



**Audit & Assessment of Quality of Service
Of
Cellular Mobile Telephone Service
For
Telecom Regulatory Authority Of India
North Zone – Punjab Service Area
(January 2015 – March 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 20th March, 2009 and the Quality of Service of Broadband Service Regulations, 2006 (11 of 2006) dated 6th 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



2. OBJECTIVES AND METHODOLOGY

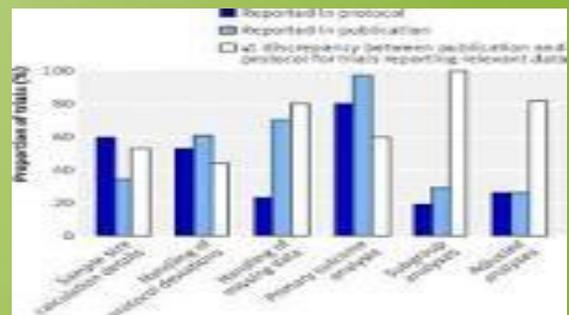
The primary objective is to audit and assess the Quality of Service being rendered by Basic, Cellular Mobile & Broadband service providers against the parameters notified by TRAI.

The audit and assessment of Quality of Service 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 Himanchal Pradesh, J&K and Maharashtra & Goa circles during the quarter January 2015 – March 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
		January-15	February-15	March-15	Address
GSM Operators					
1	AIRCEL	6 to 8 Jan-15	10 to 12 Feb-15	17 to 19 Mar-15	Dishnet Wireless Ltd Office ,Phase -7 Industrial Area, Mohali
2	AIRTEL	13 to 15 Jan-15	9 to 11 Feb-15	16 to 18 Mar-15	Bharti Airtel Campus, Plot No 21, Rajiv Gandhi Information and Technilogy Park, Chandigarh, 160101
3	TATA GSM	19 to 21 Jan-15	10 to 12 Feb-15	17 to 19 Mar-15	TTSL Office Phase-8,Industrial area Mohali
4	BSNL	12 to 14 Jan-15	4 to 6 Feb-15	18 to 20 Mar-15	BSNL Exchange Sector-49 Chandigarh
5	VIDEOCON	2, 5 & 6 Jan-15	11 to 13 Feb-15	20, 23 & 24 Mar-15	QTL Office Phase -7 Industrial Area, Mohali
6	RCOM GSM	8, 9 & 12 Jan-15	5, 6 & 9 Feb-15	18 to 20 Mar-15	Reliance Communications Ltd. Phase-8,Industrial area Mohali
7	IDEA	15, 16 & 19 Jan-15	5, 6 & 9 Feb-15	16 to 18 Mar-15	Idea Office Phase -7 Industrial Area,Mohali
8	VODAFONE	12 to 14 Jan-15	5, 6 & 9 Feb-15	13, 16 & 17 Mar-15	Vodafone Office Phase-8,Industrial area Mohali
CDMA Operators					
9	TATA CDMA	19 to 21 Jan-15	10 to 12 Feb-15	17 to 19 Mar-15	TTSL Office Phase-8,Industrial area Mohali
10	RCOM CDMA	8, 9 & 12 Jan-15	5, 6 & 9 Feb-15	18 to 20 Mar-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 March 2015.

The data generated by monthly PMR and 3-days live measurements audit for the period January 2015 to March 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 only **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 March- 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 March- 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:**

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 **3.55, 18.91%, 4.73% and 5.91%** respectively. The performance of BSNL was way beyond the benchmark.

Similar non-compliance was observed for **Aircel, BSNL, Tata (GSM) and Tata (CDMA)** during the live measurements in all three months of the Quarter ended March-2015 with their quarterly average performance as **3.73%, 19.38%, 5.47% and 5.70%** respectively,

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

(ii) With regard to the **Customer Service Quality Parameters**, it is revealed that all operators are in well compliance of the parameters on Metering and Billing Credibility, Termination of Service and Time taken for refunds. All service providers

(except Aircel) are in compliance with respect to the parameter accessibility of call center. **Aircel** failed to meet the benchmark of parameter **Accessibility of Call Center** with its achieved value as **93.11%**. Whereas, **BSNL** have not met the benchmark of '**calls answered by Operators (voice to voice) within 90 seconds**' with their performance as **68.83%**, against the benchmark of $\geq 95\%$.

3 days live measurement, revealed that all operators (**except BSNL, Tata GSM and RCOM CDMA**) 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, Tata GSM and RCOM CDMA** for parameter '**calls answered by Operators (voice to voice) within 90 seconds**' was **40.25%, 94.99% and 94.38% respectively**.

(iii) The analysis of drive tests results revealed that the performance of the services providers in general was satisfactory as they were largely meeting the benchmarks. However, parameter '**Connection with Voice Quality**' remained area of concern as the same remained underperformed for **BSNL and Tata (GSM) across Amritsar and Hoshiarpur SSAs**

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

5. PMR AUDIT REPORT



5. PMR AUDIT REPORTS:

5.1 MONTHLY PMR:

5.1.1 BUSY HOUR OF VARIOUS SERVICE PROVIDERS:

Sl. No.	Name of Service Provider	Month of Audit	Network TCBH Hour
GSM Operators			
1	AIRCEL	March -15	20:00 - 21:00
2	AIRTEL	March -15	19:00 - 20:00
3	BSNL	March -15	19:00 - 20:00
4	IDEA	March -15	20:00 - 21:00
5	RCOM GSM	March -15	19:00 - 20:00
6	TATA GSM	March -15	20:00 - 21:00
7	QUADRANT TELEVENTURES LTD	March -15	20:00 - 21:00
8	VODAFONE	March -15	19:00 - 20:00
CDMA Operators			
9	RCOM CDMA	March -15	19:00 - 20:00
10	TATA CDMA	March -15	14:00 - 15:00

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
GSM Operators						
1	AIRCEL	1	5	599	NSN	NSN
2	AIRTEL	24	55	5431	Ericsson	Ericsson
3	BSNL	12	47	3301	Ericsson & ZTE	Ericsson, ZTE & NSN
4	IDEA	9	49	4955	ZTE	ZTE & Huawei
5	RCOM GSM	3	8	1533	Huawei & Ericsson	ZTE
6	TATA GSM	2	12	1631	NSN	NSN
7	QTL	1	14	2222	Huawei & NSN	Huawei
8	VODAFONE	9	51	4864	Ericsson	Ericsson
CDMA Operators						
9	RCOM CDMA	4	3	622	Lucent, ZTE & Ericsson	Lucent & ZTE
10	TATA CDMA	3	4	405	Ericsson	Huawei & Motorola

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

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE - JAN 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
Network Service Quality Parameter													
Network Availability													
1	a) BTS Accumulated Downtime	<=2%	Jan-15	0.12%	0.03%	0.46%	0.12%	0.14%	0.04%	0.10%	0.02%	0.16%	0.05%
	b) Worst affected BTSs due to downtime	<=2%	Jan-15	0.17%	0.00%	1.82%	0.58%	0.13%	0.06%	0.14%	0.00%	0.16%	0.23%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Jan-15	98.04%	99.47%	96.67%	98.95%	99.67%	98.94%	98.65%	99.85%	98.57%	98.94%
	b) SDCCH/PAGING Channel congestion	<=1%	Jan-15	0.06%	0.05%	0.58%	0.06%	0.01%	0.02%	0.03%	0.01%	0.00%	0.00%
	c) TCH congestion	<=2%	Jan-15	0.58%	0.08%	1.52%	0.16%	0.02%	0.17%	0.27%	0.15%	0.00%	0.11%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Jan-15	0.69%	0.36%	1.56%	0.44%	0.29%	0.66%	0.93%	0.58%	0.02%	0.53%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Jan-15	3.60%	0.65%	17.01%	0.30%	0.04%	6.31%	1.09%	1.81%	0.10%	6.21%
	c) Connections with good voice quality	>=95%	Jan-15	96.72%	98.78%	95.68%	97.92%	98.95%	97.42%	97.30%	98.21%	99.72%	99.03%
4	No. of POI's having >=0.5% POI congestion		Jan-15	0	0	2	0	0	0	0	0	0	0

5.1.4 QOS PERFORMANCE OF MONTHLY PMR FEBRUARY 15 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE - FEB 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
Network Service Quality Parameter													
Network Availability													
1	a) BTS Accumulated Downtime	<=2%	Feb-15	0.16%	0.04%	0.48%	0.05%	0.21%	0.04%	0.08%	0.02%	0.18%	0.03%
	b) Worst affected BTSs due to downtime	<=2%	Feb-15	0.17%	0.04%	1.70%	0.10%	0.33%	0.00%	0.05%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Feb-15	98.04%	99.42%	96.75%	98.98%	99.64%	98.93%	98.34%	99.84%	98.62%	98.59%
	b) SDCCH/PAGING Channel congestion	<=1%	Feb-15	0.04%	0.08%	0.85%	0.05%	0.01%	0.02%	0.08%	0.03%	0.00%	0.00%
	c) TCH congestion	<=2%	Feb-15	0.40%	0.07%	1.51%	0.17%	0.03%	0.20%	0.42%	0.16%	0.01%	0.11%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Feb-15	0.65%	0.35%	1.77%	0.44%	0.30%	0.59%	1.02%	0.56%	0.02%	0.48%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Feb-15	3.53%	0.62%	18.04%	0.42%	0.04%	3.85%	1.34%	1.82%	0.09%	6.06%
	c) Connections with good voice quality	>=95%	Feb-15	96.93%	98.78%	95.51%	98.12%	98.92%	97.38%	96.91%	98.16%	99.72%	99.02%
4	No. of POI's having >=0.5% POI congestion		Feb-15	0	0	2	0	0	0	0	0	0	0

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

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE - MAR 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
Network Service Quality Parameter													
Network Availability													
1	a) BTS Accumulated Downtime	<=2%	Mar-15	0.12%	0.04%	0.65%	0.06%	0.17%	0.04%	0.10%	0.02%	0.18%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	Mar-15	0.33%	0.02%	1.97%	0.12%	0.26%	0.00%	0.32%	0.00%	0.16%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Mar-15	97.78%	99.33%	96.55%	98.79%	99.65%	98.69%	98.39%	99.83%	98.76%	98.72%
	b) SDCCH/PAGING Channel congestion	<=1%	Mar-15	0.10%	0.19%	0.98%	0.10%	0.02%	0.04%	0.05%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Mar-15	1.15%	0.07%	1.48%	0.23%	0.03%	0.33%	0.39%	0.17%	0.00%	0.10%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Mar-15	0.72%	0.34%	1.87%	0.53%	0.26%	0.71%	0.91%	0.58%	0.02%	0.43%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Mar-15	3.52%	0.62%	21.69%	0.46%	0.03%	4.02%	1.04%	2.06%	0.16%	5.45%
	c) Connections with good voice quality	>=95%	Mar-15	96.90%	98.73%	95.43%	97.99%	98.92%	97.22%	96.77%	98.05%	99.72%	99.04%
4	No. of POI's having >=0.5% POI congestion		Mar-15	0	0	2	0	0	0	0	0	0	0

5.1.6 QOS PERFORMANCE OF QUARTERLY PMR –AVERAGE OF QE- MARCH 15 (JANUARY – FEBRUARY – MARCH MONTHS AUDITED DATA)

QUARTERLY QOS PERFORMANCE (AVERAGE OF QE – MARCH 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
Network Service Quality Parameter													
Network Availability													
1	a) BTS Accumulated Downtime	<=2%	Quarterly	0.13%	0.04%	0.53%	0.08%	0.17%	0.04%	0.09%	0.02%	0.17%	0.03%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.22%	0.02%	1.83%	0.27%	0.24%	0.02%	0.17%	0.00%	0.11%	0.08%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	97.95%	99.41%	96.66%	98.91%	99.65%	98.85%	98.46%	99.84%	98.65%	98.75%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.07%	0.11%	0.80%	0.07%	0.01%	0.03%	0.05%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	0.71%	0.07%	1.50%	0.19%	0.03%	0.23%	0.36%	0.16%	0.00%	0.11%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	0.69%	0.35%	1.73%	0.47%	0.28%	0.65%	0.95%	0.57%	0.02%	0.48%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	3.55%	0.63%	18.91%	0.39%	0.04%	4.73%	1.16%	1.90%	0.12%	5.91%
	c) Connections with good voice quality	>=95%	Quarterly	96.85%	98.76%	95.54%	98.01%	98.93%	97.34%	96.99%	98.14%	99.72%	99.03%
4	No. of POI's having >=0.5% POI congestion		Quarterly	0	0	2	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 (0.02 %) 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 **3.55%, 18.91%, 4.73% and 5.91%** respectively. **The performance of BSNL was way beyond the benchmark.**

- iii. Connections with good voice quality:

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

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

The audit with respect to this parameter revealed that only **BSNL** was having congestion $> 0.5\%$ on **two POIs**.

**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) – JANUARY 15 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE - JANUARY 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			
Network Service Quality Parameter													
Network Availability													
1	a) BTS Accumulated Downtime	<=2%	Live data	0.04%	0.02%	0.71%	0.67%	0.07%	0.06%	0.07%	0.06%	0.14%	0.13%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.24%	0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.35%	99.46%	96.68%	99.03%	99.67%	98.84%	98.77%	99.85%	98.68%	98.98%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.08%	0.06%	0.24%	0.04%	0.01%	0.03%	0.02%	0.01%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.08%	0.08%	1.37%	0.13%	0.02%	0.27%	0.28%	0.15%	0.00%	0.01%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.60%	0.33%	1.55%	0.44%	0.27%	0.68%	0.85%	0.57%	0.02%	0.53%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	3.54%	0.64%	16.89%	0.34%	0.00%	8.27%	0.98%	1.82%	0.07%	6.05%
	c) Connections with good voice quality	>=95%	Live data	97.05%	98.84%	95.63%	97.93%	98.96%	97.45%	97.48%	98.24%	99.72%	99.04%
4	No. of POI having >=0.5% congestion		Live data	0	0	2	0	0	0	0	0	0	0

5.2.2 LIVE MEASUREMENT DATA (3-DAYS) – FEBRUARY 15 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE – FEBRUARY 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	
Network Service Quality Parameter													
Network Availability													
1	a) BTS Accumulated Downtime	<=2%	Live data	0.07%	0.00%	0.35%	0.03%	0.15%	0.04%	0.02%	0.01%	0.09%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.21%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.07%	99.48%	96.88%	99.08%	99.64%	98.99%	98.44%	99.87%	98.72%	98.51%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.04%	0.05%	0.59%	0.03%	0.01%	0.01%	0.14%	0.08%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.26%	0.06%	1.47%	0.12%	0.03%	0.17%	0.33%	0.13%	0.00%	0.13%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.71%	0.35%	1.67%	0.41%	0.31%	0.59%	1.06%	0.55%	0.01%	0.53%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	4.47%	0.64%	19.25%	0.33%	0.00%	3.93%	1.56%	1.81%	0.02%	5.55%
	c) Connections with good voice quality	>=95%	Live data	96.89%	98.78%	95.58%	98.11%	98.91%	97.33%	96.86%	98.18%	99.72%	98.99%
4	No. of POI having >=0.5% congestion		Live data	0	0	2	0	0	0	0	0	0	0

5.2.3 LIVE MEASUREMENT DATA (3-DAYS) – MARCH 15 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE – MARCH 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	
Network Service Quality Parameter													
Network Availability													
1	a) BTS Accumulated Downtime	<=2%	Live data	0.07%	0.02%	0.39%	0.24%	0.17%	0.03%	0.02%	0.03%	0.18%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.21%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	97.90%	99.54%	96.84%	98.87%	99.65%	98.72%	98.22%	99.82%	98.78%	98.99%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.07%	0.06%	0.74%	0.09%	0.01%	0.02%	0.04%	0.01%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.84%	0.04%	1.48%	0.21%	0.03%	0.28%	0.35%	0.18%	0.00%	0.03%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.65%	0.31%	1.88%	0.51%	0.24%	0.74%	0.95%	0.60%	0.03%	0.42%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	3.17%	0.59%	21.99%	0.46%	0.01%	4.21%	1.20%	2.09%	0.27%	5.50%
	c) Connections with good voice quality	>=95%	Live data	97.04%	98.77%	95.41%	98.11%	98.90%	97.27%	96.62%	98.06%	99.72%	99.04%
4	No. of POI having >=0.5% congestion		Live data	0	0	2	0	0	0	0	0	0	0

5.2.4 QUARTERLY QOS PERFORMANCE OF 3-DAYS LIVE MEASUREMENT AUDITED DATA (AVERAGE OF JANUARY – FEBRUARY – MARCH 2015 MONTHS AUDITED DATA)

QUARTERLY QOS PERFORMANCE OF 3-DAYS LIVE MEASUREMENT (AVERAGE OF QE- MARCH 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
Network Service Quality Parameter													
Network Availability													
1	a) BTS Accumulated Downtime	<=2%	Quarterly	0.06%	0.01%	0.48%	0.31%	0.13%	0.04%	0.04%	0.03%	0.14%	0.05%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.00%	0.00%	0.22%	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	98.11%	99.49%	96.80%	98.99%	99.65%	98.85%	98.48%	99.85%	98.73%	98.83%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.06%	0.06%	0.52%	0.05%	0.01%	0.02%	0.07%	0.03%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	0.39%	0.06%	1.44%	0.15%	0.03%	0.24%	0.32%	0.15%	0.00%	0.06%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	0.65%	0.33%	1.70%	0.45%	0.27%	0.67%	0.95%	0.57%	0.02%	0.49%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	3.73%	0.62%	19.38%	0.38%	0.00%	5.47%	1.25%	1.91%	0.12%	5.70%
	c) Connections with good voice quality	>=95%	Quarterly	96.99%	98.80%	95.54%	98.05%	98.92%	97.35%	96.99%	98.16%	99.72%	99.02%
4	No. of POI having >=0.5% congestion		Quarterly	0	0	2	0	0	0	0	0	0	0

5.2.5 KEY FINDING ON 3 DAYS LIVE MEASUREMENTS:

From three days live measurement assessment, it was found that the performance of all operators was satisfactory as they were largely meeting the benchmarks except for the parameter ‘**Worst affected cells> 3 % TCH drops**’. The benchmark for this parameter was not met by **Aircel, BSNL, Tata (GSM) and Tata (CDMA)** during the live measurements in all three months of the Quarter ended March-2015. The quarterly average performance of **Aircel, BSNL, Tata (GSM) and Tata (CDMA)** was **3.73%, 19.38%, 5.47% and 5.70%** respectively, during the live measurements in three months of the quarter. *The similar non-compliance of **Aircel, BSNL, Tata (GSM) and Tata (CDMA)** has been observed in monthly audit.*

*From the above analysis, it is concluded that the performance of **Aircel, BSNL, Tata (GSM) and Tata (CDMA)** is not satisfactory in respect of the parameter “**Worst affected cells> 3 % TCH drops**”. 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 - January 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	
Network Service Quality Parameter													
1	Network Availability												
	a) Total no. of BTSs in the licensed service area		Jan-15	599	5314	3290	4860	1536	1641	2187	4864	624	438
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Jan-15	527.85	1319.77	11272.12	4368.76	1547.72	486.74	1642.90	639.59	739.72	149.72
	c) BTS Accumulated Downtime	<=2%	Jan-15	0.12%	0.03%	0.46%	0.12%	0.14%	0.04%	0.10%	0.02%	0.16%	0.05%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Jan-15	1	0	60	28	2	1	3	0	1	1
	e) Worst affected BTSs due to downtime	<=2%	Jan-15	0.17%	0.00%	1.82%	0.58%	0.13%	0.06%	0.14%	0.00%	0.16%	0.23%
2	Connection Establishment (Accessibility)												
	a) CSSR (Call Setup Success Rate)	>=95%	Jan-15	98.04%	99.47%	96.67%	98.95%	99.67%	98.94%	98.65%	99.85%	98.57%	98.94%
	b) SDCCH/PAGING Congestion	<=1%	Jan-15	0.06%	0.05%	0.58%	0.06%	0.01%	0.02%	0.03%	0.01%	0.00%	0.00%
	c) TCH congestion	<=2%	Jan-15	0.58%	0.08%	1.52%	0.16%	0.02%	0.17%	0.27%	0.15%	0.00%	0.11%
3	Connection Maintenance (Retainability)												
	a) Call Drop Rate (CDR)	<=2%	Jan-15	0.69%	0.36%	1.56%	0.44%	0.29%	0.66%	0.93%	0.58%	0.02%	0.53%
	b) Worst affected cells>3% TCH drop	<=3%	Jan-15	3.60%	0.65%	17.01%	0.30%	0.04%	6.31%	1.09%	1.81%	0.10%	6.21%
	c) % of connections with good voice quality	>=95%	Jan-15	96.72%	98.78%	95.68%	97.92%	98.95%	97.42%	97.30%	98.21%	99.72%	99.03%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Jan-15	65	103	1679	44	2	315	75	269	2	86
	e) Total no. of cells (Sector) in the licensed service area		Jan-15	1795	15917	9870	14425	4567	4992	6860	14864	1872	1393
4	No. of POI's having >=0.5% POI congestion												

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	No. of POI's having >=0.5% POI congestion	Jan-15	0	0	2	0	0	0	0	0	0	0	
	Name of POI not meeting the benchmark	Jan-15	0	0	JALGMSS1 HFCLGS, 1151(HF_GSM_9645)	0	0	0	0	0	0	0	
Network Data													
5	a) Equipped Capacity of Network in Erlang	Jan-15	22869	246749	282000	216329	72000	107249	98133	163782	53000	81508	
	b) Total traffic in TCBH in erlang (Avg.)	Jan-15	10280	221250	61314	149686	53583	34206	43799	121611	11966	11689	
	c) Total no. of customers served (as per VLR) on last day of the month	Jan-15	470923	7118156	2370457	6265031	2336095	1306456	1462615	4492880	265481	145478	

TABLE: 2

Detailed Network Data Assessment of Cellular Mobile Telephone Services -3 days live - Punjab Circle – Jan 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	
Network Service Quality Parameter													
Network Availability													
1	a) Total no. of BTSs in the licensed service area		Live data	599	5297	3276	4785	1536	1635	2160	4826	624	438
	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	18.13	62.97	1682.97	2322.34	78.52	73.77	114.97	197.18	63.05	41.45
	c) BTS Accumulated Downtime	<=2%	Live data	0.04%	0.02%	0.71%	0.67%	0.07%	0.06%	0.07%	0.06%	0.14%	0.13%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	8	3	0	0	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.24%	0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.35%	99.46%	96.68%	99.03%	99.67%	98.84%	98.77%	99.85%	98.68%	98.98%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.08%	0.06%	0.24%	0.04%	0.01%	0.03%	0.02%	0.01%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.08%	0.08%	1.37%	0.13%	0.02%	0.27%	0.28%	0.15%	0.00%	0.01%
Connection Maintenance (Retainability)													
3	a) Call Drop Rate (CDR)	<=2%	Live data	0.60%	0.33%	1.55%	0.44%	0.27%	0.68%	0.85%	0.57%	0.02%	0.53%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	3.54%	0.64%	16.89%	0.34%	0.00%	8.27%	0.98%	1.82%	0.07%	6.05%
	c) % of connections with good voice quality	>=95%	Live data	97.05%	98.84%	95.63%	97.93%	98.96%	97.45%	97.48%	98.24%	99.72%	99.04%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	64	103	1660	49	0	413	67	271	1	84
	e) Total no. of cells (Sector) in the licensed service area		Live data	1797	16026	9828	14398	4566	4987	6846	14854	1871	1393
No. of POI's having >=0.5% POI congestion													
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	2	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	JALGMSS1 HFCLGS, 1151(HF_GSM_9645)	0	0	0	0	0	0	0

TABLE: 3

Detailed Network Data Assessment of Cellular Mobile Telephone Services - Punjab Circle - February 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	
Network Service Quality Parameter													
1	Network Availability												
	a) Total no. of BTSs in the licensed service area		Feb-15	599	5365	3299	4892	1536	1636	2203	4864	624	438
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Feb-15	644.72	1553.97	10666.62	1626.30	2124.37	480.64	1176.58	626.92	772.73	87.02
	c) BTS Accumulated Downtime	<=2%	Feb-15	0.16%	0.04%	0.48%	0.05%	0.21%	0.04%	0.08%	0.02%	0.18%	0.03%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Feb-15	1	2	56	5	5	0	1	0	0	0
e) Worst affected BTSs due to downtime	<=2%	Feb-15	0.17%	0.04%	1.70%	0.10%	0.33%	0.00%	0.05%	0.00%	0.00%	0.00%	
2	Connection Establishment (Accessibility)												
	a) CSSR (Call Setup Success Rate)	>=95%	Feb-15	98.04%	99.42%	96.75%	98.98%	99.64%	98.93%	98.34%	99.84%	98.62%	98.59%
	b) SDCCH/PAGING Congestion	<=1%	Feb-15	0.04%	0.08%	0.85%	0.05%	0.01%	0.02%	0.08%	0.03%	0.00%	0.00%
c) TCH congestion	<=2%	Feb-15	0.40%	0.07%	1.51%	0.17%	0.03%	0.20%	0.42%	0.16%	0.01%	0.11%	
3	Connection Maintenance (Retainability)												
	a) Call Drop Rate (CDR)	<=2%	Feb-15	0.65%	0.35%	1.77%	0.44%	0.30%	0.59%	1.02%	0.56%	0.02%	0.48%
	b) Worst affected cells>3% TCH drop	<=3%	Feb-15	3.53%	0.62%	18.04%	0.42%	0.04%	3.85%	1.34%	1.82%	0.09%	6.06%
	c) % of connections with good voice quality	>=95%	Feb-15	96.93%	98.78%	95.51%	98.12%	98.92%	97.38%	96.91%	98.16%	99.72%	99.02%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Feb-15	63	100	1786	62	2	192	93	273	2	84
e) Total no. of cells (Sector) in the licensed service area		Feb-15	1797	16127	9897	14691	4566	4980	6948	14972	1871	1393	
4	No. of POI's having >=0.5% POI congestion												
	No. of POI's having >=0.5% POI congestion		Feb-15	0	0	2	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Feb-15	0	0	JALGMSS1 HFCLGS, 1151(HF_GSM_9645)	0	0	0	0	0	0	0

Network Data													
5	a) Equipped Capacity of Network in Erlang		Feb-15	22797	257649	282000	216823	72000	107114	99337	167271	53000	81508
	b) Total traffic in TCBH in erlang (Avg.)		Feb-15	11052	235344	59944	156572	57055	36193	48819	127891	12473	11178
	c) Total no. of customers served (as per VLR) on last day of the month		Feb-15	485034	7373263	2372663	6367055	2379814	1330371	1496810	4510782	266503	142350

TABLE: 4

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live- Punjab Circle- Feb 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	
Network Service Quality Parameter													
Network Availability													
1	a) Total no. of BTSs in the licensed service area		Live data	599	5352	3290	4869	1536	1634	2191	4826	624	438
	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	30.69	18.69	820.73	103.73	163.97	42.60	29.00	47.77	39.72	6.76
	c) BTS Accumulated Downtime	<=2%	Live data	0.07%	0.00%	0.35%	0.03%	0.15%	0.04%	0.02%	0.01%	0.09%	0.02%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	7	0	0	0	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.21%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.07%	99.48%	96.88%	99.08%	99.64%	98.99%	98.44%	99.87%	98.72%	98.51%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.04%	0.05%	0.59%	0.03%	0.01%	0.01%	0.14%	0.08%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.26%	0.06%	1.47%	0.12%	0.03%	0.17%	0.33%	0.13%	0.00%	0.13%
Connection Maintenance (Retainability)													
3	a) Call Drop Rate (CDR)	<=2%	Live data	0.71%	0.35%	1.67%	0.41%	0.31%	0.59%	1.06%	0.55%	0.01%	0.53%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	4.47%	0.64%	19.25%	0.33%	0.00%	3.93%	1.56%	1.81%	0.02%	5.55%
	c) % of connections with good voice quality	>=95%	Live data	96.89%	98.78%	95.58%	98.11%	98.91%	97.33%	96.86%	98.18%	99.72%	98.99%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	80	104	1900	49	0	196	109	272	0	77
	e) Total no. of cells (Sector) in the licensed service area		Live data	1797	16211	9870	14660	4566	4984	6944	14972	1871	1393
4	No. of POI's having >=0.5% POI congestion												

No. of POI's having >=0.5% POI congestion	Live data	0	0	2	0	0	0	0	0	0	0	0
Name of POI not meeting the benchmark	Live data	0	0	JALGMSS1 HFCLGS, 1151(HF_GSM_9645)	0	0	0	0	0	0	0	0

TABLE: 5

Detailed Network Data Assessment of Cellular Mobile Telephone Services - Punjab Circle - March 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	
Network Service Quality Parameter													
Network Availability													
1	a) Total no. of BTSs in the licensed service area		Mar-15	599	5431	3301	4955	1533	1631	2222	4864	622	405
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Mar-15	535.57	1758.85	16079.50	2173.98	1978.25	464.38	1702.02	824.41	819.52	22.95
	c) BTS Accumulated Downtime	<=2%	Mar-15	0.12%	0.04%	0.65%	0.06%	0.17%	0.04%	0.10%	0.02%	0.18%	0.01%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Mar-15	2	1	65	6	4	0	7	0	1	0
	e) Worst affected BTSs due to downtime	<=2%	Mar-15	0.33%	0.02%	1.97%	0.12%	0.26%	0.00%	0.32%	0.00%	0.16%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Mar-15	97.78%	99.33%	96.55%	98.79%	99.65%	98.69%	98.39%	99.83%	98.76%	98.72%
	b) SDCCH/PAGING Congestion	<=1%	Mar-15	0.10%	0.19%	0.98%	0.10%	0.02%	0.04%	0.05%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Mar-15	1.15%	0.07%	1.48%	0.23%	0.03%	0.33%	0.39%	0.17%	0.00%	0.10%
Connection Maintenance (Retainability)													
3	a) Call Drop Rate (CDR)	<=2%	Mar-15	0.72%	0.34%	1.87%	0.53%	0.26%	0.71%	0.91%	0.58%	0.02%	0.43%
	b) Worst affected cells>3% TCH drop	<=3%	Mar-15	3.52%	0.62%	21.69%	0.46%	0.03%	4.02%	1.04%	2.06%	0.16%	5.45%
	c) % of connections with good voice quality	>=95%	Mar-15	96.90%	98.73%	95.43%	97.99%	98.92%	97.22%	96.77%	98.05%	99.72%	99.04%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Mar-15	63	101	2148	68	1	200	73	308	3	71
	e) Total no. of cells (Sector) in the licensed service area		Mar-15	1797	16331	9903	14799	4565	4977	7012	14972	1870	1305
No. of POI's having >=0.5% POI congestion													
4	No. of POI's having >=0.5% POI congestion		Mar-15	0	0	2	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Mar-15	0	0	JALGMSS1 HFCLGS, 1151(HF_GSM_9645)	0	0	0	0	0	0	0

Network Data													
5	a) Equipped Capacity of Network in Erlang		Mar-15	22778	265171	282000	218521	72000	107539	100557	168380	53000	76358
	b) Total traffic in TCBH in erlang (Avg.)		Mar-15	11939	228181	64471	156649	60177	36426	47932	126114	10571	12129
	c) Total no. of customers served (as per VLR) on last day of the month		Mar-15	503420	7359609	2365654	6402227	2046338	1325219	1539601	4539158	227301	137187

TABLE: 6

Detailed Network Data Assessment of Cellular Mobile Telephone Services -3 days live - Punjab Circle – March 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													
1	Network Availability												
	a) Total no. of BTSs in the licensed service area		Live data	599	5407	3299	4904	1536	1631	2213	4864	624	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	32.20	59.43	922.20	830.34	192.80	32.55	36.00	98.99	81.40	0.00
	c) BTS Accumulated Downtime	<=2%	Live data	0.07%	0.02%	0.39%	0.24%	0.17%	0.03%	0.02%	0.03%	0.18%	0.00%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	7	0	0	0	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.21%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2	Connection Establishment (Accessibility)												
	a) CSSR (Call Setup Success Rate)	>=95%	Live data	97.90%	99.54%	96.84%	98.87%	99.65%	98.72%	98.22%	99.82%	98.78%	98.99%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.07%	0.06%	0.74%	0.09%	0.01%	0.02%	0.04%	0.01%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.84%	0.04%	1.48%	0.21%	0.03%	0.28%	0.35%	0.18%	0.00%	0.03%
3	Connection Maintenance (Retainability)												
	a) Call Drop Rate (CDR)	<=2%	Live data	0.65%	0.31%	1.88%	0.51%	0.24%	0.74%	0.95%	0.60%	0.03%	0.42%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	3.17%	0.59%	21.99%	0.46%	0.01%	4.21%	1.20%	2.09%	0.27%	5.50%
	c) % of connections with good voice quality	>=95%	Live data	97.04%	98.77%	95.41%	98.11%	98.90%	97.27%	96.62%	98.06%	99.72%	99.04%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	57	96	2176	69	0	210	84	313	5	71
	e) Total no. of cells (Sector) in the licensed service area		Live data	1797	16404	9897	14769	4566	4977	7020	14972	1871	1291

4	No. of POI's having >=0.5% POI congestion												
	No. of POI's having >=0.5% POI congestion	Live data	0	0	2	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark	Live data	0	0	JALGMSS1 HFCLGS, 1151(HF_GSM_9645)	0	0	0	0	0	0	0	0

CUSTOMER SERVICE QUALITY (CSD) PARAMETERS



5.3 CUSTOMER SERVICE QUALITY PARAMETERS MEASUREMENT FOR CMTS-QE MAR- 15:

5.3.1 QUARTERLY CUSTOMER SERVICE DELIVERY (CSD) AUDITED DATA FOR CELLULAR MOBILE SERVICES (JANUARY – FEBRUARY- MARCH 2015 MONTHS AUDITED DATA):

QUARTERLY CSD DATA FOR CELLULAR MOBILE TELEPHONE SERVICES - QE MARCH 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	
Customer Service Quality Parameters													
Metering & Billing Credibility -Post Paid													
1	A) No. of bills issued during the quarter		Punjab	30667	1390371	103791	2127501	135012	224460	60737	1318600	140521	78480
	B) No. of bills disputed including billing complaints during the quarter		Punjab	1	484	50	1052	108	4	0	409	100	0
	C) % of billing complaints during the quarter	<= 0.1%	Punjab	0.003%	0.03%	0.05%	0.05%	0.08%	0.002%	0.00%	0.03%	0.07%	0.00%
Metering & Billing Credibility -Pre Paid													
2	A) Total No. of Pre-paid customers at the end of the quarter		Punjab	984708	7023260	2971752	5492329	2006529	2402698	2705753	4496914	182311	283658
	B) Total No. of complaints relating to charging, Credit and Validity during the quarter		Punjab	3	109	424	2095	1987	2	20	740	123	0
	C) % of Pre-paid Charging Complaints	<= 0.1%	Punjab	0.00%	0.002%	0.01%	0.04%	0.10%	0.00%	0.001%	0.02%	0.07%	0.00%
Resolution of Billing/Charging Complaints and Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints													
	A) No. of Billing/Charging/Credit/Validity Complaints received during the quarter		Punjab	4	595	474	10845	2095	3002	20	1149	223	261
	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	4	595	474	10845	2095	3002	20	1149	223	261
3	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	4	595	474	10845	2095	3002	20	1149	223	261
	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%	100.00%	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%

QUARTERLY CSD DATA FOR CELLULAR MOBILE TELEPHONE SERVICES - QE MARCH 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%
Response time to customers for assistance													
	A) Total no of calls attempted to customer care/Call center		Punjab	3199453	2122556	155978	15032601	5413364	604765	602164	10534971	365228	43873
	B) Total no. of calls successfully established to customer care/Call center.		Punjab	2979072	2122110	155978	15021270	5353033	600710	602164	10534971	360875	43665
4	C) % Accessibility of Call centre /customer Care (Total calls successfully established *100/ Total call attempts)	>=95%	Punjab	93.11%	99.98%	100.00%	99.92%	98.89%	99.33%	100.00%	100.00%	98.81%	99.53%
	D) Total Calls reached to operator for Voice to Voice (Total call attempts)		Punjab	409570	3609947	811593	3308553	591394	1049720	1619728	3111513	44436	48037
	E) Total number of calls answered by the operator (Voice to voice) within 90 seconds		Punjab	392143	3446279	558621	3292290	562241	1008920	1559868	3099345	42423	47579
	F) % age of calls answered by operator (voice to voice) (Total calls successfully established within 90 Sec.*100 / Total call attempts)	>=95%	Punjab	95.75%	95.47%	68.83%	99.51%	95.07%	96.11%	96.30%	99.61%	95.47%	99.05%
Termination/closure of service													
5	A) Total No. of requests for Termination / Closure of service received during the quarter		Punjab	277	3674	646	27354	1300	4858	2206	4905	630	1725
	B) No. of requests for Termination / Closure of service complied within 7 days during the quarter		Punjab	277	3674	646	27354	1300	4858	2206	4905	630	1725
	C) % of Termination/ Closure of service within 7 days	<=7days	Punjab	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Time taken for refunds of deposits after closures.													
6	A) No. of Payments/ Refunds due during the quarter		Punjab	113	754	1375	6629	1172	642	367	714	684	430
	B) No. of Payments/ Refunds Cleared during the quarter		Punjab	113	754	1375	6629	1172	642	367	714	684	430
	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%

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

CSD 3 DAYS LIVE DATA FOR CELLULAR MOBILE TELEPHONE SERVICES - QE- MARCH 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									
RESPONSE TIME TO CUSTOMERS FOR ASSISTANCE													
1	A) Total no of calls attempted to customer care/Call center		Punjab	104580	106969	4784	488715	159759	18859	18383	341015	12612	1467
	B) Total no. of calls successfully established to customer care/Call center.		Punjab	102754	106969	4784	488415	157563	18717	18383	341015	12429	1464
	C) % Accessibility of Call centre /customer Care (Total calls successfully established *100/ Total call attempts)	>=95%	Punjab	98.25%	100.00%	100.00%	99.94%	98.63%	99.25%	100.00%	100.00%	98.55%	99.80%
	D) Total Calls reached to operator for Voice to Voice (Total call attempts)		Punjab	12032	113377	31258	105948	17163	34829	52659	102762	1442	1546
	E) Total number of calls answered by the operator (Voice to voice) within 90 seconds		Punjab	11890	111958	12581	103929	16452	33086	50522	101872	1361	1544
	F) % age of calls answered by operator (voice to voice) (Total calls successfully established within 90 Sec.*100 / Total call attempts)	>=95%	Punjab	98.82%	98.75%	40.25%	98.09%	95.86%	94.996%	95.94%	99.13%	94.38%	99.87%

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 **within the prescribed bench mark of $\leq 0.1\%$** .

2. Resolution of Billing complaints and applying credits -

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

All operators were found meeting the benchmarks of the above parameters

3. Response Time to the Customer for assistance

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

All service providers (except **Aircel**) are in compliance with respect to the parameter accessibility of call center. **Aircel** failed to meet the benchmark with its achieved value as **93.11%**. Whereas, **BSNL** have not met the benchmark of 'calls answered by Operators (voice to voice) within **90 seconds**' with their performance as **68.83%**, against the benchmark of $\geq 95\%$.

4. Termination/Closure of Service

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

5. Time Taken for Refund of deposits after closures

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

Live Measurements:

The results of live measurements revealed that all operators (except **BSNL, Tata GSM and RCOM CDMA**) 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, Tata GSM and RCOM CDMA** for parameter 'calls answered by Operators (voice to voice) within 90 seconds' was **40.25%, 94.99% and 94.38%** 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)	TATA (GSM)	QTL	VODAFONE	RCOM (CDMA)	TATA (CDMA)
AIRCEL	Punjab	--	100%	100%	100%	100%	100%	100%	100%	100%	100%
AIRTEL	Punjab	100%	--	100%	100%	100%	100%	100%	100%	100%	100%
BSNL	Punjab	100%	100%	--	100%	100%	100%	100%	100%	100%	100%
IDEA	Punjab	100%	100%	100%	--	100%	100%	100%	100%	100%	100%
RCOM (GSM)	Punjab	100%	100%	100%	100%	--	100%	100%	100%	100%	100%
TATA (GSM)	Punjab	100%	100%	100%	100%	100%	--	100%	100%	100%	100%
QTL	Punjab	100%	100%	100%	100%	100%	100%	--	100%	100%	100%
VODAFONE	Punjab	100%	100%	100%	100%	100%	100%	100%	--	100%	100%
RCOM (CDMA)	Punjab	100%	100%	100%	100%	100%	100%	100%	100%	--	100%
TATA (CDMA)	Punjab	100%	100%	100%	100%	100%	100%	100%	100%	100%	--

The result of the testing revealed that the inter connection performance among the operators was quite satisfactory as 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	92	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%	92.00%	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	92	100	100	100	100	100	100	100	100
Total number of calls answered by the operator (Voice to voice) within 90 seconds	Punjab	96	86	96	100	98	100	96	100	98	100
% age of calls answered by operator(voice to voice) (Total call successfully established within 90 Sec.*100 / Total call attempt)	Punjab	96.00%	93.48%	96.00%	100.00%	98.00%	100.00%	96.00%	100.00%	98.00%	100.00%

In case of live calling with respect to the parameter Accessibility of Call Center, Airtel could connect 92% of call to the call center. However, in case of calls answered by operators (voice to voice) within 90 seconds when test calls were made to the call centers, Aircel, Airtel, BSNL, RCOM (GSM), QTL and RCOM CDMA could achieve their performance as 96%, 93.48%, 96%, 98%, 96% and 98% respectively.

6.3 LIVE CALLING ASSESSMENT FOR BILLING COMPLAINTS:

TELEPHONIC INTERVIEW FOR BILLING COMPLAINTS											
Parameter	Circle Name	AIRCEL	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	QTL	VODAFONE	RCOM (CDMA)	TATA (CDMA)
Total No. of calls Attempted	Punjab	4	126	174	145	129	112	20	149	123	161
Total No. of calls Answered	Punjab	4	100	100	100	100	100	20	100	100	100
Resolution of billing Complaints	Punjab	4	100	100	100	100	100	20	100	100	100
% 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															
Emergency no.	Circle Name	SSA Name	SDCA Name	No. of calls made	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	RCOM CDMA	TATA GSM	TATA CDMA	VIDEOCON	VODAFONE	
100,101,102/108	Punjab	Amritsar	AJNALA	9	√	√	√	√	√	√	√	√	√	√	
			AMRITSAR	9	√	√	√	√	√	√	√	√	√	√	
			GOINDWAL	9	√	√	√	√	√	√	√	√	√	√	√
			PATTI	9	√	√	√	√	√	√	√	√	√	√	√
			TARAN TARAN	9	√	√	√	√	√	√	√	√	√	√	√
			RAYYA	9	√	√	√	√	√	√	√	√	√	√	√
100,101,102/108	Punjab	Bathinda	BATHINDA	9	√	√	√	√	√	√	√	√	√	√	
			RAMAN	9	√	√	√	√	√	√	√	√	√	√	
			SARDULGARH	9	√	√	√	√	√	√	√	√	√	√	
			MANSA	9	√	√	√	√	√	√	√	√	√	√	
			PHULMANDI	9	√	√	√	√	√	√	√	√	√	√	
100,101,102/108	Punjab	Hoshiarpur	HOSHIARPUR	9	√	√	√	√	√	√	√	√	√	√	
			BALACHAUR	9	√	√	√	√	√	√	√	√	√	√	
			GARHASHANKER	9	√	√	√	√	√	√	√	√	√	√	
			TANDA URMAR	9	√	√	√	√	√	√	√	√	√	√	
			DASUA	9	√	√	√	√	√	√	√	√	√	√	

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 21st 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 **Amritsar, Bhatinda and Hoshiarpur** in the months of January, February and March 2015 respectively. The total route Kms covered during the drive tests in the respective SSAs was **552Kms, 580Kms, and 420Kms**. 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 ≥ -75 dBm for in-door coverage and ≥ -85 dBm for in-vehicle.

DRIVE TEST TABLE – 1

OPERATOR ASSISTED DRIVE TEST AT AMRITSAR SSA IN JANUARY 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																			
1	Call Attempts	Major Road	241	25	242	25	262	25	230	27	193	25	256	28	240	26	221	24	217	26	249	25	
		Highway	114	25	106	25	121	28	103	28	122	25	117	27	86	25	89	27	89	26	61	27	
		Within City	193	25	190	25	187	29	187	28	227	25	190	27	216	25	185	25	184	25	182	28	
		Overall SSA	548	75	538	75	570	82	520	83	542	75	563	82	542	76	495	76	490	77	492	80	
2	Blocked Call Rate	Major Road	0.00%	0.00%	0.00%	0.00%	0.76%	0.00%	0.43%	0.00%	0.00%	0.00%	0.39%	0.00%	1.25%	0.00%	0.00%	0.00%	0.46%	0.00%	0.40%	0.00%	
		Highway	0.00%	0.00%	0.00%	0.00%	0.83%	0.00%	1.94%	0.00%	0.00%	0.00%	0.85%	0.00%	1.16%	0.00%	0.00%	0.00%	3.37%	0.00%	0.00%	0.00%	
		Within City	0.00%	0.00%	0.00%	0.00%	0.53%	0.00%	1.07%	0.00%	0.88%	0.00%	0.00%	0.00%	0.46%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Overall SSA	0.00%	0.00%	0.00%	0.00%	0.70%	0.00%	0.96%	0.00%	0.37%	0.00%	0.36%	0.00%	0.92%	0.00%	0.00%	0.00%	0.00%	0.82%	0.00%	0.20%	0.00%
3	Dropped Call Rate (<=2%)	Major Road	0.00%	0.00%	0.00%	0.00%	0.79%	0.00%	0.00%	0.00%	0.00%	0.00%	0.78%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Highway	0.00%	0.00%	0.00%	0.00%	2.61%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.16%	0.00%	0.00%	0.00%	
		Within City	0.00%	0.00%	0.00%	0.00%	2.25%	0.00%	1.08%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Overall SSA	0.00%	0.00%	0.00%	0.00%	1.65%	0.00%	0.39%	0.00%	0.00%	0.00%	0.36%	0.00%	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%)																						

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S/N	Parameter	Classification of route covered	AIRCEL		AIRTEL		BSNL		IDEA		TATA GSM		RCOM GSM		VIDEOCON		VODAFONE		RCOM CDMA		TATA CDMA		
			OUTDOOR	INDOOR																			
	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Major Road	NA	99.43%	99.53%	99.90%	100%																
		Highway	NA	99.19%	99.88%	99.45%	100%																
		Within City	NA	99.52%	99.54%	99.14%	99.97%																
		Overall SSA	NA	99.42%	99.65%	99.56%	99.99%																
	(b) 0-5 (with frequency hopping for GSM Operators)	Major Road	95.70%	95.47%	97.69%	99.83%	90.79%	96.63%	97.41%	98.91%	96.49%	97.02%	97.52%	99.93%	96.24%	97.43%	98.11%	99.57%	NA	NA	NA	NA	
		Highway	95.96%	98.33%	98.55%	99.83%	86.17%	99.37%	96.12%	98.70%	94.71%	98.79%	97.92%	99.14%	95.75%	97.73%	97.80%	99.75%	NA	NA	NA	NA	
		Within City	96.35%	99.57%	97.79%	99.80%	89.50%	98.33%	97.69%	99.05%	95.29%	99.03%	98.41%	99.97%	95.32%	99.41%	98.45%	99.90%	NA	NA	NA	NA	
		Overall SSA	95.97%	97.75%	97.98%	99.82%	89.38%	98.15%	97.26%	98.88%	95.61%	98.34%	97.91%	99.67%	95.79%	98.19%	98.18%	99.76%	NA	NA	NA	NA	
5	Service Coverage																						
	In door (>= - 75dBm)	Major Road	74.64%	65.69%	93.67%	93.08%	56.62%	76.13%	97.69%	100%	70.68%	96.45%	80.35%	99.71%	78.82%	97.62%	86.24%	97.10%	71.97%	100%	51.14%	100%	
		Highway	67.63%	92.69%	93.25%	40.47%	51.39%	17.90%	96.38%	100%	73.88%	100%	65.98%	2.75%	62.67%	0.11%	81.28%	99.70%	54.93%	74.68%	42.83%	0.00%	
		Within City	73.24%	48.29%	93.07%	99.83%	52.47%	97.62%	95.82%	37.18%	72.57%	83.65%	74.70%	96.74%	75.02%	80.75%	89.07%	100%	76.47%	99.97%	51.66%	0.20%	
		Overall SSA	72.76%	68.82%	93.35%	77.78%	54.15%	67.99%	96.74%	82.22%	72.03%	96.49%	75.59%	64.73%	74.69%	60.50%	86.43%	99.13%	70.73%	91.44%	50.34%	32.10%	
	In-vehicle (>= - 85dBm)	Major Road	97.89%	99.74%	99.44%	99.98%	92.60%	98.06%	99.66%	100%	97.01%	99.69%	93.28%	100%	97.83%	99.97%	99.00%	99.90%	92.52%	100%	88.49%	100%	
		Highway	97.02%	99.95%	99.37%	99.57%	88.75%	99.60%	99.58%	100%	93.77%	100%	85.63%	74.70%	88.77%	50.37%	98.46%	100%	84.42%	99.38%	78.75%	43.73%	
		Within City	96.38%	89.66%	99.56%	100%	91.36%	99.97%	99.23%	95.63%	93.60%	99.52%	95.46%	100%	97.07%	99.18%	98.85%	100%	96.83%	100%	76.76%	88.70%	
Overall SSA		97.21%	96.17%	99.46%	99.85%	91.40%	99.17%	99.48%	98.76%	95.08%	99.85%	92.56%	91.15%	96.06%	83.78%	98.84%	99.97%	92.76%	99.79%	82.92%	77.31%		

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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	99.81%	100%	99.94%	100%	100%	100%	99.87%	100%	99.78%	100%	99.69%	100%	99.88%	100%	99.99%	100%	98.98%	100%	99.86%	100%
		Highway	99.72%	100%	99.89%	100%	100%	100%	99.89%	100%	98.88%	100%	99.41%	99.63%	99.78%	100%	99.95%	100%	99.93%	100%	99.93%	100%
		Within City	99.41%	96.55%	99.94%	100%	100%	100%	99.83%	99.84%	98.42%	100%	99.79%	100%	99.87%	99.99%	100%	100%	99.97%	100%	99.06%	100%
		Overall SSA	99.66%	98.76%	99.92%	100%	100%	100%	99.86%	99.95%	99.09%	100%	99.67%	99.87%	99.86%	100%	99.99%	100%	99.52%	100%	99.57%	100%
6	Call Setup Success Rate (>=95%)	Major Road	100%	100%	100%	100%	96.18%	100%	99.57%	100%	100%	100%	99.61%	100%	98.75%	100%	100%	100%	99.54%	100%	99.60%	100%
		Highway	100%	100%	100%	100%	95.04%	96.43%	97.09%	100%	100%	100%	99.15%	100%	98.84%	100%	100%	100%	96.63%	100%	100%	100%
		Within City	100%	100%	100%	100%	95.19%	100%	98.93%	100%	99.12%	100%	100%	100%	99.54%	100%	100%	100%	100%	100%	100%	100%
		Overall SSA	100%	100%	100%	100%	95.61%	98.78%	98.85%	100%	99.63%	100%	99.64%	100%	99.08%	100%	100%	100%	99.18%	100%	99.80%	100%
7	Hand Over Success Rate (HOSR)	Major Road	100%	100%	99.39%	100%	97.93%	100%	99.64%	100%	99.55%	100%	99.42%	100%	99.72%	100%	99.83%	100%	100%	100%	100%	100%
		Highway	100%	100%	98.44%	100%	98.97%	100%	100%	100%	94.90%	100%	100%	100%	100%	100%	98.83%	100%	100%	100%	100%	100%
		Within City	100%	100%	99.29%	100%	96.29%	100%	100%	100%	96.12%	100%	100%	100%	98.84%	100%	99.79%	100%	100%	100%	100%	100%
		Overall SSA	100%	100%	99.18%	100%	97.61%	100%	99.84%	100%	96.84%	100%	99.72%	100%	99.38%	100%	99.63%	100%	100%	100%	100%	100%

NA: Not Applicable

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

DRIVE TEST TABLE – 2

OPERATOR ASSISTED DRIVE TEST AT BHATINDA SSA IN FEBRUARY 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	177	25	176	25	172	26	196	29	189	25	188	27	180	25	188	25	171	26	207	25	
		Highway	163	30	181	25	187	26	185	28	168	23	188	29	139	26	163	25	146	27	129	27	
		Within City	175	26	185	25	170	25	174	30	175	25	184	27	189	25	173	26	188	26	169	25	
		Overall SSA	515	81	542	75	529	77	555	87	532	73	560	83	508	76	524	76	505	79	505	77	
2	Blocked Call Rate	Major Road	1.69%	0.00%	0.00%	0.00%	0.00%	0.00%	0.51%	0.00%	2.12%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.58%	0.00%	0.00%	0.00%	
		Highway	3.07%	0.00%	0.00%	0.00%	1.07%	0.00%	1.62%	0.00%	2.38%	0.00%	1.06%	0.00%	0.72%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Within City	2.29%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.14%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Overall SSA	2.33%	0.00%	0.00%	0.00%	0.38%	0.00%	0.72%	0.00%	1.88%	0.00%	0.36%	0.00%	0.20%	0.00%	0.00%	0.00%	0.20%	0.00%	0.00%	0.00%	
3	Dropped Call Rate (<=2%)	Major Road	0.00%	0.00%	0.00%	0.00%	0.58%	0.00%	0.52%	0.00%	0.00%	0.00%	0.53%	0.00%	0.00%	0.00%	0.00%	0.00%	0.59%	0.00%	0.00%	0.00%	
		Highway	0.00%	0.00%	0.00%	0.00%	1.63%	0.00%	0.55%	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%	
		Within City	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.57%	0.00%	0.58%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Overall SSA	0.00%	0.00%	0.00%	0.00%	0.76%	0.00%	0.54%	0.00%	0.19%	0.00%	0.18%	0.00%	0.00%	0.00%	0.00%	0.00%	0.20%	0.00%	0.00%	0.00%	
4	Percentage connections with good voice quality (=>95%)																						

AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-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																		
	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Major Road	NA	99.48%	99.97%	99.00%	98.98%															
		Highway	NA	99.07%	100%	98.80%	100%															
		Within City	NA	99.64%	100%	98.84%	99.82%															
		Overall SSA	NA	99.42%	99.99%	98.90%	99.65%															
	(b) 0-5 (with frequency hopping for GSM Operators)	Major Road	97.32%	98.61%	96.96%	98.99%	96.00%	98.17%	98.44%	99.82%	97.20%	97.26%	97.95%	99.77%	96.53%	99.97%	98.47%	98.95%	NA	NA	NA	NA
		Highway	96.03%	98.41%	97.26%	99.70%	95.73%	97.50%	96.73%	99.74%	96.02%	98.40%	96.09%	99.81%	97.32%	99.97%	97.25%	99.81%	NA	NA	NA	NA
		Within City	96.85%	96.40%	97.54%	99.75%	95.95%	96.00%	98.62%	99.84%	96.44%	99.15%	96.76%	99.91%	96.28%	99.65%	98.17%	99.52%	NA	NA	NA	NA
		Overall SSA	96.76%	97.94%	97.26%	99.48%	95.89%	97.35%	97.92%	99.80%	96.57%	98.28%	96.94%	99.83%	96.65%	99.86%	97.98%	99.42%	NA	NA	NA	NA
5	Service Coverage																					
	In door (>= - 75dBm)	Major Road	70.18%	85.34%	90.10%	1.24%	77.94%	94.20%	87.25%	100%	78.13%	7.92%	71.49%	99.63%	68.93%	99.95%	79.24%	97.01%	72.16%	100%	36.38%	28.76%
		Highway	46.46%	95.39%	85.15%	10.99%	71.63%	69.23%	80.24%	69.23%	45.98%	95.73%	49.68%	88.46%	51.40%	93.19%	57.01%	98.52%	50.03%	89.49%	50.08%	68.78%
		Within City	80.91%	93.08%	93.20%	8.35%	82.61%	65.50%	97.58%	99.72%	86.20%	96.43%	76.30%	100%	79.95%	99.02%	90.94%	92.03%	80.07%	75.85%	29.81%	0.95%
		Overall SSA	66.58%	91.04%	89.62%	6.85%	77.99%	77.46%	87.90%	86.26%	70.08%	69.40%	65.85%	95.89%	68.35%	97.37%	75.76%	95.86%	68.61%	88.45%	37.33%	33.65%
	In-vehicle (>= - 85dBm)	Major Road	91.71%	97.34%	97.86%	80.41%	98.28%	100%	99.46%	100%	96.80%	70.27%	91.21%	100%	92.71%	100%	98.26%	99.97%	93.31%	100%	79.27%	100%
		Highway	81.02%	99.19%	97.41%	99.82%	96.28%	97.36%	96.96%	95.36%	76.82%	99.96%	79.01%	97.59%	84.28%	99.94%	92.03%	99.98%	69.37%	97.71%	67.49%	99.97%
		Within City	96.47%	99.57%	99.46%	95.09%	98.82%	97.50%	99.65%	100%	99.44%	99.97%	92.75%	100%	98.60%	99.97%	99.64%	99.87%	96.29%	99.27%	73.00%	85.86%
Overall SSA		90.06%	98.60%	98.28%	91.76%	97.93%	98.37%	98.65%	97.94%	91.01%	90.97%	87.68%	99.17%	92.65%	99.97%	96.68%	99.94%	87.40%	98.99%	74.23%	95.06%	

AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-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	98.06%	100%	99.92%	100%	99.96%	100%	99.93%	100%	99.66%	99.84%	97.89%	100%	99.54%	100%	99.97%	100%	99.56%	100%	98.88%	100%
		Highway	97.68%	99.99%	99.84%	100%	99.32%	100%	99.72%	100%	96.86%	100%	97.52%	100%	98.60%	100%	99.85%	99.99%	92.92%	99.94%	97.46%	100%
		Within City	99.77%	100%	99.99%	99.97%	99.97%	100%	99.89%	100%	99.97%	100%	99.46%	100%	99.95%	100%	100%	99.99%	100%	99.97%	99.50%	99.98%
		Overall SSA	98.55%	100%	99.92%	99.99%	99.79%	100%	99.85%	100%	98.83%	99.95%	98.29%	100%	99.44%	100%	99.94%	99.99%	97.77%	99.97%	98.76%	99.99%
6	Call Setup Success Rate (>=95%)	Major Road	98.31%	100%	100%	100%	99.42%	100%	98.98%	93.10%	97.88%	100%	100%	100%	100%	100%	100%	100%	99.42%	100%	100%	100%
		Highway	96.93%	100%	100%	100%	98.40%	100%	98.92%	100%	97.62%	100%	98.94%	100%	99.28%	100%	100%	100%	100%	100%	100%	100%
		Within City	97.71%	100%	100%	100%	100%	100%	100%	100%	98.86%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Overall SSA	97.67%	100%	100%	100%	99.24%	100%	99.28%	97.70%	98.12%	100%	99.64%	100%	99.80%	100%	100%	100%	99.80%	100%	100%	100%
7	Hand Over Success Rate (HOSR)	Major Road	100%	100%	99.72%	100%	99.07%	100%	100%	100%	96.04%	100%	99.42%	100%	99.30%	100%	99.81%	100%	100%	100%	100%	100%
		Highway	100%	100%	100%	100%	96.66%	100%	99.62%	100%	98.90%	100%	100%	100%	98.36%	100%	98.38%	100%	100%	100%	100%	100%
		Within City	100%	100%	99.51%	100%	99.27%	100%	99.69%	100%	100%	100%	100%	100%	99.38%	100%	100%	100%	100%	100%	100%	100%
		Overall SSA	100%	100%	99.70%	100%	98.38%	100%	99.74%	100%	98.51%	100%	99.84%	100%	99.18%	100%	99.50%	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 HOSHIARPUR SSA IN MARCH 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	111	27	133	25	173	25	107	27	105	25	126	28	106	25	111	26	107	25	141	27	
		Highway	167	26	177	25	172	32	187	27	201	25	167	28	173	25	196	25	183	25	134	25	
		Within City	208	26	225	25	170	30	206	26	218	25	214	27	220	25	214	26	222	26	210	26	
		Overall SSA	486	79	535	75	515	87	500	80	524	75	507	83	499	75	521	77	512	76	485	78	
2	Blocked Call Rate	Major Road	2.70%	0.00%	0.00%	0.00%	0.58%	0.00%	0.00%	0.00%	0.95%	0.00%	1.59%	0.00%	0.94%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	3.70%
		Highway	0.00%	0.00%	0.00%	0.00%	1.16%	0.00%	0.00%	0.00%	1.00%	0.00%	2.40%	0.00%	0.58%	0.00%	0.00%	0.00%	0.55%	0.00%	0.00%	0.00%	
		Within City	0.96%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.46%	0.00%	0.93%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Overall SSA	1.03%	0.00%	0.00%	0.00%	0.58%	0.00%	0.00%	0.00%	0.76%	0.00%	1.58%	0.00%	0.40%	0.00%	0.00%	0.00%	0.20%	0.00%	0.00%	0.00%	1.28%
3	Dropped Call Rate (<=2%)	Major Road	0.93%	0.00%	0.00%	0.00%	0.58%	0.00%	0.00%	0.00%	0.00%	0.00%	0.81%	3.57%	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%	1.79%	0.00%	0.00%	0.00%	0.50%	0.00%	1.23%	0.00%	0.00%	0.00%	0.00%	0.00%	0.55%	0.00%	0.00%	0.00%	
		Within City	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.46%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.45%	0.00%	0.00%	0.00%	
		Overall SSA	0.21%	0.00%	0.00%	0.00%	0.79%	0.00%	0.00%	0.00%	0.38%	0.00%	0.60%	1.20%	0.00%	0.00%	0.00%	0.00%	0.39%	0.00%	0.00%	0.00%	
4	Percentage connections with good voice quality (=>95%)																						

AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-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																			
	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Major Road	NA	99.18%	100%	98.94%	99.85%																
		Highway	NA	97.53%	100%	96.95%	98.61%																
		Within City	NA	99.44%	99.97%	99.34%	99.98%																
		Overall SSA	NA	98.72%	99.99%	98.59%	99.49%																
	(b) 0-5 (with frequency hopping for GSM Operators)	Major Road	96.70%	99.66%	98.03%	99.37%	93.78%	99.63%	96.56%	99.88%	95.40%	96.51%	97.05%	99.33%	96.26%	99.10%	98.41%	99.23%	NA	NA	NA	NA	
		Highway	95.15%	99.65%	96.84%	99.51%	93.34%	94.27%	96.49%	99.91%	92.28%	93.51%	95.86%	97.92%	96.42%	99.97%	98.68%	99.77%	NA	NA	NA	NA	
		Within City	97.28%	99.58%	97.23%	99.73%	95.07%	96.81%	98.17%	99.11%	95.89%	98.60%	97.76%	99.65%	97.41%	96.46%	99.04%	99.65%	NA	NA	NA	NA	
		Overall SSA	96.42%	99.63%	97.30%	99.54%	94.21%	96.88%	97.21%	99.61%	94.69%	96.48%	96.97%	98.96%	96.83%	98.53%	98.77%	99.54%	NA	NA	NA	NA	
5	Service Coverage																						
	In door (>= - 75dBm)	Major Road	73.39%	97.21%	91.79%	99.95%	82.16%	100%	98.18%	88.11%	79.10%	55.78%	66.22%	100%	52.99%	96.76%	88.60%	100%	65.57%	8.92%	34.94%	40.38%	
		Highway	60.72%	86.33%	79.26%	100%	67.01%	98.80%	94.76%	100%	61.10%	62.29%	53.11%	95.54%	38.07%	47.61%	75.50%	97.53%	38.67%	80.77%	27.30%	51.29%	
		Within City	76.97%	93.46%	89.16%	99.99%	76.85%	98.40%	99.05%	100%	77.55%	99.19%	69.00%	12.53%	62.78%	58.36%	91.66%	99.86%	64.35%	93.32%	36.66%	90.43%	
		Overall SSA	70.60%	92.67%	86.11%	99.98%	74.92%	99.03%	97.27%	96.30%	71.90%	77.16%	63.22%	69.25%	52.26%	67.42%	84.80%	99.15%	55.68%	61.09%	33.65%	60.92%	
	In-vehicle (>= - 85dBm)	Major Road	91.08%	100%	99.27%	100%	98.84%	100%	99.81%	100%	94.89%	96.69%	88.88%	100%	91.43%	99.95%	98.27%	100%	92.43%	89.52%	69.29%	99.65%	
		Highway	83.90%	100%	96.53%	100%	93.35%	100%	99.46%	100%	87.89%	97.31%	81.85%	99.86%	73.94%	95.16%	95.26%	100%	76.33%	99.85%	56.65%	84.05%	
		Within City	94.99%	100%	98.78%	100%	97.84%	100%	99.98%	100%	95.89%	99.97%	93.17%	98.44%	94.91%	90.41%	99.55%	100%	90.51%	99.88%	73.14%	97.77%	
Overall SSA		90.30%	100%	98.06%	100%	96.63%	100%	99.75%	100%	92.75%	98.35%	88.48%	99.43%	87.00%	95.18%	97.63%	100%	85.99%	96.42%	67.60%	94.03%		

AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-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	98.96%	100%	99.96%	100%	100%	100%	99.95%	100%	98.27%	100%	99.10%	100%	99.59%	100%	99.89%	100%	99.79%	100%	99.88%	99.98%
		Highway	96.74%	100%	99.87%	100%	99.17%	100%	99.86%	100%	98.94%	100%	96.34%	100%	96.44%	99.95%	99.97%	100%	98.28%	100%	99.03%	100%
		Within City	99.31%	100%	99.96%	100%	99.63%	100%	100%	100%	100%	100%	99.94%	100%	99.82%	99.56%	100%	100%	99.86%	100%	98.75%	100%
		Overall SSA	98.35%	100%	99.92%	100%	99.57%	100%	99.93%	100%	99.23%	100%	98.58%	100%	98.62%	99.84%	99.96%	100%	99.29%	100%	99.15%	99.99%
6	Call Setup Success Rate (>=95%)	Major Road	97.30%	100%	100%	100%	98.84%	100%	100%	100%	99.05%	100%	98.41%	100%	99.06%	100%	100%	100%	100%	100%	100%	96.30%
		Highway	100%	100%	100%	100%	97.67%	100%	100%	100%	99.00%	100%	97.60%	100%	99.42%	100%	100%	100%	99.45%	100%	100%	100%
		Within City	99.04%	100%	100%	100%	97.06%	100%	100%	100%	99.54%	100%	99.07%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Overall SSA	98.97%	100%	100%	100%	97.86%	100%	100%	100%	99.24%	100%	98.42%	100%	99.60%	100%	100%	100%	99.80%	100%	100%	98.72%
7	Hand Over Success Rate (HOSR)	Major Road	100%	100%	100%	100%	100%	100%	99.55%	100%	94.74%	100%	99.44%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Highway	100%	100%	99.55%	100%	99.45%	100%	100%	100%	97.12%	100%	100%	100%	99.21%	100%	99.69%	100%	100%	100%	100%	100%
		Within City	100%	100%	99.74%	100%	100%	100%	100%	100%	98.39%	100%	99.74%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Overall SSA	100%	100%	99.73%	100%	99.85%	100%	99.89%	100%	96.90%	100%	99.73%	100%	99.81%	100%	99.91%	100%	100%	100%	100%	100%

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
AMRITSAR	Jan-15	Amritsar, Ajnala /160 Km	<p>(a)HIGHWAY:Majitha Rd, Bypass, Fatehgarh Churiyan, Bypass chwok, Ajnala Bypass Chowk, Jail Rd, Raja Sansi Kukran wala Ajnala.</p> <p>(b)Major Road:Ranjeet Avenue, Jail Rd, Ratan Singh Chowk, Fatehgarh Churiyan, Verka Bypass, Majitha Rd, Bus Stand, Haripura, Ram Bagh, IDH Market, Hakim Gate, Hall Gate, Railway Stantion, Khasa, Crystal Chwok, Lawrance Rd , Circular Rd to Ranjeet Avenue.</p> <p>(c)Inside City:Best Western, Kichlu Chowk,Crystal Chowk, Hall Gate, Town Hall, Fawara Chowk, Sufon wind Chowk, Shallda Chwok, Yarwali Gali, Bhaglan Wala Gate, Haima Gate, Khazana Gate, Lohori Gate, Bari Gate, Lohgarh Gate, Chitta Katra, Shakti Nagar, Lohgarh, Katree, Mate Gali, Railway Stantion, Crystal Chowk, Lawrance Rd, Tagore Colony, Rattan Chand, Rd, Polia Link, Krishna Nagar, Income Tex colony, Medical College Rd, Ghala Mala Chowk, Majitha Rd, Bypass</p> <p>Indoor: Hotel Best Western, Amritsar</p>	Rayya, Goindwal /210 Km	<p>(a)HIGHWAY:Rayya to Beas, Khildwan, Varapal, Khadoor Sahib, Fatehbad, Goindwal, Sahib.</p> <p>(b) Major Road:Rayya, Pheruman Rd, G.G.S Nagar, Baba Bakala Rd, Baba Bakala Bypass, Dera Beas, Baba Jamial Singh, Shahib rd, Goindwal Rd, Bypass, Fatehabad, Goindwal, Kapurthla Rd, Sub Station Rd, J.E Rd.</p> <p>(c)Inside City:Rayya Pheruman Rd, Station Rd, Guru Arjun dev Nagar, Chhota Rayya, Baba Bakala , Beas, Khildwan, Khadoor Shahib Gurdwara, Rd, Taran Taran rd, Goindwala Town.</p> <p>Indoor: Four Season Restaurant, Rayya</p>	Taran Taran, Patti /182 Km	<p>(a)HIGHWAY:Amritsar Taran Taran Highway, Taran Taran to Chabal Rd, Chabal to Bhikhiwind rd, Bhikhiwind to Patti , Patti to Sarhali, Harike.</p> <p>(b) Major Road:Taran Taran , Amritsar Rd, Rohian, Walapul rd, Railway rd, Exchange Rd, Chabal Rd, Gordiwal Rd, Amritsar Rd, Bhikhiwind Rd, Goga bua, Bhikhiwind, Khem Karan Rd, Patti Rd, Patti, Court Rd, Sarhali Rd, College Rd, Sarhali Harike Rd.</p> <p>(c)Inside City:Taran Taran Amritsar Rd, Baba Deep Singh, Avenue Gurdwara Rd, Rohian Rd, Chabal, Bhikhiwind Village, Patti Station Rd, Main Bazzar Patti, Kahiri Rd, College Rd, Grain Market, Bus Stand, Main Bazzar Rd.</p> <p>Indoor: Friends Restaurant, Patti</p>

<p>BHATINDA</p>	<p>Feb-15</p>	<p>Bathinda/150 Km</p>	<p>(a)HIGHWAY:Rose Garden, Ambuja Factory, Goniana Road, Adarsh Nagar, Thermal Colony, Bibiwala Chowk, Bucho Khurd, Bucho Chowk, Bhucho Mandi</p> <p>(b)Major Road:Bibiwala Chowk, Bharat Nagar, 100'Rd, Power house chowk, Bhagurd, Model town Ph-2, ITI chowk, Rose garden, Shiv colony, Harpal nagar, SD school, Pukhraj colony, Vishal nagar, Bhatti road, Bakshi hospital, Ram Bagh, Ajit Road, Fauji Chowk, Sharma Complex, Power House Road, Power House Chowk, Model Town Ph-3, St. Joseph School, Rajindra College, Bhucho T.E. B.S.N.L., Bucho Market, Bucho City, Railway Crossing</p> <p>(c)Inside City:Carrier T.E. BSNL, Lal Singh Basti, church, Jogi nagar, Railway Station, Sirki bazar, Guru nanakpura, Vetnery Hospital, Green Market, Bus stand, Namdev Nagarm Mittal Mall, Veer Colony, Jogi nagar, Paras Ram nagar, Mall road</p> <p>Indoor: Mittal Mall, Bathinda</p>	<p>Raman,Sardulgarh/210 Km</p>	<p>(a)HIGHWAY:Civil Hospital, ITI Chowk, Jassi Chowk, Kot Shamir Road, Kot Fatta Village, Kot Shamir Village, Talwandi Sabo, Highway Raman to Talawandi, Talwandi Chowk to GKW University to Rori.</p> <p>(b) Major Road:Talwandi Sabo Chowk, Yadwendra College, Talwandi Sabo Market, Talwandi Sabo Gurdawara sahib, Talwandi to Raman Mandi, Raman Mandi to Kenchiyon, Surdulgarh Bus Stand, Sardulgarh Market.</p> <p>(c)Inside City:Raman Kenchiyon, Raman City Market, Grain Market, Railway Stantion, Raman Kenchiyon, Kenra Bank, Raman Mandi, Handa Service Center, Sports Stadium, Sardulgarh, Gain Market, SBI Bank Sardulgarh, Sardulgarh to Mansa Road.</p> <p>Indoor: BSNL Exchange, Raman</p>	<p>Mansa,Phulm andi/220 Km</p>	<p>HIGHWAY:Bathinda to Maur, Mansa Highway, Rampur Highway, Mansa Maur Higway, Sardulgarh Highway, Bucho Highway</p> <p>(b) Major Road:Civil Hospital Bathinda, Kot shamir, Mansa Road, Mansa Market, Mansa Railway Crossing, Mansa TE, Mansa Bridge, Railway Colony, Mansa Civil Hospital, Bus Stand Mansa, Sardulgarh Road, Railway Station, Water Works Road</p> <p>(c)Inside City:Bus Stand Mansa, Rampura Phul Market, Bus stand Rampura, Phul Mandi, Main Market, Main Market Mansa, Maur Mandi Market, Dana Mandi Maur, Mansa Main Bazar, Mansa Railway Station, Hotel Saffron</p> <p>Indoor: Hotel Safforon, Mansa</p>
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<p>HOSHIARPUR</p>	<p>Mar-15</p>	<p>Hoshiarpur /130 Km</p>	<p>(a)HIGHWAY:Chandigarh,Phagwara,Jalandhar,Una bypass,Tanda bypass.(b)Major Road:Mall Rd,Sutheri Rd,Bus stand Rd,Bharwai Rd,Phagwara Rd,Civil Hospital Rd,Una Rd,DC Rd,Shimla Pahari Rd.(c)Inside City:Krishna Nagar,Mount Avenue,Dana Mandi,Ranjit Nagar,Piplawala, Bus Stand,Railway Station,Post Office,Industrial Area,Tagore Nagar,Clock Tower,Gaushala Bazar,Roshan Rd,Govt Coll Chowk,Civil Line,Police Colony,Aslamabad,Preet Nagar,D.C Office Rd. Indoor: Swarn Multiplex, Hoshiarpur</p>	<p>Garhashanker, Balachaur /150 Km</p>	<p>(a)HIGHWAY: Chabewal ,DP School,Bassi Kalan,Mmahilpur civil hospital Rd,Phagwara Rd, Jaijon Rd,Khalsa College Rd,Garhashanker,Banga Rd,Balachaur Rd. (b) Major Road:Balachaur to Bhaddi,Nawanshehr,Chandigarh,Garhashanker Rd,Garhashanker to Banga,Nawanshehr, Shri Anandpur Sahib,Nangal Rd,Chandigarh Rd,Hhosharpur Rd,Mahilpur to Hoshiarpur,Phagwara, Jaijon,Garhashanker Rd (c)Inside City:Mahilpur Committe Market,Karan Palace,Jaijon Rd Market,Garhashanker Dana Mandi,DAV Coll,Banga Rd Market,Nangal Rd Mkt,Ward no-11 mkt,Balachaur Court mkt,Dana mandi,bus stand,Nawanshehr Rd market,Bhaddi Rd Mkt. Indoor: Hotel Platinum, Garhashanker</p>	<p>Dasua,Tanda Urmr /140 Km</p>	<p>(a)HIGHWAY:Haryana,Gardiwala,Dasua,Hajipur Rd,Tanda Rd (b) Major Road:Gardiwala bus stand Rd, Dasua-Hajipur Rd,Tehsil Rd,Main Rd,Old Jalandhar Rd, Tanda Model Town,Vijay Market Rd, Tanda Bus stand Rlw Station, Main Mkt Rd. (c)Inside City:Jain Colony,Peer Baba Mahalan Gardiwala,Krishna Colony, Dasmesh Nagar ,Nihalpura ,Arjuna Colony.Darapur. Indoor: Sharma Plaza, Dasua</p>
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7.2 SSA WISE DRIVE TEST OBSERVATION:

DRIVE TEST TABLE: 5

DRIVE TEST OBSERVATION OF AMRITSAR SSA – JANUARY 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	Amritsar & Anjala	Poor Level & Quality near Bakha Hari singh, Poor Quality near Harse Chhina, Rly Station	Rayya & Goindwal	Poor Level & Quality near Dera Beas Rd, No coverage Khalchain to Khandoor Sahib, Poor Quality near Baba Bakala Rd	Taran Taran & Patti	No coverage Chabal to Bhikhi Wind, Bhikhi Wind to Patti, Taran Taran to Chabal
2	AIRTEL		Poor Quality near Vijay Nagar, Chheharta		Poor Level & Quality near Dera Baba, Baba Bakala, Khalchain		Poor Level & Quality at Taran Taran outer, Bhikhi Wind, Thakurpura Pattim outer
3	BSNL		Poor Level & Quality near Bakha Hari Singh, No coverage Bhalla to Rokhla		Poor Level & Quality near Dera Beas Rd, Baba Bakala, Khalchain, Goindwal, Khadoor		Poor Level near Patti outer
4	TATA GSM		Poor Quality near Rokhey, Meera Kot, Ranjit Nagar, NCE RD, Taran Taran Rd		Poor Level & Quality near Dera Beas		Poor Level & Quality near Taran Taran outer
5	TATA CDMA		They have coverage only in SDCA's with Poor Level & Quality at outers		They have Poor Level between Amritsar to Dera Beas, No coverage Dera Beas to Goindwal		They have coverage only in SDCA with Poor Level & Quality
6	IDEA		Poor Level & Quality at Anjala Rd		Poor Level & Quality near Dera Beas		Poor Quality near Bhikhi Wind, Patti outer, Sarhali
7	RCOM GSM		They have coverage only in SDCA's with Poor Level & Quality at outers, Poor Level near Sultanwind Gate, Poor Quality near Ranjit Vihar, Gopal Nagar, Mall Rd		Poor Level & Quality near Dera Beas, Baba Bakala, Amritsar Beas highway, Rayya Rd		Poor Level at Taran Taran outer, Chabal outer
8	RCOM CDMA		They have coverage only in Amritsar Town, Poor Level & Quality near Chherata		Poor Level & Quality near Dera Beas, Baba Bakala, No coverage Beas to Goindwal		They have coverage only in Taran Taran SDCA with Poor Level & Quality
9	QTL		No coverage Bhalla to Rokhla, Poor Level & Quality near Harse Chinna, Poor Quality near Rly Station		Poor Level & Quality near Naranjanpur, Waraich, No coverage Arowal to Nagoke		No coverage at Panjwad to Sur singh wala, Goharwad to Taran Taran, Harike to Sarhali, Poor Level & Quality near Puhla, Harike
10	VODAFONE		Poor Level at Amritsar outer, Anjala outer, Bakha Hari singh		Poor Quality near Dera Beas, Baba Bakala		Poor Quality near Harike, Bhikhi Wind

DRIVE TEST TABLE: 6

DRIVE TEST OBSERVATION OF BHATINDA SSA – FEBRUARY 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	Bhatinda & Bhucho Mandi	Poor coverage near Gill patti, Ram Nagar, Ajeet Rd, No coverage Bhatinda to Bhucho Mandi	Talwandi Sabu, Raman & Sardulgarh	No coverage at Ram Tirth Jaga, Raman Mandi Rd, Sabu to Sadulgarh Rd, Dikh, Poor Level near Kot Samir	Mansa, Mour & Rampura	Poor Level near Kot Samir, Mansa outer
2	AIRTEL		Poor Quality near Tapwal Cera, Model Town		Poor Level & Quality near Kot Samir, Talwandi Sabu outer		Poor Level near Mour, Poor Quality near Mansa outer
3	BSNL		Poor Quality near Bhatinda outer		Poor Level & Quality near Kot Samir, Poor Quality at Sadulgarh		Poor Quality near Rampura, Mour, Mansa Rly Station
4	TATA GSM		No coverage at cantt Area, Poor Level on Kotkapura Rd, Poor Quality near Ballaram Nagar, Janta Nagar		Poor Level near Kot Samir, Talwandi outer		No coverage Mour to Dikh, Poor Level near Mansa outer
5	TATA CDMA		Poor Level on Kotkapura Highway, Bibiwala Chowk, Bhucho Mandi outer		They have coverage only in SDCA's & Major Towns with Poor Level at outer		They have coverage only in SDCA's & Major Towns with Poor Level at outer
6	IDEA		Poor Level & Quality near Bhucho		---		Poor Level & Quality at Bhatinda Mansa Rd
7	RCOM GSM		Poor Level on Kotkapura Highway, Bibiwala Chowk, Bhucho Mandi outer, Poor Quality near Model Town		Poor Level near kot Samir, Baghi Bander, Talwandi outer		Poor Level near Kot Samir, Maisar Khana, Mandi Kalan, Mour outer, Mansa outer
8	RCOM CDMA		Poor Level on Kotkapura Highway, Civillines, Bhucho Mandi outer		No coverage Bhatinda outer to Talwandi, Poor Level near Talwandi, Sadulgarh Rd		They have coverage only in SDCA's & Major Towns with Poor Level & Quality at outers
9	QTL		Poor Level & Quality near Adarsh Nagar, Cantt		They have coverage only in SDCA's & Major Towns with Poor Level & Quality at outers		They have coverage only in SDCA's & Major Towns with Poor Level & Quality at outers
10	VODAFONE		Poor Quality near Bhatinda outer, Bhucho		Poor Level & Quality near Kot Samir		Poor Quality near Rampura outer, Mansa outer

DRIVE TEST TABLE: 7

DRIVE TEST OBSERVATION OF HOSHIARPUR SSA – MARCH 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	Hoshiarpur	Poor Level near Civillines, Poor Quality near Tanda Rd, Porhira Rd, Sahidad Rd	Balachaur, Garhshankar & Mahalpur	Poor Level near Karawar, Chabewal, Rukri Khurd, Poor Quality near Garhshankar, Rukri Khurd	Gardiwala, Dasuya & Tanda	Poor Level & Quality near Randhawa, Dhoot, Hariana
2	AIRTEL		Poor Level near Mount Avenue, Tanda Rd		Poor Level near Balachour outer, Poor Quality near Chabewal, Mahilpur		Poor Level & Quality near Gardiwala outer, Dasuya outer
3	BSNL		Poor Level & Quality near Mount Avenue, Tanda Rd		Poor Level & Quality near Balachour outer		Poor Level & Quality near Dasuya outer
4	TATA GSM		Poor Level near Chohal, Poor Quality near Tanda Rd, Mount Avenue		Poor Level & Quality near Garshankar, Balachour outer		Poor Level near Hariana, Gardiwala outer
5	TATA CDMA		Poor Level & Quality at Chandigarh Bypass, near Chohal		They have coverage only in SDCA's & Major Towns with Poor Level		They have coverage only in SDCA's & Major Towns with Poor Level
6	IDEA		Poor Quality near Tanda Rd, Civillines		Poor Quality at Balachour outer, Chabewal		---
7	RCOM GSM		Poor Level & Quality near Chohal, Garhshankar Rd, Chandigarh Bypass		Poor Level & Quality near Chabewal, Mahalpur outer, Garhshankar outer, No coverage garhshankar to Balachour		Poor Level & Quality at Dasuya outer, Gardiwala outer, Tanda outer, Hariana outer
8	RCOM CDMA		Poor Level & Quality near Chohal, Garhshankar Rd, Chandigarh Bypass		Poor Level & Quality near Chabewal, Mahalpur outer, Garhshankar outer, No coverage garhshankar to Balachour		Poor Level & Quality at Dasuya outer, Gardiwala outer, Tanda outer, Hariana outer
9	QTL		Poor Level & Quality near Chohal Rd, Chandigarh Bypass, Bajwara		Poor Level & Quality near Gogan, Dansiwai, Simbal Majra, Samundra		Poor Level & Quality near Bajwah, Dholowal, Gogowal, Dallewal, Bassi Nau
10	VODAFONE		Poor Level near Chohal, Poor Quality near Tanda Rd, Mount Avenue		Poor Level & Quality near Garhshankar		Poor Level near Dauya outer

DRIVE TEST TABLE: 8

NO NETWORK COVERAGE STATUS OF DRIVE TEST – JANUARY TO MARCH 15

Sr. No	Month of Drive Test	Circle	Name of Operators	SSA	SDCA Covered	Status of no network coverage area	ICR Status
1	Jan-15	Punjab	Airtel	Amritsar	AJNALA, AMRITSAR, GOINDWAL, PATTI, RAYYA and TARAN TARAN	No Coverage Issue	No
		Punjab	Vodafone		AJNALA, AMRITSAR, GOINDWAL, PATTI, RAYYA and TARAN TARAN	No Coverage Issue	No
		Punjab	Idea		AJNALA, AMRITSAR, GOINDWAL, PATTI, RAYYA and TARAN TARAN	No Coverage Issue	No
		Punjab	Tata GSM		AJNALA, AMRITSAR	No Coverage Issue	Amritsar & Ajnala: On Aircel ICR for both Amritsar & Ajnala SDCA(or Route covered for Day1).
					GOINDWAL, RAYYA	Rayya: No Coverage from Nagoke to Rayya.	----
					PATTI, TARAN TARAN	No Coverage Issue	----
		Punjab	Tata CDMA		AJNALA, AMRITSAR	Amritsar: No Coverage from Mirakot to Rajasansi. Ajnala: No Coverage from Bhalla Vill to Ajnala & Ajnala town.	No
					GOINDWAL, RAYYA	Amritsar: No Coverage for 1 km near Toll Plaza on Amritsar to Jalandhar Highway. Rayya: No Coverage at Baba Bakala. Amritsar & Ajnala: Only Rayya & Goindwal Towns are covered rest of the areas are not covered for the route covered in Day2	No
					PATTI, TARAN TARAN	Amritsar: No Coverage from Talli Sahib to Outer Taran Taran. Taran Taran: No Coverage from Tharu Pandori to Patti. Patti & Taran Taran Only Tarantaran & Patti towns are covered ,rest of the areas are not covered for the route covered in Day3.	No
					AJNALA, AMRITSAR	Amritsar: No Coverage from Rane Wali to Ajnala.	No
		Punjab	Reliance GSM		GOINDWAL, RAYYA	Rayya: No Coverage at Dera Beas. Goindwal: No Coverage from Bhinder Vill to Mianwind	Rayya: On Aircel ICR from Khilchiyan Vill to Rayya on Amritsar to Rayya Highway. Goindwal: On TATA GSM ICR from Miyavind to Goindwal.
					PATTI, TARAN TARAN	Patti: No Coverage from Panjwad	No

Sr. No	Month of Drive Test	Circle	Name of Operators	SSA	SDCA Covered	Status of no network coverage area	ICR Status
						to Bhikiwind.No Coverage from Dayalpur to Algo Kothi.	
		Punjab	Reliance CDMA		AJNALA, AMRITSAR	Amritsar: No Coverage from Rane Wali to Ajnala.	NO
		Punjab	Reliance CDMA		GOINDWAL,RAYYA	Rayya: No Coverage at Baba Bakala.No Coverage at Dera Beas.	NO
		Punjab	Reliance CDMA		PATTI,TARAN TARAN	Amritsar: No Coverage from Talli Sahib to Outer Taran Taran. Taran Taran: No Coverage from Tharu Pandori to Patti.	NO
		Punjab	BSNL		AJNALA, AMRITSAR, GOINDWAL, PATTI, RAYYA and TARAN TARAN	No Coverage Issue	NO
					AJNALA, AMRITSAR	Ajnala: No Coverage from Bhalla Vill to Rokhla Vill.	NO
					GOINDWAL,RAYYA	Rayya: No Coverage from Alowal to Nagoke	NO
		Punjab	Videocon		PATTI,TARAN TARAN	Amritsar: No Coverage from Gohalwad to Outer Taran Taran. Patti: No Coverage from Panjwad to Sur Singh Wala.No Coverage from Patti Mor to Patti.No Coverage from Sarhali to Outer Harike.	NO
					AJNALA, AMRITSAR	No Coverage Issue	NO
		Punjab	Aircel		GOINDWAL,RAYYA	Rayya: No Coverage at Dera Beas.	Rayya & Goindwal: On TATA GSM ICR from Nagoke Vill to Goindwal & Goindwal town also.
2	Feb-15	Punjab	Airtel	Bathinda	BATHINDA, RAMAN, SARDULGARH, MANSA, PHULMANDI	No Coverage Issue	NO
		Punjab	Vodafone	Bathinda	BATHINDA, RAMAN, SARDULGARH, MANSA, PHULMANDI	No Coverage Issue	NO
		Punjab	Idea	Bathinda	BATHINDA, RAMAN, SARDULGARH, MANSA, PHULMANDI	No Coverage Issue	NO
					Bathinda	Bathinda: No Coverage at Military area on Bathinda-Mansa Highway.	NO
		Punjab	Tata GSM		RAMAN,SARDULGARH	Raman: No Coverage from Talwandi Sabo to Raman Highway.No Coverage from Talwandi Sabo to Sardulgarh.	Bathinda: On Reliance GSM ICR at Kot Fattir Vill.
					MANSA,PHULMANDI	Phulmandi: No Coverage from	Mansa: On Reliance GSM ICR

Sr. No	Month of Drive Test	Circle	Name of Operators	SSA	SDCA Covered	Status of no network coverage area	ICR Status
						Outer Maur to Rampura Phul.	from Kot Bahara to Bhai Bhaktaur.
		Punjab	Tata CDMA		Bathinda	Bathinda: No Coverage at Military area on Bathinda-Mansa Highway.	NO
		Punjab	Tata CDMA		RAMAN,SARDULGARH	Raman: No Coverage from Talwandi Sabo to Raman Highway.No Coverage from Talwandi Sabo to Sardulgarh.	NO
		Punjab	Tata CDMA		MANSA,PHULMANDI	Bathinda No Coverage at Kot Fattir. Mansa: No Coverage from Outer Maur to Mansa.	NO
		Punjab	Reliance GSM		Bathinda	Bathinda: No Coverage at Military area on Bathinda-Mansa Highway.	NO
		Punjab	Reliance GSM		RAMAN,SARDULGARH	Sardulgarh: No Coverage from Surtia Vill to outer Sardulgarh. Raman: No Coverage from Jajal Vill to outer Raman.	NO
		Punjab	Reliance GSM		MANSA,PHULMANDI	No Coverage Issue	NO
		Punjab	Reliance GSM		Bathinda	No Coverage Issue	NO
		Punjab	Reliance CDMA		RAMAN,SARDULGARH	Bathinda: No Coverage at Kot Shamir Vill. Sardulgarh: No Coverage from Surtia Vill to outer Sardulgarh.	NO
		Punjab	Reliance CDMA		MANSA,PHULMANDI	Bathinda: No Coverage at Kot Shamir to Maiser Khana. Mansa: No Coverage from Bhai Desa to Mansa. Ramangarh to Mandi KalanBhai Desa to Thutiawala Outer.	NO
		Punjab	BSNL		Bathinda	Bathinda: No Coverage at Military area on Bathinda-Mansa Highway.	NO
		Punjab	BSNL		RAMAN,SARDULGARH	No Coverage Issue	NO
		Punjab	BSNL		MANSA,PHULMANDI	No Coverage Issue	NO
		Punjab	BSNL		Bathinda	No Coverage Issue	NO
		Punjab	Videocon		RAMAN,SARDULGARH	Bathinda: No Coverage from outer Kot Shamir to Talwandi Sabo on Bathinda to Mansa Highway. Raman: No Coverage from Talwandi Sabo to Raman Highway. Sardulgarh: No Coverage from Guru Kashi Uni to Sardulgarh.	NO
		Punjab	Videocon		MANSA,PHULMANDI	Mansa: No Coverage from outer Bhai Bhaktaur to Maur. No Coverage from Maur to Mansa. Phulmandi: No Coverage from Outer Maur to Rampura Phul.	NO
		Punjab	Aircel		Bathinda	Bathinda: No Coverage at Military	On TATA GSM ICR for whole

Sr. No	Month of Drive Test	Circle	Name of Operators	SSA	SDCA Covered	Status of no network coverage area	ICR Status
						area on Bathinda-Mansa Highway.	Bathinda SSA.
					RAMAN,SARDULGARH	Raman: No Coverage from Talwandi Sabo to Raman Highway. Sardulgarh: No Coverage from Outer Talwandi Sabo to Sardulgarh road.	On TATA GSM ICR for whole Bathinda SSA with Exception i.e. Raman: On Reliance GSM ICR from Kot Fattir to Bhagi Vandar.
					MANSA,PHULMANDI	Mansa: Outer Maur Mandi to Rampura, Outer Maur to Mansa	On TATA GSM ICR for whole Bathinda SSA with Exception i.e.On Reliance GSM ICR near kot Fattir.
3	Mar-15	Punjab	Airtel	Hoshiarpur	HOSHIARPUR, BALACHAUR, DASUA, GARHASHANKER and TANDA URMAR	No Coverage Issue	NO
		Punjab	Vodafone		HOSHIARPUR, BALACHAUR, DASUA, GARHASHANKER and TANDA URMAR	No Coverage Issue	NO
		Punjab	Idea		HOSHIARPUR, BALACHAUR, DASUA, GARHASHANKER and TANDA URMAR	No Coverage Issue	NO
		Punjab	Tata GSM		HOSHIARPUR	No Coverage Issue	NO
					GARHASHANKER, BALACHAUR	No Coverage Issue	Hoshiarpur: On Reliance GSM ICR from Chabewal to Mahilpur.
					DASUA,TANDA URMAR	No Coverage Issue	NO
		Punjab	Tata CDMA		HOSHIARPUR	No Coverage Issue	NO
					GARHASHANKER, BALACHAUR	Hoshiarpur: No cov from Chagran to Mahilpur. Balachaur: No cov from Garhashanker to Balachaur & Balachaur town also.	NO
					DASUA,TANDA URMAR	Hoshiarpur: No Cov from Baghpur to outer Hariana. Dasua: No Cov from Bhunga to Talwandi Jatta.Hwy not covered b/w Gardiwala to Khaira Kotli. Tanda Urmr: No cov from Garna Sahib to Tanda.	NO
					HOSHIARPUR	No Coverage Issue	Hoshiarpur: On TATA GSM ICR at Hoshiarpur to Una Rd.
		Punjab	Reliance GSM		GARHASHANKER, BALACHAUR	Balachaur: No Cov from Majari to Balachaur.	Hoshiarpur: On TATA GSM ICR from Hoshairpur to Mahilpur. Garhashanker: On TATA GSM ICR from Garhashanker to Majari.
					DASUA,TANDA URMAR	No Coverage Issue	DASUA: ON TATA GSM ICR from Adda Dosadka to Dasua.

Sr. No	Month of Drive Test	Circle	Name of Operators	SSA	SDCA Covered	Status of no network coverage area	ICR Status
		Punjab	Reliance CDMA		HOSHIARPUR		NO
					GARHASHANKER, BALACHAUR	Balachaur: No cov from Dhamai Vill to Balachaur.	NO
					DASUA,TANDA URMAR	DASUA: No Cov from Bhunga to Talwandi Jatta.No cov from Khuda to Kurala.	NO
	Punjab	BSNL	HOSHIARPUR		No Coverage Issue	NO	
					GARHASHANKER, BALACHAUR	No Coverage Issue	NO
					DASUA,TANDA URMAR	No Coverage Issue	NO
	Punjab	Videocon	HOSHIARPUR		Hoshiarpur: No Coverage near Bajwara at Una Rd.	NO	
					GARHASHANKER, BALACHAUR	Garhashanker: No Cov from Mahilpur to Saila.	NO
					DASUA,TANDA URMAR	Dasua: No cov from Dalewal to Bhunga.	Hoshiarpur& Dasua: On TATA GSM ICR from Hoshiarpur to Dasua.
	Punjab	Aircel	HOSHIARPUR	No Coverage Issue	On TATA GSM ICR for whole Hoshiarpur SSA.		
				GARHASHANKER, BALACHAUR	Hoshiarpur: No Coverage from Chabewal to Mahilpur.	On TATA GSM ICR for whole Hoshiarpur SSA with Exception i.e On Reliance GSM ICR at Mahilpur outer & some part of town also.	
				DASUA,TANDA URMAR	No Coverage Issue	On TATA GSM ICR for whole Hoshiarpur SSA.	

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 January-15**, drive tests were conducted across **Amritsar SSA** covering Amritsar, Ajnala, Rayya, Goindwal, Taran Taran and Patti SDCAs. The performance of the Service Providers across Amritsar SSA was satisfactory as the operators were largely meeting the benchmarks. However, the parameter **Voice quality** remained non-compliant for the Operator **BSNL** with its performance as **89.38%** on overall SSA level.
- (ii) **In the Month of February -15**, drive tests were conducted across **Bhatinda SSA** covering Bhatinda, Raman, Sardulgarh, Mansa, Phulmandi SDCAs. The performance of the Service Providers across Bhatinda SSA was satisfactory as all operators were in compliance with the benchmarks of all the parameters.
- (iii) **In the month of March -15**, drive tests were conducted across **Hoshiarpur SSA** covering Hoshiarpur, Garhashanker, Balachaur, Dasua, Tanda Urmar SDCAs. In this SSA, only parameter **Voice Quality** remained the area of concern as it could not be performed well up to the benchmark by the Operators **BSNL (94.21%) and Tata GSM (94, 69%)**.

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 detail of Network coverage and Intra Circle Roaming (ICR) status of different service providers at various locations in the three SSAs is given in table-8.

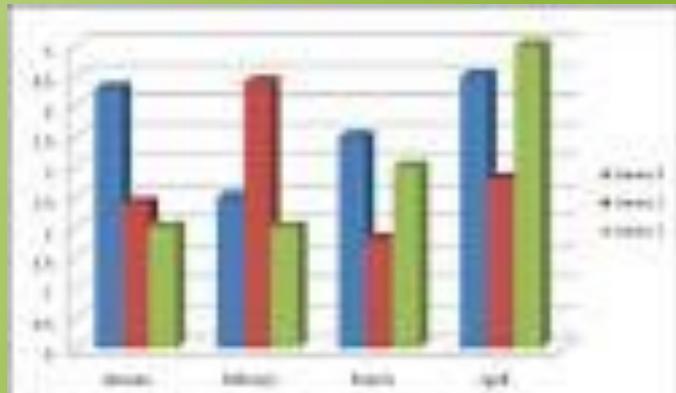
*The analysis of drive tests results revealed that the performance of the services providers in general was satisfactory as they were largely meeting the benchmarks. However, parameter 'Connection with Voice Quality' remained area of concern as the same remained underperformed for **BSNL and Tata (GSM) across Amritsar and Hoshiarpur SSAs***

8. GRAPHICAL REPRESENTATION (CELLULAR MOBILE SERVICE PROVIDERS)

AVERAGED QUARTERLY PMR

V/S

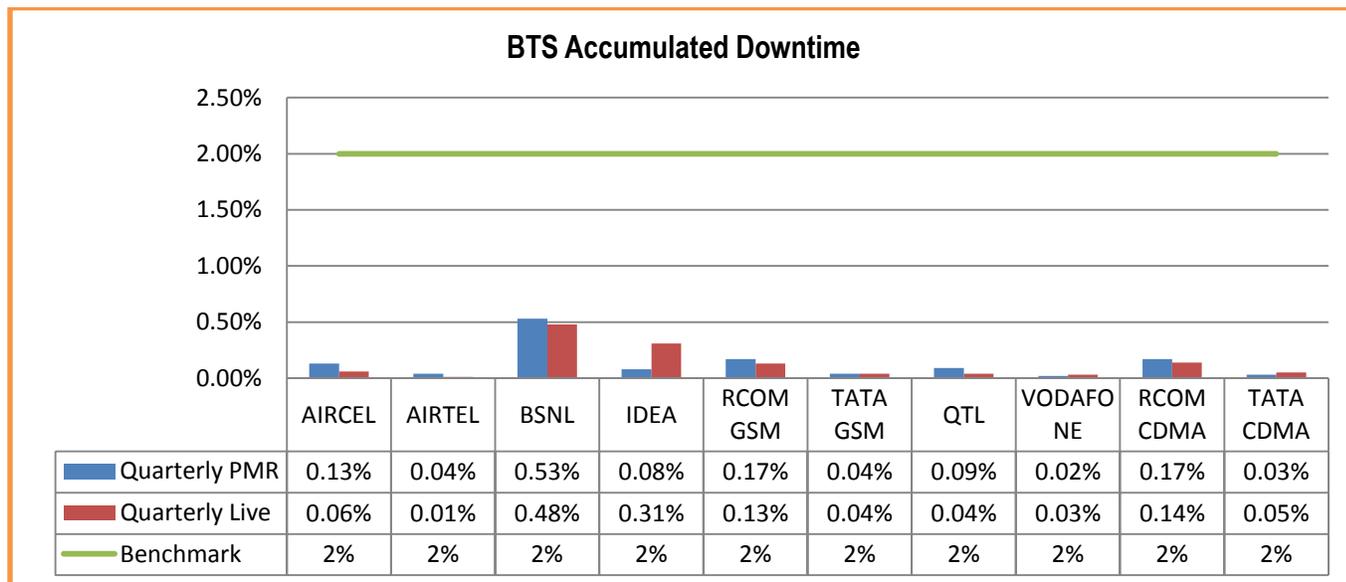
AVERAGED QUARTERLY 3-DAYs LIVE MEASURMENT



8. GRAPHICAL REPRESENTATION (CMTS):

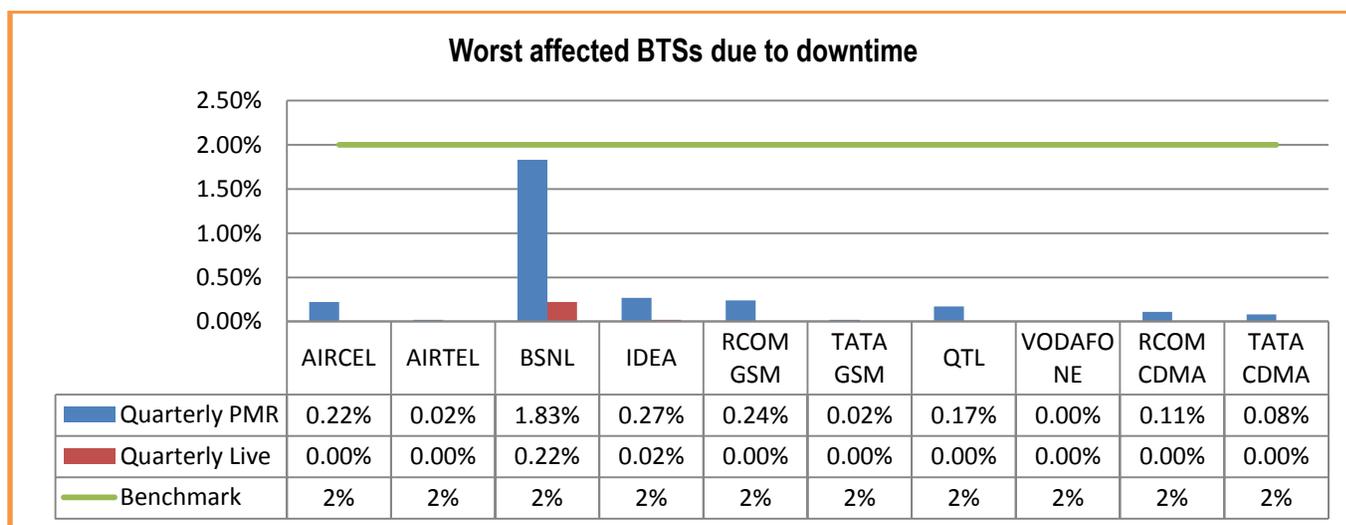
Graphical Representation of Performance of the Cellular Mobile Service Providers (PMR) V/S 3-Days Live Measurement (Quarterly Average Data):

I. BTS ACCUMULATED DOWNTIME:



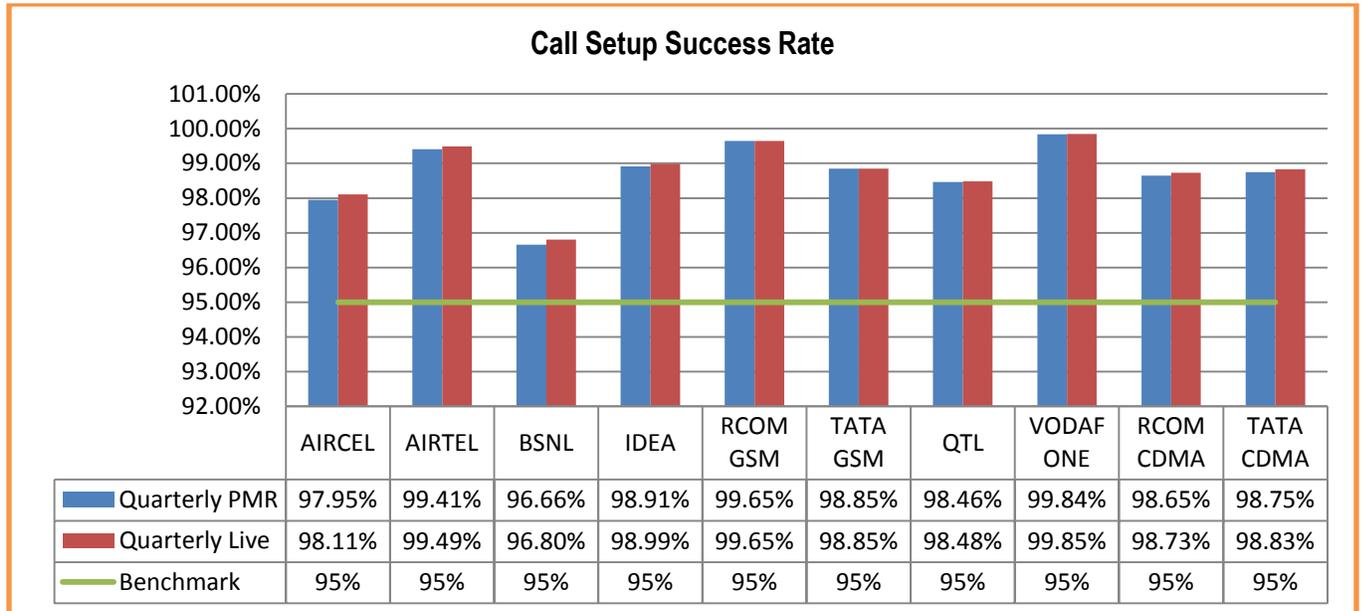
All operators are meeting the benchmarks.

II. WORST AFFECTED BTSS DUE TO DOWNTIME :



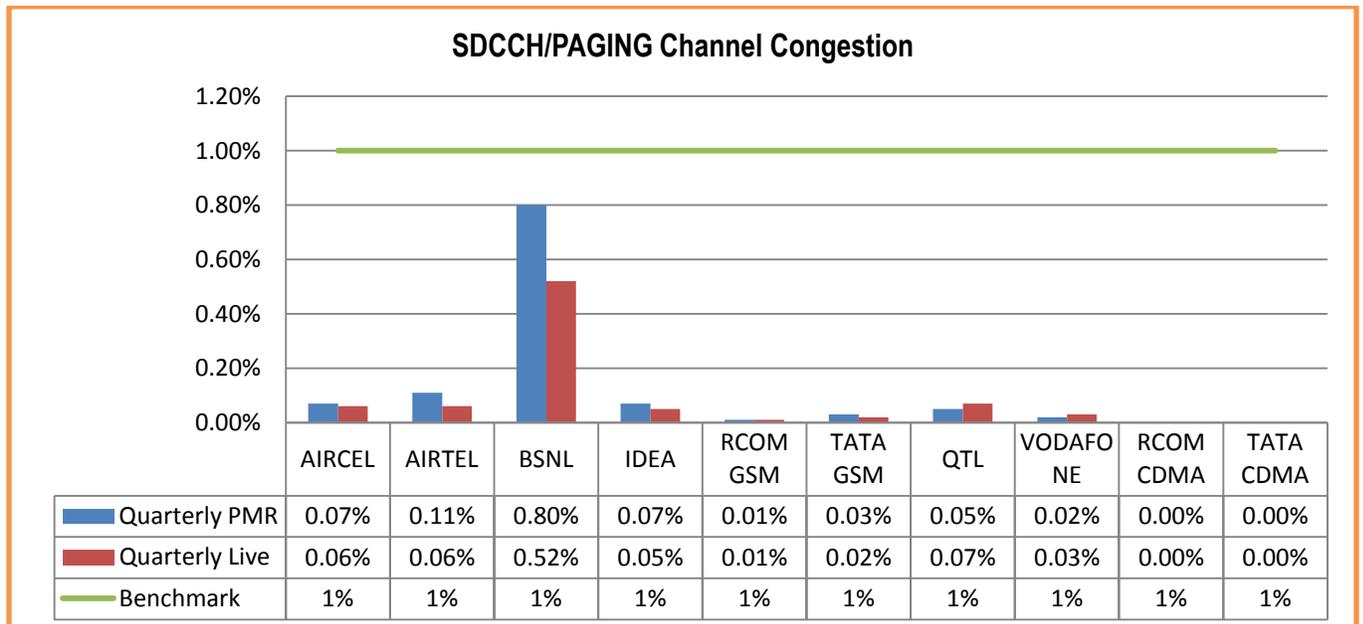
All operators are meeting the benchmarks.

III. CALL SETUP SUCCESS RATE :



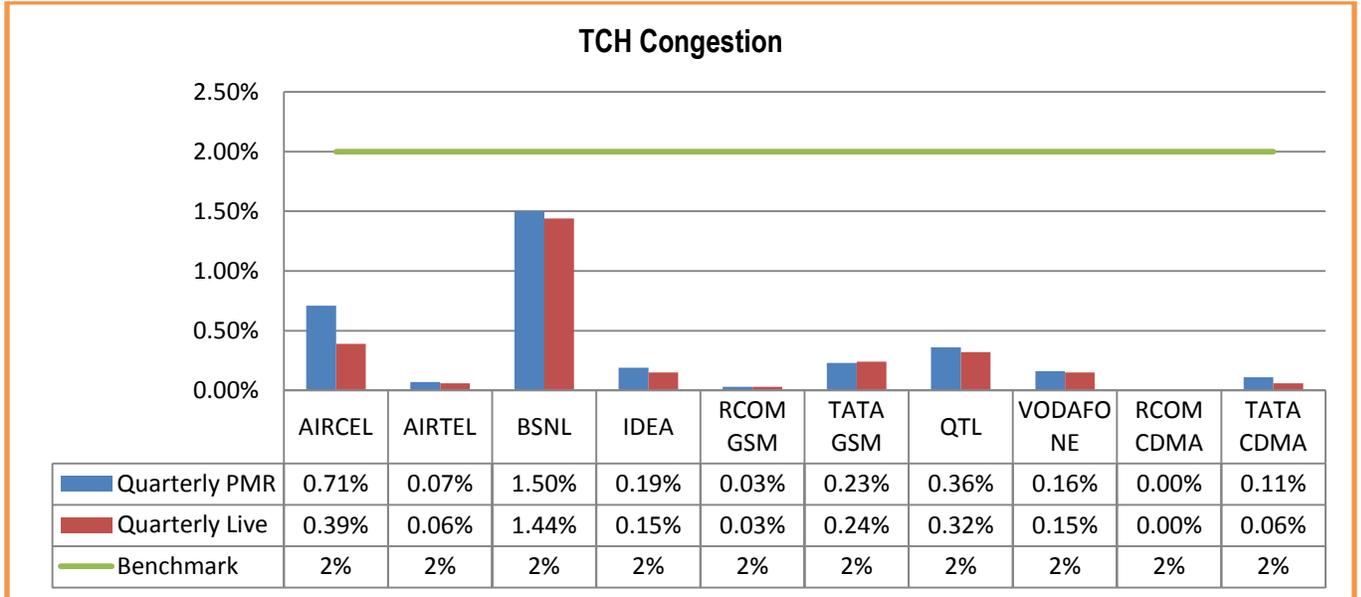
All operators are meeting the benchmarks.

IV. SDCCH/PAGING CHANNEL CONGESTION



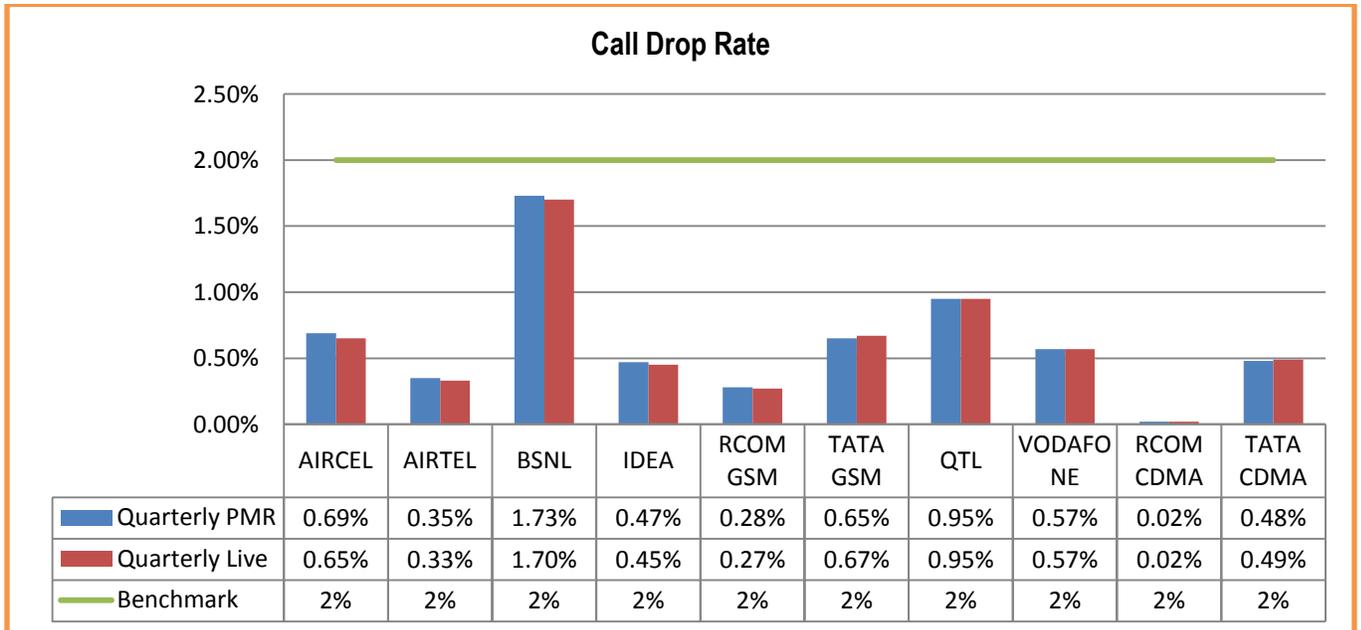
All operators are meeting the benchmarks.

V. TCH CONGESTION :



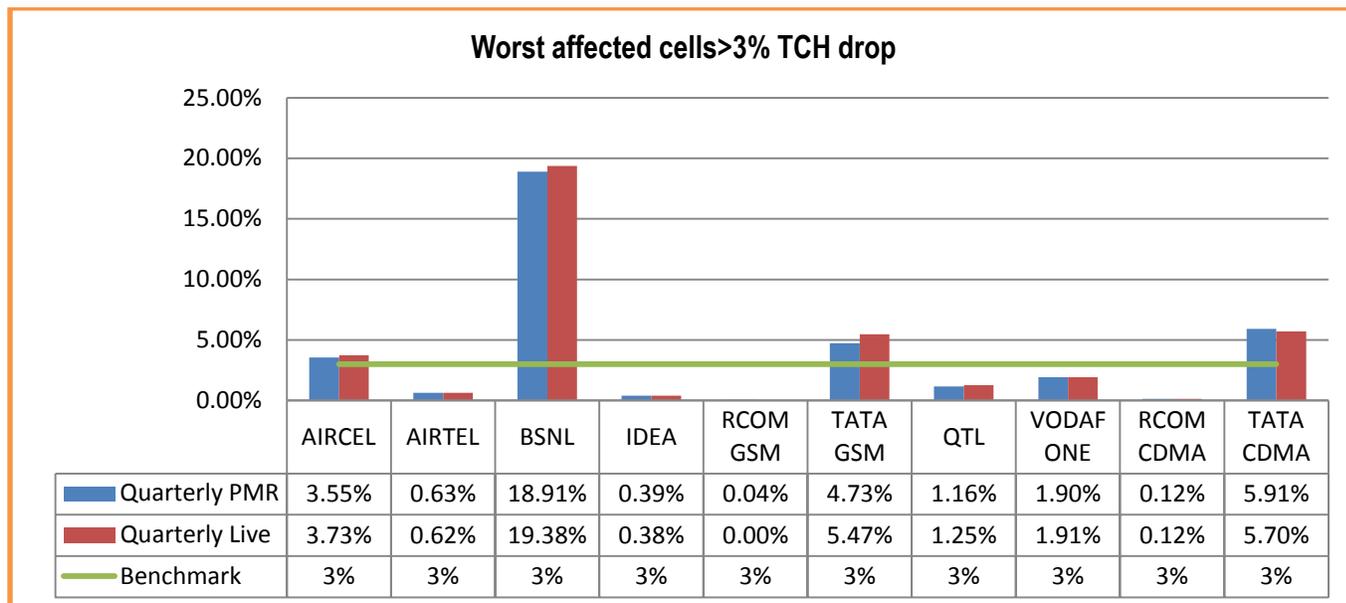
All operators are meeting the benchmarks.

VI. CALL DROP RATE :



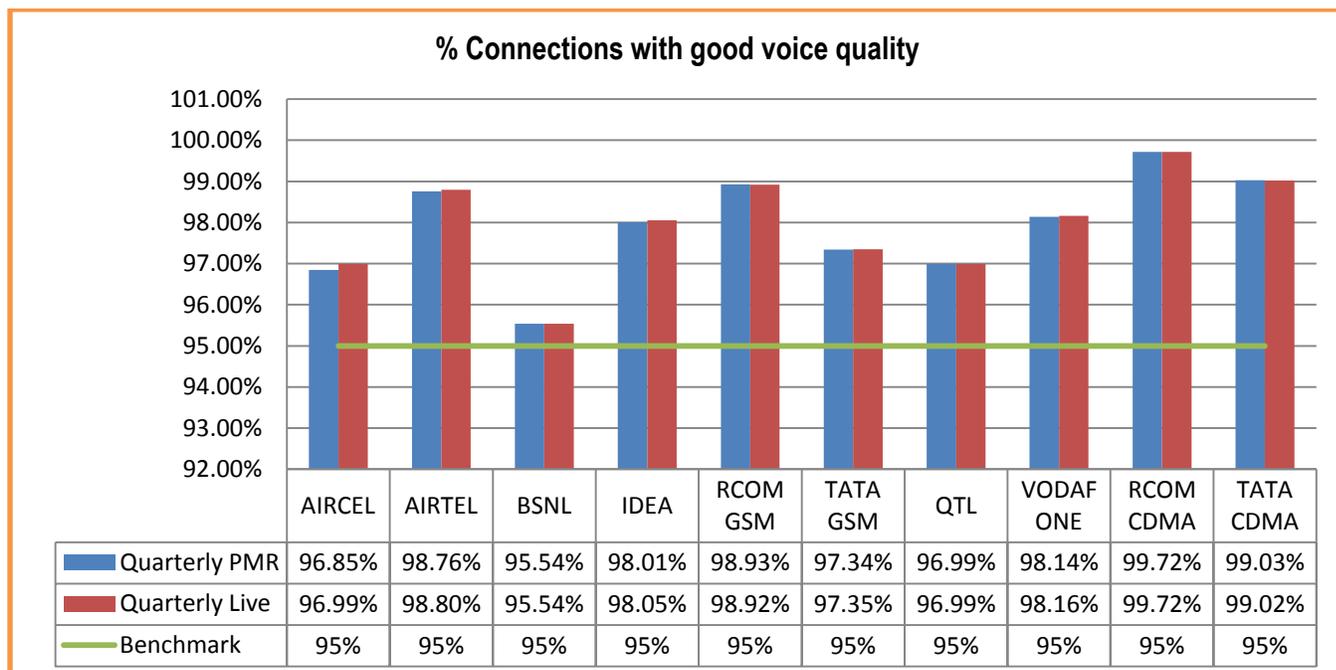
All operators are meeting the benchmarks.

VII. WORST AFFECTED CELLS>3% TCH DROP:



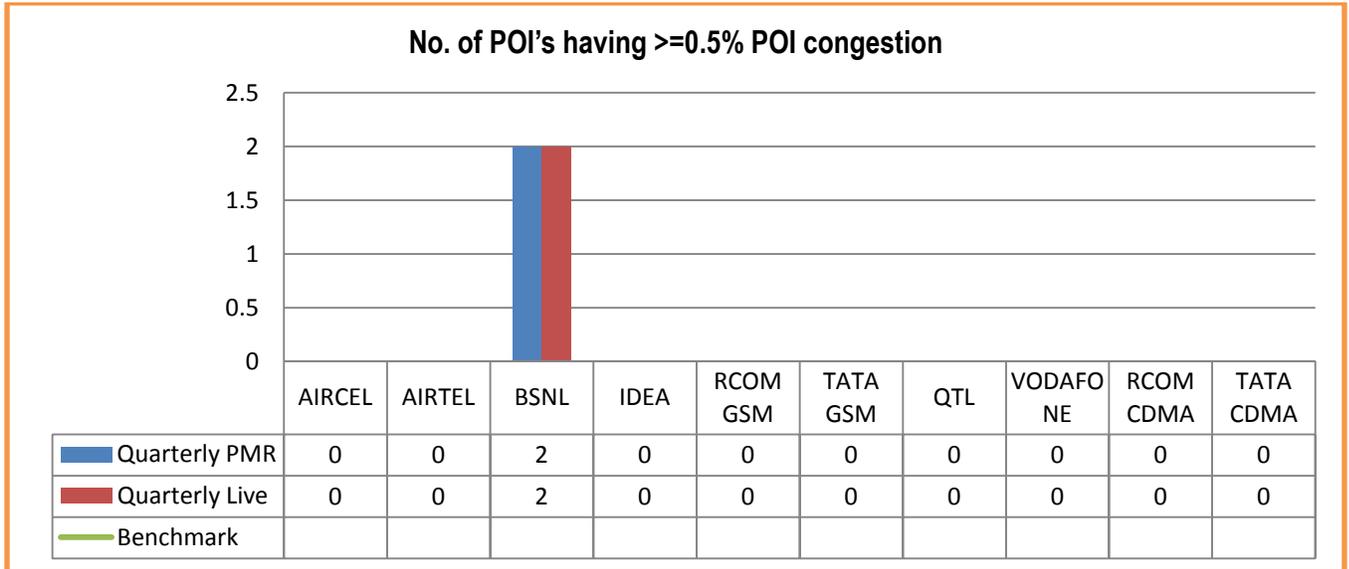
Aircel, BSNL, Tata (GSM) and Tata (CDMA) could not meet the benchmark.

VIII. PERCENTAGE OF CONNECTIONS WITH GOOD VOICE QUALITY:



All operators are meeting the benchmarks.

IX. POI CONGESTION:



All operators are meeting the benchmark except BSNL.