

REPORT
ON
AUDIT & ASSESSMENT OF QUALITY OF SERVICE
OF
CELLULAR MOBILE TELEPHONE SERVICE
FOR
NORTH ZONE – PUNJAB CIRCLE

Report Period: January 2012 – March 2012

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

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- *Not conducted for this quarter*
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- *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 (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 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.
- vii) Emergency (level 1) calls testing.

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

Systems audited:-

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

Facilities audited:-

1. Billing documents.
2. Customer Care records.

Field data collections carried out:-

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

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

- ✓ TCIL auditors visited all the NSS (Network Sub System) and BSS (Base-station Sub System) to check data for all the operators in their respective service area.

- ✓ All the NSS and BSS data for the relevant details were collected either directly from the centralized NOC or through a remote access to the NOC.
- ✓ The Radio parameters were audited/ verified from the data collected from OMC-R (Operation and Maintenance Center – Radio, as part of BSS data).
- ✓ The Drive test was conducted in high, low and medium dense areas including highways, commercial complex and residential areas and special attention was paid for the areas for which TRAI has received complaints.
- ✓ The POI and other network related parameters were audited/ verified from the data collected from the OMC-S (Operation and Maintenance Center – Switch as part of NSS data).
- ✓ The data related to Billing and Customer care was checked for the previous month and verified with the customers by calling them on random basis. The process of registration and handling of the complaints was also studied for the various operators. Call centre number were called for measuring the efficiency of the call centre.
- ✓ The inter operator call assessment test was carried out during the time period as is specified in the tender document. TCBH (Time Consistent Busy Hour) is taken after observation of the traffic consistently for 3 days prior to the audit activity.
- ✓ Data has been collected for busy hour of network in case of live assessment & month of audit for all service providers & verified that service providers are providing busy hour data only for QoS service. We found that TCBH hour is matching with network busy hour as provided by service providers for 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.

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 1th quarter (January – March 2012). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken for the period July – September 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	Jan-2012	1900-2000 Hrs
2	Airtel Ltd	Jan-2012	1900-2000 Hrs
3	BSNL	Jan-2012	1900-2000 Hrs
4	Idea	Jan-2012	1900-2000 Hrs
5	Loop	Jan-2012	1800-1900 Hrs
6	QTL (Videocon)	Jan-2012	1900-2000 Hrs
7	Reliance Communication	Feb-2012	1900-2000 Hrs
8	Tata Communications	Jan-2012	1900-2000 Hrs
9	Vodafone	Jan-2012	1900-2000 Hrs
CDMA Operators			
10	MTS	Jan-2012	1900-2000 Hrs
11	QTL	Jan-2012	1900-2000 Hrs
12	Reliance Communication	Feb-2012	1900-2000 Hrs
13	Tata Communications	Jan-2012	1900-2000 Hrs

Note: During Audit & Drive Test, it was found that:

1. Aircel is on ICR with Tata GSM in Patiala while Videocon is on ICR with Tata GSM in Firozpur.
2. Loop, MTS & QTL CDMA are under roll out obligation, and functional only in (Kartarpur & Sarhind), (Banur, Kartarpur, Tappa, Morinda, Bagapurana, Longowal, Jaito, Gardhiwala, Dinnanagar, Kurali, Doraha, Majitha & Zira) & (Tappa, Morinda, Nawanshahar, Raikot, Baghapurana, Sultanpur Lodhi, Shakkot, Dasuya, Gidderbaha) in Punjab Circle respectively.
3. Etisalat closed all the services in Punjab Circle.

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	Loop	QTL	Reliance	TATA	V-fone	MTS	QTL	Reliance	Tata
S/N	Name of Parameter		GSM Operators						CDMA Operators						
1	Network Service Quality Parameter														
	Network Availability														
	a) BTS Accumulated Downtime	<=2%	0.02%	0.05%	0.27%	0.03%	0.00%	0.06%	0.19%	0.03%	0.02%	0.42%	0.00%	0.14%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Connection Establishment (Accessibility)														
	c) CSSR (Call Setup Success Rate)	>=95%	98.12%	99.08%	97.74%	98.96%	100.00%	99.07%	99.66%	99.05%	99.68%	99.71%	98.40%	99.07%	98.62%
	d) SDCCH/PAGING congestion	<=1%	0.02%	0.07%	0.91%	0.20%	0.00%	0.01%	0.00%	0.12%	0.05%	0.00%	0.75%	0.00%	0.00%
e) TCH congestion	<=2%	0.01%	0.20%	1.35%	0.69%	0.00%	0.11%	0.01%	0.07%	0.13%	0.00%	0.85%	0.06%	0.03%	
2	Connection maintenance (retainability)														
	a) CDR	<=2%	0.69%	0.65%	1.84%	1.13%	0.00%	0.76%	0.48%	0.66%	0.81%	0.00%	1.52%	0.32%	0.99%
	b) Worst affected cells>3% TCH drop	<=3%	2.25%	1.20%	6.33%	3.22%	5.50%	1.57%	0.00%	5.19%	4.54%	0.85%	0.00%	0.29%	1.10%
	c) Good voice quality	>=95%	97.29%	98.82%	-	98.23%	99.23%	98.12%	99.23%	97.76%	97.76%	99.30%	97.58%	98.36%	-
3	No. of POI having congestion >0.5%	<0.5%	4	0	0	0	0	0	2	0	0	0	0	5	1
4	Response time to customers for assistance														
	a) Accessibility of call centre/Customer Care	>=95%	100%	100%	100%	100%	100%	100%	99%	100%	100%	98%	100%	97%	100%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	96.50%	99.83%	94.12%	92.50%	100.00%	96.73%	95.44%	98.20%	98.56%	90.98%	98.58%	90.87%	98.33%
NA: Not Applicable, NR: Not Received															

From the 3 days live data assessment, it is found that all the operators are meeting most of the network parameters except for BSNL, Idea, LOOP, Tata GSM & Vodafone for “Worst affected cells>3% TCH drop” parameter.

One Month Data Audit		Bench-mark	AIRCEL	AIRTEL	BSNL	IDEA	LOOP	QTL	RELIANCE	TATA	V-FONE	MTS	QTL	RELIANCE	TATA
S/N	Name of Parameter		GSM Operators						CDMA Operators						
(A)	Network Service Quality Parameter														
1	Network Availability														
	a) BTS Accumulated Downtime	<=2%	0.04%	0.05%	0.43%	0.05%	0.00%	0.11%	0.07%	0.04%	0.02%	0.35%	0.17%	0.06%	0.03%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.05%	0.98%	0.00%	0.00%	0.18%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2	Connection Establishment (Accessibility)														
	a) CSSR (Call Setup Success Rate)	>=95%	98.01%	99.17%	97.64%	98.80%	99.97%	98.39%	99.65%	99.04%	99.69%	99.75%	98.32%	99.01%	98.53%
	b) SDCCH/PAGING congestion	<=1%	0.03%	0.09%	0.97%	0.12%	0.02%	0.04%	0.00%	0.02%	0.06%	0.00%	0.77%	0.00%	0.00%
	c) TCH congestion	<=2%	0.01%	0.18%	1.39%	0.78%	0.00%	0.28%	0.01%	0.13%	0.12%	0.00%	0.91%	0.09%	0.05%
3	Connection maintenance (retainability)														
	a) CDR	<=2%	0.74%	0.68%	1.99%	1.20%	0.89%	0.79%	0.49%	0.66%	0.79%	0.13%	1.49%	0.39%	0.98%
	b) Worst affected cells>3% TCH drop	<=3%	2.20%	1.29%	4.84%	2.95%	3.42%	1.71%	0.00%	5.11%	4.53%	1.49%	0.00%	0.38%	0.80%
	c) Good voice quality	>=95%	97.19%	98.87%	-	98.17%	99.08%	97.98%	99.21%	97.72%	97.74%	99.29%	97.77%	98.37%	-
4	No of POI having congestion>0.5%	<0.5%	4	0	0	0	0	0	2	0	0	0	0	5	0
(B)	Customer Service Quality Parameters														
5	Metering/billing credibility-Post paid	<= 0.1%	0.00%	0.01%	0.02%	0.06%	-	-	0.10%	0.28%	0.00%	-	0.00%	0.10%	0.29%
6	Metering /billing credibility-Pre paid	<= 0.1%	0.01%	0.01%	0.02%	0.01%	0.00%	0.02%	0.08%	0.04%	0.01%	0.00%	0.00%	0.02%	0.03%
7	Resolution of billing/ charging complaints	100% within 4 weeks	100%	100%	100%	100%	-	100%	100%	100%	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%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
8	Response time to customers for assistance														
	a) Accessibility of call centre/Customer Care	>=95%	100%	99%	100%	100%	100%	100%	99%	100%	100%	98%	100%	99%	100%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	92.91%	92.56%	95.39%	90.70%	100.00%	93.16%	81.72%	82.03%	97.24%	95.83%	97.65%	89.72%	94.69%
9	Termination/closure of service	<=7days	100%	100%	100%	100%	-	-	100%	100%	100%	-	100%	100%	100%
10	Time taken for refunds of deposits after closures.	100% within 60 days	100%	100%	100%	100%	-	-	-	100%	100%	-	37%	100%	100%

NA: Not Applicable, NR: Not Received

From the month data assessment, it is found that all the operators are meeting most of the network parameters except for BSNL, Loop, Tata GSM & Vodafone 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 for the parameter "calls answered by operators (voice-to-voice)", with Reliance GSM, Tata GSM & Reliance CDMA are not meeting the 90% benchmark.

A below benchmark performance is observed in case of QTL CDMA for "Time taken for refunds of deposits after closures" parameter.

Under "Metering/Billing Credibility (Post-Paid)" section Tata GSM & Tata CDMA is not meeting the prescribed benchmark.

Operator-Assisted Drive Test

The Operator Assisted Drive Test was conducted in Punjab for all the operators. The main agenda of this Drive Test was to capture the actual picture of all Service Providers on ground level and for that cities to be drive are Gurdaspur, Firozpur & Sangrur. During Drive, Route covered was about around 100-110 Km depending on city areas within the speed limit of 30Km/hr. In all the cities, zones were selected for covering different density areas (High, Medium & Low dense areas).

SN	Parameter	City Name	Airtel	BSNL	Idea	Reliance	Tata	QTL	Vodafone	Reliance	Tata	
			GSM Operators							CDMA Operators		
1.1	Blocked Call Rate (<=3%)	Gurdaspur	0.00%	9.33%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Firozpur	0.00%	0.00%	0.00%	0.00%	0.00%	ICR With Tata GSM	0.00%	0.00%	0.00%	
		Sangrur	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
1.2	Dropped Call Rate (<=2%)	Gurdaspur	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Firozpur	0.00%	0.00%	0.00%	0.00%	0.00%	ICR With Tata GSM	0.00%	0.00%	0.00%	
		Sangrur	0.00%	0.98%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
1.3	Percentage of connections with good voice quality (>=95%)											
	(i) 0-4 (w/o frequency hopping)	Gurdaspur									100.00%	97.99%
		Firozpur									100.00%	99.89%
		Sangrur									97.00%	98.55%
	(ii) 0-5 (with frequency hopping)	Gurdaspur	98.30%	97.40%	95.00%	98.00%	95.18%	97.07%	97.00%			
		Firozpur	97.90%	93.97%	93.20%	98.00%	98.62%	ICR With Tata GSM	98.00%			
Sangrur		96.90%	95.70%	97.10%	98.00%	96.55%	96.09%	98.20%				
1.4	Call Setup Success Rate (>=95%)	Gurdaspur	100.00%	90.67%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	
		Firozpur	100.00%	100.00%	100.00%	100.00%	100.00%	ICR With Tata GSM	100.00%	100.00%	100.00%	
		Sangrur	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	

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

- ✚ Blocked call rate parameter is not met by BSNL in Gurdaspur.
- ✚ Good Voice quality parameter is not met by Idea and BSNL in Firozpur.
- ✚ Call Setup Success Rate is not met by BSNL in Gurdaspur.

Note: QTL is on ICR with Tata GSM in Firozpur.

Independent Drive Test

The independent drive test activity was conducted in Punjab Circle for various service providers in three different cities namely “Fazilka, Patiala & Ropar”.

SN	Parameter	Vodafone (Fazilka)	Tata GSM (Fazilka)	Tata CDMA (Fazilka)	QTL GSM (Patiala)	Aircel (Patiala)	QTL GSM (Ropar)
1.1	Blocked Call Rate (<=3%)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1.2	Dropped Call Rate (<=2%)	0.00%	0.00%	0.00%	0.78%	0.00%	0.00%
1.3	Percentage of connections with good voice quality (=>95%)						
	(i) 0-4 (w/o frequency hopping) for CDMA operators	-		99.20%	-		
	(ii) 0-5 (with frequency hopping) for GSM operators	97.00%	97.48%	-	95.21%	95.66%	97.60%
1.4	Call Setup Success Rate (>=95%)	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

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

- All the Operators meeting the TRAI Benchmark for all the parameters.

Note: Aircel is on ICR with Tata GSM in Patiala.

(B) Basic Telephone Service (Wireline) Providers.
- Not conducted for this quarter

(C) Broadband Service Providers
- Not conducted for this quarter

CHAPTER-3: AUDIT-PMR VERIFICATION

I. Cellular Mobile Telephone Service

PMR		Bench-mark	Audit	Aircel	Airtel	BSNL	Idea	Loop	QTL	Reliance	TATA	V-Fone	MTS	QTL	Reliance	Tata	
S/N	Name of Parameter			GSM Operators									CDMA Operators				
(A)	Network Service Quality Parameter																
1	Network Availability																
	BTS Accumulated Downtime	<=2%	Reported	0.12%	0.08%	0.48%	0.05%	0.24%	0.14%	0.08%	0.02%	0.01%	0.00%	0.04%	0.06%	0.01%	
			Verified	0.12%	0.08%	0.48%	0.05%	0.24%	0.14%	0.08%	0.02%	0.01%	0.00%	0.04%	0.06%	0.01%	
	Worst affected BTSs due to downtime	<=2%	Reported	0.00%	0.23%	1.87%	0.04%	0.16%	0.04%	0.00%	0.00%	0.13%	0.00%	0.00%	0.00%	0.00%	
Verified			0.00%	0.23%	1.87%	0.04%	0.16%	0.04%	0.00%	0.00%	0.13%	0.00%	0.00%	0.00%	0.00%		
2	Connection Establishment (Accessibility)																
	CSSR (Call Setup Success Rate)	>=95%	Reported	98.45%	99.09%	98.35%	98.13%	100.00%	98.52%	99.78%	98.42%	98.72%	96.97%	98.84%	99.07%	98.42%	
			Verified	98.45%	99.09%	98.35%	98.13%	100.00%	98.52%	99.78%	98.42%	98.72%	96.97%	98.84%	99.07%	98.42%	
	SDCCH/PAGING congestion	<=1%	Reported	0.16%	0.13%	0.82%	0.36%	0.02%	0.07%	0.17%	0.00%	0.10%	0.00%	0.26%	0.02%	0.00%	
			Verified	0.16%	0.13%	0.82%	0.36%	0.02%	0.07%	0.17%	0.00%	0.10%	0.00%	0.26%	0.02%	0.00%	
	TCH congestion	<=2%	Reported	0.04%	0.21%	0.93%	1.34%	0.00%	0.22%	0.74%	0.40%	0.49%	0.00%	4.43%	0.06%	0.40%	
Verified			0.04%	0.21%	0.93%	1.34%	0.00%	0.22%	0.74%	0.40%	0.49%	0.00%	4.43%	0.06%	0.40%		
3	Connection maintenance (retainability)																
	CDR	<=2%	Reported	0.90%	0.76%	1.90%	1.52%	0.39%	0.97%	0.29%	0.95%	0.96%	0.01%	1.73%	0.60%	0.95%	
			Verified	0.90%	0.76%	1.90%	1.52%	0.39%	0.97%	0.29%	0.95%	0.96%	0.01%	1.73%	0.60%	0.95%	
	Worst affected cells>3% TCH drop	<=3%	Reported	2.37%	1.38%	5.64%	2.80%	0.00%	0.82%	0.72%	0.77%	2.91%	1.85%	0.88%	0.31%	0.77%	
			Verified	2.37%	1.38%	5.64%	2.80%	0.00%	0.82%	0.72%	0.77%	2.91%	1.85%	0.88%	0.31%	0.77%	
	Good voice quality	>=95%	Reported	97.29%	98.79%	95.01%	96.76%	99.00%	97.92%	99.22%	99.49%	97.57%	98.12%	98.08%	99.39%	99.49%	
Verified			97.29%	98.79%	95.01%	96.76%	99.00%	97.92%	99.22%	99.49%	97.57%	98.12%	98.08%	99.39%	99.49%		
4	No. of POI having congestion>0.5%	<0.5%	Reported	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		
(B)	Customer Service Quality Parameters																

5	Metering/billing credibility-Post paid	<= 0.1%	Reported	0.00%	0.03%	0.00%	0.06%	0.00%	0.00%	0.10%	0.01%	0.06%	0.00%	0.02%	0.08%	0.01%
			Verified	0.00%	0.03%	0.00%	0.06%	0.00%	0.00%	0.10%	0.01%	0.06%	0.00%	0.02%	0.08%	0.01%
6	Metering /billing credibility-Pre paid	<= 0.1%	Reported	0.03%	0.01%	0.00%	0.00%	0.00%	0.06%	0.06%	0.03%	0.01%	0.00%	0.00%	0.02%	0.03%
			Verified	0.03%	0.01%	0.00%	0.00%	0.00%	0.06%	0.06%	0.03%	0.01%	0.00%	0.00%	0.02%	0.03%
7	Resolution of billing/ charging complaints	100% within 4 weeks	Reported	100.00%	100.00%	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%
			Verified	100.00%	100.00%	100.00%	100.00%	-	100.00%	100.00%	100.00%	100.00%	-	100.00%	100.00%	100.00%
	Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	Reported	100.00%	100.00%	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%
			Verified	100.00%	100.00%	100.00%	100.00%	-	100.00%	100.00%	100.00%	100.00%	-	100.00%	100.00%	100.00%
8	Response time to customers for assistance	>=95%	Reported	100.00%	82.0%	100.00%	97.12%	100.00%	98.16%	98.95%	98.00%	100.00%	0.00%	100.00%	94.71%	98.00%
			Verified	100.00%	82.0%	100.00%	97.12%	100.00%	98.16%	98.95%	98.00%	100.00%	-	100.00%	94.71%	98.00%
	% call answered by operators(voice to voice) within 60 sec.	>=90%	Reported	83.6%	86.0%	95.00%	63.3%	100.00%	94.62%	87.00%	94.00%	97.92%	90.25%	91.00%	94.32%	94.00%
			Verified	83.6%	86.0%	95.00%	63.3%	100.00%	94.62%	87.00%	94.00%	97.92%	90.25%	91.00%	94.32%	94.00%
9	Termination/closure of service	<=7days	Reported	100.00%	100.00%	100.00%	99.87%	0.00%	0.00%	100.00%	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%
			Verified	100.00%	100.00%	100.00%	99.87%	-	-	100.00%	100.00%	100.00%	-	100.00%	100.00%	100.00%
			Reported	100.00%	100.00%	100.00%	100.00%	0.00%	0.00%	100.00%	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%
10	Time taken for refunds of deposits after closures.	100% within 60 days	Verified	100.00%	100.00%	100.00%	100.00%	-	-	100.00%	100.00%	100.00%	-	100.00%	100.00%	100.00%

NA: Not Applicable, NR: Not Received

✚ No Deviation is found when compared with Operator reported data.

II. Basic Service (Wireline) Service

-Not conducted for this quarter

III. Broadband Service

-Not conducted for this quarter

CHAPTER-4: DETAILED FINDINGS & ANALYSIS

I. Cellular Mobile Telephone Service

(A) MSC Audit

(1) 3 Days Live measurement Data assessment & Summarized Findings

S/N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Idea	Loop	QTL	Reliance	TATA	V-fone	MTS	QTL	Reliance	Tata	
			GSM Operators						CDMA Operators							
A	Network Service Quality Parameter															
1	Network Availability															
	a) BTS Accumulated Downtime	<=2%	0.02%	0.05%	0.27%	0.03%	0.00%	0.06%	0.19%	0.03%	0.02%	0.42%	0.00%	0.14%	0.02%	
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
	1) Total no. of BTSs in the licensed service area		607	4091	3681	3823	4	1676	1772	1634	4289	13	10	970	648	
	2) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		7.75	142.2	724	88.8	0	71.19	245	34.65	64.41	3.96	0	95	10.26	
	3) 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	
	Connection Establishment (Accessibility)															
	c) CSSR	>=95%	98.12%	99.08%	97.74%	98.96%	100.00%	99.07%	99.66%	99.05%	99.68%	99.71%	98.40%	99.07%	98.62%	
	d) SDCCH/PAGING congestion	<=1%	0.03%	0.09%	0.97%	0.12%	0.02%	0.04%	0.00%	0.02%	0.06%	0.00%	0.77%	0.00%	0.00%	
	e) TCH congestion	<=2%	0.01%	0.18%	1.39%	0.78%	0.00%	0.28%	0.01%	0.13%	0.12%	0.00%	0.91%	0.09%	0.05%	
2	Connection maintenance															
	a) CDR	<=2%	0.69%	0.65%	1.84%	1.13%	0.00%	0.76%	0.48%	0.66%	0.81%	0.00%	1.52%	0.32%	0.99%	
	b) Cells having > 3% TCH drop	<=3%	2.25%	1.20%	6.33%	3.22%	5.50%	1.57%	0.00%	5.19%	4.54%	0.85%	0.00%	0.29%	1.10%	
	c) Good voice quality	>=95%	97.29%	98.82%	-	98.23%	99.23%	98.12%	99.23%	97.76%	97.76%	99.30%	97.58%	98.36%	-	
	d) No. of cells > 3% TCH drop		41	147	535	369	1	79	0	254	599	0	0	8	22	
	e) Avg no. of cells in the network		1,821	12,240	8,462	11,458	12	5,044	5,316	4,904	13,191	39	30	2,910	1,999	
3	No of POI having congestion>0.5%	<0.5%	4	0	0	0	0	0	2	0	0	0	0	5	1	

	a) Name of POI not meeting the benchmark		Reliance; BSNL; VSNL; BTSOL	-	-	-	-	-	ARTL; VDPH	-	-	-	-	Airtel; L2 GMSC; Cellone; Tata; Idea	RILNGNILD
	b) Total No. of circuits on POI		19,820	171,170	62,673	100,907	390	334	304,073	12,249	128,679	1,118	207	414,894	24,868
	c) Avg No. of call attempts on POI		242,777	2,702,243	813,584	1,605,618	14	4,299	220,193	205,480	1,928,275	41	11	57,451	615,641
	d) Avg traffic served on POI (Erlang)		5,059	95,137	35,017	26,469	0	131	4,983	6,095	72,770	2	13	3,705	31,949
	e) Total number of working POI Service Area wise		33	54	49	32	14	32	24	22	46	25	16	33	120
	f) Equipped Capacity of Network in respect of Traffic in erlang		50,000	274,076	260,005	164,947	89	64,575	72,000	99,006	140,685	4,200	16,800	83,000	183,926
	g) Total traffic handled in TCBH in erlang		4,472	205,354	73,578	137,234	0	21,084	64,630	28,904	125,910	1	77	21,185	57,413
(B)	Customer Service Quality Parameters														
4	Response time to customers for assistance														
	a) Accessibility of call centre	>=95%	100%	100%	100%	100%	100%	100%	99%	100%	100%	98%	100%	96.6%	100%
	b) % of call answered by operators(voice to voice) within 60 sec	>=90%	96.50%	99.83%	94.12%	92.50%	100.00%	96.73%	95.44%	98.20%	98.56%	90.98%	98.58%	90.87%	98.33%
	c) No. of call attempts to call centre / customer care nos. during TCBH (Avg)		27,517	200,921	79,637	140,269	1	1,497	61,171	58,706	11,458	133	422	8,890	12,291
	d) No. of calls connected and answered successfully to call centre / customer care nos. during TCBH (Avg)		26,555	200,581	74,953	129,753	1	1,448	58,383	57,648	11,293	121	416	8,078	12,086
NA: Not Applicable, NR: Not Received															

Parameter-wise Findings (Live Data Assessment):

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

- **BTS accumulated downtime (benchmark $\leq 2\%$):** All operators are meeting benchmark with values laying between 0.00% and 0.42%.
- **Worst affected BTSs due to downtime (benchmark $\leq 2\%$):** All operators are meeting benchmark with values laying between 0.00% and 0.01%.
- **Call setup success rate (benchmark $\geq 95\%$):** All operators are meeting the benchmark with values laying between 97.74% and 100%.
- **SDCCH/PAGING Channel congestion (benchmark $\leq 1\%$):** All operators are meeting the benchmark with values laying between 0.00% and 0.97%.
Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.
- **TCH congestion (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values laying between 0.00% and 1.39%.
- **Call drop rate (benchmark $\leq 2\%$):** All other operators are meeting the benchmark with values laying between 0.00% and 1.84%.
- **Cell exceeding 3% TCH drop (benchmark $\leq 3\%$):** Except for Bsnl(6.33%), Idea(3.22%), Loop Telecom(5.50%), Tata GSM(5.19%) & Vodafone(4.54%) rests of the operators are satisfying the benchmark with value in between 0.00% and 2.25%.
- **Connections with good voice quality (benchmark $\geq 95\%$):** All operators are meeting the benchmark with values laying between 97.29% and 99.30%. For this parameter, BSNL & Tata CDMA values are not system generated.
- **No. of POI's having Congestion $>0.5\%$:** For this parameter, mostly Operators found overall no congestion, However few cases are observed for some operators like Aircel, Reliance GSM, Reliance CDMA & Tata CDMA having calls failures $>0.5\%$ with nos. 4, 2, 5 & 1 respectively. It was also observed that some are in the range of over 100% though causing no traffic failure due to overflow technique i.e. the extra traffic is carried over by some other operating POI as has been designed to do so.
- **%age of call answered by operator (electronically IVR) (benchmark >95):** All the operators are meeting the benchmark with values laying between 96.60% to 100%.
- **%age of call answered by operator (Voice to voice) (benchmark $>90\%$):** All the operator are meeting the benchmark with value in between 90.87% and 100%.

(2) Month Data Assessment & Summarized Findings

S/ N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Idea	Loop	QTL	Reliance	TATA	V-fone	MTS	QTL	Reliance	Tata		
			GSM Operators										CDMA Operators				
(A)	Network Service Quality Parameter																
1	Network Availability																
	a) BTS Accumulated Downtime	<=2%	0.04%	0.05%	0.43%	0.05%	0.00%	0.11%	0.07%	0.04%	0.02%	0.35%	0.17%	0.06%	0.03%		
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.05%	0.98%	0.00%	0.00%	0.18%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		
	c) Total no. of BTSs in the licensed service area		607	4,091	3,681	3,823	4	1,676	1,772	1,634	4,289	13	10	970	648		
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		185	1,424	11,709	1,423	0	1,396	921	445	755	34	13	464	132		
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	2	36	0	0	3	0	0	0	0	0	0	0		
2	Connection Establishment (Accessibility)																
	a) CSSR (Call Setup Success Rate)	>=95%	98.01%	99.17%	97.64%	98.80%	99.97%	98.39%	99.65%	99.04%	99.69%	99.75%	98.32%	99.01%	98.53%		
	b) SDCCH/PAGING congestion	<=1%	0.03%	0.09%	0.97%	0.12%	0.02%	0.04%	0.00%	0.02%	0.06%	0.00%	0.77%	0.00%	0.00%		
	c) TCH congestion	<=2%	0.01%	0.18%	1.39%	0.78%	0.00%	0.28%	0.01%	0.13%	0.12%	0.00%	0.91%	0.09%	0.05%		
3	Connection maintenance (retainability)																
	a) CDR	<=2%	0.74%	0.68%	1.99%	1.20%	0.89%	0.79%	0.49%	0.66%	0.79%	0.13%	1.49%	0.39%	0.98%		
	b) Worst affected cells>3% TCH drop	<=3%	2.20%	1.29%	4.84%	2.95%	3.42%	1.71%	0.00%	5.11%	4.53%	1.49%	0.00%	0.38%	0.80%		
	c) Good voice quality	>=95%	97.19%	98.87%	-	98.17%	99.08%	97.98%	99.21%	97.72%	97.74%	99.29%	97.77%	98.37%	-		
	d) Avg No. of cells exceeding 3% TCH drop (call drop)		40	158	410	338	0	86	0	251	597	1	0	11	16		
	e) Total no. of cells in the network		1,821	12,240	8,462	11,458	12	5,044	5,316	4,904	13,191	39	30	2,910	1,999		
4	No of POI having congestion>0.5%	<0.5%	4	0	0	0	0	0	2	0	0	0	0	5	0		
	a) Name of POI not meeting the benchmark		Reliance; BSNL; VSNL; BTSO	-	-	-	-	-	ARTL; VDPH	-	-	-	-	Airtel; L2 GMSC; Cellone; Tata;	-		

			L										Idea		
	b) Total No. of call attempts on POI (Avg.)		234,715	4368273	757,350	1,600,165	7	4,077	6239322	200,371	1,917,901	26	266	2,090,868	7499353
	c) Total traffic served on POI (Erlang) (Avg.)		4,940	94,576	32,522	25,816	0	125	142,087	20,027	71,429	1	24	133,228	367,520
	d) Total No. of circuits on POI		19,820	171,170	62,673	100,907	390	334	304,073	12,249	128,679	1,118	207	414,894	24,868
	e) Total number of working POI Service Area wise		33	54	49	32	14	32	24	22	46	25	16	33	120
	f) Capacity of POI		17,745	167,356	43,871	100,907	349	284	282,645	11,548	128,228	796	5,444	379,830	28,511
5	Network Data														
	a) Equipped Capacity of Network Erlang		50,000	274,076	260,005	164,947	89	64,575	72,000	99,006	140,685	4,200	16,800	83,000	183,926
	b) Total traffic handled in TCBH in erlang		4,324	201,637	57,091	135,505	0	21,667	64,630	28,481	122,504	1	72	21,185	57,692
	c) Total no. of customers served (as per VLR) on last day of the month		460,565	6,357,345	1,793,859	4,817,667	5	583,855	2162643	1,197,858	4,106,670	260	490	543,347	527,838
(B)	Customer Service Quality Parameters														
6	Metering/billing credibility-Post paid	$\leq 0.1\%$	0.00%	0.01%	0.02%	0.06%	NA	NA	0.10%	0.28%	0.00%	NA	0.00%	0.10%	0.29%
	a) No. of bills issued during the period		16,147	460,906	33,159	459,936	0	0	20,711	28,587	121,156	0	9,939	94,332	101,920
	b) No. of bills disputed including billing complaints during the period		0	54	5	293	0	0	20	80	6	0	0	93	300
7	Metering /billing credibility-Pre paid	$\leq 0.1\%$	0.01%	0.01%	0.02%	0.01%	0.00%	0.02%	0.08%	0.04%	0.01%	0.00%	0.00%	0.02%	0.03%
	a) No. of charging / credit / validity complaints during the quarter		78	501	964	249	0	206	3,266	721	436	0	0	218	268
	b) Total no. of pre-paid customers at the end of the quarter		857,795	7,842,550	4,651,651	4,720,761	147	1263367	3892230	1,773,487	4,267,633	882	19,241	910,958	784,879
8	Resolution of billing/ charging complaints	<i>100% within 4 weeks</i>	100%	100%	100%	100%	-	100%	100%	100%	100%	-	-	100%	100%
	a) No. of billing/(post paid) and charging, credit/validity (pre paid) complaints resolved within 4 weeks during the quarter		142	10,045	971	542		206	3,286	801	525			311	568
	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		142	10,045	971	542	-	206	3,286	801	525	-	-	311	568
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the		78	563	941	542		206	808	17	162			80	1

	quarter														
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		64	9,482	30	0		0	2,478	784	368			231	567
	e) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<i><=1 week</i>	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
9	Response time to customers for assistance														
	a) Accessibility of call centre/Customer Care	<i>>=95 %</i>	100.00 %	99.00%	100.00 %	100.00 %	100.00 %	100.00 %	99.00 %	100.00 %	100.00 %	98.00 %	100.00 %	99.00%	100.00 %
	b) % call answered by operators(voice to voice) within 60 sec.	<i>>=90 %</i>	92.91%	92.56%	95.39%	90.70%	100.00 %	93.16 %	81.72 %	82.03%	97.24%	95.83 %	97.65 %	89.72%	94.69 %
	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		301,367	2,218,071	54,730	1,527,603	1	17,731	608,933	721,900	118,979	72	4,546	88,322	123,307
	d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		280,012	2052985	52,209	1,385,474	1	16,518	497,613	592,148	115,694	69	4,439	79,245	116,758
10	Termination/closure of service	<i><=7days</i>	100%	100%	100%	100%	-	-	100%	100%	100%	-	100%	100%	100%
	a) Total No. of requests for Termination / Closure of service received during the quarter		342	4251	265	2309			224	1264	366		141	592	2774
	b) No.of requests for Termination / Closure of service complied within 7 days during the quarter		342	4251	265	2309	-	-	224	1264	366	-	141	592	2774
11	Time taken for refunds of deposits after closures.	<i>100% within 60 days</i>	100%	100%	100%	100%	-	-	NA	100%	100%	-	37%	100%	100%
NA: Not Applicable, NR: Not Received															

Parameter-wise Findings (Month Data Assessment):

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

- **BTS accumulated downtime (benchmark <=2%):** All operators are meeting the benchmark with values laying between 0.00% and 0.43%.
- **Worst affected BTSs due to downtime (benchmark <= 2%):** All operators are meeting the benchmark with values laying between 0.00% and 0.98%.
- **Call setup success rate (benchmark >= 95%):** All operators are meeting the benchmark with values laying between 97.64% and 99.97%.
- **SDCCH/PAGING Channel congestion (benchmark <= 1%):** All operators are meeting the benchmark with values laying between 0.00% and 0.97%.
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 0.00% and 1.39%.
- **Call drop rate (benchmark <= 2%):** All operators are meeting the benchmark with values laying between 0.13% and 1.99%.
- **Cell exceeding 3% TCH drop (benchmark <= 3%):** Except for BSNL (4.84%), Loop (3.42%), Tata GSM (5.11%) & Vodafone(4.53%) rests of the operators are satisfying the benchmark with value in between 0.00% and 2.95%.
- **Connections with good voice quality (benchmark >= 95%):** All the operators are meeting the benchmark with values laying between 97.19% and 99.29%. For this parameter, BSNL & Tata CDMA values are not system generated.
- **No. of POI's having Congestion >0.5%:** For this parameter, mostly Operators were found to have no POIs congestion, However few cases are observed for some operators like Aircel, Reliance GSM & Reliance CDMA having call congestion >0.5% in 4, 2 & 5 nos. of POI respectively. It was also observed that some operators are in the range of over 100% traffic flow 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 laying between 98.00% to 100%.
- **%age of call answered by operator (Voice to voice) (benchmark >90%):** Except for Reliance GSM, Tata GSM & Tata CDMA rests of the operators are meeting the benchmark with values laying between 90.70% to 100%.
- **Metering and billing credibility-Postpaid (benchmark <= 0.1%):** Except Tata GSM & Tata CDMA rest of the operators are meeting the benchmark with values laying between 0.00% to 0.29%
- **Metering and billing credibility-Pre paid (benchmark <= 0.1%):** All the operators are meeting the benchmark with values laying between 0.00% and 0.08%.
- **Resolution of billing/ charging complaints (benchmark 100% within 4 weeks):** All operators are meeting the benchmark.
- **Termination/Closure of service (Benchmark <= 7 days):** All operators have satisfied the benchmark.
- **Time taken for refunds of deposits after closures (benchmark 100% within <=60 days):** Except QTL CDMA rest of the operators have satisfied the benchmark.

3) Sample Coverage

Switches/BSC/BTS details of operators:

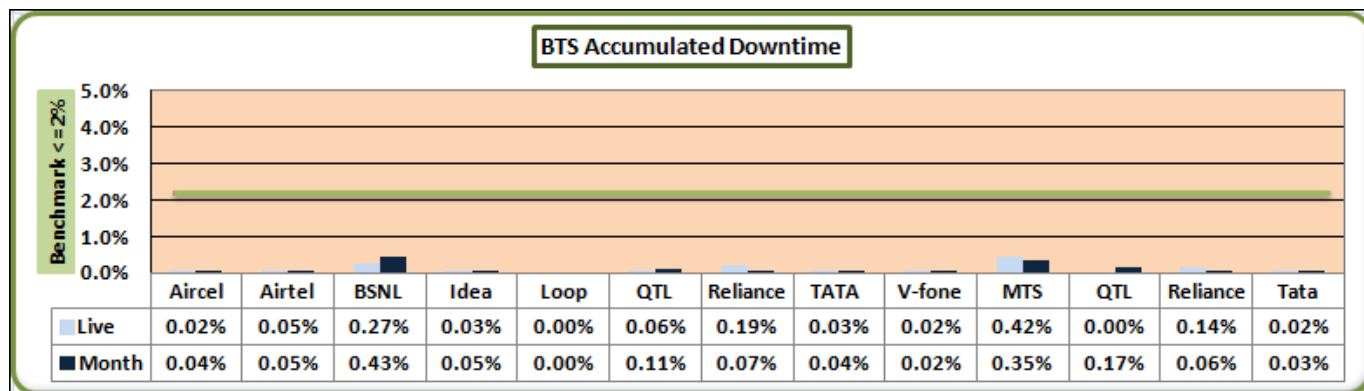
Sl.	Name of Service Provider	No. of MSC/GMSC	No. of BSC	No. of BTS
GSM Operators				
1	Aircel Ltd	1	6	607
2	Airtel Ltd	24	50	4091
3	BSNL	13	45	3681
4	Idea	7	74	3823
5	Loop	1	1	4
6	QTL (Videocon)	1	9	1676
7	Reliance Communication	3	7	1772
8	Tata Communications	2	12	1634
9	Vodafone	8	50	4289
CDMA Operators				
10	MTS	1	1	13
11	QTL	1	2	10
12	Reliance Communication	5	5	970
13	Tata Communications	5	5	648

4) Performance (Graphical Representation)

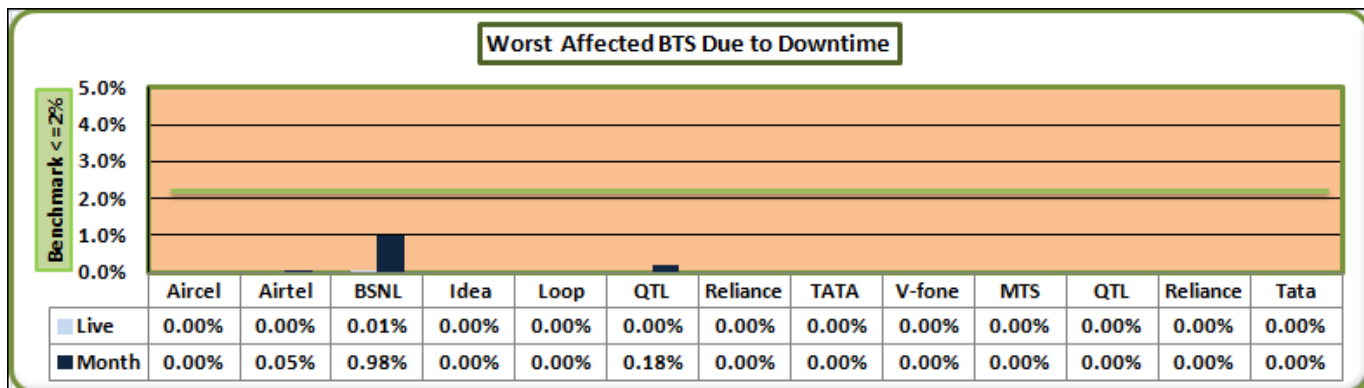
Comparison between Live measurements and One month data Audit – Cellular Mobile Telephone Services

A) NETWORK PERFORMANCE

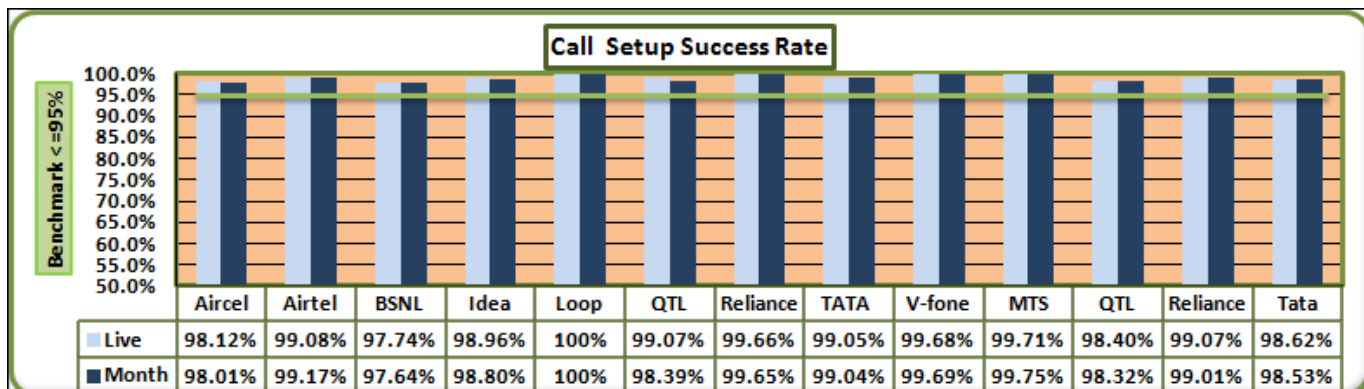
BTS accumulated downtime: All operators are meeting the TRAI benchmarks ($\geq 2\%$) for both one month data and 3 days live data taken in the month of audit.



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

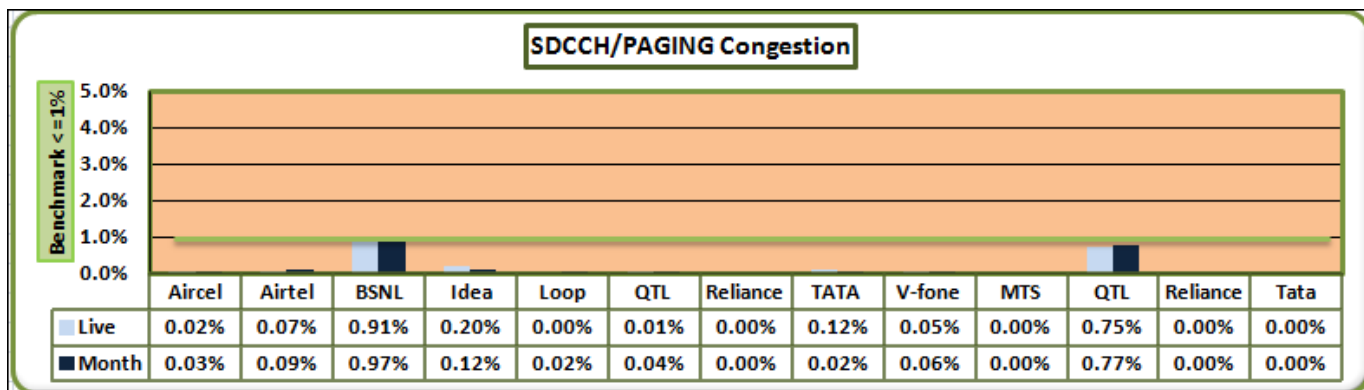


Call Setup Success Rate (CSSR): All operators are meeting the TRAI benchmarks ($\geq 95\%$) for both one month data and 3 days live data taken in the month of audit.

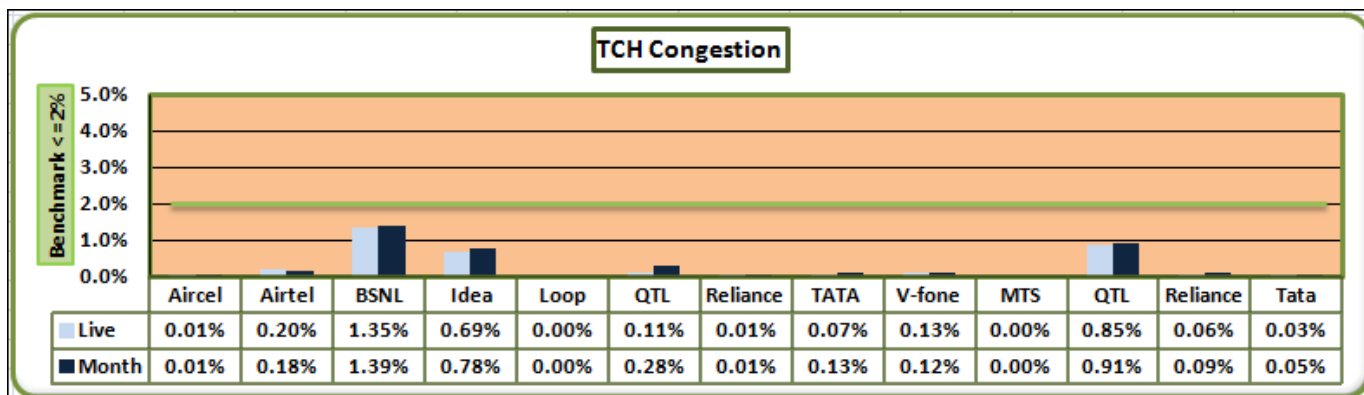


Blocked call rate:

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

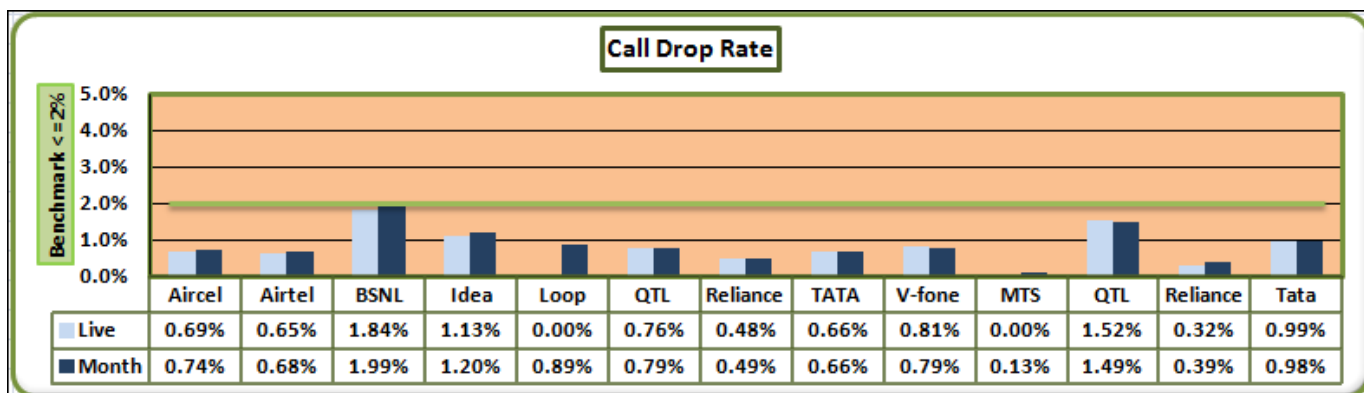


TCH congestion (%): All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data.

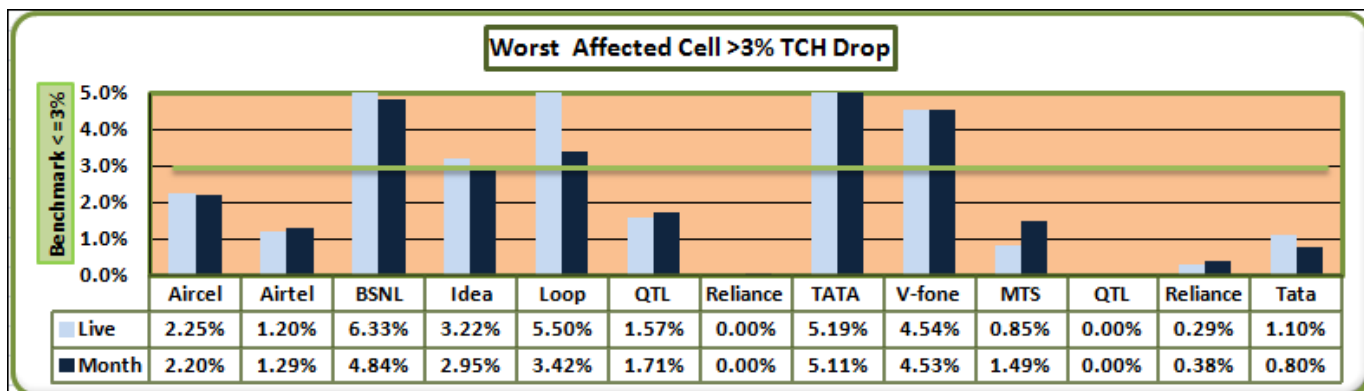


Connection Maintainability (Retainability):

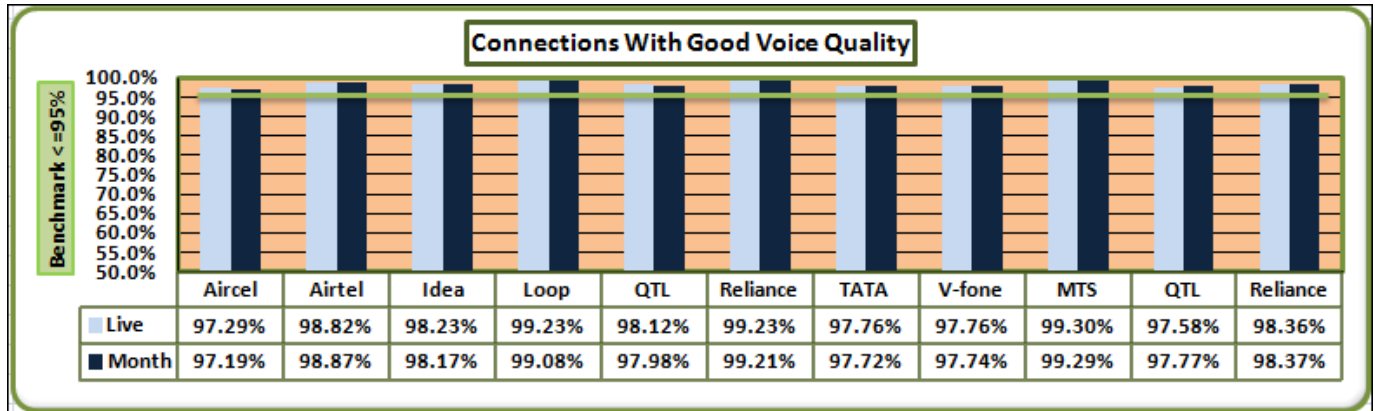
Call Drop Rate (CDR) (%): All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data.



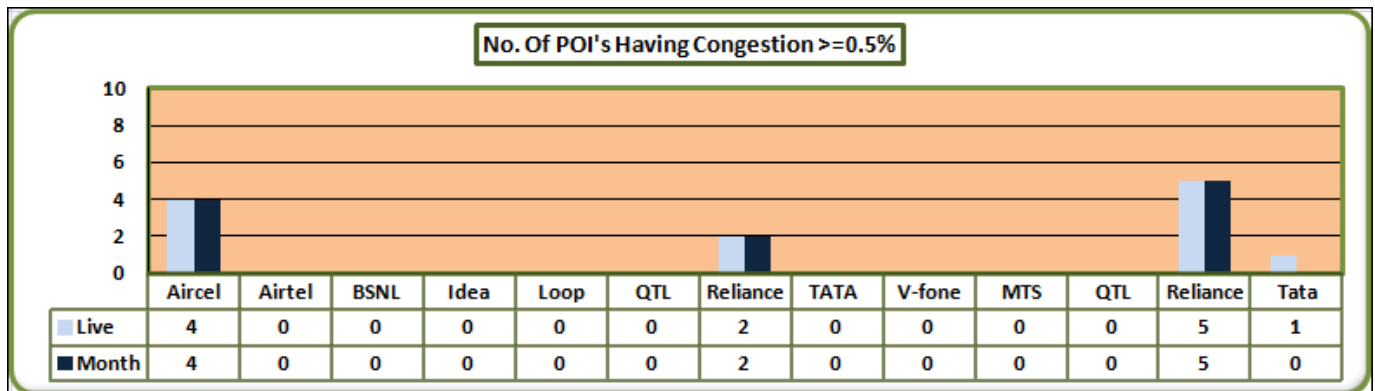
Worst affected Cell exceeding 3% TCH Drop: For live data, BSNL, Idea, Loop, Tata GSM & Vodafone and for month data BSNL, Loop, Tata GSM & Vodafone are not meeting the benchmark of $\leq 3\%$.



Percentage of connections with good voice quality (benchmark $\geq 95\%$): 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. For BSNL and Tata CDMA values are not system generated.



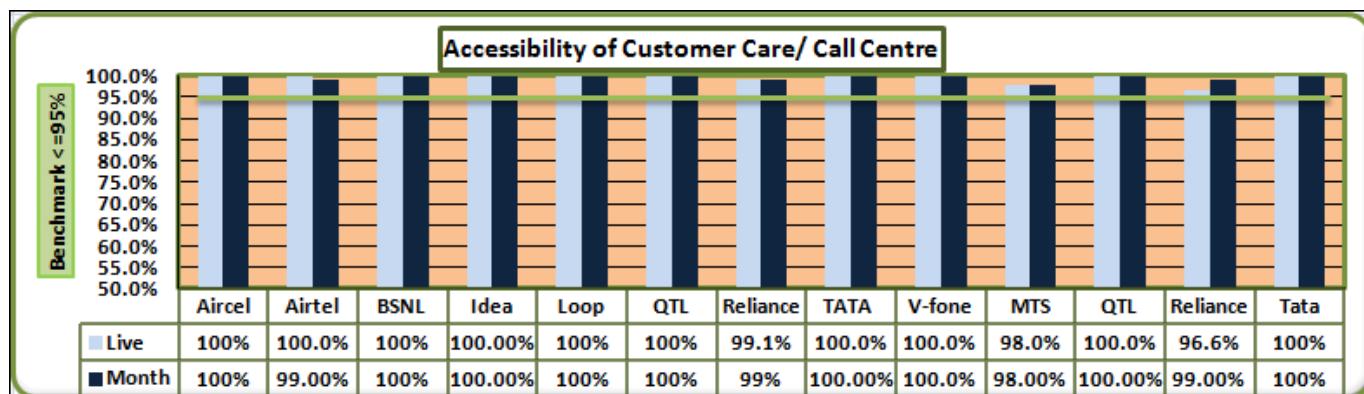
No of POI's having Congestion $>0.5\%$: For both Live and month audit, Aircel (4), Reliance GSM (2) and Reliance CDMA (5) are having congestion $\geq 0.5\%$ in individual POIs.



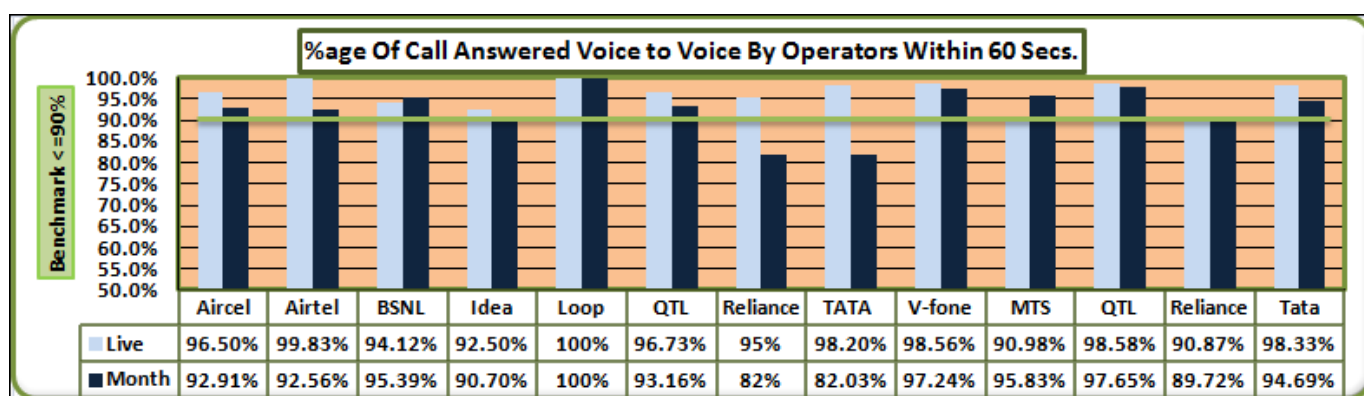
B) CUSTOMER SERVICE QUALITY PARAMETERS

Response time to the customer for assistance:

Percentage of call answered (Electronically): All the 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: For Month data, only Reliance (GSM & CDMA) & Tata GSM were not meeting the benchmark. Rest of operators are meeting benchmark for both cases.



5) Critical Analysis

From the data table it can be seen that BSNL, Loop, Tata GSM & Vodafone are not meeting the benchmark for the parameter 'Worst affected cells having more than 3% TCH drop rate' in both live and month data case as well as Idea is not meeting benchmark in live data. This may have happened due to mainly in the change adopted for calculating the parameter considering CBBH instead of TCBH, which reflects more practical way of calculating TCH drop keeping in view customer satisfaction.

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

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

For the parameter "Percentage of call answered (Voice to Voice)" Reliance (GSM&CDMA) &Tata CDMA were not meeting the benchmark in case of month of audit.

(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	Idea	QTL GSM	Rcom GSM	Tata GSM	Vodafone	Rcom CDMA	Tata CDMA
Total No. of Calls Attempted	78	100	100	100	100	100	100	100	100
Total No. of calls Answered	75	95	97	90	94	95	93	92	97
Cases resolved with 4 weeks	75	95	97	90	94	95	93	92	97
%age of cases resolved	100%	100%	100%	100%	100%	100%	100%	100%	100%

3) Live calling to call center:

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

Calling Operator	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Vodafone	Vodafone	MTS	Rcom CDMA	Tata CDMA
Total No. of Calls Attempted	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
Calls got connected to agent within 60 Sec	96	95	96	95	93	97	96	95	98	94	96
%age of calls got answered	96%	95%	96%	95%	93%	97%	96%	95%	98%	94%	96%

- 4) **Level 1 Calling:** Level 1 calling such as calling at emergency no. (Police, Fire, and Hospital), Railway enquiry systems etc were made as shown in table below so as to check the service of such short codes. In all 3 cities, it was found to be functional for respective providers.

Emergency no.		Calls attempted	Aircel	Airtel	BSNL	Idea	RCOM GSM	Tata GSM	Vodafone	QTL	RCOM CDMA	Tata CDMA
Gurdaspur												
100	Police	1	1	1	1	1	1	1	1	1	1	1
101	Fire	1	1	1	1	1	1	1	1	1	1	1
102	Ambulance	1	1	1	1	1	1	1	1	1	1	1
139	Railway	2	2	2	2	2	2	2	2	2	2	2
Firozpur												
100	Police	1	1	1	1	1	1	1	1	1	1	1
101	Fire	1	1	1	1	1	1	1	1	1	1	1
102	Ambulance	1	1	1	1	1	1	1	1	1	1	1
139	Railway	2	2	2	2	2	2	2	2	2	2	2
Sangrur												
100	Police	1	1	1	1	1	1	1	1	1	1	1
101	Fire	1	1	1	1	1	1	1	1	1	1	1
102	Ambulance	1	1	1	1	1	1	1	1	1	1	1
139	Railway	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 was found that the operators had made refunds in 100% cases as claimed by their records.

Similarly, 50-50 live calls were made to call center in each half i.e. 11 to 1pm and 4 to 7pm and it was found that all the operators are meeting the 90% benchmark.

Level 1 call testing was done in all the three drive test cities (Gurdaspur, Firozpur & Sangrur) to the Telephone numbers (100, 101, 102 & 139) emergency calls were landing to their local centers, Overall result was satisfactory for all service providers.

(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 1000 to 0100 hrs and between 1900 to 2000 hrs so that TCBH hours for all the operators were covered.

(2) Performance based on live measurement

Calling Operator	Aircel	Airtel	BSNL	Idea	Reliance (GSM)	Tata (GSM)	Vodafone	Videocon	MTS	Reliance (CDMA)	Tata (CDMA)
	Ambala & Panipat										
Aircel	-	100%	98%	96%	99%	100%	100%	100%	100%	97%	100%
Airtel	97%	-	96%	100%	100%	100%	100%	96%	99%	100%	100%
BSNL	96%	100%	-	97%	100%	99%	96%	100%	97%	98%	98%
Idea	98%	98%	98%	-	100%	100%	100%	100%	99%	99%	100%
Reliance (GSM)	98%	100%	100%	100%	-	100%	100%	99%	100%	100%	100%
Tata (GSM)	99%	96%	98%	100%	97%	-	97%	100%	97%	99%	97%
Vodafone	100%	100%	100%	100%	100%	100%	-	100%	100%	97%	100%
Videocon	99%	98%	100%	99%	97%	99%	100%	-	99%	98%	97%
MTS	100%	97%	99%	100%	100%	100%	98%	98%	-	99%	100%
Reliance (CDMA)	97%	95%	97%	97%	98%	96%	99%	97%	96%	-	97%
Tata (CDMA)	98%	100%	100%	99%	100%	100%	100%	100%	100%	100%	-

(3) Critical Analysis

In the inter-operator call assessment test, calls were made from one operator to other operators so as to check congestion on both the operators' network. In such cases, the radio part, switch part & the POI in-between the operators are involved and hence if any congestion is found in the network, it may be due to any of these parts. The result shows that there is not much congestion on the operator networks except Reliance CDMA with all the operators in the evening time.

(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 100-110Km depending on city areas within the speed limit of 30Km/hr.

DRIVE TEST LOCATIONS***GURDASPUR***

LOW DENSE: Kalanour Chowk, Jail rd, Railway rd, Cantt. Area.
 MEDIUM DENSE: Islamabad, Pathankot-amritsar bypass area, Municipal Area.
 HIGH DENSE: Hero chowk, Amritsar Bypass, Bus stand, Hardowala rd, Girls School.

FIROZPUR

LOW DENSE: Shershah wali chowk, Mall road, Zira road.
 MEDIUM DENSE: Railway station, Cantt. Area.
 HIGH DENSE: Malwal road, Lohara bazaar, Delhi gate, Amritsari gate, Udham singh chowk, Bus stand.

SANGRUR

LOW DENSE: BSNL Exchange, Patiala Road, Gaushala Rd., Mahilan Rd.
 MEDIUM DENSE: Sunam Rd., Upli Rd., Dhuri Gate, Barnala Rd., Dhuri Rd., Sangrur Bypass Rd.
 HIGH DENSE: Bhalwan Rd., Thalash Bagh, Sangrur Bus Stand, and Khamomajra Rd.

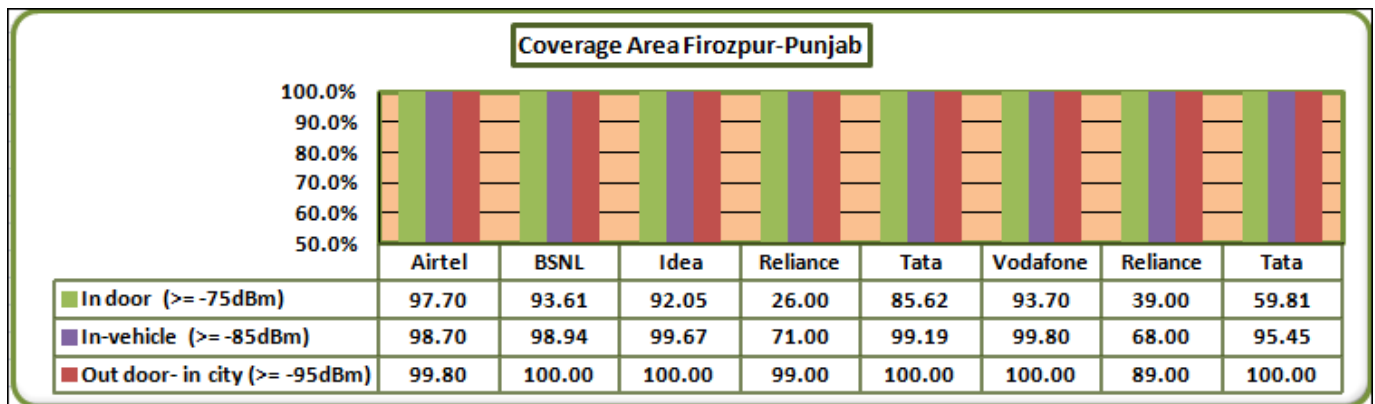
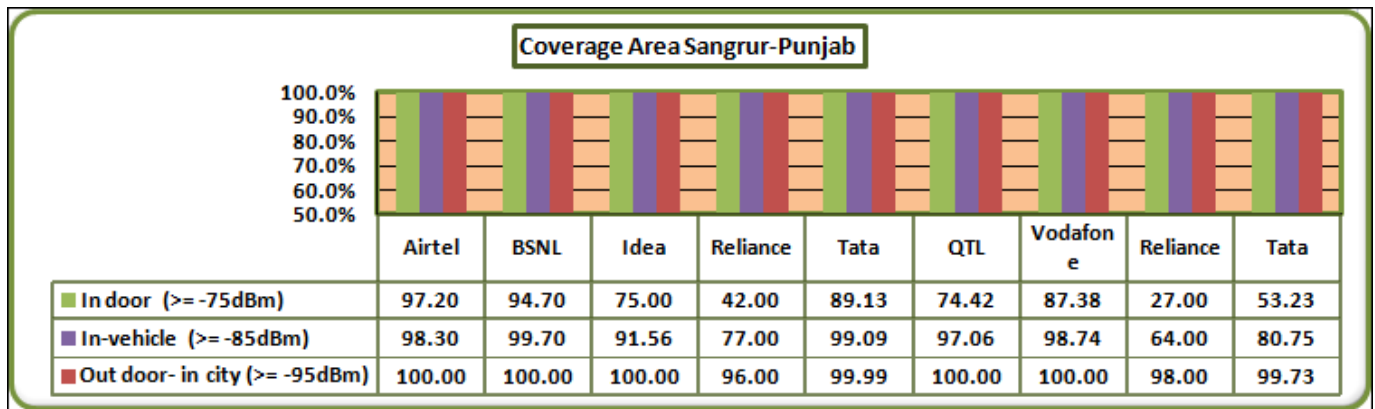
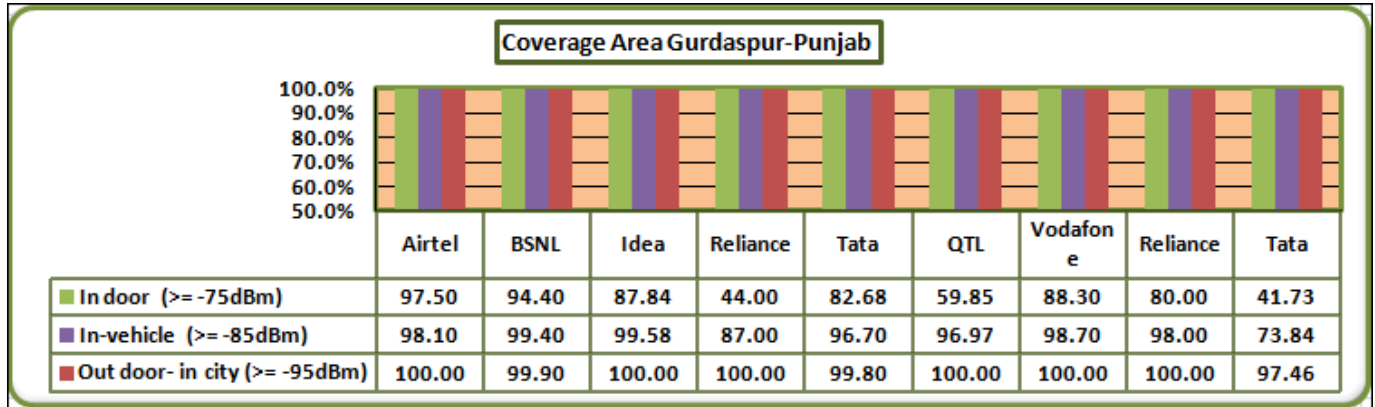
2) Operator Assisted Drive Test (for Punjab Circle)

SN	Parameter	City Name	Airtel	BSNL	Idea	Reliance	Tata	QTL	Vodafone	Reliance	Tata		
			GSM Operators							CDMA Operators			
1.1	Call Attempts	Gurdaspur	77	75	82	70	88	73	71	70	81		
		Firozpur	84	69	82	53	75	ICR With Tata GSM	48	54	86		
		Sangrur	79	103	91	80	61	79	63	80	70		
1.2	Blocked Call Rate (<=3%)	Gurdaspur	0.00%	9.33%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		
		Firozpur	0.00%	0.00%	0.00%	0.00%	0.00%	ICR With Tata GSM	0.00%	0.00%	0.00%		
		Sangrur	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		
1.3	Dropped Call Rate (<=2%)	Gurdaspur	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		
		Firozpur	0.00%	0.00%	0.00%	0.00%	0.00%	ICR With Tata GSM	0.00%	0.00%	0.00%		
		Sangrur	0.00%	0.98%	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)	Gurdaspur								100.00%	97.99%		
		Firozpur								100.00%	99.89%		
		Sangrur								97.00%	98.55%		
(ii) 0-5 (with frequency hopping)	Gurdaspur	98.30%	97.40%	95.00%	98.00%	95.18%	97.07%	97.00%					

		Firozpur	97.90%	93.97%	93.20%	98.00%	98.62%	ICR With Tata GSM	98.00%		
		Sangrur	96.90%	95.70%	97.10%	98.00%	96.55%	96.09%	98.20%		
	Service Coverage										
	In door (>= -75dBm)	Gurdaspur	97.50	94.40	87.84	44.00	82.68	59.85	88.30	80.00	41.73
		Firozpur	97.70	93.61	92.05	26.00	85.62	ICR With Tata GSM	93.70	39.00	59.81
		Sangrur	97.20	94.70	75.00	42.00	89.13	74.42	87.38	27.00	53.23
	In-vehicle (>= -85dBm)	Gurdaspur	98.10	99.40	99.58	87.00	96.70	96.97	98.70	98.00	73.84
		Firozpur	98.70	98.94	99.67	71.00	99.19	ICR With Tata GSM	99.80	68.00	95.45
		Sangrur	98.30	99.70	91.56	77.00	99.09	97.06	98.74	64.00	80.75
	Out door- in city (>= -95dBm)	Gurdaspur	100.00	99.90	100.00	100.00	99.80	100.00	100.00	100.00	97.46
		Firozpur	99.80	100.00	100.00	99.00	100.00	ICR With Tata GSM	100.00	89.00	100.00
		Sangrur	100.00	100.00	100.00	96.00	99.99	100.00	100.00	98.00	99.73
1.5											
	Call Setup Success Rate (>=95%)	Gurdaspur	100.00%	90.67%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
		Firozpur	100.00%	100.00%	100.00%	100.00%	100.00%	ICR With Tata GSM	100.00%	100.00%	100.00%
		Sangrur	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
1.6											

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:

- ✚ Performance of all Operators in **Gurdaspur town** was satisfactory for most of the KPI parameters except for BSNL for the parameter “Blocked Call Rate”, & “CSSR”. During Drive Test, route was covered about 95 Km and CSSR was observed between 90.67% and 100%. Under Voice Quality Section, Airtel & Reliance among GSM and Reliance among CDMA Operator performed slightly better than others. As far as RF coverage level considered, BSNL & Airtel achieved max. No’s. of percentage of samples within -75dBm.
- ✚ Performance in **Firozpur Town** was satisfactory for most of the operators except for BSNL & Idea which fails to meet benchmark for the KPI parameters namely “Good voice quality”. Under RF coverage level section, Airtel performed quite better than others. During Drive, route was covered about 90 Km. Under Voice quality section, Tata GSM showing performance slightly better than other service providers. QTL GSM is having ICR agreement with Tata GSM.
- ✚ Similarly, performance in **Sangrur Town** was satisfactory for all operators for all the KPI parameters. During drive, route was covered about 100 Km. under Voice quality section, Vodafone & Tata CDMA showing slightly higher values than others. As far as RF coverage level considered Airtel performed quite better than other operators.

(E) Independent Drive test**1. Sample Coverage**

The independent drive test activity was conducted in Punjab Circle for various service providers in three different cities namely “**Fazilka, Patiala & Ropar**”. For testing the service provider performance on ground level, TCIL auditor carried out Drive Test and checks the radio coverage along with different KPI parameters by making test calls of 120 sec. in different areas on different days. During Drive test, Route was covered about between 50 to 80 Km for all 3 cities depending upon the city areas within the speed limit of 25-30Km/hr.

Note: Videocon is on ICR with Tata GSM in Narnaul, While Aircel is on ICR with Tata GSM in Patiala.

Drive Test Locations and Service Provider’s name:

- | | |
|-------------------|---|
| 1. <i>Fazilka</i> | - <i>Vodafone (10 BTS), Tata GSM (4 BTS) & Tata CDMA (1 BTS).</i> |
| 2. <i>Patiala</i> | - <i>QTL GSM (66 BTS) & Aircel (with Tata GSM 80BTS).</i> |
| 3. <i>Ropar</i> | - <i>QTL GSM (6 BTS).</i> |

Area Coverage Details:

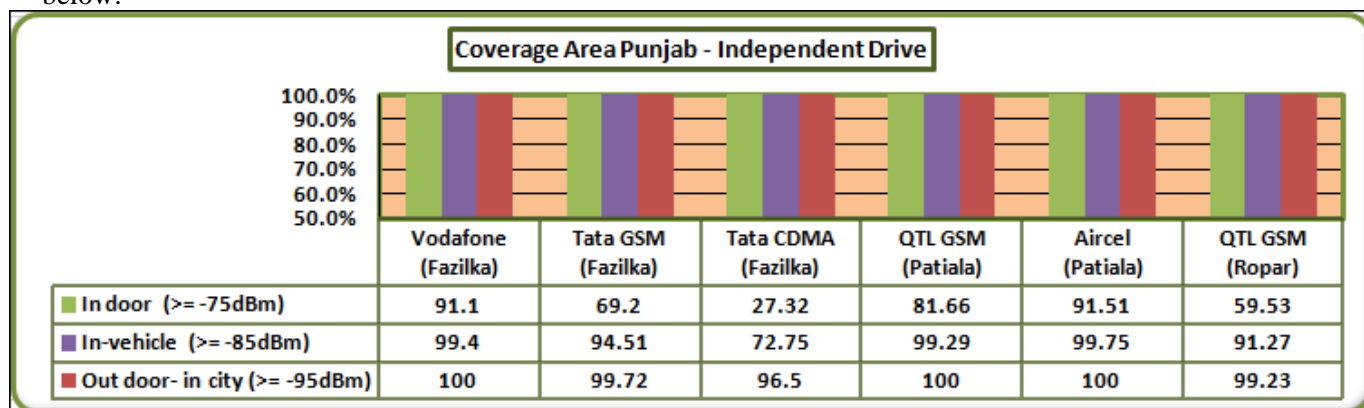
- 1) **Fazilka** : Rampura, Jalalabad Rd, Gaushala Rd, Clock Tower Rd, Radha Swami Colony, Railway Station, Bus Stand Rd, Malout Rd, Grain Market.
- 2) **Patiala** : Qila Mubarak Complex, Qila Androon, Rang Mahal and Sheesh Mahal, Model Town, Bus Stand, Mall Road, Main Market, Railway St., Chandigarh Road.
- 3) **Ropar** : Amritsar Road, Bus Stand, Railway St., Main Market.

2) Performance (for the respective cities for Punjab Circle)

SN	Parameter	Vodafone (Fazilka)	Tata GSM (Fazilka)	Tata CDMA (Fazilka)	QTL GSM (Patiala)	Aircel (Patiala)	QTL GSM (Ropar)
1.1	Call Attempts	41	48	58	128	83	48
1.2	Blocked Call Rate (<=3%)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1.3	Dropped Call Rate (<=2%)	0.00%	0.00%	0.00%	0.78%	0.00%	0.00%
1.4	Percentage of connections with good voice quality (=>95%)						
	(i) 0-4 (w/o frequency hopping)	NA	NA	99.20%	NA	NA	NA
	(ii) 0-5 (with frequency hopping)	97.00%	97.48%	NA	95.21%	95.66%	97.60%
1.5	Service Coverage						
	In door (>= -75dBm)	91.1	69.2	27.32	81.66	91.51	59.53
	In-vehicle (>= -85dBm)	99.4	94.51	72.75	99.29	99.75	91.27
	Out door- in city (>= -95dBm)	100	99.72	96.5	100	100	99.23
1.6	Call Setup Success Rate (>=95%)	100%	100%	100%	100%	100.00%	100%

Graphical Representation

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



(3) Critical Analysis

The drive test data was found to be satisfactory for most of the parameters

- ✦ During Drive Test for **Vodafone, Tata GSM & Tata CDMA in Fazilka Town**, a total of **40 to 55 test calls** were made and out of that **all calls** got successfully established for respective service provider. Under **RF coverage level section**, **Vodafone** performed better than **Tata GSM & Tata CDMA both** as they got 91.11% of samples within -75dBm. & in case of **Voice quality section**, **Tata GSM** showing better results than **Vodafone & Tata CDMA** as they achieving **97.48% of samples within 0-5 number** indicating good voice quality.
- ✦ Performance in **Patiala Town** was found to be satisfactory for all parameter to both of the operators. The **RF coverage level** was found average throughout the town with **QTL GSM (81.66%) & Aircel (91.51%) of samples within -75dBm Rx level** and achieved no blocked and **1** dropped calls with **QTL GSM**. As far as **Voice quality parameter** concerned, both meeting TRAI Benchmark as operator achieved **QTL GSM (95.21%) & Aircel (95.66%) of samples within 0-5 number**. During testing, a total of **QTL GSM (128) & Aircel (83) test calls** were made and all were successfully connected & completed which results into **100% CSSR & HOSR** respectively.
- ✦ Performance of **QTL GSM in Ropar Town** was found to be satisfactory for all parameter to both of the operators. The **RF coverage level** was found average throughout the town with **59.53% of samples within -75dBm Rx level** and achieved no blocked or dropped calls. As far as **Voice quality parameter** concerned, both meeting TRAI Benchmark as operator achieved **97.60% of samples within 0-5 number**. During testing, a total of **48 test calls** were made and all were successfully connected & completed which results into **100% CSSR & HOSR** respectively.

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

From live, month, PMR and Drive Tests findings, it can be concluded that on an average, performance of the operators in the service area (Punjab) is for most of the **Network Parameters**. However, the benchmark of $\leq 3\%$ for “worst affected cells $> 3\%$ TCH drop” is not met by BSNL, Idea, Loop, Tata GSM & Vodafone.

Under **Customer Service Quality Parameter** “accessibility of call centre” parameter it is found that all the operators are fulfilling TRAI benchmark of $\geq 95\%$. Apart from this, the “operator answered calls (voice-to-voice) within 60 seconds” parameter benchmark is not met by Reliance (CDMA & GSM) & Tata GSM for month data.

Regarding **Metering/Billing Credibility** issues, Tata GSM & Tata CDMA shows below benchmark value for Post-paid connections.

II. Basic Telephone Service (Wireline) Providers

- Not conducted for this quarter

III. Broadband Service Providers

- Not conducted for this quarter