111	121/19 20	155	*222/*333	121
Total No. of Calls Attempted	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Total No. of calls connected to IVR	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Calls got connected to agent within 60 Sec	95	96	95	97	98	97	96	95	98	98	96	95	97	98
%age of calls got answered	95%	96%	95%	97%	98%	97%	96%	95%	98%	98%	96%	95%	97%	98%

(4) Level 1 live calling

	Emergency no.	No. of calls made	Aircel	Airtel	BSNL	Etisalat	Idea	Reliance (GSM)	Tata (GSM)	Videocon	Vodafone	Loop	MTS	HFCl (CDMA)	Reliance (CDMA)	Tata (CDMA)
							Amritsar									
100	Police	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
101	Fire	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
102	Ambulance	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
139	Railway	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
							Patiala									
100	Police	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
101	Fire	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
102	Ambulance	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
139	Railway	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
							Bhatinda									
100	Police	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
101	Fire	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
102	Ambulance	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
139	Railway	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

(5) Critical Analysis

Random numbers were selected from the operators' database of billing/metering complaints and calls were made to the customers to get their feedback for complaint redressal. It is found that the operators had made refunds in 100% in most of the 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 (Punjab Circle) were made between 1100 to 1400 hrs and between 1600 to 1900 hrs so that TCBH hours for all the operators were covered.

(2) Performance based on live measurement

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

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Reliance (GSM)	100%	100%	100%	100%	100%	-	100%	100%	100%	100%	100%	100%	100%	100%
Tata (GSM)	96%	96%	100%	100%	100%	97%	-	100%	100%	100%	97%	100%	100%	100%
Videocon	100%	96%	95%	100%	99%	96%	100%	-	99%	98%	98%	100%	100%	99%
Vodafone	98%	100%	100%	98%	100%	100%	100%	100%	-	100%	99%	100%	98%	100%
Loop	100%	99%	100%	97%	100%	98%	100%	97%	100%	-	100%	100%	100%	100%
MTS	100%	100%	100%	98%	98%	100%	100%	96%	100%	100%	-	100%	98%	100%
HFCL	100%	98%	100%	100%	100%	96%	100%	100%	100%	100%	100%	-	97%	97%
Reliance (CDMA)	97%	100%	95%	100%	100%	100%	100%	99%	100%	100%	99%	100%	-	98%
Tata (CDMA)	100%	100%	98%	100%	100%	99%	100%	100%	97%	100%	98%	100%	97%	-

(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 Punjab 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

AMRITSAR

LOW DENSE: Ranjeet pura , Kot khalsa, Lawrence road, Ranjeet Avenue.
MEDIUM DENSE: Hakima gate, Gurbaksh nagar, Katra dullo, Randev palace, Albert road.
HIGH DENSE: Hall bazaar, Rly Stn, Guru Bazar, Golden Temple, Cristal Chowk..

PATIALA

LOW DENSE: Rajendra hospital, sanour road, badsan chungi, Nabha road.
MEDIUM DENSE: Thapar College, sangrur road, rajpura road, Mohindar College.
HIGH DENSE: Ragho majra, Saifabadi gate, Dharampura bazaar, Bus stand..
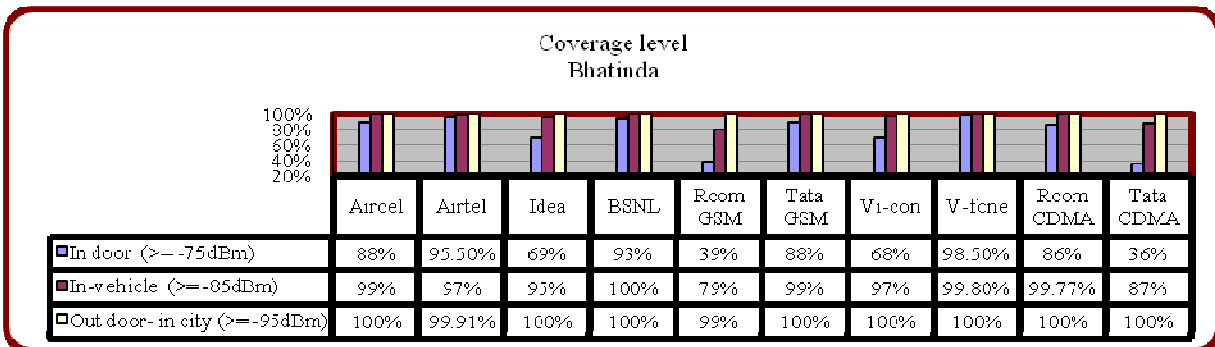
BHATINDA

LOW DENSE: Futi Road, dabwali road, badal road, thandi sadak, rose garden
MEDIUM DENSE: ITI chowk, mehna chowk, rose garden, clock tower.
HIGH DENSE: Dhobi bazaar, firkin bazaar, quila road, bus stand road.

(2). Performance Operator assisted drive test (for respective cities):

SN	Parameter	City Name	Aircel	Airtel	Idea	BSNL	Rcom GSM	Tata GSM	Videocon	Vodafone	Rcom CDMA	Tata CDMA
			GSM Operators									
1.1	Call Attempts	Amritsar	93	116	88	88	89	93	141	90	89	88
		Patiala	61	149	96	66	104	61	99	78	104	86
		Bhatinda	50	143	66	59	62	50	87	63	62	83
1.2	Blocked Call Rate (<=3%)	Amritsar	2.15%	0.00%	0.00%	1.13%	0.00%	2.15%	1.41%	0.00%	0.00%	0.00%
		Patiala	0.00%	0.00%	0.00%	3.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		Bhatinda	0.00%	0.00%	0.00%	5.08%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1.3	Dropped Call Rate (<=2%)	Amritsar	0.00%	0.00%	0.00%	1.13%	0.00%	0.00%	0.70%	0.00%	0.00%	0.00%
		Patiala	0.00%	0.00%	0.00%	4.59%	0.00%	0.00%	1.01%	0.00%	0.00%	1.16%
		Bhatinda	2.00%	0.00%	0.00%	3.38%	0.00%	2.00%	0.00%	0.00%	0.00%	1.20%
1.4	Percentage of connections with good voice quality (=>95%)											
	(i) 0-4 (w/o frequency hopping)	Amritsar									97.70%	98.11%
		Patiala									99.50%	97.69%
		Bhatinda									99.35%	97.40%
	(ii) 0-5 (with frequency hopping)	Amritsar	95%	96%	95%	93.80%	98.82%	95%	96%	97.70%		
		Patiala	96%	95%	96%	94%	98.79%	96%	95%	97.20%		
		Bhatinda	97%	96%	97%	91%	97.8%	97%	95.45%	97.40%		
1,5	Service Coverage											
	In door (>= -75dBm)	Amritsar	93%	92%	78%	84%	72%	93%	74%	97%	67%	65%
		Patiala	96%	94%	79%	54.60%	43%	96%	73%	97.70%	73%	32.71%
		Bhatinda	88%	95.50%	69%	93%	39%	88%	68%	98.50%	86%	36%
	In-vehicle (>= -85dBm)	Amritsar	99.92%	98%	98%	98.90%	97.50%	99.92%	99%	99.94%	96%	97%
		Patiala	100%	97%	99%	93.70%	75.6%	100%	99%	99.90%	98%	71.96%
		Bhatinda	99%	97%	95%	100%	79%	99%	97%	99.80%	99.77%	87%
	Outdoor- in city (>= -95dBm)	Amritsar	100%	99.83%	100%	99%	99.97%	100%	100%	100%	100%	100%
		Patiala	100%	99.73%	100%	100%	96%	100%	100%	100%	100%	99.82%
		Bhatinda	100%	99.91%	100%	100%	99%	100%	100%	100%	100%	100%
1.6	Call Setup Success Rate (>=95%)	Amritsar	97.85%	100%	100%	98.87%	100%	97.85%	98.59%	100%	100%	100%
		Patiala	100%	100%	100%	96.97%	100%	100%	100%	100%	100%	100%
		Bhatinda	100%	100%	100%	94.92%	100%	100%	100%	100%	100%	100%

Graphical Representation

Coverage level Amritsar

	Aircel	Airtel	Idea	BSNL	Rcom GSM	Tata GSM	Vi-con	V-fone	Rcom CDMA	Tata CDMA
◻In door (>= -75dBm)	93%	92%	78%	84%	72%	93%	74%	97%	67%	65%
◼In-vehicle (>=-85dBm)	99.92%	98%	98%	98.90%	97.50%	99.92%	99%	99.94%	96%	97%
◻Out door- in city (>=-95dBm)	100%	99.83%	100%	99%	99.97%	100%	100%	100%	100%	100%

Coverage level Patiala

	Aircel	Airtel	Idea	BSNL	Rcom GSM	Tata GSM	Vi-con	V-fone	Rcom CDMA	Tata CDMA
◻In door (>=-75dBm)	96%	94%	79%	54.60%	43%	96%	73%	97.70%	73%	32.71%
◼In-vehicle (>=-85dBm)	100%	97%	99%	93.70%	75.6%	100%	99%	99.90%	98%	71.96%
◻Out door- in city (>=-95dBm)	100%	99.73%	100%	100%	96%	100%	100%	100%	100%	99.82%

Coverage level Bhatinda

	Aircel	Airtel	Idea	BSNL	Rcom GSM	Tata GSM	Vi-con	V-fone	Rcom CDMA	Tata CDMA
◻In door (>=-75dBm)	88%	93.50%	69%	93%	39%	88%	68%	98.50%	86%	36%
◼In-vehicle (>=-85dBm)	99%	97%	95%	100%	79%	99%	97%	99.80%	99.77%	87%
◻Out door- in city (>=-95dBm)	100%	99.91%	100%	100%	99%	100%	100%	100%	100%	100%

(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:

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

- Blocked Call Rate & Drop call rate benchmark is not meet by BSNL in Patiala & Bhatinda.
- As far as Good voice quality is concerned it is found that only BSNL is not meeting the benchmarks in all 3 cities respectively.
- Call Set up Success Rate is not meet by BSNL only in Bhatinda.

(E) **Independent Drive Test**--------------- *Submitted as separate report.*

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

From Live, Month, PMR and Drive Tests findings, it can be observed that on an average, performance of the operators in the service area (Punjab) is somehow satisfactory for **Network Parameters**. As far as parameter of worst affected cell > 3% TCH drop is concerned, few operators are not complying the benchmark like Etisalat, BSNL, TTSL GSM & Vodafone respectively.

Regarding **Metering/Billing** cases for post-paid services, only TTSL (GSM & CDMA) is slightly deviating from the benchmark in comparison with other operators.

Under **Customer Service Quality Parameter** "% of Calls answered by the operators (voice-to-voice) within 60 seconds" parameter is found that Airtel & Idea are not fulfilling TRAI benchmark of >=90%. Apart from this, the "accessibility of call centre" parameter is meet by all the operators.
For Termination & closures cases , only Idea is not complying the benchmark.

During **Drive Tests**, high Blocked Call & Drop call rates were found in case of BSNL in Patiala & Bhatinda. Although Good voice quality is also not meet by BSNL in all 3 cities in comparison to other operators. As far as call setup success rate is concerned, BSNL is not meet the benchmark in Bhatinda.

III.   Basic Telephone Service (Wireline) Providers
……..Audit not done for this quarter

IV.   Broadband Service Providers
……..Audit not done for this quarter