

REPORT

ON

AUDIT & ASSESSMENT OF QUALITY OF SERVICE

OF

CELLULAR MOBILE TELEPHONE SERVICE

FOR

NORTH ZONE – PUNJAB CIRCLE

Report Period: APRIL 2012 – JUNE 2012

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Table of Contents

CHAPTER-1: Introduction

- I. Background
- II. Objectives and Methodology

CHAPTER-2: Executive Summary

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

- (A) Cellular Mobile Telephone Service Providers

- 3 days Live Data Audit
- One Month Data Audit
- Operator Assisted Drive Test
- Independent Drive Test

- (B) **Basic Telephone Service (Wireline) Providers**

-- NOT CONDUCTED ---

- (C) **Broadband Service Providers**

---- NOT CONDUCTED.-----

CHAPTER-3: Audit-PMR data verification results

- I. Cellular Mobile Telephone Service

CHAPTER-4: Detailed Findings & Analysis

- I. Cellular Mobile Telephone Service

- (A) **MSC audit**

- 1) 3 days live measurement data assessment & summarized findings
- 2) One month audit data report & summarized findings
- 3) Sample coverage
- 4) Performance (Graphical Representation)
- 5) Critical Analysis

- (B) **Redressal**

- 1) Sample coverage
- 2) Performance based on live Calling for Billing Complaints
- 3) Live calling to call centre
- 4) Level 1 live calling
- 5) Critical Analysis

(C) Inter operator call assessment

- 1) Sample coverage
- 2) Performance based on live Calling
- 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

III. Broadband Service Providers

NOT CONDUCTED

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 No. (Level 1) calling done.

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.
- ✓ For Basic Wireline Service, the Network parameter of the QoS TRAI regulations is observed / verified for the 3 days for nearly 5% of the telephone exchanges covering 10% of the SDCA in a Service area.
- ✓ For Broadband Services audit was conducted for service provider have not baser of more than 10,000 only. Audit data was collected from the centralized NOC or through a remote access to the NOC were collected. Network parameters were also checked from the centralized NOC. MRTG, Cacti and Sandvine software were used for monitoring link utilization. Smoke Ping and Ping Test were used for monitoring Network Latency.

CHAPTER 2: EXECUTIVE SUMMARY

I. Preface

This report highlights the findings for the audit & assessment of Quality of Service of Cellular Mobile Services in Punjab Circle in 2nd quarter (April – 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 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	May-2012	2000-2100 Hrs
2.	Airtel Ltd	May -2012	1900-2000 Hrs
3.	Idea	May -2012	2000-2100 Hrs
4.	Uninor	May -2012	2000-2100 Hrs
5.	BSNL	April -2012	1900-2000 Hrs
6.	Reliance Communication	May -2012	1900-2000 Hrs
7.	Tata Teleservices Ltd.	May-2012	2000-2100 Hrs
8.	Videocon	May -2012	2100-2200 Hrs
9.	Vodafone	May -2012	2000-2100 Hrs
CDMA Operators			
10.	HFCL	May -2012	1900-2000 Hrs
11.	MTS	May -- 2012	1900-2000 Hrs
12.	Reliance Communication	May -2012	1900-2000 Hrs
13.	Tata Teleservices Ltd.	May -2012	2000-2100 Hrs

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

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

(A) Cellular Mobile Telephone Services

3 days Live Data Audit		Bench- mark	Aircel	Airtel	BSNL	Idea	Uninor	Rcom GSM	TTSL GSM	Videoc on	Vodafon e	HFCL	MTS	Rcom CDMA	Tata CDMA
S/ N	Name of Parameter														
(A) -1	Network Service Quality Parameter														
	BTS Accumulated Downtime	<=2%	0.00%	0%	0.09%	0%	0%	0%	0.04%	0.06%	0.04%	0.00%	0%	0.13%	0.02%
	Worst affected BTS due to downtime	<=2%	0%	0.00%	0%	0%	0%	0%	0%	0%	0.00%	0.00%	0%	0%	0%
1	Connection Establishment (Accessibility)														
	a) CSSR (Call Setup Success Rate)	>=95 %	99.88%	99.72%	98.37%	99.06 %	99.68%	99.99%	99.92 %	99.81%	99.90%	98.51%	100.00 %	100.00%	99.86%
	b) SDCCH/PAGING congestion	<=1%	0.08%	0.08%	0.45%	0.15%	0.32%	0.00%	0.02%	0.03%	0.03%	0.77%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.04%	0.20%	1.18%	0.79%	0.00%	0.01%	0.06%	0.16%	0.07%	0.72%	0.00%	0.00%	0.14%
2	Connection maintenance (retainability)														
	a) CDR	<=2%	0.54%	0.62%	1.72%	0.78%	0.00%	0.34%	0.46%	0.79%	0.60%	1.47%	0.00%	0.00%	0.73%
	b) Worst affected cells>3% TCH drop	<=3%	1.04%	1.05%	2.95%	0.99%	1.59%	0.00%	3.34%	0.91%	2.37%	0.00%	0.00%	0.00%	5.14%
	c) Good voice quality	>=95 %	97.88%	98.96%	95.54%	98.19 %	98.57%	99.40%	97.47 %	97.82%	97.87%	98.09%	99.30%	99.70%	0%
3	No of POI having > 0.5% congestion	>=0.5 %	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Response time to customers for assistance														
	a) Accessibility of call centre/Customer Care	>=95 %	100%	100.00 %	100%	100%	100%	99%	100%	96%	100%	100%	99.92%	99%	100%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90 %	80.43%	96.35%	90%	93.95 %	100%	61.48%	84.31 %	97%	96.94%	96.72%	98.29%	91.25%	97.45%

From the 3 days live data assessment, it is found that most of the operators are meeting the network parameters, except TTSL (GSM) for the parameter "Worst affected cells>3% TCH drop".

Performance related to customer care data is found to be satisfactory for most of the operators. Except Aircel, RCOM (GSM) & TTSL (GSM) for the Parameter "% of calls answered by operators (voice-to-voice)".

One Month Data Audit		Bench- mark	Aircel	Airtel	BSNL	Idea	Uninor	Rcom GSM	TTSL GSM	Videocon	Vodafone	HFCL	MTS	Rcom CDMA	Tata CDMA
S/N	Name of Parameter		GSM Operators									CDMA Operators			
(A)	Network Service Quality Parameter														
1	Network Availability														
	a) BTS Accumulated Downtime	<=2%	0.00%	0.05%	0.01%	0.03%	1.02%	0.09%	0.05%	0.10%	0.04%	0.19%	0.34%	0.09%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.02%	0.60%	0.00%	0.00%	0.00%	0.24%	0.12%	0.00%	0.00%	0.00%	0.00%	0.00%
2	Connection Establishment (Accessibility)														
	a) CSSR (Call Setup Success Rate)	>=95%	99.91%	99.80%	97.92%	98.94%	99%	99.98%	99.91%	99.77%	99.82%	98.26%	100%	100.00%	99.81%
	b) SDCCH/PAGING congestion	<=1%	0.02%	0.05%	0.96%	0.21%	0.35%	0.00%	0.01%	0.08%	0.08%	0.79%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.07%	0.15%	1.12%	0.85%	0.47%	0.02%	0.08%	0.15%	0.10%	0.95%	0.00%	0.00%	0.19%
3	Connection maintenance (retainability)														
	a) CDR	<=2%	0.55%	0.59%	1.94%	0.84%	0.47%	0.37%	0.47%	0.80%	0.63%	1.45%	0.20%	0.00%	0.76%
	b) Worst affected cells>3% TCH drop	<=3%	0.99%	1.11%	7.54%	1.00%	0.00%	0.00%	3.48%	0.95%	2.82%	0.00%	2.56%	0.00%	6.12%
	c) Good voice quality	>=95%	97.70%	99.02%	96%	98.16%	98.16%	99.38%	97.36%	97.81%	97.83%	97.78%	99.31%	99.71%	NA
4	No of POI having > 0.5% congestion	>=0.5%	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%	0.00%	0.02%	0.06%	NA	0.10%	0.31%	NA	0.07%	0.00%	NA	0.10%	0.19%
6	Metering /billing credibility-Pre paid	<= 0.1%	0.01%	0.00%	0.01%	0.00%	0.00%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%	0.03%	0.02%
7	Resolution of billing/ charging complaints	100% within 4 weeks	100%	100%	100%	100%	NA	100%	100%	100%	100%	NA	NA	100%	100%
	a) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	100%	100%	100%	100%	NA	100%	100%	100%	100%	NA	NA	100%	100%
8	Response time to customers for assistance														
	a) Accessibility of call centre/Customer Care	>=95%	100%	100.00%	100%	100%	100%	99%	100%	99%	100%	100%	99.61%	99%	98%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	40.55%	86.71%	90%	95.01%	100%	77.09%	59.63%	97%	95.52%	95.79%	96.42%	91.27%	92.31%
9	Termination/closure of service	<=7days	100%	100%	100%	100%	NA	100%	100%	NA	100%	100%	100%	100%	100%
10	Time taken for refunds of deposits after closures.	100% within 60 days	100%	100%	100%	100%	NA	100%	100%	NA	100%	100%	100%	100%	100%

NA: Not Applicable, NP: Data Not Provided

Analysis:--

- From the month data assessment, it is found that most of the operators are meeting the network parameters, except BSNL, TTSL(GSM) & TTSL (CDMA) are found not meeting the benchmark for “Worst affected cells>3% TCH drop”.
- Under Metering & Billing Section for Post-Paid services, all operators are meeting the benchmark, except TTSL (GSM) & TTSL (CDMA).
- Performance related to customer care data for voice to voice call is found to be satisfactory for most of the operators, except Aircel Aircel, RCOM(GSM) & TTSL(GSM) .
- TTSL (CDMA) has not provided the data due to not generating in system.

Operator-Assisted Drive Test

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

SN	Parameter	City Name	Airtel	BSNL	Idea	Videocon	Vodafone	Rcom (GSM)	TTSL (GSM)	Rcom (CDMA)	TTSL (CDMA)
			GSM Operators						CDMA Operators		
1.1	Blocked Call Rate (<=3%)	Kapurthala	0.00%	1.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		Muktsar	0.00%	4.08%	0.00%	0.00%	0.00%	0.99%	0.00%	0.00%	0.00%
		Barnala	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1.2	Dropped Call Rate (<=2%)	Kapurthala	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		Muktsar	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		Barnala	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1.3	(i) 0-4 (w/o frequency hopping)										
		Kapurthala								99.27%	99.75%
		Muktsar								99.70%	99.66%
	Barnala								99.82%	99.54%	
	(ii) 0-5 (with frequency hopping)	Kapurthala	98.00%	99.00%	96.5%	95.70%	98.80%	98.49%	98.10%		
		Muktsar	96.00%	92.50%	96.64%	96.60%	98.20%	96.83%	96.70%		
Barnala		97.00%	98.00%	95.30%	95.70%	98.80%	99.33%	98.36%			
1.4	Call Setup Success Rate (>=95%)	Kapurthala	100.00%	98.99%	100%	100.00%	100%	100%	100%	100%	100%
		Muktsar	100.00%	95.92%	100%	100.00%	100%	99%	100%	100%	100%
		Barnala	100%	100%	100%	100.00%	100%	100%	100%	100%	100%
1.5	Handover Success Rate (HOSR)	Kapurthala	100%	100%	100.00%	100.00%	100%	100%	100%	100%	100%
		Muktsar	99.80%	100%	100.00%	99.17%	100%	99.11%	100%	100%	100%
		Barnala	98.60%	100%	98.18%	100%	100%	100%	100%	100%	100%

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

- Blocked Call Rate is not met by BSNL in Muktsar only, rest all are satisfying the benchmark
- Good Voice quality parameter is not met by BSNL in Muktsar.

NOTE-- Airtel & Videocon are having an ICR agreement with TTSL in Punjab Circle and MTS & Uninor has no operation in these 3 cities

.As far as

HFCL(CDMA) is concerned they have closed so many sites and already informed earlier,so no drive test is done for HFCL.

Etisalat and Loop has closed its operation from Punjab Circle.

Independent Drive Test:--

SN	Parameter	Aircel (Fazilka)	Airtel (Sutla & Chak)	BSNL (Fazilka)	HFCL (Sutla & Chak)
1.1	Call Attempts	53	11	32	30
1.2	Blocked Call Rate (<=3%)	0.00%	0.00%	0.00%	6.66%
1.3	Dropped Call Rate (<=2%)	0.00%	0.00%	0.00%	0.00%
1.4	Percentage of connections with good voice quality (=>95%)				
	(i) 0-4 (w/o frequency hopping)				
	(ii) 0-5 (with frequency hopping)	98.01%	97%	95.10%	92%
1.5	Service Coverage				
	In door (>= -75dBm)	75.60%	46%	97.01%	11.10%
	In-vehicle (>= -85dBm)	99.14%	87%	98.34%	33.24%
	Outdoor- in city (>= -95dBm)	100%	98%	100.00%	95.50%
1.6	Call Setup Success Rate (>=95%)	100%	100%	100%	93.34%
1.7	Handover Success Rate	100%	100%	99.11%	100.00%

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

- Blocked Call Rate is not met by HFCL in Hoshiarpur (Sutla & Chak) only, rest all are satisfying the benchmark
- Good Voice quality & Call Setup Success Rate parameter are not met by HFCL.

CHAPTER-3: AUDIT-PMR VERIFICATION (OCT 2011—DEC 2011)

Cellular Mobile Service:--

PMR		Bench- mark	Audit	Aircel	Airtel	BSNL	Etisalat	Idea	Uninor	Loop	Rcom GSM	Tata GSM	Videocon	Vodafone	HFCL	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	0.08%	0.05%	0.40%	0.07%	0.04%	1.23%	0.18%	0.11%	0.02%	0.13%	0.01%	0.05%	0.00%	0.06%	0.01%
			Verified	0.08%	0.05%	0.40%	0.07%	0.04%	1.23%	0.18%	0.11%	0.02%	0.13%	0.01%	0.05%	0.00%	0.06%	0.01%
	Worst affected BTSs due to downtime	<=2%	Reported	0.00%	0.09%	1.95%	0.00%	0.00%	0.00%	0.04%	0.02%	0.00%	0.12%	0.05%	0.00%	0.00%	0.00%	0.00%
Verified			0.00%	0.09%	1.95%	0.00%	0.00%	0.00%	0.04%	0.02%	0.00%	0.12%	0.05%	0.00%	0.00%	0.00%	0.00%	0.00%
2	Connection Establishment (Accessibility)																	
	CSSR (Call Setup Success Rate)	>=95%	Reported	98.18%	99.13%	97.99%	99.57%	98.75%	99.94%	100.00%	99.42%	98.86%	98.50%	98.93%	98.61%	98.53%	99.13%	98.57%
			Verified	98.18%	99.13%	97.99%	99.57%	98.75%	99.94%	100.00%	99.42%	98.86%	98.50%	98.93%	98.61%	98.53%	99.13%	98.57%
	SDCCH/PAGING congestion	<=1%	Reported	0.06%	0.12%	0.72%	0.03%	0.25%	0.01%	0.08%	0.06%	0.05%	0.06%	0.11%	0.55%	0.00%	0.00%	0.00%
			Verified	0.06%	0.12%	0.72%	0.03%	0.25%	0.01%	0.08%	0.06%	0.05%	0.06%	0.11%	0.55%	0.00%	0.00%	0.00%
	TCH congestion	<=2%	Reported	0.01%	0.22%	1.21%	0.00%	0.78%	0.75%	0.00%	0.19%	0.15%	0.19%	0.35%	0.87%	0.00%	0.16%	0.03%
Verified			0.01%	0.22%	1.21%	0.00%	0.78%	0.75%	0.00%	0.19%	0.15%	0.19%	0.35%	0.87%	0.00%	0.16%	0.03%	
3	Connection maintenance (retainability)																	
	CDR	<=2%	Reported	0.63%	0.73%	1.99%	0.81%	1.19%	0.32%	0.62%	0.76%	0.68%	0.78%	0.78%	1.67%	0.34%	0.48%	0.61%
			Verified	0.63%	0.73%	1.99%	0.81%	1.19%	0.32%	0.62%	0.76%	0.68%	0.78%	0.78%	1.67%	0.34%	0.48%	0.61%
	Worst affected cells>3% TCH drop	<=3%	Reported	1.30%	1.33%	5.84%	1.85%	2.57%	0.53%	0.00%	0.35%	1.57%	0.66%	2.21%	0.22%	2.36%	0.13%	0.96%
			Verified	1.30%	1.33%	5.84%	1.85%	2.57%	0.53%	0.00%	0.35%	1.57%	0.66%	2.21%	0.22%	2.36%	0.13%	0.96%
	Good voice quality	>=95%	Reported	97.30%	98.78%	95.37%	98.65%	97.34%	99.00%	98.92%	98.98%	96.61%	98.10%	97.72%	97.72%	97.64%	98.66%	99.10%
Verified			97.30%	98.78%	95.37%	98.65%	97.34%	99.00%	98.92%	98.98%	96.61%	98.10%	97.72%	97.72%	97.64%	98.66%	99.10%	
4	POI congestion	<=0.5%	Reported	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Verified	0	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%	Reported	0.01%	0.00%	0.00%	0.00%	0.05%	0.00%	0.00%	0.10%	0.00%	0.00%	0.07%	0.00%	0.00%	0.10%	0.01%
			Verified	0.01%	0.00%	0.00%	0.00%	0.05%	0.00%	0.00%	0.10%	0.00%	0.00%	0.07%	0.00%	0.00%	0.10%	0.01%

PMR		Bench- mark	Audit	Aircel	Airtel	BSNL	Etisalat	Idea	Uninor	Loop	Rcom GSM	Tata GSM	Videocon	Vodafone	HFCL	MTS	Rcom CDMA	Tata CDMA
S/N	Name of Parameter			GSM Operators										CDMA Operators				
6	Metering /billing credibility-Pre paid	<= 0.1%	Reported	0.08%	0.08%	0.00%	0.02%	0.01%	0.00%	0.00%	0.04%	0.00%	0.07%	0.01%	0.00%	0.00%	0.03%	0.00%
			Verified	0.08%	0.08%	0.00%	0.02%	0.01%	0.00%	0.00%	0.04%	0.00%	0.07%	0.01%	0.00%	0.00%	0.03%	0.00%
7	Resolution of billing/ charging complaints	100% within 4 weeks	Reported	100%	100%	100%	100%	100.0%	0.0%	0.0%	100.0%	100.0%	100.0%	100.00%	100.00%	0%	100%	100%
			Verified	100%	100%	100%	100%	100.0%	0.0%	0.0%	100.0%	100.0%	100.0%	100.00%	100.00%	0%	100%	100%
	Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	Reported	100%	100%	100%	0%	100%	0%	0%	100%	100%	100%	100%	100%	0%	100%	100%
			Verified	100%	100%	100%	0%	100%	0%	0%	100%	100%	100%	100%	100%	0%	100%	100%
8	Response time to customers for assistance																	
	Accessibility of call centre/Customer Care	>=95%	Reported	100.00%	99.79%	100.00%	98.77%	99%	100%	100.00%	98.98%	99%	98.38%	100%	100%	0.00%	99.35%	99.00%
			Verified	100.00%	99.79%	100.00%	98.77%	99%	100%	100.00%	98.98%	99%	98.38%	100%	100%	0.00%	99.35%	99.00%
	% call answered by operators(voice to voice) within 60 sec.	>=90%	Reported	90.12%	97.27%	95.00%	99.24%	88.74%	100.00%	100.00%	79.18%	92.00%	94.07%	96.80%	96.00%	0.00%	90.39%	96.00%
Verified			90.12%	97.27%	95.00%	99.24%	88.74%	100.00%	100.00%	79.18%	92.00%	94.07%	96.80%	96.00%	0.00%	90.39%	96.00%	
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%	100%	0.00%	100.00%	0.00%	0.00%	100%	100%	0.00%	100%	100%	0.00%	100%	100.00%
Verified			100.00%	100.00%	100%	0.00%	100.00%	0.00%	0.00%	100%	100%	0.00%	100%	100%	0.00%	100%	100.00%	
10	Time taken for refunds of deposits after closures.	100% within 60 days	Reported	100%	100%	100%	0%	100%	0%	0%	100%	100%	0%	0%	100%	0%	100%	100%
			Verified	100%	100%	100%	0%	100%	0%	0%	100%	100%	0%	0%	100%	0%	100%	100%

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	Bench mark	Aircel	Airtel	BSNL	Idea	Uninor	Rcom GSM	TTSL GSM	Videocon	Vodafone	HFCL	MTS	Rcom CDMA	Tata CDMA
			GSM Operators										CDMA Operators		
(A)-1	Network Service Quality Parameter														
	BTS Accumulated Downtime	<=2%	0.00%	0%	0.09%	0%	0%	0.09%	0.04%	0.06%	0.04%	0.00%	0%	0.13%	0.02%
	Worst affected BTS due to downtime	<=2%	0%	0.00%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		1.75	208	180	99	9	111	44	77	109	0	4	93	10
	No. of BTSs having accumulated downtime of >24 hours in a month		0	0	1	0	0	0	0	0	0	0	0	0	0
2	Connection Establishment (Accessibility)														
	a) CSSR	>=95%	99.88%	99.72%	98.37%	99.06%	100%	99.99%	99.92%	99.81%	99.90%	98.51%	100%	100%	99.86%
	b) SDCCH/PAGING congestion	<=1%	0.08%	0.08%	0.45%	0.15%	0.32%	0.00%	0.02%	0.03%	0.03%	0.77%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.04%	0.20%	1.18%	0.79%	0.00%	0.01%	0.06%	0.16%	0.07%	0.72%	0.00%	0.00%	0.14%
3	Connection maintenance														
	a) CDR	<=2%	0.54%	0.62%	1.72%	0.78%	0.00%	0.34%	0.46%	0.79%	0.60%	1.47%	0.00%	0.00%	0.73%
	b) Cells having > 3% TCH drop	<=3%	1.04%	1.05%	2.95%	0.99%	1.59%	0.00%	3.34%	0.91%	2.37%	0.00%	0.00%	0.00%	5.14%
	c) Good voice quality	>=95%	97.88%	98.96%	95.54%	98.19%	98.57%	99.40%	97.47%	97.82%	97.87%	98.09%	99.30%	99.70%	NA
	d) No. of cells > 3% TCH drop		19	138	250	114	2	0	169	48	315	0	0	0	104
	e) Total no. of cells in the		1,821	13,116	8,478	11,492	126	5,355	5,056	5,270	13,313	30	39	2,910	2,025

S/N	Name of Parameter	Bench mark	Aircel	Airtel	BSNL	Idea	Uninor	Rcom GSM	TTSL GSM	Videocon	Vodafone	HFCL	MTS	Rcom CDMA	Tata CDMA
			GSM Operators										CDMA Operators		
	network														
4	No of POI having > 0.5% congestion	>=0.5%	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
	b) Total No. of circuits on POI		16,889	168,398	62,456	102,954	931	11,531	13,146	10,485	136,363	115	1088	17,802	19,555
	c) Avg No. of call attempts on POI		289,640	2,763,840	847,753	1,721,743	29	206,735	235,879	15,416	2,064,162	6	26	75,686	6,583
	d) Avg traffic served on POI (Erlang)		5,875	100,705	33,507	27,723	2	4,840	7,767	477	75,545	14	1	3,998	256
	e) Total number of working POI Service Area wise		33	71	49	30	29	40	26	30	47	20	25	40	180
	f) Equipped Capacity of Network in respect of Traffic in erlang		50,000	285,908	260,005	167,217	832	72,000	104,099	67,750	144,023	16,800	4,200	83,000	187,001
	g) Total traffic handled in TCBH in erlang		5275	194249	95,947	144780	2	61632	29445	30113	122261	71	2	33288	49047
(B)	Customer Service Quality Parameters														
5	Response time to customers for assistance														
	a) Accessibility of call centre	>=95%	100%	100.00%	100%	100%	100%	99%	100%	96%	100%	100%	99.92%	99%	100%
	b) % of call answered by operators(voice to voice) within 60 sec	>=90%	80.43%	96.35%	90.40%	93.95%	100%	61.48%	84.31%	97%	96.94%	96.72%	98.29%	91.25%	97.45%
	c) No. of call attempts to call centre / customer care nos. during TCBH (Avg)		38,730	204,442	7,633	156,582	28	61,261	51,405	2,295	110,576	366	10,310	9,575	10,977
	d) No. of calls connected and answered successfully to call centre / customer care nos. during TCBH (Avg)		31,150	196,975	6,900	147,105	28	37,665	43,342	2,216	107,188	354	10,134	8,737	10,697

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 Circle Service Area are as given below:-

- **Worst affected BTSs due to downtime (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0% and 0.13%.
- **Worst affected BTSs due to downtime (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0% and 0.04%.
- **Call Setup Success Rate (CSSR) (benchmark $\geq 95\%$):** All operators are meeting the benchmark with values lying between 98.51% and 100%.
- **SDCCH/PAGING Channel congestion (benchmark $\leq 1\%$):** All operators, are meeting the benchmark with values lying between 0% and 0.77%
Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.
- **TCH congestion (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0% and 1.18%.
- **Call Drop Rate (CDR) (benchmark $\leq 2\%$):** Rest of the operators are meeting the benchmark with values lying between 0.08% and 1.72%.
- **Cell exceeding 3% TCH drop (benchmark $\leq 3\%$):** TTSL (GSM) & TTSL (CDMA) are not satisfying the benchmark, rest of the operators are meeting the benchmark.
- **Connections with good voice quality (benchmark $\geq 95\%$):** All the operators are meeting the benchmark TTSL(CDMA) has not provided the data, becoz the parameter is not generating in the system .
- **No of POI > 0.5% Congestion (benchmark $\geq 0.5\%$):** None of the operators are having POIs more than 0.5% congestion. There was congestion found on the POIs in general, but was under the benchmark of 0.5%. Cases were found where individual POIs were showing high utilization/usage and some were 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 the operators are meeting the benchmark with values lying between 96% to 100%.
- **%age of call answered by operator (Voice to voice) (benchmark $>90\%$):** Rest of the operators are meeting the benchmarks Except Aircel , RCOM (GSM) & TTSL (GSM) .

(2) Month Data Assessment & Summarized Findings

S/ N	Name of Parameter	Bench mark	Aircel	Airtel	BSNL	Idea	Uninor	Rcom GSM	TTSL GSM	Vi-con	V-fone	HFCL	MTS	Rcom CDMA	Tata CDMA	
			GSM Operators										CDMA Operators			
(A)	Network Service Quality Parameter															
1	Network Availability															
	a) BTS Accumulated Downtime	<=2%	0.00%	0.05%	0.01%	0.03%	1.02%	0.09%	0.05%	0.10%	0.04%	0.19%	0.34%	0.09%	0.02%	
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.02%	0.60%	0.00%	0.00%	0.00%	0.24%	0.12%	0.00%	0.00%	0.00%	0.00%	0.00%	
	c) Total no. of BTSs in the licensed service area		607	4,387	2,842	3,834	42	1,785	1,685	1,730	4,324	10	13	970	652	
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		6	1,612	205	963	319	1,135	630	1,253	1,340	14	33	643	116	
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	1	17	0	0	0	0	4	2	0	0	0	0	
2	Connection Establishment (Accessibility)															
	a) CSSR (Call Setup Success Rate)	>=95%	99.91%	99.80%	97.92%	98.94%	99.18%	99.98%	99.91%	99.77%	99.82%	98.26 %	100.00 %	100.00 %	99.81%	
	b) SDCCH/PAGING congestion	<=1%	0.02%	0.05%	0.96%	0.21%	0.35%	0.00%	0.01%	0.08%	0.08%	0.79%	0.00%	0.00%	0.00%	

S/ N	Name of Parameter	Bench mark	Aircel	Airtel	BSNL	Idea	Uninor	Rcom GSM	TTSL GSM	Vi-con	V-fone	HFCL	MTS	Rcom CDMA	Tata CDMA
			GSM Operators										CDMA Operators		
	c) TCH congestion	<=2%	0.07%	0.15%	1.12%	0.85%	0.47%	0.02%	0.08%	0.15%	0.10%	0.95%	0.00%	0.00%	0.19%
3	Connection maintenance (retainability)														
	a) CDR	<=2%	0.55%	0.59%	1.94%	0.84%	0.47%	0.37%	0.47%	0.80%	0.63%	1.45%	0.20%	0.00%	0.76%
	b) Worst affected cells>3% TCH drop	<=3%	0.99%	1.11%	7.54%	1.00%	0.00%	0.00%	3.48%	0.95%	2.82%	0.00%	2.56%	0.00%	6.12%
	c) Good voice quality	>=95%	97.70%	99.02%	95.50%	98.16%	98.16%	99.38%	97.36%	97.81%	97.83%	97.78%	99.31%	99.71%	NA
	d) Total No. of cells exceeding 3% TCH drop (call drop)		18	145	639	115	0	0	176	50	375	0	1	0	124
	e) Total no. of cells in the network		1,821	13,116	8,478	11,492	126	5,355	5,056	5,270	13,313	30	39	2,910	2,025
4	No of POI having > 0.5% congestion	>=0.5%	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
	b) Total No. of call attempts on POI (Avg.)		275,686	2,804,253	864,058	1,706,600	30	215,817	237,542	5,045	1,998,228	8	29	105,916	72,001
	c) Total traffic served on POI (Erlang) (Avg.)		5,688	84,706	33,605	27,521	2	4,593	7,927	156	74,084	13	1	5,303	2,838
	d) Total No. of circuits on POI		16,889	168,398	62,456	102,954	931	11,531	13,146	10,485	136,363	115	1088	17,802	19,555

S/ N	Name of Parameter	Bench mark	Aircel	Airtel	BSNL	Idea	Uninor	Rcom GSM	TTSL GSM	Vi-con	V-fone	HFCL	MTS	Rcom CDMA	Tata CDMA
			GSM Operators										CDMA Operators		
	e) Total number of working POI Service Area wise		33	71	49	30	29	40	26	30	47	20	25	40	180
	f) Capacity of POI		15,994	164,606	43,719	99,751	772	10,675	12,488	9,807	133,645	96	776	16,016	38,939
5	Network Data														
	a) Equipped Capacity of Network Erlang		50,000	285,908	260,005	167,217	832	72,000	104,099	67,750	144,023	16,800	4200	83,000	187,001
	b) Total traffic in TCBH in erlang (Avg.)		5,275	194,249	95,947	144,780	2	61,632	29,445	30,113	122,261	71	2.00	33,288	49,047
	c) Total no. of customers served (as per VLR) on last day of the month		557,031	6,350,166	2,377,297	5,053,132	182	2,025,186	1,057,327	666,431	4,075,020	384	260	497,413	443,562
(B)	Customer Service Quality Parameters														
5	Metering/billing credibility-Post paid	<= 0.1%	0.00%	0.00%	0.02%	0.06%	NA!	0.10%	0.31%	NA!	0.07%	0.00%	NA!	0.10%	0.19%
	a) No. of bills issued during the period		19,001	58,326	33,695	475,337	NA	21,148	33,573	NA	306,404	8,420	NA	81,171	103,636

S/ N	Name of Parameter	Bench mark	Aircel	Airtel	BSNL	Idea	Uninor	Rcom GSM	TTSL GSM	Vi-con	V-fone	HFCL	MTS	Rcom CDMA	Tata CDMA
			GSM Operators										CDMA Operators		
	b) No. of bills disputed including billing complaints during the period		0	2	8	264	NA	21	103	NA	205	0	NA	81	196
6	Metering /billing credibility-Pre paid	$\leq 0.1\%$	0.01%	0.00%	0.01%	0.00%	0.00%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%	0.03%	0.02%
	a) No. of charging / credit / validity complaints during the quarter		79	73	344	160	0	1,271	377	124	633	0	0	276	165
	b) Total no. of pre-paid customers at the end of the quarter		974,582	2,265,062	4,568,048	5,055,331	717	3,929,759	1,916,437	1,400,184	4,227,719	8,055	987	912,048	707,385
7	Resolution of billing/charging complaints	<i>100% within 4 weeks</i>	100%	100%	100%	100%	NA	100%	100%	100%	100%	NA	NA	100%	100%
	a) No. of billing/(post paid) and charging, credit/validity (pre paid) complaints resolved within 4 weeks during the quarter		100%	100%	100%	100%	NA	100%	100%	100%	100%	NA	NA	100%	100%
	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		79	7,982	352	424	0	1,292	480	124	838	NA	NA	357	361

S/ N	Name of Parameter	Bench mark	Aircel	Airtel	BSNL	Idea	Uninor	Rcom GSM	TTSL GSM	Vi-con	V-fone	HFCL	MTS	Rcom CDMA	Tata CDMA
			GSM Operators										CDMA Operators		
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		72	338	352	424	0	792	0	124	287	NA	NA	164	0
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		7	7,644	0	0	0	500	480	0	551	NA	NA	193	361
	e) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	≤ 1 week	100%	100%	100%	100%	NA	100%	100%	100%	100%	NA	NA	100%	100%
8	Response time to customers for assistance														
	a) Accessibility of call centre/Customer Care	$\geq 95\%$	100%	100.00%	100%	100%	100%	99%	100%	99.00%	100%	100%	99.61%	99%	98%
	b) % call answered by operators(voice to voice) within 60 sec.	$\geq 90\%$	40.55%	86.71%	90%	95.01%	100%	77.09%	59.63%	97.30%	95.52%	95.79%	96.42%	91.27%	92.31%
	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		494,672	204,442	7,633	156,582	28	61,261	51,405	2,295	1,207,841	4,036	13,870	9,575	10,977

S/ N	Name of Parameter	Bench mark	Aircel	Airtel	BSNL	Idea	Uninor	Rcom GSM	TTSL GSM	Vi-con	V-fone	HFCL	MTS	Rcom CDMA	Tata CDMA
			GSM Operators										CDMA Operators		
	d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		200,565	2,022,015	60,044	1,465,897	886	467,416	361,664	21,565	1,153,750	3,866	13,374	80,924	116,488
9	Termination/closure of service	<i><=7days</i>	100%	100%	100%	100%	NA	100%	100%	NA	100%	100%	100%	100%	100%
	a) Total No. of requests for Termination / Closure of service received during the quarter		389	4,191	170	2,498	NA	212	1,133	NA	1,711	119	109	351	2,521
	b) No. of requests for Termination / Closure of service complied within 7 days during the quarter		389	4,191	170	2,498	NA	212	1,133	NA	1,711	119	109	351	2,521
10	Time taken for refunds of deposits after closures.	<i>100% within 60 days</i>	100%	100%	100%	100%	NA	100%	100%	NA	100%	100%	100%	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 Circle Service Area are as given below:-

- **BTS accumulated downtime (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0% and 1.02%.
- **Worst affected BTSs due to downtime (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0% and 0.60%.
- **Call setup success rate (benchmark $\geq 95\%$):** All operators are meeting the benchmark with values lying between 97.92% and 100%.
- **SDCCH/PAGING Channel congestion (benchmark $\leq 1\%$):** All operators are meeting the benchmark with values lying between 0% and 0.96%.
Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.
- **TCH congestion (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0% and 1.12%.
- **Call drop rate (benchmark $\leq 2\%$):** Rest of the operators are meeting the benchmark with values lying between 0% and 1.94%.
- **Cell exceeding 3% TCH drop (benchmark $\leq 3\%$):** All operators are meeting the benchmark BSNL (5.75%), TTSL(GSM) & TTSL (CDMA) .
- **Connections with good voice quality (benchmark $\geq 95\%$):** All the GSM operators are meeting the benchmark. TTSL (CDMA) has declared that the parameter is not system generated.

- **No of POI > 0.5% Congestion (benchmark $\geq 0.5\%$):** None of the operators are having POIs more than 0.5% congestion. There was congestion found on the POIs in general, but was under the benchmark of 0.5%. Cases were found where individual POIs were showing high utilization/usage and some were 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.
- **%age of call answered by operator (Voice to voice) (benchmark $>90\%$):** Except Aircel, Airtel , RCOM (GSM) & TTSL(GSM), Rest of the operators are meeting the benchmark.
- **Metering and billing credibility-Post paid (benchmark $\leq 0.1\%$):** Rest of the operators are meeting the benchmark. except TTSL(GSM & CDMA) deviating with a value of 0.31%. & 0.19% respectively.
- **Metering and billing credibility-Pre paid (benchmark $\leq 0.1\%$):** Rest of the operators are meeting the benchmark.
- **Resolution of billing/ charging complaints (benchmark 100% within 4 weeks):** All operators are meeting the benchmark in Punjab circle .
- **Termination/Closure of service (Benchmark ≤ 7 days):** All operators have satisfied the benchmark.
- **Time taken for refunds of deposits after closures (benchmark 100% within ≤ 60 days):** All operators have satisfied the benchmark

(3) Sample Coverage

Switches/BSC/BTS details of operators:

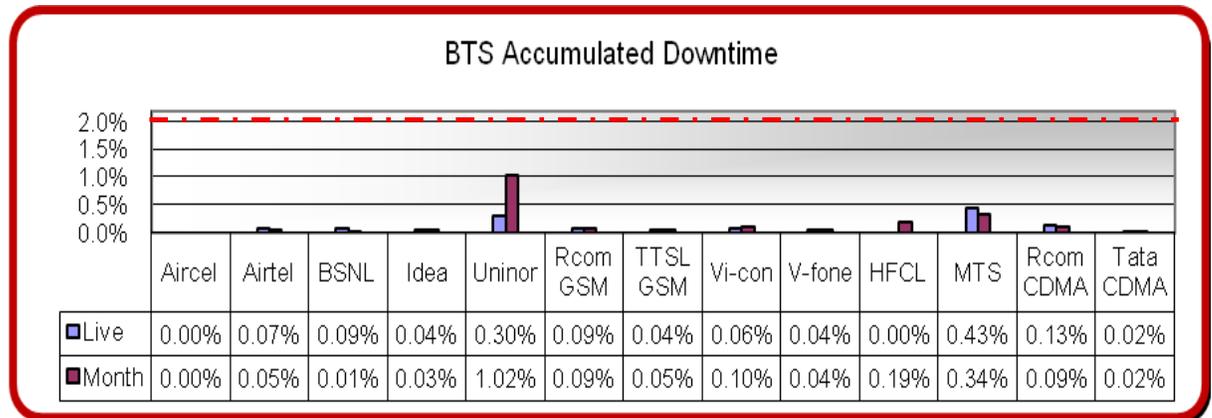
Sl.	Name of Service Provider	No. of MSC	No. of BSC	No. of BTS
GSM Operators				
1	Aircel	1	6	607
2	Airtel	24	50	4387
3	BSNL	13	45	2842
4	Idea	7	73	3834
5	Reliance Communication	3	8	1785
6	Tata Teleservices Ltd.	2	12	1675
7	Videocon	1	9	1730
8.	Uninor	1	2	42
9.	Vodafone	7	50	4327
CDMA Operators				
10.	HFCL	1	2	10
11.	MTS	1	1	13
12.	Reliance Communication	5	5	970
13.	Tata Teleservices Ltd.	8	7	652

(4) Performance (Graphical Representation)

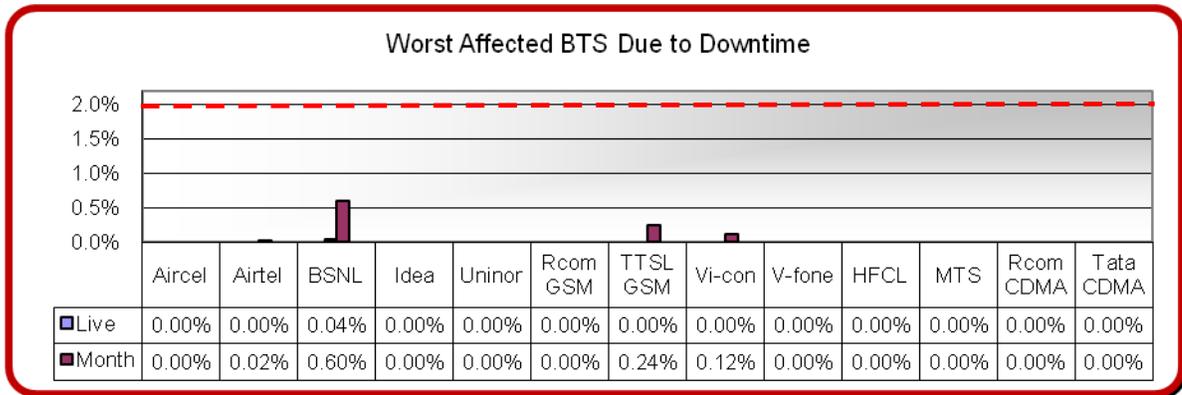
Comparison between Live measurements and One month data Audit – Cellular Mobile Telephone Services

A) NETWORK PERFORMANCE

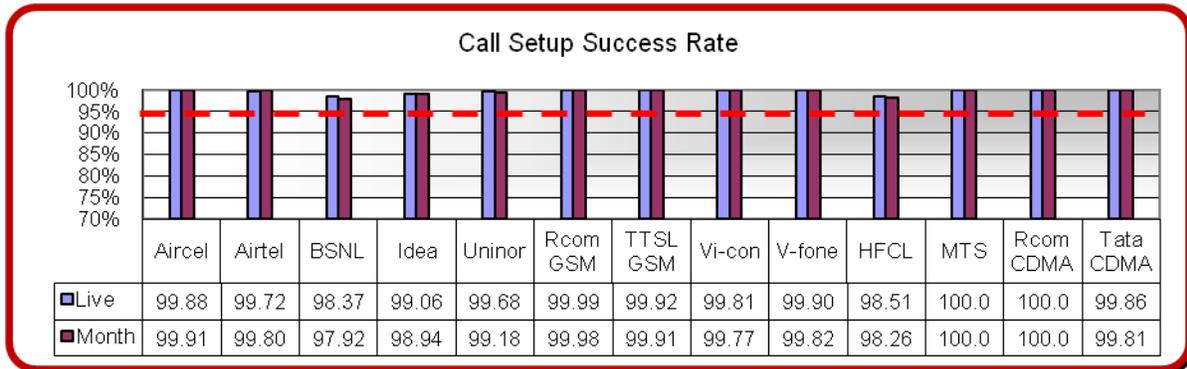
BTS Accumulated Downtime: All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data taken in the month of audit.



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

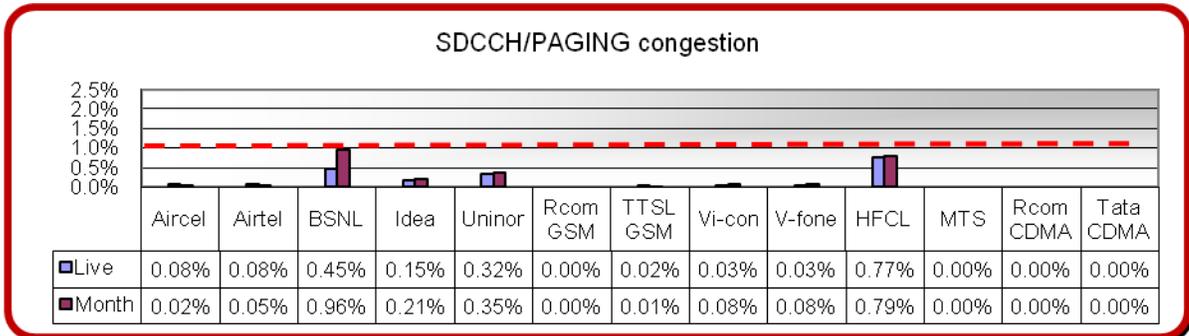


Call Setup Success Rate (CSSR): All operators are meeting the TRAI benchmarks ($\geq 95\%$) for both one month data and 3 days live data taken in the month of audit

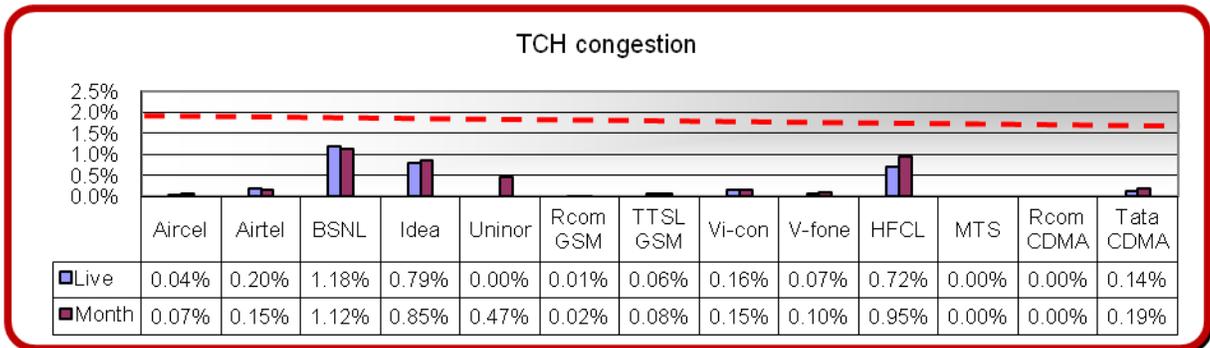


Blocked call rate:

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

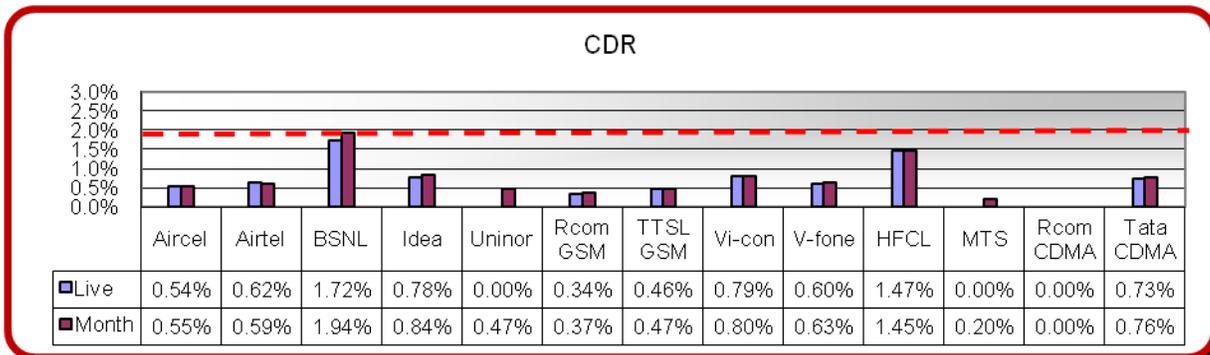


TCH congestion (%): All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data.

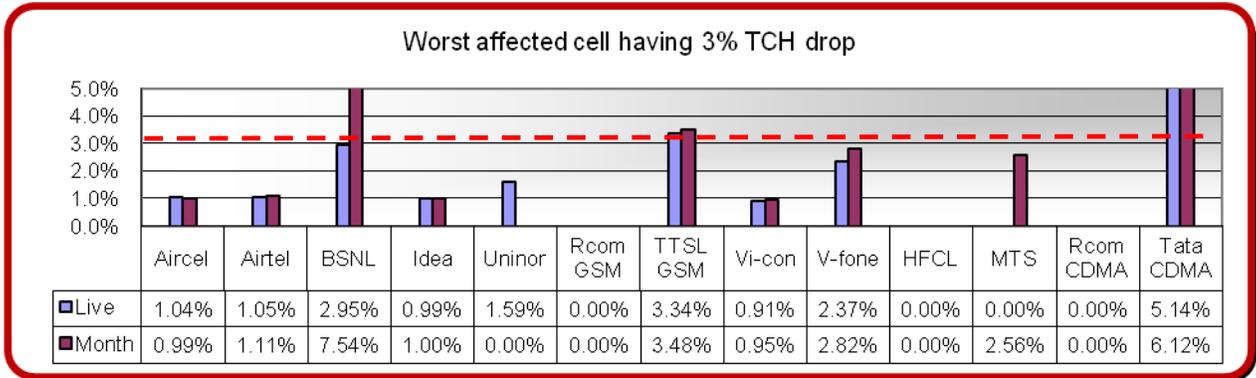


Connection Maintainability (Retainability):

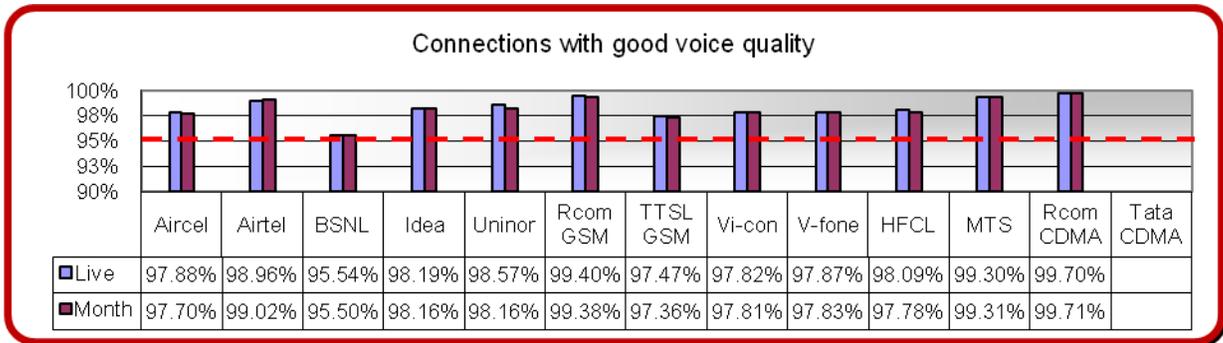
Call Drop Rate (CDR) (%): Rest of the operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data taken in the month of audit.



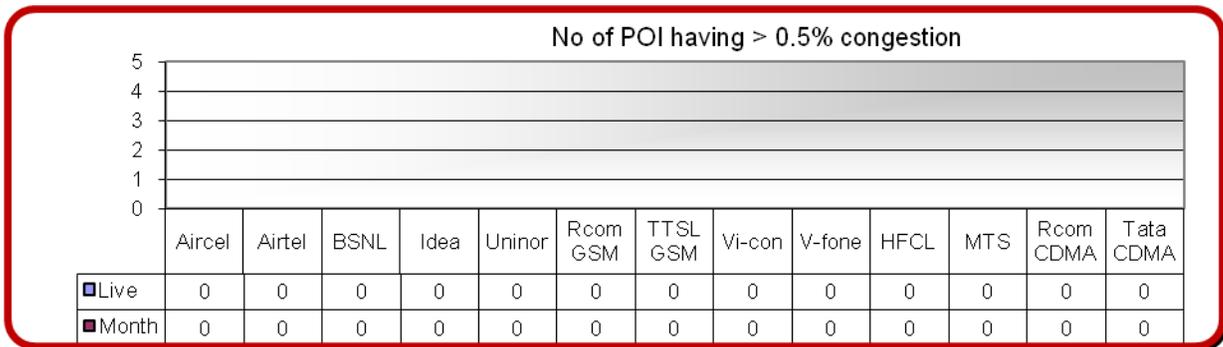
Worst affected Cell exceeding 3% TCH Drop: In case of both live and month data, TTSL (GSM) & TTSL (CDMA) and for Month data only BSNL are found not meeting the benchmark of $\leq 3\%$. Rest of the operators is meeting the benchmark for both cases.



Percentage of connections with good voice quality (benchmark $\geq 95\%$): All the operators are meeting the TRAI benchmarks ($\geq 95\%$) for both one month data and 3 days live data. TTSL(CDMA) has not provided the data as data is not generated from the system.



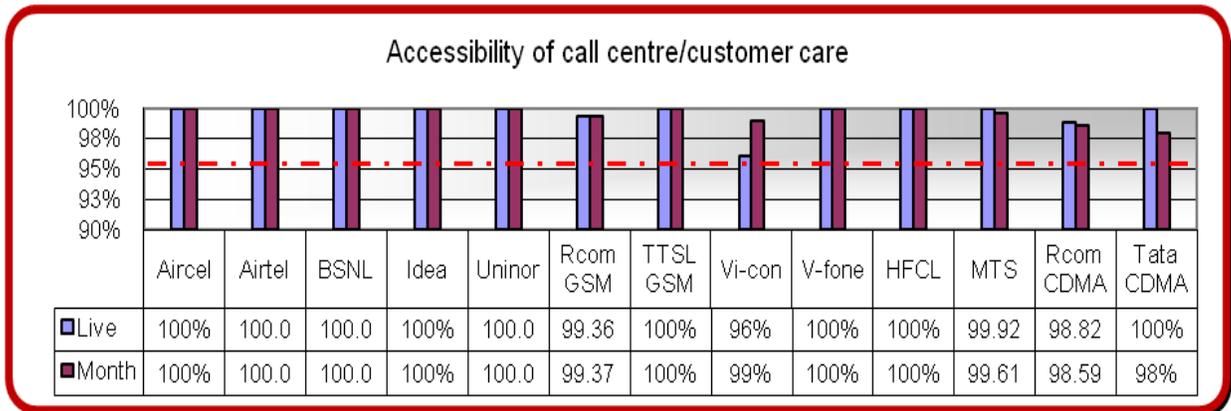
No of POI having > 0.5% Congestion: None of the operators are having POIs above 0.5% congestion ($\geq 0.5\%$) for both one month data and 3 days live data.



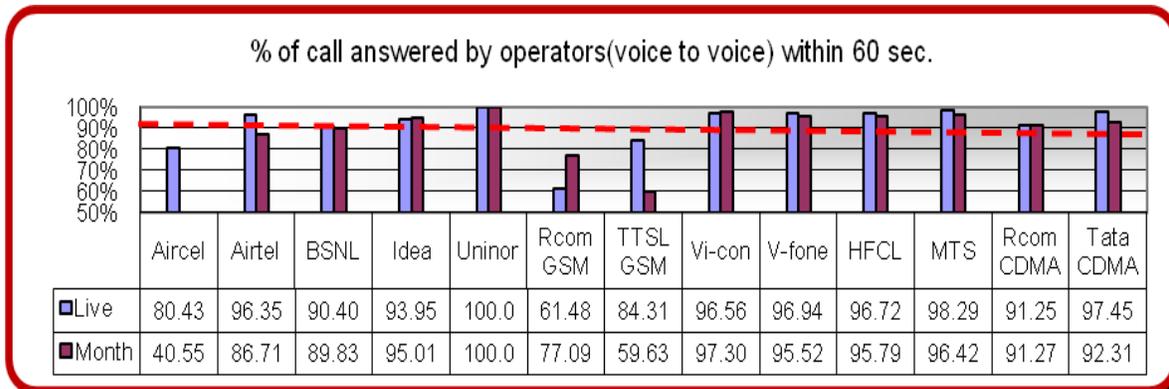
CUSTOMER SERVICE QUALITY PARAMETERS

Response time to the customer for assistance:

Percentage of call answered (Electronically): All operators are meeting the TRAI benchmarks ($\geq 95\%$) for both one month data and 3 days live data.



Percentage of call answered by operators (Voice to voice) within 60 sec: Except for Aircel & TTSL (GSM) in both Month & Live cases and Airtel & BSNL are only in Month case, not meeting the benchmarks. Rest of the operators are meeting the TRAI benchmarks ($\geq 90\%$) for both one month data and 3 days live data taken in the month of audit.



(5) Critical Analysis

From the month data assessment, it is found that most of the operators are meeting the network parameters, except BSNL, TTSL(GSM) & TTSL (CDMA) are found not meeting the benchmark for “Worst affected cells>3% TCH drop”.

Under Metering & Billing Section for Post-Paid services, all operators are meeting the benchmark, except TTSL (GSM) & TTSL (CDMA).

Performance related to customer care data for voice to voice call is found to be satisfactory for most of the operators, except Aircel Aircel, RCOM(GSM) & TTSL(GSM)

TTSL (CDMA) has not provided the data due to not generating in system.

(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 based on Live calling for Billing Complaints

Calling Operator	Aircel	Airtel	Idea	Rcom(GSM)	TTSL GSM	Videocon	Vodafone	Rcom(CDMA)	TTSL CDMA
Total No. of calls attempted	100	100	100	100	100	100	100	100	100
Total No. of calls answered	40	60	80	75	40	35	45	40	53
Cases resolved with 4 weeks	40	60	80	75	40	35	45	40	53
%age of cases resolved	100%	100%	100%	100%	100%	100%	100%	100%	100%

(3) Live calling to call centre (Chandigarh)

Calling Operator	Aircel	Airtel	Idea	BSNL	Uninor	Tata GSM	Rcom GSM	Videocon	Vodafone	MTS	HFCL	Rcom CDMA	Tata CDMA
Call Centre No.	121/198	121/198	198/123 45	1500	121/198	121	*222/*33 3	121	111/198	155	121	*222/*333	121
Total No. of Calls Attempted	100	100	100	100	100	100	100	100	100	100	100	100	100
Total No. of calls connected to IVR	100	100	100	100	100	100	100	100	100	100	100	100	100
Calls got connected to agent within 60 Sec	85	97	94	90	87	95	96	90	97	96	92	95	95
%age of calls got answered	85%	97%	94%	90%	87%	95%	96%	90%	97%	96%	92%	95%	95%

(4) Level 1 live calling (Kapurthala)

Emergency No.	No. of calls made	Airtel	Aircel	Idea	Tata (GSM)	V-fone	Tata (CDMA)	BSNL	Room (GSM)	Room (CDMA)	HFCL	Vi-con
100	2	2	2	2	2	2	2	2	2	2	2	2
101	2	2	2	2	2	2	2	2	2	2	2	2
102/108	2	2	2	2	2	2	2	2	2	2	2	2
139	2	2	2	2	2	2	2	2	2	2	2	2

Level 1 live calling (Muktsar)

Emergency No.	No. of calls made	Airtel	Aircel	Idea	Tata (GSM)	V-fone	Tata (CDMA)	BSNL	Room (GSM)	Room (CDMA)	HFCL	Vi-con
100	2	2	2	2	2	2	2	2	2	2	2	2
101	2	2	2	2	2	2	2	2	2	2	2	2
102/108	2	2	2	2	2	2	2	2	2	2	2	2
139	2	2	2	2	2	2	2	2	2	2	2	2

Level 1 live calling (Barnala)

Emergency No.	No. of calls made	Airtel	Aircel	Idea	Tata (GSM)	V-fone	Tata (CDMA)	BSNL	Room (GSM)	Room (CDMA)	HFCL	Vi-con
100	2	2	2	2	2	2	2	2	2	2	2	2
101	2	2	2	2	2	2	2	2	2	2	2	2
102/108	2	2	2	2	2	2	2	2	2	2	2	2
139	2	2	2	2	2	2	2	2	2	2	2	2

(5) Critical Analysis

Random numbers were selected (for whom refund were given) from the operators' database of billing/metering complaints and calls were made to the customers to get their feedback for complaint redressal. It was found that the operators had made refunds in 100% cases as claimed by their records. As far as call to call centre is concerned few operators like Airtel (Prepaid), Uninor (Prepaid) and Rcom (GSM)-Prepaid are having congestion in their network, because calls were not connected properly and after connecting it got disconnected within few seconds. All the Emergency no's were got connected from every operator..

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 1900 to 2000 hrs and between 2000 to 2100 hrs so that TCBH hours for all the operators were covered.

(2) Performance based on live Calling (Chandigarh)

Calling perator	Aircel	Airtel	Idea	Uninor	BSNL	TTSL(G SM)	RTL (GSM)	MTS	Videoco n	V- Fone	HFCL	TATA CDMA	RCom CDMA
Aircel	-	96%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Airtel	100%	-	100%	98%	100%	100%	99%	100%	100%	100%	98%	98%	100%
Idea	100%	100%	-	100%	95%	100%	100%	98%	97%	99%	100%	100%	98%
Uninor	100%	100%	100%	-	100%	96%	96%	96%	100%	100%	92%	97%	100%
BSNL	100%	100%	100%	99%	-	97%	100%	95%	100%	100%	94%	100%	100%
RTL GSM	100%	100%	100%	100%	100%	100%	-	93%	96%	95%	97%	100%	96%
TTSL GSM	100%	100%	100%	98%	100%	-	100%	97%	100%	100%	99%	95%	100%
MTS								-	98%	97%	100%	96%	94%
Videocon	100%	98%	100%	100%	97%	100%	98%	94%	-	100%	98%	100%	100%
HFCL	100%	100%	100%	90%	85%	90%	95%	93%	98%	96%	-	95%	95%
V- Fone	100%	100%	96%	100%	100%	99%	100%	100%	100%	-	97%	100%	100%
TATA CDMA	97%	100%	100%	97%	100%	100%	97%	100%	100%	98%	99%	-	97%
RCom CDMA	100%	100%	100%	100%	100%	100%	100%	98%	98%	96%	94%	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 few congestion on the Operator network.

(D) Drive Test of the Mobile Network of Service Providers:

SN	Parameter	City Name	Airtel	BSNL	Idea	Videocon	Vodafone	Rcom (GSM)	TTSL (GSM)	Rcom (CDMA)	TTSL (CDMA)
			GSM Operators						CDMA Operators		
1.1	Call Attempts	Kapurthala	53	79	53	38	53	66	43	70	76
		Muktsar	73	50	82	89	67	101	80	101	92
		Barnala	66	49	72	62	66	91	55	91	66
1.2	Blocked Call Rate (<=3%)	Kapurthala	0.00%	1.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		Muktsar	0.00%	4.08%	0.00%	0.00%	0.00%	0.99%	0.00%	0.00%	0.00%
		Barnala	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1.3	Dropped Call Rate (<=2%)	Kapurthala	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		Muktsar	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		Barnala	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1.4	Percentage of connections with good voice quality (>=95%) (i) 0-4 (w/o frequency hopping)	Kapurthala								99.27%	99.75%
		Muktsar								99.70%	99.66%
		Barnala								99.82%	99.54%
	(ii) 0-5 (with frequency hopping)	Kapurthala	98.00%	99.00%	96.5%	95.70%	98.80%	98.49%	98.10%		
		Muktsar	96.00%	92.50%	96.64%	96.60%	98.20%	96.83%	96.70%		
	Barnala	97.00%	98.00%	95.30%	95.70%	98.80%	99.33%	98.36%			
1.5	Service Coverage										
	In door (>= -75dBm)	Kapurthala	84.00%	98.00%	97.00%	65.72%	88.47%	33%	73.77%	74%	48.40%
		Muktsar	62.00%	92.99%	79.53%	67.67%	97.00%	65%	84.68%	80%	42.45%
		Barnala	78.00%	80.40%	80.50%	61.84%	77.20%	84%	89.15%	85%	34.74%
	In-vehicle (>= -85dBm)	Kapurthala	98.00%	100.00%	99.00%	95.20%	99.62%	79%	95.85%	94%	94.19%
		Muktsar	89.00%	97.00%	98.89%	96.41%	99.90%	90%	99.06%	99%	86.04%
		Barnala	99.00%	98.98%	98.19%	93.90%	97.90%	99%	99.73%	100%	83.08%
Out door- in city (>= -95dBm)	Kapurthala	100%	100%	100%	100.00%	100.00%	98%	100%	100%	99.99%	
	Muktsar	99%	99%	100%	100.00%	100.00%	98%	100.00%	100%	99.97%	
	Barnala	100%	100%	100%	100.00%	100.00%	100%	100.00%	100%	99.89%	
1.6	Call Setup Success Rate (>=95%)	Kapurthala	100.00%	98.99%	100%	100.00%	100.00%	100.00%	100%	100%	100%
		Muktsar	100.00%	95.92%	100%	100.00%	100.00%	99%	100%	100%	100%
		Barnala	100%	100%	100%	100.00%	100%	100.00%	100%	100.00%	100%
1.7	Handover Success Rate (HOSR)	Kapurthala	100%	100%	100.00%	100.00%	100.00%	100.00%	100%	100%	100%
		Muktsar	99.80%	100%	100.00%	99.17%	100.00%	99.11%	100%	100%	100.00%
		Barnala	98.60%	100%	98.18%	100%	100%	100%	100%	100%	100%

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

- Blocked Call Rate is not met by BSNL in Muktsar only, rest all are satisfying the benchmark
- Good Voice quality parameter is not met by BSNL in Muktsar.

NOTE-- Airtel & Videocon are having an ICR agreement with TTSL in Punjab Circle and MTS & Uninor has no operation in these 3 cities. As far as HFCL (CDMA) is concerned they Have closed so many sites and already informed earlier, so no drive test is done for HFCL. Etisalat and Loop has closed its operation from Punjab Circle.

(1) Sample Coverage

The Operator Assisted Drive Test was conducted at Punjab Circle 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

KAPURTHALA

HIGH DENSE Sadar Bazar, bus Stand, Rly Station
MEDIUM DENSE: Moti Bagh, Bypass colony, Ramnik Hotel road.
LOW DENSE: Gurunanak Nagar, FCI Kapurthala highway by pass Rd...

MUKTSAR

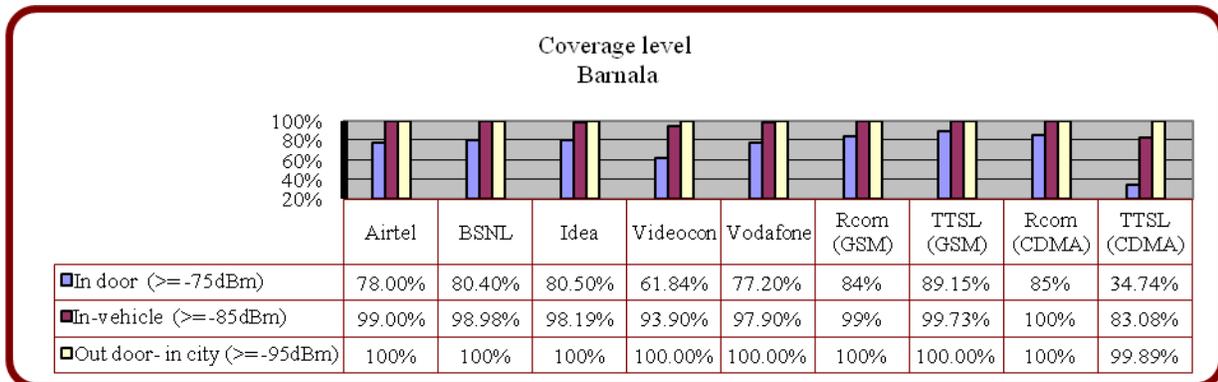
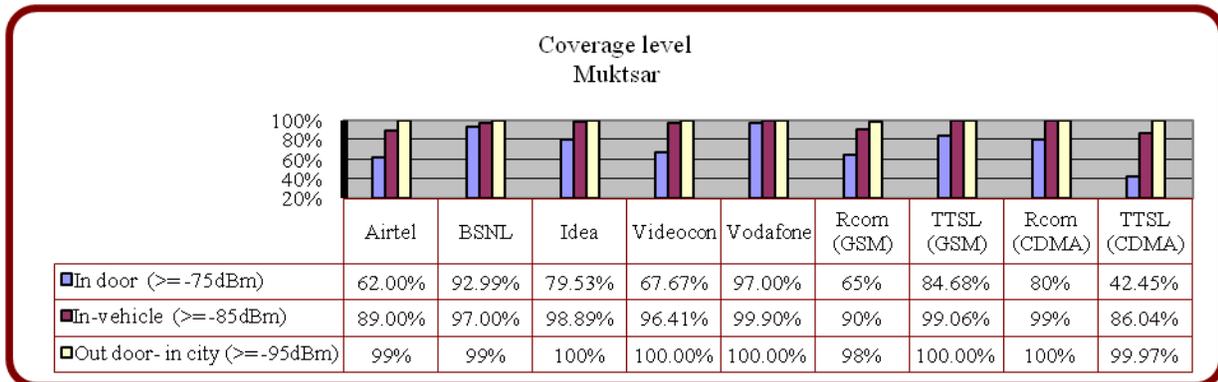
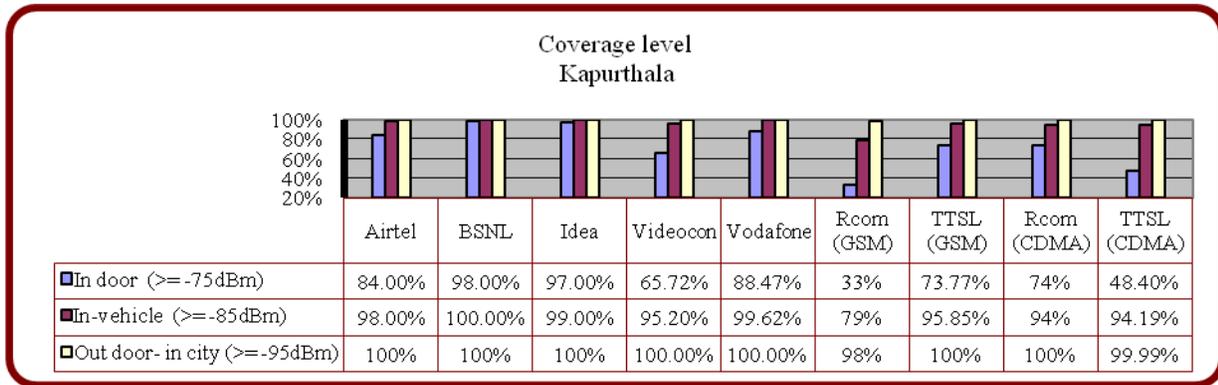
HIGH DENSE: Gandhi Chowk, Kotka pura road, Masti Road.
MEDIUM DENSE: Grain Market, Abohar road , Jalalabad bypass..
LOW DENSE: Canal bypass, Malout road, Bhatinda highway road..

BARNALA

HIGH DENSE: KC road, BSNL Exchange, Barnala Market.
MEDIUM DENSE Rly Stn, 16 Acre colony, court road, Shekha road. .
LOW DENSE: Grain market, Raikot Road, Handiya Road.

(2) Graphical Representation

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



(3) Critical Analysis

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

- Blocked Call Rate is not met by BSNL in Muktsar only, rest all are satisfying the benchmark.
- Good Voice quality parameter is not met by BSNL in Muktsar.
- MTS & Uninor have no service in Kapurthala, Muktsar , Barnala..

Operators are found satisfying the TRAI benchmark for almost all the parameters such as Blocked Call Rate, Dropped Call rate, voice Quality & Call setup Success Rate of all the Operators in Punjab Circle. Exception is found for BSNL in Muktsar for the Parameter Blocked call & Voice Quality respectively.

During Drive Test of BSNL in Muktsar, some RF coverage issue was found in some areas like Gandhi chowk , Kotkapura etc .Due to this reason Voice Quality & Blocked Call Rate effected over there.

NOTE:--

- 1) Aircel & Videocon are having an ICR agreement with TTSL in Punjab Circle
- 2) HFCL(CDMA) has closed so many sites in Punjab and already Informed to DOT, so no drive test is done for HFCL.
- 3) Etisalat and Loop has closed its operation in Punjab Circle.

(E) Independent Drive Test :-

1.) Sample Coverage

The Operator Assisted Drive Test was conducted at Punjab Circle for all the operators. Route covered was about around 40- 60Km depending on city areas within the speed limit of 25 Km/hr.

DRIVE TEST LOCATIONS

HOSHAIARPUR (SUTLA & CHAK) - AIRTEL & HFCL

HIGH DENSE Market area , Bus Stop Area .
MEDIUM DENSE: Sutla area village , Chak area atta.
LOW DENSE: Hoshiarpur highway, pathankot bypass.

FAZILKA (AIRCEL & BSNL)

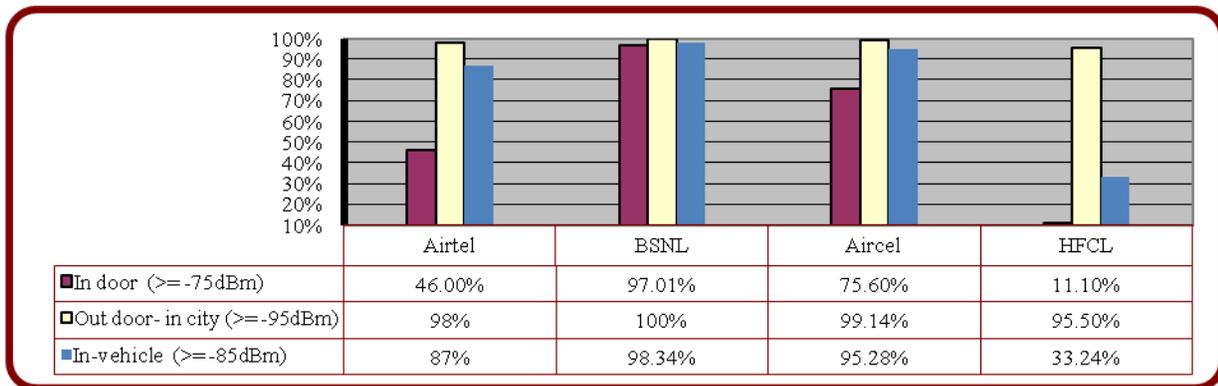
HIGH DENSE: MR College., Main Market, and Rly Station.
MEDIUM DENSE: Tower Area, Market Road, College.
LOW DENSE: Abohar road, fazilka bypass, highway abohar.

2) Performance (for the respective cities)

SN	Parameter	Aircel (Fazilka)	Airtel (Sutla & Chak)	BSNL (Fazilka)	HFCL (Sutla & Chak)
1.1	Call Attempts	53	11	32	30
1.2	Blocked Call Rate (<=3%)	0.00%	0.00%	0.00%	6.66%
1.3	Dropped Call Rate (<=2%)	0.00%	0.00%	0.00%	0.00%
1.4	Percentage of connections with good voice quality (=>95%)				
	(i) 0-4 (w/o frequency hopping)				
	(ii) 0-5 (with frequency hopping)	98.01%	97%	95.10%	92%
1.5	Service Coverage				
	In door (>= -75dBm)	75.60%	46%	97.01%	11.10%
	In-vehicle (>= -85dBm)	99.14%	87%	98.34%	33.24%
	Outdoor- in city (>= -95dBm)	100%	98%	100.00%	95.50%
1.6	Call Setup Success Rate (>=95%)	100%	100%	100%	93.34%
1.7	Handover Success Rate	100%	100%	99.11%	100.00%

(2) Graphical Representation

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



(3) Critical Analysis

The Independent drive test data was found to be satisfactory for most of the parameters. However, some deviations are found in some parameter.

- Blocked Call Rate is not met by HFCL in Hoshiarpur (Sutla & Chak) only, rest all are satisfying the benchmark.
- Good Voice quality & CSSR parameters are not met by HFCL in Hoshiarpur (Sutla & chak).
- HFCL & Aircel are on ICR with TTSL in Hoshiarpur (Sutla & Chak) and Fazilka.

During Drive Test of HFCL in Sutla & chak, some RF coverage issue was found in some area like bus stop ,village market road . Due to this reason Voice Quality, Blocked Call & call setup Success rate are affected in these area.

NOTE-- Aircel is having an ICR agreement with TTSL in Punjab Circle

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

From the month data assessment, it is found that most of the operators are meeting the network parameters, except BSNL, TTSL(GSM) & TTSL (CDMA) are found not meeting the benchmark for “Worst affected cells>3% TCH drop”.

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

Under Metering & Billing Section for Post-Paid services, all operators are meeting the benchmark, except TTSL (GSM) & TTSL (CDMA).

Performance related to customer care data for voice to voice call is found to be satisfactory for most of the operators, except Aircel , RCOM(GSM) & TTSL(GSM)

TTSL (CDMA) has not provided the data due to not generating in system.

For ‘Resolution of billing/ charging complaints’ parameters all the operators are meeting 100% benchmark within 4 weeks. Also for the parameter ‘Time taken for refunds of deposits after closures’ all operators are meeting the benchmark of 100% within 60 days.

During Drive Test

- Blocked Call Rate is not met by BSNL in Muktsar only, rest all are satisfying the benchmark.
- Good Voice quality parameter is not met by BSNL in Muktsar.

NOTE- 1.) MTS & Uninor have no service in Kapurthala, Muktsar, and Barnala.

2.) Aircel & Videocon are having an ICR with TTSL in Punjab Circle.