

**Audit & Assessment of Quality of Service  
Of  
Cellular Mobile Telephone Service  
For  
Telecom Regulatory Authority Of India  
North Zone – Punjab Service Area  
(July 2014 – September 2014)**

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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**



## 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**





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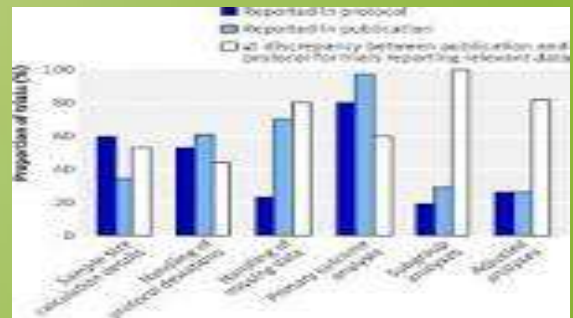
The primary objective is to audit and assess the Quality of Service being rendered by Basic, Cellular Mobile & Broadband service providers against the parameters notified by TRAI.

The audit and assessment of Quality of Service was 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, QoS audit for Basic (Wire line) and Broadband Services was also undertaken for UP (E), UP (W) and MP&CG circles during the quarter July – September 2014.**

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. 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	Dates of live measurement Audit			Audit Location
		July-14	August-14	September-14	Address
<b>GSM Operators</b>					
1	AIRCEL	15 to 17 Jul-14	11 to 13 Aug-14	9 to 11 Sep-14	Dishnet Wireless Ltd Office ,Phase -7 Industrial Area,Mohali
2	AIRTEL	13 to 15 Jul-14	8, 11 to 12 Aug-14	8 to 10 Sep-14	Bharti Airtel Campus, Plot No 21, Rajiv Gandhi Information and Technilogy Park, Chandigarh, 160101
3	TATA GSM	10,11 & 14 Jul-14	12 to 14 Aug-14	3 to 5 Sep-14	TTSL Office Phase-8,Industrial area Mohali
4	BSNL	14 to 16 Jul-14	7 to 8 & 11 Aug-14	4 to 5 & 8 Sep-14	BSNL Exchange Sector-49 Chandigarh
5	VIDEOCON	14 to 16 Jul-14	14, 18 to 19 Aug-14	8 to 10 Sep-14	QTL Office Phase -7 Industrial Area, Mohali
6	RCOM GSM	8 to 10 Jul-14	6 to 8 Aug-14	3 to 4 & 8 Sep-14	Reliance Communications Ltd. Phase-8,Industrial area Mohali
7	IDEA	9 to 11 Jul-14	6 to 8 Aug-14	5, 8 to 9 Sep-14	Idea Office Phase -7 Industrial Area,Mohali
8	VODAFONE	10,11 & 14 Jul-14	7,8 & 11 Aug-14	3 to 5 Sep-14	Vodafone Office Phase-8,Industrial area Mohali
<b>CDMA Operators</b>					
9	TATA CDMA	16 to 18 Jul-14	12 to 14 Aug-14	3 to 5 Sep-14	TTSL Office Phase-8,Industrial area Mohali
10	RCOM CDMA	8 to 10 Jul-14	6 to 8 Aug-14	3 to 4 & 8 Sep-14	Reliance Communications Ltd. Phase-8,Industrial area Mohali

For all the above operators, audit was conducted in all the three months of the Quarter ended September 2014.

The data generated by monthly PMR and 3-days live measurements audit for the period July-2014 to September-2014 has been successfully uploaded to the server located at TRAI premises.

### 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 once in a year. **However, QoS audit for basic (wire line) service was not required to be done for Punjab Circle in the quarter ended September- 2014, as it has already been done in the month of June 2014.**

### 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 once in a year. **However, the QoS audit for Broadband service was not required to be done for Punjab Circle in the quarter ended September- 2014, as it has already been done in the month of June 2014.**

## **4. EXECUTIVE SUMMARY**



## 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 drive tests in three select SSAs per service provider per quarter.
- 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.
- **Essence of compliance report of service providers with respect to the QoS:**

### Cellular Mobile Service:

(i) From month audit & 3 days live findings, it was concluded that on an average, performance of the operators in the Punjab Service Area was satisfactory for **Network Parameters** except for one parameter namely **‘Worst affected cells having > 3% TCH drop’** which could not be met by **Aircel, BSNL, Tata (GSM) and Tata (CDMA)**. The quarterly average performance of **Aircel, BSNL, Tata (GSM) and Tata (CDMA)** for this parameter was **4.51%, 21.76%, 4.98% and 6.58%** respectively.

Similar non-compliance was observed for **Aircel, BSNL, Tata (GSM) and Tata (CDMA)** during the live measurements in all three months of the Quarter ended September-2014 with their quarterly average performance as **4.57%, 22.19%, 5.08% and 6.65%** respectively,

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

(ii) 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, Termination of Service and Time taken for refunds. However, **RCOM (GSM)** could not meet the benchmark for the parameter **‘% of billing complaints during the quarter – Pre-paid’** with its performance as **0.29%** against the benchmark of **<= 0.1%**.

With respect to parameter **Call answered by operators (voice to voice within 90 sec.)**, **Tata (GSM) and Tata (CDMA)** has not met the benchmark of ‘calls answered by Operators (voice to voice) within **90 seconds** (as they provided the data for 90 seconds). They have achieved their performance as **90.53% and 94.56%** respectively against the benchmark of **>=95%**.

During 3 days live measurement, All operators (except **Tata GSM, RCOM GSM and RCOM CDMA**) have met the benchmarks for the parameters '**Accessibility to call center and call connection to operators (Voice to voice) within 60/90 seconds**'. Accessibility to call center for **Tata GSM** was **90.83%** and **RCOM GSM & RCOM CDMA** has performed with **86.73%** and **87.05%** of calls connected to operator within 60 seconds respectively whereas **Tata (CDMA)** have not met the benchmark of 'calls answered by Operators (voice to voice) within **90 seconds (93.54%)**'.

(iii) With regard to the results of drive tests conducted in three SSAs namely Pathankot, Ferozepur and Jalandhar, it was revealed that in general the performance of the services providers was satisfactory as they were largely meeting the benchmarks. However, **BSNL** could not perform well in respect of the prime parameters **CDR, Voice Quality, CSSR and Call Blocked rate** across the above three SSAs.

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

## **5. PMR AUDIT REPORT**





## 5. PMR AUDIT REPORTS:

### 5.1 MONTHLY PMR:

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

Sl. No.	Name of Service Provider	Month of Audit	Network TCBH Hour
<b>GSM Operators</b>			
1	AIRCEL	Sept -14	20:00 -21:00
2	AIRTEL	Sept -14	20:00 -21:00
3	BSNL	Sept -14	19:00 – 20:00
4	IDEA	Sept -14	20:00 -21:00
5	RCOM GSM	Sept -14	19:00 – 20:00
6	TATA GSM	Sept -14	20:00 -21:00
7	QUADRANT TELEVENTURES LTD	Sept -14	20:00 - 21:00
8	VODAFONE	Sept -14	19:00 – 20:00
<b>CDMA Operators</b>			
9	RCOM CDMA	Sept -14	19:00 - 20:00
10	TATA CDMA	Sept -14	12:00 -13:00

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

#### 5.1.2 SWITCHES/BSC/BTS DETAILS OF SERVICE PROVIDERS:

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	5	599	NSN	NSN
2	AIRTEL	24	55	5140	Ericsson	Ericsson
3	BSNL	14	51	3174	Ericsson & ZTE	Ericsson, ZTE & NSN
4	IDEA	9	50	4555	ZTE	ZTE & Huawei
5	RCOM GSM	3	8	1537	Huawei & Ericsson	ZTE
6	TATA GSM	2	12	1658	NSN	NSN
7	QTL	2	12	2079	Huawei & NSN	Huawei
8	VODAFONE	9	50	4696	Ericsson	Ericsson
<b>CDMA Operators</b>						
9	RCOM CDMA	4	3	625	Lucent, ZTE & Ericsson	Lucent & ZTE
10	TATA CDMA	3	4	462	Ericsson	Huawei & Motorola

5.1.3 QOS PERFORMANCE OF MONTHLY PMR – JULY-14 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE - JULY 14 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%	July-14	0.27%	0.07%	0.45%	0.07%	0.23%	0.06%	0.14%	0.05%	0.25%	0.03%
	b) Worst affected BTSs due to downtime	<=2%	July-14	0.33%	0.04%	1.91%	0.09%	0.19%	0.00%	0.39%	0.11%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	July-14	97.70%	99.40%	96.04%	98.75%	99.54%	98.99%	97.89%	99.85%	98.51%	98.62%
	b) SDCCH/PAGING Channel congestion	<=1%	July-14	0.29%	0.08%	0.76%	0.09%	0.02%	0.02%	0.08%	0.04%	0.00%	0.00%
	c) TCH congestion	<=2%	July-14	1.27%	0.08%	1.63%	0.13%	0.05%	0.11%	0.38%	0.15%	0.10%	0.11%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	July-14	0.82%	0.45%	1.86%	0.60%	0.32%	0.66%	1.10%	0.59%	0.10%	0.63%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	July-14	4.21%	0.82%	17.50%	0.35%	0.02%	4.82%	1.37%	1.41%	0.08%	6.07%
	c) Connections with good voice quality	>=95%	July-14	97.05%	98.55%	95.15%	97.50%	98.83%	97.04%	97.10%	98.02%	99.73%	98.98%
4	No. of POI's having >=0.5% POI congestion		July-14	0	0	0	0	0	0	0	0	0	0

5.1.4 QOS PERFORMANCE OF MONTHLY PMR – AUGUST 14 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE - AUGUST 14 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%	Aug-14	0.22%	0.07%	0.38%	0.05%	0.20%	0.04%	0.09%	0.03%	0.18%	0.06%
	b) Worst affected BTSs due to downtime	<=2%	Aug-14	0.67%	0.02%	1.96%	0.07%	0.39%	0.00%	0.00%	0.02%	0.16%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Aug-14	97.32%	99.38%	95.88%	98.53%	99.59%	98.86%	97.92%	99.84%	98.22%	98.92%
	b) SDCCH/PAGING Channel congestion	<=1%	Aug-14	0.45%	0.08%	0.61%	0.07%	0.01%	0.01%	0.09%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Aug-14	1.85%	0.08%	1.69%	0.16%	0.04%	0.20%	0.46%	0.16%	0.17%	0.11%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Aug-14	0.84%	0.43%	1.83%	0.67%	0.31%	0.67%	1.12%	0.63%	0.24%	0.48%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Aug-14	4.22%	0.75%	19.18%	0.37%	0.03%	4.76%	1.59%	1.74%	0.11%	6.50%
	c) Connections with good voice quality	>=95%	Aug-14	96.82%	98.50%	95.32%	97.24%	98.87%	96.95%	97.00%	98.00%	99.71%	99.03%
4	No. of POI's having >=0.5% POI congestion		Aug-14	0	0	0	0	0	0	0	0	0	0

5.1.5 QOS PERFORMANCE OF MONTHLY PMR – SEPTEMBER 14 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE - SEPTEMBER 14 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%	Sep-14	0.31%	0.08%	0.40%	0.13%	0.16%	0.06%	0.15%	0.04%	0.13%	0.04%
	b) Worst affected BTSs due to downtime	<=2%	Sep-14	0.67%	0.02%	1.92%	0.37%	0.13%	0.00%	0.19%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Sep-14	96.97%	99.36%	95.35%	98.60%	99.56%	98.72%	97.68%	99.75%	98.52%	98.43%
	b) SDCCH/PAGING Channel congestion	<=1%	Sep-14	0.59%	0.08%	0.47%	0.06%	0.01%	0.02%	0.13%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Sep-14	1.14%	0.09%	1.44%	0.13%	0.04%	0.24%	0.58%	0.25%	0.01%	0.55%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Sep-14	0.96%	0.46%	1.75%	0.68%	0.33%	0.77%	1.17%	0.67%	0.04%	0.46%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Sep-14	5.10%	0.74%	28.61%	0.50%	0.00%	5.35%	1.82%	1.65%	0.13%	7.18%
	c) Connections with good voice quality	>=95%	Sep-14	96.54%	98.53%	95.29%	97.22%	98.82%	96.95%	96.65%	97.84%	99.72%	99.04%
4	No. of POI's having >=0.5% POI congestion		Sep-14	0	0	0	0	0	0	0	0	0	0

**5.1.6 QOS PERFORMANCE OF QUARTERLY PMR –AVERAGE OF QE- SETEMBER 14 (JULY – AUGUST – SEPTEMBER MONTHS AUDITED DATA)**

QUARTERLY QOS PERFORMANCE (AVERAGE OF QE – SEPTEMBER 14) – PUNJAB CIRCLE													
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%	Quarterly	0.27%	0.07%	0.41%	0.08%	0.20%	0.05%	0.13%	0.04%	0.19%	0.04%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.56%	0.03%	1.93%	0.18%	0.24%	0.00%	0.19%	0.04%	0.05%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	97.33%	99.38%	95.76%	98.63%	99.56%	98.86%	97.83%	99.81%	98.42%	98.66%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.44%	0.08%	0.61%	0.07%	0.01%	0.02%	0.10%	0.03%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	1.42%	0.08%	1.59%	0.14%	0.04%	0.18%	0.47%	0.19%	0.09%	0.26%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	0.87%	0.45%	1.81%	0.65%	0.32%	0.70%	1.13%	0.63%	0.13%	0.52%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	<b>4.51%</b>	0.77%	<b>21.76%</b>	0.41%	0.02%	<b>4.98%</b>	1.59%	1.60%	0.11%	<b>6.58%</b>
	c) Connections with good voice quality	>=95%	Quarterly	96.80%	98.53%	95.25%	97.32%	98.84%	96.98%	96.92%	97.95%	99.72%	99.02%
4	No. of POI's having >=0.5% POI congestion		Quarterly	0	0	0	0	0	0	0	0	0	0

### 5.1.7 KEY FINDINGS ON MONTHLY PMR AUDIT REPORTS:

The audit of network related parameters for cellular mobile service providers was conducted at their respective MSCs in the circles.

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 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.**

### 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 (0.13 %) 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 **Aircel, BSNL, Tata (GSM)** and **Tata (CDMA)**. The quarterly averaged performance of **Aircel, BSNL, Tata (GSM)** and **Tata (CDMA)** for this parameter was **4.51%, 21.76%, 4.98% and 6.58%** respectively. The performance of BSNL was way beyond the benchmark.

iii. Connections with good voice quality:

The audit results for this parameter indicates that all operators have met the bench mark during the quarter.

iv. No. of POI's having  $\geq 0.5\%$  POI congestion:

The audit with respect to this parameter revealed that all the operators met the benchmark for this parameter as there was no individual POI having congestion  $> 0.5\%$ .

**3-DAYS LIVE MEASUREMENT DATA VERIFICATION FOR  
CELLULAR MOBILE SERVICE PROVIDERS  
(NETWORK SERVICE QUALITY PARAMETER)**





## 5.2 LIVE MEASUREMENT DATA (3-DAYS) FOR CELLULAR MOBILE SERVICE PROVIDERS (NETWORK SERVICE QUALITY PARAMETER):

### 5.2.1 LIVE MEASUREMENT DATA (3-DAYS) - JULY 14 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE - JULY 14 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	0.10%	0.05%	0.97%	0.11%	0.13%	0.13%	0.24%	0.08%	0.10%	0.13%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.29%	0.02%	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	97.95%	99.45%	96.46%	98.54%	99.53%	98.99%	98.07%	99.82%	98.89%	98.49%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.10%	0.05%	0.97%	0.14%	0.02%	0.02%	0.09%	0.17%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.78%	0.09%	1.47%	0.23%	0.05%	0.11%	0.30%	0.18%	0.00%	0.17%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.80%	0.42%	1.57%	0.68%	0.30%	0.72%	1.05%	0.68%	0.06%	0.69%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	3.96%	0.84%	14.84%	0.37%	0.00%	4.68%	1.44%	1.43%	0.04%	6.45%
	c) Connections with good voice quality	>=95%	Live data	97.22%	98.59%	95.77%	97.30%	98.80%	96.90%	97.24%	97.95%	99.72%	98.96%
4	No. of POI having >=0.5% congestion		Live data	0	0	0	0	0	0	0	0	0	0

5.2.2 LIVE MEASUREMENT DATA (3-DAYS) – AUGUST 14 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE – AUGUST 14 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	0.29%	0.02%	0.29%	0.10%	0.17%	0.02%	0.11%	0.05%	0.14%	0.14%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.32%	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	97.72%	99.44%	96.12%	98.72%	99.61%	98.97%	98.31%	99.83%	98.81%	99.02%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.08%	0.04%	0.67%	0.05%	0.01%	0.01%	0.05%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.73%	0.06%	1.79%	0.15%	0.04%	0.10%	0.31%	0.17%	0.00%	0.03%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.83%	0.44%	1.92%	0.66%	0.34%	0.72%	1.03%	0.68%	0.04%	0.46%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	3.43%	0.77%	26.01%	0.39%	0.00%	4.91%	1.35%	1.96%	0.12%	6.26%
	c) Connections with good voice quality	>=95%	Live data	96.90%	98.49%	95.28%	97.34%	98.84%	96.88%	97.15%	97.96%	99.72%	99.03%
4	No. of POI having >=0.5% congestion		Live data	0	0	0	0	0	0	0	0	0	0

5.2.3 LIVE MEASUREMENT DATA (3-DAYS) – SEPTEMBER 14 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE – SEPTEMBER 14 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	0.28%	0.04%	1.06%	0.13%	0.17%	0.08%	0.06%	0.11%	0.20%	0.14%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.47%	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	97.41%	99.32%	96.05%	98.01%	99.59%	98.70%	98.03%	99.80%	98.83%	98.82%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.47%	0.11%	0.30%	0.05%	0.01%	0.03%	0.07%	0.07%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.76%	0.10%	1.66%	0.13%	0.04%	0.29%	0.42%	0.20%	0.00%	0.09%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.99%	0.49%	1.58%	0.66%	0.33%	0.81%	1.16%	0.69%	0.03%	0.44%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	6.33%	0.80%	25.71%	0.58%	0.00%	5.65%	1.71%	2.01%	0.12%	7.23%
	c) Connections with good voice quality	>=95%	Live data	96.63%	98.53%	95.27%	97.35%	98.84%	97.11%	96.98%	97.93%	99.71%	99.04%
4	No. of POI having >=0.5% congestion		Live data	0	0	0	0	0	0	0	0	0	0

**5.2.4 QUARTERLY QOS PERFORMANCE OF 3-DAYS LIVE MEASUREMENT AUDITED DATA (AVERAGE OF JULY – AUGUST – SEPTEMBER 2014 MONTHS AUDITED DATA)**

QUARTERLY QOS PERFORMANCE OF 3-DAYS LIVE MEASUREMENT (AVERAGE OF QE- SEPTEMBER14) – PUNJAB CIRCLE													
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%	Quarterly	0.22%	0.04%	0.77%	0.11%	0.16%	0.08%	0.14%	0.08%	0.15%	0.14%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.00%	0.00%	0.36%	0.01%	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	97.69%	99.40%	96.21%	98.42%	99.58%	98.89%	98.14%	99.82%	98.84%	98.78%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.22%	0.07%	0.65%	0.08%	0.01%	0.02%	0.07%	0.09%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	0.76%	0.08%	1.64%	0.17%	0.04%	0.17%	0.34%	0.18%	0.00%	0.10%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	0.87%	0.45%	1.69%	0.67%	0.32%	0.75%	1.08%	0.68%	0.04%	0.53%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	4.57%	0.80%	22.19%	0.45%	0.00%	5.08%	1.50%	1.80%	0.09%	6.65%
	c) Connections with good voice quality	>=95%	Quarterly	96.92%	98.54%	95.44%	97.33%	98.83%	96.96%	97.12%	97.95%	99.72%	99.01%
4	No. of POI having >=0.5% congestion		Quarterly	0	0	0	0	0	0	0	0	0	0

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

From three days live measurement assessment, it was found that the performance of all operators was satisfactory as they were largely meeting the benchmarks except for the parameter ‘**Worst affected cells> 3 % TCH drops**’. The benchmark for this parameter was not met by **Aircel, BSNL, Tata (GSM) and Tata (CDMA)** during the live measurements in all three months of the Quarter ended September-2014. The quarterly average performance of **Aircel, BSNL, Tata (GSM) and Tata (CDMA)** was **4.57%, 22.19%, 5.08% and 6.65%** respectively, during the live measurements in three months of the quarter. *The similar non-compliance of **Aircel, BSNL, Tata (GSM) and Tata (CDMA)** has been observed in monthly audit.*

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

5.2.6 DETAILED NETWORK DATA ASSESSMENT OF CELLULAR MOBILE TELEPHONE SERVICES:

TABLE: 1

Detailed Network Data Assessment of Cellular Mobile Telephone Services- Punjab Circle - July 14 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		July-14	600	5072	3136	4550	1540	1657	2063	4584	625	460
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		July-14	1221	2779	10481	2295	2609	690	2192	1607	1174	102
	c) BTS Accumulated Downtime	<=2%	July-14	0.27%	0.07%	0.45%	0.07%	0.23%	0.06%	0.14%	0.05%	0.25%	0.03%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		July-14	2	2	60	4	3	0	8	5	0	0
e) Worst affected BTSs due to downtime	<=2%	July-14	0.33%	0.04%	1.91%	0.09%	0.19%	0.00%	0.39%	0.11%	0.00%	0.00%	
2	<b>Connection Establishment (Accessibility)</b>												
	a) CSSR (Call Setup Success Rate)	>=95%	July-14	97.70%	99.40%	96.04%	98.75%	99.54%	98.99%	97.89%	99.85%	98.51%	98.62%
	b) SDCCH/PAGING Congestion	<=1%	July-14	0.29%	0.08%	0.76%	0.09%	0.02%	0.02%	0.08%	0.04%	0.00%	0.00%
c) TCH congestion	<=2%	July-14	1.27%	0.08%	1.63%	0.13%	0.05%	0.11%	0.38%	0.15%	0.10%	0.11%	
3	<b>Connection Maintenance (Retainability)</b>												
	a) Call Drop Rate (CDR)	<=2%	July-14	0.82%	0.45%	1.86%	0.60%	0.32%	0.66%	1.10%	0.59%	0.10%	0.63%
	b) Worst affected cells>3% TCH drop	<=3%	July-14	4.21%	0.82%	17.50%	0.35%	0.02%	4.82%	1.37%	1.41%	0.08%	6.07%
	c) % of connections with good voice quality	>=95%	July-14	97.05%	98.55%	95.15%	97.50%	98.83%	97.04%	97.10%	98.02%	99.73%	98.98%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		July-14	76	125	1646	48	1	243	89	198	1	88
e) Total no. of cells (Sector) in the licensed service area		July-14	1800	15270	9408	13688	4578	5027	6500	14016	1874	1457	
4	<b>No. of POI's having &gt;=0.5% POI congestion</b>												
	No. of POI's having >=0.5% POI congestion		July-14	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		July-14	0	0	0	0	0	0	0	0	0	0
5	<b>Network Data</b>												
	a) Equipped Capacity of Network in Erlang		July-14	23290	249647	343000	196902	72000	107603	90297	145867	53000	84974
	b) Total traffic in TCBH in erlang (Avg.)		July-14	9218	212698	65579	150796	52456	30731	41477	120618	12837	14758
c) Total no. of customers served (as per VLR) on last day of the month		July-14	460393	7044190	239569	5828660	2435234	1129249	1190548	4410610	310003	222998	

**TABLE: 2**

Detailed Network Data Assessment of Cellular Mobile Telephone Services -3 days live - Punjab Circle – July 14 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
Network Service Quality Parameter													
<b>Network Availability</b>													
1	a) Total no. of BTSs in the licensed service area		Live data	600	5035	3103	4547	1540	1656	2061	4551	625	460
	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	44	172	2166	363	142	156	355	247	45	44
	c) BTS Accumulated Downtime	<=2%	Live data	0.10%	0.05%	0.97%	0.11%	0.13%	0.13%	0.24%	0.08%	0.10%	0.13%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	9	1	0	0	1	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.29%	0.02%	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	97.95%	99.45%	96.46%	98.54%	99.53%	98.99%	98.07%	99.82%	98.89%	98.49%
	b) SDCCCH/PAGING Congestion	<=1%	Live data	0.10%	0.05%	0.97%	0.14%	0.02%	0.02%	0.09%	0.17%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.78%	0.09%	1.47%	0.23%	0.05%	0.11%	0.30%	0.18%	0.00%	0.17%
<b>Connection Maintenance (Retainability)</b>													
3	a) Call Drop Rate (CDR)	<=2%	Live data	0.80%	0.42%	1.57%	0.68%	0.30%	0.72%	1.05%	0.68%	0.06%	0.69%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	3.96%	0.84%	14.84%	0.37%	0.00%	4.68%	1.44%	1.43%	0.04%	6.45%
	c) % of connections with good voice quality	>=95%	Live data	97.22%	98.59%	95.77%	97.30%	98.80%	96.90%	97.24%	97.95%	99.72%	98.96%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	71	127	1381	51	0	235	93	201	1	94
	e) Total no. of cells (Sector) in the licensed service area		Live data	1800	15146	9309	13685	4578	5027	6495	14013	1874	1457
<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: 3

Detailed Network Data Assessment of Cellular Mobile Telephone Services - Punjab Circle - August 14 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		Aug-14	600	5111	3161	4555	1537	1658	2065	4646	625	462
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Aug-14	980	2671	9022	1622	2233	500	1454	976	853	212
	c) BTS Accumulated Downtime	<=2%	Aug-14	0.22%	0.07%	0.38%	0.05%	0.20%	0.04%	0.09%	0.03%	0.18%	0.06%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Aug-14	4	1	62	3	6	0	0	1	1	0
e) Worst affected BTSs due to downtime	<=2%	Aug-14	0.67%	0.02%	1.96%	0.07%	0.39%	0.00%	0.00%	0.02%	0.16%	0.00%	
2	<b>Connection Establishment (Accessibility)</b>												
	a) CSSR (Call Setup Success Rate)	>=95%	Aug-14	97.32%	99.38%	95.88%	98.53%	99.59%	98.86%	97.92%	99.84%	98.22%	98.92%
	b) SDCCH/PAGING Congestion	<=1%	Aug-14	0.45%	0.08%	0.61%	0.07%	0.01%	0.01%	0.09%	0.02%	0.00%	0.00%
c) TCH congestion	<=2%	Aug-14	1.85%	0.08%	1.69%	0.16%	0.04%	0.20%	0.46%	0.16%	0.17%	0.11%	
3	<b>Connection Maintenance (Retainability)</b>												
	a) Call Drop Rate (CDR)	<=2%	Aug-14	0.84%	0.43%	1.83%	0.67%	0.31%	0.67%	1.12%	0.63%	0.24%	0.48%
	b) Worst affected cells>3% TCH drop	<=3%	Aug-14	4.22%	0.75%	19.18%	0.37%	0.03%	4.76%	1.59%	1.74%	0.11%	6.50%
	c) % of connections with good voice quality	>=95%	Aug-14	96.82%	98.50%	95.32%	97.24%	98.87%	96.95%	97.00%	98.00%	99.71%	99.03%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Aug-14	76	115	1819	51	1	240	103	245	2	95
e) Total no. of cells (Sector) in the licensed service area		Aug-14	1800	15395	9483	13695	4572	5044	6509	14121	1874	1458	
4	<b>No. of POI's having &gt;=0.5% POI congestion</b>												
	No. of POI's having >=0.5% POI congestion		Aug-14	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Aug-14	0	0	0	0	0	0	0	0	0	0
5	<b>Network Data</b>												
	a) Equipped Capacity of Network in Erlang		Aug-14	22802	248537	343000	196996	72000	107752	91280	148197	53000	85053
	b) Total traffic in TCBH in erlang (Avg.)		Aug-14	9427	215691	66829	150603	58394	32071	43638	122236	12624	15096
c) Total no. of customers served (as per VLR) on last day of the month		Aug-14	454325	7146135	2493289	5927670	2510352	1154069	1264574	4493920	303335	212394	

**TABLE: 4**

**Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live- Punjab Circle- August 14 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	600	5072	3136	4550	1540	1657	2063	4585	625	461
	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	123	69	664	338	187	2725	170	181	62	45
	c) BTS Accumulated Downtime	<=2%	Live data	0.29%	0.02%	0.29%	0.10%	0.17%	0.02%	0.11%	0.05%	0.14%	0.14%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	10	0	0	0	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.32%	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	97.72%	99.44%	96.12%	98.72%	99.61%	98.97%	98.31%	99.83%	98.81%	99.02%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.08%	0.04%	0.67%	0.05%	0.01%	0.01%	0.05%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.73%	0.06%	1.79%	0.15%	0.04%	0.10%	0.31%	0.17%	0.00%	0.03%
<b>Connection Maintenance (Retainability)</b>													
3	a) Call Drop Rate (CDR)	<=2%	Live data	0.83%	0.44%	1.92%	0.66%	0.34%	0.72%	1.03%	0.68%	0.04%	0.46%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	<b>3.43%</b>	0.77%	<b>26.01%</b>	0.39%	0.00%	<b>4.91%</b>	1.35%	1.96%	0.12%	<b>6.26%</b>
	c) % of connections with good voice quality	>=95%	Live data	96.90%	98.49%	95.28%	97.34%	98.84%	96.88%	97.15%	97.96%	99.72%	99.03%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	62	117	2447	54	0	248	88	277	2	91
	e) Total no. of cells (Sector) in the licensed service area		Live data	1800	15270	9408	13697	4578	5048	6503	14116	1874	1458
<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 - September 14 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>													
<b>Network Availability</b>													
1	a) Total no. of BTSs in the licensed service area		Sep-14	599	5140	3174	4555	1537	1658	2079	4696	625	462
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Sep-14	1317	2877	9235	4425	1723	662	2253	1359	606	145
	c) BTS Accumulated Downtime	<=2%	Sep-14	0.31%	0.08%	0.40%	0.13%	0.16%	0.06%	0.15%	0.04%	0.13%	0.04%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Sep-14	4	1	61	17	2	0	4	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Sep-14	0.67%	0.02%	1.92%	0.37%	0.13%	0.00%	0.19%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Sep-14	96.97%	99.36%	95.35%	98.60%	99.56%	98.72%	97.68%	99.75%	98.52%	98.43%
	b) SDCCH/PAGING Congestion	<=1%	Sep-14	0.59%	0.08%	0.47%	0.06%	0.01%	0.02%	0.13%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Sep-14	1.14%	0.09%	1.44%	0.13%	0.04%	0.24%	0.58%	0.25%	0.01%	0.55%
<b>Connection Maintenance (Retainability)</b>													
3	a) Call Drop Rate (CDR)	<=2%	Sep-14	0.96%	0.46%	1.75%	0.68%	0.33%	0.77%	1.17%	0.67%	0.04%	0.46%
	b) Worst affected cells>3% TCH drop	<=3%	Sep-14	<b>5.10%</b>	0.74%	<b>28.61%</b>	0.50%	0.00%	<b>5.35%</b>	1.82%	1.65%	0.13%	<b>7.18%</b>
	c) % of connections with good voice quality	>=95%	Sep-14	96.54%	98.53%	95.29%	97.22%	98.82%	96.95%	96.65%	97.84%	99.72%	99.04%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Sep-14	91	114	2724	68	0	269	120	236	2	105
	e) Total no. of cells (Sector) in the licensed service area		Sep-14	1794	15488	9522	13713	4569	5037	6559	14308	1874	1461
<b>No. of POI's having &gt;=0.5% POI congestion</b>													
4	No. of POI's having >=0.5% POI congestion		Sep-14	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Sep-14	0	0	0	0	0	0	0	0	0	0
<b>Network Data</b>													
5	a) Equipped Capacity of Network in Erlang		Sep-14	25290	249526	315000	197713	72000	107744	91695	153386	53000	85141
	b) Total traffic in TCBH in erlang (Avg.)		Sep-14	9709	217933	68067	151317	58381	34275	47242	125680	12915	12975
	c) Total no. of customers served (as per VLR) on last day of the month		Sep-14	461054	7185776	2375194	5955037	2531211	1201248	1316947	4507030	292194	201844

TABLE: 6

Detailed Network Data Assessment of Cellular Mobile Telephone Services -3 days live - Punjab Circle – September 14 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									
<b>Network Service Quality Parameter</b>													
1	<b>Network Availability</b>												
	a) Total no. of BTSs in the licensed service area		Live data	597	5111	3161	4556	1537	1656	2073	4646	625	462
	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	122	132	2406	420	185	99	86	375	91	48
	c) BTS Accumulated Downtime	<=2%	Live data	0.28%	0.04%	1.06%	0.13%	0.17%	0.08%	0.06%	0.11%	0.20%	0.14%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	15	0	0	0	0	0	0	0
e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.47%	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	97.41%	99.32%	96.05%	98.01%	99.59%	98.70%	98.03%	99.80%	98.83%	98.82%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.47%	0.11%	0.30%	0.05%	0.01%	0.03%	0.07%	0.07%	0.00%	0.00%
c) TCH congestion	<=2%	Live data	0.76%	0.10%	1.66%	0.13%	0.04%	0.29%	0.42%	0.20%	0.00%	0.09%	
3	<b>Connection Maintenance (Retainability)</b>												
	a) Call Drop Rate (CDR)	<=2%	Live data	0.99%	0.49%	1.58%	0.66%	0.33%	0.81%	1.16%	0.69%	0.03%	0.44%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	<b>6.33%</b>	0.80%	<b>25.71%</b>	0.58%	0.00%	<b>5.65%</b>	1.71%	2.01%	0.12%	<b>7.23%</b>
	c) % of connections with good voice quality	>=95%	Live data	96.63%	98.53%	95.27%	97.35%	98.84%	97.11%	96.98%	97.93%	99.71%	99.04%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	113	124	2438	79	0	285	112	288	2	106
e) Total no. of cells (Sector) in the licensed service area		Live data	1791	15395	9483	13715	4569	5048	6536	14300	1874	1461	
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

## **CUSTOMER SERVICE QUALITY (CSD) PARAMETERS**



### 5.3 CUSTOMER SERVICE QUALITY PARAMETERS MEASUREMENT FOR CMTS-QE SEPT 14:

#### 5.3.1 QUARTERLY CUSTOMER SERVICE DELIVERY (CSD) AUDITED DATA FOR CELLULAR MOBILE SERVICES (JULY TO SEPTEMBER 2014 MONTHS AUDITED DATA):

#### QUARTERLY CSD DATA FOR CELLULAR MOBILE TELEPHONE SERVICES -QE SEPTEMBER 14

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	30311	1296097	117016	1832045	124617	170933	29080	1246130	160331	89380
	B) No. of bills disputed including billing complaints during the quarter		Punjab	0	910	NP	831	116	12	0	658	152	5
	C)% of billing complaints during the quarter	<= 0.1%	Punjab	0.00%	0.07%	NP	0.05%	0.09%	0.01%	0.00%	0.05%	0.09%	0.01%
2	<b>Metering &amp; Billing Credibility -Pre Paid</b>												
	A) Total No. of Pre-paid customers at the end of the quarter		Punjab	981426	6939414	3100690	5307776	2531141	1971014	2420256	4351587	260385	285738
	B) Total No. of complaints relating to charging, Credit and Validity during the quarter		Punjab	9	230	NP	1171	7330	4	10	268	242	3
	C) % of Pre-paid Charging Complaints	<= 0.1%	Punjab	0.00%	0.00%	NP	0.02%	0.29%	0.00%	0.00%	0.01%	0.09%	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	9	1140	NP	8007	7446	2273	10	926	394	212
	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	9	1140	NP	8007	7446	2273	10	926	394	212
	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%	NP	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%	NP	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

QUARTERLY CSD DATA FOR CELLULAR MOBILE TELEPHONE SERVICES -QE SEPTEMBER 14

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	
4	<b>Response time to customers for assistance</b>												
	A) Total no of calls attempted to customer care/Call center		Punjab	2390062	1865357	NP	17621577	5312400	632483	702165	11412950	293156	62057
	B) Total no. of calls successfully established to customer care/Call center		Punjab	2370472	1814678	NP	17601500	5242700	626861	702165	11412950	289601	61341
	C) % Accessibility of Call centre /customer Care (Total call successfully established *100 / Total call attempt)	>=95%	Punjab	99.18%	97.28%	NP	99.89%	98.69%	99.11%	100.00%	100.00%	98.79%	98.85%
	D) Total Calls reached to agent desk for Voice to Voice (Total call attempt)		Punjab	461008	4592180	NP	3789608	1448262	973693	2031930	2981272	77270	72116
	E) Total number of calls answered by the operator (Voice to voice) within 60/90 seconds		Punjab	424207	4440125	NP	3585477	1321009	881517	1849905	2961679	71901	68192
	F) % age of calls answered by operator (voice to voice) (Total call successfully established within 60 Sec/90 sec.) *100/ Total call attempts	>=90% (60 Sec.) & >=95% (90 Sec.)	Punjab	92.02%	*96.69%	NP	94.61%	91.21%	*90.53%	91.04%	99.34%	93.05%	*94.56%
5	<b>Termination/closure of service</b>												
	A) Total No. of requests for Termination / Closure of service received during the quarter		Punjab	248	3411	907	27233	854	4342	30	6229	482	1692
	B) No. of requests for Termination / Closure of service complied within 7 days during the quarter		Punjab	248	3411	907	27233	854	4342	30	6229	482	1692
	C) % of Termination/ Closure of service within 7 days	<=7days	Punjab	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	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	93	926	716	7868	951	1035	0	946	688	847
	B) No. of Payments/ Refunds Cleared during the quarter		Punjab	93	926	716	7868	951	1035	0	946	688	847
	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%	100.00%	100.00%	100.00%	100.00%

\* Call answered within 90 Seconds (voice to voice) as per TRAI QoS Regulation (Third amendment) dated 21st August 2014.  
 NP: Data not provided by BSNL due to non-functional of their call center

5.3.2 3 DAYS LIVE CSD AUDITED DATA FOR CELLULAR MOBILE SERVICES (QE - SEPT 2014):

CSD 3 DAYS LIVE DATA FOR CELLULAR MOBILE TELEPHONE SERVICES - QE- SEPTEMBER 14

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									
<b>RESPONSE TIME TO CUSTOMERS FOR ASSISTANCE</b>													
1	Total no of calls attempted to customer care/Call center		Punjab	92351	73569	NP	510989	156499	32316	21873	351682	9061	1730
	Total no. of calls successfully established to customer care/Call center		Punjab	89651	73569	NP	510631	155384	29352	21873	351682	8983	1724
	% Accessibility of Call centre /customer Care (Total call successfully established*100 / Total call attempt)	>=95%	Punjab	97.08%	100.00%	NP	99.93%	99.29%	<b>90.83%</b>	100.00%	100.00%	99.14%	99.65%
	Total Calls reached to agent desk for Voice to Voice (Total call attempt)		Punjab	16017	36376	NP	106436	33323	19387	71497	95501	2077	1889
	Total number of calls answered by the operator (Voice to voice) within 60/90 seconds		Punjab	15054	35612	NP	106154	28900	19255	66645	94891	1808	1767
	% age of calls answered by operator(voice to voice) (Total call successfully established within 60 Sec/90 sec.*100 / Total call attempt)	>=90% (60 Sec.) & >=95% (90 Sec.)	Punjab	93.99%	*97.90%	NP	99.74%	<b>86.73%</b>	*99.32%	93.21%	99.36%	<b>87.05%</b>	<b>*93.54%</b>

\* Call answered within 90 Seconds (voice to voice) as per TRAI QoS Regulation (Third amendment) dated 21st August 2014.

NP: Data not provided by BSNL due to non-functional of their call center

## KEY FINDINGS: CUSTOMER SERVICE DELIVERY PARAMETERS

### 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 was largely within the prescribed bench mark of  $\leq 0.1\%$ . Only **RCOM (GSM)** could not meet the benchmark for the parameter '**% of billing complaints during the quarter – Pre-paid**' with its performance as **0.29%** against the benchmark of  $\leq 0.1\%$ .

### 2. Resolution of Billing complaints and applying credits -

- 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

### 3. 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 are in compliance with respect to the parameter accessibility of call center. However, **Tata (GSM) and Tata (CDMA)** has not met the benchmark of 'calls answered by Operators (voice to voice) within **90 seconds** as they provided the data for 90 seconds. They have achieved their performance as **90.53% and 94.56%** respectively against the benchmark of  $\geq 95\%$ . Call center of BSNL was not functional so they did not provide the data related to the call center.

### 4. Termination/Closure of Service

In case of this parameters also, all service providers have settled the **Termination/Closure** within the benchmark of 7 days.

### 5. 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.

### Live Measurements:

The results of live measurements revealed that all operators (except **Tata GSM, RCOM GSM and RCOM CDMA**) have met the benchmarks for the parameters '**Accessibility to call center and call connection to operators (Voice to voice) within 60/90 seconds**. Accessibility to Call center for **Tata GSM** was **90.83%** and **RCOM GSM & RCOM CDMA** has performed with **86.73%** and **87.05%** of calls connected to operator within 60 seconds respectively whereas **Tata (CDMA)** have not met the benchmark of 'calls answered by Operators (voice to voice) within **90 seconds (93.54%)**).

## **6. LIVE CALLING ASSESSMENT**





## 6. LIVE CALLING ASSESSMENT:

### 6.1 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.

INTER OPERATOR CALL ASSESSMENT BASED ON LIVE MEASUREMENT											
Calling Operators	Circle Name	AIRCEL	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	QTL	VODAFONE	RCOM (CDMA)	TATA (CDMA)
AIRCEL	Punjab	--	100%	100%	100%	100%	100%	100%	100%	100%	100%
AIRTEL	Punjab	100%	--	100%	100%	100%	100%	100%	100%	100%	100%
BSNL	Punjab	100%	100%	--	100%	100%	100%	100%	100%	100%	100%
IDEA	Punjab	100%	100%	100%	--	100%	100%	100%	100%	100%	100%
RCOM (GSM)	Punjab	100%	100%	100%	100%	--	100%	100%	100%	100%	100%
TATA (GSM)	Punjab	100%	100%	100%	100%	100%	--	100%	100%	100%	100%
QTL	Punjab	100%	100%	100%	100%	100%	100%	--	100%	100%	100%
VODAFONE	Punjab	100%	100%	100%	100%	100%	100%	100%	--	100%	100%
RCOM (CDMA)	Punjab	100%	100%	100%	100%	100%	100%	100%	100%	--	100%
TATA (CDMA)	Punjab	100%	100%	100%	100%	100%	100%	100%	100%	100%	--

The result of the testing revealed that the inter connection performance among the operators was quite satisfactory as there was hardly any problem in interconnection from one operator to other operators which indicated there was no congestion on the individual POIs of the service providers.

## 6.2 CUSTOMER CARE / HELPLINE ASSESSMENT:

LIVE CALLING TO CALL CENTRE											
Parameter	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 attempted to customer care/Call center	Punjab	100	100	100	100	100	100	100	100	100	100
Total no. of calls successfully established to customer care/Call center	Punjab	96	100	100	100	100	100	100	100	100	100
% Accessibility of Call centre / customer Care (Total call successfully established *100 / Total call attempt)	Punjab	96.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Total Calls reached to agent desk for Voice to Voice (Total call attempt)	Punjab	100	100	100	100	100	100	100	100	100	100
Total number of calls answered by the operator (Voice to voice) within 90 seconds	Punjab	96	98	84	100	96	100	96	86	100	100
% age of calls answered by operator(voice to voice) (Total call successfully established within 90 Sec.*100 / Total call attempt)	Punjab	96.00%	98.00%	84.00%	100.00%	96.00%	100.00%	96.00%	86.00%	100.00%	100.00%

In case of calls answered by operators (voice to voice) within 60 seconds when test calls were made to the call centers, all operators were able to connect the calls with their call center operators/agents successfully for most of the attempts except BSNL and Vodafone as they could achieve their performance as 84% and 86% respectively.

## 6.3 LIVE CALLING ASSESSMENT FOR BILLING COMPLAINTS:

TELEPHONIC INTERVIEW FOR BILLING COMPLAINTS											
Parameter	Circle Name	AIRCEL	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	QTL	VODAFONE	RCOM (CDMA)	TATA (CDMA)
Total No. of calls Attempted	Punjab	9	100	ND	100	100	100	10	100	100	100
Total No. of calls Answered	Punjab	7	71	ND	67	66	77	8	79	62	73
Resolution of billing Complaints	Punjab	7	71	ND	67	66	77	8	79	62	73
% age of cases resolved	Punjab	100.00%	100.00%	ND	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

ND: Not done due to BSNL not provided the detail of billing complaints.

To test the Service Providers performance on billing related complaints and their resolutions, TUV-SUD auditors conducted a customer feedback calling for about random 100 nos. of customers. However, in some cases, the number of customers contacted for verification was very less due to less number of billing complaints. During live calling, some of the customers did not attend the calls while few others reported that their complaints have been resolved but not sure of duration of their resolution. However, most of the customers reported their satisfaction on resolution of the billing complaints.

**6.4 LEVEL -1 CALLING ASSESSMENT:**

LEVEL 1 LIVE CALLING															
Emergency no.	Circle Name	SSA Name	SDCA Name	No. of calls made	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	RCOM CDMA	TATA GSM	TATA CDMA	VIDEOCON	VODAFONE	
100, 101, 102, 108	Punjab	Pathankot	Batala	8	√	√	√	√	√	√	√	√	√	√	
			Qadian	8	√	√	√	√	√	√	√	√	√	√	
			Gurdaspur	8	√	√	√	√	√	√	√	√	√	√	√
			Dinanagar	8	√	√	√	√	√	√	√	√	√	√	√
			Pathankot	8	√	√	√	√	√	√	√	√	√	√	√
			Jugial	8	√	√	√	√	√	√	√	√	√	√	√
100, 101, 102, 108	Punjab	Ferozepur	Ferozepur	8	√	√	√	√	√	√	√	√	√	√	
			Moga	8	√	√	√	√	√	√	√	√	√	√	
			Zira	8	√	√	√	√	√	√	√	√	√	√	
			Faridkot	8	√	√	√	√	√	√	√	√	√	√	
			Kotkapura	8	√	√	√	√	√	√	√	√	√	√	
			Malout	8	√	√	√	√	√	√	√	√	√	√	
			Abohar	8	√	√	√	√	√	√	√	√	√	√	
			Fazilka	8	√	√	√	√	√	√	√	√	√	√	
			Guruaharsahai	8	√	√	√	√	√	√	√	√	√	√	
Muktasar	8	√	√	√	√	√	√	√	√	√	√				
100, 101, 102, 108	Punjab	Jalandhar	Jalandhar	8	√	√	√	√	√	√	√	√	√	√	
			Kapurthala	8	√	√	√	√	√	√	√	√	√	√	
			Nawanshahar	8	√	√	√	√	√	√	√	√	√	√	
			Nakodar	8	√	√	√	√	√	√	√	√	√	√	
			Phagwara	8	√	√	√	√	√	√	√	√	√	√	
			Phillaur	8	√	√	√	√	√	√	√	√	√	√	
			Sultanpur Lodhi	8	√	√	√	√	√	√	√	√	√	√	

To assess the availability and efficiency of level 1 services such as police, fire, ambulance (emergency services) offered by various mobile service providers in the SDCAs of three select SSAs, the calls were made from mobile phones provided by the service providers during the drive tests. In these SSA of Punjab service areas, the emergency services as mentioned in the above table were found functional in the networks of all the service providers.

## 7. DRIVE TEST



## **7. OPERATOR ASSESTID DRIVE TEST**

In terms of TRAI's letter dated 21<sup>st</sup> January, 2014, the drive tests were conducted for three consecutive days in one select SSA each month in each service area. Thus, the drive tests were carried out in three SSA's namely **Pathankot, Ferozpur and Jalandhar** in the months of July, August and September 2014 respectively. The total route Kms covered during the drive tests in the respective SSAs was **469Kms, 560Kms, and 515Kms**. 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. 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.

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.

DRIVE TEST TABLE - 1

OPERATOR ASSISTED DRIVE TEST AT PATHANKOT SSA IN JULY 14 MONTH - PUNJAB CIRCLE

S/N	Parameter	Classification of route covered	AIRCEL		AIRTEL		BSNL		IDEA		TATA GSM		RCOM GSM		VIDEOCON		VODAFONE		RCOM CDMA		TATA CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
1	Call Attempts	Major Road	154	25	185	25	191	26	162	25	176	25	123	26	149	25	162	26	117	26	142	25	
		Highway	231	25	213	25	243	25	239	25	214	25	158	25	209	25	228	26	164	25	223	25	
		Within City	159	25	164	27	144	24	176	25	189	30	243	22	185	25	174	26	192	22	169	28	
		Overall SSA	544	75	562	77	578	75	577	75	579	80	524	73	543	75	564	78	473	73	534	78	
2	Blocked Call Rate	Major Road	0.65%	0.00%	0.00%	0.00%	7.33%	0.00%	0.00%	0.00%	1.14%	0.00%	1.63%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Highway	0.00%	0.00%	0.00%	0.00%	2.06%	0.00%	0.42%	0.00%	0.93%	0.00%	5.70%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Within City	0.63%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Overall SSA	0.37%	0.00%	0.00%	0.00%	3.29%	0.00%	0.17%	0.00%	0.69%	0.00%	2.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
3	Dropped Call Rate (<=2%)	Major Road	0.65%	0.00%	0.00%	0.00%	0.57%	0.00%	0.00%	0.00%	0.57%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.71%	0.00%	0.00%	0.00%	
		Highway	0.00%	0.00%	0.00%	0.00%	0.87%	0.00%	0.00%	0.00%	0.00%	0.00%	0.67%	0.00%	0.00%	0.00%	0.00%	0.00%	7.14%	0.00%	0.00%	0.00%	
		Within City	0.00%	0.00%	0.00%	0.00%	0.70%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.08%	0.00%	0.00%	0.00%	
		Overall SSA	0.18%	0.00%	0.00%	0.00%	0.73%	0.00%	0.00%	0.00%	0.17%	0.00%	0.19%	0.00%	0.00%	0.00%	0.00%	0.00%	3.67%	0.00%	0.00%	0.00%	
4	Percentage connections with good voice quality (=>95%)																						

**AUDIT & ASSESSMENT OF QOS FOR QE-SEPTEMBER-2014-PUNJAB CIRCLE**

S/N	Parameter	Classification of route covered	AIRCEL		AIRTEL		BSNL		IDEA		TATA GSM		RCOM GSM		VIDEOCON		VODAFONE		RCOM CDMA		TATA CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Major Road	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.05%	100%	95.78%	99.90%	
		Highway	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.09%	100%	96.21%	95.04%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.57%	100%	97.93%	99.98%
		<b>Overall SSA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>98.95%</b>	<b>100%</b>	<b>96.63%</b>	<b>98.38%</b>
	(b) 0-5 (with frequency hopping for GSM Operators)	Major Road	95.89%	95.57%	95.45%	96.67%	95.33%	<b>93.74%</b>	97.63%	99.81%	96.11%	99.29%	95.02%	98.72%	96.66%	98.88%	96.70%	99.05%	NA	NA	NA	NA	
		Highway	95.70%	99.53%	96.67%	99.72%	<b>93.45%</b>	98.60%	97.31%	99.91%	96.87%	96.12%	95.15%	98.68%	96.84%	99.98%	97.60%	99.47%	NA	NA	NA	NA	
		Within City	96.38%	98.48%	96.89%	97.79%	<b>93.17%</b>	<b>88.10%</b>	98.21%	99.81%	97.17%	97.20%	99.24%	99.14%	97.24%	99.76%	97.75%	99.34%	NA	NA	NA	NA	
		<b>Overall SSA</b>	<b>95.95%</b>	<b>97.85%</b>	<b>96.39%</b>	<b>98.04%</b>	<b>93.98%</b>	<b>93.58%</b>	<b>97.75%</b>	<b>99.84%</b>	<b>96.73%</b>	<b>97.54%</b>	<b>97.07%</b>	<b>98.84%</b>	<b>96.92%</b>	<b>99.54%</b>	<b>97.39%</b>	<b>99.28%</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	
5	<b>Service Coverage</b>																						
	In door (>= -75dBm)	Major Road	62.45%	1.64%	93.33%	99.84%	50.65%	0.60%	94.42%	76.39%	64.37%	0.03%	49.18%	0.53%	61.93%	70.53%	85.85%	99.90%	28.16%	0.03%	17.70%	0.00%	
		Highway	53.22%	0.35%	92.67%	100%	36.14%	99.30%	89.98%	84.70%	58.15%	29.39%	46.18%	3.53%	45.18%	23.25%	74.18%	99.71%	15.07%	4.28%	14.24%	0.00%	
		Within City	61.98%	1.56%	93.18%	93.59%	44.11%	96.60%	98.90%	99.11%	85.15%	33.86%	74.94%	41.90%	63.68%	88.55%	92.68%	99.97%	31.05%	97.56%	31.69%	13.45%	
		<b>Overall SSA</b>	<b>58.68%</b>	<b>1.23%</b>	<b>93.04%</b>	<b>97.73%</b>	<b>42.87%</b>	<b>76.88%</b>	<b>94.08%</b>	<b>86.74%</b>	<b>68.88%</b>	<b>21.49%</b>	<b>60.57%</b>	<b>14.08%</b>	<b>56.03%</b>	<b>60.79%</b>	<b>83.05%</b>	<b>99.86%</b>	<b>24.93%</b>	<b>31.00%</b>	<b>20.48%</b>	<b>5.11%</b>	
	In-vehicle (>= -85dBm)	Major Road	86.68%	74.68%	99.59%	100%	91.01%	76.20%	99.96%	99.95%	94.32%	79.76%	77.12%	81.66%	90.74%	98.60%	98.85%	100%	46.00%	72.29%	53.20%	31.86%	
		Highway	80.51%	39.71%	99.67%	100%	78.82%	100%	99.82%	99.98%	86.69%	94.22%	75.59%	4.61%	78.79%	92.29%	96.81%	99.97%	32.08%	81.66%	34.45%	0.31%	
		Within City	87.98%	72.88%	99.07%	99.97%	89.92%	99.90%	100%	99.95%	98.70%	99.98%	96.49%	91.02%	94.38%	96.86%	98.83%	100%	64.69%	99.97%	69.47%	95.15%	
<b>Overall SSA</b>		<b>84.61%</b>	<b>63.59%</b>	<b>99.44%</b>	<b>99.99%</b>	<b>85.62%</b>	<b>94.80%</b>	<b>99.92%</b>	<b>99.96%</b>	<b>92.91%</b>	<b>91.46%</b>	<b>85.90%</b>	<b>57.70%</b>	<b>87.32%</b>	<b>95.91%</b>	<b>98.00%</b>	<b>99.99%</b>	<b>47.07%</b>	<b>83.52%</b>	<b>50.36%</b>	<b>47.10%</b>		

AUDIT & ASSESSMENT OF QOS FOR QE-SEPTEMBER-2014-PUNJAB CIRCLE



S/N	Parameter	Classification of route covered	AIRCEL		AIRTEL		BSNL		IDEA		TATA GSM		RCOM GSM		VIDEOCON		VODAFONE		RCOM CDMA		TATA CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
	Outdoor-in city (>= 95dBm)	Major Road	98.97%	98.98%	100%	100%	99.44%	98.90%	100%	100%	99.85%	99.94%	97.01%	99.73%	99.44%	99.95%	100%	100%	83.61%	100%	97.26%	99.30%
		Highway	96.41%	96.09%	100%	100%	98.09%	100%	100%	100%	99.37%	100%	95.52%	79.63%	97.43%	99.94%	99.97%	100%	71.67%	99.97%	87.52%	98.02%
		Within City	98.72%	95.94%	99.95%	100%	99.44%	100%	100%	100%	99.91%	100%	100%	99.93%	74.70%	99.99%	99.97%	100%	90.16%	100%	98.34%	100%
		Overall SSA	97.89%	96.97%	99.98%	100%	98.87%	99.76%	100%	100%	99.69%	99.98%	97.99%	92.80%	90.45%	99.96%	99.98%	100%	82.29%	99.00%	93.57%	99.21%
6	Call Setup Success Rate (>=95%)	Major Road	99.35%	100%	100%	100%	91.10%	100%	100%	100%	98.86%	100%	98.37%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Highway	100%	100%	100%	100%	94.24%	100%	98.74%	100%	99.07%	100%	94.30%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Within City	99.37%	100%	100%	100%	99.31%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Overall SSA	99.63%	100%	100%	100%	94.46%	100%	99.48%	100%	99.31%	100%	97.90%	100%	100%	100%	100%	100%	100%	100%	100%	100%
7	Hand Over Success Rate (HOSR)	Major Road	100%	100%	100%	100%	99.61%	100%	99.71%	100%	100%	100%	100%	100%	99.47%	100%	100%	100%	100%	100%	100%	100%
		Highway	100%	100%	100%	100%	97.49%	100%	99.74%	98.65%	99.24%	100%	100%	100%	99.52%	100%	99.62%	100%	100%	100%	100%	100%
		Within City	100%	100%	100%	100%	99.71%	100%	99.74%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Overall SSA	100%	100%	100%	100%	98.86%	100%	99.73%	99.38%	99.72%	100%	100%	100%	99.71%	100%	99.85%	100%	100%	100%	100%	100%

NA: Not Applicable

The service providers having block call rate more than 3% have been shaded in yellow colour.



DRIVE TEST TABLE – 2

OPERATOR ASSISTED DRIVE TEST AT FEROTZEPUR SSA IN AUGUST 14 MONTH - PUNJAB CIRCLE

S/N	Parameter	Classification of route covered	AIRCEL		AIRTEL		BSNL		IDEA		TATA GSM		RCOM GSM		VIDEOCON		VODAFONE		RCOM CDMA		TATA CDMA			
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR		
1	Call Attempts	Major Road	219	26	215	27	229	26	173	26	205	26	234	26	235	25	233	26	238	26	181	25		
		Highway	200	26	266	27	286	25	242	29	184	25	282	26	218	25	256	26	260	26	155	26		
		Within City	148	26	151	26	150	28	124	25	157	25	163	27	180	25	160	26	166	27	154	27		
		Overall SSA	567	78	632	80	665	79	539	80	546	76	679	79	633	75	649	78	664	79	490	78		
2	Blocked Call Rate	Major Road	0.00%	0.00%	0.00%	0.00%	5.68%	0.00%	0.58%	0.00%	0.98%	0.00%	0.43%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		
		Highway	0.00%	0.00%	0.00%	0.00%	3.50%	0.00%	1.24%	0.00%	0.00%	0.00%	3.19%	0.00%	0.00%	0.00%	0.00%	0.00%	0.38%	0.00%	0.00%	0.00%		
		Within City	0.00%	0.00%	0.00%	0.00%	2.00%	0.00%	0.81%	0.00%	0.64%	0.00%	1.23%	0.00%	0.00%	0.00%	0.00%	0.00%	0.60%	0.00%	0.00%	0.00%		
		Overall SSA	0.00%	0.00%	0.00%	0.00%	3.91%	0.00%	0.93%	0.00%	0.55%	0.00%	1.77%	0.00%	0.00%	0.00%	0.00%	0.00%	0.30%	0.00%	0.00%	0.00%		
3	Dropped Call Rate (<=2%)	Major Road	0.00%	0.00%	0.00%	0.00%	2.37%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.43%	0.00%	0.00%	0.00%	1.66%	0.00%			
		Highway	0.00%	0.00%	0.00%	0.00%	5.82%	0.00%	1.68%	0.00%	0.00%	0.00%	1.10%	0.00%	0.00%	0.39%	0.00%	0.00%	0.00%	1.29%	0.00%			
		Within City	0.00%	0.00%	0.00%	0.00%	1.39%	0.00%	0.00%	0.00%	0.00%	0.00%	0.62%	0.00%	0.00%	0.00%	0.00%	0.61%	0.00%	0.00%	0.00%			
		Overall SSA	0.00%	0.00%	0.00%	0.00%	3.65%	0.00%	0.75%	0.00%	0.00%	0.00%	0.60%	0.00%	0.00%	0.31%	0.00%	0.15%	0.00%	1.02%	0.00%			
4	Percentage connections with good voice quality (=>95%)																							

**AUDIT & ASSESSMENT OF QOS FOR QE-SEPTEMBER-2014-PUNJAB CIRCLE**

S/N	Parameter	Classification of route covered	AIRCEL		AIRTEL		BSNL		IDEA		TATA GSM		RCOM GSM		VIDEOCON		VODAFONE		RCOM CDMA		TATA CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Major Road	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.67%	100%	97.53%	100%	
		Highway	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.12%	100%	98.02%	100%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.58%	99.76%	99.11%	99.95%
		<b>Overall SSA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>98.78%</b>	<b>99.94%</b>	<b>98.18%</b>	<b>99.98%</b>
	(b) 0-5 (with frequency hopping for GSM Operators)	Major Road	96.53%	99.80%	<b>94.55%</b>	98.43%	<b>83.01%</b>	99.50%	98.11%	97.97%	96.01%	99.60%	96.30%	99.79%	96.96%	99.91%	96.93%	96.54%	NA	NA	NA	NA	
		Highway	95.90%	99.72%	96.82%	96.82%	<b>82.59%</b>	95.71%	95.88%	99.91%	96.05%	98.42%	<b>93.07%</b>	99.25%	96.27%	99.85%	95.04%	98.90%	NA	NA	NA	NA	
		Within City	96.21%	99.72%	<b>94.89%</b>	97.77%	<b>88.41%</b>	<b>77.02%</b>	97.70%	99.42%	96.11%	98.83%	96.81%	99.13%	96.85%	99.73%	96.89%	98.65%	NA	NA	NA	NA	
		<b>Overall SSA</b>	<b>96.23%</b>	<b>99.75%</b>	<b>95.74%</b>	<b>97.69%</b>	<b>84.07%</b>	<b>90.19%</b>	<b>97.01%</b>	<b>99.11%</b>	<b>96.05%</b>	<b>98.94%</b>	<b>95.11%</b>	<b>99.39%</b>	<b>96.70%</b>	<b>99.83%</b>	<b>96.19%</b>	<b>98.02%</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	
5	<b>Service Coverage</b>																						
	<b>In door (&gt;= -75dBm)</b>	Major Road	59.76%	63.44%	97.24%	21.24%	63.12%	63.20%	99.24%	99.92%	66.94%	31.61%	79.18%	98.96%	60.62%	39.01%	93.20%	92.18%	78.85%	98.16%	21.07%	28.56%	
		Highway	49.35%	66.12%	94.98%	98.52%	52.77%	99.64%	92.99%	97.69%	63.14%	97.16%	47.26%	99.56%	48.84%	66.34%	82.67%	99.86%	53.21%	99.94%	21.07%	99.10%	
		Within City	64.89%	4.65%	96.17%	64.21%	66.08%	99.70%	99.76%	9.91%	77.07%	91.22%	76.24%	1.53%	72.38%	64.04%	96.46%	50.09%	65.54%	0.94%	24.07%	0.00%	
		<b>Overall SSA</b>	<b>57.39%</b>	<b>44.67%</b>	<b>95.93%</b>	<b>60.88%</b>	<b>59.36%</b>	<b>88.51%</b>	<b>96.58%</b>	<b>70.42%</b>	<b>68.69%</b>	<b>73.18%</b>	<b>65.57%</b>	<b>65.49%</b>	<b>60.11%</b>	<b>56.44%</b>	<b>89.94%</b>	<b>80.06%</b>	<b>65.60%</b>	<b>66.32%</b>	<b>21.99%</b>	<b>43.07%</b>	
	<b>In-vehicle (&gt;= -85dBm)</b>	Major Road	88.97%	97.12%	99.97%	99.78%	93.08%	99.90%	99.96%	100%	94.45%	98.53%	96.98%	100%	94.41%	90.59%	99.49%	99.78%	95.23%	99.91%	59.54%	96.01%	
		Highway	81.84%	92.12%	99.72%	99.99%	88.77%	99.96%	98.81%	100%	90.14%	100%	75.74%	100%	82.80%	99.78%	97.87%	99.98%	78.02%	100%	55.56%	100%	
		Within City	93.66%	93.49%	99.93%	99.35%	96.39%	100%	99.95%	85.92%	97.94%	100%	94.74%	60.77%	98.70%	97.28%	99.71%	97.43%	91.80%	20.11%	67.33%	31.25%	
<b>Overall SSA</b>		<b>87.65%</b>	<b>94.04%</b>	<b>99.84%</b>	<b>99.65%</b>	<b>92.00%</b>	<b>99.96%</b>	<b>99.45%</b>	<b>95.51%</b>	<b>94.07%</b>	<b>99.50%</b>	<b>87.85%</b>	<b>86.45%</b>	<b>91.79%</b>	<b>95.88%</b>	<b>98.92%</b>	<b>99.03%</b>	<b>87.72%</b>	<b>73.33%</b>	<b>60.08%</b>	<b>73.53%</b>		

**AUDIT & ASSESSMENT OF QOS FOR QE-SEPTEMBER-2014-PUNJAB CIRCLE**

S/N	Parameter	Classification of route covered	AIRCEL		AIRTEL		BSNL		IDEA		TATA GSM		RCOM GSM		VIDEOCON		VODAFONE		RCOM CDMA		TATA CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
	Outdoor-in city (>= 95dBm)	Major Road	96.73%	98.92%	100%	100%	99.44%	100%	100%	100%	99.61%	100%	99.97%	100%	99.72%	99.90%	100%	100%	99.98%	100%	95.86%	100%
		Highway	96.45%	99.60%	99.98%	100%	99.03%	99.96%	99.75%	100%	98.70%	100%	96.72%	100%	98.58%	100%	99.90%	100%	97.92%	100%	96.53%	100%
		Within City	99.74%	99.82%	100%	99.99%	99.82%	100%	99.98%	100%	99.76%	100%	99.91%	97.84%	99.93%	99.94%	100%	99.96%	99.44%	99.91%	98.68%	100%
		Overall SSA	97.41%	99.47%	99.99%	100%	99.36%	99.99%	99.88%	100%	99.35%	100%	98.64%	99.25%	99.40%	99.95%	99.96%	99.99%	99.05%	99.97%	96.93%	100%
6	Call Setup Success Rate (>=95%)	Major Road	100%	100%	100%	100%	92.14%	96.15%	99.42%	100%	99.02%	100%	99.57%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Highway	100%	100%	100%	100%	96.15%	100%	98.35%	100%	100%	100%	96.81%	100%	100%	100%	100%	100%	99.62%	100%	100%	100%
		Within City	100%	100%	100%	100%	96.00%	100%	99.19%	100%	99.36%	100%	98.77%	100%	100%	100%	100%	100%	99.40%	100%	100%	100%
		Overall SSA	100%	100%	100%	100%	94.74%	98.73%	98.89%	100%	99.45%	100%	98.23%	100%	100%	100%	100%	100%	99.70%	100%	100%	100%
7	Hand Over Success Rate (HOSR)	Major Road	100%	100%	100%	100%	93.56%	100%	99.73%	100%	95.15%	100%	100%	100%	100%	99.52%	100%	100%	100%	100%	100%	100%
		Highway	100%	100%	99.71%	100%	90.53%	100%	99.61%	100%	99.37%	100%	97.84%	100%	98.83%	100%	98.21%	100%	100%	100%	100%	100%
		Within City	100%	100%	100%	100%	99.66%	100%	100%	100%	96.90%	100%	100%	100%	99.69%	100%	99.75%	100%	100%	100%	100%	100%
		Overall SSA	100%	100%	99.88%	100%	93.60%	100%	99.73%	100%	97.13%	100%	99.28%	100%	99.55%	100%	99.09%	100%	100%	100%	100%	100%

NA: Not Applicable

The service providers having block call rate more than 3% have been shaded in yellow colour.

DRIVE TEST TABLE – 3

OPERATOR ASSISTED DRIVE TEST AT JALANDHAR SSA IN SEPTEMBER 14 MONTH - PUNJAB CIRCLE

S/N	Parameter	Classification of route covered	AIRCEL		AIRTEL		BSNL		IDEA		TATA GSM		RCOM GSM		VIDEOCON		VODAFONE		RCOM CDMA		TATA CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
1	Call Attempts	Major Road	205	25	217	26	198	25	216	25	226	25	251	26	215	25	216	26	253	27	198	26	
		Highway	152	25	173	25	197	25	151	25	168	25	148	26	148	25	156	25	120	25	128	25	
		Within City	201	25	181	25	184	25	193	25	210	25	185	26	200	25	196	25	171	26	214	25	
		Overall SSA	558	75	571	76	579	75	560	75	604	75	584	78	563	75	568	76	544	78	540	76	
2	Blocked Call Rate	Major Road	1.46%	0.00%	0.00%	0.00%	2.02%	0.00%	0.00%	0.00%	1.77%	0.00%	0.80%	0.00%	0.00%	0.00%	0.00%	0.00%	0.40%	0.00%	0.00%	0.00%	
		Highway	0.66%	0.00%	0.00%	0.00%	1.52%	0.00%	0.66%	0.00%	0.60%	0.00%	1.35%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Within City	2.49%	0.00%	0.00%	0.00%	3.26%	0.00%	0.00%	0.00%	0.48%	0.00%	1.08%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Overall SSA	1.61%	0.00%	0.00%	0.00%	2.25%	0.00%	0.18%	0.00%	0.99%	0.00%	1.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.18%	0.00%	0.00%	0.00%	
3	Dropped Call Rate (<=2%)	Major Road	0.50%	0.00%	0.00%	0.00%	0.51%	0.00%	0.00%	0.00%	0.00%	0.00%	0.80%	0.00%	0.00%	0.00%	0.00%	0.00%	1.59%	0.00%	0.00%	0.00%	
		Highway	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.68%	0.00%	0.68%	0.00%	0.00%	0.00%	1.67%	0.00%	0.78%	0.00%	
		Within City	0.51%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.96%	0.00%	0.55%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Overall SSA	0.36%	0.00%	0.00%	0.00%	0.17%	0.00%	0.00%	0.00%	0.33%	0.00%	0.69%	0.00%	0.18%	0.00%	0.00%	0.00%	1.10%	0.00%	0.19%	0.00%	
4	Percentage connections with good voice quality (=>95%)																						

**AUDIT & ASSESSMENT OF QOS FOR QE-SEPTEMBER-2014-PUNJAB CIRCLE**

S/N	Parameter	Classification of route covered	AIRCEL		AIRTEL		BSNL		IDEA		TATA GSM		RCOM GSM		VIDEOCON		VODAFONE		RCOM CDMA		TATA CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Major Road	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.16%	99.54%	99.36%	99.98%	
		Highway	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.16%	100%	98.94%	99.56%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.27%	99.77%	99.79%	100%
		<b>Overall SSA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>98.98%</b>	<b>99.76%</b>	<b>99.44%</b>	<b>99.85%</b>
	(b) 0-5 (with frequency hopping for GSM Operators)	Major Road	<b>94.24%</b>	98.51%	97.43%	97.75%	<b>91.87%</b>	98.76%	98.22%	99.81%	<b>94.84%</b>	97.66%	97.01%	100%	97.00%	99.59%	97.74%	99.35%	NA	NA	NA	NA	
		Highway	95.19%	98.49%	96.76%	97.36%	<b>91.58%</b>	98.47%	96.57%	99.95%	95.25%	98.63%	<b>94.96%</b>	99.74%	96.33%	99.59%	97.69%	99.55%	NA	NA	NA	NA	
		Within City	96.29%	99.52%	95.64%	99.68%	<b>91.31%</b>	95.91%	98.32%	99.78%	95.69%	98.30%	98.02%	98.25%	97.58%	99.15%	98.04%	99.54%	NA	NA	NA	NA	
		<b>Overall SSA</b>	<b>95.25%</b>	<b>98.84%</b>	<b>96.70%</b>	<b>98.14%</b>	<b>91.60%</b>	<b>97.76%</b>	<b>97.82%</b>	<b>99.85%</b>	<b>95.24%</b>	<b>98.25%</b>	<b>96.82%</b>	<b>99.34%</b>	<b>97.04%</b>	<b>99.44%</b>	<b>97.83%</b>	<b>99.47%</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	
5	<b>Service Coverage</b>																						
	<b>In door (&gt;= -75dBm)</b>	Major Road	75.79%	48.50%	94.29%	81.59%	97.59%	78.82%	98.09%	80.72%	88.80%	48.51%	71.81%	100%	69.82%	8.93%	88.22%	67.06%	37.56%	97.28%	38.92%	0.00%	
		Highway	65.88%	1.50%	90.99%	76.54%	95.36%	99.55%	93.48%	84.98%	79.46%	1.26%	51.19%	1.37%	46.17%	2.32%	74.41%	9.02%	29.60%	4.07%	29.49%	0.00%	
		Within City	72.36%	15.21%	92.94%	99.93%	95.94%	99.96%	97.71%	42.45%	88.53%	80.45%	74.73%	91.56%	67.87%	38.98%	91.66%	87.40%	55.58%	4.23%	38.57%	52.77%	
		<b>Overall SSA</b>	<b>71.62%</b>	<b>21.15%</b>	<b>93.03%</b>	<b>84.75%</b>	<b>96.37%</b>	<b>93.16%</b>	<b>96.73%</b>	<b>69.40%</b>	<b>86.17%</b>	<b>62.26%</b>	<b>67.60%</b>	<b>64.33%</b>	<b>62.54%</b>	<b>17.80%</b>	<b>85.71%</b>	<b>56.24%</b>	<b>41.64%</b>	<b>35.80%</b>	<b>36.58%</b>	<b>17.51%</b>	
	<b>In-vehicle (&gt;= -85dBm)</b>	Major Road	94.60%	97.93%	99.78%	99.67%	99.37%	99.38%	99.91%	100%	99.04%	99.75%	93.72%	100%	95.09%	41.78%	98.81%	98.13%	75.63%	100%	73.11%	5.40%	
		Highway	88.05%	73.35%	99.50%	98.55%	98.26%	100%	99.76%	99.99%	96.64%	91.86%	78.90%	87.56%	83.53%	80.61%	96.32%	80.17%	60.06%	5.65%	66.05%	1.83%	
		Within City	93.03%	77.38%	99.78%	100%	97.41%	100%	99.94%	99.95%	99.19%	99.83%	95.00%	100%	95.24%	89.79%	99.22%	98.76%	82.56%	94.58%	70.70%	68.42%	
<b>Overall SSA</b>		<b>92.09%</b>	<b>82.60%</b>	<b>99.71%</b>	<b>99.37%</b>	<b>98.39%</b>	<b>99.80%</b>	<b>99.88%</b>	<b>99.98%</b>	<b>98.44%</b>	<b>98.49%</b>	<b>90.43%</b>	<b>95.85%</b>	<b>91.94%</b>	<b>74.53%</b>	<b>98.29%</b>	<b>92.87%</b>	<b>74.50%</b>	<b>67.66%</b>	<b>70.49%</b>	<b>25.12%</b>		

**AUDIT & ASSESSMENT OF QOS FOR QE-SEPTEMBER-2014-PUNJAB CIRCLE**

S/N	Parameter	Classification of route covered	AIRCEL		AIRTEL		BSNL		IDEA		TATA GSM		RCOM GSM		VIDEOCON		VODAFONE		RCOM CDMA		TATA CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
	Outdoor-in city (>= 95dBm)	Major Road	99.49%	100%	99.99%	100%	100%	99.84%	100%	100%	99.99%	100%	99.47%	100%	99.62%	99.39%	100%	100%	97.24%	100%	98.41%	99.91%
		Highway	98.33%	97.82%	99.98%	99.99%	100%	100%	100%	100%	99.72%	100%	96.46%	100%	98.67%	98.47%	99.96%	99.79%	95.72%	99.91%	97.38%	99.97%
		Within City	99.57%	97.67%	99.97%	99.99%	100%	100%	100%	100%	99.99%	100%	99.80%	100%	99.84%	98.47%	100%	99.79%	99.65%	99.91%	97.93%	99.97%
		<b>Overall SSA</b>	<b>99.17%</b>	<b>98.47%</b>	<b>99.98%</b>	<b>100%</b>	<b>100%</b>	<b>99.95%</b>	<b>100%</b>	<b>100%</b>	<b>99.92%</b>	<b>100%</b>	<b>98.83%</b>	<b>100%</b>	<b>99.44%</b>	<b>99.23%</b>	<b>99.99%</b>	<b>99.90%</b>	<b>97.68%</b>	<b>99.97%</b>	<b>97.98%</b>	<b>99.91%</b>
6	Call Setup Success Rate (>=95%)	Major Road	98.54%	100%	100%	100%	97.98%	100%	100%	100%	98.23%	100%	99.20%	100%	100%	100%	100%	100%	99.60%	100%	100%	100%
		Highway	99.34%	100%	100%	100%	98.48%	100%	99.34%	100%	99.40%	100%	98.65%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Within City	97.51%	100%	100%	100%	96.74%	100%	100%	100%	99.52%	100%	98.92%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		<b>Overall SSA</b>	<b>98.39%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>97.75%</b>	<b>100%</b>	<b>99.82%</b>	<b>100%</b>	<b>99.01%</b>	<b>100%</b>	<b>98.97%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>99.82%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>
7	Hand Over Success Rate (HOSR)	Major Road	98.82%	100%	100%	100%	98.39%	100%	99.78%	100%	100%	100%	98.72%	100%	98.86%	100%	99.81%	100%	100%	100%	100%	100%
		Highway	100%	100%	100%	100%	98.07%	100%	99.26%	100%	99.39%	100%	99.20%	100%	97.44%	100%	99.00%	100%	100%	100%	100%	100%
		Within City	99.40%	100%	100%	100%	99.48%	100%	100%	100%	98.29%	100%	100%	100%	99.48%	100%	99.78%	100%	100%	100%	100%	100%
		<b>Overall SSA</b>	<b>99.45%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>98.62%</b>	<b>100%</b>	<b>99.70%</b>	<b>100%</b>	<b>99.26%</b>	<b>100%</b>	<b>99.22%</b>	<b>100%</b>	<b>98.77%</b>	<b>100%</b>	<b>99.56%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

NA: Not Applicable

The service providers having block call rate more than 3% have been shaded in yellow colour.

7.1 DETAIL OF THE ROUTES COVERED DURING THE DRIVE TESTS:

DRIVE TEST TABLE: 4

Name of SSA	Month of Drive Test	Day 1		Day 2		Day 3	
		Name of SDCA Covered/Route KMs	Route Covered	Name of SDCA Covered	Route Covered	Name of SDCA Covered/Route Kms	Route Covered
PATHANKOT	July-14	Batala, Qadian/ 200KM	<p><b>(a) Highway:</b> BSNL exchange to simble chowk,sugar mill, dyalgarh, udowal,Naushera Majju singh, simble chowk batala, kahnuwan chowk, R.R Bawa college,Qadia chungi,Wadala Granthian highway, Thind,Dalla mor,kotli, sikar,Dera Baba Nanak.</p> <p><b>(b) Major road:</b> Batala,Dhampur colony,pahari gate,khajuri gate,circular road,city road,gandhi chowk,railway station,bank colony,bhandari mohalla,thathiari gate,hathi gate,achli gate main mohalla,umapur chowk.quadia to dhariwal road,butter road,college road,harchowal road,civil lines.</p> <p><b>(c) Within City:</b> Batala-Dhampura colony,urban estate,roadways deptt,Guru Teg Bahadur Colony,Shastri Nagar,Gandhi Chowk,Sunder Nagar(DBN Road),Qadian-Dhariwal road,Mohalla Dhampura,Bus stand, butter road,college road,sant nagar,partap nagar,rly station,harchowal road,civil lines,Vill Nangal,bus stand,PSEB chowk. Dera Baba Nanak-Electricity Board Off,DBN to ASR , Bye paa,Gurdwara.</p> <p><b>INDOOR:</b> Swam Radios</p>	Gurdaspur, Dinanagar/ 110 KM	<p><b>(a) Highway:</b> Gurdaspur to Beant College to Dinanagar to Parmanand to Dinanagar,</p> <p><b>(B) Major Road:</b> BSNL Exchange to Jail road,to Paniar,Mann Kaur road,Pahra Vill to Sangalpura road.</p> <p><b>(c) Within City:</b> Kkanuwan chowk,dhariwal road,prem nagar, fish market,jail road,hanuman chowk to exchange to dinanagar ,railway line,DAV school to bsnl exchange.</p> <p><b>INDOOR:</b> Municipal Corporation Office</p>	Pathankot, Jugial / 159KM	<p><b>(a) Highway:</b> NHIA, Sama, Kotli, Jhakolai,Sujanpur, Ferozepur Kalan,Jalandhar himachal bye pass,</p> <p><b>(B) Major road:</b> Simble chowk,dalhousie road,badhani,dhaki road,dhangu road,siali road.</p> <p><b>(c) Within City:</b>Kali Mata Mandir,Shahpur chowk,Abrol Nagra,Indira colony,Jugial.</p> <p><b>INDOOR:</b> BSNL exchange</p>

<p><b>FEROZEPUR</b></p>	<p>Aug-14</p>	<p>Ferozepur, Moga,Zira / <b>165KM</b></p>	<p><b>(a) Major Road:</b> Ferozepur Cantt to city bus stand,H.B Colony,Delhi gate,Bhatia vali basti,Zira gate to Bansi gate.Talwandi bhai bus stand,Mini Secretariat road moga, bus stand moga, railway station moga,bus stand zira,faridkot road zira,jalandhar rad zira.</p> <p><b>(b) Within city:</b> Dana mandi,loche wala,ekta colony,Azad Nagar,malwal road,Des samaj Coll road,Delhi gate,main bazar. Zira city</p> <p><b>(c) Highway:</b>Fzr to talwandi to moga, Moga to zira via kot ise kha.</p> <p><b>INDOOR:</b> School,Zira</p>	<p>Faridkot, Kotkapura, Muktsar,Malout / <b>185KM</b></p>	<p><b>(a) Major road:</b> Sadiq Road faridkot,bus stand to ghandtaghar chowk,railway road bazar fdk,muktsar bypass.Kotkapura to muktsar road, bus stand kpt, railway station kpt, D.C road mkt(Muktsar),water works mkt, Tibi sahib road mkt,railway station mkt,Malot railway station &amp; bus stand</p> <p><b>(b) Within City:</b>Faridkot main bazar,Kotkapura citybank road mkt,kacheri road malout.</p> <p><b>(c) Highway:</b> Fzr to Faridkot to Kotkapura to muktsar to Malout Highway.</p> <p><b>INDOOR:</b> Dhunia Electronics, Malout</p>	<p>Abohar, Fazilka, Guruhsahai./ <b>210KM</b></p>	<p><b>(a)Highway:</b> Fazilka-Abohar-Jalalabad-Guruhsahai-Ferozepur.</p> <p><b>(b)Major Road:</b>Abohar Exchange To Hanumangarh Rd Bypass,Ambala Cantt,Bus Stand,Railwaystation ,Ambala.Fazilka Main Bazar, Bus Stand.Jalalabad Stadium Rd,Bus Stand Main Bazar,Guruhsahai Main Bazaar</p> <p><b>(c) Within City:</b>Circular Rd Abohar,Nai Abadi,Gandhi Chowk Fazilka,Jalalabad Town,Guruhsahai Town.</p> <p><b>INDOOR:</b> Post Office, Ferozepur Cantt</p>
<p><b>JALANDHAR</b></p>	<p>Sep-14</p>	<p>Jalandhar, Nakodar/ <b>160KM</b></p>	<p><b>(a) Highway:</b>Jalandhar-Amritsar bypass road,Maqsooda,Jalandhar-Lambra-Nakodar Highway.</p> <p><b>(b) Major Road:</b>Defence colony,urban estate,garha road,bus stand,model town,kapurthala chowk,sodal road,rama mandi,rakoha nakodar-railway road,mithapur road,main bazar nakodar,bus stand nakodar,Baba Murad Shah Ji Road,bsnl exchange ,Nakodar.</p> <p><b>(C) Within City:</b>Railway station area,phagwara gate,jyoti chowk,jail road,basti shekh.120 ft road,mithapur road,sabzi mandi nakodar,post office &amp; main market nakodar.</p> <p><b>INDOOR:</b> Old Civil court, Nakodar</p>	<p>Phagwara, Phillaur, Nawanshehr / <b>225KM</b></p>	<p><b>(a) Highway:</b>Jalandhar to Phagwara,Phagwara JCT Mill via Goraya to Phillaur.Phillaur to Nawanshehr via Nagar - Lasara-Rahon.Rahon to Chandigarh road.</p> <p><b>(b) Major Road:</b>Banga road,railway road,Bhagatpura,new model town phagwara,mebli gate,plani gate ,sugar mill,main bazar phillaur,Hanuman Mandir area,garah road,abra rd,KC College,nawanshehr,DC Office rd Nawanshehr.</p> <p><b>(c) Within City:</b>Labour chowk,khera rd,adarsh nagar,Baba Fateh Singh Nagar,Shaheed Udhham singh Nagar near sugar mill phillaur,Ravidaspura area preet nagar,railway station,Ramgarh Nawanshehr,Dana mandi,Hargobvind Nagar shanti nagar colony Lal Chowk.</p> <p><b>INDOOR:</b> Post Office,Nawanshehr</p>	<p>Kapurthala, Sultanpur Lodhi / <b>130KM</b></p>	<p><b>(a) Highway:</b>Jalandhar to Kkapurthala chowk-Kapurthala highway,Kapurthala-Lohia Khas-Sultanpur Lodhi Highway.</p> <p><b>(b) Major Road:</b>Railway station rdD C Chowk,bus stand,bsnl exchange,model town,ajit nagar,katto mohalla,markfed,College rd kapurthala,Lohia khas railway colony,railway station ,bus stand lohia,Ranjeet nagar,FCI colony,moti nagarRramneek hotel,circular rd.</p> <p><b>(c) Within City:</b> Ajit nagar, markfed, Katter mohalla,Model town, Gurdawara Sahib Road,Sainik School, Market Area, Lohia Khas town,Sultanpur Lodhi town.</p> <p><b>INDOOR:</b> Popli Restaurant,Kapurthala</p>



**7.2 SSA WISE DRIVE TEST OBSERVATION:**

**DRIVE TEST TABLE: 5**

**DRIVE TEST OBSERVATION OF PATHANKOT SSA – JULY 14**

S NO	Name of SP	SDCA Covered in Day 1	Day 1 Observation	SDCA Covered in Day 2	Day 2 Observation	SDCA Covered in Day 3	Day 3 Observation
1	AIRCEL	Batala	Poor Level & Quality near Bhagowal, Granthiya, Dera Rd	Gurdaspur	Poor Level & Quality near Bariar, Loro Shormo, Tibri Rd	Pathankot	Poor Level & Quality near Ghoh, Gandhi Nagar
2	AIRTEL		Poor Quality near Batala to DBN Rd, Quadian, BSNL Exchange Batala		Poor Level & Quality near Paniar, Prem Nagar		Poor Level & Quality near Madhopur Rd, Jugial, Indira Colony
3	BSNL		Poor Level & Quality near Dera Baba Nanak		Poor Level & Quality near Gurudaspur Outer, Dinanagar Outer		Poor Level & Quality near Pathankot Outer, Kotli
4	TATA GSM		Poor Level & Quality near Granthian, Dera Baba Nanak, Poor Quality near Tibba bazar, Jalandhar Rd		Poor Level & Quality near Nangal Kotli, Poor Quality near SD Girls College, Babbawal		Poor Level & Quality near Khandawar
5	TATA CDMA		Poor level at Batala Outer, Quadian Outer, Poor Quality near Batal to Quadian RD, Urban Estate, Bhandari Gate, Dera Baba Nanak		Poor Level & Quality near Dinanagar, Tibri Cant, Sohal, Gurdadpur Outer		Poor Level & Quality near Jugial Rd, Sujanpur Rd, Madhopur Rd
6	IDEA		Poor Quality near BSNL Exchange		Poor Quality near hanuman Chowk, Dhariwal Rd		---
7	RCOM GSM		Poor Level & Quality near Wadala Grathian		Poor Level near najowal, Abul Khair, Japowal and Poor Quality near Gandhian		Poor Level & Quality near Khadawar, Kale Chak, 21 Sub Area, Ghoh
8	RCOM CDMA		Poor Level & Quality near Naushahra Majha Singh to Kandiala, Mansurke and Poor Level near Granthian, Batala Town		Poor Level near Bhule Chak, Abul Khair, Jakhar Pindi, Najowal, Nabibpur, Tibri Cant Rd		Poor Level near Kotla, Mammon Cant, Khadwar, 21 Sub Area, Simbal Chowk
9	QTL		Poor Level & Quality near Khwaja Wardag, Navva Pind, Quadian Outer		Poor Level & Quality near Awankha, Gurdaspur Outer		Poor Level & Quality near Bharoli, Dadwan, Gandran Lahri
10	VODAFONE		---		Poor Quality near Bypass Rd		Poor Quality near Jugial HW, Bangoli Chowk, Indira Colony, Ptahankot Bypass

DRIVE TEST TABLE: 6

**DRIVE TEST OBSERVATION OF FEROZEPUR SSA – AUGUST 14**

S NO	Name of SP	SDCA Covered in Day 1	Day 1 Observation	SDCA Covered in Day 2	Day 2 Observation	SDCA Covered in Day 3	Day 3 Observation
1	AIRCEL	Ferozepur, Moga & Zira	Poor Level & Quality near Ferozepur Outer, Dhindsa, No Coverage between Lohara kot Ise Khan Rd, Tarawandi to Zira Rd, Fattuwala	Faridkot, Kotkapura, Mukatsar & Malout	Poor Level & Quality near Sandhwan, Golewala, Jania Mohalla faridkot, Talawandi Rd faridkot	Abhohar, Fazilka & Jalalabad	Poor Level & Quality Lekhe ke Udder, Kot Ise Khan Rd, Gankhera, Naranga Saval, Kotakpura
2	AIRTEL		Poor Quality patches on Ferozepur to Moga HW		Smal Quality patch on Kotkapura to Mukatsar HW		Poor Quality at Fazilka Outer
3	BSNL		Poor Level & Quality near Talawandi Bhai Outer, between Zira to Ferozepur HW Karial		Poor Level & Quality near Faridkot Outer, Ferozepur to Faridkot HW, Kotkapura to Mukatsar HW		Poor Level & Quality between Ferozepur to Jalalabad, Abhohar, Fazilka Outer
4	TATA GSM		Poor Quality near FCI Godowan		Poor Level near Grain market, Mukatsar Outer		Poor Level & Quality at Abhohar Outer, Id Gaha BastiKanshi Ram Colony, Civil Lines
5	TATA CDMA		They have coverage only in SDCA'S with Poor level in Outers		They have coverage only in SDCA'S with Poor level in Outers		They have coverage only in SDCA'S with Poor level in Outers
6	IDEA		Poor Quality patches at Zira Outer		---		Poor Quality patch at Jalalabad Outer
7	RCOM GSM		Poor Level & Quality near Ferozepur Outer, Talwandi Bhai, Landeke		Poor Level & Quality near Kasubega, Arayarwala, Dogar Basti, Valmiki Mandir		Poor Level & Quality near Jalalabad Outer, Khai, Guru Har Sarai, Bodiwala Pitha, Abhohar Outer
8	RCOM CDMA		Poor Level & Quality patches near Kanshinagar, Cant Area, Longiwing, Talwandi Bhai		Poor Level & Quality near Nangal Sayal, Kamhaina Chowk, Mukatsar Outer		Poor Level near Jalalabad Outer, Guru Har Sarai
9	QTL		Poor Level & Quality near Shukhwala		Poor Level & Quality near Faridkot Outer to Sandhva Outer, Kotkapura to Kukatsar HW		They coverage in only SDCA's with Poor Level & Quality at outer of all SDCA's
10	VODAFONE		Poor Quality near Cant Area, Zira Outer, Kot Ise Khan		Poor Quality near Ferozepur to Faridkot HW		Poor Quality patches at Abhohar Bypass

DRIVE TEST TABLE: 7

**DRIVE TEST OBSERVATION OF JALANDHAR SSA – SEPTEMBER 14**

S NO	Name of SP	SDCA Covered in Day 1	Day 1 Observation	SDCA Covered in Day 2	Day 2 Observation	SDCA Covered in Day 3	Day 3 Observation
1	AIRCEL	Jalandhar & Nakodar	Poor Level & Quality near Gohir, Bopa Rai Kalan, Adarsh Nagar, Shanti Nagar, Lajpat Nagar	Phagwada & Nawasehar	Poor Level & Quality near Paghwada Rd, Nawashar, Rahon Rd, Urban Estate	Kapurthala	Poor Level & Quality near Lodhi Rd, Kapurthala Outer, Dadwindi, Lohian, PAP Chowk
2	AIRTEL		Poor Level & Quality near Anand Nagar, Bhagar Nagar		Poor Level & Quality near Nawasehar, Phagwada Outer, Phillaur		Poor Quality near Lohiakhas
3	BSNL		Poor Quality near Anand Nagar		----		----
4	TATA GSM		Poor Quality near Anand Nagar, Shanti Nagar, Lajpat Nagar, Sangat Nagar		Poor Level near Rly Stn, Phagwada Outer		Poor Quality near Kapurthala Outer
5	TATA CDMA		Poor Level & Quality near Nakodar Outer		Poor Level & Quality near Nawasehar Outer, Phagwada Outer		Poor Level near Sultanpur Outer
6	IDEA		----		Poor Quality near Phagwada Outer		Poor Quality near Sultanpur Outer
7	RCOM GSM		Poor Level & Quality at Nakodar Outer		Poor Level & Quality near Phagwada Outer, Lovely University, Nawasehar Outer		Poor Level & Quality near kapurthala Outer, Sultanpur Outer
8	RCOM CDMA		Poor Level & Quality near Modern school, Danish Manda, WTC, Nakodar Outer, Model Town		Poor Level & Quality near Phillaur Outer, Phagwada Outer, Rahon		Poor Level & Quality near Hussainpura, Lether Basti
9	QTL		Poor Level near Nakodar Outer, Lohar Sukh Singh		Poor Level & Quality near Paghwada Outer		Poor Level near Mand, Karahal
10	VODAFONE		----		Poor Level near Rahon, Phillaur		Poor Level near Guru Nank Mission Chowk

### 7.3 KEY FINDINGS ON DRIVE TEST:

The key observations that could be derived from the results of the drive tests were as under –

- (i) **In the Month of July-14**, drive tests were conducted across **Pathankot SSA** covering Batala, Qadian, Gurdaspur, Dinanagar, Pathankot and Jugial, SDCAs.. The performance of **BSNL** for parameter **Voice Quality, CSSR and Call Block rate** was below the benchmark on SSA level with its achieved values as **93.98% (Outdoor) / 93.58% (Indoor), 94.46% and 3.29%** respectively. With respect to the parameter **Call Drop rate, RCOM (CDMA)** remained non-compliant with its performance as **3.67%** on SSA basis. All other operators were found satisfactory in their performance during the drive tests.
- (ii) **In the Month of August -14**, drive tests were conducted across **Ferozpur SSA** covering Ferozpur, Moga, Zira, Faridkot, Kotkapura, Muktsar, Malout, Abohar, Fazilka and Guru Harsarai SDCAs.. The performance of the Service Providers across Ferozpur SSA was satisfactory as the operators were largely meeting the benchmarks. However, **BSNL** remained under performed for parameters **Call Drop Rate, Voice Quality, CSSR and Call Block rate** having overall achieved values as **3.65%, 84.07% (Outdoor) / 90.19% (Indoor), 94.74% and 3.91%** respectively. All other operators were found satisfactory in their performance during the drive tests.
- (iii) **In the month of September-14**, drive tests were conducted across **Jalandhar SSA** covering Jalandhar, Nakodar, Phagwara, Phillaur, Nawanshahr, Kapurthala and Sultanpur Lodi SDCAs. In this SSA also, the performance of the service providers was in general satisfactory as they were largely meeting the benchmarks. Only the parameter '**Voice Quality**' remained non-complied by **BSNL** with their overall performance as **91.60%**.

The deficiencies with respect to adequate coverage and voice quality, encountered by different Service providers at the various locations as shown in the drive tests plots, are detailed in the above table.-5, table-6 and table-7.

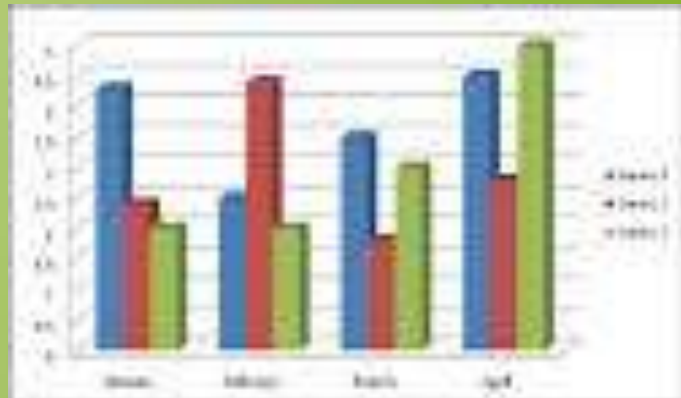
*The analysis of drive tests results revealed that the performance of the services providers was satisfactory as they were largely meeting the benchmarks. However, **BSNL** could not perform well in respect of the prime parameters **CDR, Voice Quality, CSSR and Call Blocked rate** across the above three SSAs.*

## 8. GRAPHICAL REPRESENTATION (CELLULAR MOBILE SERVICE PROVIDERS)

AVERAGED QUARTERLY PMR

V/S

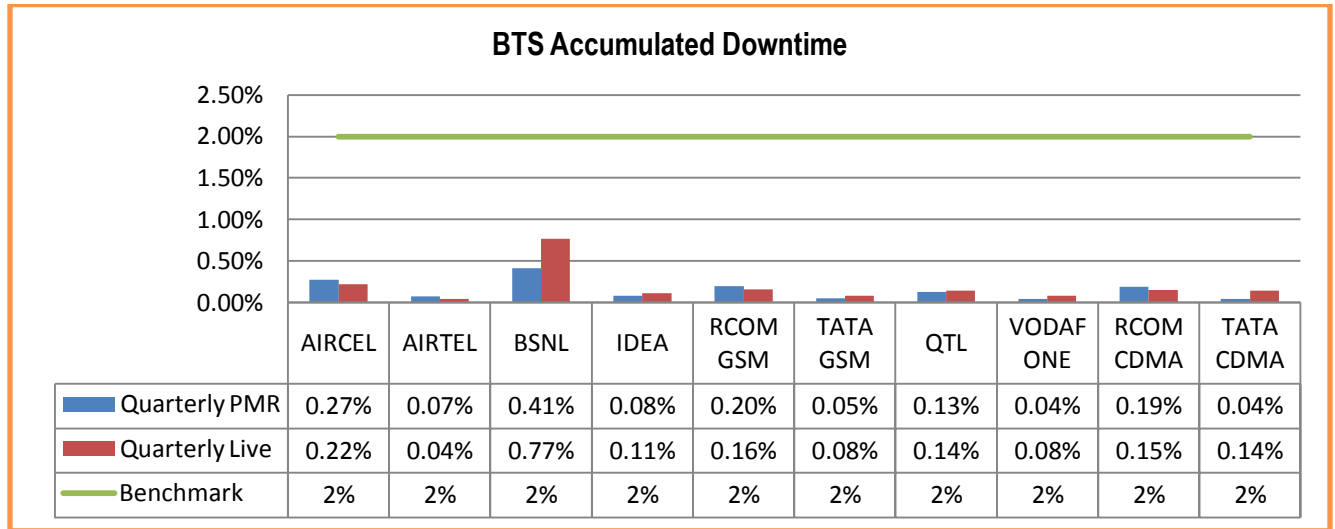
AVERAGED QUARTERLY 3-DAYs LIVE MEASURMENT



## 8. GRAPHICAL REPRESENTATION (CMTS):

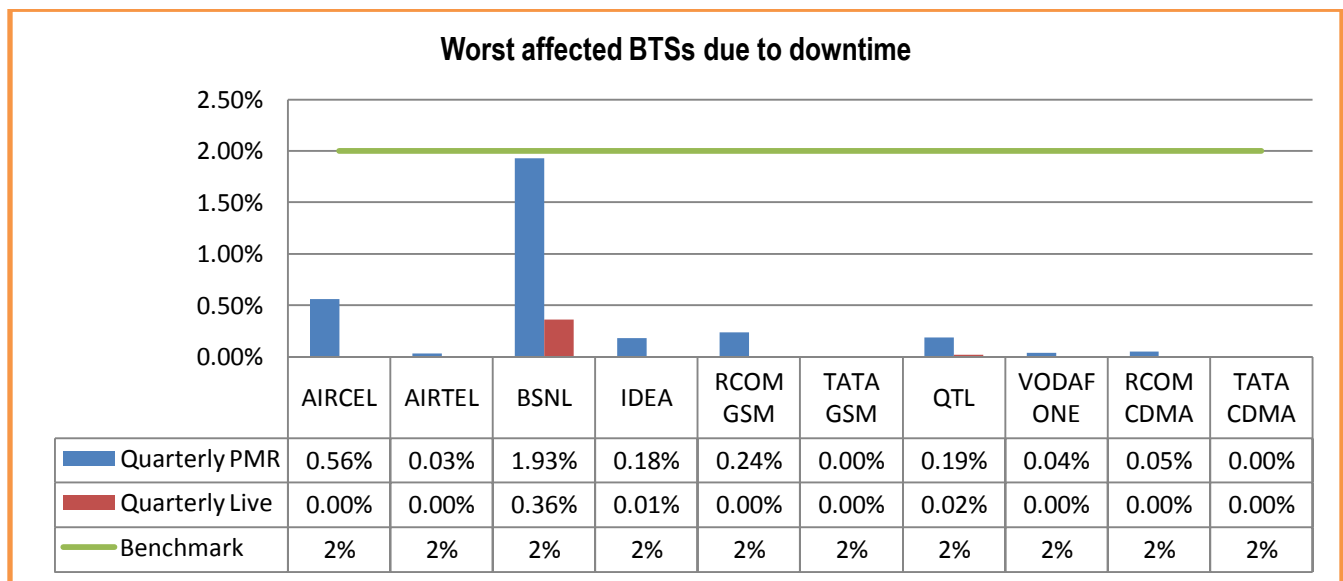
Graphical Representation of Performance of the Cellular Mobile Service Providers (PMR) V/S 3-Days Live Measurement (Quarterly Average Data):

### I. BTS ACCUMULATED DOWNTIME:



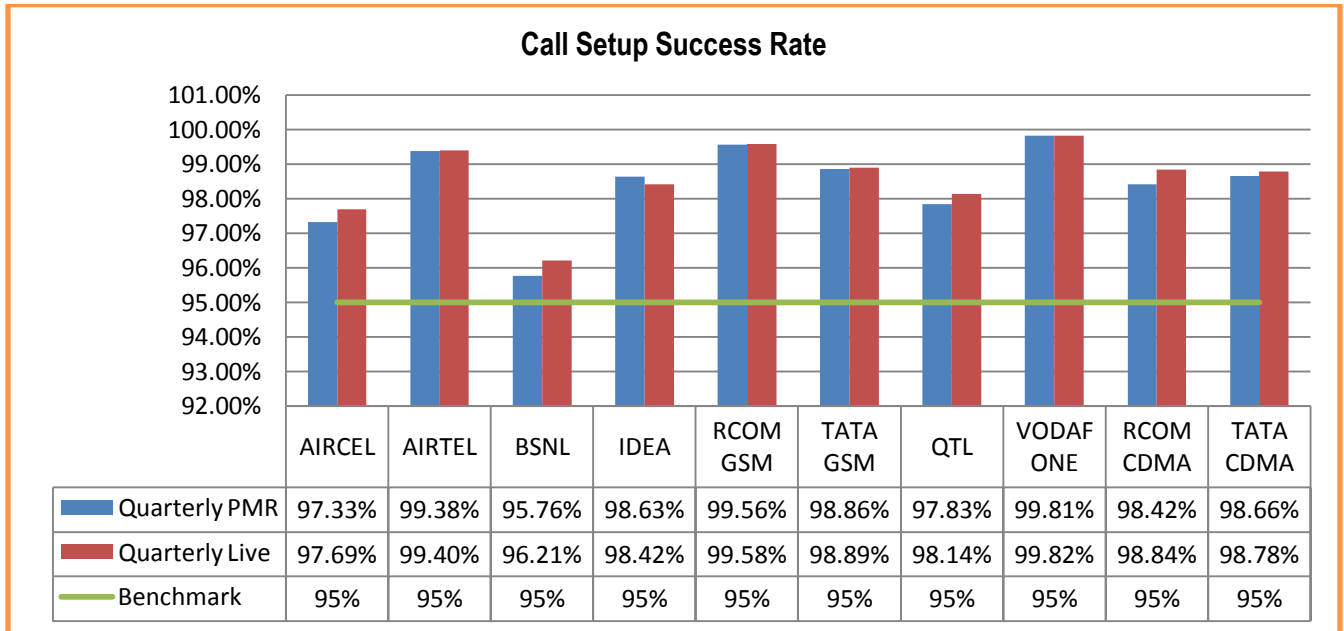
All operators are meeting the benchmarks.

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



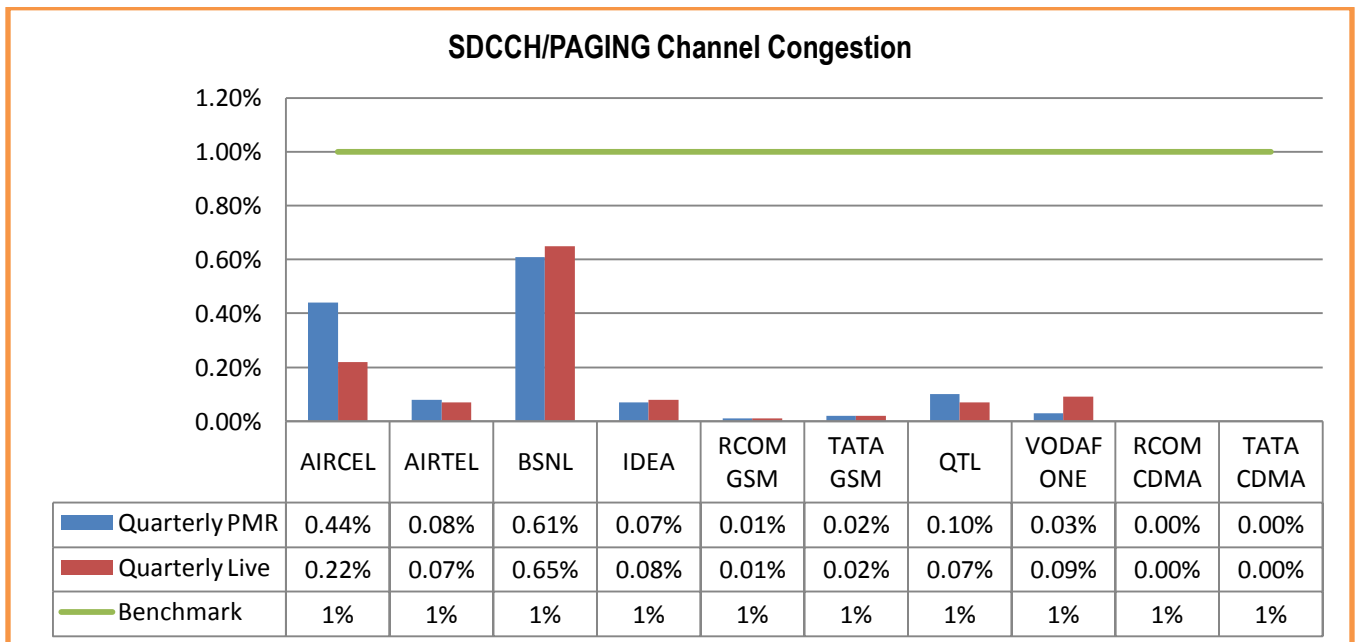
All operators are meeting the benchmarks.

**III. CALL SETUP SUCCESS RATE :**



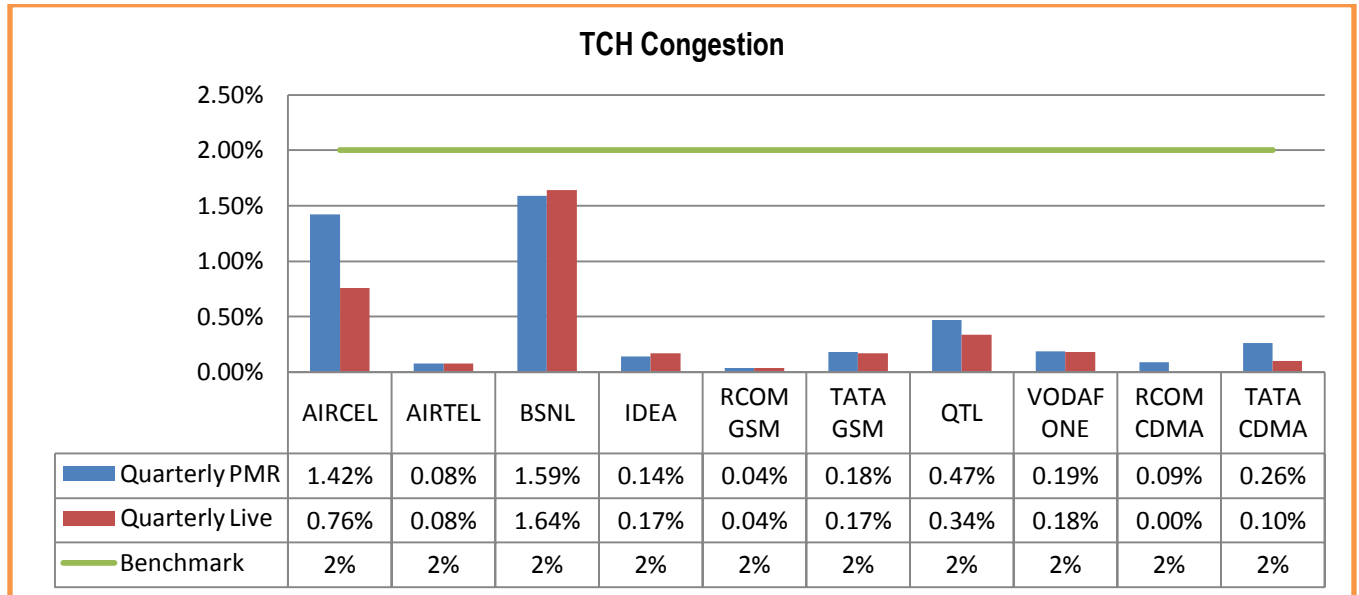
All operators are meeting the benchmarks.

**IV. SDCCH/PAGING CHANNEL CONGESTION**



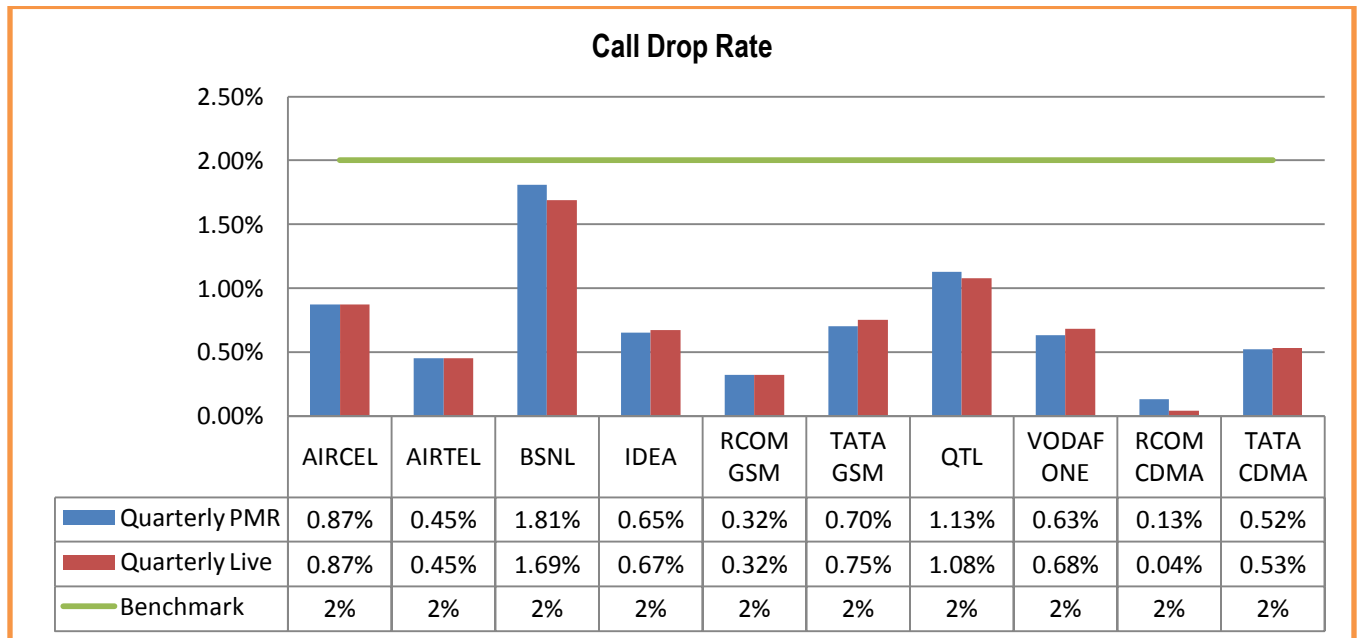
All operators are meeting the benchmarks.

**V. TCH CONGESTION :**



All operators are meeting the benchmarks.

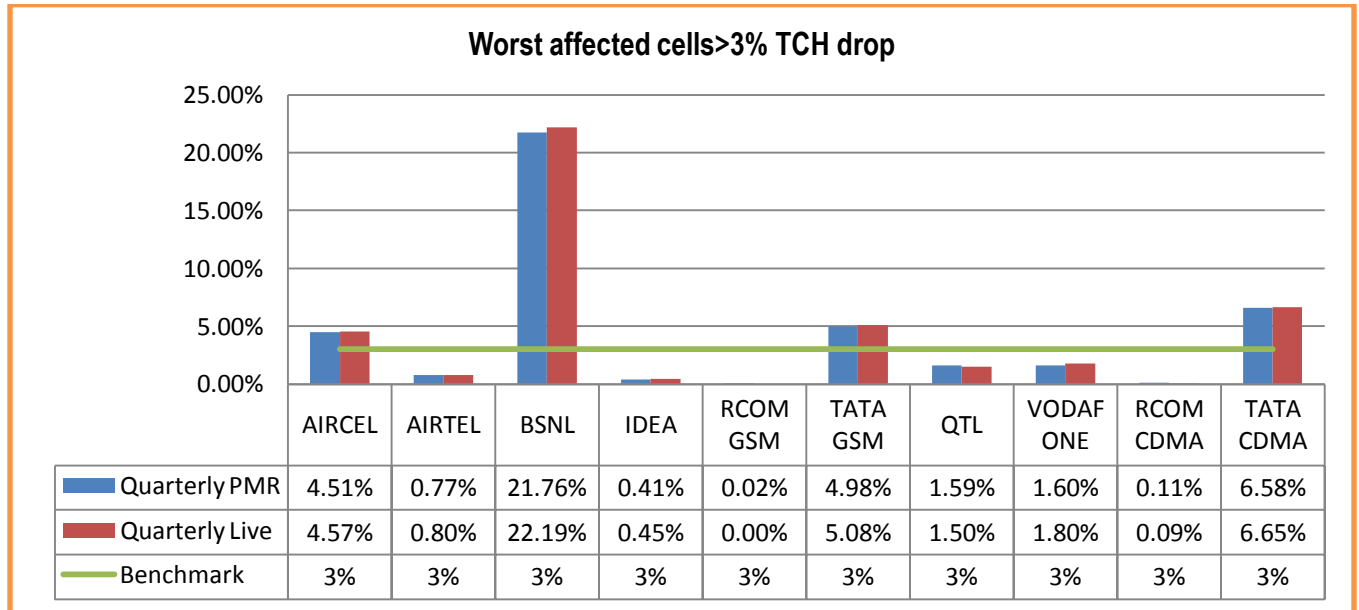
**VI. CALL DROP RATE :**



All operators are meeting the benchmarks.

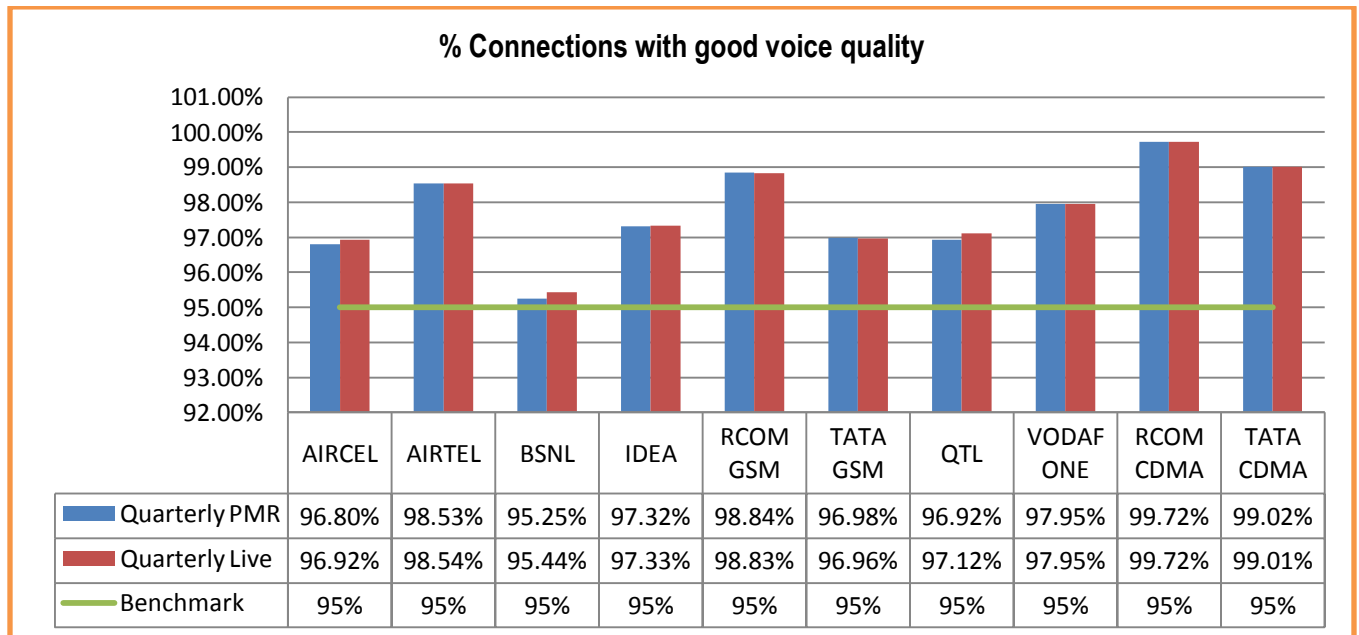


**VII. WORST AFFECTED CELLS>3% TCH DROP:**



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

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



All operators are meeting the benchmarks.