



**Audit & Assessment of Quality of Service  
Of  
Cellular Mobile Telephone Service  
For  
Telecom Regulatory Authority Of India  
North Zone – Punjab Service Area  
(July 2015 – September 2015)**

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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.

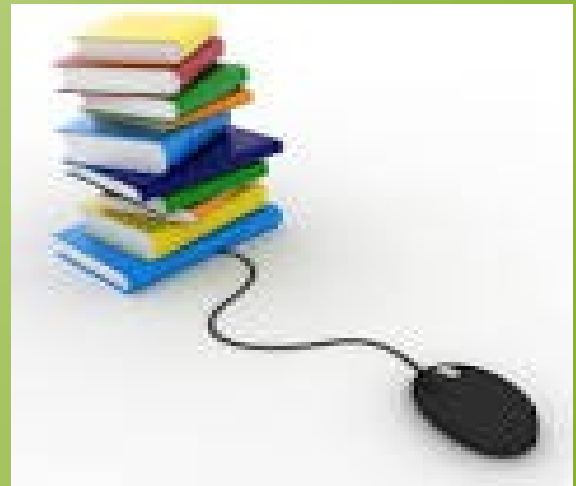
TRAI, the regulatory watch dog for the Quality of Service for the telecom services – Basic (Wire line), Cellular Mobile (Wireless) and Broadband has commissioned **M/s TUV-SUD South Asia Pvt. Ltd.** for conducting audit and assessment of quality of service of service providers, in terms of the benchmarks 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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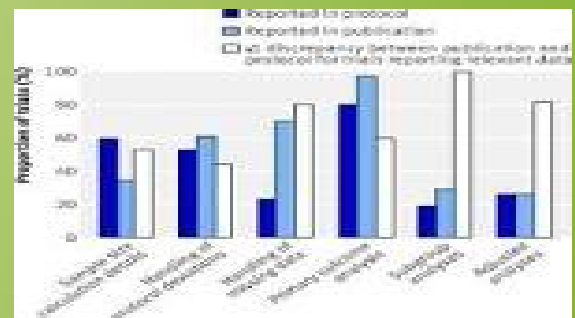
The primary objective is to audit and assess the Quality of Service being rendered by Basic, Cellular Mobile & Broadband service providers against the parameters notified by TRAI.

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 2015 – September 2015.**

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-15	August-15	Sept-15	Address
<b>GSM Operators</b>					
1	AIRCEL	17, 20 & 21 Jul-15	20, 21 & 24 Aug-15	16 to 18 Sep-15	Dishnet Wireless Ltd Office ,Phase -7 Industrial Area, Mohali
2	AIRTEL	22 to 24 Jul-15	21, 24 & 25 Aug-15	8 to 10 Sep-15	Bharti Airtel Campus, Plot No 21, Rajiv Gandhi Information and Technilogy Park, Chandigarh, 160101
3	TATA GSM	15 to 17 Jul-15	19 to 21 Aug-15	15 to 17 Sep-15	TTSL Office Phase-8,Industrial area Mohali
4	BSNL	16, 17 & 20 Jul-15	12 to 14 Aug-15	16 to 18 Sep-15	BSNL Exchange Sector-49 Chandigarh
5	VIDEOCON	20 to 22 Jul-15	20, 21 & 24 Aug-15	14 to 16 Sep-15	QTL Office Phase -7 Industrial Area, Mohali
6	RCOM GSM	22 to 24 Jul-15	24 to 26 Aug-15	10, 11 & 14 Sep-15	Reliance Communications Ltd. Phase-8,Industrial area Mohali
7	IDEA	14 to 16 Jul-15	13, 14 & 17 Aug-15	9 to 11 Sep-15	Idea Office Phase -7 Industrial Area,Mohali
8	VODAFONE	21 to 23 Jul-15	19 to 21 Aug-15	15 to 17 Sep-15	Vodafone Office Phase-8,Industrial area Mohali
<b>CDMA Operators</b>					
9	TATA CDMA	15 to 17 Jul-15	19 to 21 Aug-15	15 to 17 Sep-15	TTSL Office Phase-8,Industrial area Mohali
10	RCOM CDMA	22 to 24 Jul-15	24 to 26 Aug-15	10, 11 & 14 Sep-15	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 Sept. 2015.

The data generated by monthly PMR and 3-days live measurements audit for the period July 2015 to September 2015 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**. **Based on this criterion, QoS audit for basic (wire line) service was not required to be done for Punjab Circle in the quarter ended Sept. - 2015, as the same has already been done during QE June 2015.**

### 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 **only once in a year**. **Based on this criterion, the QoS audit for Broadband service was not required to be done for Punjab Circle in the quarter ended September-2015, as the same has already been done during QE June 2015.**

## **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:**

### 1) Cellular Mobile Service:

(i) From the audit of **monthly PMR and Live measurements** of the network parameter, it was revealed that performance of all the operators in Punjab Service Area was satisfactory 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 averaged performance of **Aircel, BSNL, Tata (GSM) and Tata (CDMA)** for this parameter was **3.67%, 3.37%, 4.11% and 6.94%** respectively.

(ii) 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 the QE September-2015. The quarterly average performance of **Airecl, BSNL, Tata (GSM) and Tata (CDMA)** was **3.82%, 9.51%, 4.00% and 6.66%** respectively. The similar non-compliance of **Aircel, BSNL, Tata (GSM) and Tata (CDMA)** was observed in monthly audit also.

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**”.

(iii) With regard to the **Customer Service Quality Parameters**, it is revealed that most of the operators are in well compliance of the parameters on Metering and Billing Credibility, Termination of Service and Time taken for refunds. Only, **Vodafone** could not meet the benchmark for billing complaints for both post-paid and pre-paid with its performance as **0.21% and 0.24%** respectively.

Regarding the parameters related to ‘Response time to customers for assistance’, all service providers except Aircel, are in compliance with respect to the parameter accessibility of call center. The performance of Aircel was 94.74%. However, **Airtel, BSNL and Tata (GSM)** have not met the benchmark of ‘**calls answered by Operators (voice to voice) within 90 seconds**’ with their performance as **84.49%, 78.50% and 90.48%**, against the benchmark of  $\geq 95\%$ .

In case of the parameter ‘**Termination/Closure** within the benchmark of 7 days’, the performance of **Idea** was very marginally below the benchmark (**99.99%**).

The results of **live measurements** revealed that all operators (**except BSNL**) have met the benchmarks for the parameters ‘**Accessibility to call center**’ and ‘**Call connection to operators (Voice to voice) within 90 seconds**’. The performance of **BSNL** for parameter ‘**calls answered by Operators (voice to voice) within 90 seconds**’ was **50.60%** respectively.

(iv) The analysis of drive test results revealed that the performance of the services providers namely **BSNL, Idea, Aircel** and **Videocon** failed to meet the benchmarks of the parameter **Voice quality** in one or the other SSAs namely **Pathankot, Ferozpur and Jalandhar** where drive tests were conducted during the Quarter. The performance of the service providers was within the norms for other parameters.

## **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 -15	20:00 - 21:00
2	AIRTEL	Sept -15	19:00 - 20:00
3	BSNL	Sept -15	19:00 - 20:00
4	IDEA	Sept -15	20:00 - 21:00
5	RCOM GSM	Sept -15	19:00 - 20:00
6	TATA GSM	Sept -15	20:00 - 21:00
7	QUADRANT TELEVENTURES LTD	Sept -15	20:00 - 21:00
8	VODAFONE	Sept -15	20:00 - 21:00
<b>CDMA Operators</b>			
9	RCOM CDMA	Sept -15	19:00 - 20:00
10	TATA CDMA	Sept -15	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	632	NSN	NSN
2	AIRTEL	23	56	5561	Ericsson	Ericsson
3	BSNL	12	47	3363	Ericsson & ZTE	Ericsson, ZTE & NSN
4	IDEA	9	49	5355	ZTE	ZTE & Huawei
5	RCOM GSM	3	8	1534	Huawei & Ericsson	ZTE
6	TATA GSM	2	12	1631	NSN	NSN
7	QTL	1	14	2293	Huawei & NSN	Huawei
8	VODAFONE	9	51	5004	Ericsson	Ericsson
<b>CDMA Operators</b>						
9	RCOM CDMA	4	3	621	Lucent, ZTE & Ericsson	Lucent & ZTE
10	TATA CDMA	3	4	397	Ericsson	Huawei & Motorola

5.1.3 QOS PERFORMANCE OF MONTHLY PMR – JULY-15 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE - JULY 15 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-15	0.11%	0.06%	0.67%	0.05%	0.17%	0.05%	0.15%	0.03%	0.18%	0.11%
	b) Worst affected BTSs due to downtime	<=2%	July-15	0.33%	0.00%	1.85%	0.02%	0.39%	0.06%	0.27%	0.00%	0.48%	0.50%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	July-15	97.24%	99.09%	96.73%	98.88%	99.58%	98.71%	97.86%	99.84%	98.76%	98.30%
	b) SDCCH/PAGING Channel congestion	<=1%	July-15	0.60%	0.13%	0.93%	0.05%	0.02%	0.03%	0.11%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	July-15	1.92%	0.16%	0.69%	0.09%	0.04%	0.29%	0.41%	0.16%	0.00%	0.03%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	July-15	0.95%	0.52%	1.77%	0.56%	0.22%	0.69%	0.86%	0.57%	0.04%	0.63%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	July-15	4.36%	0.82%	4.62%	0.47%	0.00%	4.36%	1.05%	2.90%	0.21%	6.85%
	c) Connections with good voice quality	>=95%	July-15	96.48%	98.47%	95.54%	98.12%	99.04%	97.21%	96.08%	97.94%	99.70%	98.98%
4	No. of POI's having >=0.5% POI congestion		July-15	0	0	0	0	0	0	0	0	0	0

5.1.4 QOS PERFORMANCE OF MONTHLY PMR AUGUST-15 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE - AUGUST 15 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-15	0.12%	0.05%	0.65%	0.03%	0.12%	0.02%	0.13%	0.02%	0.13%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	Aug-15	0.16%	0.05%	1.88%	0.00%	0.07%	0.00%	0.09%	0.02%	0.16%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Aug-15	97.48%	99.12%	97.54%	98.87%	99.56%	98.53%	97.70%	99.82%	98.75%	98.66%
	b) SDCCH/PAGING Channel congestion	<=1%	Aug-15	0.38%	0.10%	0.38%	0.05%	0.02%	0.05%	0.16%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Aug-15	1.23%	0.12%	0.63%	0.12%	0.05%	0.34%	0.48%	0.18%	0.01%	0.04%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Aug-15	0.85%	0.52%	1.20%	0.60%	0.17%	0.67%	0.86%	0.60%	0.04%	0.50%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Aug-15	3.45%	0.77%	2.72%	0.45%	0.00%	4.13%	1.33%	2.94%	0.18%	7.33%
	c) Connections with good voice quality	>=95%	Aug-15	96.71%	98.42%	95.50%	97.99%	99.04%	97.16%	96.04%	97.89%	99.70%	99.04%
4	No. of POI's having >=0.5% POI congestion		Aug-15	0	0	0	0	0	0	0	0	0	0

5.1.5 QOS PERFORMANCE OF MONTHLY PMR – SEPTEMBER- 15 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE - SEPTEMBER 15 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-15	0.12%	0.06%	0.58%	0.05%	0.14%	0.04%	0.23%	0.05%	0.12%	0.03%
	b) Worst affected BTSs due to downtime	<=2%	Sep-15	0.00%	0.00%	1.72%	0.02%	0.07%	0.18%	0.09%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Sep-15	97.72%	99.24%	97.05%	98.66%	99.59%	98.38%	97.32%	99.66%	98.82%	98.58%
	b) SDCCH/PAGING Channel congestion	<=1%	Sep-15	0.15%	0.23%	0.46%	0.09%	0.02%	0.05%	0.21%	0.18%	0.00%	0.00%
	c) TCH congestion	<=2%	Sep-15	0.80%	0.17%	0.61%	0.15%	0.04%	0.40%	0.48%	0.34%	0.00%	0.02%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Sep-15	0.86%	0.40%	0.54%	0.63%	0.20%	0.70%	0.96%	0.59%	0.03%	0.45%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Sep-15	3.21%	0.81%	2.77%	0.51%	0.00%	3.85%	1.02%	2.92%	0.19%	6.65%
	c) Connections with good voice quality	>=95%	Sep-15	97.03%	98.76%	95.41%	97.76%	99.07%	97.05%	95.40%	97.83%	99.70%	99.06%
4	No. of POI's having >=0.5% POI congestion		Sep-15	0	0	0	0	0	0	0	0	0	0

**5.1.6 QOS PERFORMANCE OF QUARTERLY PMR –AVERAGE OF QE- SEPT 15 (JULY – AUG – SEPT MONTHS AUDITED DATA)**

QUARTERLY QOS PERFORMANCE (AVERAGE OF QE – SEPTEMBER 15) – 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	0.12%	0.06%	0.63%	0.04%	0.14%	0.04%	0.17%	0.03%	0.14%	0.05%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.16%	0.02%	1.82%	0.01%	0.18%	0.08%	0.15%	0.01%	0.21%	0.17%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	97.48%	99.15%	97.11%	98.80%	99.58%	98.54%	97.63%	99.77%	98.78%	98.51%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.38%	0.15%	0.59%	0.06%	0.02%	0.04%	0.16%	0.07%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	1.32%	0.15%	0.64%	0.12%	0.04%	0.34%	0.46%	0.23%	0.00%	0.03%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	0.89%	0.48%	1.17%	0.60%	0.20%	0.69%	0.89%	0.59%	0.04%	0.53%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	<b>3.67%</b>	0.80%	<b>3.37%</b>	0.48%	0.00%	<b>4.11%</b>	1.13%	2.92%	0.19%	<b>6.94%</b>
	c) Connections with good voice quality	>=95%	Quarterly	96.74%	98.55%	95.48%	97.96%	99.05%	97.14%	95.84%	97.89%	99.70%	99.03%
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 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 (0.04 %) 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 **3.67%, 3.37%, 4.11% and 6.94%** respectively.

- 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 operators were having congestion  $< 0.5\%$  i.e. within the benchmark.

**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- 15 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE - JULY 15 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	0.13%	0.01%	0.68%	0.06%	0.27%	0.05%	0.16%	0.02%	0.22%	0.07%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.18%	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	97.24%	99.07%	97.05%	98.79%	99.57%	98.58%	98.03%	99.84%	98.75%	98.25%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.31%	0.10%	0.87%	0.06%	0.02%	0.04%	0.06%	0.01%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	2.01%	0.19%	0.67%	0.08%	0.03%	0.31%	0.33%	0.16%	0.00%	0.02%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Live data	1.03%	0.55%	1.78%	0.59%	0.22%	0.73%	0.86%	0.60%	0.03%	0.68%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	5.38%	0.81%	20.02%	0.54%	0.01%	4.68%	1.06%	2.94%	0.29%	7.75%
	c) Connections with good voice quality	>=95%	Live data	96.49%	98.45%	95.46%	98.07%	99.01%	97.18%	96.13%	97.90%	99.70%	98.99%
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- 15 MONTH:**

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE – AUGUST 15 MONTH													
Live measurement Data		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators							CDMA Operators		
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	Live data	0.06%	0.14%	0.48%	0.03%	0.06%	0.02%	0.14%	0.02%	0.10%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.48%	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	97.78%	98.86%	97.69%	98.78%	99.59%	98.53%	97.98%	99.77%	98.81%	98.73%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.01%	0.27%	0.39%	0.05%	0.02%	0.08%	0.09%	0.05%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.21%	0.16%	0.51%	0.11%	0.04%	0.29%	0.34%	0.23%	0.01%	0.01%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.78%	0.52%	1.61%	0.62%	0.22%	0.71%	0.81%	0.64%	0.03%	0.45%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	2.93%	0.81%	5.52%	0.55%	0.00%	3.86%	1.04%	2.94%	0.20%	6.56%
	c) Connections with good voice quality	>=95%	Live data	97.02%	98.39%	95.56%	97.94%	99.06%	97.13%	96.23%	97.85%	99.69%	95.32%
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- 15 MONTH:**

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE – SEPTEMBER 15 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	0.14%	0.02%	0.70%	0.02%	0.21%	0.02%	0.10%	0.03%	0.14%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.54%	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	97.91%	99.41%	96.54%	98.68%	99.63%	98.30%	97.45%	99.84%	98.87%	98.96%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.12%	0.05%	0.53%	0.04%	0.02%	0.08%	0.16%	0.03%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.33%	0.11%	0.65%	0.14%	0.03%	0.44%	0.41%	0.16%	0.01%	0.02%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.75%	0.38%	0.57%	0.69%	0.20%	0.76%	0.95%	0.54%	0.03%	0.41%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	3.15%	0.80%	2.99%	0.44%	0.00%	3.45%	1.08%	2.89%	0.14%	5.67%
	c) Connections with good voice quality	>=95%	Live data	97.15%	98.75%	95.33%	97.60%	99.10%	96.97%	95.31%	97.87%	99.70%	99.07%
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- 2015 MONTHS AUDITED DATA)**

QUARTERLY QOS PERFORMANCE OF 3-DAYS LIVE MEASUREMENT (AVERAGE OF QE- SEPT 15) – 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	0.11%	0.06%	0.62%	0.04%	0.18%	0.03%	0.13%	0.02%	0.15%	0.03%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.00%	0.00%	0.40%	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%	Quarterly	97.64%	99.11%	97.09%	98.75%	99.60%	98.47%	97.82%	99.82%	98.81%	98.65%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.15%	0.14%	0.60%	0.05%	0.02%	0.07%	0.10%	0.03%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	0.85%	0.15%	0.61%	0.11%	0.03%	0.35%	0.36%	0.18%	0.01%	0.02%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	0.85%	0.48%	1.32%	0.63%	0.21%	0.73%	0.87%	0.59%	0.03%	0.51%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	<b>3.82%</b>	0.81%	<b>9.51%</b>	0.51%	0.00%	<b>4.00%</b>	1.06%	2.92%	0.21%	<b>6.66%</b>
	c) Connections with good voice quality	>=95%	Quarterly	96.89%	98.53%	95.45%	97.87%	99.06%	97.09%	95.89%	97.87%	99.70%	97.79%
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 the QE September-2015. The quarterly average performance of **Airecl, BSNL, Tata (GSM) and Tata (CDMA)** was **3.82%, 9.51%, 4.00% and 6.66%** respectively. The similar non-compliance of **Aircel, BSNL, Tata (GSM) and Tata (CDMA)** was observed in monthly audit also.

*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**”. Further, the performance of **BSNL** is very poor in respect of this parameter.*

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 15 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-15	611	5577	3349	5143	1534	1632	2257	4931	621	404
	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-15	522.35	2469.08	16754.77	1776.27	1992.35	653.76	2510.95	1216.96	813.25	323.62
	c) BTS Accumulated Downtime	<=2%	July-15	0.11%	0.06%	0.67%	0.05%	0.17%	0.05%	0.15%	0.03%	0.18%	0.11%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		July-15	2	0	62	1	6	1	6	0	3	2
e) Worst affected BTSs due to downtime	<=2%	July-15	0.33%	0.00%	1.85%	0.02%	0.39%	0.06%	0.27%	0.00%	0.48%	0.50%	
2	<b>Connection Establishment (Accessibility)</b>												
	a) CSSR (Call Setup Success Rate)	>=95%	July-15	97.24%	99.09%	96.73%	98.88%	99.58%	98.71%	97.86%	99.84%	98.76%	98.30%
	b) SDCCH/PAGING Congestion	<=1%	July-15	0.60%	0.13%	0.93%	0.05%	0.02%	0.03%	0.11%	0.02%	0.00%	0.00%
c) TCH congestion	<=2%	July-15	1.92%	0.16%	0.69%	0.09%	0.04%	0.29%	0.41%	0.16%	0.00%	0.03%	
3	<b>Connection Maintenance (Retainability)</b>												
	a) Call Drop Rate (CDR)	<=2%	July-15	0.95%	0.52%	1.77%	0.56%	0.22%	0.69%	0.86%	0.57%	0.04%	0.63%
	b) Worst affected cells>3% TCH drop	<=3%	July-15	<b>4.36%</b>	0.82%	<b>4.62%</b>	0.47%	0.00%	<b>4.36%</b>	1.05%	2.90%	0.21%	<b>6.85%</b>
	c) % of connections with good voice quality	>=95%	July-15	96.48%	98.47%	95.54%	98.12%	99.04%	97.21%	96.08%	97.94%	99.70%	98.98%
d) Total No. of cells exceeding 3% TCH drop (call drop)		July-15	80	270	464	73	0	217	74	438	4	88	

Detailed Network Data Assessment of Cellular Mobile Telephone Services- Punjab Circle - July 15 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	
	e) Total no. of cells (Sector) in the licensed service area		July-15	1832	32744	10047	15490	4564	4976	7114	15122	1864	1291
4	<b>No. of POI's having &gt;=0.5% POI congestion</b>												
	No. of POI's having >=0.5% POI congestion		July-15	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		July-15	0	0	0	0	0	0	0	0	0	0
5	<b>Network Data</b>												
	a) Equipped Capacity of Network in Erlang		July-15	26142	269850	282000	223952	72000	107618	104749	170546	53000	70356
	b) Total traffic in TCBH in erlang (Avg.)		July-15	16515	214363	94036	159543	51194	36058	48101	119394	7880	10560
	c) Total no. of customers served (as per VLR) on last day of the month		July-15	545176	7370422	2384804	6505629	1997112	1324712	1610160	4468753	219847	118738

TABLE: 2

Detailed Network Data Assessment of Cellular Mobile Telephone Services -3 days live - Punjab Circle – July 15 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									
Network Service Quality Parameter													
<b>Network Availability</b>													
1	a) Total no. of BTSs in the licensed service area		Live data	611	5576	3338	5140	1534	1630	2246	4914	621	404
	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	57.48	51.13	1640.62	223.83	299.83	64.26	263.96	69.20	98.63	21.03
	c) BTS Accumulated Downtime	<=2%	Live data	0.13%	0.01%	0.68%	0.06%	0.27%	0.05%	0.16%	0.02%	0.22%	0.07%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	6	0	0	0	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.18%	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	97.24%	99.07%	97.05%	98.79%	99.57%	98.58%	98.03%	99.84%	98.75%	98.25%
	b) SDCC/PAGING Congestion	<=1%	Live data	0.31%	0.10%	0.87%	0.06%	0.02%	0.04%	0.06%	0.01%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	2.01%	0.19%	0.67%	0.08%	0.03%	0.31%	0.33%	0.16%	0.00%	0.02%
<b>Connection Maintenance (Retainability)</b>													
3	a) Call Drop Rate (CDR)	<=2%	Live data	1.03%	0.55%	1.78%	0.59%	0.22%	0.73%	0.86%	0.60%	0.03%	0.68%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	5.38%	0.81%	20.02%	0.54%	0.01%	4.68%	1.06%	2.94%	0.29%	7.75%
	c) % of connections with good voice quality	>=95%	Live data	96.49%	98.45%	95.46%	98.07%	99.01%	97.18%	96.13%	97.90%	99.70%	98.99%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	99	137	2005	84	0	233	76	445	5	100
	e) Total no. of cells (Sector) in the licensed service area		Live data	1833	16954	10014	15492	4562	4974	7131	15126	1862	1291
<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 15 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-15	615	5582	3357	5284	1534	1631	2277	4978	621	397
	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-15	555.65	2235.11	16164.00	1104.04	1379.32	246.46	2252.43	785.59	584.90	46.40
	c) BTS Accumulated Downtime	<=2%	Aug-15	0.12%	0.05%	0.65%	0.03%	0.12%	0.02%	0.13%	0.02%	0.13%	0.02%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Aug-15	1	3	63	0	1	0	2	1	1	0
	e) Worst affected BTSs due to downtime	<=2%	Aug-15	0.16%	0.05%	1.88%	0.00%	0.07%	0.00%	0.09%	0.02%	0.16%	0.00%
2	<b>Connection Establishment (Accessibility)</b>												
	a) CSSR (Call Setup Success Rate)	>=95%	Aug-15	97.48%	99.12%	97.54%	98.87%	99.56%	98.53%	97.70%	99.82%	98.75%	98.66%
	b) SDCCH/PAGING Congestion	<=1%	Aug-15	0.38%	0.10%	0.38%	0.05%	0.02%	0.05%	0.16%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Aug-15	1.23%	0.12%	0.63%	0.12%	0.05%	0.34%	0.48%	0.18%	0.01%	0.04%
3	<b>Connection Maintenance (Retainability)</b>												
	a) Call Drop Rate (CDR)	<=2%	Aug-15	0.85%	0.52%	1.20%	0.60%	0.17%	0.67%	0.86%	0.60%	0.04%	0.50%
	b) Worst affected cells>3% TCH drop	<=3%	Aug-15	<b>3.45%</b>	0.77%	2.72%	0.45%	0.00%	<b>4.13%</b>	1.33%	2.94%	0.18%	<b>7.33%</b>
	c) % of connections with good voice quality	>=95%	Aug-15	96.71%	98.42%	95.50%	97.99%	99.04%	97.16%	96.04%	97.89%	99.70%	99.04%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Aug-15	64	130	274	71	0	205	96	448	3	94
	e) Total no. of cells (Sector) in the licensed service area		Aug-15	1844	16970	10071	15649	4562	4978	7203	15225	1862	1286



Detailed Network Data Assessment of Cellular Mobile Telephone Services - Punjab Circle - August 15 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>No. of POI's having &gt;=0.5% POI congestion</b>													
4	No. of POI's having >=0.5% POI congestion		Aug-15	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Aug-15	0	0	0	0	0	0	0	0	0	0
<b>Network Data</b>													
5	a) Equipped Capacity of Network in Erlang		Aug-15	26312	275346	282000	225827	72000	107567	108530	169897	53000	69126
	b) Total traffic in TCBH in erlang (Avg.)		Aug-15	16976	217930	98033	160726	53330	37204	48673	121538	10077	10616
	c) Total no. of customers served (as per VLR) on last day of the month		Aug-15	556560	7244004	2416127	6543701	1929326	1354197	1602799	4504178	205616	113132

**TABLE: 4**

**Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live- Punjab Circle- August 15 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	615	5579	3349	5181	1534	1631	2075	4953	621	404
	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	27.07	548.38	1154.60	119.54	66.50	26.55	212.37	72.29	46.60	3.23
	c) BTS Accumulated Downtime	<=2%	Live data	0.06%	0.14%	0.48%	0.03%	0.06%	0.02%	0.14%	0.02%	0.10%	0.01%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	16	0	0	0	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.48%	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	97.78%	98.86%	97.69%	98.78%	99.59%	98.53%	97.98%	99.77%	98.81%	98.73%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.01%	0.27%	0.39%	0.05%	0.02%	0.08%	0.09%	0.05%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.21%	0.16%	0.51%	0.11%	0.04%	0.29%	0.34%	0.23%	0.01%	0.01%
<b>Connection Maintenance (Retainability)</b>													
3	a) Call Drop Rate (CDR)	<=2%	Live data	0.78%	0.52%	1.61%	0.62%	0.22%	0.71%	0.81%	0.64%	0.03%	0.45%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	2.93%	0.81%	5.52%	0.55%	0.00%	3.86%	1.04%	2.94%	0.20%	6.56%
	c) % of connections with good voice quality	>=95%	Live data	97.02%	98.39%	95.56%	97.94%	99.06%	97.13%	96.23%	97.85%	99.69%	95.32%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	54	137	555	86	0	192	75	448	4	85
	e) Total no. of cells (Sector) in the licensed service area		Live data	1845	16975	10047	15587	4562	4977	7221	15240	1862	1291
<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 – Sept. 15 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		Sep-15	632	5561	3363	5355	1534	1631	2293	5004	621	397
	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-15	527.53	2555.23	11251.55	1802.29	1568.38	480.21	3813.08	1629.48	550.83	78.34
	c) BTS Accumulated Downtime	<=2%	Sep-15	0.12%	0.06%	0.58%	0.05%	0.14%	0.04%	0.23%	0.05%	0.12%	0.03%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Sep-15	0	0	58	1	1	3	2	0	0	0
e) Worst affected BTSs due to downtime	<=2%	Sep-15	0.00%	0.00%	1.72%	0.02%	0.07%	0.18%	0.09%	0.00%	0.00%	0.00%	
2	<b>Connection Establishment (Accessibility)</b>												
	a) CSSR (Call Setup Success Rate)	>=95%	Sep-15	97.72%	99.24%	97.05%	98.66%	99.59%	98.38%	97.32%	99.66%	98.82%	98.58%
	b) SDCCH/PAGING Congestion	<=1%	Sep-15	0.15%	0.23%	0.46%	0.09%	0.02%	0.05%	0.21%	0.18%	0.00%	0.00%
c) TCH congestion	<=2%	Sep-15	0.80%	0.17%	0.61%	0.15%	0.04%	0.40%	0.48%	0.34%	0.00%	0.02%	
3	<b>Connection Maintenance (Retainability)</b>												
	a) Call Drop Rate (CDR)	<=2%	Sep-15	0.86%	0.40%	0.54%	0.63%	0.20%	0.70%	0.96%	0.59%	0.03%	0.45%
	b) Worst affected cells>3% TCH drop	<=3%	Sep-15	3.21%	0.81%	2.77%	0.51%	0.00%	3.85%	1.02%	2.92%	0.19%	6.65%
	c) % of connections with good voice quality	>=95%	Sep-15	97.03%	98.76%	95.41%	97.76%	99.07%	97.05%	95.40%	97.83%	99.70%	99.06%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Sep-15	60	138	279	81	0	192	74	448	3	84
e) Total no. of cells (Sector) in the licensed service area		Sep-15	1876	16965	10089	16014	4562	4976	7261	15341	1862	1270	
4	<b>No. of POI's having &gt;=0.5% POI congestion</b>												
	No. of POI's having >=0.5% POI congestion		Sep-15	0	0	0	0	0	0	0	0	0	0

Detailed Network Data Assessment of Cellular Mobile Telephone Services - Punjab Circle – Sept. 15 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	
	Name of POI not meeting the benchmark		Sep-15	0	0	0	0	0	0	0	0	0	0
<b>Network Data</b>													
5	a) Equipped Capacity of Network in Erlang		Sep-15	27174	274677	282000	229657	72000	107585	110845	169578	53000	69126
	b) Total traffic in TCBH in erlang (Avg.)		Sep-15	16561	221461	107810	163323	52684	39343	49415	125776	9613	9389
	c) Total no. of customers served (as per VLR) on last day of the month		Sep-15	565248	7248957	2428326	6632168	1906823	1398153	1650504	4553085	205427	110879

TABLE: 6

Detailed Network Data Assessment of Cellular Mobile Telephone Services -3 days live - Punjab Circle – Sept. 15 month													
S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
<b>Network Service Quality Parameter</b>													
1	<b>Network Availability</b>												
	a) Total no. of BTSs in the licensed service area		Live data	625	5582	3357	5301	1534	1630	2285	4978	621	397
	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	61.60	82.83	1702.85	72.20	226.60	20.91	156.63	108.36	61.77	1.36
	c) BTS Accumulated Downtime	<=2%	Live data	0.14%	0.02%	0.70%	0.02%	0.21%	0.02%	0.10%	0.03%	0.14%	0.00%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	18	0	0	0	0	0	0	0
e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.54%	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	97.91%	99.41%	96.54%	98.68%	99.63%	98.30%	97.45%	99.84%	98.87%	98.96%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.12%	0.05%	0.53%	0.04%	0.02%	0.08%	0.16%	0.03%	0.00%	0.00%
c) TCH congestion	<=2%	Live data	0.33%	0.11%	0.65%	0.14%	0.03%	0.44%	0.41%	0.16%	0.01%	0.02%	
3	<b>Connection Maintenance (Retainability)</b>												
	a) Call Drop Rate (CDR)	<=2%	Live data	0.75%	0.38%	0.57%	0.69%	0.20%	0.76%	0.95%	0.54%	0.03%	0.41%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	3.15%	0.80%	2.99%	0.44%	0.00%	3.45%	1.08%	2.89%	0.14%	5.67%
	c) % of connections with good voice quality	>=95%	Live data	97.15%	98.75%	95.33%	97.60%	99.10%	96.97%	95.31%	97.87%	99.70%	99.07%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	59	136	301	70	0	172	79	442	3	72
e) Total no. of cells (Sector) in the licensed service area		Live data	1875	16986	10071	15978	4562	4974	7264	15321	1862	1270	
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- 15:

#### 5.3.1 QUARTERLY CUSTOMER SERVICE DELIVERY (CSD) AUDITED DATA FOR CELLULAR MOBILE SERVICES (JULY – AUG- SEPT - 2015 MONTHS AUDITED DATA):

#### QUARTERLY CSD DATA FOR CELLULAR MOBILE TELEPHONE SERVICES - QE SEPTEMBER 15

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>													
<b>Metering &amp; Billing Credibility -Post Paid</b>													
1	A) No. of bills issued during the quarter		Punjab	26716	1433155	106600	2248023	183195	240593	82906	1360308	134076	62326
	B) No. of bills disputed including billing complaints during the quarter		Punjab	0	163	68	1858	169	9	0	2910	111	1
	C) % of billing complaints during the quarter	<= 0.1%	Punjab	0.00%	0.01%	0.06%	0.08%	0.09%	0.004%	0.00%	0.21%	0.08%	0.00%
<b>Metering &amp; Billing Credibility -Pre Paid</b>													
2	A) Total No. of Pre-paid customers at the end of the quarter		Punjab	1005948	7789996	3186199	5599939	1909145	2708996	2935195	4510056	177734	282169
	B) Total No. of complaints relating to charging, Credit and Validity during the quarter		Punjab	3	104	447	2237	1735	0	20	10626	152	0
	C) % of Pre-paid Charging Complaints	<= 0.1%	Punjab	0.00%	0.001%	0.01%	0.04%	0.09%	0.00%	0.001%	0.24%	0.09%	0.00%
<b>Resolution of Billing/Charging Complaints and Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints</b>													
3	A) No. of Billing/Charging/Credit/Validity Complaints received during the quarter		Punjab	3	267	515	15045	1904	9	20	13536	263	1
	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	3	267	515	15031	1904	9	20	13536	263	1
	C) No. of billing complaints for Post paid customers/Charging/Credit/Validity complaints for pre-paid customers resolved within 6 weeks during the quarter		Punjab	3	267	515	15045	1904	9	20	13536	263	1
	D) % of billing complaints (for post paid customer) / Charging /Credit /Validity (for Pre paid customer) resolved within 4 weeks	>=98% within 4 weeks	Punjab	100.00%	100.00%	100.00%	99.91%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	E) % of billing complaints (for post paid customer) / Charging/Credit/Validity (for Pre paid customer) resolved within 6 weeks	100% within 6 weeks	Punjab	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

**AUDIT & ASSESSMENT OF QOS FOR QE SEPTEMBER-2015-PUNJAB CIRCLE**



**QUARTERLY CSD DATA FOR CELLULAR MOBILE TELEPHONE SERVICES - QE SEPTEMBER 15**

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		
	F) % of Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints	<=1 week	Punjab	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
<b>Response time to customers for assistance</b>													
	A) Total no of calls attempted to customer care/Call center		Punjab	3378348	5719274	138879	17468576	865457	496973	600962	8949041	58822	35769
	B) Total no. of calls successfully established to customer care/Call center.		Punjab	3200510	5719274	138879	17365725	852363	492995	600962	8949041	57864	35500
4	C) % Accessibility of Call centre /customer Care (Total calls successfully established *100/ Total call attempts)	>=95%	Punjab	94.74%	100.00%	100.00%	99.41%	98.49%	99.20%	100.00%	100.00%	98.37%	99.25%
	D) Total Calls reached to operator for Voice to Voice (Total call attempts)		Punjab	522374	3549034	872294	3447641	690187	941590	1633860	2795847	82465	37444
	E) Total number of calls answered by the operator (Voice to voice) within 90 seconds		Punjab	500726	2998659	684741	3425919	677382	851969	1568692	2766695	78524	36968
	F) % age of calls answered by operator (voice to voice) (Total calls successfully established within 90 Sec.*100 / Total call attempts )	>=95%	Punjab	95.86%	84.49%	78.50%	99.37%	98.14%	90.48%	96.01%	98.96%	95.22%	98.73%
<b>Termination/closure of service</b>													
5	A) Total No. of requests for Termination / Closure of service received during the quarter		Punjab	204	5625	837	34763	1513	3798	3232	7114	530	1189
	B) No. of requests for Termination / Closure of service complied within 7 days during the quarter		Punjab	204	5625	837	34762	1513	3798	3232	7114	530	1189
	C) % of Termination/ Closure of service within 7 days	<=7days	Punjab	100.00%	100.00%	100.00%	99.997%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
<b>Time taken for refunds of deposits after closures.</b>													
6	A) No. of Payments/ Refunds due during the quarter		Punjab	165	1082	825	8556	569	627	62	9968	318	362
	B) No. of Payments/ Refunds Cleared during the quarter		Punjab	165	1082	825	8556	569	627	62	9968	318	362
	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%

NB: Accessibility of call center / Customer care data of RCOM (GSM & CDMA) are based on one month data i.e. August 15 as July-15 & September-15 month's data were not provided by RCOM (GSM & CDMA) due to TTI server issue.



**5.3.2 3 DAYS LIVE CSD AUDITED DATA FOR CELLULAR MOBILE SERVICES (QE - SEPT 2015):**

**CSD 3 DAYS LIVE DATA FOR CELLULAR MOBILE TELEPHONE SERVICES - QE- SEPTEMBER 15**

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	A) Total no of calls attempted to customer care/Call center		Punjab	113560	80583	4679	111276	NP	12204	20344	251275	NP	998
	B) Total no. of calls successfully established to customer care/Call center.		Punjab	111586	80583	4679	108246	NP	12108	20344	251275	NP	997
	C) % Accessibility of Call centre /customer Care (Total calls successfully established *100/ Total call attempts)	>=95%	Punjab	98.26%	100.00%	100.00%	97.28%	NP	99.21%	100.00%	100.00%	NP	99.90%
	D) Total Calls reached to operator for Voice to Voice (Total call attempts)		Punjab	15407	114358	27627	111276	31152	28294	56978	95614	4805	780
	E) Total number of calls answered by the operator (Voice to voice) within 90 seconds		Punjab	15233	113250	13980	107991	29597	28049	55479	95508	4719	778
	F) % age of calls answered by operator (voice to voice) (Total calls successfully established within 90 Sec.*100 / Total call attempts )	>=95%	Punjab	98.87%	99.03%	50.60%	97.05%	95.01%	99.13%	97.37%	99.89%	98.21%	99.74%

NP: RCOM (GSM & CDMA) has not provided data for the parameter "Accessibility of call center / Customer care" due to TTI server issue

## 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 majorly **within the prescribed bench mark of  $\leq 0.1\%$** . Only, **Vodafone** could not meet the benchmark for billing complaints for both post-paid and pre-paid with its performance as **0.21% and 0.24%** respectively.

### 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 except **Aircel** are in compliance with respect to the parameter Accessibility of call center. **Aircel** could achieve the level of **94.74%**. However, **Airtel, BSNL and Tata (GSM)** have not met the benchmark of 'calls answered by Operators (voice to voice) within 90 seconds' with their performance as **84.49%, 78.50% and 90.48%**, against the benchmark of  $\geq 95\%$ .

### 4. Termination/Closure of Service

In case of this parameters also, all service providers (except Idea) have settled the **Termination/Closure** within the benchmark of 7 days. The performance of **Idea** was very marginally below the benchmark (**99.99%**).

### 5. Time Taken for Refund of deposits after closures

Regarding this parameter, 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 BSNL**) have met the benchmarks for the parameters '**Accessibility to call center**' and '**Call connection to operators (Voice to voice) within 90 seconds**'. The performance of **BSNL** for parameter '**calls answered by Operators (voice to voice) within 90 seconds**' was **50.60%** respectively.

## **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	RCOM CDMA	TATA GSM	TATA CDMA	VIDEOCON	VODAFONE
AIRCEL	Punjab	---	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
AIRTEL	Punjab	100.00%	---	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
BSNL	Punjab	100.00%	100.00%	---	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
IDEA	Punjab	100.00%	100.00%	100.00%	---	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
RCOM GSM	Punjab	100.00%	100.00%	100.00%	100.00%	---	100.00%	100.00%	100.00%	100.00%	100.00%
RCOM CDMA	Punjab	100.00%	100.00%	100.00%	100.00%	100.00%	---	100.00%	100.00%	100.00%	100.00%
TATA GSM	Punjab	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	---	100.00%	100.00%	100.00%
TATA CDMA	Punjab	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	---	100.00%	100.00%
VIDEOCON	Punjab	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	---	100.00%
VODAFONE	Punjab	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	---

The result of the testing revealed that the inter connection performance among the operators was quite satisfactory as no problem was observed in interconnection from one operator to other operators.

## 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	100	100	100	100	100	100	100	100	100	100
% Accessibility of Call centre / customer Care (Total call successfully established *100 / Total call attempt)	Punjab	100.00%	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	98	100	100	100	96	100	100	100	98	100
% age of calls answered by operator(voice to voice) (Total call successfully established within 90 Sec.*100 / Total call attempt)	Punjab	98.00%	100.00%	100.00%	100.00%	96.00%	100.00%	100.00%	100.00%	98.00%	100.00%

In case of calls answered by operators (voice to voice) within 90 seconds when test calls were made to the call centers, Aircel, RCOM (GSM) and RCOM CDMA could achieve their performance as 98%, 96% and 98% respectively.

## 6.3 LIVE CALLING ASSESSMENT FOR BILLING COMPLIANTS:

Performance (live calling for billing complaints)											
	Circle Name	AIRCEL	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	VIDEOCON	VODAFONE	RCOM (CDMA)	TATA (CDMA)
Total No. of calls Attempted	Punjab	3	150	150	150	150	9	20	150	80	1
Total No. of calls Answered	Punjab	2	130	118	132	125	6	17	138	64	1
Cases resolved within 4 weeks	Punjab	2	130	118	132	125	6	17	138	64	1
%age of cases resolved	Punjab	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

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, so shortfall was made good by taking other complaints to make verification of 100 Complaints. However, most of the customers reported their satisfaction on resolution of the billing complaints.

**6.4 LEVEL -1 CALLING ASSESSMENT:**

LEVEL 1 LIVE CALLING																		
Month	Circle Name	SSA Name	Name of SDCA	Emergency No.	No. of calls made per operator	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	RCOM CDMA	TATA CDMA	TATA GSM	VIDEOCON	VODAFONE			
July'15	PUNJAB	Pathankot	PATHANKOT	100, 101, 108 ,1091	4,5,4,4	√	√	√	√	√	√	√	√	√	√			
				1073, 1098	4,4	√	√	√	√	√	√	√	√	√	√			
			GURDASPUR	100, 101, 108 ,1091	4,5,4,4	√	√	√	√	√	√	√	√	√	√	√	√	
				1073, 1098	4,4	√	√	√	√	√	√	√	√	√	√	√	√	
			BATALA	100, 101, 108 ,1091	4,5,4,4	√	√	√	√	√	√	√	√	√	√	√	√	
				1073, 1098	4,4	√	√	√	√	√	√	√	√	√	√	√	√	
			DINANAGAR	100, 101, 108 ,1091	4,5,4,4	√	√	√	√	√	√	√	√	√	√	√	√	
				1073, 1098	4,4	√	√	√	√	√	√	√	√	√	√	√	√	
			QUdain	100, 101, 108 ,1091	4,5,4,4	√	√	√	√	√	√	√	√	√	√	√	√	
				1073, 1098	4,4	√	√	√	√	√	√	√	√	√	√	√	√	
			JUGIAL	100, 101, 108 ,1091	4,5,4,4	√	√	√	√	√	√	√	√	√	√	√	√	
				1073, 1098	4,4	√	√	√	√	√	√	√	√	√	√	√	√	
			August'15	PUNJAB	Ferozpur	FEROZPUR	100, 101, 108 ,1091	4,5,4,4	√	√	√	√	√	√	√	√	√	√
							1073, 1098	4,4	√	√	√	√	√	√	√	√	√	√
MOGA	100, 101, 108 ,1091	4,5,4,4				√	√	√	√	√	√	√	√	√	√	√		
	1073, 1098	4,4				√	√	√	√	√	√	√	√	√	√	√		
Muktsar	100, 101, 108 ,1091	4,5,4,4				√	√	√	√	√	√	√	√	√	√	√		
	1073, 1098	4,4				√	√	√	√	√	√	√	√	√	√	√		
Kotkapur	100, 101, 108 ,1091	4,5,4,4				√	√	√	√	√	√	√	√	√	√	√		
	1073,	4				√	√	√	√	√	√	√	√	√	√	√		
Faridkot	100, 101, 108 ,1091	4,5,4,4				√	√	√	√	√	√	√	√	√	√	√		
	1073, 1098	4				√	√	√	√	√	√	√	√	√	√	√		
Abohar	100, 101, 108 ,1091	4,5,4,4				√	√	√	√	√	√	√	√	√	√	√		
	1,073	4				√	√	√	√	√	√	√	√	√	√	√		
Bagha Purana	100, 101, 108 ,1091	4,5,4,4				√	√	√	√	√	√	√	√	√	√	√		
	1,073	4				√	√	√	√	√	√	√	√	√	√	√		
fazilka	100, 101, 108 ,1091	4,5,4,4				√	√	√	√	√	√	√	√	√	√	√		
	1,073	4				√	√	√	√	√	√	√	√	√	√	√		
Zira	100, 101, 108 ,1091	4,5,4,4				√	√	√	√	√	√	√	√	√	√	√		
	1,073	4				√	√	√	√	√	√	√	√	√	√	√		
Guru Har Sahai	100, 101, 108 ,1091	4,5,4,4				√	√	√	√	√	√	√	√	√	√	√		
	1,073	4				√	√	√	√	√	√	√	√	√	√	√		
Malaut	100, 101, 108 ,1091	4,5,4,4	√	√	√	√	√	√	√	√	√	√	√					
	1073, 1098	4,4	√	√	√	√	√	√	√	√	√	√	√					
Sep'15	PUNJAB	Jalandhar	Jalandhar	100, 101, 108 ,1091	4,5,4,4	√	√	√	√	√	√	√	√	√				
				1073, 1098	4,4	√	√	√	√	√	√	√	√	√				
			Nwasahar	100, 101, 108 ,1091,1073, 1098	4,5,4,4,4,4	√	√	√	√	√	√	√	√	√				
			Phagwara	100, 101, 108 ,1091	4,5,4,4	√	√	√	√	√	√	√	√	√	√			
				1073, 1098	4,4	√	√	√	√	√	√	√	√	√	√			
			Kapurthla	100, 101, 108 ,1091,1073, 1098	4,5,4,4,4,4	√	√	√	√	√	√	√	√	√	√			
			Phillor	100, 101, 108 ,1091	4,5,4,4	√	√	√	√	√	√	√	√	√	√			
				1073, 1098	4,4	√	√	√	√	√	√	√	√	√	√			
Sultanpur lodhi	100, 101, 108 ,1091,1073, 1098	4,5,4,4,4,4	√	√	√	√	√	√	√	√	√	√						

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 2015 respectively. The total route Kms covered during the drive tests in the respective SSAs was **500Kms, 525Kms and 500Kms**. 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 15 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	128	28	188	25	212	25	195	26	177	25	161	26	147	25	187	27	121	25	133	25	
		Highway	113	28	100	25	99	25	110	25	115	25	107	26	87	25	108	27	107	25	92	25	
		Within City	246	25	258	25	258	26	255	26	251	24	248	26	242	25	220	26	245	21	270	25	
		Overall SSA	487	81	546	75	569	76	560	77	543	74	516	78	476	75	515	80	473	71	495	75	
2	Blocked Call Rate	Major Road	2.34%	3.57%	0.53%	0.00%	1.42%	0.00%	0.51%	0.00%	1.13%	0.00%	0.62%	0.00%	0.00%	0.00%	0.53%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Highway	1.77%	0.00%	0.00%	0.00%	1.01%	0.00%	0.00%	0.00%	1.74%	0.00%	0.00%	0.00%	0.00%	0.00%	0.93%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Within City	2.03%	0.00%	0.00%	0.00%	1.55%	0.00%	0.78%	0.00%	0.80%	0.00%	0.00%	0.00%	0.41%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Overall SSA	2.05%	1.23%	0.18%	0.00%	1.41%	0.00%	0.54%	0.00%	1.10%	0.00%	0.19%	0.00%	0.21%	0.00%	0.39%	0.00%	0.00%	0.00%	0.00%	0.00%	
3	Dropped Call Rate (<=2%)	Major Road	0.00%	7.41%	1.07%	0.00%	1.91%	4.00%	0.00%	0.00%	0.00%	0.00%	0.63%	0.00%	0.00%	0.00%	0.00%	0.00%	1.65%	0.00%	0.00%	0.00%	
		Highway	3.60%	0.00%	0.00%	0.00%	1.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.93%	0.00%	0.00%	0.00%	0.00%	0.00%	0.93%	0.00%	1.09%	0.00%	
		Within City	0.83%	0.00%	0.00%	0.00%	1.18%	0.00%	0.00%	0.00%	0.00%	0.00%	1.21%	0.00%	0.00%	0.00%	0.00%	0.00%	0.41%	0.00%	0.00%	0.00%	
		Overall SSA	1.26%	2.50%	0.37%	0.00%	1.43%	1.33%	0.00%	0.00%	0.00%	0.00%	0.97%	0.00%	0.00%	0.00%	0.00%	0.00%	0.85%	0.00%	0.20%	0.00%	
4	Percentage connections with good voice quality (=>95%)																						

AUDIT & ASSESSMENT OF QOS FOR QE SEPTEMBER-2015-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	98.36%	99.04%	98.91%	99.53%	
		Highway	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.06%	99.10%	91.78%	98.89%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.75%	100.00%	97.95%	99.85%
		Overall SSA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.00%	99.35%	97.10%	99.42%
	(b) 0-5 (with frequency hopping for GSM Operators)	Major Road	94.28%	99.44%	96.73%	99.73%	94.17%	94.12%	94.15%	97.52%	95.30%	97.79%	97.56%	99.17%	95.16%	99.82%	96.75%	99.66%	NA	NA	NA	NA	
		Highway	94.91%	99.83%	96.06%	99.73%	95.00%	99.32%	94.03%	99.93%	95.47%	93.67%	96.37%	100.00%	96.31%	97.79%	97.01%	99.54%	NA	NA	NA	NA	
		Within City	96.79%	99.40%	97.03%	99.76%	94.25%	95.09%	94.94%	99.20%	96.14%	97.67%	98.64%	100.00%	95.57%	99.74%	97.86%	98.84%	NA	NA	NA	NA	
		Overall SSA	95.67%	99.57%	96.77%	99.74%	94.35%	96.14%	94.48%	98.84%	95.73%	96.43%	97.86%	99.72%	95.58%	99.08%	97.29%	99.36%	NA	NA	NA	NA	
5	Service Coverage																						
	In door (>= - 75dBm)	Major Road	57.21%	42.01%	79.50%	46.81%	59.61%	86.80%	89.02%	99.97%	67.65%	69.21%	65.90%	13.07%	68.47%	34.13%	74.81%	100%	58.52%	0.00%	49.59%	0.23%	
		Highway	47.81%	96.53%	75.41%	39.15%	50.62%	99.80%	90.86%	99.84%	72.67%	99.94%	61.36%	100%	47.20%	19.05%	78.93%	100%	54.48%	0.00%	28.37%	88.63%	
		Within City	62.63%	79.30%	84.26%	58.59%	60.51%	93.00%	97.12%	99.88%	83.59%	100%	69.62%	99.88%	72.55%	98.58%	95.02%	99.97%	72.97%	100%	41.61%	92.76%	
		Overall SSA	57.94%	72.42%	80.94%	48.18%	58.44%	93.25%	93.01%	99.90%	75.65%	89.84%	66.86%	70.91%	66.87%	49.52%	84.50%	99.99%	65.02%	30.29%	41.36%	59.73%	
	In-vehicle (>= - 85dBm)	Major Road	82.72%	99.91%	97.50%	72.32%	88.22%	99.50%	99.20%	100%	89.53%	99.96%	89.49%	91.73%	93.02%	87.19%	92.18%	100%	85.45%	0.00%	86.87%	41.85%	
		Highway	80.83%	99.86%	96.44%	79.28%	89.97%	100%	99.52%	100%	96.54%	100%	90.53%	100%	88.60%	96.92%	97.11%	100%	84.26%	0.00%	73.77%	100%	
		Within City	87.82%	99.92%	98.03%	95.79%	91.90%	99.80%	99.70%	100%	98.22%	100%	95.31%	100%	95.97%	99.95%	99.58%	100%	94.78%	100%	86.41%	100%	
Overall SSA		84.88%	99.90%	97.56%	82.47%	90.17%	99.77%	99.48%	100%	94.71%	99.99%	92.58%	97.24%	93.79%	94.72%	96.44%	100%	89.96%	30.29%	84.27%	80.10%		

AUDIT & ASSESSMENT OF QOS FOR QE SEPTEMBER-2015-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	96.59%	99.91%	99.69%	100%	98.38%	99.90%	99.92%	100%	98.93%	100%	99.14%	99.97%	99.61%	99.87%	99.29%	100%	99.73%	61.19%	99.82%	100%
		Highway	96.28%	99.86%	99.74%	100%	99.52%	100%	99.91%	100%	99.82%	100%	99.61%	100%	99.52%	100%	99.83%	100%	99.71%	99.68%	99.96%	100%
		Within City	97.17%	99.92%	99.91%	100%	99.56%	99.90%	99.97%	100%	99.92%	100%	99.79%	100%	99.88%	100%	99.94%	100%	99.59%	100%	99.99%	100%
		<b>Overall SSA</b>	<b>96.82%</b>	<b>99.90%</b>	<b>99.79%</b>	<b>100%</b>	<b>99.11%</b>	<b>99.93%</b>	<b>99.94%</b>	<b>100%</b>	<b>99.54%</b>	<b>100%</b>	<b>99.55%</b>	<b>99.99%</b>	<b>99.74%</b>	<b>99.96%</b>	<b>99.68%</b>	<b>100%</b>	<b>99.65%</b>	<b>86.31%</b>	<b>99.94%</b>	<b>100%</b>
6	Call Setup Success Rate (>=95%)	Major Road	97.66%	96.43%	99.47%	100%	98.58%	100%	98.97%	100%	98.87%	100%	99.38%	100%	100%	100%	99.47%	100%	100%	100%	100%	100%
		Highway	98.23%	100%	100%	100%	98.99%	100%	100%	100%	98.26%	100%	100%	100%	100%	100%	99.07%	100%	100%	100%	100%	100%
		Within City	97.97%	100%	100%	100%	98.45%	100%	99.22%	100%	99.20%	100%	100%	100%	99.59%	100%	100%	100%	100%	100%	100%	100%
		<b>Overall SSA</b>	<b>97.95%</b>	<b>98.77%</b>	<b>99.82%</b>	<b>100%</b>	<b>98.59%</b>	<b>100%</b>	<b>99.29%</b>	<b>100%</b>	<b>98.90%</b>	<b>100%</b>	<b>99.81%</b>	<b>100%</b>	<b>99.79%</b>	<b>100%</b>	<b>99.61%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>
7	Hand Over Success Rate (HOSR)	Major Road	98.96%	100%	99.29%	100%	97.86%	100%	99.75%	100%	95.93%	100%	100%	100%	98.86%	100%	99.59%	100%	100%	100%	100%	100%
		Highway	100%	100%	100%	100%	100%	100%	99.52%	100%	98.92%	100%	99.12%	100%	98.70%	100%	99.67%	100%	100%	100%	100%	100%
		Within City	98.93%	100%	100%	100%	99.13%	100%	99.64%	100%	100%	100%	99.28%	100%	98.93%	100%	100%	100%	100%	100%	100%	100%
		<b>Overall SSA</b>	<b>99.21%</b>	<b>100%</b>	<b>99.74%</b>	<b>100%</b>	<b>98.80%</b>	<b>100%</b>	<b>99.66%</b>	<b>100%</b>	<b>98.48%</b>	<b>100%</b>	<b>99.45%</b>	<b>100%</b>	<b>98.88%</b>	<b>100%</b>	<b>99.78%</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.

DRIVE TEST TABLE – 2

OPERATOR ASSISTED DRIVE TEST AT FEROTZEPUR SSA IN AUGUST 15 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	93	26	115	25	118	27	124	25	112	24	102	26	82	25	120	25	83	24	74	25	
		Highway	100	28	211	25	202	25	203	25	104	26	141	27	105	26	192	26	122	26	53	25	
		Within City	271	22	236	25	267	24	278	25	270	24	263	26	278	26	260	26	278	26	268	25	
		Overall SSA	464	76	562	75	587	76	605	75	486	74	506	79	465	77	572	77	483	76	395	75	
2	Blocked Call Rate	Major Road	1.08%	0.00%	0.00%	0.00%	0.85%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.22%	0.00%	0.83%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Highway	1.00%	0.00%	0.00%	0.00%	2.48%	0.00%	0.99%	0.00%	1.92%	0.00%	0.00%	0.00%	0.95%	0.00%	1.04%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Within City	4.80%	0.00%	0.00%	0.00%	0.00%	0.00%	0.36%	0.00%	0.37%	0.00%	0.00%	0.00%	0.72%	0.00%	0.00%	3.85%	0.00%	0.00%	0.00%	0.00%	
		Overall SSA	3.23%	0.00%	0.00%	0.00%	1.02%	0.00%	0.50%	0.00%	0.62%	0.00%	0.00%	0.00%	0.86%	0.00%	0.52%	1.30%	0.00%	0.00%	0.00%	0.00%	
3	Dropped Call Rate (<=2%)	Major Road	0.00%	0.00%	0.00%	0.00%	2.56%	0.00%	0.00%	0.00%	0.89%	0.00%	0.98%	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%	3.55%	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%	
		Within City	1.16%	0.00%	0.00%	0.00%	0.37%	0.00%	0.00%	0.00%	0.37%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.36%	0.00%	0.00%	0.00%	
		Overall SSA	0.67%	0.00%	0.00%	0.00%	1.89%	0.00%	0.00%	0.00%	0.41%	0.00%	0.20%	0.00%	0.00%	0.00%	0.00%	0.00%	0.21%	0.00%	0.00%	0.00%	
4	Percentage connections with good voice quality (=>95%)																						

AUDIT & ASSESSMENT OF QOS FOR QE SEPTEMBER-2015-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	97.72%	99.97%	99.23%	100.00%	
		Highway	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.69%	99.79%	99.26%	99.98%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.04%	99.94%	99.33%	100.00%
		<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>97.90%</b>	<b>99.90%</b>	<b>99.30%</b>	<b>99.99%</b>
	(b) 0-5 (with frequency hopping for GSM Operators)	Major Road	<b>94.42%</b>	99.60%	95.33%	97.79%	<b>90.31%</b>	<b>93.10%</b>	<b>94.01%</b>	99.67%	95.50%	99.51%	97.98%	99.61%	<b>91.56%</b>	96.81%	95.07%	99.49%	NA	NA	NA	NA	
		Highway	<b>93.72%</b>	99.81%	95.65%	95.32%	<b>90.83%</b>	<b>94.46%</b>	<b>93.99%</b>	96.82%	95.24%	99.51%	96.85%	99.80%	<b>93.59%</b>	98.66%	95.40%	99.64%	NA	NA	NA	NA	
		Within City	95.63%	99.70%	95.51%	97.85%	<b>91.41%</b>	<b>90.41%</b>	95.71%	98.99%	96.52%	99.29%	97.73%	99.76%	<b>94.97%</b>	98.75%	97.40%	98.96%	NA	NA	NA	NA	
		<b>Overall SSA</b>	<b>94.96%</b>	<b>99.70%</b>	<b>95.51%</b>	<b>97.01%</b>	<b>91.00%</b>	<b>92.72%</b>	<b>94.79%</b>	<b>98.49%</b>	<b>96.03%</b>	<b>99.44%</b>	<b>97.54%</b>	<b>99.73%</b>	<b>94.11%</b>	<b>98.07%</b>	<b>96.27%</b>	<b>99.36%</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	44.97%	90.73%	94.25%	96.91%	41.86%	66.48%	83.16%	100%	56.70%	100%	50.01%	100%	61.99%	44.64%	60.61%	80.24%	50.86%	92.39%	10.36%	0.00%	
		Highway	37.37%	92.80%	91.74%	99.44%	48.92%	98.45%	80.17%	99.78%	48.18%	98.18%	42.88%	99.31%	48.01%	78.72%	58.07%	94.03%	35.05%	93.25%	4.77%	97.62%	
		Within City	69.69%	97.81%	98.98%	99.59%	66.44%	99.87%	95.82%	100%	69.69%	90.01%	68.87%	75.72%	74.64%	98.01%	90.67%	99.61%	66.76%	99.87%	14.31%	72.34%	
		<b>Overall SSA</b>	<b>57.38%</b>	<b>93.44%</b>	<b>95.41%</b>	<b>98.65%</b>	<b>55.69%</b>	<b>86.24%</b>	<b>88.03%</b>	<b>99.92%</b>	<b>62.33%</b>	<b>94.66%</b>	<b>58.04%</b>	<b>91.77%</b>	<b>66.80%</b>	<b>73.61%</b>	<b>73.61%</b>	<b>91.50%</b>	<b>55.96%</b>	<b>95.18%</b>	<b>12.28%</b>	<b>58.27%</b>	
	<b>In-vehicle (&gt;= - 85dBm)</b>	Major Road	80.03%	99.30%	99.53%	99.98%	86.54%	96.78%	97.59%	100%	89.43%	100%	79.47%	100%	94.37%	97.97%	92.55%	99.92%	77.24%	99.84%	34.20%	15.55%	
		Highway	73.27%	100%	99.26%	99.86%	91.10%	99.98%	97.69%	100%	82.87%	100%	76.44%	100%	87.66%	98.98%	89.10%	100%	66.18%	99.91%	30.36%	100%	
		Within City	92.16%	99.80%	99.88%	99.99%	94.88%	99.98%	99.67%	100%	94.26%	98.63%	93.71%	100%	96.61%	99.96%	98.84%	100%	91.93%	100%	58.41%	98.07%	
<b>Overall SSA</b>		<b>85.45%</b>	<b>99.69%</b>	<b>99.58%</b>	<b>99.95%</b>	<b>91.95%</b>	<b>98.72%</b>	<b>98.59%</b>	<b>100%</b>	<b>90.82%</b>	<b>99.40%</b>	<b>86.17%</b>	<b>100%</b>	<b>94.31%</b>	<b>98.96%</b>	<b>94.30%</b>	<b>99.97%</b>	<b>82.85%</b>	<b>99.92%</b>	<b>50.04%</b>	<b>72.30%</b>		

AUDIT & ASSESSMENT OF QOS FOR QE SEPTEMBER-2015-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	97.46%	100%	99.84%	100%	100%	100%	99.67%	100%	98.55%	100%	98.01%	100%	99.61%	100%	99.16%	100%	96.53%	100%	88.08%	92.67%
		Highway	95.33%	100%	99.82%	99.96%	100%	100%	99.69%	100%	97.45%	100%	96.02%	100%	99.41%	99.98%	98.48%	100%	96.00%	100%	84.21%	100%
		Within City	99.32%	100%	99.95%	100%	100%	100%	99.93%	100%	99.63%	99.97%	99.64%	100%	99.83%	100%	99.87%	100%	99.51%	100%	96.11%	100%
		Overall SSA	98.05%	100%	99.88%	99.99%	100%	100%	99.80%	100%	98.93%	99.99%	98.33%	100%	99.70%	99.99%	99.26%	100%	98.10%	100%	92.99%	97.65%
6	Call Setup Success Rate (>=95%)	Major Road	98.92%	100%	100%	100%	99.15%	100%	100%	100%	100%	100%	100%	100%	98.78%	100%	99.17%	100%	100%	100%	100%	100%
		Highway	99.00%	100%	100%	100%	97.52%	100%	99.01%	100%	98.08%	100%	100%	100%	99.05%	100%	98.96%	100%	100%	100%	100%	100%
		Within City	95.20%	100%	100%	100%	100%	100%	99.64%	100%	99.63%	100%	100%	100%	99.28%	100%	100%	96.15%	100%	100%	100%	100%
		Overall SSA	96.77%	100%	100%	100%	98.98%	100%	99.50%	100%	99.38%	100%	100%	100%	99.14%	100%	99.48%	98.70%	100%	100%	100%	100%
7	Hand Over Success Rate (HOSR)	Major Road	97.87%	100%	99.03%	100%	98.94%	100%	99.64%	100%	96.51%	100%	100%	100%	97.33%	100%	98.13%	100%	100%	100%	100%	100%
		Highway	98.86%	100%	99.19%	100%	96.06%	100%	99.45%	100%	98.84%	100%	100%	100%	97.40%	100%	98.40%	100%	100%	100%	100%	100%
		Within City	99.02%	100%	99.73%	100%	97.98%	100%	99.80%	100%	100%	100%	99.43%	100%	98.29%	100%	99.36%	100%	100%	100%	100%	100%
		Overall SSA	98.70%	100%	99.42%	100%	97.48%	100%	99.65%	100%	98.97%	100%	99.68%	100%	97.93%	100%	98.77%	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 15 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	185	27	186	28	167	26	178	27	197	25	200	26	140	25	198	25	209	25	202	25	
		Highway	104	32	166	25	127	26	111	27	96	26	106	26	144	25	103	26	97	25	67	25	
		Within City	192	29	185	25	174	26	227	26	201	24	208	26	210	26	200	25	224	25	200	25	
		Overall SSA	481	88	537	78	468	78	516	80	494	75	514	78	494	76	501	76	530	75	469	75	
2	Blocked Call Rate	Major Road	2.16%	0.00%	0.00%	0.00%	2.99%	0.00%	0.00%	0.00%	2.54%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Highway	4.81%	0.00%	0.00%	0.00%	3.15%	0.00%	0.90%	0.00%	0.00%	0.00%	0.94%	0.00%	2.08%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Within City	1.56%	0.00%	0.00%	0.00%	2.30%	0.00%	0.00%	0.00%	2.49%	0.00%	0.48%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Overall SSA	2.49%	0.00%	0.00%	0.00%	2.78%	0.00%	0.19%	0.00%	2.02%	0.00%	0.39%	0.00%	0.61%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
3	Dropped Call Rate (<=2%)	Major Road	1.10%	0.00%	0.00%	0.00%	1.23%	0.00%	0.00%	0.00%	1.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.96%	0.00%	0.00%	0.00%	
		Highway	2.02%	0.00%	0.00%	0.00%	0.81%	0.00%	0.00%	0.00%	0.00%	0.00%	0.95%	0.00%	0.00%	0.00%	0.00%	0.00%	3.09%	0.00%	0.00%	0.00%	
		Within City	1.06%	0.00%	0.00%	0.00%	0.59%	0.00%	0.00%	0.00%	0.51%	0.00%	0.48%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Overall SSA	1.28%	0.00%	0.00%	0.00%	0.88%	0.00%	0.00%	0.00%	0.62%	0.00%	0.39%	0.00%	0.00%	0.00%	0.00%	0.00%	0.94%	0.00%	0.00%	0.00%	
4	Percentage connections with good voice quality (=>95%)																						

AUDIT & ASSESSMENT OF QOS FOR QE SEPTEMBER-2015-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	97.35%	99.97%	99.74%	100.00%	
		Highway	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.67%	99.94%	99.36%	99.79%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.43%	100.00%	99.95%	99.91%
		<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>97.26%</b>	<b>99.97%</b>	<b>99.78%</b>	<b>99.90%</b>
	(b) 0-5 (with frequency hopping for GSM Operators)	Major Road	<b>94.66%</b>	99.79%	96.43%	98.88%	<b>87.71%</b>	<b>89.66%</b>	95.13%	98.50%	<b>94.15%</b>	99.52%	97.44%	97.35%	<b>93.31%</b>	99.12%	98.52%	99.77%	NA	NA	NA	NA	
		Highway	<b>94.69%</b>	99.80%	98.13%	98.06%	<b>88.13%</b>	<b>93.81%</b>	96.57%	96.48%	96.33%	99.49%	95.66%	100.00%	<b>94.68%</b>	99.00%	97.99%	99.67%	NA	NA	NA	NA	
		Within City	95.97%	99.68%	97.74%	99.76%	<b>88.49%</b>	97.49%	<b>94.33%</b>	99.64%	96.32%	99.52%	98.52%	98.77%	<b>93.34%</b>	98.55%	98.83%	99.48%	NA	NA	NA	NA	
		<b>Overall SSA</b>	<b>95.19%</b>	<b>99.76%</b>	<b>97.39%</b>	<b>98.91%</b>	<b>88.13%</b>	<b>93.66%</b>	<b>95.26%</b>	<b>98.18%</b>	<b>95.46%</b>	<b>99.51%</b>	<b>97.53%</b>	<b>98.71%</b>	<b>93.72%</b>	<b>98.89%</b>	<b>98.54%</b>	<b>99.64%</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	76.78%	96.09%	91.84%	99.51%	82.30%	50.50%	98.75%	100%	91.30%	100%	77.36%	99.70%	78.36%	40.59%	86.99%	100%	75.54%	99.91%	75.95%	100%	
		Highway	62.80%	96.37%	98.85%	99.97%	79.44%	87.07%	96.35%	100%	71.94%	100%	63.73%	100%	75.87%	9.72%	69.41%	99.50%	58.67%	78.78%	52.04%	67.32%	
		Within City	77.61%	96.56%	97.15%	100%	81.49%	64.63%	99.25%	100%	91.80%	100%	87.21%	97.36%	84.16%	75.03%	90.13%	99.57%	87.51%	77.52%	63.25%	66.52%	
		<b>Overall SSA</b>	<b>74.18%</b>	<b>96.35%</b>	<b>95.61%</b>	<b>99.82%</b>	<b>81.25%</b>	<b>68.81%</b>	<b>98.23%</b>	<b>100%</b>	<b>87.66%</b>	<b>100%</b>	<b>78.71%</b>	<b>99.03%</b>	<b>80.11%</b>	<b>41.87%</b>	<b>85.31%</b>	<b>99.69%</b>	<b>77.58%</b>	<b>85.42%</b>	<b>67.19%</b>	<b>77.81%</b>	
	<b>In-vehicle (&gt;= - 85dBm)</b>	Major Road	96.39%	98.03%	98.59%	100%	98.24%	95.80%	99.80%	100%	98.99%	100%	96.78%	100%	98.33%	92.78%	97.24%	100%	96.73%	100%	94.67%	100%	
		Highway	88.59%	100%	99.86%	100%	94.27%	99.83%	99.45%	100%	94.28%	100%	88.06%	100%	96.37%	78.74%	90.07%	100%	89.60%	99.55%	85.69%	100%	
		Within City	96.15%	99.17%	99.61%	100%	98.79%	99.21%	99.89%	100%	99.34%	100%	98.98%	100%	98.38%	99.61%	98.55%	99.92%	99.46%	81.14%	92.89%	99.97%	
		<b>Overall SSA</b>	<b>94.66%</b>	<b>99.13%</b>	<b>99.29%</b>	<b>100%</b>	<b>97.46%</b>	<b>98.39%</b>	<b>99.73%</b>	<b>100%</b>	<b>98.20%</b>	<b>100%</b>	<b>95.98%</b>	<b>100%</b>	<b>97.79%</b>	<b>90.38%</b>	<b>96.57%</b>	<b>99.97%</b>	<b>96.60%</b>	<b>93.60%</b>	<b>92.67%</b>	<b>99.99%</b>	



AUDIT & ASSESSMENT OF QOS FOR QE SEPTEMBER-2015-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	99.67%	100%	99.92%	100%	99.89%	99.98%	99.96%	100%	99.83%	100%	99.71%	100%	99.87%	99.20%	99.89%	100%	99.99%	100%	99.98%	100%
		Highway	98.72%	100%	99.98%	100%	99.82%	99.98%	99.82%	100%	99.42%	100%	99.05%	100%	99.79%	98.62%	99.20%	100%	99.54%	100%	100%	100%
		Within City	99.50%	99.95%	99.94%	100%	99.97%	100%	99.96%	100%	99.85%	100%	100%	100%	99.90%	99.99%	99.97%	100%	100%	100%	100%	100%
		<b>Overall SSA</b>	<b>99.40%</b>	<b>99.98%</b>	<b>99.94%</b>	<b>100%</b>	<b>99.91%</b>	<b>99.99%</b>	<b>99.92%</b>	<b>100%</b>	<b>99.75%</b>	<b>100%</b>	<b>99.70%</b>	<b>100%</b>	<b>99.86%</b>	<b>99.27%</b>	<b>99.81%</b>	<b>100%</b>	<b>99.91%</b>	<b>100%</b>	<b>99.99%</b>	<b>100%</b>
6	Call Setup Success Rate (>=95%)	Major Road	97.84%	100%	100%	100%	97.60%	100%	99.44%	100%	97.46%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Highway	95.19%	100%	100%	100%	97.64%	100%	99.10%	100%	100%	100%	99.06%	100%	97.92%	100%	100%	100%	100%	100%	100%	100%
		Within City	98.44%	100%	100%	100%	98.28%	100%	100%	100%	97.51%	100%	99.52%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		<b>Overall SSA</b>	<b>97.51%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>97.86%</b>	<b>100%</b>	<b>99.61%</b>	<b>100%</b>	<b>97.98%</b>	<b>100%</b>	<b>99.61%</b>	<b>100%</b>	<b>99.39%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>
7	Hand Over Success Rate (HOSR)	Major Road	94.63%	100%	98.67%	100%	98.18%	100%	99.48%	100%	97.65%	100%	99.47%	100%	97.01%	92.00%	99.35%	100%	100%	100%	100%	100%
		Highway	89.42%	100%	100%	100%	98.58%	100%	99.39%	100%	95.29%	100%	98.37%	100%	95.94%	100%	100%	100%	100%	100%	100%	100%
		Within City	97.67%	100%	100%	100%	99.37%	100%	99.83%	100%	95.93%	100%	99.71%	100%	95.90%	100%	100%	100%	100%	100%	100%	100%
		<b>Overall SSA</b>	<b>94.59%</b>	<b>100%</b>	<b>99.46%</b>	<b>100%</b>	<b>98.75%</b>	<b>100%</b>	<b>99.62%</b>	<b>100%</b>	<b>96.49%</b>	<b>100%</b>	<b>99.34%</b>	<b>100%</b>	<b>96.25%</b>	<b>95.00%</b>	<b>99.75%</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 KMs	Route Covered	Name of SDCA Covered/Route Kms	Route Covered
Pathankot	July'15	Pathankot,Jugiyal / 140 Km	Malikpur Chowk, Sama, Kotli, Simbal Chowk, Mammon Chowk, Jandwal, Haryal Chowk, Bungal, Mammon Cantt, Victoria Estate, Bangoli Chowk, Jugyal, Patel Chowk, Dhakki Road, Dhera, Baroli Kalan, Malikpur Chowk, Bangoli Chowk, Ghoh, Jugyal, Patel Chowk, Gaddi Hatha Chowk, Civil Chowk, Civil Hospital, Shastri Nagar, Bus Stand, Indra Colony, Abrol Nagar, Jugyal Local, Sahpur, Modal Town, Jodhamal Colony, Ram Shamam Colony,Lamini	Dinanagar, Gurdaspur / 150 Km	Malikpur Chowk, Rashpalama, Parmanand, Khanwan, Dinanagar, Paniar, Gurdaspur, Verka Plant, Tibri Road, Para Village, Khanowan Chowk, Hardo Channi Road, Shikha, Hamrajpur, Tibri, Purana Challa, Nawapind, Ghot Pokar, Jail Road, Baryar, Prem Nagar, Fish Market, Jail Road, Hanuman Chowk, Garden Colony, Gita Bhawan, College Road, Railway Line, Dav School, Dinanagar Bus Stand.	Batala,Quadian/ 210 Km	Gurdaspur Bypass, Japowal, Sohal, Dhariwal, Naushehra Majja Singh, Batala, Quadian Road Chungi, Wadala Granthian, Thind, Dala Chowk, Quadian, Simbal Chowk, Batala Bus Stand, Focal Point, Dera Road, Kalanour Road, Modal Town, Batala Bypass, Taragarh, Kotli Surat Mali, Dera Baba Nanak, Bhgawal, Batala Dharpura Colony, Achli Gate, Khagari Gate, City Road, Gandhi Chowk, Bank Colony, Bhandari Mohalla, Hathi Gate, Ahori Gate, Umarpura Chowk, Butter Road, Urban Estate, Quadian Bus Stand.
Ferozpur	Aug'15	Moga, Ferozpur, Zira / 165 Km	Buttar,Moga-Zira,Bhatinda Road,Buggi Pura, Nihalsingh Wala, V Mart Road, Court Road,Kutchhery Road, Lic Road, Grain Market,,Main Bazaar, Zira, Ferozpur	Ferozpur, Guruhar Sahib, Fazilka, Abohar, Malaut / 220 Km	Abohar Bypass,Malout Bypass,Fazilka Bypass, Sito Chowk, Multani Gate,Bus Stand,Zira Gate,Mimt Engg College,Dav School Bsnl ,Exchange, Ferozpur,Guruhar Sahib,Jalabad,Fazilka,Abohar,Malout.	Faridkot, Kotkapura, Muktasar / 140 Km	Faridkot Bypass,Talwandi Bypass,Moga Road,Malout Bypass,Jalalabad Bypass,Kotakpura Road, Multani Gate, Zira Gate,Machhi Chowk,Medical College,Baba Farid Gurudwara,Old Cantt,Bus Stand, Ferozpur Cantt,Udhamsingh Chowk,Faridkot,Kotakpura,Muktsar.
Jalandhar	Sep'15	Jalandhar,Nakodar/1 50km	Pap Chownk- Maqsudan Bupass, Wadala Chownk- Jalandhar Bypass Nakodar,Pap Chownk- Bfs Chownk-Hotel International-Defence Colony- Cool Rd- Jyoti Chownk- Model Town Mkt- Ravidass Chownk- Basti Chownk- 120Ft Road- Leather Complex- Kapurthala Chownk- Patel Chownk- Jail Road- Basti Adda- Jyoti Chownk- Hotel Palaza-Gpo-Ladowali Rd- Bsf Chownk,Pathankot Chownk- Pap Chownk- Ue Phase 1- Hadda Chownk	Kapurthla/Sultanpur Lodhi/165km	Sports Complex(Jal)- Jal Bypass(Kapurthala), Kapurthala-Sultanpur Lodhi,Jal Bypass Kapurthala, Sherawala Gate Mohalla, Ajit Nagar- Sainik School- Kadopur- Bus Stand- Malkana Mohalla- Kanjali Rd- Sultanpur Main Bazar- Baba Nanak Gurudwara,Shree Bean Shahib Gurudwara,Mohalla Shergarh- Shalimar Garden- Prachin Show Mandi- Chirst King- Model Town- Sainik School- Tej Catt Rd- Sultanpur- Main Bazar- Baba Nanak Gurudwara Rd	Phagwara/Philor, Nwashar/185km	Jalandhar Pap Chownk-Jalandhar Rd Phagwara, Jct Mill- Banga Rd-Phagwara- Goraya-Phillour, Phillour- Nawashear Via Rahon Rd,Bhagatpura-Mehli Gate-Sugar Mill-Adarsh Nagar-Main Bazar Phillour- Hanuman Mandir- Chaudhrian Mohalla- Kc College,Hsp Bypass Phagwara- Banga Rd- Railway Road, Nakodar Rd- Shivpuri- Gur Mandi- Dc Office- Railway Station Nawashear- Karyam Rd, Chd Rd

**7.2 SSA WISE DRIVE TEST OBSERVATION:**

**DRIVE TEST TABLE: 5**

**DRIVE TEST OBSERVATION OF PATHANKOT SSA – JULY 15**

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	Pathankot, Jugiyal	Poor Rx Level and Rx Quality Near Indira Nagar and Rara, Jandwal, Jugial Highway and Pathankot Jugial Road.	Dinanagar, Gurdaspur	Poor Rx level and Rx Quality Near Dina Nagar, Dorangla Road, Hayat Nagar, Karawar.	Batala, Quadian	Poor Rx Level and Rx Quality Near Batala to Dera Baba Nanak Road, Quadian Road, Batala Bypass Road.
2	AIRTEL		Poor Rx Level and Rx Quality Near Gho, Pangoli.		Poor Rx Level and Rx Quality at Some Places of Gurdaspur SSA, Tibri.		Poor Rx Quality Near Batala, Quadian, Badala Banger.
3	BSNL		Poor Rx Level and Rx Quality Near Mammon Cantt, in Pathankot Town.		Poor Rx Level and Rx Quality Near Dinanagar, Centraljail Gurdaspur.		Poor Rx Level and Rx Quality Near Batala Town.
4	TATA GSM		Poor Rx Level and Rx Quality from Goh to Jugial and at Pathankot Chakki Highway.		Poor Rx Level and Rx Quality Near Dinanagar, in Gurdaspur Town.		Poor Rx Level and Rx Quality from Kotli to Dera Baba Nanak, Dear Baba Nanak.
5	TATA CDMA		They Have Coverage only in Major Towns with Poor Rx Level and Rx Quality at Outer.		They Have Coverage only in Major Towns with Poor Rx Level and Rx Quality at Outer.		They Have Coverage only in Major Towns with Poor Rx Level and Rx Quality at Outer.
6	IDEA		Overall Good Rx Level, But Poor Rx Quality Observed in Pathankot Town and at Gurdaspur and Pathankot Highway.		Overall Good Rx Level and Rx Quality Observed in Covered SDCA's.		Poor Rx Quality Near Quadian SDCA, in Batala Town.
7	RCOM GSM		Poor Rx Level and Rx Quality Near Jugial Town, in Pathankot, Sujanpur, Bharoli Kalan.		Poor Rx Level and Rx Quality Near Dinanagar and in Gurdaspur Town.		Poor Rx Level and Rx Quality Near Batala SDCA, Makilkiwala.
8	RCOM CDMA		Poor Rx Level and Rx Quality at Some Places of Pathankot SDCA.		Poor Rx Level and Rx Quality Near Pathankot to Gurdaspur Highway and in Gurdaspur Town.		Poor Rx Level and Rx Quality Near Dhariwal and Quadian SDCA.
9	QTL		They Have Coverage only in Major Towns with Poor Rx Level and Rx Quality at Outer.		They Have Coverage only in Major Towns with Poor Rx Level and Rx Quality at Outer.		They Have Coverage only in Major Towns with Poor Rx Level and Rx Quality at Outer.
10	VODAFONE		Poor Rx Quality Near Pathankot to Jugiyal Road.		Poor Rx Level and Rx Quality Near Tibri Cantt.		Poor rx level and Rx Quality Near kalanaur, Dear Baba Nanak Highway.

**DRIVE TEST TABLE: 6**

**DRIVE TEST OBSERVATION OF FIROZEPUR SSA – AUGUST 15**

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	Moga, Ferozpur, Zira,	They Have Coverage only in Major Towns with Poor Rx Level and Rx Quality at Outer.	Ferozpur, Guruhar sahib, Fazilka, Abohar, Malaut.	They Have Coverage only in Major Towns with Poor Rx Level and Rx Quality at Outer.	Faridkot, Kotkapura, Mukhtasar.	They Have Coverage only in Major Towns with Poor Rx Level and Rx Quality at Outer.
2	AIRTEL		Poor Rx Level and Rx Quality Near Markhai, Phullewala.		Poor Rx Quality Near Jalalabad, Fazilika and Abohar SDCA.		Poor Rx Level and Rx Quality Near Tibbi, Kotkapura.
3	BSNL		Poor Rx Quality Near Zira and Ferozpur SDCA. At Moga to Kotakpur Highway.		Poor Rx Level and Rx Quality Near Abohar Town.		Poor Rx Level and Rx Quality in Mukhtasar Town, Mukhtasar to Kotkapura Highway.
4	TATA GSM		They Have Coverage only in Major Towns with Poor Rx Level and Rx Quality at Outer.		They Have Coverage only in Major Towns with Poor Rx Level and Rx Quality at Outer.		They Have Coverage only in Major Towns with Poor Rx Level and Rx Quality at Outer.
5	TATA CDMA		They Have Coverage only in Major Towns with Poor Rx Level and Rx Quality at Outer.		They Have Coverage only in Major Towns with Poor Rx Level and Rx Quality at Outer.		They Have Coverage only in Major Towns with Poor Rx Level and Rx Quality at Outer.
6	IDEA		Overall Good Rx Level and Rx Quality in Covered SDCA's.		Poor rx Quality Near Guruhar Sahai, ferzpur City.		Poor Rx Quality Near Faridkot Town and Mukhtasar.
7	RCOM GSM		They Have Coverage only in Major Towns with Poor Rx Level and Rx Quality at Outer.		Poor Rx Level and Rx Quality Near Fazilka Town.		Poor Rx Level and Rx Quality in Mukhtasar Town.
8	RCOM CDMA		Poor Rx Level and Rx Quality at Zira to Ferozpur Highway.		They Have Coverage only in Major Towns with Poor Rx Level and Rx Quality at Outer.		Poor rx Level and Rx Quality Between Mukhtasar to Bariwala.
9	QTL		Poor Rx Level and Rx Quality Near Mansurpura Deva, Bankhandi, Dosanjh Village.		Poor Rx Level and Rx Quality Near Mohanke, Amir Khas, Khai, Dangar Khera.		Poor Rx Level and Rx Quality Near Golewal, Viring..
10	VODAFONE		Overall Good Rx Level and Rx Quality in Covered SDCA's.		Poor Rx Level and Rx Quality in Most of the Covered SDCA's on Day 2.		Overall Good Rx Level and Rx Quality in Covered SDCA's.

**DRIVE TEST TABLE: 7**

**DRIVE TEST OBSERVATION OF JALANDHAR SSA – SEPTEMBER 15**

S NO	Name of SP	Month	SSA Covered	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	Sep'15	Jalandhar	Jalandhar, Nakodar	Poor Rx Quality & level at jalandar Nakodar Road.	Kapurthla Sultanpur Lodhi	Poor Rx Level and Rx Quality Near Mohla Shergarh,Sultanpur Lodhi Highway,Hussainpura.	Phagwara, Phillor, Nwasahar	Poor Rx Level and Rx Quality Nagar to Urapur Outer,Philor Outer,Mehrampur,Village Rahon,Ragon to Hiala.
2	Airtel				Overall Good Rx Level and Rx Quality in Covered SDCA's.		Overall Good Rx Level and Rx Quality in Covered SDCA's.		Overall Good Rx Level and Rx Quality in Covered SDCA's.
3	BSNL				Poor Rx Level and Rx Quality Near Jalandhar Nakodar Highway.		Overall Good Rx Level and Rx Quality in Covered SDCA's.		Poor Rx Level and Rx Quality Near Near Rahon Road.
4	TATA GSM				Poor Rx Level and Rx Quality Near Brindpur,Jalndhar Kunj to Village mandi,Wadala to Daliwal,Near Dudwindi Outer.		Poor Rx Level and Rx Quality Near Sultanpur Lodhi,Kadak kalan,Brindpur.		Poor Rx Level and Rx Quality Near Nagar to Urapur Outer,Philor Outer,Mehrampur,Village Rahon,Ragon to Hiala.
5	TATA CDMA				Poor Rx Level and Rx Quality Near Brindpur,Jalndhar Kunj to Village mandi,Wadala to Daliwal,Near Dudwindi Outer.		Poor Rx Level and Rx Quality Near Sultanpur Lodhi,Kadak kalan,Brindpur.		Poor Rx Level and Rx Quality Near Nagar to Urapur Outer,Philor Outer,Mehrampur,Village Rahon,Ragon to Hiala.
6	Idea				Overall Good Rx Level and Rx Quality in Covered SDCA's.		Poor Rx Level and Rx Quality Near Hussainpur,Sultanpur Lodhi Road.		Poor Rx Level and Rx Quality Near Good Rx Quality & Level.
7	RCOM GSM				Poor Rx Level and Rx Quality Near Lambra,Kanga shabbu,Jalandhar to Nakodar Highway,Ladowali Road.		Poor Rx Level and Rx Quality Near Mohla Shergarh,Sultanpur Lodhi Highway,Hussainpura.		Poor Rx Level and Rx Quality Near Phillour-Nawashear via rahon Rd,Bhagatpura.
8	RCOM CDMA				Poor Rx Level and Rx Quality Near Near Lambra,Kanga shabbu,Jalandhar to Nakodar Highway,Ladowali Road.		Poor Rx Level and Rx Quality Near Mohla Shergarh,Sultanpur Lodhi Highway,Hussainpura.		Poor Rx Level and Rx Quality Near Phillour-Nawashear via rahon Rd,Bhagatpura.
9	QTL				Poor Rx Level and Rx Quality Near Gohir to Nakodar Road,Nakodar Outer,Brindpur,Jalndhar Kunj to Village mandi,Wadala to Daliwal,Near Dudwindi Outer.		Poor Rx Level and Rx Quality Near Dudwindi Outer to Sultanpur Lodhi,Kadak kalan,Brindpur.		Poor Rx Level and Rx Quality Near Nagar to Urapur Outer,Philor Outer,Mehrampur,Village Rahon,Ragon to Hiala.
10	Vodafone				Overall Good Rx Level and Rx Quality in Covered SDCA's.		Overall Good Rx Level and Rx Quality in Covered SDCA's.		Overall Good Rx Level and Rx Quality in Covered SDCA's.

### 7.3 KEY FINDINGS ON DRIVE TEST:

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

- (i) **In the Month of July-15**, drive test was conducted across **Pathankot SSA** covering Pathankot, Jugiyal, Dinanagar, Durgapur, Batala, Quadian SDCAs. The drive test results revealed that performance of the **BSNL and Idea** remained non-complied in respect of the parameter **Voice Quality** with their achieved values as **94.35%** and **94.48%** respectively. The performance of other operators was within benchmark.
- (ii) **In the Month of August -15**, drive test was conducted across **Ferozpur SSA** covering Moga, Ferozpur, Zira, Guruhar Sahib, Fazilka, Aboha, Malaut, Faridakot, Katakapura, Muktasar SDCAs. The performance of the Service Providers across Ferozpur SSA was satisfactory as the operators were largely in compliance with the benchmarks of the parameters except for the parameter **Voice Quality**. **Aircel, BSNL, Idea and Videocon** remained under performed with their performance as **94.96% (outdoor), 91.00% (outdoor) / 92.72% (Indoor), 94.79% (outdoor) and 94.11% (outdoor)** respectively.
- (iii) **In the month of September -15**, drive tests were conducted across **Jalandhar SSA** covering Jalandhar, Nakodar, Kapurthala, Sultanpur, Lodhi, Phagwara, Nawasha SDCAs. The drive test results revealed that performance of the **BSNL and Videocon** remained non-complied in respect of the parameter **Voice Quality** with their achieved values as **88.13% (outdoor) / 93.66% (indoor) and 93.72% (outdoor) respectively**. For other parameters, the performance of all operators was satisfactory.

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

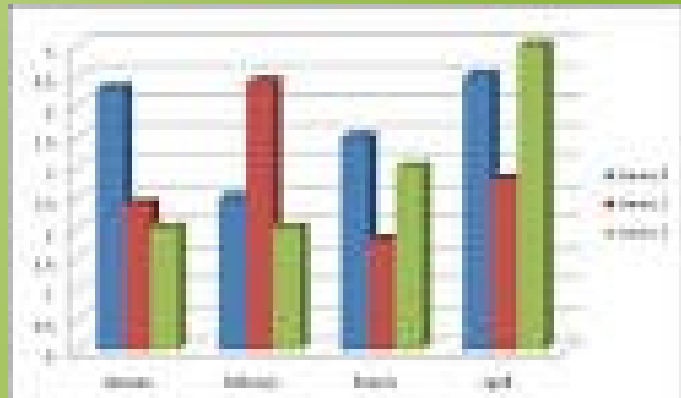
*The analysis of drive test results revealed that the performance of the services providers namely **BSNL , Idea, Aircel and Videocon** failed to meet the benchmarks of the parameter **Voice quality** in one or the other SSAs namely **Pathankot, Ferozpur and Jalandhar** where drive tests were conducted during the Quarter. The performance of the service providers was within the norms for other parameters.*

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

AVERAGED QUARTERLY PMR

V/S

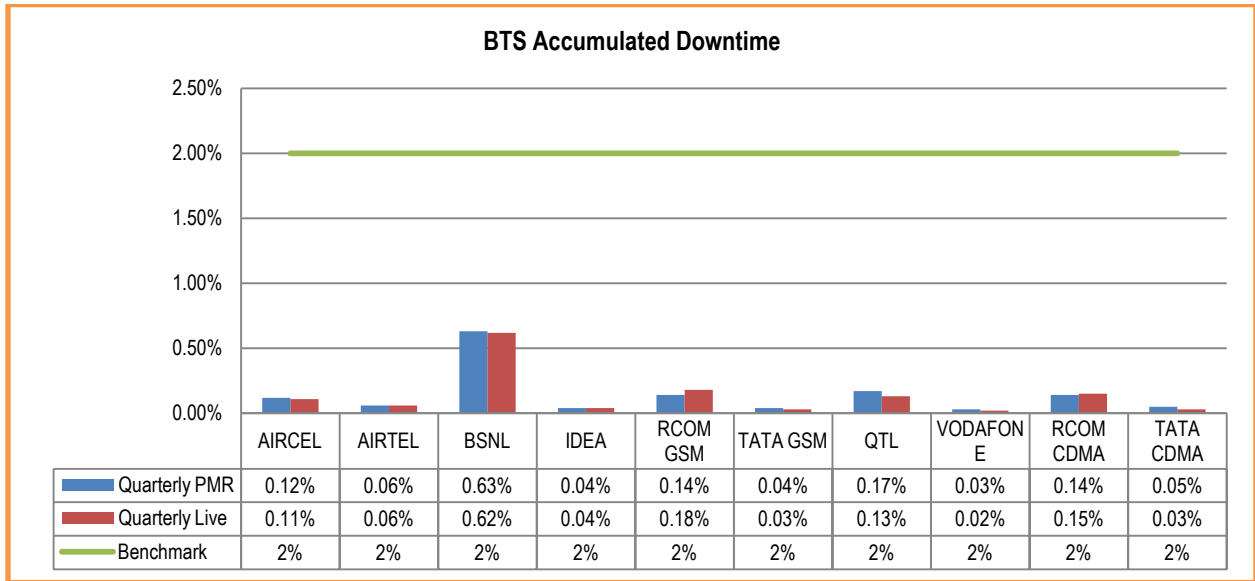
AVERAGED QUARTERLY 3-DAYs LIVE MEASURMENT



**8. GRAPHICAL REPRESENTATION (CMTS):**

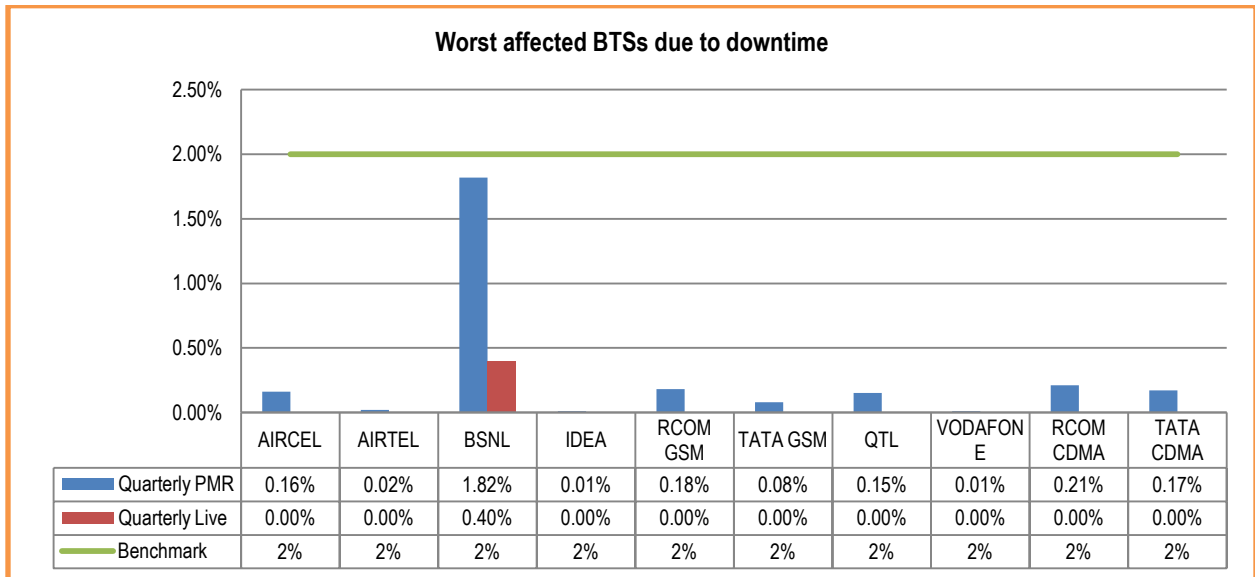
Graphical Representation of Performance of the Cellular Mobile Service Providers (PMR) V/S 3-Days Live Measurement (Quarterly Average Data):

**I. BTS ACCUMULATED DOWNTIME:**



All operators are meeting the benchmarks.

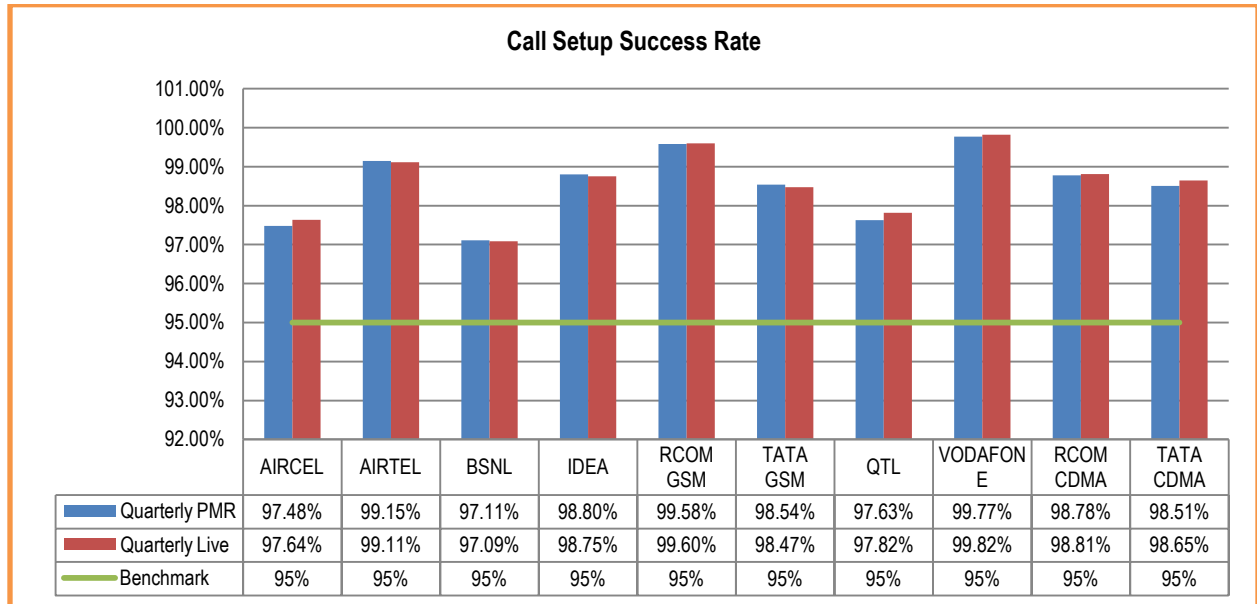
**II. WORST AFFECTED BTSS DUE TO DOWNTIME :**



All operators are meeting the benchmarks.

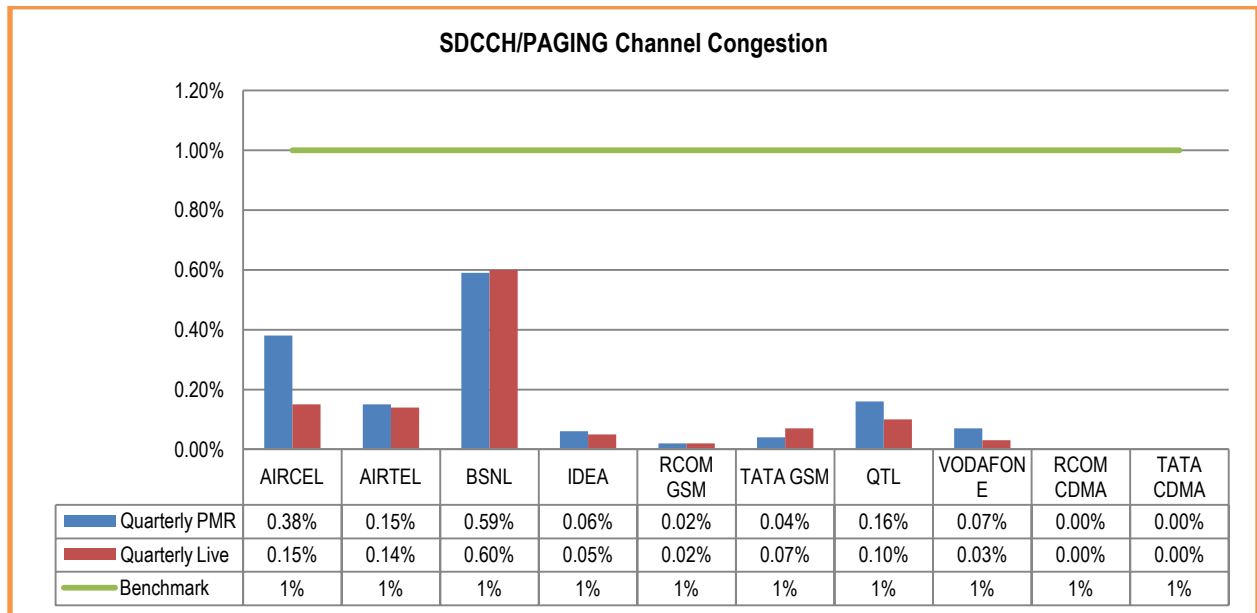


**III. CALL SETUP SUCCESS RATE :**



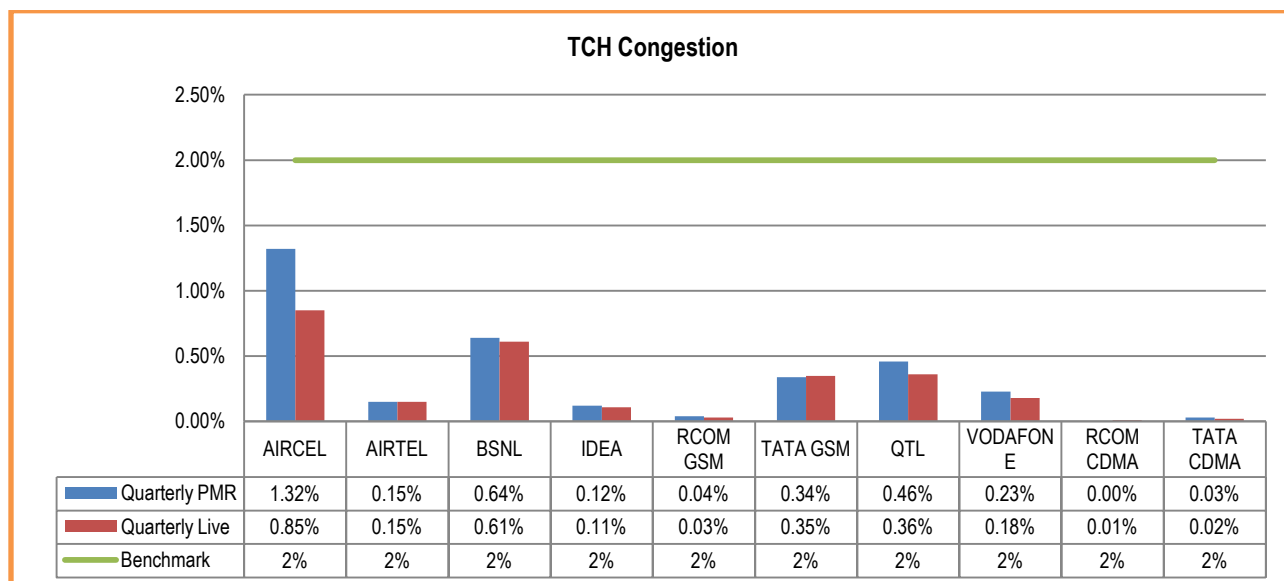
All operators are meeting the benchmarks.

**IV. SDCCH/PAGING CHANNEL CONGESTION**



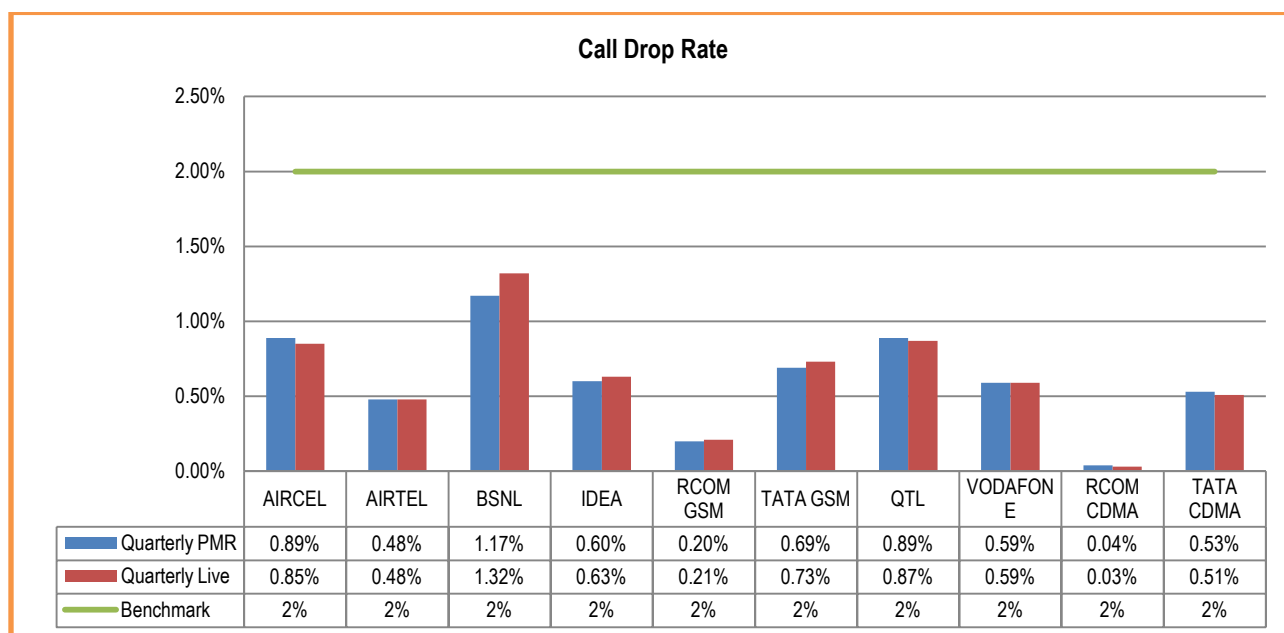
All operators are meeting the benchmarks.

**V. TCH CONGESTION :**



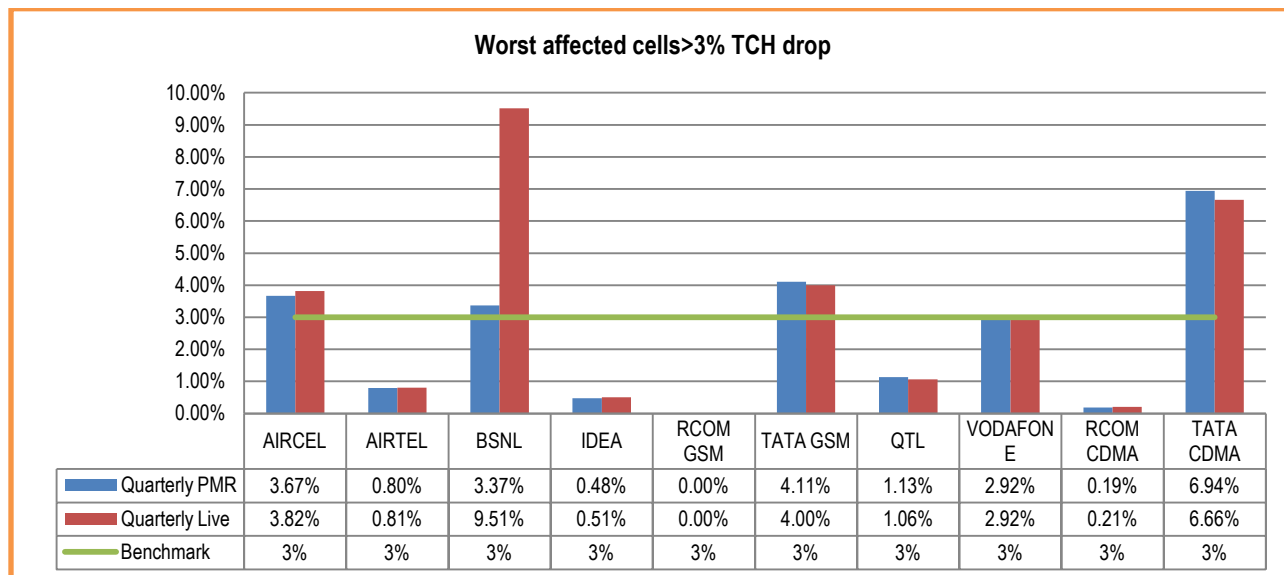
All operators are meeting the benchmarks.

**VI. CALL DROP RATE :**



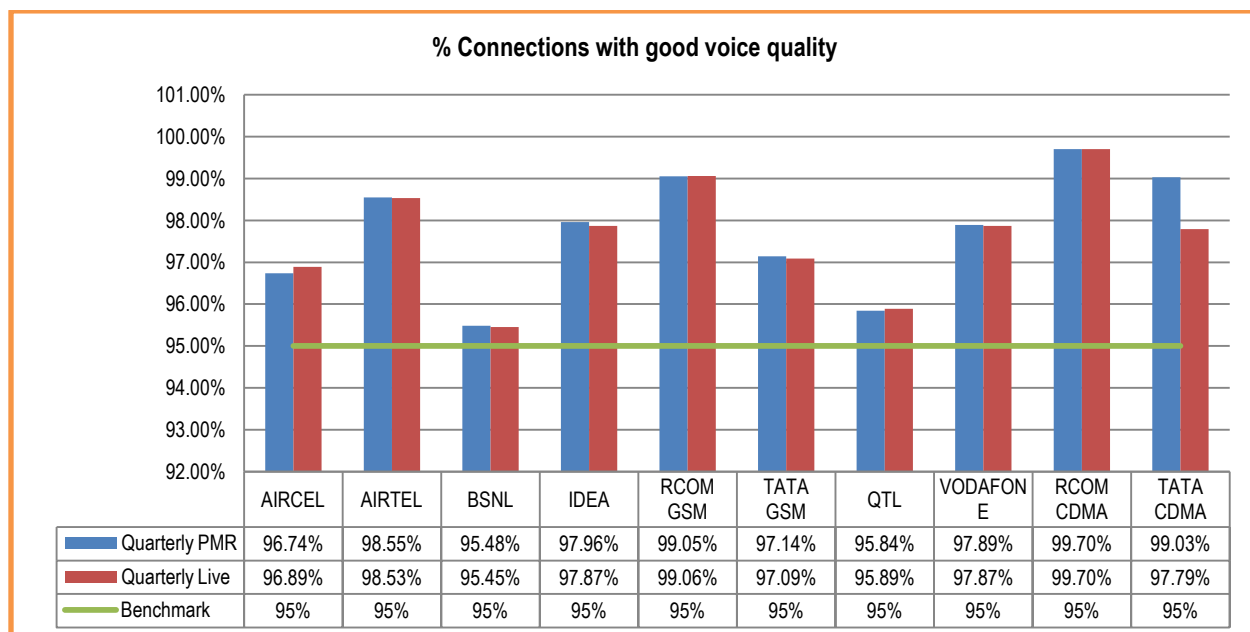
All operators are meeting the benchmarks.

**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.

## 9. PMR VERIFICATION TABLE:

### (i) NETWORK RELATED PARAMETERS:

Name of Service Provider	Parameter	BTS Accumulated Downtime	Worst affected BTSs due to downtime	CSSR (Call Setup Success Rate)	SDCCH/PAGING Channel congestion	TCH congestion	CDR (Call Drop Rate)	Worst affected cells>3% TCH drop (Call drop) rate	Connections with good voice quality	No. of POI's having >=0.5% POI congestion
Benchmark		≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%	≤ 0.5%
AIRCEL	Reported	0.12	0.11	97.48	0.38	1.32	0.89	3.67	96.74	0
	Verified	0.12%	0.16%	97.48%	0.38%	1.32%	0.89%	3.67%	96.74%	0
AIRTEL	Reported	0.06	0.02	99.12	0.13	0.14	0.51	0.80	98.48	0
	Verified	0.06%	0.02%	99.15%	0.15%	0.15%	0.48%	0.80%	98.55%	0
BSNL	Reported	0.63	1.82	97.11	0.59	0.65	1.17	3.37	95.48	0
	Verified	0.63%	1.82%	97.11%	0.59%	0.64%	1.17%	3.37%	95.48%	0
IDEA	Reported	0.04	0.01	98.80	0.05	0.08	0.40	0.48	97.96	0
	Verified	0.04%	0.01%	98.80%	0.06%	0.12%	0.60%	0.48%	97.96%	0
RCOM GSM	Reported	0.15	0.17	99.58	0.02	0.04	0.19	0.00	99.05	0
	Verified	0.14%	0.18%	99.58%	0.02%	0.04%	0.20%	0.00%	99.05%	0
TATA GSM	Reported	0.04	0.08	98.54	0.04	0.34	0.69	4.11	97.14	0
	Verified	0.04%	0.08%	98.54%	0.04%	0.34%	0.69%	4.11%	97.14%	0
QTL	Reported	0.17	0.15	97.63	0.16	0.46	0.89	1.12	95.84	0
	Verified	0.17%	0.15%	97.63%	0.16%	0.46%	0.89%	1.13%	95.84%	0
VODAFONE	Reported	0.03	0.01	99.77	0.07	0.23	0.58	2.91	97.89	0
	Verified	0.03%	0.01%	99.77%	0.07%	0.23%	0.59%	2.92%	97.89%	0
RCOM CDMA	Reported	0.14	0.21	98.78	0.00	0.01	0.04	0.18	99.70	0
	Verified	0.14%	0.21%	98.78%	0.00%	0.00%	0.04%	0.19%	99.70%	0
TATA CDMA	Reported	0.16	0.17	98.51	0.00	0.03	0.53	6.97	99.03	0
	Verified	0.05%	0.17%	98.51%	0.00%	0.03%	0.53%	6.94%	99.03%	0

- The above data is averaged for three months of the quarter ending September-2015.
- The PMR data provided by the service providers is largely matching with verified (audited) data. However the variation in data has been indicated by yellow colour.
- Aircel, BSNL, Tata GSM and Tata CDMA have not met the benchmark for the parameter "Worst affected cells>3% TCH drop".

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

Name of Service Provider	Parameter	Metering and billing credibility - post paid	Metering and billing credibility - pre paid	Resolution of billing /charging complaints	Resolution of billing /charging complaints	Period of applying credit / waiver/ adjustment to customer's account from the date of resolution of complaints	Accessibility of call centre/ customer care	Percentage of calls answered by the operators (voice to voice) within 90 seconds	%age requests for Termination / Closure of service	Time taken for refund of deposits after closures
Benchmark		<= 0.1%	<= 0.1%	98% within 4 weeks	100% within 6 weeks	within 1 week of resolution of complaint	>=95%	≥ 95%	100% within <=7days	100% within 60 days
AIRCEL	Reported	0.00	0.00	100.00	100.00	100.00	94.74	95.86	100.00	100.00
	Verified	0.00%	0.00%	100.00%	100.00%	100.00%	94.74%	95.86%	100.00%	100.00%
AIRTEL	Reported	0.01	0.00	100.00	100.00	100.00	100.00	84.49	100.00	100.00
	Verified	0.01%	0.00%	100.00%	100.00%	100.00%	100.00%	84.49%	100.00%	100.00%
BSNL	Reported	0.06	0.00	100.00	100.00	100.00	100.00	82.96	100.00	100.00
	Verified	0.06%	0.01%	100.00%	100.00%	100.00%	100.00%	78.50%	100.00%	100.00%
IDEA	Reported	0.08	0.04	99.91	100.00	99.93	99.41	99.37	99.99	100.00
	Verified	0.08%	0.04%	99.91%	100.00%	100.00%	99.41%	99.37%	100.00%	100.00%
RCOM (GSM)	Reported	0.09	0.09	100.00	100.00	100.00	98.53	98.14	100.00	100.00
	Verified	0.09%	0.09%	100.00%	100.00%	100.00%	98.49%	98.14%	100.00%	100.00%
TATA (GSM)	Reported	0.00	0.00	100.00	100.00	100.00	99.20	90.48	100.00	100.00
	Verified	0.00%	0.00%	100.00%	100.00%	100.00%	99.20%	90.48%	100.00%	100.00%
QTL	Reported	0.00	0.07	100.00	100.00	100.00	100.00	96.01	100.00	100.00
	Verified	0.00%	0.00%	100.00%	100.00%	100.00%	100.00%	96.01%	100.00%	100.00%
VODAFONE	Reported	0.00	0.00	100.00	100.00	100.00	100.00	98.96	100.00	100.00
	Verified	0.21%	0.24%	100.00%	100.00%	100.00%	100.00%	98.96%	100.00%	100.00%
RCOM (CDMA)	Reported	0.08	0.09	100.00	100.00	100.00	98.57	95.22	100.00	100.00
	Verified	0.08%	0.09%	100.00%	100.00%	100.00%	98.37%	95.22%	100.00%	100.00%
TATA (CDMA)	Reported	0.00	0.00	100.00	100.00	100.00	99.25	98.73	100.00	100.00
	Verified	0.00%	0.00%	100.00%	100.00%	100.00%	99.25%	98.73%	100.00%	100.00%

- The above data is average for three months of the quarter ending September-2015.
- The PMR data provided by the service providers is largely matching with verified (audited) data. However the variation in data has been indicated by yellow colour.
- Airtel, BSNL and Tata GSM have not met the benchmark for the parameter “% call answered by operators (voice to voice) within 90 sec”.
- Aircel has not met the benchmark for the parameter “Accessibility of call centre/ customer care”.
- Vodafone has not met the benchmark for the parameters “Metering and billing credibility - Post paid” and “Metering and billing credibility - Pre paid”.