



**REPORT**  
**ON**  
**AUDIT & ASSESSMENT OF QUALITY OF SERVICE**  
**OF**  
**CELLULAR MOBILE TELEPHONE SERVICE**  
**FOR**  
**TELECOM REGULATORY AUTHORITY OF INDIA**  
**NORTH ZONE – PUNJAB CIRCLE**  
**(OCTOBER 2013 – DECEMBER 2013)**

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## PREFACE

The Telecom Regulatory Authority of India (TRAI) was established in 1997 by an Act of Parliament, called the Telecom Regulatory Authority of India Act, 1997, to regulate telecom services. The Authority's mission is to ensure that the interest of consumers are protected and at the same time to nurture conditions for growth of telecommunications, broadcasting and cable services in a manner and at a pace which will enable India to play a leading role in emerging global information society.

The Authority, in exercise of its functions as per the provisions in the TRAI Act, has been entrusted to measure the Quality of Service provided by the Service Providers from time to time and to compare them with the benchmarks so as to assess the level of performance. In pursuance of this, TRAI has appointed **M/s TUV-SUD South Asia Pvt. Ltd.** to carry out "Audit and Assessment of Quality of Service" provided by Basic (Wire line), Cellular Mobile and Broadband service providers in terms of the benchmarks specified in the respective regulations, in North and West Zones.

TUV-SUD South Asia carried out QoS audit as per the norms of TRAI in all the eight circles / services areas of the North Zone and four circles of the West Zone. This report details the performance of the various service providers in **Punjab circle** against the QoS bench marks laid down by TRAI in the respective regulations.



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## **1. BACKGROUND**

Telecom Regulatory Authority of India has been entrusted to “lay down the standards of quality of service to be provided by the service providers and ensure the quality of service and conduct the periodical survey of such service provided by the service providers so as to protect interest of the consumers of telecommunication services” vide sub-clause (v) of clause (b) of sub-section (1) of section 11 of the Telecom Regulatory Authority of India Act, 1997 (24 of 1997).

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, the regulatory watch dog for the Quality of Service for the telecom services – Basic (Wire line), Cellular Mobile (Wireless) and Broadband has commissioned **M/s TUV-SUD South Asia Pvt. Ltd.** for conducting audit and assessment of quality of service of service providers, in terms of the benchmarks specified in the “The Standards of Quality of Service of Basic Telephone Service (Wire line) and Cellular Mobile Telephone Service Regulations, 2009 (7 of 2009) dated 20<sup>th</sup> March, 2009 and the Quality of Service of Broadband Service Regulations, 2006 (11 of 2006) dated 6<sup>th</sup> October, 2006 on zonal basis for **North Zone and West Zone** comprising of the following Telecom Circles/Metro Service Areas:

**North Zone:** Delhi, Jammu & Kashmir, Himachal Pradesh, Punjab, Haryana, Rajasthan, Uttar Pradesh-East and Uttar Pradesh-West (including Uttarakhand). For the cellular mobile telephone service the service area of Delhi includes Ghaziabad, Faridabad, Noida and Gurgaon.

**West Zone:** Mumbai, Maharashtra (including Goa and excluding Mumbai), Gujarat and Madhya Pradesh (including Chhattisgarh).

The Audit exercise would assess the Quality of Service of telecom operators providing Basic (Wire line), Cellular Mobile (Wireless) and Broadband services by auditing the relevant QoS records maintained by the



operators, conducting drive tests as well as live measurements and comparing them with quality of service benchmarks stipulated by TRAI. The audit would be carried out by **TUV-SUD South Asia** every quarter across all the Circles/Service areas of North and West Zones for Cellular Mobile Service. However, in respect of Basic telephone service (wireline) and Broadband service, a circle would be audited once in a year.

## **2. OBJECTIVES AND METHODOLOGY**

The primary objective is to audit and assess the Quality of Service being rendered by Basic, Cellular Mobile & Broadband service providers against the parameters notified by TRAI.

The audit and assessment of Quality of Service is carried out by **TUV SUD South Asia across all the Circles/Service areas of North and West Zones for Cellular Mobile Service. Apart from this, Delhi, Haryana & Maharashtra Circles also include audit for Basic (Wire line) and Broadband services as mandated by TRAI, during the quarter October- December 2013.**

The Scope of work as per the Terms of Reference (TOR) includes the following:

- i) Preparation of Performance Monitoring reports (PMRs) and uploading in the system.
- ii) Live measurements of the performance of Service Providers (SPs) against the benchmarks for three days during each audit.
- iii) Monthly audit based on one month data of the SPs.
- iv) Drive test of the RF networks.
- v) Audit of the performance of call centers with respect to their accessibility and percentage of calls answered by the operators and random customer feedback by calling the customers to get feedback of the services provided by the service providers.
- vi) Transfer of data generated by the RF drive test/Live measurements / PMR/ monthly audit to the server located at TRAI premises on real time basis.



### 3. SAMPLE SIZE

#### 3.1 SAMPLING FOR CELLULAR MOBILE (WIRELESS) SERVICE PROVIDERS

- 100% of the Gateway MSC's (GMSC's) and Mobile Switching Centers (MSC's) of all the Cellular Mobile Service Providers or Unified Access Service Providers (UASP) were covered for audit in specified circles/service areas. Following are the various operators covered in Punjab circle

Sl. No.	Name of Service Provider
<b>GSM Operators</b>	
1	AIRCEL
2	AIRTEL
3	BSNL
4	IDEA
5	RCOM GSM
6	TATA GSM
7	QUADRANT TELEVENTURES LTD (QTL)
8	VODAFONE
<b>CDMA Operators</b>	
9	RCOM CDMA
10	TATA CDMA

For all the above operators, audit was conducted in all the three months of the Quarter ended December 2013.



### 3.2 SAMPLING FOR BASIC (WIRE LINE) SERVICES

- The QoS audit for basic (wire line) service is to be done for the number of exchanges spread over in about 10% of SDCAs with each service providers in specified circles. **However, QoS audit for basic (wire line) service was not required to be done for Punjab Circle in the quarter ended December 2013.**

### 3.3 SAMPLING FOR BROADBAND SERVICE PROVIDERS

- TUV–SUD South Asia has to conduct the audit and assessment of Quality of Service of Broadband Service only in respect of the service providers who are having broadband subscriber base of more than 10,000 subscribers in their licensed service area, for 5% of Point of Presence (PoPs) spread over in 10% SDCAs in specified Telecom Circle. **However, the QoS audit for Broadband service was not required to be done for Punjab Circle in the quarter ended December 2013.**



#### 4. EXECUTIVE SUMMARY

The executive summary put in a nutshell the key findings of the Audit by providing: -

- “Service provider performance report” for Cellular mobile, Basic (wire line) and Broadband services , which gives a foretaste of the performance of various operators against the benchmark specified by TRAI, during the months in which the Audit was carried out by TUV-SUD Auditors
- “Parameter wise critical findings” for Cellular mobile, Basic (wire line) and Broadband services: This indicates key observations and findings from different activities carried out during the Audit process
- TUV-SUD conducted audit involved a 3 stage verification process which consisted of auditing the records of the service providers and verifying the data submitted to TRAI. The second step involved a three day live measurement of all the network parameters. On the basis of the three days live measurement, the auditors checked the busy hour of the day for the service provider and collected the data for this busy hour for the month in which the audit was conducted. Finally, the performance of the service providers was also gauged by conducting 3 drive tests in different cities of a circle/service area per service provider per month. Thus total 90 (3x10x3) drive tests in three months of quarter ended December 2013 were carried out in **Punjab circle**.

The three stage audit / verification viz audit of the records, live measurements and drive tests of all the cellular mobile operators was repeated every month. In case of Basic (Wire line) and Broadband, this exercise is required to be carried out on quarterly basis.





#### 4.1 SERVICE PROVIDER PERFORMANCE REPORT BASED ON MONTHLY DATA VERIFICATION: NETWORK SERVICE QUALITY PARAMETER- CELLULAR MOBILE SERVICES.

##### BUSY HOUR OF VARIOUS SERVICE PROVIDERS:

Sl. No.	Name of Service Provider	Month of Audit	Network TCBH Hour
<b>GSM Operators</b>			
1	AIRCEL	Dec-13	19:00 - 20:00
2	AIRTEL	Dec-13	20:00 - 21:00
3	BSNL	Dec-13	19:00 - 20:00
4	IDEA	Dec-13	19:00 - 20:00
5	RCOM GSM	Dec-13	19:00 - 20:00
6	TATA GSM	Dec-13	19:00 - 20:00
7	QUADRANT TELEVENTURES LTD	Dec-13	20:00 - 21:00
8	VODAFONE	Dec-13	19:00 - 20:00
<b>CDMA Operators</b>			
9	RCOM CDMA	Dec-13	19:00 - 20:00
10	TATA CDMA	Dec-13	20:00 - 21:00

The TCBH reported by all the service providers matched the network busy hour calculated by TUV auditors for the Punjab circle.

##### SWITCHES/BSC/BTS DETAILS OF OPERATORS:

Sl. No.	Name of Service Provider	No. of MSC + GMSC	No. of BSC	No. of BTS	NSS make	BSS make
<b>GSM Operators</b>						
1	AIRCEL	1	6	600	NSN	NSN
2	AIRTEL	24	58	4823	Ericsson	Ericsson
3	BSNL	14	50	2969	Ericsson & ZTE	Ericsson, ZTE & NSN
4	IDEA	9	52	4518	ZTE	ZTE & Huawei
5	RCOM GSM	3	8	1670	Huawei & Ericsson	ZTE
6	TATA GSM	2	12	1651	NSN	NSN
7	QTL	2	11	2019	Huawei & NSN	Huawei
8	VODAFONE	9	50	4471	Ericsson	Ericsson
<b>CDMA Operators</b>						
9	RCOM CDMA	4	3	900	Lucent, ZTE & Ericsson	Lucent & ZTE
10	TATA CDMA	4	5	562	Ericsson	Huawei & Motorola



TABLES OF MONTHLY QOS PERFORMANCE:

TABLE: 1

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE- OCT-13 MONTH													
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators									CDMA Operators
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	Oct-13	0.19%	0.06%	0.57%	0.03%	0.09%	0.00%	0.06%	0.03%	0.12%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	Oct-13	0.17%	0.08%	0.34%	0.00%	0.12%	0.00%	0.00%	0.00%	0.11%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Oct-13	97.95%	99.16%	97.47%	98.11%	99.63%	99.26%	97.77%	99.81%	99.07%	98.93%
	b) SDCCH/PAGING Channel congestion	<=1%	Oct-13	0.07%	0.09%	0.84%	0.10%	0.02%	0.00%	0.26%	0.03%	0.00%	0.00%
	c) TCH congestion	<=2%	Oct-13	0.44%	0.15%	1.68%	0.54%	0.04%	0.06%	0.35%	0.19%	0.00%	0.04%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Oct-13	0.79%	0.55%	1.44%	0.67%	0.31%	0.60%	1.03%	0.62%	0.01%	0.63%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Oct-13	2.00%	1.01%	3.18%	0.89%	0.04%	4.51%	1.69%	0.94%	0.04%	3.36%
	c) Connections with good voice quality	>=95%	Oct-13	97.79%	98.63%	NP	96.67%	98.98%	97.53%	97.58%	98.07%	99.70%	NP
4	No. of POI's having >=0.5% POI congestion		Oct-13	0	0	0	0	0	0	0	0	0	0



TABLE: 2

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE- NOV-13 MONTH													
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators								CDMA Operators	
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	Nov-13	0.13%	0.03%	0.05%	0.03%	0.07%	0.03%	0.09%	0.02%	0.06%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	Nov-13	0.00%	0.06%	0.00%	0.00%	0.18%	0.00%	0.00%	0.09%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Nov-13	98.17%	99.35%	97.56%	98.20%	99.67%	99.24%	97.97%	99.84%	99.02%	98.98%
	b) SDCCH/PAGING Channel congestion	<=1%	Nov-13	0.03%	0.08%	0.85%	0.07%	0.03%	0.00%	0.16%	0.04%	0.00%	0.00%
	c) TCH congestion	<=2%	Nov-13	0.40%	0.12%	1.67%	0.54%	0.03%	0.00%	0.41%	0.16%	0.00%	0.09%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Nov-13	0.73%	0.51%	1.57%	0.59%	0.29%	0.50%	0.79%	0.61%	0.00%	0.56%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Nov-13	1.50%	1.04%	3.56%	0.67%	0.02%	3.76%	1.30%	0.81%	0.04%	3.54%
	c) Connections with good voice quality	>=95%	Nov-13	97.88%	98.68%	NP	96.91%	99.04%	97.85%	97.92%	98.10%	99.70%	98.98%
4	No. of POI's having >=0.5% POI congestion		Nov-13	0	0	0	0	0	0	0	0	0	0



**TABLE: 3**

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE- DEC-13 MONTH													
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators									CDMA Operators
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	Dec-13	0.10%	0.05%	0.23%	0.04%	0.09%	0.04%	0.05%	0.03%	0.10%	0.13%
	b) Worst affected BTSs due to downtime	<=2%	Dec-13	0.00%	0.04%	1.52%	0.02%	0.18%	0.00%	0.00%	0.11%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Dec-13	98.17%	99.40%	97.29%	98.39%	99.70%	99.20%	97.16%	99.85%	98.92%	98.98%
	b) SDCCH/PAGING Channel congestion	<=1%	Dec-13	0.02%	0.06%	0.93%	0.08%	0.02%	0.00%	0.11%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Dec-13	0.11%	0.12%	1.52%	0.38%	0.03%	0.07%	0.71%	0.15%	0.00%	0.00%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Dec-13	0.77%	0.49%	1.57%	0.59%	0.27%	0.54%	0.87%	0.61%	0.01%	0.61%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Dec-13	1.44%	1.02%	<b>9.32%</b>	0.63%	0.02%	<b>4.03%</b>	0.88%	0.78%	0.07%	<b>3.07%</b>
	c) Connections with good voice quality	>=95%	Dec-13	97.97%	98.71%	NP	96.87%	99.07%	97.96%	97.76%	98.12%	99.70%	99.03%
4	<b>No. of POI's having &gt;=0.5% POI congestion</b>		Dec-13	0	0	0	0	0	<b>2</b>	0	0	0	0

**KEY FINDINGS: CELLULAR MOBILE SERVICES**

The audit of network related parameters for cellular mobile service providers was conducted at their respective MSCs in the circle. However, in case of Reliance Communication, the audit of Customer service related parameters was conducted at their central NOC at DAKC Mumbai.

TUV conducted audit for cellular mobile operators based on **three stage audit / verification viz audit of the records, live measurements and drive tests. This exercise has been repeated every month for CMSPs.**



**Network Service Quality Parameters:**

▪ **Network Availability**

- i. BTS Accumulated Downtime (Not Available for Service):
- ii. Worst affected BTSs due to downtime

For measuring the performance against the benchmark for this parameter, down time of each BTS lasting for more than 1 hour at a time in a day during the period of a month has been taken for computation.

In Punjab circle, all the operators were found meeting benchmark on the above parameters 'BTS accumulated downtime' and 'worst affected BTSs due to down time' in all the three months of the quarter.

▪ **Connection Establishment (Accessibility)**

- i. Call Set-up Success Rate(CSSR)

CSSR includes complete signaling in the call set up process and does not aim to measure the performance of the called exchange or that of the Point of Interconnection (POI). CSSR was established as the ratio of total number of successful call attempts (establishment) to the total number of call attempts made. All the operators were found to be calculating the parameter as per the TRAI's specified norms.

All the operators were comfortably meeting the benchmark on this parameter.

▪ **Parameters related to Network Congestion:**

The parameters namely SDCCH / Paging Channel Congestion, TCH and POI are prescribed with the aim of measuring the congestion in the network.

In CDMA system, there is no direct counter defined for reporting Paging Channel Congestion as reported by Tata Teleservices. However, they have a defined counter for Paging Channel Occupancy Ratio (PCH Average Using Ratio) which is used to determine the Paging Channel Occupancy which on an average is < 50% on all sites in the network. When the value of this parameter is less than 100%, it is counted as 0% congestion. Thus, there is no congestion on the paging channel in CDMA system.

With respect to this parameter, the performance of the operators is quite satisfactory as all operators met the TRAI specified benchmarks on the congestion parameters. However, for the parameter '**congestion on individual POI links between a service provider vis-à-vis other service providers**', **Tata (GSM) was found having congestion on two no. of POIs, one with Data Com Access and the other with TCL-NLD in the month of December-13.**

▪ **Connection Maintenance (Retainability)**

- i. Call Drop Rate:

This parameter gives a reliable measurement of the mobile network used by the service provider for maintaining a call once it has been correctly established. Failures in coverage, network congestion and network failures have important impact on this parameter.



The audit of this parameter revealed that all the service providers were measuring this parameter as per the TRAI guidelines. Also, all the service providers were found to be meeting the TRAI specified benchmark. The lowest call drop rate (0.01 %) was for RCOM CDMA during the quarter.

ii. Worst affected cells having more than 3% TCH drops

Worst affected cells are defined as cells in which the call drop rate exceeds 3% during cell Bouncing Busy Hour (CBBH) or at any other hour of a day.

The audit with respect to this parameter revealed that all the operators met the benchmark for this parameter except **BSNL and Tata (GSM)**. BSNL could perform for this parameter as **3.18%, 3.56% and 9.32%** during the months of October, November and December 2013 respectively, whereas the performance of **Tata (GSM)** remained **4.51%, 3.76% and 4.03%** in the month of October, November and December -13 respectively. The performance of **Tata CDMA** was 3.36%, 3.54% & 3.07% in the respective months of the quarter.

*Tata (GSM) had the similar non-compliance during live measurements in the months of October, November and December -2013.*

iii. Connections with good voice quality:

Some of the Operators are measuring this parameter through the system generated data at their switches whereas some are measuring through their periodic drive tests. The audit results for this parameter indicates that all operators have met the bench mark successfully during the quarter. BSNL is not getting the data generated by the system for this parameter, so not provided the data for this parameter.



**4.2 CUSTOMER SERVICE QUALITY PARAMETERS MEASUREMENT-QE DEC-13:**

CSD DATA FOR CELLULAR MOBILE TELEPHONE SERVICES-QE DEC-13													
Quarterly CSD Audit Data		Bench- mark	Circle Name	AIRCEL	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	QTL	VODAFONE	RCOM (CDMA)	TATA (CDMA)
S/ N	Name of Parameter			GSM Operators								CDMA Operators	
<b>Customer Service Quality Parameters</b>													
1	<b>Metering &amp; Billing Credibility -Post Paid</b>												
	A) No. of bills issued during the quarter		Punjab	12381	535493	38678	582916	29606	52367	Not App.	361236	65194	66684
	B) No. of bills disputed including billing complaints during the quarter		Punjab	0	275	16	254	24	0	Not App.	139	61	0
	C)% of billing complaints during the quarter	<= 0.1%	Punjab	0.00%	0.01%	0.03%	0.04%	0.08%	0.00%	Not App.	0.04%	0.09%	0.00%
2	<b>Metering &amp; Billing Credibility -Pre Paid</b>												
	A) Total No. of Pre-paid customers at the end of the quarter		Punjab	947182	6659904	4413113	5218590	2582602	2990728	1886650	4183618	308427	2990728
	B) Total No. of complaints relating to charging, Credit and Validity during the quarter		Punjab	0	281	217	321	2595	0	56	133	305	0
	C) % of Pre-paid Charging Complaints	<= 0.1%	Punjab	0.00%	0.00%	0.00%	0.01%	0.10%	0.00%	0.00%	0.00%	0.10%	0.00%
3	<b>Resolution of Billing/Charging Complaints and Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints</b>												
	A) No. of Billing/Charging/Credit/Validity Complaints received during the quarter		Punjab	0	4275	233	3748	2619	0	56	272	366	0
	B) No. of billing complaints for Post paid customers/Charging/Credit/Validity complaints for pre-paid customers resolved within 4 weeks during the quarter		Punjab	0	4275	233	3748	2619	0	56	272	366	0
	C) % of billing complaints (for post paid customer) / Charging/Credit/Validity (for Pre paid customer) resolved within 4 weeks	100 % within 4 week	Punjab	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	D) % of Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints	<=1 week	Punjab	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
4	<b>Response time to customers for assistance</b>												
	A) Accessibility of call centre/Customer Care	>=95%	Punjab	99.94%	99.99%	100.00%	100.00%	98.95%	99.13%	95.50%	100.00%	99.01%	98.07%



	B) % call answered by operators(voice to voice) within 60 sec.	>=90%	Punjab	92.65%	94.00%	66.62%	98.60%	77.84%	99.09%	92.03%	97.83%	90.32%	98.60%
5	<b>Termination/closure of service</b>												
	A) Total No. of requests for Termination / Closure of service received during the quarter		Punjab	120	3711	305	2004	368	354	Not App.	1484	239	928
	B) No. of requests for Termination / Closure of service complied within 7 days during the quarter		Punjab	120	3711	305	2004	368	354	Not App.	1484	239	928
	C) % of Termination/ Closure of service within 7 days	<=7days	Punjab	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	Not App.	100.00%	100.00%	100.00%
6	<b>Time taken for refunds of deposits after closures.</b>												
	A) No. of Payments/ Refunds due during the quarter		Punjab	20	4275	220	301	220	126	Not App.	1484	339	59
	B) No. of Payments/ Refunds Cleared during the quarter		Punjab	20	4275	220	301	220	126	Not App.	1484	339	59
	C)Time taken for refunds of deposits after closures.	100% within 60 days	Punjab	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	Not App.	100.00%	100.00%	100.00%

**KEY FINDINGS:**

**1. Metering and billing credibility-(Post paid & Pre-paid)**

The performance of the service providers with respect to the parameter metering and billing credibility for both post-paid and pre-paid is well within the prescribed bench mark of <=0.1 %. Quadrant Televentures Ltd (QTL) has no post-paid customers, so not provided the data for billing related parameters applicable for post-paid subscribers.

- i. Resolution of billing /charging complaints
- ii. Period of applying credit/waiver/adjustment to customer's account from the date of resolution of complaints

All operators were found meeting the benchmarks of the above parameters

**2. Response Time to the Customer for assistance**

- i. Accessibility of call centre/customer care
- ii. Percentage of calls answered by Operators (Voice to Voice)

All service providers except **BSNL and RCOM (GSM)**, are in compliance with respect to the parameter accessibility of call center. BSNL and RCOM (GSM) have not met the benchmark of 'calls answered by Operators (voice to voice) within 60 seconds'. They could achieve their performance level as **66.62%** and **77.84%** respectively against the benchmark of 90%.





### ***3. Termination/Closure of Service***

In case of this parameters also, all service providers have settled the closure/termination within the benchmark of 7 days.

### ***4. Time Taken for Refund of deposits after closures***

All operators were found to have complied with the benchmark of 100% refund of deposits within 60 days of closure.



**4.3 SERVICE PROVIDER PERFORMANCE REPORT BASED ON 3-DAYS LIVE MEASUREMENT DATA VERIFICATION CONDUCTED IN EACH MONTH OF THE QUARTER:**

**A) NETWORK SERVICE QUALITY PARAMETER- CELLULAR MOBILE SERVICES**

**TABLE: 1**

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE- OCT-13 MONTH													
Live measurement Data		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators			
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	Live data	0.19%	0.18%	0.21%	0.04%	0.18%	0.01%	0.13%	0.03%	0.18%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.14%	99.26%	97.11%	98.17%	99.63%	99.28%	98.13%	99.82%	99.07%	99.24%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.00%	0.14%	0.52%	0.06%	0.02%	0.00%	0.07%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.10%	0.09%	1.82%	0.59%	0.04%	0.01%	0.17%	0.18%	0.00%	0.01%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.73%	0.57%	1.97%	0.65%	0.31%	0.58%	0.93%	0.64%	0.01%	0.59%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	5.56%	1.15%	2.96%	0.76%	0.00%	3.90%	1.83%	1.66%	0.02%	3.12%
	c) Connections with good voice quality	>=95%	Live data	97.86%	99.58%	97.98%	96.71%	99.01%	97.71%	98.07%	98.03%	99.70%	NP
4	<b>No. of POI having &gt;=0.5% congestion</b>		Live data	0	0	0	0	0	0	0	0	0	0



TABLE: 2

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE- NOV-13 MONTH													
Live measurement Data		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators									CDMA Operators
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	Live data	0.06%	0.05%	0.23%	0.02%	0.06%	1.17%	0.10%	0.01%	0.05%	0.03%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.33%	99.44%	98.02%	98.30%	99.68%	99.29%	97.54%	99.84%	98.93%	98.86%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.00%	0.05%	0.62%	0.05%	0.01%	0.001%	0.17%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.04%	0.08%	1.56%	0.56%	0.04%	0.01%	0.53%	0.16%	0.005%	0.04%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.71%	0.51%	1.36%	0.58%	0.28%	0.56%	0.81%	0.64%	0.01%	0.61%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	3.22%	1.07%	2.87%	0.67%	0.00%	3.93%	1.29%	1.32%	0.01%	3.39%
	c) Connections with good voice quality	>=95%	Live data	97.94%	98.69%	NP	96.83%	99.01%	97.72%	97.85%	98.07%	99.70%	NP
4	No. of POI having >=0.5% congestion		Live data	0	0	0	0	0	0	0	0	0	0



TABLE: 3

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE- DEC-13 MONTH													
Live measurement Data		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators									CDMA Operators
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	Live data	0.21%	0.04%	0.25%	0.27%	0.11%	0.00%	0.03%	0.02%	0.09%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.30%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.31%	99.42%	97.82%	98.49%	99.68%	99.23%	97.49%	99.86%	98.89%	98.93%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.00%	0.04%	0.68%	0.10%	0.02%	0.00%	0.08%	0.01%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.01%	0.11%	1.56%	0.37%	0.03%	0.08%	0.60%	0.14%	0.00%	0.08%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.70%	0.52%	1.53%	0.56%	0.28%	0.51%	0.81%	0.58%	0.00%	0.58%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	4.94%	1.03%	3.11%	0.57%	0.00%	4.05%	0.84%	1.19%	0.04%	0.83%
	c) Connections with good voice quality	>=95%	Live data	97.87%	98.70%	NP	96.94%	99.05%	97.91%	97.82%	98.14%	99.70%	99.06%
4	No. of POI having >=0.5% congestion		Live data	0	0	0	0	0	0	0	0	0	0

**KEY FINDING ON 3 DAYS LIVE MEASUREMENTS:**

From three days live measurement assessment, it is found that the performance of all operators is satisfactory as they are largely meeting the benchmarks except the parameter 'Worst affected cells> 3 % TCH drops". The benchmark for this parameter was not met by **Aircel, Tata (GSM) and Tata (CDMA)** during the live measurements in all three months of the Quarter ended December-2013. BSNL also failed to meet the benchmark in the month of December 2013. The performance level of Aircel was 5.56%, 3.22% and 4.94% during the live measurements in the months of October, November and December 2013 respectively. Tata (GSM) could perform as 3.90%, 3.93% and



4.05% in the respective months and Tata (CDMA) remained with performance level as 3.12% in October & 3.39% in November-13 months. *The similar non-compliance of Tata (GSM) has been observed in monthly audit.*

*From the above analysis, it is concluded that the performance of Aircel, Tata (GSM) and Tata (CDMA) is not satisfactory in respect of the parameter "Worst affected cells> 3 % TCH drops".*

**INTER OPERATOR CALLS ASSESSMENT**

Inter operator call assessment with a sample of 2x50 test calls for each Service provider operating in Punjab service area during the time 1100 to 1400 Hrs and 1600 to 1900 was carried out by TUV auditors. The test calls were made from one operator to another within the same licensed area to judge the ease of connectivity amongst the operators. While doing this exercise, the radio part, the switch part and POI in between the two operators are involved. Congestion in any of these network elements could result in congestion in the network.

<b>INTER OPERATOR CALL ASSESSMENT BASED ON LIVE MEASUREMENT</b>											
Calling Operators	Circle Name	AIRCEL	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	QTL	VODAFONE	RCOM (CDMA)	TATA (CDMA)
AIRCEL	<b>Punjab</b>	--	100%	94%	100%	100%	100%	100%	97%	100%	97%
AIRTEL	<b>Punjab</b>	100%	--	100%	100%	100%	100%	100%	100%	100%	100%
BSNL	<b>Punjab</b>	92%	100%	--	100%	100%	100%	94%	100%	100%	95%
IDEA	<b>Punjab</b>	100%	100%	100%	--	100%	100%	100%	100%	100%	100%
RCOM (GSM)	<b>Punjab</b>	100%	100%	100%	100%	--	100%	100%	100%	100%	100%
TATA (GSM)	<b>Punjab</b>	100%	100%	100%	100%	100%	--	100%	100%	100%	100%
QTL	<b>Punjab</b>	100%	100%	100%	100%	100%	100%	--	100%	100%	100%
VODAFONE	<b>Punjab</b>	100%	100%	100%	100%	100%	100%	100%	--	100%	100%
RCOM (CDMA)	<b>Punjab</b>	100%	100%	100%	100%	100%	100%	100%	100%	--	100%
TATA (CDMA)	<b>Punjab</b>	100%	100%	100%	100%	100%	100%	100%	100%	100%	--

The result of the testing revealed that the inter connection performance among the operators is somewhat satisfactory. However, Calls attempted from Aircel to BSNL and Vodafone were 94% and 97% successful and BSNL to Aircel, QTL and Tata CDMA were 92%, 94% and 95% respectively.



**B) CUSTOMER SERVICE QUALITY PARAMETER- CELLULAR MOBILE SERVICES**

CSD 3 DAYS LIVE DATA FOR CELLULAR MOBILE TELEPHONE SERVICES-QE-DEC-13													
3 days live CSD Audit Data		Bench- mark	Circle Name	AIRCEL	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	QTL	VODAFONE	RCOM (CDMA)	TATA (CDMA)
S/ N	Name of Parameter			GSM Operators							CDMA Operators		
<b>Response time to customers for assistance</b>													
1	A) Accessibility of call centre/Customer Care	>=95%	Punjab	99.93%	100.00%	100.00%	100.00%	98.99%	99.11%	99.30%	100.00%	99.34%	100.00%
	B) % call answered by operators(voice to voice) within 60 sec.	>=90%	Punjab	92.30%	90.00 %	31.46 %	100.00%	92.82%	99.00%	91.86%	99.05 %	89.50%	99.20 %

**CUSTOMER CARE / HELPLINE ASSESSMENT**

LIVE CALLING TO CALL CENTRE											
	Circle Name	AIRCEL	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	QTL	VODAFONE	RCOM (CDMA)	TATA (CDMA)
Total No. of calls Attempted	Punjab	100	100	100	100	100	100	100	100	100	100
Total No. of calls connected to IVR	Punjab	100	100	100	100	100	100	100	100	100	100
Calls got connected to agent within 60 Sec	Punjab	100	100	100	100	100	100	100	100	100	100
%age of calls got answered	Punjab	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

**KEY FINDINGS:** The results for three days live measurements reveal that all operators have met the benchmarks for the parameters 'Accessibility to call center and call connection to operators (Voice to voice) except BSNL and RCOM (CDMA) which have performed with 31.46% and 89.50% of calls connected to operator within 60 seconds. Thus performance of BSNL is very poor with respect to this parameter.

In case of calls answered by operators (voice to voice) within 60 seconds when test calls were made to the call centers, the calls got connected within 60 seconds for all the operators.



**LEVEL-1 LIVE CALLING**

LEVEL 1 LIVE CALLING												
Emergency no.	Circle Name	No. of calls made	AIRCEL	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	QTL	VODAFONE	RCOM (CDMA)	TATA (CDMA)
101	Punjab	50	50	50	50	50	50	50	50	50	50	50
102	Punjab	50	50	50	50	50	50	50	50	50	50	50
100	Punjab	30	30	30	30	30	30	30	30	30	30	30

To assess the availability and efficiency of level 1 services such as police, fire, ambulance (emergency services) offered by various mobile service providers, the calls were made from mobile phones provided by the service providers. In Punjab service area, these services were found functional in the networks of all the service providers.

**5. DRIVE TEST**

**5.1 OPERATOR ASSISTED DRIVE TEST:**

In Punjab Service area, total 90 drive tests in three months of the quarter ended December 2013 @ of 3 drive tests per operator per month (total 3x10x3=90 drive tests) were conducted covering Jalandhar, Hoshiarpur and Kapurthala during the month of October-13, Ludhiana, Sangrur and Moga during November -13 and Patiala, Bathinda and Mansa cities during December-2013 . The performance of the operators has been highlighted below in the Tables. The drive test was conducted simultaneously for all the operators following the same route of drive tests. A sample of about 120 - 150 test calls were made during a drive test covering about a distance of 100 K.M. The holding period for all test calls was 120 seconds. The drive test vehicle across all routes plied at a speed of about 30-50 km per hour. The routes were so selected that the drive test could cover the congested areas/commercial areas of the above 09 cities in Punjab circle.

For measuring voice quality, Rx Qual samples on a scale from 0 to 7 for GSM operators and Frame Error Rate (FERs) for CDMA service providers were measured. As per the QoS norms, Rx Qual between 0- 5 for GSM operators and between 0-4% FER value for CDMA operators FERs is considered to be good, where as Rx Qual beyond this benchmark is considered to be bad. Call drops were measured by the number of calls that were dropped to the total number of calls established during the drive test. Similarly CSSR was measured as the ratio of total calls established to the total call attempts made. Signal strength was measured in dBm at street level with strength  $\geq -75$  dBm for in-door coverage and  $\geq -85$  dBm for in-vehicle.

**AUDIT & ASSESSMENT OF QOS FOR QE-DECEMBER-2013-PUNJAB CIRCLE**



**DRIVE TEST TABLE: 1**

<b>OPERATOR-ASSISTED DRIVE TEST-PUNJAB CIRCLE-OCT-13 MONTH</b>														
S/N	Parameter	City Name	Drive Test Period	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA	
				GSM Operators								CDMA Operators		
1	Blocked Call Rate (<=3%)	Jalandhar	Oct-13	ICR	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Hoshiarpur	Oct-13	ICR	0.00%	0.00%	0.00%	0.95%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Kapurthala	Oct-13	ICR	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.93%	0.00%	
2	Dropped Call Rate (<=2%)	Jalandhar	Oct-13	ICR	0.00%	0.00%	0.00%	0.00%	0.79%	0.00%	0.00%	0.00%	0.00%	
		Hoshiarpur	Oct-13	ICR	0.00%	1.04%	0.00%	0.95%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Kapurthala	Oct-13	ICR	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
3	<b>Percentage connections with good voice quality (=&gt;95%)</b>													
	(a) 0-4 (w/o frequency hopping for CDMA Optrs.)	Jalandhar	Oct-13	ICR	NA	NA	NA	NA	NA	NA	NA	NA	98.17%	99.15%
		Hoshiarpur	Oct-13	ICR	NA	NA	NA	NA	NA	NA	NA	NA	99.08%	98.06%
		Kapurthala	Oct-13	ICR	NA	NA	NA	NA	NA	NA	NA	NA	99.65%	99.98%
	(b) 0-5 (with frequency hopping for GSM Operators)	Jalandhar	Oct-13	ICR	96.27%	100.0%	98.07%	97.44%	95.68%	96.23%	97.55%	NA	NA	
		Hoshiarpur	Oct-13	ICR	97.85%	100.0%	98.25%	96.43%	95.37%	96.66%	98.07%	NA	NA	
Kapurthala		Oct-13	ICR	97.63%	100.0%	98.07%	95.45%	97.61%	96.19%	99.52%	NA	NA		
4	<b>Service Coverage</b>													
	In door (>= -75dBm)	Jalandhar	Oct-13	ICR	97.01%	96.82%	83.71%	59.64%	91.68%	76.28%	95.39%	91.18%	60.25%	
		Hoshiarpur	Oct-13	ICR	93.39%	79.02%	71.26%	54.25%	88.23%	62.14%	97.23%	71.78%	44.53%	
		Kapurthala	Oct-13	ICR	84.43%	94.62%	71.92%	32.31%	79.40%	72.77%	95.22%	80.50%	42.89%	
	In-vehicle (>= -85dBm)	Jalandhar	Oct-13	ICR	99.79%	99.80%	99.77%	89.24%	99.50%	97.22%	99.42%	96.68%	94.45%	
		Hoshiarpur	Oct-13	ICR	99.63%	98.32%	97.48%	88.24%	98.66%	94.90%	99.99%	97.05%	80.73%	
		Kapurthala	Oct-13	ICR	97.40%	98.08%	98.19%	72.53%	98.09%	97.01%	99.90%	98.12%	78.84%	
	Outdoor - in city (>= -95dBm)	Jalandhar	Oct-13	ICR	99.96%	100.0%	100.0%	99.56%	100.0%	100.0%	100.0%	100.0%	99.78%	
		Hoshiarpur	Oct-13	ICR	99.94%	99.93%	99.83%	98.51%	99.98%	100.0%	100.0%	99.89%	98.07%	
Kapurthala		Oct-13	ICR	99.99%	100.0%	100.0%	96.18%	99.99%	100.0%	100.0%	100.0%	99.34%		
5	Call Setup Success Rate (>=95%)	Jalandhar	Oct-13	ICR	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%		
		Hoshiarpur	Oct-13	ICR	100.0%	100.0%	100.0%	99.05%	100.0%	100.0%	100.0%	100.0%		
		Kapurthala	Oct-13	ICR	100.0%	100.0%	99.15%	100.0%	100.0%	100.0%	100.0%	99.07%		

\*NA: Not Applicable, ICR: Intra Circle Roaming





**DRIVE TEST TABLE: 2**

OPERATOR-ASSISTED DRIVE TEST-PUNJAB CIRCLE-NOV-13 MONTH													
S/N	Parameter	City Name	Drive Test Period	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
1	Blocked Call Rate (<=3%)	Ludhiana	Nov-13	0.00%	0.00%	0.79%	0.00%	2.07%	ICR	0.59%	0.00%	0.00%	0.00%
		Sangrur	Nov-13	ICR	0.00%	1.33%	2.35%	1.39%	0.00%	0.00%	0.00%	0.00%	0.00%
		Moga	Nov-13	ICR	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.78%	0.00%	0.00%
2	Dropped Call Rate (<=2%)	Ludhiana	Nov-13	0.68%	0.00%	8.66%	0.00%	0.00%	ICR	0.00%	0.00%	0.00%	0.00%
		Sangrur	Nov-13	ICR	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		Moga	Nov-13	ICR	0.00%	0.74%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Percentage connection with good voice quality (=>95%)													
3	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Ludhiana	Nov-13	NA	NA	NA	NA	NA	NA	NA	NA	99.66%	98.76%
		Sangrur	Nov-13	NA	NA	NA	NA	NA	NA	NA	NA	98.93%	98.81%
		Moga	Nov-13	NA	NA	NA	NA	NA	NA	NA	NA	99.28%	99.15%
	(b) 0-5 (with frequency hopping for GSM Operators)	Ludhiana	Nov-13	92.45%	96.03%	87.06%	95.12%	95.48%	ICR	94.35%	96.94%	NA	NA
		Sangrur	Nov-13	ICR	97.90%	94.27%	97.67%	98.23%	97.33%	97.32%	98.05%	NA	NA
		Moga	Nov-13	ICR	98.03%	86.73%	97.67%	99.11%	97.90%	96.65%	98.37%	NA	NA
Service Coverage													
4	In door (>= -75dBm)	Ludhiana	Nov-13	80.8%	96.41%	100.0%	98.84%	77.34%	ICR	85.05%	99.80%	94.17%	75.62%
		Sangrur	Nov-13	ICR	87.40%	74.54%	92.58%	58.30%	94.94%	68.90%	96.38%	77.29%	54.32%
		Moga	Nov-13	ICR	92.17%	72.98%	88.13%	72.58%	81.59%	73.25%	97.81%	92.18%	18.69%
	In-vehicle (>= -85dBm)	Ludhiana	Nov-13	98.6%	99.95%	100.0%	99.79%	97.38%	ICR	99.39%	100.0%	99.61%	99.38%
		Sangrur	Nov-13	ICR	98.94%	96.71%	99.59%	90.27%	99.97%	95.76%	99.98%	97.53%	91.06%
		Moga	Nov-13	ICR	99.56%	95.58%	99.68%	97.01%	98.62%	98.03%	99.97%	99.69%	54.20%
	Outdoor-in city (>= -95dBm)	Ludhiana	Nov-13	99.8%	100.0%	100.0%	100.0%	99.99%	ICR	100.0%	100.0%	100.0%	100.0%
		Sangrur	Nov-13	ICR	99.99%	100.00%	100.0%	99.71%	100.0%	100.0%	100.0%	99.94%	100.0%
		Moga	Nov-13	ICR	99.98%	99.55%	100.0%	99.95%	99.97%	100.0%	100.0%	100.0%	96.10%
5	Call Setup Success Rate (>=95%)	Ludhiana	Nov-13	95.5%	100.0%	99.21%	100.0%	98.62%	ICR	99.41%	100.0%	100.0%	100.0%
		Sangrur	Nov-13	ICR	100.0%	98.67%	97.65%	98.61%	100.0%	100.00%	100.0%	100.0%	100.0%
		Moga	Nov-13	ICR	100.00%	98.55 %	100.00%	100.00%	100.00%	99.22 %	100.00%	100.00%	100.00%

\*NA: Not Applicable, ICR: Intra Circle Roaming



**DRIVE TEST TABLE: 3**

OPERATOR-ASSISTED DRIVE TEST-PUNJAB CIRCLE-DEC-13 MONTH													
S/N	Parameter	City Name	Drive Test Period	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
1	Blocked Call Rate (<=3%)	Patiala	Dec-13	ICR	0.00%	0.00%	0.00%	0.00%	0.83%	0.00%	0.00%	0.00%	0.65%
		Bathinda	Dec-13	ICR	0.00%	1.03%	0.00%	0.89%	0.00%	0.00%	0.00%	0.88%	0.00%
		Mansa	Dec-13	ICR	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.10%	0.00%
2	Dropped Call Rate (<=2%)	Patiala	Dec-13	ICR	0.00%	0.00%	0.00%	1.41%	0.84%	0.00%	0.00%	0.00%	0.65%
		Bathinda	Dec-13	ICR	0.00%	0.00%	0.00%	1.79%	0.00%	0.00%	0.00%	0.88%	0.00%
		Mansa	Dec-13	ICR	0.00%	1.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Percentage connection with good voice quality (=>95%)													
3	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Patiala	Dec-13	NA	NA	NA	NA	NA	NA	NA	NA	99.73%	99.62%
		Bathinda	Dec-13	NA	NA	NA	NA	NA	NA	NA	NA	99.52%	98.86%
		Mansa	Dec-13	NA	NA	NA	NA	NA	NA	NA	NA	99.91%	99.30%
	(b) 0-5 (with frequency hopping for GSM Operators)	Patiala	Dec-13	ICR	97.15%	93.57 %	98.15%	95.99 %	96.36 %	97.36 %	97.80 %	NA	NA
		Bathinda	Dec-13	ICR	96.67%	90.96 %	98.54%	96.98 %	96.58 %	95.64 %	97.30 %	NA	NA
		Mansa	Dec-13	ICR	96.36%	92.15 %	98.70%	96.18 %	97.87 %	96.31 %	98.70 %	NA	NA
Service Coverage													
4	In door (>= - 75dBm)	Patiala	Dec-13	ICR	95.46%	55.84%	88.92%	82.53%	89.66%	80.02%	98.50%	98.22%	57.12%
		Bathinda	Dec-13	ICR	82.74%	89.88%	78.43%	62.29%	81.35%	64.26%	93.78%	94.52%	63.12%
		Mansa	Dec-13	ICR	88.30%	95.36%	78.31%	35.56%	77.59%	47.01%	82.68%	81.00%	37.49%
	In-vehicle (>= - 85dBm)	Patiala	Dec-13	ICR	99.86%	92.93%	99.90%	98.99%	99.00%	99.51%	99.98%	100.0%	96.23%
		Bathinda	Dec-13	ICR	99.09%	99.69%	98.42%	93.07%	96.44%	85.28%	99.54%	98.16%	92.70%
		Mansa	Dec-13	ICR	98.72%	99.29%	98.06%	72.86%	98.76%	90.97%	96.74%	95.33%	86.22%
	Outdoor-in city (>= - 95dBm)	Patiala	Dec-13	ICR	99.99%	99.95%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		Bathinda	Dec-13	ICR	99.96%	100.0%	99.97%	99.92%	99.87%	87.07%	100.0%	99.99%	99.99%
		Mansa	Dec-13	ICR	99.96%	99.99%	92.93%	97.14%	100.0%	99.45%	99.93%	99.87%	99.99%
5	Call Setup Success Rate (>=95%)	Patiala	Dec-13	ICR	100.0%	100.0%	100.0%	100.0%	99.17%	100.0%	100.00%	100.0%	99.35%
		Bathinda	Dec-13	ICR	100.0%	98.97%	100.0%	99.11%	100.0%	100.0%	100.00%	99.12%	100.0%
		Mansa	Dec-13	ICR	100.0%	97.73%	100.0%	100.0%	100.0%	100.0%	100.00%	98.90%	100.0%

\*NA: Not Applicable, ICR: Intra Circle Roaming



**DETAIL OF THE ROUTES COVERED DURING THE DRIVE TESTS:**

**DRIVE TEST TABLE: 4**

Drive Test PB Circle Oct-13 to Dec-13						
Month/Year	City	P1	P2	Across	Congested	In Building
Oct-13	JALANDHAR	Jalandhar-Amritsar Expressway,Bypass Jalandhar,Pap Chowk	Maqsoodan Road,Kapurthala Highway,Nakodara Highway	Bsf Chowk To Kapurthala Chowk, Mithapur Road,Urban Estate To Defence Colony	Railway Station,Phagwara Gate,Mayi Hira Gate	Hotel Country Inn, Mbd Mall, Puda Office
	HOSHIARPUR	Prabhat Chowk,Tanda Road,Dhobi Ghat,Dasuya Bypass	Bullanwali-Kachari,Fatehgarh Chowk,Phagwara Bypass,Jalandhar Bypass-Prabhat Chowk	Model Town,Shimla Pahari Chowk,Danamandi,Railway Mandi	Bus Stand,Clock Tower,Session Chowk,Gurmandi	VISHAL MART, SWARAN MULTIPLEX
	KAPURTHAL A	BSNL Exchange,Sheikhpura, Kesribagh To Amritsar Road,Sainik School	Baby Model School,Ajit Nagar,Jalandhar Bypass,Jamamsjid Complex	Hussainpura,Railway Station,Moti Bagh,Model Town	Sadar Bazar,Model Town,Tagore Nagar,Sabji Mandi	EASY DAY, ELECTRICITY BOARD OFFICE, HOTEL BASANT PLAZA
Nov-13	LUDHIANA	Bharat Nagar Chowk,DMC To Jal Bye Pass,Samrala Chowk,Lohara	Lahora To Arora Palace,PAU,DMC,Leh	Jal Bye Pass,Samrala Chowk,Sherpur Chowk,Dhandari	Jagraon Bridge,Civil Hospital,CMC,Samrala Chowk	SILVER ARK MALL, BADRA SHOW ROOM, EASY DAY
	SANGRUR	Bsnl Exchange,Mangwal,Ps pcl Office	Barnala Chowk,Bus Stand,Kkaula Park,Hharipura Colony	Bada Chowk,Barnala Road,Chandigarh Road	Kaula Park,Prem Basti,Main Market	Civil Hospital, Dc Office, Vishal Mart
	MOGA	Nestle Ind,Amritsar Road,Ludhiana Road,Kotkapura Road	Kotkapura Road,Main Bazar Outer,Geeta Bhawan,Nestle Moga	Ferozepur Road,Amritsar Road,Ludhiana Road,Kot Road	Main Bazar,Railway Station,Underbridge Moga	MINI SEACRATICAT, DR. BR AMBEDKAR BHAWAN
Dec-13	PATIALA	Sirhind Bypass,Rajpura Road,Topkhana,Mahindra College	Topkhana Road,Bhadson Road,Sirhind Bypass,Sanna Adda To Pilli Sadak,Tripri Sirhind Bypass	Sirhind Bypass,Bus Stand,Rajpura Road,Phawara Chowk	Qilla Mohalla,Churi Bazar,Mochi Market,Ragho Mazra	RAJENDRA HOSPITAL, APPOLO STADIUM



	<b>BATHINDA</b>	Bibiwala Chowk, Tikoni Chowk, Liberty Chowk	Liberty Chowk, Model Town, Bibiwala Chowk, NFI Colony	NFL Colony, Hanuman Chowk, Bibiwala 100 Ft Road, Mati Das Nagar	Hanuman Chowk, Dhobi Bazar, Mall Road, AC Market	MITTAL MALL, KAPSONS
	<b>MANSA</b>	Sports Stadium, Tikoni Chowk, Railway Station, Water Treatment Plant	Water Treatment Plant, Green Valley, Mansa Sardulgarh Road, Tikoni Chowk	Trikoni Chowk, New Court Complex, Girls College, Thana Chowki Police	Ward No 18, Bus Stand, Main Bazar, Railway Track	DC OFFICE, ELECTRICITY BOARD OFFICE



**KEY FINDINGS:** The key observations that could be derived from the results of the drive tests are as under –

- (i) (a) Aircel is not operating its service on its own network at all cities covered in this quarter except Ludhiana, but is on ICR with Tata (GSM).  
  
(b) Tata (GSM) is on ICR with Aircel at Ludhiana.  
  
(c) In the above drive test tables, NA means not applicable for voice quality (0-4) without frequency hopping for GSM operators and Voice quality (0-5) with frequency hopping for CDMA operators.
- (ii) **In the Month of October-13**, drive tests were conducted at Jalandhar, Hoshiarpur and Kapurthala . The performance of all operators found satisfactory in these cities as they were in compliance of the benchmarks of the parameters which could be derived from the drive tests.
- (iii) **In the Month of November-13**, drive tests were conducted at Ludhiana, Sangrur and Moga cities. The performance of **BSNL** for the parameter Call drop Rate in Ludhiana city was **8.66%**, way beyond the benchmark of < 2%. **BSNL** also could not meet the benchmark of ‘% connection with Good Voice Quality’ in all the three cities, whereas **Aircel and QTL** also failed to meet the benchmark of this parameter in Ludhiana City. The performance of BSNL with respect to the parameter ‘Good Voice Quality’ was **87.06%**, **94.27%** and **86.73%** in Ludhiana, Sangrur and Moga cities respectively. While in case of **Aircel and QTL**, it was **92.45%** and **94.35%** respectively in Ludhiana.
- (iv) **In the month of December-13**, drive tests were conducted at Patiala, Bathinda and Mansa cities. **BSNL** repeated the similar non-compliance as was in the month of November-13 with respect to the parameter ‘Good Voice Quality’ as it could achieve the performance level of **93.57%**, **90.96%** and **92.15%** against the benchmark of > 95 %.

## 5.2 INDEPENDENT DRIVE TEST:

The independent drive tests are to be carried out by M/s TUV for any service provider on receiving advice from TRAI, based on any complaint from subscribers, relating to poor network coverage in certain areas of the cities. As TUV was not advised by TRAI to conduct the drive test independently on the basis of Subscribers complaint or otherwise, the independent drive tests were not conducted by TUV in this quarter.



## **6. ESSENCE OF COMPLIANCE REPORT OF SERVICE PROVIDERS WITH RESPECT TO THE QOS**

From month audit & 3 days live findings, it can be concluded that on an average, performance of the operators in the service area Punjab is satisfactory for **Network Parameters** except for one parameter namely '**Worst affected cells having > 3% TCH drop**' which could not be met by BSNL, Tata (GSM) in monthly. Similar non-compliance of these operators along with Aircel and Tata (CDMA) was also recorded during three days live measurements. In monthly audit, BSNL could perform for this parameter as 3.18%, 3.56% and 9.32% during the months of October, November and December 2013 respectively, whereas the performance of Tata (GSM) remained 4.51% ,3.76% and 4.03% in the month of October, November and December -13 respectively.

During the live measurements, the performance level of the same parameter for Aircel was 5.56%, 3.22% and 4.94% in the months of October, November and December 2013 respectively. Tata (GSM) could perform as 3.90%, 3.93% and 4.05% in the respective months and Tata (CDMA) remained with performance level as 3.12% in October & 3.39% in November-13 months. BSNL also failed to meet the benchmark of this parameter with performance level of 3.11% in the month of December 2013.

With regard to the **Customer Service Quality Parameters**, it is revealed that all operators are in well compliance of the parameters on Metering and Billing Credibility, Response Time to Customers, Termination of Service and Time taken for refunds. However, BSNL and RCOM (GSM) have not met the benchmark of 'calls answered by Operators (voice to voice) within 60 seconds'. They could achieve their performance level as 66.62% and 77.84% respectively, way below the benchmark of 90%.

With regard to the **results of drive tests conducted in nine cities**, it was concluded that the performance of BSNL, & Aircel for parameters '**% connection with Good Voice Quality**' remained matter of concern. BSNL could not meet the benchmark in number of cities where the drive tests were carried out, whereas Aircel and QTL could not meet the benchmark at Ludhiana. The non-compliance of BSNL in respect 'Call Drop Rate' was recorded in Ludhiana with performance level of 8.66%, way beyond the benchmark of < 2%.

*Thus taking cognizance on overall performance of the service providers, it is concluded that service providers specially BSNL, Tata (GSM), Tata (CDMA) and Aircel need to improve the performance of their networks for one or the other parameter in Punjab Service Area..*



## 7. DETAILED NETWORK DATA ASSESSMENT OF CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE:

TABLE: 1

Detailed Network Data Assessment of Cellular Mobile Telephone Services- Punjab Circle- Oct-13 month													
S/N	Name of Parameter	Bench- mark	Audit Period	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
<b>Network Service Quality Parameter</b>													
1	<b>Network Availability</b>												
	a) Total no. of BTSs in the licensed service area		Oct-13	601	4784	2947	4471	1667	1646	1964	4449	900	564
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Oct-13	840	2134	1205.58	933.39	1129	382.66	820	1133.80	801	32.69
	c) BTS Accumulated Downtime	<=2%	Oct-13	0.19%	0.06%	0.57%	0.03%	0.09%	0.00%	0.06%	0.03%	0.12%	0.01%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Oct-13	1	4	10	0	2	0	0	0	1	0
	e) Worst affected BTSs due to downtime	<=2%	Oct-13	0.17%	0.08%	0.34%	0.00%	0.12%	0.00%	0.00%	0.00%	0.11%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Oct-13	97.95%	99.16%	97.47%	98.11%	99.63%	99.26%	97.77%	99.81%	99.07%	98.93%
	b) SDCCH/PAGING Congestion	<=1%	Oct-13	0.07%	0.09%	0.84%	0.10%	0.02%	0.00%	0.26%	0.03%	0.00%	0.00%
	c) TCH congestion	<=2%	Oct-13	0.44%	0.15%	1.68%	0.54%	0.04%	0.06%	0.35%	0.19%	0.00%	0.04%
<b>Connection Maintenance (Retainability)</b>													
3	a) Call Drop Rate (CDR)	<=2%	Oct-13	0.79%	0.55%	1.44%	0.67%	0.31%	0.60%	1.03%	0.62%	0.01%	0.63%
	b) Worst affected cells>3% TCH drop	<=3%	Oct-13	2.00%	1.01%	3.18%	0.89%	0.04%	4.51%	1.69%	0.94%	0.04%	3.36%
	c) % of connections with good voice quality	>=95%	Oct-13	97.79%	98.63%	NP	96.67%	98.98%	97.53%	97.58%	98.07%	99.70%	NP
	d) Total No. of cells exceeding 3% TCH drop		Oct-13	36	145	266	117	2	219	103	129	1	61

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	(call drop)												
	e) Total no. of cells (Sector) in the licensed service area		Oct-13	1803	14340	8362	13114	5001	4962	6099	13696	2700	1792
	<b>No. of POI's having &gt;=0.5% POI congestion</b>												
4	No. of POI's having >=0.5% POI congestion		Oct-13	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Oct-13	0	0	0	0	0	0	0	0	0	0
	<b>Network Data</b>												
5	a) Equipped Capacity of Network in Erlang		Oct-13	25365	258792.70	283000	196510	72000	107988.10	77789.28	148949.65	53000	109224
	b) Total traffic in TCBH in erlang (Avg.)		Oct-13	8678.50	209098.25	114938	152365	64411.52	27890.22	37479.35	129497	12769.64	33499.596
	c) Total no. of customers served (as per VLR) on last day of the month		Oct-13	427512	6215976	2392345	5616289	2505032	1156456	980372	4314820	347695	281551





TABLE: 2

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live- Punjab Circle- Oct-13 month													
S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
<b>Network Service Quality Parameter</b>													
1	<b>Network Availability</b>												
	a) Total no. of BTSs in the licensed service area		Live data	601	4784	2947	4471	1670	1646	1958	4435	899	564
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Live data	83.49	105.65	454	131	211	11	190	83.10	117	1.91
	c) BTS Accumulated Downtime	<=2%	Live data	0.19%	0.18%	0.21%	0.04%	0.18%	0.01%	0.13%	0.03%	0.18%	0.00%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	1	0	0	0	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2	<b>Connection Establishment (Accessibility)</b>												
	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.14%	99.26%	97.11%	98.17%	99.63%	99.28%	98.13%	99.82 %	99.07%	99.24 %
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.00%	0.14%	0.52%	0.06%	0.02%	0.00%	0.07%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.10%	0.09%	1.82%	0.59%	0.04%	0.01%	0.17%	0.18%	0.00%	0.01%
3	<b>Connection Maintenance (Retainability)</b>												
	a) Call Drop Rate (CDR)	<=2%	Live data	0.73%	0.57%	1.97%	0.65%	0.31%	0.58%	0.93%	0.64%	0.01%	0.59%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	5.56%	1.15%	2.96%	0.76%	0.00%	3.90%	1.83%	1.66%	0.02%	3.12%
	c) % of connections with good voice quality	>=95%	Live data	97.86%	99.58%	97.98%	96.71%	99.01%	97.71%	98.07%	98.03 %	99.70%	NP
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	100	165	248	102	0	194	112	226	1	56
	e) Total no. of cells (Sector) in the licensed service area		Live data	1803	14340	8368	13408	4969	4967	6124	13654	2697	1794
4	<b>No. of POI's having &gt;=0.5% POI congestion</b>												
	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0	0



**TABLE: 3**

Detailed Network Data Assessment of Cellular Mobile Telephone Services- Punjab Circle- Nov-13 month													
S/N	Name of Parameter	Bench- mark	Audit Period	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators						CDMA Operators			
<b>Network Service Quality Parameter</b>													
1	<b>Network Availability</b>												
	a) Total no. of BTSs in the licensed service area		Nov-13	601	4778	2957	4510	1669	1650	1986	4449	900	564
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Nov-13	575.28	1182	1146.23	814.10	847	340	1282	563.97	396	137
	c) BTS Accumulated Downtime	<=2%	Nov-13	0.13%	0.03%	0.05%	0.03%	0.07%	0.03%	0.09%	0.02%	0.06%	0.00%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Nov-13	0	3	0	0	3	0	0	4	0	0
e) Worst affected BTSs due to downtime	<=2%	Nov-13	0.00%	0.06%	0.00%	0.00%	0.18%	0.00%	0.00%	0.09%	0.00%	0.00%	
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Nov-13	98.17%	99.35%	97.56%	98.2%	99.67%	99.24%	97.9%	99.84%	99.02%	98.98%
	b) SDCCH/PAGING Congestion	<=1%	Nov-13	0.03%	0.08%	0.85%	0.07%	0.03%	0.00%	0.16%	0.04%	0.00%	0.00%
	c) TCH congestion	<=2%	Nov-13	0.40%	0.12%	1.67%	0.54%	0.03%	0.00%	0.41%	0.16%	0.00%	0.09%
<b>Connection Maintenance (Retainability)</b>													
3	a) Call Drop Rate (CDR)	<=2%	Nov-13	0.73%	0.51%	1.57%	0.59%	0.29%	0.50%	0.79%	0.61%	0.00%	0.56%
	b) Worst affected cells>3% TCH drop	<=3%	Nov-13	1.50%	1.04%	3.56%	0.67%	0.02%	3.76%	1.30%	0.81%	0.04%	3.54%
	c) % of connections with good voice quality	>=95%	Nov-13	97.88%	98.68%	NP	96.9%	99.04%	97.85%	97.9%	98.10%	99.70%	98.98%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Nov-13	27	149	306	90	1	187	81	111	1	64

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	e) Total no. of cells (Sector) in the licensed service area		Nov-13	1803	14340	8595	13411	4966	4978	6208	13696	2700	1803
4	<b>No. of POI's having &gt;=0.5% POI congestion</b>												
	No. of POI's having >=0.5% POI congestion		Nov-13	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Nov-13	0	0	0	0	0	0	0	0	0	0
5	<b>Network Data</b>												
	a) Equipped Capacity of Network in Erlang		Nov-13	25446.71	256158.42	283000	196539	72000	108225.1	78488	126597	53000	99220
	b) Total traffic in TCBH in erlang (Avg.)		Nov-13	8464.67	229334.22	104388.51	154150	64441.82	30075.51	32691	150395.24	13771.36	22793.81967
	c) Total no. of customers served (as per VLR) on last day of the month		Nov-13	418979	6862578	2396491	5646680	2543194	11385772	1012472	4268380	357089	262674



TABLE: 4

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live- Punjab Circle- Nov-13 month														
S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA	
				GSM Operators								CDMA Operators		
<b>Network Service Quality Parameter</b>														
1	<b>Network Availability</b>													
	a) Total no. of BTSs in the licensed service area		Live data	601	4784	2947	4474	1670	1646	1964	4449	900	564	
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Live data	26.84	163.82	488	64.11	73	13.88	136	44.42	31	11.6	
	c) BTS Accumulated Downtime	<=2%	Live data	0.06%	0.05%	0.23%	0.02%	0.06%	1.17%	0.10%	0.01%	0.05%	0.03%	
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	1	0	0	0	0	1	0	0	
2	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	
	<b>Connection Establishment (Accessibility)</b>													
	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.33%	99.44%	98.02%	98.30%	99.68%	99.29%	97.54%	99.84%	98.93%	98.86%	
2	b) SDCCH/PAGING Congestion	<=1%	Live data	0.00%	0.05%	0.62%	0.05%	0.01%	0.001%	0.17%	0.02%	0.00%	0.00%	
	c) TCH congestion	<=2%	Live data	0.04%	0.08%	1.56%	0.56%	0.04%	0.01%	0.53%	0.16%	0.005%	0.04%	
3	<b>Connection Maintenance (Retainability)</b>													
	a) Call Drop Rate (CDR)	<=2%	Live data	0.71%	0.51%	1.36%	0.58%	0.28%	0.56%	0.81%	0.64%	0.01%	0.61%	
	b) Worst affected cells>3% TCH drop	<=3%	Live data	3.22%	1.07%	2.87%	0.67%	0.00%	3.93%	1.29%	1.32%	0.01%	3.39%	
	c) % of connections with good voice quality	>=95%	Live data	97.94%	98.69%	NP	96.83%	99.01%	97.72%	97.85%	98.07%	99.70%	NP	
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	58	153	240	89	0	196	79	181	1	61	
4	e) Total no. of cells (Sector) in the licensed service area		Live data	1803	14340	8354	13315	4969	4973	6142	13696	2700	1801	
	<b>No. of POI's having &gt;=0.5% POI congestion</b>													
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0	0	
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0	0	



TABLE: 5

Detailed Network Data Assessment of Cellular Mobile Telephone Services- Punjab Circle- Dec-13 month													
S/N	Name of Parameter	Bench- mark	Audit Period	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators									
<b>Network Service Quality Parameter</b>													
1	<b>Network Availability</b>												
	a) Total no. of BTSs in the licensed service area		Dec-13	600	4823	2969	4518	1670	1651	2019	4471	900	562
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Dec-13	451.30	1914	4994	1398.25	1160	511.53	697	950.58	663	71.02
	c) BTS Accumulated Downtime	<=2%	Dec-13	0.10%	0.05%	0.23%	0.04%	0.09%	0.04%	0.05%	0.03%	0.10%	0.13%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Dec-13	0	2	45	1	3	0	0	5	0	0
e) Worst affected BTSs due to downtime	<=2%	Dec-13	0.00%	0.04%	1.52%	0.02%	0.18%	0.00%	0.00%	0.11%	0.00%	0.00%	
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Dec-13	98.17%	99.40%	97.29%	98.39%	99.70%	99.20%	97.16%	99.85%	98.92%	98.98%
	b) SDCCH/PAGING Congestion	<=1%	Dec-13	0.02%	0.06%	0.93%	0.08%	0.02%	0.00%	0.11%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Dec-13	0.11%	0.12%	1.52%	0.38%	0.03%	0.07%	0.71%	0.15%	0.00%	0.00%
<b>Connection Maintenance (Retainability)</b>													
3	a) Call Drop Rate (CDR)	<=2%	Dec-13	0.77%	0.49%	1.57%	0.59%	0.27%	0.54%	0.87%	0.61%	0.01%	0.61%
	b) Worst affected cells>3% TCH drop	<=3%	Dec-13	1.44%	1.02%	9.32%	0.63%	0.02%	4.03%	0.88%	0.78%	0.07%	3.07%
	c) % of connections with good voice quality	>=95%	Dec-13	97.97%	98.71%	NP	96.87%	99.07%	97.96%	97.76%	98.12%	99.70%	99.03%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Dec-13	26	147	830	86	1	201	56	108	2	55
	e) Total no. of cells (Sector) in the licensed		Dec-13	1800	14468	8907	13545	4969	4990	6333	13760	2700	1805

## AUDIT & ASSESSMENT OF QOS FOR QE-DECEMBER-2013-PUNJAB CIRCLE



	service area												
4	<b>No. of POI's having &gt;=0.5% POI congestion</b>												
	No. of POI's having >=0.5% POI congestion		Dec-13	0	0	0	0	0	2	0	0	0	0
	Name of POI not meeting the benchmark		Dec-13	0	0	0	0	0	Data Com Access & TCL NLD	0	0	0	0
5	<b>Network Data</b>												
	a) Equipped Capacity of Network in Erlang		Dec-13	25053	253911	283000	194707	72000	108356.49	80079	149741	53000	83722
	b) Total traffic in TCBH in erlang (Avg.)		Dec-13	8255	215918	69552	154279	60617	29613.47	37938	123087	14791	19600
	c) Total no. of customers served (as per VLR) on last day of the month		Dec-13	427879	7365470	2409103	5678613	2482376	1164412	1047637	4289290	354527	262024



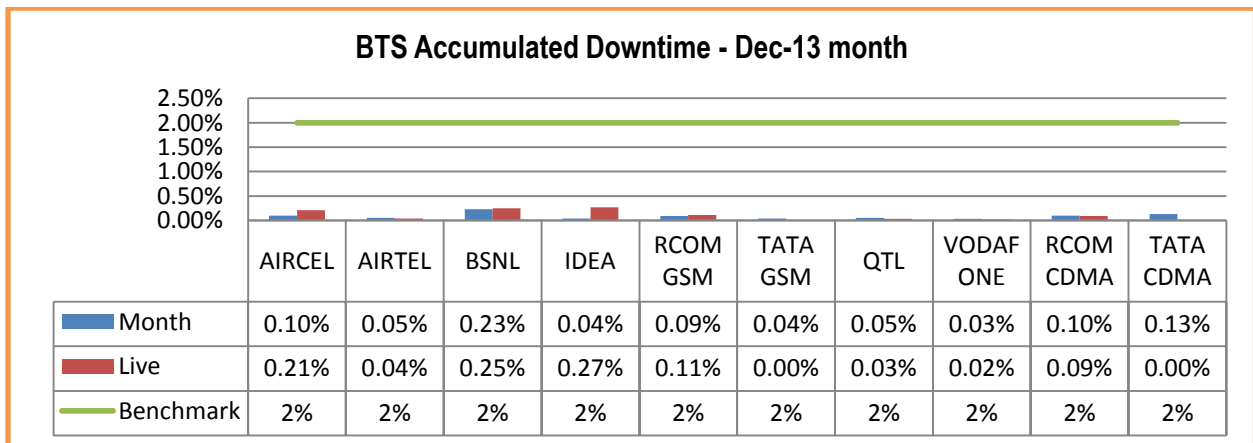
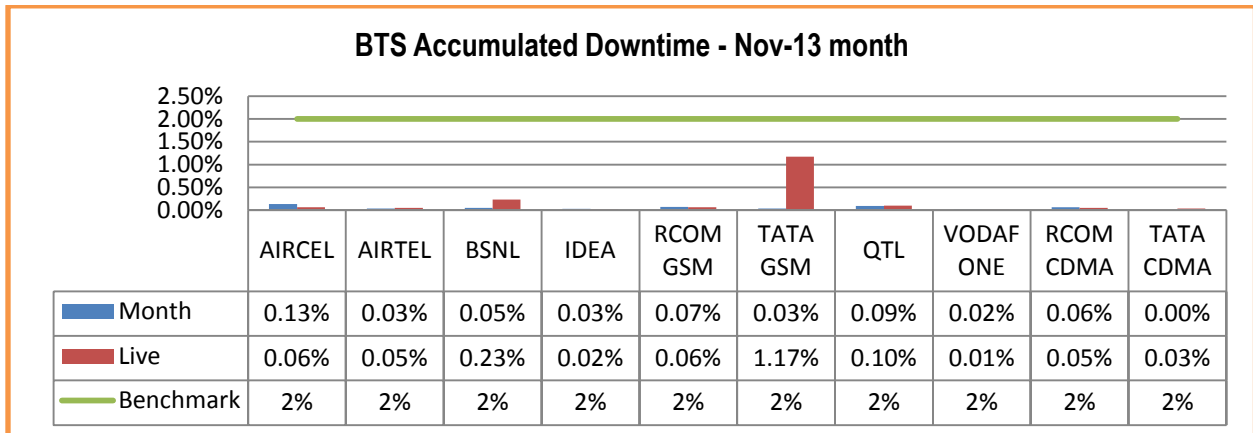
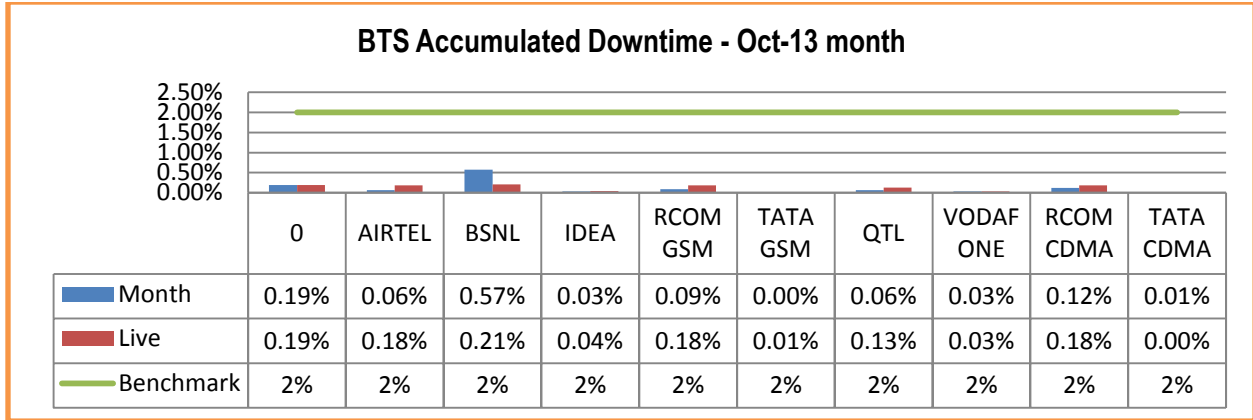
TABLE: 6

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live- Punjab Circle- Dec-13 month													
S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) Total no. of BTSs in the licensed service area		Live data	601	4778	2969	4513	1670	1650	1986	4450	900	1690
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Live data	92.70	147.98	537	87.91	131	10	42	61.29	55	1.09
	c) BTS Accumulated DT	<=2%	Live data	0.21%	0.04%	0.25%	0.27%	0.11%	0.00%	0.03%	0.02%	0.09%	0.00%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	9	0	0	0	0	2	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.30%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.31%	99.42%	97.82%	98.49%	99.68%	99.23%	97.49%	99.86%	98.89%	98.93%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.00%	0.04%	0.68%	0.10%	0.02%	0.00%	0.08%	0.01%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.01%	0.11%	1.56%	0.37%	0.03%	0.08%	0.60%	0.14%	0.00%	0.08%
<b>Connection Maintenance (Retainability)</b>													
3	a) Call Drop Rate (CDR)	<=2%	Live data	0.70%	0.52%	1.53%	0.56%	0.28%	0.51%	0.81%	0.58%	0.00%	0.58%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	4.94%	1.03%	3.11%	0.57%	0.00%	4.05%	0.84%	1.19%	0.04%	0.83%
	c) % of connections with good voice Qty.	>=95%	Live data	97.87%	98.70%	NP	96.94%	99.05%	97.91%	97.82%	98.14%	99.70%	99.06%
	d) Total No. of cells exceeding 3% TCH drop		Live data	89	148	277	78	0	202	52	163	1	15
	e) Total no. of cells (Sector) in the licensed SA		Live data	1803	14326	8907	13534	4969	4987	6208	13699	2700	1804
<b>No. of POI's having &gt;=0.5% POI congestion</b>													
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the BM		Live data	0	0	0	0	0	0	0	0	0	0



**8. GRAPHICAL REPRESENTATION OF PERFORMANCE OF THE CELLULAR MOBILE SERVICE PROVIDERS-MONTHLY V/S 3-DAYS LIVE MEASUREMENT:**

**I. BTS ACCUMULATED DOWNTIME**

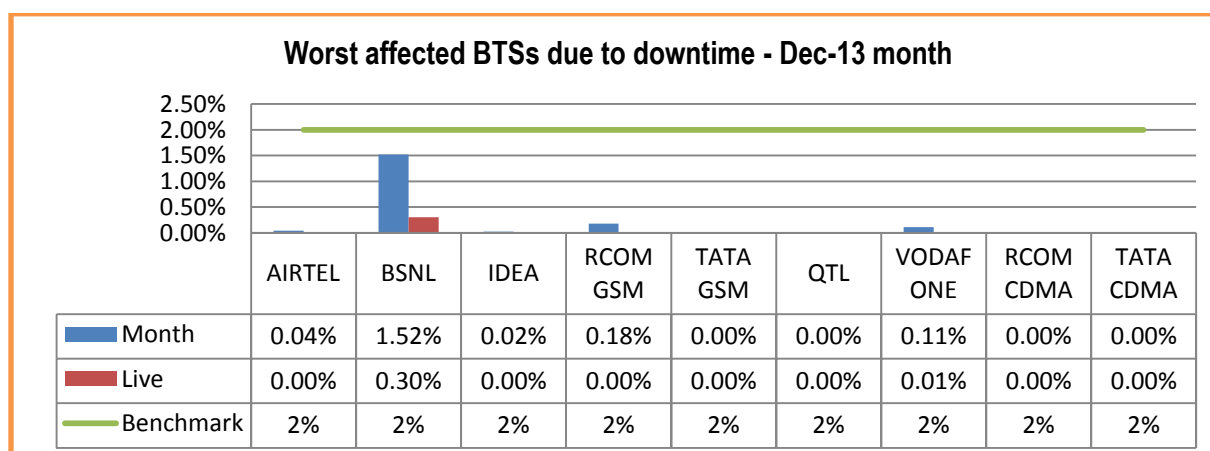
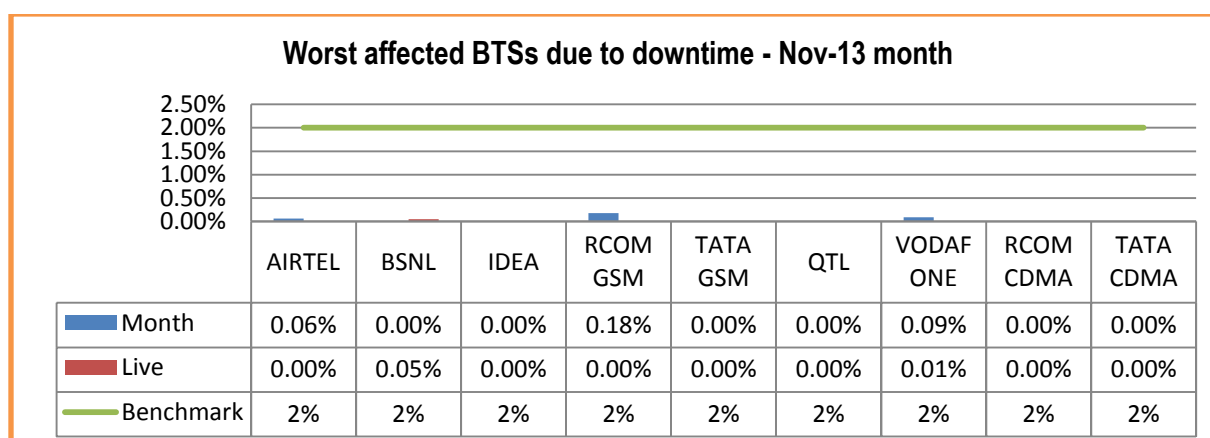
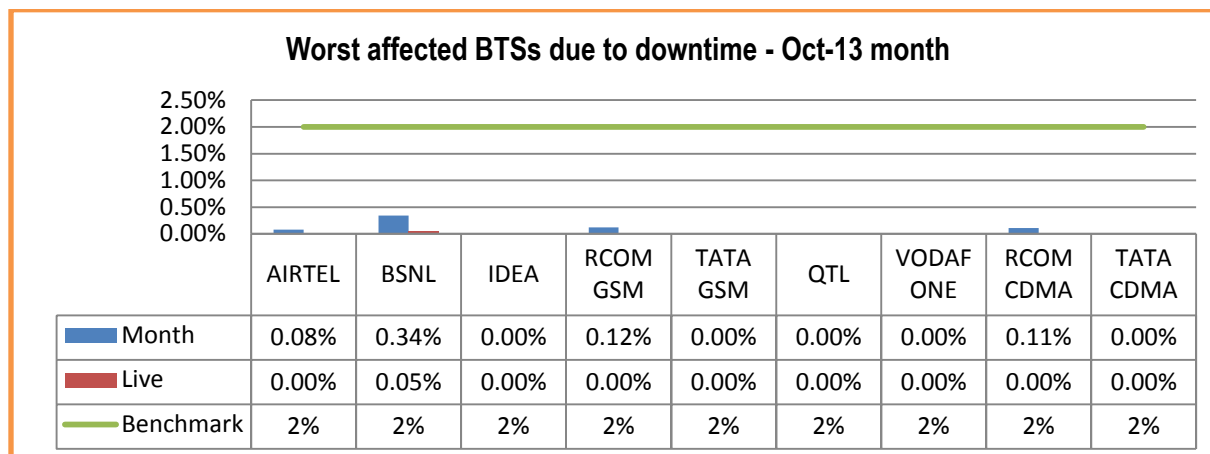


All operators are meeting the benchmarks.





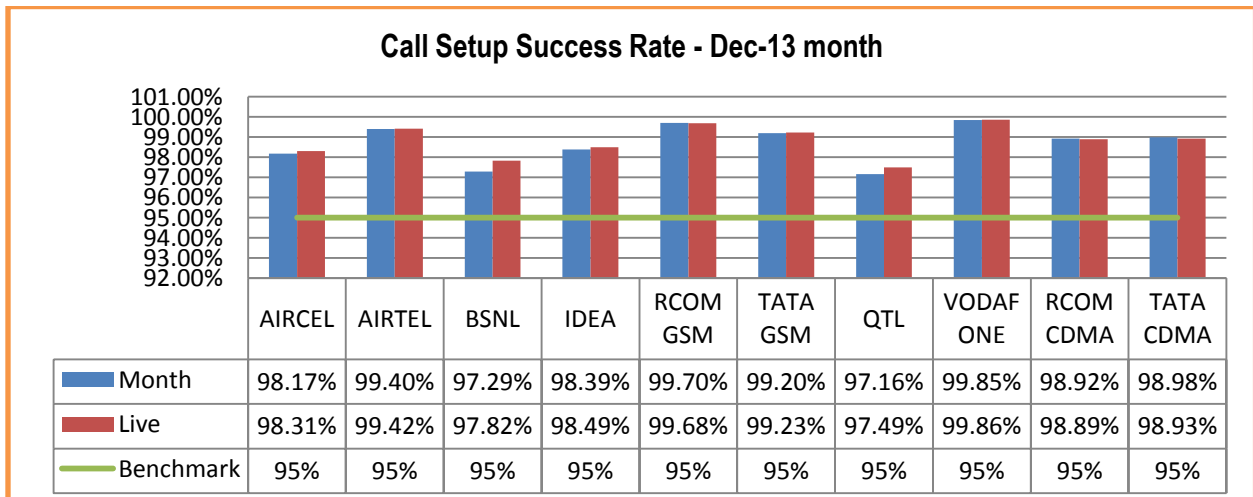
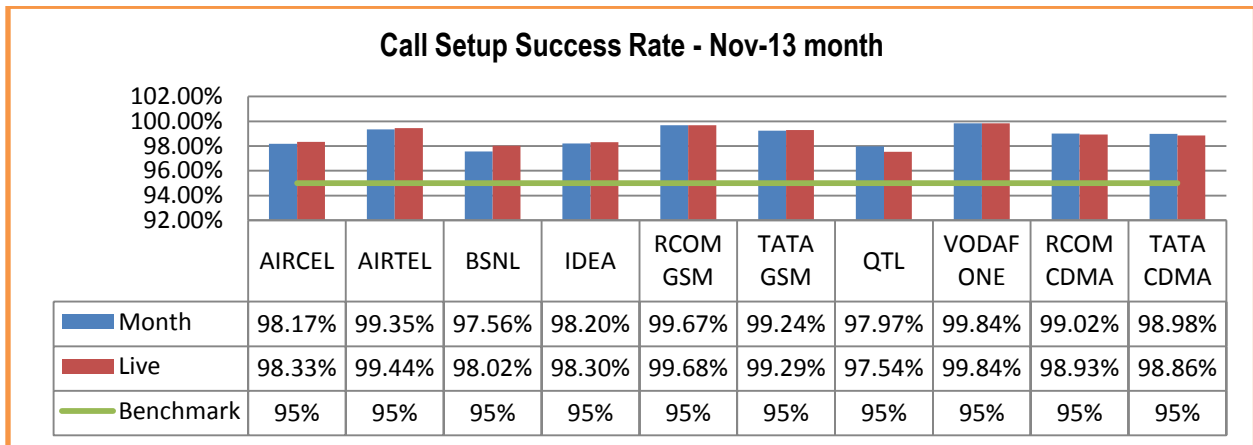
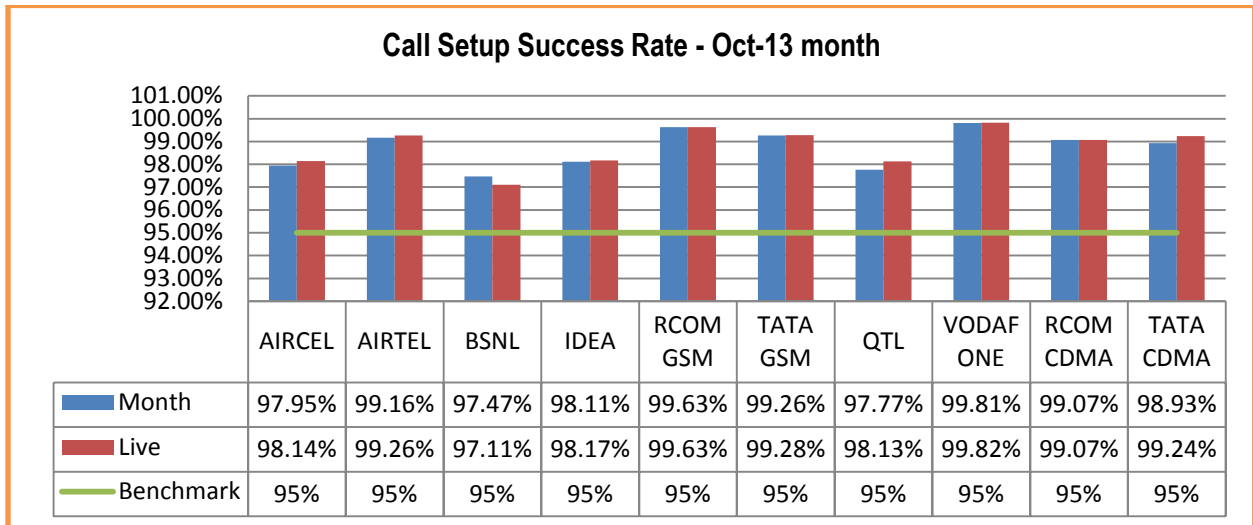
**II. WORST AFFECTED BTSS DUE TO DOWNTIME :**



All operators are meeting the benchmarks.



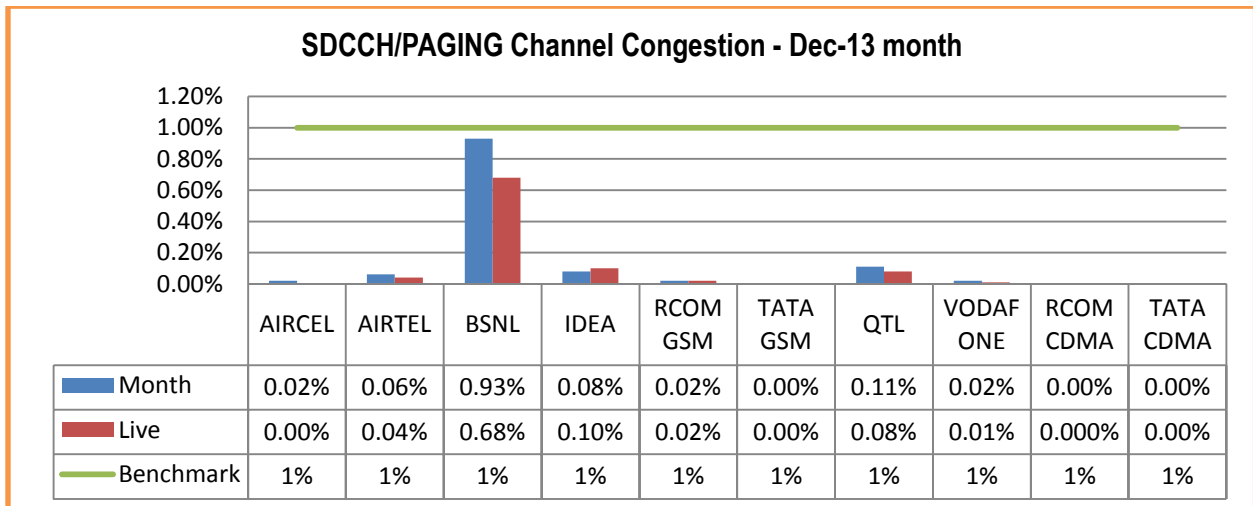
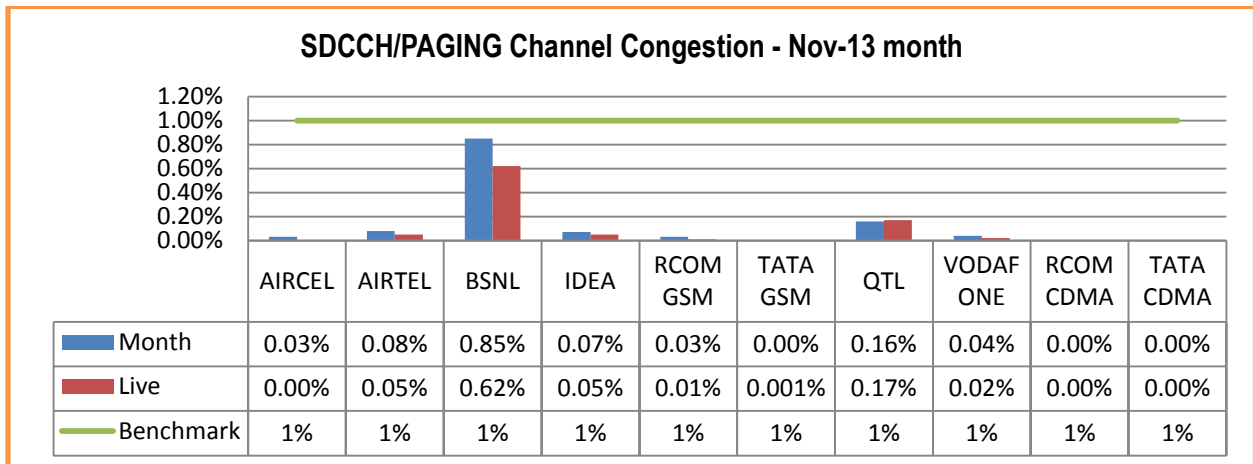
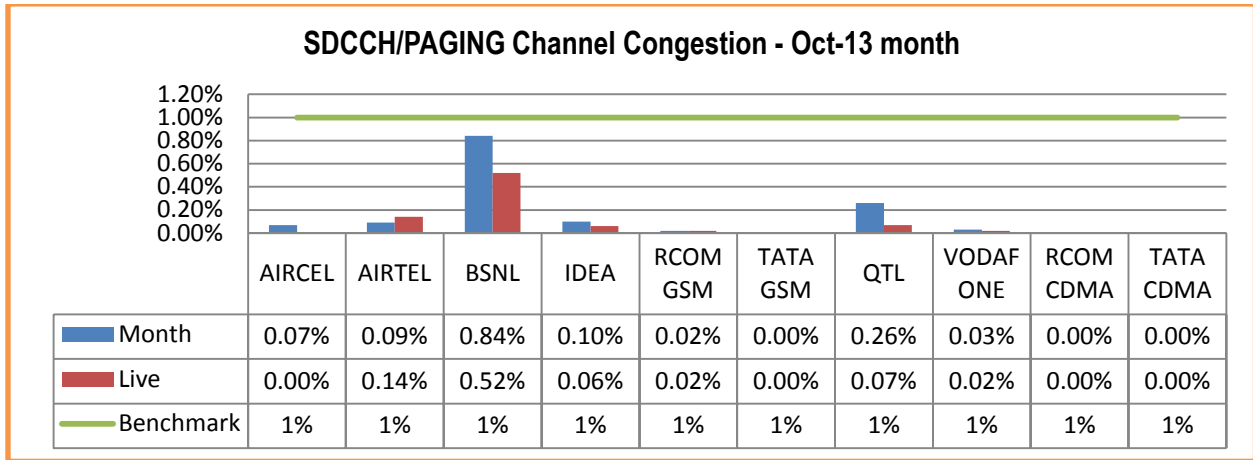
**III. CALL SETUP SUCCESS RATE :**



All operators are meeting the benchmarks.



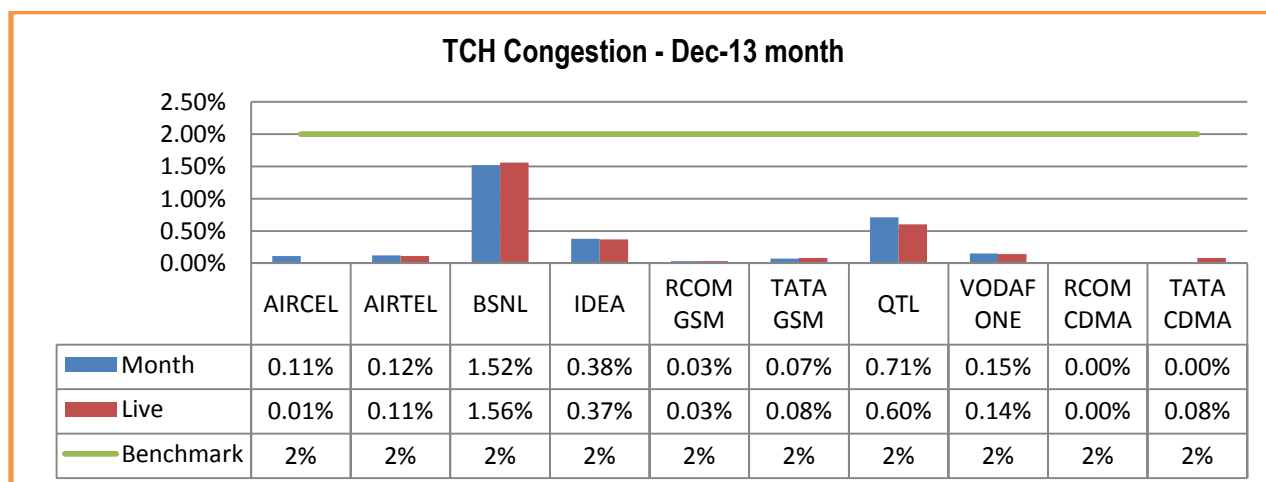
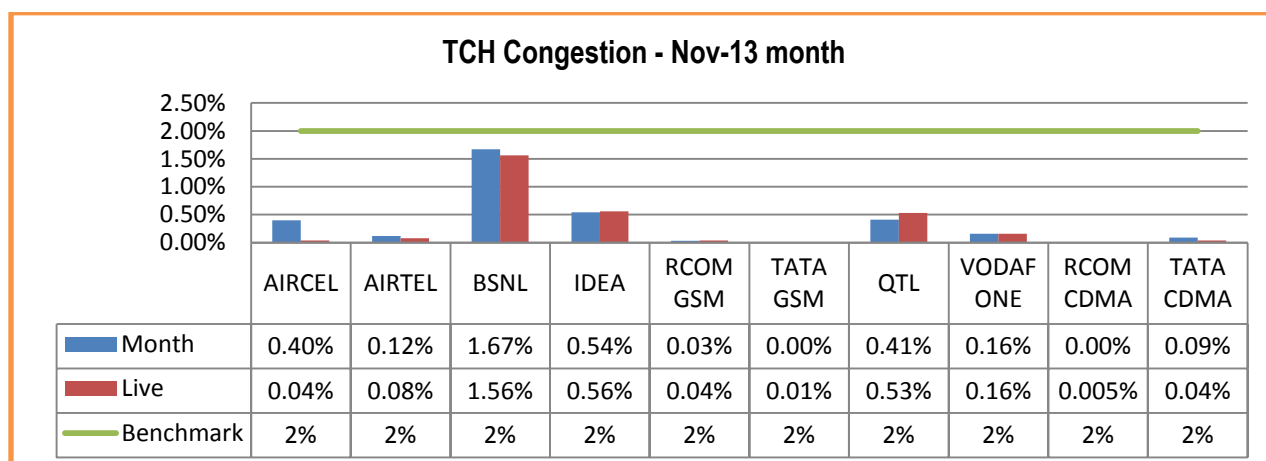
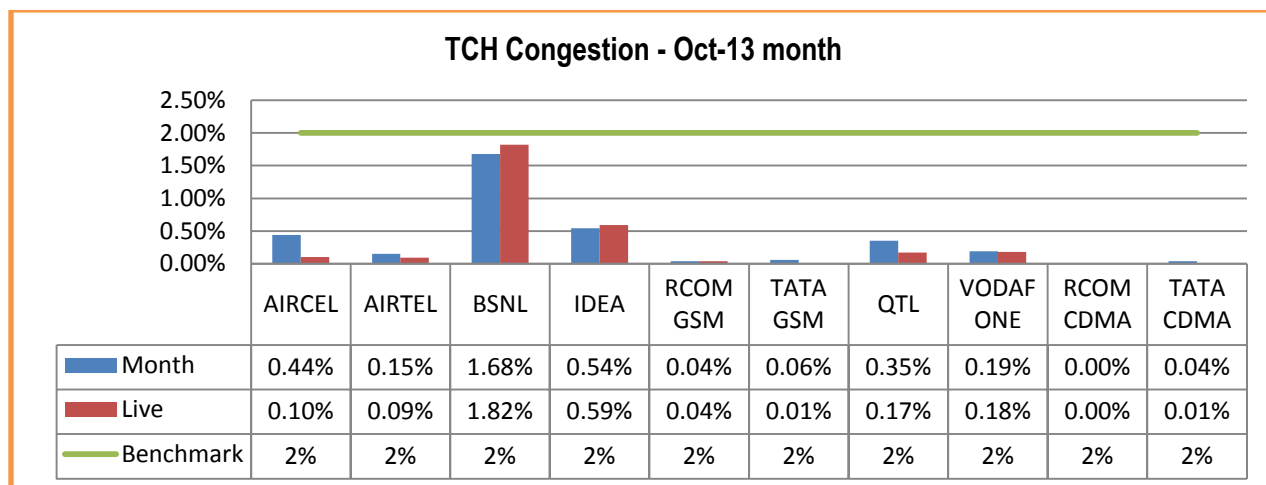
IV. SDCCH/PAGING CHANNEL CONGESTION



All operators are meeting the benchmarks.



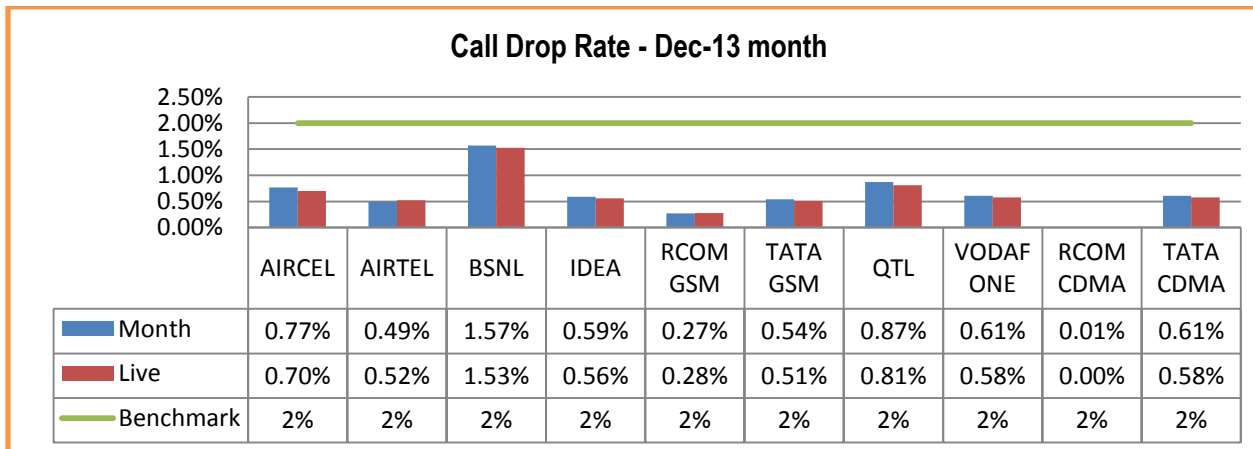
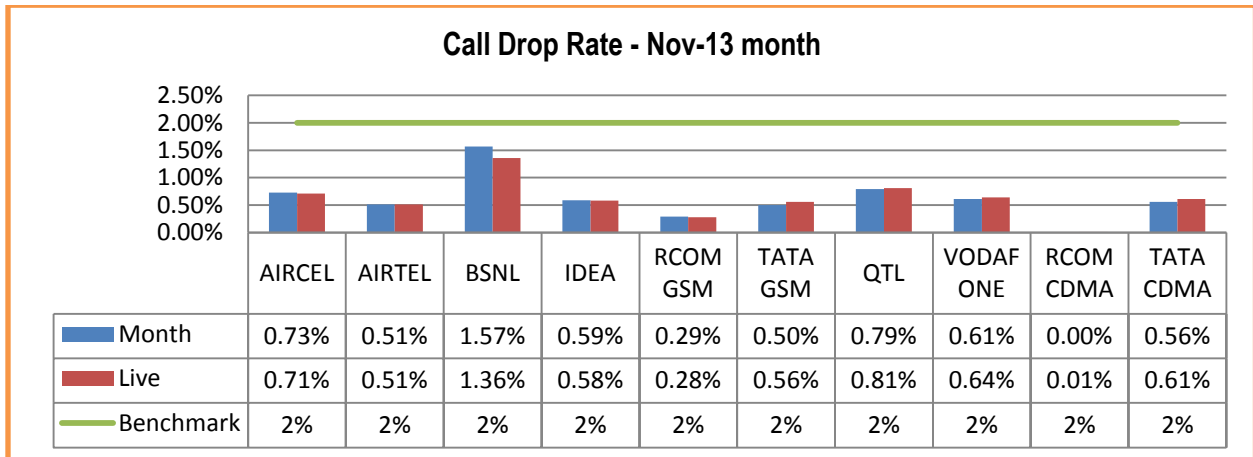
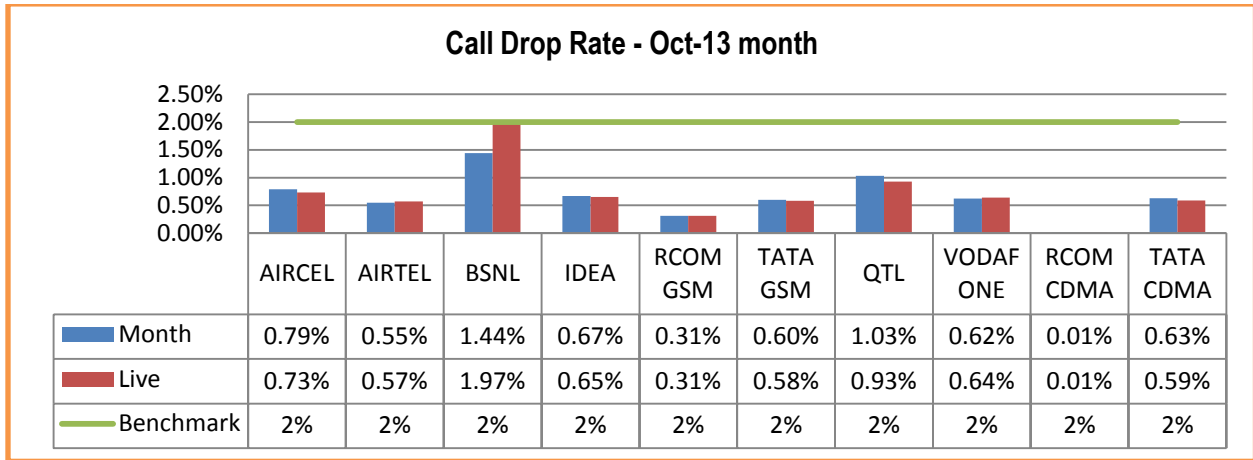
V. TCH CONGESTION :



All operators are meeting the benchmarks.



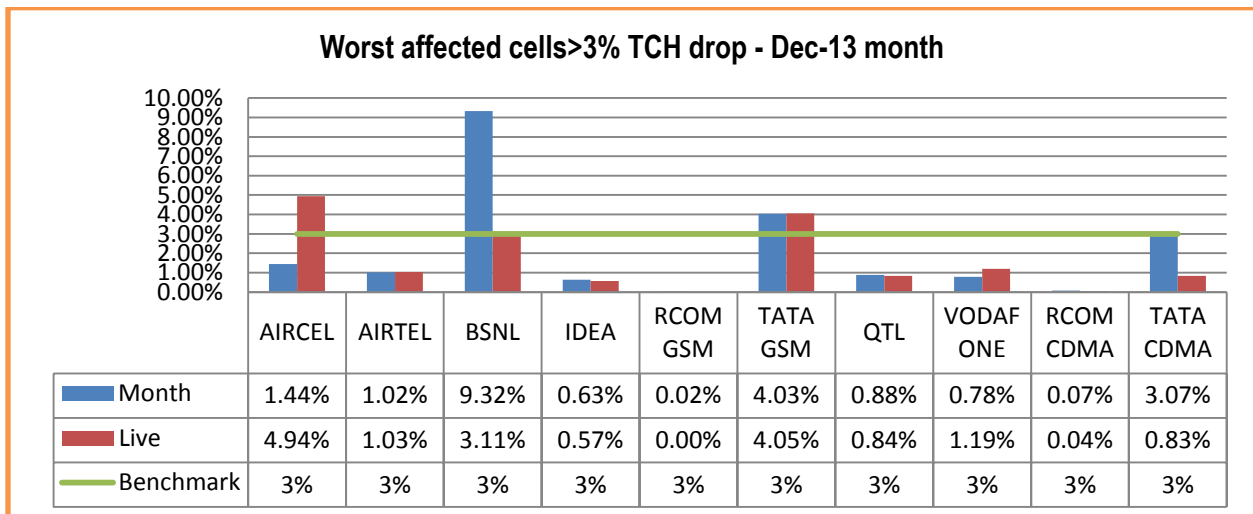
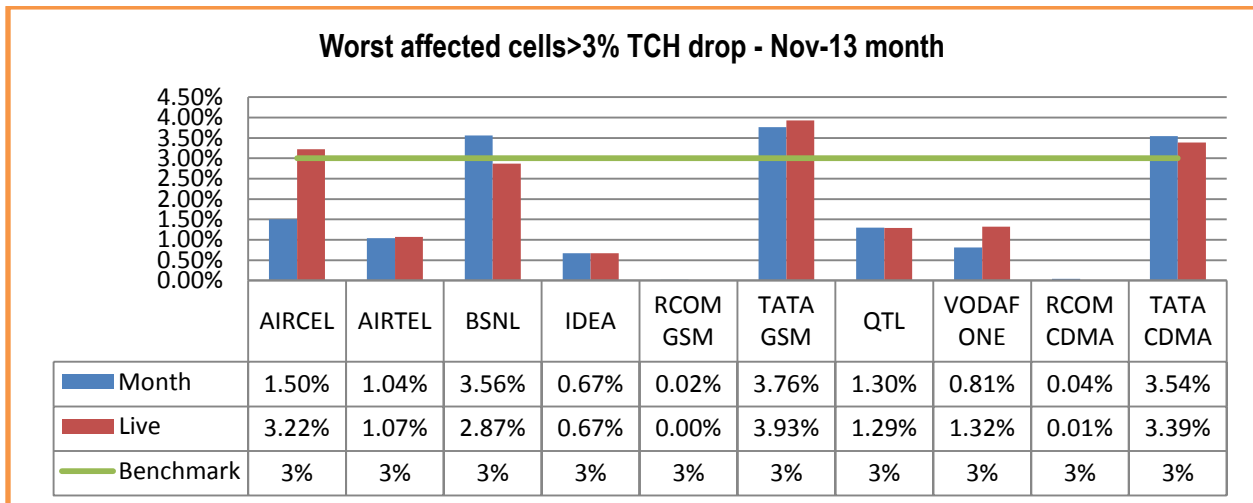
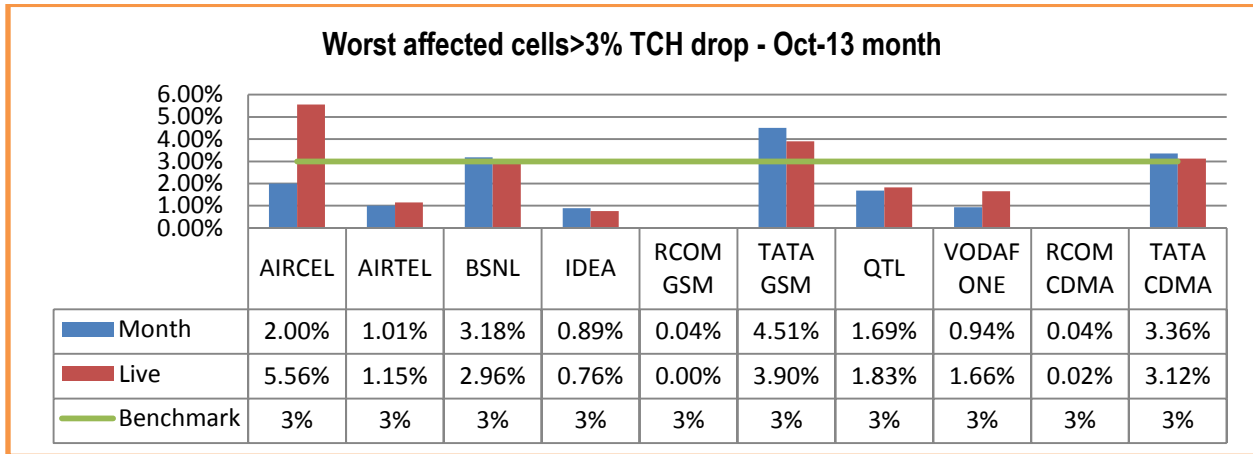
**VI. CALL DROP RATE :**



All operators are meeting the benchmarks.



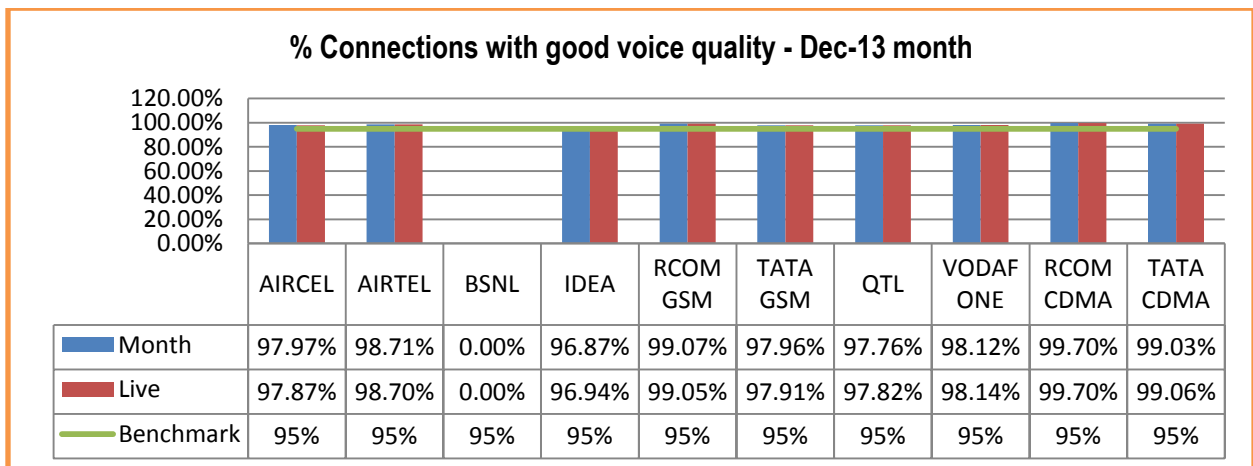
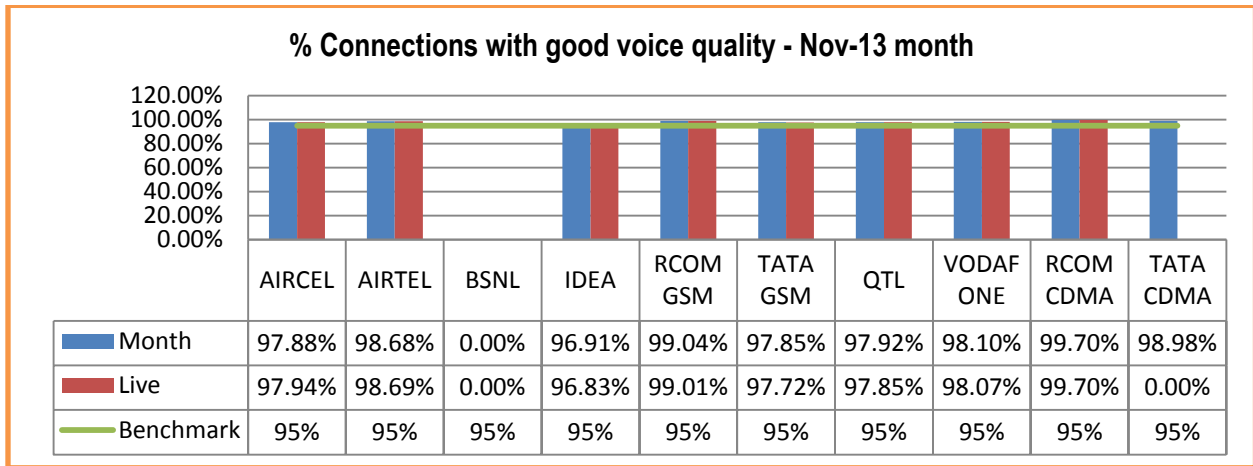
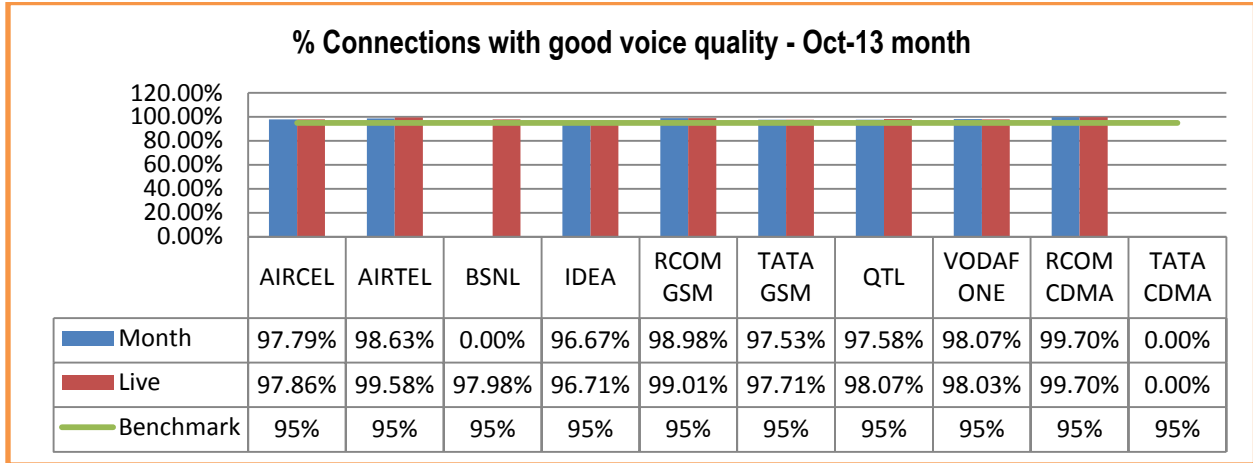
**VII. WORST AFFECTED CELLS>3% TCH DROP:**



BSNL, Tata (GSM), Tata (CDMA) and Aircel could not meet the benchmark.



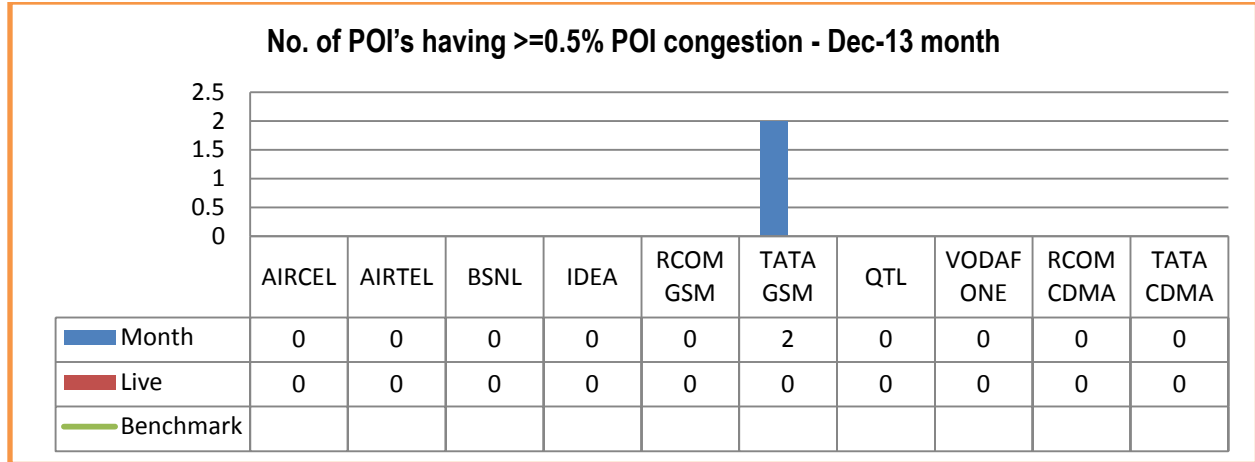
**VIII. PERCENTAGE OF CONNECTIONS WITH GOOD VOICE QUALITY:**





All operators are meeting the benchmarks. BSNL has no system generated data, so not provided the data for this parameter.

**IX. NO. OF POI'S HAVING  $\geq 0.5\%$  POI CONGESTION :**



Tata (GSM) was found having congestion on two no. of POIs, one with Data Com Access and the other with TCL-NLD in the month of December-13.





## 9. PMR VERIFICATION SHEET:

### a) NETWORK RELATED PARAMETER:

Punjab Circle		BTS Accumulated Downtime	Worst affected BTSs due to downtime	CSSR (Call Setup Success Rate)	SDCCH/PAGING Channel congestion	TCH congestion	CDR (Call Drop Rate)	Worst affected cells>3% TCH drop (Call drop) rate	Connections with good voice quality	No. of POI's having >=0.5% POI congestion
<b>Benchmark</b>		≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%	≤ 0.5%
AIRCEL	Reported	0.14	0.06	98.10	0.04	0.32	0.76	1.65	97.88	0
	Verified	0.14%	0.06%	98.10%	0.04%	0.32%	0.76%	1.65%	97.88%	0
AIRTEL	Reported	0.05	0.06	99.30	0.08	0.13	0.52	1.02	98.67	0
	Verified	0.05%	0.06%	99.30%	0.08%	0.13%	0.52%	1.02%	98.67%	0
BSNL	Reported	0.20	1.57	97.67	0.90	1.70	1.70	5.37	95.87	0
	Verified	0.28%	0.62%	97.44%	0.87%	1.62%	1.53%	5.35%	NP	0
IDEA	Reported	0.03	0.01	98.23	0.08	0.49	0.62	0.73	96.82	0
	Verified	0.03%	0.01%	98.23%	0.08%	0.49%	0.62%	0.73%	96.82%	0
RCOM GSM	Reported	0.09	0.16	99.67	0.02	0.04	0.29	0.03	99.03	0
	Verified	0.08%	0.16%	99.67%	0.02%	0.03%	0.29%	0.03%	99.03%	0
TATA GSM	Reported	0.03	0.08	99.20	0.00	0.07	0.55	0.86	97.78	0
	Verified	0.02%	0.00%	99.23%	0.00%	0.04%	0.55%	4.10%	97.78%	1
QTL	Reported	0.07	0.00	97.63	0.18	0.49	0.90	1.29	97.75	0
	Verified	0.07%	0.00%	97.63%	0.18%	0.49%	0.90%	1.29%	97.75%	0
VODAFONE	Reported	0.03	0.10	99.83	0.03	0.17	0.61	0.84	98.10	0
	Verified	0.03%	0.07%	99.83%	0.03%	0.17%	0.61%	0.84%	98.10%	0
RCOM CDMA	Reported	0.09	0.04	99.00	0.00	0.00	0.01	0.05	99.70	0
	Verified	0.09%	0.04%	99.00%	0.00%	0.00%	0.01%	0.05%	99.70%	0
TATA CDMA	Reported	0.02	0.00	98.96	0.00	0.06	0.58	0.48	98.97	0
	Verified	0.05%	0.00%	98.96%	0.00%	0.04%	0.60%	3.32%	99.01%	0

- I. The above data is averaged for three months of the quarter ending December-2013.
- II. The PMR data provided by the service providers is largely matching with verified (audited) data .However in case of the parameter “Worst affected cells>3% TCH drop” for Tata GSM and CDMA, there was significant variation between the reported and verified data. It could be due to different way of calculating the performance with respect to this parameter by Tata GSM/CDMA.
- III. Tata GSM has reported no congestion on any individual POI but on verification it was found that Tata GSM was having congestion on single POI.
- IV. BSNL has not met the benchmark for the parameter “Worst affected cells>3% TCH drop”.



**b) CUSTOMER SERVICE DELIVERY (CSD) RELATED PARAMETER:**

Punjab Circle		% of billing complaints during the quarter	% of Pre-paid Charging Complaints	% of billing complaints (for post paid customer) / Charging/Credit/Validity (for Pre paid customer) resolved within 4 weeks	% of Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints	Accessibility of call centre/Customer Care	% call answered by operators(voice to voice) within 60 sec.	% of Termination/ Closure of service within 7 days	Time taken for refunds of deposits after closures.
<b>Benchmark</b>		<b>&lt;= 0.1%</b>	<b>&lt;= 0.1%</b>	<b>100 % within 4 week</b>	<b>&lt;=1 week</b>	<b>&gt;=95%</b>	<b>&gt;=90%</b>	<b>100% within &lt;=7days</b>	<b>100% within 60 days</b>
AIRCEL	Reported	0.00	0.00	100.00	100.00	99.94	92.61	100.00	100.00
	Verified	0.00%	0.00%	100.00%	100.00%	99.94%	92.65%	100.00%	100.00%
AIRTEL	Reported	0.05	0.00	100.00	100.00	100.00	94.00	100.00	100.00
	Verified	0.01%	0.00%	100.00%	100.00%	99.99%	94.00%	100.00%	100.00%
BSNL	Reported	0.00	0.00	100.00	0.00	100.00	67.00	100.00	100.00
	Verified	0.03%	0.00%	100.00%	100.00%	100.00%	<b>66.62%</b>	100.00%	100.00%
IDEA	Reported	0.02	0.01	100.00	100.00	99.92	98.20	100.00	100.00
	Verified	0.04%	0.01%	100.00%	100.00%	100.00%	98.60%	100.00%	100.00%
RCOM (GSM)	Reported	0.08	0.10	100.00	100.00	98.96	74.89	100.00	100.00
	Verified	0.08%	0.10%	100.00%	100.00%	98.95%	<b>77.84%</b>	100.00%	100.00%
TATA (GSM)	Reported	0.00	0.00	100.00	100.00	99.08	90.80	100.00	100.00
	Verified	0.00%	0.00%	100.00%	100.00%	99.13%	99.09%	100.00%	100.00%
VIDEOCON	Reported	0.00	0.01	100.00	100.00	95.54	92.06	NA	NA
	Verified	NA	0.00%	100.00%	100.00%	95.50%	92.03%	NA	NA
VODAFONE	Reported	0.04	0.00	100.00	100.00	100.00	99.44	100.00	100.00
	Verified	0.04%	0.00%	100.00%	100.00%	100.00%	97.83%	100.00%	100.00%
RCOM (CDMA)	Reported	0.09	0.10	100.00	100.00	99.01	92.07	100.00	100.00
	Verified	0.09%	0.10%	100.00%	100.00%	99.01%	90.32%	100.00%	100.00%
TATA (CDMA)	Reported	0.00	0.00	100.00	100.00	98.40	95.38	100.00	100.00
	Verified	0.00%	0.00%	100.00%	100.00%	98.07%	98.60%	100.00%	100.00%

- i. The above data is averaged for three months of the quarter ending December-2013.
- ii. The PMR data provided by the service providers is largely matching with verified (audited) data.
- iii. BSNL and RCOM GSM have not met the benchmark for the parameter “% call answered by operators (voice to voice) within 60 sec.”