



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

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PREFACE

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

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

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

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1. BACKGROUND



1. BACKGROUND

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

The purpose of laying down Quality of Service Parameters is to:

- i) Create conditions for consumer satisfaction by making known the quality of service, which the Service provider is required to provide, and the user has a right to expect.
- ii) Measure the Quality of Service provided by the Service Providers from time to time and to compare them with the norms so as to assess the level of performance.
- iii) Generally protect the interests of consumers of telecommunication services.

TRAI, the regulatory watch dog for the Quality of Service for the telecom services – Basic (Wire line), Cellular Mobile (Wireless) and Broadband has commissioned **M/s TUV-SUD South Asia Pvt. Ltd.** for conducting audit and assessment of quality of service of service providers, in terms of the benchmarks specified in the “The Standards of Quality of Service of Basic Telephone Service (Wire line) and Cellular Mobile Telephone Service Regulations, 2009 (7 of 2009) dated 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

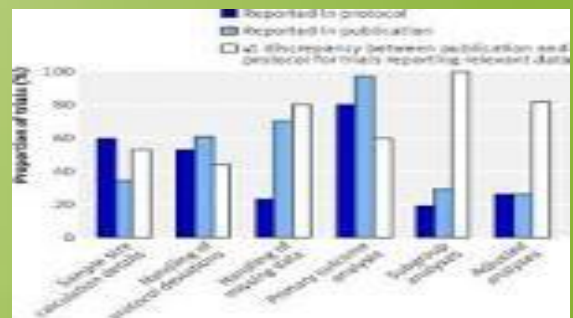
The primary objective is to audit and assess the Quality of Service being rendered by Basic, Cellular Mobile & Broadband service providers against the parameters notified by TRAI.

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 Delhi, Haryana and Mumbai circles during the quarter October – December 2014.**

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

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

3. SAMPLE SIZE



3. SAMPLE SIZE

3.1 SAMPLING FOR CELLULAR MOBILE (WIRELESS) SERVICE PROVIDERS

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

Sl. No.	Name of Service Provider	Dates of live measurement Audit			Audit Location
		October-14	November-14	December-14	
GSM Operators		October-14	November-14	December-14	Address
1	AIRCEL	14 to 16 Oct-14	11 to 13 Nov-14	4, 5 & 8 Dec-14	Dishnet Wireless Ltd Office ,Phase -7 Industrial Area, Mohali
2	AIRTEL	13 to 15 Oct-14	12 to 14 Nov-14	8 to 10 Dec-14	Bharti Airtel Campus, Plot No 21, Rajiv Gandhi Information and Technology Park, Chandigarh, 160101
3	TATA GSM	15 to 17 Oct-14	6, 7 & 10 Nov-14	17 to 19 Dec-14	TTSL Office Phase-8,Industrial area Mohali
4	BSNL	8 to 10 Oct-14	7, 10 & 11 Nov-14	5, 8 & 9 Dec-14	BSNL Exchange Sector-49 Chandigarh
5	VIDEOCON	14 to 16 Oct-14	10 to 12 Nov-14	8 to 10 Dec-14	QTL Office Phase -7 Industrial Area, Mohali
6	RCOM GSM	8 to 10 Oct-14	5 to 7 Nov-14	8 to 10 Dec-14	Reliance Communications Ltd. Phase-8,Industrial area Mohali
7	IDEA	13 to 15 Oct-14	5 to 7 Nov-14	5, 8 & 9 Dec-14	Idea Office Phase -7 Industrial Area,Mohali
8	VODAFONE	8 to 10 Oct-14	4, 5 & 7 Nov-14	3 to 5 Dec-14	Vodafone Office Phase-8,Industrial area Mohali
CDMA Operators					
9	TATA CDMA	15 to 17 Oct-14	5 to 7 Nov-14	17 to 19 Dec-14	TTSL Office Phase-8,Industrial area Mohali
10	RCOM CDMA	8 to 10 Oct-14	6, 7 & 10 Nov-14	8 to 10 Dec-14	Reliance Communications Ltd. Phase-8, Industrial area Mohali

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

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

3.2 SAMPLING FOR BASIC (WIRE LINE) SERVICES

- The QoS audit for basic (wire line) service is to be done for the number of exchanges spread over in about 10% of SDCAs with each service providers in specified circles only once in a year **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 December- 2014.**

3.3 SAMPLING FOR BROADBAND SERVICE PROVIDERS

- TUV–SUD South Asia has to conduct the audit and assessment of Quality of Service of Broadband Service only in respect of the service providers who are having broadband subscriber base of more than 10,000 subscribers in their licensed service area, for 5% of Point of Presence (PoPs) spread over in 10% SDCAs in specified Telecom Circle 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 December- 2014.**

4. EXECUTIVE SUMMARY



4. EXECUTIVE SUMMARY

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

- “Service provider performance report” for Cellular mobile, Basic (wire line) and Broadband services , which gives a foretaste of the performance of various operators against the benchmark specified by TRAI, during the months in which the Audit was carried out by TUV-SUD Auditors.
- “Parameter wise critical findings” for Cellular mobile, Basic (wire line) and Broadband services: This indicates key observations and findings from different activities carried out during the Audit process.
- TUV-SUD conducted audit involved a 3 stage verification process which consisted of auditing the records of the service providers and verifying the data submitted to TRAI. The second step involved a three day live measurement of all the network parameters. On the basis of the three days live measurement, the auditors checked the busy hour of the day for the service provider and collected the data for this busy hour for the month in which the audit was conducted Finally, the performance of the service providers was also gauged by conducting drive tests in three select SSAs per service provider per quarter.
- The three stage audit / verification viz audit of the records, live measurements and drive tests of all the cellular mobile operators was repeated every month. In case of Basic (Wire line) and Broadband, this exercise is required to be carried out on quarterly basis.
- **Essence of compliance report of service providers with respect to the QoS:**

Cellular Mobile Service:

(i) From 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 **3.17%, 19.46%, 3.89% and 5.46%** 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 December-2014 with their quarterly average performance as **3.24%, 23.27%, 4.00% and 5.61%** respectively,

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

(ii) With regard to the **Customer Service Quality Parameters**, it is revealed that all operators are in well compliance of the parameters on Metering and Billing Credibility, Termination of Service and Time taken for refunds. All service providers are in compliance with respect to the parameter accessibility of call center. However, **BSNL, RCOM(GSM) and Tata(GSM)** have not met the benchmark of “calls answered by Operators (voice to voice) within **90 seconds**” with their achieved performance as **61.68%, 92.96% and 86.64%** respectively against the benchmark of $\geq 95\%$.

During 3 days live measurement, all operators (except **Airtel and Tata GSM**) have met the benchmarks for the parameters “**Accessibility to call center**” and “**Call connection to operators (Voice to voice) within 90 seconds**”. **Airtel and Tata GSM** remained short of benchmark for parameter ‘**calls connected to operator within 90 seconds**’ with their performance as **94.84%** and **81.02%** 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 **Airtel, BSNL, RCOM (GSM), Tata (GSM) and Videocon across the three SSAs namely Patiala, Sangrur and Chandigarh where the drive tests were conducted.**

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

5. PMR AUDIT REPORT



5. PMR AUDIT REPORTS:

5.1 MONTHLY PMR:

5.1.1 BUSY HOUR OF VARIOUS SERVICE PROVIDERS:

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

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

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	5237	Ericsson	Ericsson
3	BSNL	12	48	3276	Ericsson & ZTE	Ericsson, ZTE & NSN
4	IDEA	9	50	4780	ZTE	ZTE & Huawei
5	RCOM GSM	3	8	1538	Huawei & Ericsson	ZTE
6	TATA GSM	2	12	1648	NSN	NSN
7	QTL	2	12	2160	Huawei & NSN	Huawei
8	VODAFONE	9	51	4826	Ericsson	Ericsson
CDMA Operators						
9	RCOM CDMA	4	3	625	Lucent, ZTE & Ericsson	Lucent & ZTE
10	TATA CDMA	3	4	449	Ericsson	Huawei & Motorola

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

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE - OCT 14 MONTH													
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators									CDMA Operators
Network Service Quality Parameter													
Network Availability													
1	a) BTS Accumulated Downtime	<=2%	Oct-14	0.13%	0.05%	0.35%	0.06%	0.10%	0.02%	0.07%	0.02%	0.13%	0.03%
	b) Worst affected BTSs due to downtime	<=2%	Oct-14	0.33%	0.04%	1.85%	0.04%	0.20%	0.00%	0.10%	0.00%	0.16%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Oct-14	97.45%	99.38%	96.47%	98.79%	99.62%	98.94%	98.32%	99.81%	98.55%	98.78%
	b) SDCCH/PAGING Channel congestion	<=1%	Oct-14	0.35%	0.11%	0.34%	0.06%	0.01%	0.02%	0.09%	0.44%	0.00%	0.00%
	c) TCH congestion	<=2%	Oct-14	1.54%	0.08%	1.09%	0.20%	0.03%	0.14%	0.31%	0.19%	0.00%	0.12%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Oct-14	0.78%	0.46%	1.42%	0.55%	0.29%	0.66%	0.99%	0.60%	0.03%	0.61%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Oct-14	3.64%	0.73%	18.93%	0.29%	0.00%	4.04%	1.30%	1.69%	0.14%	5.54%
	c) Connections with good voice quality	>=95%	Oct-14	96.55%	98.51%	95.59%	97.32%	98.87%	97.13%	96.90%	97.88%	99.72%	98.98%
4	No. of POI's having >=0.5% POI congestion		Oct-14	0	0	0	0	0	0	0	0	0	0

5.1.4 QOS PERFORMANCE OF MONTHLY PMR NOVEMBER 14 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE - NOV 14 MONTH													
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators								CDMA Operators	
Network Service Quality Parameter													
Network Availability													
1	a) BTS Accumulated Downtime	<=2%	Nov-14	0.09%	0.04%	0.64%	0.02%	0.13%	0.01%	0.05%	0.02%	0.13%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	Nov-14	0.00%	0.02%	1.54%	0.06%	0.20%	0.00%	0.09%	0.00%	0.48%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Nov-14	97.56%	99.49%	96.83%	98.85%	99.65%	99.02%	98.75%	99.84%	98.61%	98.87%
	b) SDCCH/PAGING Channel congestion	<=1%	Nov-14	0.44%	0.08%	0.43%	0.05%	0.02%	0.05%	0.04%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Nov-14	1.78%	0.07%	1.56%	0.16%	0.03%	0.09%	0.24%	0.16%	0.00%	0.08%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Nov-14	0.71%	0.41%	1.80%	0.45%	0.28%	0.57%	0.84%	0.55%	0.02%	0.54%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Nov-14	2.90%	0.73%	19.65%	0.21%	0.00%	3.68%	0.96%	1.68%	0.07%	5.39%
	c) Connections with good voice quality	>=95%	Nov-14	96.63%	98.67%	95.85%	97.52%	98.92%	97.31%	97.32%	98.06%	99.72%	99.00%
4	No. of POI's having >=0.5% POI congestion		Nov-14	0	0	1	0	0	0	0	0	0	0

5.1.5 QOS PERFORMANCE OF MONTHLY PMR – DECEMBER- 14 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE - DEC 14 MONTH													
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators									CDMA Operators
Network Service Quality Parameter													
Network Availability													
1	a) BTS Accumulated Downtime	<=2%	Dec-14	0.21%	0.05%	0.50%	0.04%	0.18%	0.03%	0.08%	0.02%	0.15%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	Dec-14	0.67%	0.02%	1.86%	0.06%	0.07%	0.00%	0.09%	0.00%	0.16%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Dec-14	98.16%	99.50%	96.48%	98.90%	99.66%	98.97%	98.72%	99.86%	98.70%	98.93%
	b) SDCCH/PAGING Channel congestion	<=1%	Dec-14	0.08%	0.05%	0.87%	0.06%	0.01%	0.03%	0.05%	0.01%	0.00%	0.00%
	c) TCH congestion	<=2%	Dec-14	0.59%	0.07%	1.55%	0.18%	0.02%	0.12%	0.29%	0.14%	0.00%	0.19%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Dec-14	0.69%	0.41%	1.70%	0.47%	0.28%	0.61%	0.88%	0.57%	0.02%	0.60%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Dec-14	2.96%	0.74%	19.80%	0.23%	0.03%	3.95%	1.04%	1.76%	0.09%	5.44%
	c) Connections with good voice quality	>=95%	Dec-14	96.99%	98.74%	95.73%	97.58%	98.93%	97.35%	97.38%	98.19%	99.72%	99.02%
4	No. of POI's having >=0.5% POI congestion		Dec-14	0	0	2	0	0	0	0	0	0	0

5.1.6 QOS PERFORMANCE OF QUARTERLY PMR –AVERAGE OF QE- DECEMBER 14 (OCTOBER – NOVEMBER – DECEMBER MONTHS AUDITED DATA)

QUARTERLY QOS PERFORMANCE (AVERAGE OF QE – DECEMBER 14) – PUNJAB CIRCLE													
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators									CDMA Operators
Network Service Quality Parameter													
Network Availability													
1	a) BTS Accumulated Downtime	<=2%	Quarterly	0.14%	0.05%	0.50%	0.04%	0.14%	0.02%	0.07%	0.02%	0.14%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.33%	0.03%	1.75%	0.05%	0.16%	0.00%	0.09%	0.00%	0.27%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	97.72%	99.46%	96.59%	98.85%	99.64%	98.98%	98.60%	99.84%	98.62%	98.86%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.29%	0.08%	0.55%	0.06%	0.01%	0.03%	0.06%	0.16%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	1.30%	0.07%	1.40%	0.18%	0.03%	0.12%	0.28%	0.16%	0.00%	0.13%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	0.73%	0.43%	1.64%	0.49%	0.28%	0.61%	0.90%	0.57%	0.02%	0.58%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	3.17%	0.73%	19.46%	0.24%	0.01%	3.89%	1.10%	1.71%	0.10%	5.46%
	c) Connections with good voice quality	>=95%	Quarterly	96.72%	98.64%	95.72%	97.47%	98.91%	97.26%	97.20%	98.04%	99.72%	99.00%
4	No. of POI's having >=0.5% POI congestion		Quarterly	0	0	1	0	0	0	0	0	0	0

5.1.7 KEY FINDINGS ON MONTHLY PMR AUDIT REPORTS:

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

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

Network Service Quality Parameters:

- **Network Availability**

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

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

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

- **Connection Establishment (Accessibility)**

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

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

All the operators were meeting the benchmark on this parameter.

- **Parameters related to Network Congestion:**

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

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

With respect to this parameter, the performance of the operators is quite satisfactory as **all operators met the TRAI specified benchmarks on the congestion parameters.**

- **Connection Maintenance (Retainability)**

- i. Call Drop Rate:

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

The audit of this parameter revealed that all the service providers were measuring this parameter as per the TRAI guidelines. Also, all the service providers were found to be meeting the TRAI specified benchmark. The lowest call drop rate (0.02 %) 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 **3.17%, 19.46%, 3.89% and 5.46%** 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 **one POI** only.

**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) – OCTOBER 14 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE - OCTOBER 14 MONTH													
Live measurement Data		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators			
Network Service Quality Parameter													
Network Availability													
1	a) BTS Accumulated Downtime	<=2%	Live data	0.11%	0.03%	0.71%	0.10%	0.11%	0.03%	0.09%	0.04%	0.16%	0.04%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.69%	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	98.14%	99.53%	96.08%	98.88%	99.61%	98.98%	98.65%	99.80%	98.58%	98.71%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.01%	0.02%	0.50%	0.08%	0.02%	0.01%	0.03%	0.07%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.36%	0.07%	1.10%	0.21%	0.03%	0.09%	0.20%	0.20%	0.00%	0.23%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.68%	0.41%	1.53%	0.54%	0.29%	0.68%	0.89%	0.68%	0.03%	0.61%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	3.28%	0.64%	26.57%	0.28%	0.00%	4.29%	1.24%	1.23%	0.07%	5.36%
	c) Connections with good voice quality	>=95%	Live data	96.98%	98.58%	95.47%	97.51%	98.88%	97.14%	97.12%	97.85%	99.73%	98.99%
4	No. of POI having >=0.5% congestion		Live data	0	0	0	0	0	0	0	0	0	0

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

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE – NOVEMBER 14 MONTH													
Live measurement Data		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators							CDMA Operators		
Network Service Quality Parameter													
Network Availability													
1	a) BTS Accumulated Downtime	<=2%	Live data	0.04%	0.02%	0.21%	0.01%	0.10%	0.01%	0.11%	0.01%	0.11%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.22%	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	97.77%	99.47%	96.73%	98.88%	99.63%	99.11%	98.80%	99.85%	98.49%	98.90%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.95%	0.08%	0.29%	0.05%	0.01%	0.00%	0.02%	0.03%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	1.19%	0.08%	1.57%	0.21%	0.03%	0.03%	0.19%	0.15%	0.00%	0.11%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.82%	0.41%	1.93%	0.47%	0.27%	0.55%	0.85%	0.57%	0.03%	0.57%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	2.95%	0.64%	21.36%	0.23%	0.00%	3.62%	1.08%	1.73%	0.11%	5.17%
	c) Connections with good voice quality	>=95%	Live data	96.44%	98.67%	95.88%	97.54%	98.87%	97.29%	97.25%	98.03%	99.73%	99.00%
4	No. of POI having >=0.5% congestion		Live data	0	0	0	0	0	0	0	0	0	0

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

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE – DECEMBER 14 MONTH													
Live measurement Data		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators							CDMA Operators		
Network Service Quality Parameter													
Network Availability													
1	a) BTS Accumulated Downtime	<=2%	Live data	0.54%	0.01%	0.34%	0.02%	0.13%	0.02%	0.09%	0.02%	0.14%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.06%	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	98.25%	99.49%	96.18%	98.92%	99.66%	99.08%	98.74%	99.87%	98.77%	98.49%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.02%	0.03%	0.71%	0.05%	0.01%	0.01%	0.05%	0.01%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.36%	0.06%	1.58%	0.13%	0.03%	0.06%	0.28%	0.13%	0.00%	0.70%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.89%	0.41%	1.82%	0.46%	0.26%	0.67%	0.83%	0.55%	0.02%	0.61%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	3.48%	0.73%	21.87%	0.19%	0.00%	4.09%	0.96%	1.53%	0.02%	6.31%
	c) Connections with good voice quality	>=95%	Live data	97.06%	98.72%	95.77%	97.36%	98.94%	97.44%	97.38%	98.15%	99.72%	99.02%
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 OCTOBER – NOVEMBER – DECEMBER 2014 MONTHS AUDITED DATA)

QUARTERLY QOS PERFORMANCE OF 3-DAYS LIVE MEASUREMENT (AVERAGE OF QE- DECEMBER14) – 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	0.23%	0.02%	0.42%	0.04%	0.11%	0.02%	0.10%	0.02%	0.14%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.00%	0.00%	0.32%	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%	Quarterly	98.05%	99.50%	96.33%	98.89%	99.63%	99.06%	98.73%	99.84%	98.61%	98.70%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.33%	0.04%	0.50%	0.06%	0.01%	0.01%	0.03%	0.04%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	0.64%	0.07%	1.42%	0.18%	0.03%	0.06%	0.22%	0.16%	0.00%	0.35%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	0.80%	0.41%	1.76%	0.49%	0.27%	0.63%	0.86%	0.60%	0.03%	0.60%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	3.24%	0.67%	23.27%	0.23%	0.00%	4.00%	1.09%	1.50%	0.07%	5.61%
	c) Connections with good voice quality	>=95%	Quarterly	96.83%	98.66%	95.71%	97.47%	98.90%	97.29%	97.25%	98.01%	99.73%	99.00%
4	No. of POI having >=0.5% congestion		Quarterly	0	0	1	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 December-2014. The quarterly average performance of **Aircel, BSNL, Tata (GSM) and Tata (CDMA)** was **3.24%, 23.27%, 4.00% and 5.61%** 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 - October 14 month

S/N	Name of Parameter	Bench- mark	Audit Period	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
Network Service Quality Parameter													
Network Availability													
1	a) Total no. of BTSs in the licensed service area		Oct-14	599	5162	3187	4629	1537	1648	2085	4736	625	448
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Oct-14	588.59	1977.48	8229.40	2072.67	1134.58	249.71	1145.65	765.01	607.00	95.31
	c) BTS Accumulated Downtime	<=2%	Oct-14	0.13%	0.05%	0.35%	0.06%	0.10%	0.02%	0.07%	0.02%	0.13%	0.03%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Oct-14	2	2	59	2	3	0	2	0	1	0
	e) Worst affected BTSs due to downtime	<=2%	Oct-14	0.33%	0.04%	1.85%	0.04%	0.20%	0.00%	0.10%	0.00%	0.16%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Oct-14	97.45%	99.38%	96.47%	98.79%	99.62%	98.94%	98.32%	99.81%	98.55%	98.78%
	b) SDCCH/PAGING Congestion	<=1%	Oct-14	0.35%	0.11%	0.34%	0.06%	0.01%	0.02%	0.09%	0.44%	0.00%	0.00%
	c) TCH congestion	<=2%	Oct-14	1.54%	0.08%	1.09%	0.20%	0.03%	0.14%	0.31%	0.19%	0.00%	0.12%
Connection Maintenance (Retainability)													
3	a) Call Drop Rate (CDR)	<=2%	Oct-14	0.78%	0.46%	1.42%	0.55%	0.29%	0.66%	0.99%	0.60%	0.03%	0.61%
	b) Worst affected cells>3% TCH drop	<=3%	Oct-14	3.64%	0.73%	18.93%	0.29%	0.00%	4.04%	1.30%	1.69%	0.14%	5.54%
	c) % of connections with good voice quality	>=95%	Oct-14	96.55%	98.51%	95.59%	97.32%	98.87%	97.13%	96.90%	97.88%	99.72%	98.98%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Oct-14	65	113	1809	40	0	203	85	244	3	79
	e) Total no. of cells (Sector) in the licensed service area		Oct-14	1799	15570	9561	13767	4569	5025	6579	14472	1874	1430
No. of POI's having >=0.5% POI congestion													
4	No. of POI's having >=0.5% POI congestion		Oct-14	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Oct-14	0	0	0	0	0	0	0	0	0	0
Network Data													
5	a) Equipped Capacity of Network in Erlang		Oct-14	25296	252185	282000	204576	72000	107635	92445	156410	53000	28000
	b) Total traffic in TCBH in erlang (Avg.)		Oct-14	9681	222308	106355	154856	56776	33051	45431	123803	12165	2891
	c) Total no. of customers served (as per VLR) on last day of the month		Oct-14	458006	6652646	2385200	6063127	2568468	1175946	1318414	4492220	287345	104896

TABLE: 2

Detailed Network Data Assessment of Cellular Mobile Telephone Services -3 days live - Punjab Circle – Oct 14 month													
S/N	Name of Parameter	Bench-mark	Average of 3 Days	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
Network Service Quality Parameter													
Network Availability													
1	a) Total no. of BTSs in the licensed service area		Live data	600	5140	3174	4565	1537	1648	2083	4696	625	448
	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	48.49	93.83	1614.45	339.88	120.12	38.64	128.35	175.03	71.85	14.45
	c) BTS Accumulated Downtime	<=2%	Live data	0.11%	0.03%	0.71%	0.10%	0.11%	0.03%	0.09%	0.04%	0.16%	0.04%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	22	0	0	0	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.69%	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	98.14%	99.53%	96.08%	98.88%	99.61%	98.98%	98.65%	99.80%	98.58%	98.71%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.01%	0.02%	0.50%	0.08%	0.02%	0.01%	0.03%	0.07%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.36%	0.07%	1.10%	0.21%	0.03%	0.09%	0.20%	0.20%	0.00%	0.23%
Connection Maintenance (Retainability)													
3	a) Call Drop Rate (CDR)	<=2%	Live data	0.68%	0.41%	1.53%	0.54%	0.29%	0.68%	0.89%	0.68%	0.03%	0.61%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	3.28%	0.64%	26.57%	0.28%	0.00%	4.29%	1.24%	1.23%	0.07%	5.36%
	c) % of connections with good voice quality	>=95%	Live data	96.98%	98.58%	95.47%	97.51%	98.88%	97.14%	97.12%	97.85%	99.73%	98.99%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	59	99	2530	39	0	216	81	178	1	76
	e) Total no. of cells (Sector) in the licensed service area		Live data	1800	15488	9522	13737	4569	5025	6574	14454	1874	1424
No. of POI's having >=0.5% POI congestion													
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0	0

TABLE: 3

Detailed Network Data Assessment of Cellular Mobile Telephone Services - Punjab Circle - November 14 month

S/N	Name of Parameter	Bench- mark	Audit Period	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators									
Network Service Quality Parameter													
1	Network Availability												
	a) Total no. of BTSs in the licensed service area		Nov-14	600	5189	3250	4680	1537	1648	2133	4786	625	449
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Nov-14	383.25	1647.75	15002.58	806.98	1420.78	158.81	819.16	545.07	599.55	55.60
	c) BTS Accumulated Downtime	<=2%	Nov-14	0.09%	0.04%	0.64%	0.02%	0.13%	0.01%	0.05%	0.02%	0.13%	0.02%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Nov-14	0	1	50	3	3	0	2	0	3	0
e) Worst affected BTSs due to downtime	<=2%	Nov-14	0.00%	0.02%	1.54%	0.06%	0.20%	0.00%	0.09%	0.00%	0.48%	0.00%	
2	Connection Establishment (Accessibility)												
	a) CSSR (Call Setup Success Rate)	>=95%	Nov-14	97.56%	99.49%	96.83%	98.85%	99.65%	99.02%	98.75%	99.84%	98.61%	98.87%
	b) SDCCH/PAGING Congestion	<=1%	Nov-14	0.44%	0.08%	0.43%	0.05%	0.02%	0.05%	0.04%	0.02%	0.00%	0.00%
c) TCH congestion	<=2%	Nov-14	1.78%	0.07%	1.56%	0.16%	0.03%	0.09%	0.24%	0.16%	0.00%	0.08%	
3	Connection Maintenance (Retainability)												
	a) Call Drop Rate (CDR)	<=2%	Nov-14	0.71%	0.41%	1.80%	0.45%	0.28%	0.57%	0.84%	0.55%	0.02%	0.54%
	b) Worst affected cells>3% TCH drop	<=3%	Nov-14	2.90%	0.73%	19.65%	0.21%	0.00%	3.68%	0.96%	1.68%	0.07%	5.39%
	c) % of connections with good voice quality	>=95%	Nov-14	96.63%	98.67%	95.85%	97.52%	98.92%	97.31%	97.32%	98.06%	99.72%	99.00%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Nov-14	52	113	1916	29	0	185	64	245	1	77
e) Total no. of cells (Sector) in the licensed service area		Nov-14	1798	15064	9750	13980	4569	5026	6630	14584	1874	1425	
4	No. of POI's having >=0.5% POI congestion												
	No. of POI's having >=0.5% POI congestion		Nov-14	0	0	1	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Nov-14	0	0	JALGMSS1 HFCLGS	0	0	0	0	0	0	0
5	Network Data												
	a) Equipped Capacity of Network in Erlang		Nov-14	25300	246815	282000	209828	72000	107637	94127	156730	53000	83337
	b) Total traffic in TCBH in erlang (Avg.)		Nov-14	9760	223779	110113	155954	55931	35594	44890	124707	11553	13127
c) Total no. of customers served (as per VLR) on last day of the month		Nov-14	470851	7277001	2374955	6147481	2542257	1244537	1377862	4483550	279111	155648	

TABLE: 4

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live- Punjab Circle- November 14 month

S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
Network Service Quality Parameter													
Network Availability													
1	a) Total no. of BTSs in the licensed service area		Live data	599	5170	3187	4634	1537	1648	2089	4736	625	448
	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	16.29	65.52	476.70	28.03	112.95	16.22	160.14	33.72	50.60	4.66
	c) BTS Accumulated Downtime	<=2%	Live data	0.04%	0.02%	0.21%	0.01%	0.10%	0.01%	0.11%	0.01%	0.11%	0.01%
	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%	0.22%	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	97.77%	99.47%	96.73%	98.88%	99.63%	99.11%	98.80%	99.85%	98.49%	98.90%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.95%	0.08%	0.29%	0.05%	0.01%	0.00%	0.02%	0.03%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	1.19%	0.08%	1.57%	0.21%	0.03%	0.03%	0.19%	0.15%	0.00%	0.11%
Connection Maintenance (Retainability)													
3	a) Call Drop Rate (CDR)	<=2%	Live data	0.82%	0.41%	1.93%	0.47%	0.27%	0.55%	0.85%	0.57%	0.03%	0.57%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	2.95%	0.64%	21.36%	0.23%	0.00%	3.62%	1.08%	1.73%	0.11%	5.17%
	c) % of connections with good voice quality	>=95%	Live data	96.44%	98.67%	95.88%	97.54%	98.87%	97.29%	97.25%	98.03%	99.73%	99.00%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	53	100	2042	32	0	182	71	252	2	74
	e) Total no. of cells (Sector) in the licensed service area		Live data	1797	15634	9561	13951	4569	5025	6597	14579	1874	1424
No. of POI's having >=0.5% POI congestion													
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0	0

TABLE: 5

Detailed Network Data Assessment of Cellular Mobile Telephone Services - Punjab Circle - December 14 month

S/N	Name of Parameter	Bench- mark	Audit Period	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
Network Service Quality Parameter													
Network Availability													
1	a) Total no. of BTSs in the licensed service area		Dec-14	599	5237	3276	4780	1538	1648	2160	4826	625	449
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Dec-14	946.67	1787.29	12285.65	1504.63	2021.15	385.94	1226.12	784.77	713.83	83.47
	c) BTS Accumulated Downtime	<=2%	Dec-14	0.21%	0.05%	0.50%	0.04%	0.18%	0.03%	0.08%	0.02%	0.15%	0.02%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Dec-14	4	1	61	3	1	0	2	0	1	0
	e) Worst affected BTSs due to downtime	<=2%	Dec-14	0.67%	0.02%	1.86%	0.06%	0.07%	0.00%	0.09%	0.00%	0.16%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Dec-14	98.16%	99.50%	96.48%	98.90%	99.66%	98.97%	98.72%	99.86%	98.70%	98.93%
	b) SDCCH/PAGING Congestion	<=1%	Dec-14	0.08%	0.05%	0.87%	0.06%	0.01%	0.03%	0.05%	0.01%	0.00%	0.00%
	c) TCH congestion	<=2%	Dec-14	0.59%	0.07%	1.55%	0.18%	0.02%	0.12%	0.29%	0.14%	0.00%	0.19%
Connection Maintenance (Retainability)													
3	a) Call Drop Rate (CDR)	<=2%	Dec-14	0.69%	0.41%	1.70%	0.47%	0.28%	0.61%	0.88%	0.57%	0.02%	0.60%
	b) Worst affected cells>3% TCH drop	<=3%	Dec-14	2.96%	0.74%	19.80%	0.23%	0.03%	3.95%	1.04%	1.76%	0.09%	5.44%
	c) % of connections with good voice quality	>=95%	Dec-14	96.99%	98.74%	95.73%	97.58%	98.93%	97.35%	97.38%	98.19%	99.72%	99.02%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Dec-14	53	116	1946	32	2	198	70	259	2	78
	e) Total no. of cells (Sector) in the licensed service area		Dec-14	1800	15748	9828	14190	4570	5019	6773	14737	1874	1426
No. of POI's having >=0.5% POI congestion													
4	No. of POI's having >=0.5% POI congestion		Dec-14	0	0	2	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Dec-14	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		Dec-14	25326	238544	282000	215063	72000	107569	96225	156053	53000	83426
	b) Total traffic in TCBH in erlang (Avg.)		Dec-14	10127	216346	108236	151253	48828	34538	43155	121779	11273	11053
	c) Total no. of customers served (as per VLR) on last day of the month		Dec-14	474489	7262124	2375788	6180416	2539650	1279580	1445964	4462970	273452	148783

TABLE: 6

Detailed Network Data Assessment of Cellular Mobile Telephone Services -3 days live - Punjab Circle – December 14 month													
S/N	Name of Parameter	Bench-mark	Average of 3 Days	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	QTL	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
Network Service Quality Parameter													
Network Availability													
1	a) Total no. of BTSs in the licensed service area		Live data	600	5233	3250	4689	1537	1648	2137	4786	625	449
	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	231.76	29.88	806.93	74.36	142.15	26.72	136.38	53.97	62.82	7.21
	c) BTS Accumulated Downtime	<=2%	Live data	0.54%	0.01%	0.34%	0.02%	0.13%	0.02%	0.09%	0.02%	0.14%	0.02%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	2	0	0	0	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.06%	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	98.25%	99.49%	96.18%	98.92%	99.66%	99.08%	98.74%	99.87%	98.77%	98.49%
	b) SDCC/PAGING Congestion	<=1%	Live data	0.02%	0.03%	0.71%	0.05%	0.01%	0.01%	0.05%	0.01%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.36%	0.06%	1.58%	0.13%	0.03%	0.06%	0.28%	0.13%	0.00%	0.70%
Connection Maintenance (Retainability)													
3	a) Call Drop Rate (CDR)	<=2%	Live data	0.89%	0.41%	1.82%	0.46%	0.26%	0.67%	0.83%	0.55%	0.02%	0.61%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	3.48%	0.73%	21.87%	0.19%	0.00%	4.09%	0.96%	1.53%	0.02%	6.31%
	c) % of connections with good voice quality	>=95%	Live data	97.06%	98.72%	95.77%	97.36%	98.94%	97.44%	97.38%	98.15%	99.72%	99.02%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	63	115	2132	27	0	205	65	225	0	90
	e) Total no. of cells (Sector) in the licensed service area		Live data	1800	15822	9750	14100	4569	5026	6756	14732	1874	1426
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

CUSTOMER SERVICE QUALITY (CSD) PARAMETERS



5.3 CUSTOMER SERVICE QUALITY PARAMETERS MEASUREMENT FOR CMTS-QE DEC. 14:

5.3.1 QUARTERLY CUSTOMER SERVICE DELIVERY (CSD) AUDITED DATA FOR CELLULAR MOBILE SERVICES (OCTOBER TO DECEMBER 2014 MONTHS AUDITED DATA):

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

Quarterly CSD Audit Data		Bench- mark	Circle Name	AIRCEL	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	QTL	VODAFONE	RCOM (CDMA)	TATA (CDMA)
S/ N	Name of Parameter			GSM Operators								CDMA Operators	
Customer Service Quality Parameters													
Metering & Billing Credibility -Post Paid													
1	A) No. of bills issued during the quarter		Punjab	30256	1361196	109504	1899889	130241	219351	45194	1279979	148586	84039
	B) No. of bills disputed including billing complaints during the quarter		Punjab	0	904	40	1138	36	16	0	422	42	17
	C)% of billing complaints during the quarter	<= 0.1%	Punjab	0.00%	0.07%	0.04%	0.06%	0.03%	0.01%	0.00%	0.03%	0.03%	0.02%
Metering & Billing Credibility -Pre Paid													
2	A) Total No. of Pre-paid customers at the end of the quarter		Punjab	957131	7056216	3162216	5401444	2690057	2122544	2491505	4393264	278703	280716
	B) Total No. of complaints relating to charging, Credit and Validity during the quarter		Punjab	4	91	1658	1652	2391	3	9	514	88	0
	C) % of Pre-paid Charging Complaints	<= 0.1%	Punjab	0.00%	0.001%	0.05%	0.03%	0.09%	0.00%	0.00%	0.01%	0.03%	0.00%
Resolution of Billing/Charging Complaints and Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints													
3	A) No. of Billing/Charging/Credit/Validity Complaints received during the quarter		Punjab	4	995	1698	10319	2427	2900	9	936	130	295
	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	995	1698	10319	2427	2900	9	936	130	295
	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	995	1698	10319	2427	2900	9	936	130	295
	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 DECEMBER 14

<u>Quarterly CSD Audit Data</u>		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	3005883	1956043	163498	15698687	4627696	636301	630461	10454577	276165	49622
	B) Total no. of calls successfully established to customer care/Call center.		Punjab	2984968	1956043	163498	15682978	4586672	630880	630461	10454577	272540	49014
4	C) % Accessibility of Call centre /customer Care (Total calls successfully established *100/ Total call attempts)	>=95%	Punjab	99.30%	100.00%	100.00%	99.90%	99.11%	99.15%	100.00%	100.00%	98.69%	98.77%
	D) Total Calls reached to operator for Voice to Voice (Total call attempts)		Punjab	435456	3948197	774796	3281624	935286	988709	1939750	2989815	50880	55343
	E) Total number of calls answered by the operator (Voice to voice) within 90 seconds		Punjab	421774	3818573	477864	3269484	869401	856625	1856755	2984058	48786	54507
	F) % age of calls answered by operator (voice to voice) (Total calls successfully established within 90 Sec.*100 / Total call attempts)	>=95%	Punjab	96.86%	96.72%	61.68%	99.63%	92.96%	86.64%	95.72%	99.81%	95.88%	98.49%
Termination/closure of service													
5	A) Total No. of requests for Termination / Closure of service received during the quarter		Punjab	192	2964	670	26813	1176	4384	65	5180	634	1394
	B) No. of requests for Termination / Closure of service complied within 7 days during the quarter		Punjab	192	2964	670	26813	1176	4384	65	5180	634	1394
	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	96	839	743	6935	1387	334	0	1458	851	287
	B) No. of Payments/ Refunds Cleared during the quarter		Punjab	96	839	743	6935	1387	334	0	1458	851	287
	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 - DEC 2014):

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

3 days live CSD Audit Data		Bench- mark	Circle Name	AIRCEL	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	QTL	VODAFONE	RCOM (CDMA)	TATA (CDMA)
S/ N	Name of Parameter			GSM Operators									
RESPONSE TIME TO CUSTOMERS FOR ASSISTANCE													
1	A) Total no of calls attempted to customer care/Call center		Punjab	90889	64100	7733	575609	94978	21723	19527	330923	6645	1452
	B) Total no. of calls successfully established to customer care/Call center.		Punjab	89239	64100	7733	575194	94192	21559	19527	330923	6602	1447
	C) % Accessibility of Call centre /customer Care (Total calls successfully established *100/ Total call attempts)	>=95%	Punjab	98.18%	100.00%	100.00%	99.93%	99.17%	99.25%	100.00%	100.00%	99.35%	99.66%
	D) Total Calls reached to operator for Voice to Voice (Total call attempts)		Punjab	13726	123305	20498	114267	24683	34977	63569	97020	1480	1661
	E) Total number of calls answered by the operator (Voice to voice) within 90 seconds		Punjab	13487	116945	19871	114007	24544	28337	61713	96889	1459	1655
	F) % age of calls answered by operator (voice to voice) (Total calls successfully established within 90 Sec.*100 / Total call attempts)	>=95%	Punjab	98.26%	94.84%	96.94%	99.77%	99.44%	81.02%	97.08%	99.86%	98.58%	99.64%

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 are in compliance with respect to the parameter accessibility of call center. However, **BSNL, RCOM (GSM) and Tata (GSM)** have not met the benchmark of 'calls answered by Operators (voice to voice) within 90 seconds'. They have achieved their performance as **61.68%, 92.96% and 86.64%** respectively 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 Airtel and Tata GSM**) 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 **Airtel and Tata GSM** for parameter '**calls answered by Operators (voice to voice) within 90 seconds**' was **94.84%** and **81.02%** 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	97%	100%	--	100%	100%	100%	95%	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. However, when calls attempted from BSNL to Aircel & QTL, the interconnection was 97% & 95% successful. Thus there was no much problem in interconnection from one operator to other operators.

6.2 CUSTOMER CARE / HELPLINE ASSESSMENT:

LIVE CALLING TO CALL CENTRE											
Parameter	Circle Name	AIRCEL	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	QTL	VODAFONE	RCOM (CDMA)	TATA (CDMA)
Total No. of calls Attempted	Punjab	100	100	100	100	100	100	100	100	100	100
Total no of calls attempted to customer care/Call center	Punjab	100	100	100	100	100	100	100	100	100	100
Total no. of calls successfully established to customer care/Call center	Punjab	100	100	100	100	100	100	100	100	100	100
% Accessibility of Call centre / customer Care (Total call successfully established *100 / Total call attempt)	Punjab	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Total Calls reached to agent desk for Voice to Voice (Total call attempt)	Punjab	100	100	100	100	100	100	100	100	100	100
Total number of calls answered by the operator (Voice to voice) within 90 seconds	Punjab	96	97	100	100	96	100	96	100	95	100
% age of calls answered by operator(voice to voice) (Total call successfully established within 90 Sec.*100 / Total call attempt)	Punjab	96.00%	97.00%	100.00%	100.00%	96.00%	100.00%	96.00%	100.00%	95.00%	100.00%

In case of calls answered by operators (voice to voice) within 90 seconds when test calls were made to the call centers, all operators were able to connect the calls with their call center operators/agents successfully for most of the attempts except Aircel, Airtel, RCOM (GSM), QTL and RCOM CDMA as they could achieve their performance as 96%, 97%, 96%, 96% and 95% 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	100	100	100	100	100	9	100	100	100
Total No. of calls Answered	Punjab	2	64	54	37	47	53	5	40	51	33
Resolution of billing Complaints	Punjab	2	64	54	37	47	53	5	40	51	33
% 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 while few others reported that there complaints have been resolved but not sure of duration of their resolution. However, most of the customers reported their satisfaction on resolution of the billing complaints.

6.4 LEVEL -1 CALLING ASSESSMENT:

LEVEL 1 LIVE CALLING															
Emergency no.	Circle Name	SSA Name	SDCA Name	No. of calls made	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	RCOM CDMA	TATA GSM	TATA CDMA	VIDEOCON	VODAFONE	
100,101,102/108	Punjab	Patiala	Patiala	12	√	√	√	√	√	√	√	√	√	√	
			Samana	12	√	√	√	√	√	√	√	√	√	√	
			Rajpura	12	√	√	√	√	√	√	√	√	√	√	√
			Nabha	12	√	√	√	√	√	√	√	√	√	√	√
			Sirhind	12	√	√	√	√	√	√	√	√	√	√	√
100,101,102/108	Punjab	Sangrur	Sangrur	12	√	√	√	√	√	√	√	√	√	√	
			Sunam	12	√	√	√	√	√	√	√	√	√	√	
			Malerkotla	12	√	√	√	√	√	√	√	√	√	√	√
			Barnala	12	√	√	√	√	√	√	√	√	√	√	√
100,101,1091,102/108	Punjab	Chandigarh	Chandigarh	10	√	√	√	√	√	√	√	√	√	√	
			Chandigarh	10	√	√	√	√	√	√	√	√	√	√	
			Chandigarh	10	√	√	√	√	√	√	√	√	√	√	

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 **Patiala, Sangrur and Chandigarh** in the months of October, November and December 2014 respectively. The total route Kms covered during the drive tests in the respective SSAs was **482Kms, 404Kms, and 415Kms**. 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 PATIALA SSA IN OCTOBER 14 MONTH - PUNJAB CIRCLE

S/N	Parameter	Classification of route covered	AIRCEL		AIRTEL		BSNL		IDEA		TATA GSM		RCOM GSM		VIDEOCON		VODAFONE		RCOM CDMA		TATA CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
1	Call Attempts	Major Road	133	25	109	25	116	25	102	26	122	25	127	27	122	25	122	24	136	27	127	25	
		Highway	147	25	131	25	142	16	147	26	144	25	151	30	134	25	161	26	180	30	132	25	
		Within City	271	25	290	25	270	27	275	25	294	25	300	28	307	25	291	27	320	27	302	25	
		Overall SSA	551	75	530	75	528	68	524	77	560	75	578	85	563	75	574	77	636	84	561	75	
2	Blocked Call Rate	Major Road	1.50%	0.00%	0.00%	0.00%	2.59%	0.00%	0.98%	0.00%	0.00%	0.00%	1.57%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Highway	0.68%	0.00%	0.00%	0.00%	2.82%	0.00%	4.08%	0.00%	2.78%	0.00%	0.66%	10.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.76%	
		Within City	0.00%	0.00%	0.00%	0.00%	1.48%	3.70%	0.36%	0.00%	0.00%	0.00%	0.33%	0.00%	0.65%	0.00%	0.00%	0.00%	0.00%	0.00%	0.66%	0.00%	
		Overall SSA	0.54%	0.00%	0.00%	0.00%	2.08%	1.47%	1.53%	0.00%	0.71%	0.00%	0.69%	3.53%	0.36%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.53%	0.00%
3	Dropped Call Rate (<=2%)	Major Road	0.00%	0.00%	0.00%	0.00%	1.79%	0.00%	0.00%	0.00%	0.82%	0.00%	0.80%	0.00%	0.82%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Highway	0.00%	0.00%	0.00%	0.00%	0.74%	0.00%	1.41%	0.00%	0.71%	0.00%	1.33%	0.00%	0.00%	0.00%	0.00%	0.00%	0.56%	3.33%	0.00%	0.00%	
		Within City	0.37%	0.00%	0.00%	0.00%	0.38%	0.00%	0.73%	0.00%	0.00%	0.00%	0.33%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Overall SSA	0.18%	0.00%	0.00%	0.00%	0.78%	0.00%	0.78%	0.00%	0.36%	0.00%	0.70%	0.00%	0.18%	0.00%	0.00%	0.00%	0.16%	1.19%	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	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Major Road	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.49%	99.97%	99.03%	100%	
		Highway	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.23%	98.88%	98.78%	99.56%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.45%	100%	99.08%	99.88%
		Overall SSA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.14%	99.61%	99.00%	99.81%
	(b) 0-5 (with frequency hopping for GSM Operators)	Major Road	95.15%	96.10%	96.74%	98.31%	92.67%	95.22%	96.52%	99.91%	96.20%	99.00%	94.69%	99.97%	96.72%	98.53%	97.38%	98.81%	NA	NA	NA	NA	
		Highway	94.04%	99.39%	96.37%	98.12%	91.60%	98.32%	94.86%	99.76%	95.72%	95.81%	92.00%	99.59%	95.56%	99.77%	95.32%	99.20%	NA	NA	NA	NA	
		Within City	95.13%	99.40%	97.17%	99.07%	94.60%	91.49%	97.59%	98.85%	96.63%	98.23%	94.97%	99.30%	96.59%	99.76%	96.93%	98.07%	NA	NA	NA	NA	
		Overall SSA	94.84%	98.25%	96.81%	98.54%	93.40%	94.51%	96.68%	99.51%	96.28%	97.72%	94.15%	99.62%	96.38%	99.35%	96.58%	98.70%	NA	NA	NA	NA	
5	Service Coverage																						
	In door (>= - 75dBm)	Major Road	60.97%	92.52%	93.06%	96.70%	67.82%	100%	97.12%	55.87%	77.09%	99.84%	71.52%	100%	73.47%	62.00%	97.83%	99.70%	78.37%	100%	33.84%	73.98%	
		Highway	65.37%	97.92%	92.69%	99.36%	65.86%	99.82%	95.67%	94.13%	73.71%	37.38%	58.05%	99.82%	62.03%	92.86%	90.37%	91.70%	71.73%	78.23%	29.37%	28.26%	
		Within City	66.80%	99.33%	92.30%	99.73%	62.22%	88.60%	98.98%	100%	82.20%	100%	63.76%	99.86%	68.93%	50.16%	98.76%	100%	80.52%	100%	32.54%	97.31%	
		Overall SSA	65.01%	96.51%	92.60%	98.52%	64.42%	94.56%	97.77%	83.51%	78.44%	84.80%	63.98%	99.89%	68.33%	68.21%	96.24%	97.03%	77.75%	92.66%	32.09%	66.53%	
	In-vehicle (>= - 85dBm)	Major Road	93.17%	99.39%	99.72%	99.99%	92.55%	100%	99.40%	99.73%	97.53%	100%	94.79%	100%	97.23%	96.96%	100%	100%	94.66%	100%	72.85%	99.66%	
		Highway	90.39%	99.83%	99.08%	99.97%	90.29%	100%	99.25%	100%	95.94%	84.71%	87.38%	99.85%	93.88%	99.92%	99.35%	100%	93.54%	78.23%	63.17%	90.50%	
		Within City	93.87%	99.99%	99.58%	99.91%	88.46%	99.98%	99.77%	100%	97.97%	100%	90.54%	100%	96.75%	98.75%	100%	100%	98.12%	100%	71.94%	100%	
Overall SSA		92.75%	99.73%	99.45%	99.96%	89.85%	99.99%	99.57%	99.91%	97.27%	96.30%	90.65%	99.95%	96.19%	98.54%	99.82%	100%	96.18%	92.66%	70.09%	96.72%		

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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	99.58%	100%	99.97%	100%	99.46%	100%	99.73%	99.89%	99.88%	100%	99.91%	100%	90.86%	99.99%	100%	100%	100%	100%	98.86%	100%
		Highway	99.35%	100%	99.86%	100%	99.67%	100%	99.78%	100%	99.82%	99.96%	98.81%	99.88%	99.72%	100%	100%	100%	99.78%	100%	96.13%	100%
		Within City	99.44%	100%	99.97%	100%	99.22%	100%	99.94%	100%	99.94%	99.96%	99.54%	99.88%	99.94%	100%	100%	100%	100%	100%	98.83%	100%
		Overall SSA	99.45%	100%	99.93%	100%	99.39%	100%	99.86%	99.96%	99.89%	99.99%	99.44%	99.96%	97.90%	99.98%	100%	100%	99.94%	100%	98.20%	100%
6	Call Setup Success Rate (>=95%)	Major Road	96.99%	100%	100%	100%	96.55%	100%	99.02%	100%	100%	100%	98.43%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Highway	97.96%	100%	100%	100%	95.07%	100%	95.92%	100%	97.22%	100%	99.34%	90.00%	100%	100%	100%	100%	100%	100%	99.24%	100%
		Within City	99.63%	100%	100%	100%	97.78%	92.59%	99.27%	100%	100%	100%	99.67%	100%	99.35%	100%	100%	100%	100%	100%	99.34%	100%
		Overall SSA	98.55%	100%	100%	100%	96.78%	97.06%	98.28%	100%	99.29%	100%	99.31%	96.47%	99.64%	100%	100%	100%	100%	100%	99.47%	100%
7	Hand Over Success Rate (HOSR)	Major Road	100%	100%	100%	100%	90.87%	100%	98.96%	100%	98.35%	100%	98.83%	100%	99.04%	100%	99.40%	100%	100%	100%	100%	100%
		Highway	100%	100%	98.50%	100%	99.28%	100%	99.42%	100%	96.15%	100%	99.37%	100%	99.60%	100%	98.85%	100%	100%	100%	100%	100%
		Within City	100%	100%	99.76%	100%	98.33%	100%	99.83%	100%	100%	100%	99.03%	100%	99.36%	100%	100%	100%	100%	100%	100%	100%
		Overall SSA	100%	100%	99.52%	100%	96.80%	100%	99.51%	100%	98.41%	100%	99.08%	100%	99.35%	100%	99.53%	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 SANGRUR SSA IN NOVEMBER 14 MONTH - PUNJAB CIRCLE

S/N	Parameter	Classification of route covered	AIRCEL		AIRTEL		BSNL		IDEA		TATA GSM		RCOM GSM		VIDEOCON		VODAFONE		RCOM CDMA		TATA CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
1	Call Attempts	Major Road	122	25	147	25	90	27	98	27	124	25	117	26	122	25	116	26	139	29	114	26	
		Highway	67	25	89	26	82	25	83	28	89	25	87	26	88	26	87	25	53	27	60	27	
		Within City	355	25	329	25	288	26	356	26	344	29	367	28	329	25	343	25	335	27	345	25	
		Overall SSA	544	75	565	76	460	78	537	81	557	79	571	80	539	76	546	76	527	83	519	78	
2	Blocked Call Rate	Major Road	0.00%	0.00%	0.00%	0.00%	1.11%	0.00%	0.00%	0.00%	4.03%	0.00%	0.00%	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%	1.22%	0.00%	1.20%	0.00%	1.12%	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%	4.51%	0.00%	0.28%	0.00%	0.87%	3.45%	0.27%	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%	3.26%	0.00%	0.37%	0.00%	1.62%	1.27%	0.18%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
3	Dropped Call Rate (<=2%)	Major Road	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.88%	0.00%	
		Highway	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.20%	0.00%	2.27%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.67%	0.00%
		Within City	0.00%	0.00%	0.00%	0.00%	0.37%	0.00%	0.28%	0.00%	0.00%	0.00%	0.27%	3.57%	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%	0.23%	0.00%	0.37%	0.00%	0.36%	0.00%	0.18%	1.25%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.39%	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	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Major Road	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.52%	100%	98.26%	98.72%	
		Highway	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.96%	100%	96.01%	100%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.83%	99.35%	98.71%	98.60%
		Overall SSA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.66%	99.83%	98.30%	99.11%
	(b) 0-5 (with frequency hopping for GSM Operators)	Major Road	96.97%	98.13%	98.56%	99.75%	93.07%	96.49%	94.98%	99.77%	95.86%	97.43%	96.12%	99.11%	96.23%	98.55%	97.62%	98.70%	NA	NA	NA	NA	
		Highway	96.90%	99.55%	99.05%	99.49%	92.83%	99.35%	94.88%	99.35%	95.59%	98.74%	95.17%	100%	94.45%	97.82%	96.83%	98.97%	NA	NA	NA	NA	
		Within City	96.90%	98.55%	98.41%	98.63%	94.35%	97.29%	97.04%	98.85%	96.31%	97.59%	97.76%	98.11%	97.35%	99.92%	98.53%	99.13%	NA	NA	NA	NA	
		Overall SSA	96.92%	98.74%	98.59%	99.29%	93.82%	97.68%	96.32%	99.34%	96.09%	97.94%	97.04%	99.06%	96.67%	98.77%	98.08%	98.93%	NA	NA	NA	NA	
5	Service Coverage																						
	In door (>= - 75dBm)	Major Road	67.49%	86.06%	95.60%	99.80%	89.20%	99.99%	96.08%	99.22%	73.55%	97.81%	65.08%	99.76%	76.44%	64.76%	88.13%	94.10%	43.34%	99.16%	32.98%	44.16%	
		Highway	53.63%	46.76%	92.67%	98.69%	83.30%	75.53%	91.80%	99.97%	63.08%	50.87%	48.75%	100%	47.26%	75.19%	68.70%	99.70%	51.26%	0.09%	20.87%	13.71%	
		Within City	59.35%	82.56%	92.52%	99.74%	88.27%	99.30%	97.69%	97.43%	66.66%	84.20%	68.41%	99.32%	67.06%	58.88%	88.49%	99.30%	57.32%	45.86%	31.30%	2.40%	
		Overall SSA	60.38%	72.08%	93.31%	99.42%	87.62%	91.93%	96.45%	99.18%	67.61%	78.34%	64.89%	99.69%	66.18%	66.27%	85.38%	97.58%	53.04%	49.11%	30.48%	20.42%	
	In-vehicle (>= - 85dBm)	Major Road	94.29%	98.55%	99.58%	99.96%	99.80%	100%	99.62%	100%	95.29%	100%	90.79%	100%	97.95%	95.06%	98.42%	99.90%	85.74%	100%	73.90%	98.84%	
		Highway	85.91%	86.60%	99.48%	99.99%	99.33%	100%	99.20%	100%	92.86%	98.31%	78.61%	100%	88.72%	97.33%	96.28%	100%	77.47%	50.64%	51.38%	85.91%	
		Within City	91.57%	98.22%	99.53%	99.92%	99.51%	99.97%	99.90%	99.72%	94.94%	97.58%	93.45%	99.92%	95.47%	92.64%	97.90%	100%	89.70%	55.14%	80.74%	19.99%	
Overall SSA		91.41%	94.55%	99.53%	99.96%	99.54%	99.99%	99.73%	99.93%	94.68%	98.61%	90.76%	99.97%	95.01%	95.01%	97.76%	99.96%	87.43%	70.15%	75.90%	69.04%		

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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	99.66%	99.99%	99.93%	100%	99.98%	100%	99.89%	100%	99.74%	100%	99.53%	100%	99.93%	99.85%	99.96%	100%	99.99%	100%	99.70%	100%
		Highway	97.68%	99.27%	99.95%	100%	99.98%	100%	99.79%	100%	99.44%	100%	98.64%	100%	99.39%	99.81%	99.90%	100%	99.55%	100%	99.18%	100%
		Within City	99.25%	100%	99.98%	100%	99.94%	100%	99.98%	100%	99.79%	100%	99.21%	100%	99.84%	99.81%	99.97%	100%	99.98%	100%	94.84%	100%
		Overall SSA	99.13%	99.76%	99.96%	100%	99.96%	100%	99.93%	100%	99.72%	99.98%	99.20%	99.99%	99.79%	99.79%	99.96%	100%	99.94%	99.91%	96.40%	98.66%
6	Call Setup Success Rate (>=95%)	Major Road	100%	100%	100%	100%	96.67%	100%	98.98%	100%	95.97%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Highway	100%	100%	100%	100%	98.78%	100%	100%	100%	98.88%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Within City	100%	100%	100%	100%	94.44%	100%	99.72%	100%	99.13%	96.55%	99.73%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Overall SSA	100%	100%	100%	100%	95.65%	100%	99.63%	100%	98.38%	98.73%	99.82%	100%	100%	100%	100%	100%	100%	100%	100%	100%
7	Hand Over Success Rate (HOSR)	Major Road	100%	100%	99.45%	100%	94.61%	100%	99.56%	100%	98.80%	100%	100%	88.00%	99.04%	100%	99.31%	100%	100%	100%	100%	100%
		Highway	100%	100%	100%	100%	94.67%	100%	99.47%	100%	100%	100%	100%	100%	98.24%	100%	98.82%	100%	100%	100%	100%	100%
		Within City	100%	100%	99.49%	100%	96.38%	100%	99.83%	100%	98.50%	100%	99.66%	100%	99.78%	100%	100%	100%	100%	100%	100%	100%
		Overall SSA	100%	100%	99.53%	100%	95.61%	100%	99.71%	100%	98.89%	100%	99.82%	96.55%	99.29%	100%	99.65%	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 CHANDIGARH SSA IN DECEMBER 14 MONTH - PUNJAB CIRCLE

S/N	Parameter	Classification of route covered	AIRCEL		AIRTEL		BSNL		IDEA		TATA GSM		RCOM GSM		VIDEOCON		VODAFONE		RCOM CDMA		TATA CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
1	Call Attempts	Major Road	159	25	198	25	184	25	160	25	175	26	176	29	183	25	160	30	176	27	190	26	
		Highway	152	25	140	25	151	26	146	28	160	27	147	27	150	25	150	30	161	28	139	26	
		Within City	226	25	215	25	241	27	235	25	250	21	257	27	261	25	233	29	269	28	243	25	
		Overall SSA	537	75	553	75	576	78	541	78	585	74	580	83	594	75	543	89	606	83	572	77	
2	Blocked Call Rate	Major Road	0.63%	0.00%	0.00%	0.00%	1.09%	0.00%	0.00%	0.00%	1.14%	0.00%	0.00%	0.00%	1.64%	0.00%	0.00%	0.00%	0.00%	0.00%	4.21%	0.00%	
		Highway	0.66%	0.00%	0.00%	0.00%	0.66%	0.00%	0.00%	0.00%	0.63%	0.00%	0.68%	0.00%	1.33%	0.00%	0.00%	0.00%	0.62%	0.00%	1.44%	0.00%	
		Within City	1.33%	0.00%	0.00%	0.00%	1.24%	0.00%	0.00%	0.00%	0.40%	0.00%	0.39%	0.00%	1.15%	0.00%	0.00%	0.00%	1.12%	0.00%	0.82%	0.00%	
		Overall SSA	0.93%	0.00%	0.00%	0.00%	1.04%	0.00%	0.00%	0.00%	0.68%	0.00%	0.34%	0.00%	1.35%	0.00%	0.00%	0.00%	0.66%	0.00%	2.10%	0.00%	
3	Dropped Call Rate (<=2%)	Major Road	1.27%	0.00%	0.00%	0.00%	1.12%	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%	1.10%	0.00%	
		Highway	0.66%	0.00%	0.00%	0.00%	1.34%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.73%	0.00%	
		Within City	0.90%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.40%	0.00%	0.39%	0.00%	0.00%	0.00%	0.00%	0.00%	0.38%	0.00%	0.41%	0.00%	
		Overall SSA	0.94%	0.00%	0.00%	0.00%	0.72%	0.00%	0.00%	0.00%	0.17%	0.00%	0.17%	0.00%	0.00%	0.00%	0.00%	0.00%	0.17%	0.00%	0.71%	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	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Major Road	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.40%	99.97%	99.56%	99.90%	
		Highway	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.81%	100%	99.23%	100%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.39%	100%	99.81%	100%
		Overall SSA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.25%	99.99%	99.59%	99.97%
	(b) 0-5 (with frequency hopping for GSM Operators)	Major Road	91.73%	92.20%	98.34%	99.48%	90.55%	99.77%	96.74%	99.22%	94.23%	94.21%	93.98%	98.09%	93.08%	99.19%	96.12%	99.63%	NA	NA	NA	NA	
		Highway	93.33%	97.52%	97.64%	99.64%	91.00%	93.04%	95.03%	99.14%	94.73%	99.28%	94.74%	99.85%	94.09%	98.71%	96.47%	99.55%	NA	NA	NA	NA	
		Within City	92.39%	98.67%	98.14%	98.74%	91.15%	99.32%	96.82%	97.34%	94.78%	99.68%	94.79%	99.41%	94.21%	98.33%	96.78%	99.59%	NA	NA	NA	NA	
		Overall SSA	92.46%	96.22%	98.07%	99.30%	90.92%	97.43%	96.31%	98.59%	94.60%	97.58%	94.54%	99.08%	93.84%	98.75%	96.50%	99.59%	NA	NA	NA	NA	
5	Service Coverage																						
	In door (>= -75dBm)	Major Road	77.06%	99.77%	97.73%	99.86%	83.71%	100%	98.09%	96.76%	89.32%	100%	84.57%	99.89%	57.73%	98.74%	89.62%	99.98%	79.59%	75.58%	68.11%	97.20%	
		Highway	83.67%	82.59%	96.95%	92.45%	81.42%	99.18%	99.56%	99.99%	92.90%	100%	86.03%	100%	63.47%	68.92%	89.86%	99.98%	80.66%	100%	69.23%	97.26%	
		Within City	79.57%	97.40%	96.86%	100%	83.89%	99.30%	99.80%	100%	92.42%	100%	86.79%	100%	67.92%	73.34%	93.01%	100%	92.39%	99.89%	82.28%	97.27%	
		Overall SSA	80.00%	93.29%	97.19%	97.38%	83.17%	99.49%	99.23%	98.95%	91.62%	100%	85.95%	99.96%	63.72%	80.38%	91.15%	99.99%	85.67%	92.87%	74.63%	97.24%	
	In-vehicle (>= -85dBm)	Major Road	94.73%	99.99%	99.77%	100%	98.49%	100%	99.99%	99.99%	98.50%	100%	96.94%	100%	90.37%	100%	99.70%	100%	96.19%	100%	92.99%	97.94%	
		Highway	97.61%	99.58%	99.66%	99.97%	96.15%	99.76%	99.97%	100%	98.87%	100%	98.74%	100%	91.43%	99.30%	99.56%	100%	97.55%	100%	89.80%	98.16%	
		Within City	95.71%	99.99%	99.78%	100%	99.02%	99.81%	100%	100%	99.24%	100%	98.24%	100%	95.61%	99.07%	99.91%	100%	97.87%	100%	96.95%	97.44%	
Overall SSA		95.96%	99.86%	99.74%	99.99%	98.08%	99.86%	99.99%	100%	98.91%	100%	97.98%	100%	92.99%	99.46%	99.75%	100%	97.29%	100%	93.94%	97.87%		

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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	99.26%	100%	99.95%	100%	100%	100%	100%	100%	99.83%	100%	99.90%	100%	99.37%	100%	100%	100%	100%	100%	96.06%	98.36%
		Highway	99.53%	100%	99.92%	99.98%	99.89%	100%	99.98%	100%	99.62%	100%	99.96%	100%	99.08%	99.97%	100%	100%	99.84%	100%	97.00%	98.56%
		Within City	99.84%	100%	99.95%	99.98%	99.99%	100%	100%	100%	99.84%	100%	99.96%	100%	99.75%	99.97%	100%	100%	100%	100%	98.30%	98.56%
		Overall SSA	99.57%	100%	99.94%	99.99%	99.97%	100%	100%	100%	99.77%	100%	99.94%	100%	99.47%	99.94%	100%	100%	99.96%	100%	97.28%	98.74%
6	Call Setup Success Rate (>=95%)	Major Road	99.37%	100%	100%	100%	97.28%	100%	100%	100%	98.86%	100%	100%	100%	98.36%	100%	100%	100%	100%	100%	95.79%	100%
		Highway	99.34%	100%	100%	100%	98.68%	100%	100%	100%	99.38%	100%	99.32%	100%	98.67%	100%	100%	100%	99.38%	100%	98.56%	100%
		Within City	98.67%	100%	100%	100%	95.85%	100%	100%	100%	99.60%	100%	99.61%	100%	98.85%	100%	100%	100%	98.88%	100%	99.18%	100%
		Overall SSA	99.07%	100%	100%	100%	97.05%	100%	100%	100%	99.32%	100%	99.66%	100%	98.65%	100%	100%	100%	99.34%	100%	97.90%	100%
7	Hand Over Success Rate (HOSR)	Major Road	100%	100%	96.94%	100%	94.77%	100%	100%	100%	98.73%	100%	98.96%	100%	97.85%	100%	98.68%	100%	100%	100%	100%	100%
		Highway	100%	100%	98.51%	100%	96.38%	100%	99.67%	100%	98.41%	100%	100%	100%	94.72%	100%	98.65%	100%	100%	100%	99.94%	100%
		Within City	100%	100%	100%	100%	97.16%	100%	99.35%	100%	98.27%	100%	99.32%	100%	97.35%	100%	99.65%	100%	100%	100%	100%	100%
		Overall SSA	100%	100%	98.60%	100%	96.08%	100%	99.67%	100%	98.45%	100%	99.36%	100%	96.93%	100%	99.07%	100%	100%	100%	99.99%	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
PATIALA	Oct-14	Patiala, Samana/ 170KM	(a)HIGHWAY:Patiala to Samana,Patran Road (b)Major Road: Sirhond Bypass to Bahadurgarh, to Ghanaur road,urban estate,bus stand,sirhind road,Bhadson road,Nabha road. (c)Inside City:Mmodel town, Pratap Nagar,Badungar,Leela Bhawan,Fountain chowk,Polo ground road,Sabji mandi,Raghu Majra,Gud Mandi,Sanauri Adda,Mathura colony,SST colony,GuruNanak Nagar,Focal Point,Tirpudi,Samana bus stand,Mmain bazar Samana,Nabha road,Mehra Mohalla,Samana Mandi Bazar,Tehsil Road, Ravidas Nagar,Patran Road. Indoor: Gopal Restaurant	Rajpura/ 170KM	(a)HIGHWAY:Rajpura Bypass to Banur, to Zirakpur. (b) Major Road:Liberty chowk, Durga Mandir,Kalgidhar Chowk,ITI Road,Hospital Road,Sabji Mandi,Pogla Road,Anaj Mandi. (c)Inside City:Railway station,Bus stand,Pandit Mohalla, Lakkar Mandi, Guta Colony,Civil Hosital,PSTCL Office Road,Anaj Mandi(Banur),Tepla Road,Spynet Tower,Savitri Apartment,VIP Road,Mount Villa. Indoor: Grand Punjab Complex	Nabha ,Sirhind/ 142KM	(a) HIGHWAY:Patiala Gate to Rotipul, Rotipul to Bhadson,Bhadson to Chahal,Amloh Market,Givindgarh,Sirhind Highway. (b) Major Road: Rotipull, Grid Chowk, Cantt Road, Daladdi, Boura Gate, Circukar Road,Thui Road, Nabha Bypass. (c)Inside City:Patiala Gate, Heera Mahal,Chacha Market,College Road,Mohas Gate, Nabha Qilla,Hospital Road,Bhai Kahan Singh Street, High Court Road, Arimal Road,Gandhi Nagar. Indoor: Modern Complex
SANGRUR	Nov-14	Sangrur,Sunam/ 140 KM	(a)HIGHWAY:Barnala Rd to Mastuana Sahib, Hareri Rd,Dhuri Rd to Sangrur Bypass to Nankiana Rd to Patiala Rd to Sunam via Khamu Majra via Mehlan Chowk to Sunam Road. (b)Major Road:BSNL Office, Mahelan Chowk Rd, Gaushala Rd, Sangrur Bypass, Fountain Chowk, AD College, Lehra Gagga Rd & Hrial Road. (c)Inside City:Sangrur Bypass, Nankiana Rd, Kishanpura Basti, Ashok Wali Gali, Guru Nanak Colony, Mehal Mubarak , Khalifa Bagh, Kaula Park, Nabha Gate , Patiala Gate, Bonasar	Malerkotla/134 Km	(a)HIGHWAY:ITI Chowk, Malerkotla to Amargarh Rd, Ludhiana Rd,Dhuri rd Via Bhasaur. (b) Major Road:Truck Union, Bus Stand Rd, Civil Hospital Rd, Railway Rd, Delhi Gate, College Rd, Dhuri Rd, Grewal Chowk, Ludhiana Rd.Dargah Rd, Raikot Rd, Kulti Mandir Rd, Mandir Rd, Satta Chowk, Dehli Gate Rd, Club Chowk, Sirhindi Gate, Amargarh Rd & Dhuri Rd. (c) Inside City:Dhuri Rd, Anaj Mandi, Bus Stand, Stadium Rd, Railway stantion Rd, Sant Colony, Nr. Naina Devi Mandir, College Rd, Club Chowk Rd, Bus Stand	Barnala/130 Km	(a) HIGHWAY:Dhanaula Barnala Rd, Barnala Raikot , Sanghera.Bhadalwadh to Mehal Kalan. (b) Major Road:Baranal Bypass, Guru Ravidas Chowk, Raikot Rd, Sanghera Rd, New Model Town, Baghapura Rd, Court Rd, College Rd, P.C Rd, Railway Stantion Rd, Old Cinema Rd, Gaushala Rd, Bajwa Patti, Ferwahi Bazar. (c)Inside City:Deepak Dhaba Dhanaula ,Kuleka Rd, Mansa Rd, Dhanaula Sangrur Rd, Bus Stand ,

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			<p>Bagn, Court Road, Bus Stand, Prem Basti, Railway Stantion, Gaushala Rd, Patiala Rd, Ranjit Club, DC Office, BSNL Exchange, Roxy Rd, Harel Rd, Barnala Rd, Sunam, Bus stand, Sunam Market, Mohalla Chartriwal & Purani Anaj Mandi.</p> <p>Indoor: J.D Plaza</p>		<p>Rd, Railways Stantion Rd, Civil hospital rd, Satta Chowk, Milakha Bazzar, Loha Bazar,Dalgarh Rd, Bhamsi Mohalla, Lal Bazar, Tolab Bazar, Khanna Rd, Amargarh Rd, Jamalpura, Sangrur Rd, Dhuri Rd, Sherpur Chowk,Kakarwal, Chowk, Bus stand,Railway Station & Dhuri Bypass.</p> <p>Indoor: Hotel Sukhwendra</p>		<p>Attargarh Rd, Fauji Marg, Bypass Rd, Sadar Bazzar, Maharaja Aggarsain Chowk, Bus Stand Rd, Court rd, College Rd, Gobind Clony, Lucky Colony, Court Rd, Nanaksar Rd, Hardiaya Rd, Lakhi colony, Sekha Rd, Raikot rd, Mehal Kalan, Bus Stand, Dhanera Rd & Mehal Khurd.</p> <p>Indoor: Chawla Food Court</p>
CHANDIGARH	Dec-14	Chandigarh/140KM	<p>(a)HIGHWAY:Bus Stand, Sec 43, Sec 39 (CHD - Mohali H/W), Dhanas, Dakshin Marg, Tribune Chowk, Airport (Ambala Hoghway), Industrial Area, Purn Marg, Madhya Marg, PGI, Sarangpur Barrier (Kurali / Balongi H/W).</p> <p>(b)Major Road:Sarangpur, Sec 38 West, Paschim Marg, Dental College, Punjab University, Udyog Path, Himalaya Marg, Jain Marg, Raj Bhawan, Sec 26, IT Park Chandigarh.</p> <p>(c)Inside City:Manimajra Town, MH2 Manimajra, Kalagram, Transport Chowk, Sec 26, Sec 28, Sec 27, Sec 20, Sec 21,Sec 22,Sec 17, Sec 18, Sec 34, Sec 35, Sec 44, Sec 45, Burail, Sec 33, Sec 46, Sec 51, Khajeri, Furniture Market & Sec 53.</p> <p>Indoor: Passport Office,Sector-34</p>	Chandigarh/135 km	<p>(a)HIGHWAY:Housing Board , Manimajra, Coman Hospital, Chandimandir, Shimla Highway, Sec 20, Dehradun Highway, Sec 25 & Panchkula.</p> <p>(b) Major Road:Sec 25, Sec 26, Sec 21, Sec 20, Sec 17, Sec 7, Sec 6, Sec 5, Sec 2, Sec1, DC Office, Mansa Devi Complex, Sec 4, MDC, Sec 5, Mansa Devi Temples, Sec 6, Sec 5, Bus Stand, Sec 11, Industrail Aera 11A , Panchkula, 2A ph-5, Panchkula & BEL.</p> <p>(c)Inside City:Sec 5, Sec11, Sec 15, Sec 16, 2A Phase 1,Industrial Area, Phase 2, Sec 5, Sec 14, Sec 12A, Sec 12, Sec 4, Sec 10, Sec 9, Sec 8 & Sec 6.</p> <p>Indoor: Shalimar Mall,Panchkula</p>	Chandigarh/140 km	<p>(a) HIGHWAY:Phase 2, Verka Plant, Balongi, Kharar, Chandigarh - Ropar H/W, Kharar Landran, Chunri Kalan, Shirind highway, Landran & Chandigarh - Patiala H/W.</p> <p>(b) Major Road:Sec 82, Industrial Area, Gurudawara,I/A Phase 8,Quark City, Industrail Area Phase 7, Phase 4, Phase 3B2, Phase 7, Phase 8, Bus Stand, Phase 5, Phase 10 & Phase 11.</p> <p>(c)Inside City:Sec 68, Kumbra,sec 69, Sec 70, Vill. Mataur, Phase 7, Phase 3B2, Phase 5, Sahimajra, Industrail Area Phase 7, Vill. Mohali, Phase 4, Phase 3B2, Phase 5, Phase 10, Phase 11, Kambali & Railway Station mohali.</p> <p>Indoor: Reliance Fresh, Mohali</p>

7.2 SSA WISE DRIVE TEST OBSERVATION:

DRIVE TEST TABLE: 5

DRIVE TEST OBSERVATION OF PATIALA SSA – OCTOBER 14

S NO	Name of SP	SDCA Covered in Day 1	Day 1 Observation	SDCA Covered in Day 2	Day 2 Observation	SDCA Covered in Day 3	Day 3 Observation
1	AIRCEL	Patiala & Samana	No coverage between Patiala to Samana, Poor Level & Quality near Kartal Colony, Poor Quality near Rajpura Bypass, Civillines, Mando Phal Sirhind, Bus stand, Haji Majra, Polo Ground	Rajpura, Banur & Zirakpur	No coverage between Banaur to Zirakpur, Poor Level & Quality near Ram Nagar, Poor Quality near Chatt, Rajpura	Nabha, Mandi Govind garah & Sirhind	No coverage between Amloh to Bhadsan, Poor Level & Quality near Horlicks Factory, Poor Quality near LBM College
2	AIRTEL		Poor Quality near Tipri, Kheri, Samana outer		---		Poor Level & Quality near Bhadson
3	BSNL		Poor Level near Kheri, Smana outer		Poor Level near Ziralpur outer		Poor Level near Bhadson, Nabha outer, Almoh
4	TATA GSM		They have coverage only in SDCA's & Major towns with Poor Level & Quality at outers, Poor Level & Quality near Ishwar Enclave, Civil lines		They have coverage only in SDCA's & Major towns with Poor Level & Quality at outers, Poor Level & Quality near Indira market		They have coverage only in SDCA's & Major towns with Poor Level & Quality at outers
5	TATA CDMA		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		They have coverage only in SDCA's & Major towns with Poor Level & Quality at outers
6	IDEA		---		---		---
7	RCOM GSM		Poor Level & Quality near Bhadson Rd, Rajpura Bypass, Kheri, Nabha Gate, Samana outer		Poor Level & Quality near Indira market, Kalo Majra, Chatt, Hotel Pal		Poor Level & Quality at Nabha outer, Sirhind outer
8	RCOM CDMA		Poor Level & Quality near Shekhpura, Kheri		Poor Level & Quality near Hotel Pal, Banur outer		Poor Level near Bhadson, Nabha outer
9	QTL		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, Poor Level & Quality near Banur Rd, Jasuna		No coverage between Saloni to Turan, Harnaspura to Sirhind, Lubhana to Samla, Kallar to Sakrali, Poor Level & Quality near Bhadson, Amroh outer
10	VODAFONE		Poor Quality near Tipri, Nabha Rd, Kheri, Samana outer		Poor Level & Quality at Rajpura Bypass		Poor Level & Quality near Bhadson, Sirhind HW

DRIVE TEST TABLE: 6

DRIVE TEST OBSERVATION OF SANGRUR SSA – NOVEMBER 14

S NO	Name of SP	SDCA Covered in Day 1	Day 1 Observation	SDCA Covered in Day 2	Day 2 Observation	SDCA Covered in Day 3	Day 3 Observation
1	AIRCEL	Sangrur & Sunam	No coverage between Sangrur to Mehlan chowk, Poor Level & Quality near Anai Mandi Sunam, Poor Quality near Dhuri Gate, Krishna Basti Sunam	Malerkotla & Dhuri	Poor Level & Quality near Dulma	Barnala, Dhanaula & Mahal Kalan	Poor Level & Quality near Mehal Kalan, Raikot Barnala
2	AIRTEL		Poor Level at Sunam outer		Poor Level near Sadrabad, Malerkotla outer		Poor Level near Dhanaula outer
3	BSNL		No coverage between Mehla chowk to Sunam, Sangrur to Dirba, Small Quality patches in overall city		Poor Level & Quality near Ratolan		Poor Level & Quality near Barnala outer, Dhanaula outer, Mehal Kalan outer
4	TATA GSM		Poor Level & Quality between Mehal to Sunam Rd, at Sunam outer, Sangrur outer		Poor Level & Quality at Malerkotla & Dhuri outer		Poor Level & Quality at Barnala, Dhanaula & Mahel Kalan outer
5	TATA CDMA		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		They have coverage only in SDCA's & Major towns with Poor Level & Quality at outers
6	IDEA		Poor Quality at Sangrur outer, Sunam Rd, Sunam outer		Poor Level & Quality at Malerkotla & Dhuri outer		Poor Quality at Dhanaula outer
7	RCOM GSM		No coverage between Sangrur to Sunam at Some places, Poor Level & Quality near Ranjit Sigh Market, Bachu Khan, Sunam College		No Coverage between Malerkotla to Dhuri and Poor Level at outers		Poor Level at Dhanuala Rd Barnala, Poor Quality at Mahelkalan Rd Barnala
8	RCOM CDMA		No coverage between Sangrur to Sunam at Some places, Poor Quality near Manguwal, Fountain Chowk		No Coverage between Malerkotla to Dhuri and Poor Level at outers		Poor Level at Dhanuala Rd Barnala, Poor Quality at Mahelkalan Rd Barnala
9	QTL		Poor Level & Quality at Patiala Bypass, Khadial Ramgarh		No coverage between Malerkotla to Sangala, near Babanpur		Poor Level & Quality near Bazidke Kalan
10	VODAFONE		Poor Level & Quality at Sangrur & Sunam outer, Gaushala Rd		Poor Level & Quality at Malerkotla & Dhuri outer		Poor Level & Quality at Barnala Bypass, Dhanaula & Mahel Kalan outer

DRIVE TEST TABLE: 7

DRIVE TEST OBSERVATION OF CHANDIGARH SSA – DECEMBER 14

S NO	Name of SP	SDCA Covered in Day 1	Day 1 Observation	SDCA Covered in Day 2	Day 2 Observation	SDCA Covered in Day 3	Day 3 Observation
1	AIRCEL	Chandigarh	Poor Level & Quality near Sarangpur, Poor Quality near Sec-10, 11, 15, 16 Chowk, Rose Garden, Labour Chowk, Sec-42C, Sec-20B, Tribune Chowk, Gandhi Tech Park	Chandigarh	Poor Quality near Subzi Mandi, Kalagram, Judian, Old Panchkula, Haripur, Sec-9, 10, 15, 16 Chowk, BEL Colony	Chandigarh	Poor Level near YP School, Darshan Vihar, Poor Quality near NIIFT, Gracian Hospital, GMADA Sports Complex, HMADA Sports Complex, PCA Stadium, Patti Sohana
2	AIRTEL		Poor Level & Quality near Transport Area, Tribune Chowk, Sarangpur, Sec-63		Poor Quality near MDC Sec-5, IA Ph-1, Housing Board Chowk		Poor Quality near Industrial Area, Balongi, Landran
3	BSNL		Poor Level & Quality near Sec-7, Poor Quality near ITBP Campus, Tribune Chowk, Sec-10, Sec-63, Dhanas		Poor Quality near Sec-6, Judian, Haripur, Housing Board Chowk		Poor Level & Quality near Kharar, Balongi, Saneta, Landrian
4	TATA GSM		Poor Level & Quality near Sarangpur, Poor Quality near Sec-39D, MG Institute, Kishangarh, Mani Majra, Tribune Chowk, Sec-43B, Sec-17		Poor Quality near Rly Station, Housing Board Chowk		Poor Level & Quality near Landrian, Poor Quality near PH-5, Shahi Majra, Industrial Area, Sec-69
5	TATA CDMA		Poor Level near Sec-17, Sec-26		---		Poor Level near Saneta, Jhanjheri
6	IDEA		Poor Quality near Transport Area, Tribune Chowk, Sec-63, Dhanas		Poor Quality near MDC Sec-5, Sec-21, Housing Board Chowk		Poor Quality near Balongi, Saneta, Landrian, Jhanjheri, Kharar Rd
7	RCOM GSM		Poor Level & Quality near Dhanas, Sec-4, Sec-42, Sec-20C, Sec-26		Poor Quality near Sec-26, Sec-17B		Poor Level & Quality near Industrial Area, Ph-3 B2, Landrian, Sec-62, Saneta
8	RCOM CDMA		Poor Level near Sec-28, Poor Quality near Hallo Majra		Poor Level & Quality near Sec-26, Mani Majra, Sec-2		Poor Level near Landrian
9	QTL		Poor Level & Quality near Mullanpur, Dadu Majra Colony, Rajiv Vihar, Transport Area, Sec-51, Sec-25, Burail Market		Poor Quality near MDC Sec-5, Housing Board Chowk		Poor Level & Quality near Kharar, Jhanjheri, Balongi
10	VODAFONE		Poor Quality near Sec-27, Madhya Marg, Tribune Chowk		Poor Quality near Housing Board Chowk, IA Ph-1, District court		Poor Quality near Landrian, Saneta, Mauli Baidwan

DRIVE TEST TABLE: 8

NO NETWORK COVERAGE STATUS OF DRIVE TEST – OCTOBER TO DECEMBER 14

Sr. No	Month of Drive Test	Circle	Name of Operators	SSA	SDCA Covered	Status of no network coverage area	ICR Status
1	Oct 14	Punjab	Airtel	Patiala	Patiala, Samana, Rajpura, Nabha, Sirhind	-----	No
		Punjab	Vodafone		Patiala, Samana, Rajpura, Nabha, Sirhind	-----	No
		Punjab	Idea		Patiala, Samana, Rajpura, Nabha, Sirhind	-----	No
		Punjab	Tata GSM		Patiala, Samana	No Coverage from Wazidpur to Outer Samana on Patiala-Samana Highway	No
					Rajpura	No Coverage near Vill Karala	No
					Nabha ,Sirhind	-----	On Videocon ICR from Bhadson to Outer Amloh.
		Punjab	Tata CDMA		Patiala, Samana	No Coverage from Wazidpur to Outer Samana on Patiala-Samana Highway	No
					Rajpura	Highway Partially covered from Banur to Zirakpur	On Reliance CDMA ICR from Rampur Kala to Zirakpur & Zirakpur Town.
					Nabha ,Sirhind	No coverage from Outer Nabha to Chaswal.	No
					Patiala, Samana	No Coverage from Wazidpur to Outer Samana on Patiala-Samana Highway	No
		Punjab	Reliance GSM		Rajpura	No Coverage near Vill Karala	On Tata GSM ICR at Kallu Mazra & Banur.
					Nabha, Sirhind	No coverage from Chahal to Amloh.	On TATA GSM ICR near Rotipull.
					Patiala, Samana	No Coverage from Wazidpur to Outer Samana on Patiala-Samana Highway	No
		Punjab	Reliance CDMA		Rajpura, Nabha ,Sirhind	-----	No
		Punjab	BSNL		Patiala, Samana, Rajpura, Nabha, Sirhind	-----	No
		Punjab	Videocon		Patiala, Samana	No Coverage from Wazidpur to Outer Samana on Patiala-Samana Highway	No

Sr. No	Month of Drive Test	Circle	Name of Operators	SSA	SDCA Covered	Status of no network coverage area	ICR Status
		Punjab	Aircel		Rajpura	No coverage from Vill Karala to Rampur Kala.No Coverage at Vill Jansua on Rajpura to Banur Highway.	No
					Nabha, Sirhind	No coverage from Lubhana to Shamla.No coverage from Kalar Majri to Chaswal.No coverage from Salani to Turan.No coverage from Harbanspura to Sirhind.	No
					Patiala, Samana	No Coverage from Wazidpur to Outer Samana on Patiala-Samana Highway	On TATA GSM ICR for whole SSA
					Rajpura	Highway Partially covered from Banur to Zirakpur	On TATA GSM ICR for whole SSA
					Nabha ,Sirhind	No coverage from outer Nabha to Bhadson	On TATA GSM ICR for whole SSA
2	Nov 14	Punjab	Airtel	Sangrur	Sangrur,Sunam,Malerkotla,Barnala	-----	No
		Punjab	Vodafone		Sangrur,Sunam,Malerkotla,Barnala	-----	No
		Punjab	Idea		Sangrur,Sunam,Malerkotla,Barnala	-----	No
		Punjab	Tata GSM		Sangrur,Sunam	-----	On Videocon ICR at Kanoli Upla Vill for 2 Km on Sangrur-Sunam Highway
					Malerkotla, Barnala	-----	No
					Sangrur,Sunam	-----	No
		Punjab	Tata CDMA		Malerkotla	No Cov from Outer Malerkotla to Sanghala	No
					Barnala	No Cov from Bhadawad to Mehal Kalan.	No
		Punjab	Reliance GSM		Sangrur,Sunam	No Cov from Khamu Mayra to Outer Mehalan.	No
					Malerkotla	No Cov from Outer Bhasaur to Outer Dhuri	No
					Barnala	-----	No
					Sangrur,Sunam	No Cov from Khamu Mayra to Outer Sunam	No
		Punjab	Reliance CDMA		Malerkotla	No Cov from Bhasod to Outer Dhuri	No
					Barnala	No Cov from Sehjra to Mehal Kalan. Also No Cov at Mehal Kalan Town.	No
		Punjab	BSNL		Sangrur,Sunam,Malerkotla,Barnala	-----	No

Sr. No	Month of Drive Test	Circle	Name of Operators	SSA	SDCA Covered	Status of no network coverage area	ICR Status
		Punjab	Videocon		Sangrur, Sunam, Barnala, Malerkotla	No Coverage from Outer Malerkotla to Sanghala	No
		Punjab	Aircel		Sangrur, Sunam, Barnala, Malerkotla	No Network Sangrur to Sunam Road (Mehlan Chowk)	On TATA GSM ICR for whole SSA
3	Dec 14	Punjab	Tata GSM	Chandigarh	Chandigarh (Panchkula)	----	No
					Chandigarh(Kharar, Mohali)	No coverage between Landran and Jhanjeri Village.	No
		Punjab	Tata CDMA		Chandigarh (Panchkula, Kharar, Mohali)	----	On Reliance CDMA ICR for whole SSA.
		Punjab	Reliance GSM		Chandigarh (Panchkula)	----	On TATA GSM ICR near Pipliwala and near Raj Bhawan.
					Chandigarh(Kharar, Mohali)	No coverage between Landran and Jhanjeri Village.	No
		Punjab	Reliance CDMA		Chandigarh (Panchkula, Kharar, Mohali)	----	No
		Punjab	BSNL		Chandigarh (Panchkula, Kharar, Mohali)	----	No
		Punjab	Videocon		Chandigarh (Panchkula, Kharar, Mohali)	No Coverage from Raipur Kalan to Sector 80 Mohali.	No
		Punjab	Airtel		Chandigarh (Panchkula, Kharar, Mohali)	----	No
		Punjab	Vodafone		Chandigarh (Panchkula, Kharar, Mohali)	----	No
		Punjab	Idea		Chandigarh (Panchkula, Kharar, Mohali)	----	No
		Punjab	Aircel		Chandigarh (Panchkula, Kharar, Mohali)	No Coverage near Jhanjeri Vill on Landran-Jhanjeri Highway.	On TATA GSM ICR for whole 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 October-14**, drive tests were conducted across **Patiala SSA** covering Patiala, Samana Rajpura, Banur, Zirakpur, Nabha, Mandi Govind garah & Sirhind SDCAs. The performance of the Service Providers across Patiala SSA was satisfactory as the operators were largely meeting the benchmarks. However, the parameter **Voice quality** remained non complied for the Operators **Aircel, BSNL and RCOM (GSM)** with their performance as **94.84%, 93.40 (Outdoor) / 94.51% (Indoor) and 94.15%** respectively on overall SSA level.
- (ii) **In the Month of November -14**, drive tests were conducted across **Sangrur SSA** covering Sangrur , Sunam, Malerkotla , Dhuri, Barnala, Dhanaula & Mahal Kalan SDCAs. The performance of the Service Providers across Sangrur SSA was satisfactory as the operators were largely meeting the benchmarks. However, **BSNL** remained under performed for parameters **Voice Quality**, and **Call Block rate** having overall achieved values as **93.82%, and 3.26%** respectively.
- (iii) **In the month of December-14**, drive tests were conducted across **Chandigarh SSA** 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 **Aircel (92.46%), BSNL (90.92%), Tata GSM (94.60%), RCOM GSM (94.54%), and Videocon (93.84%)**.

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.

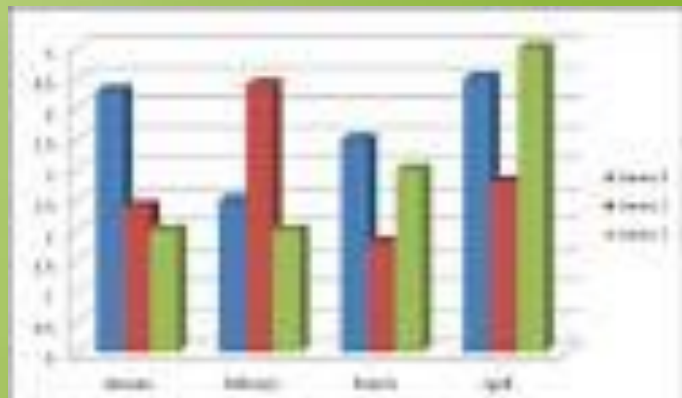
*The analysis of drive tests results revealed that the performance of the services providers in general was satisfactory as they were largely meeting the benchmarks. However, parameter 'Connection with Voice Quality' remained area of concern as the same remained underperformed for **Aircel, BSNL, RCOM(GSM),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

8. GRAPHICAL REPRESENTATION (CELLULAR MOBILE SERVICE PROVIDERS)

AVERAGED QUARTERLY PMR

V/S

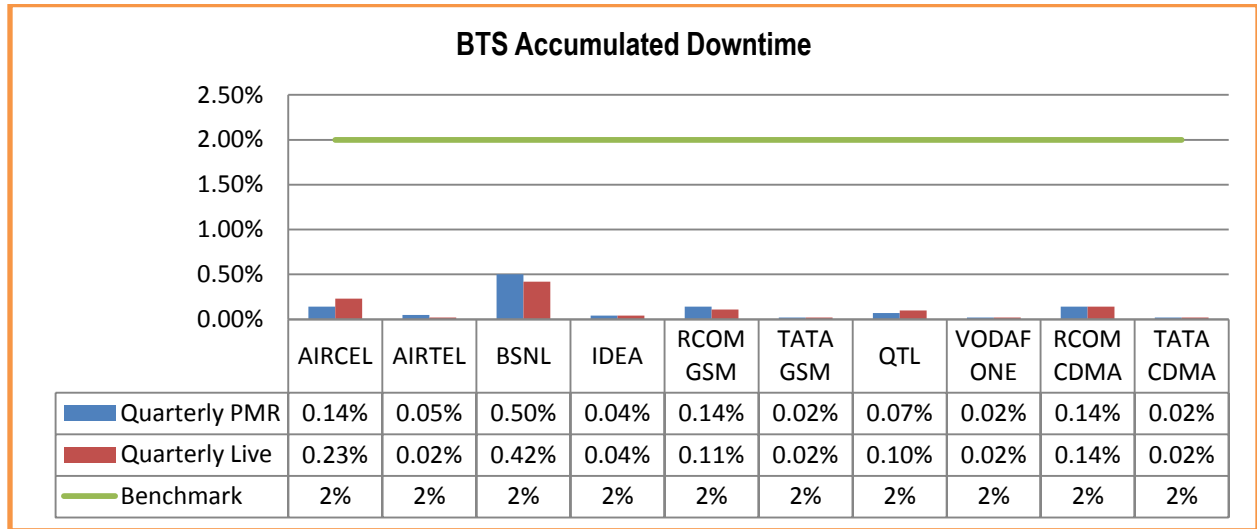
AVERAGED QUARTERLY 3-DAYs LIVE MEASURMENT



8. GRAPHICAL REPRESENTATION (CMTS):

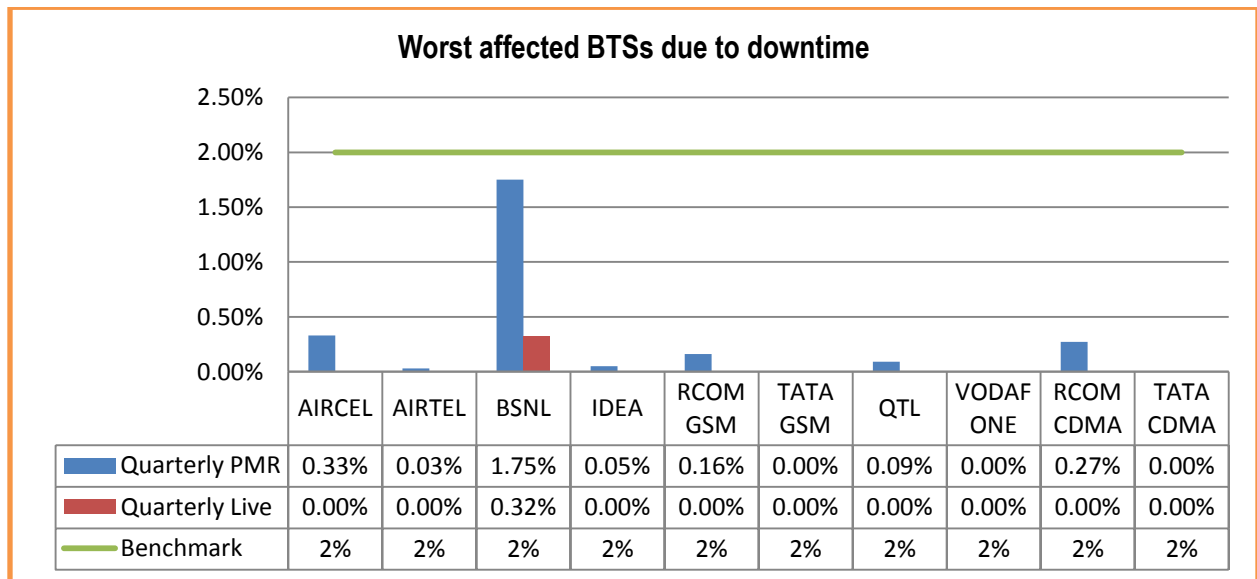
Graphical Representation of Performance of the Cellular Mobile Service Providers (PMR) V/S 3-Days Live Measurement (Quarterly Average Data):

I. BTS ACCUMULATED DOWNTIME:



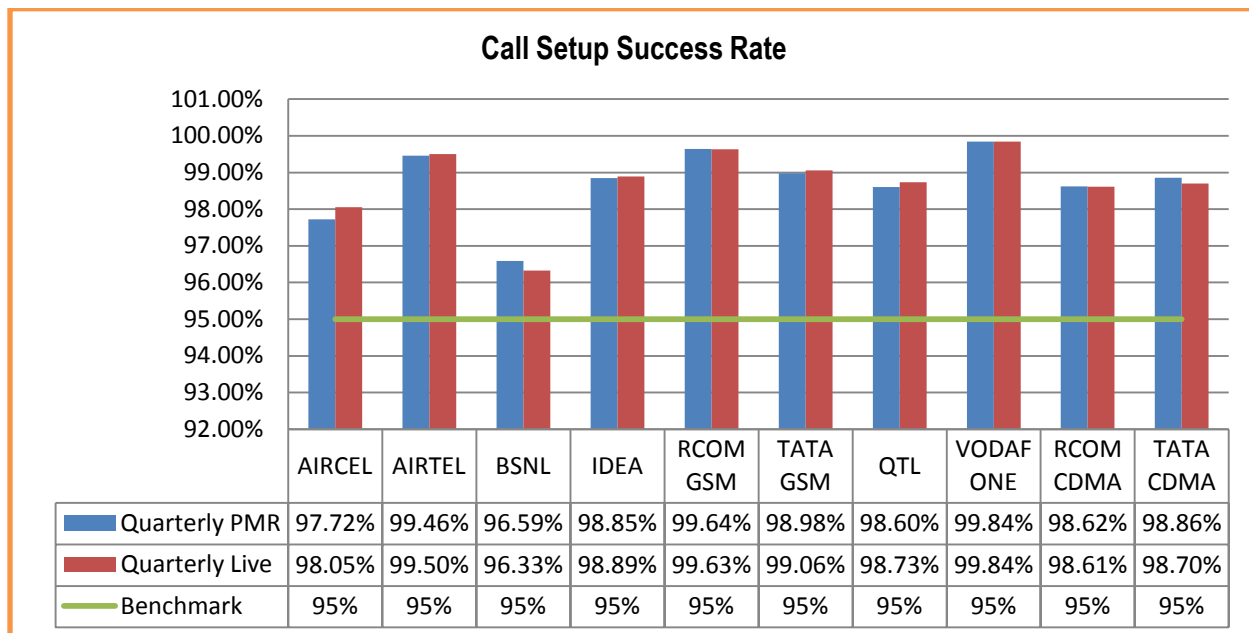
All operators are meeting the benchmarks.

II. WORST AFFECTED BTSS DUE TO DOWNTIME :



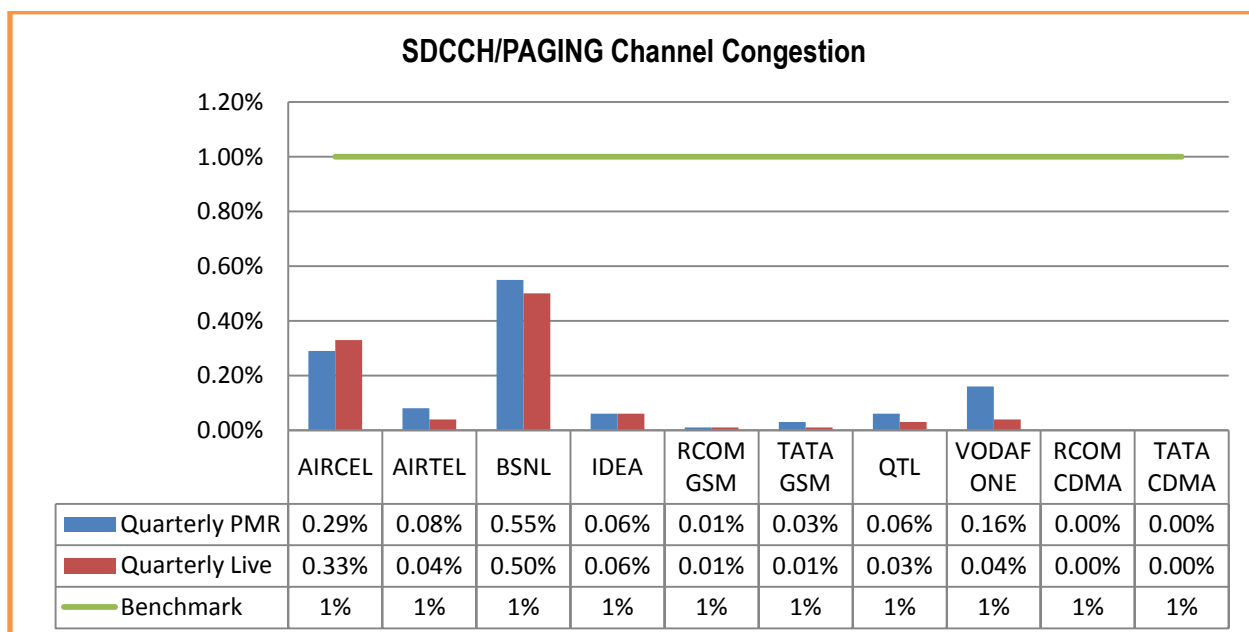
All operators are meeting the benchmarks.

III. CALL SETUP SUCCESS RATE :



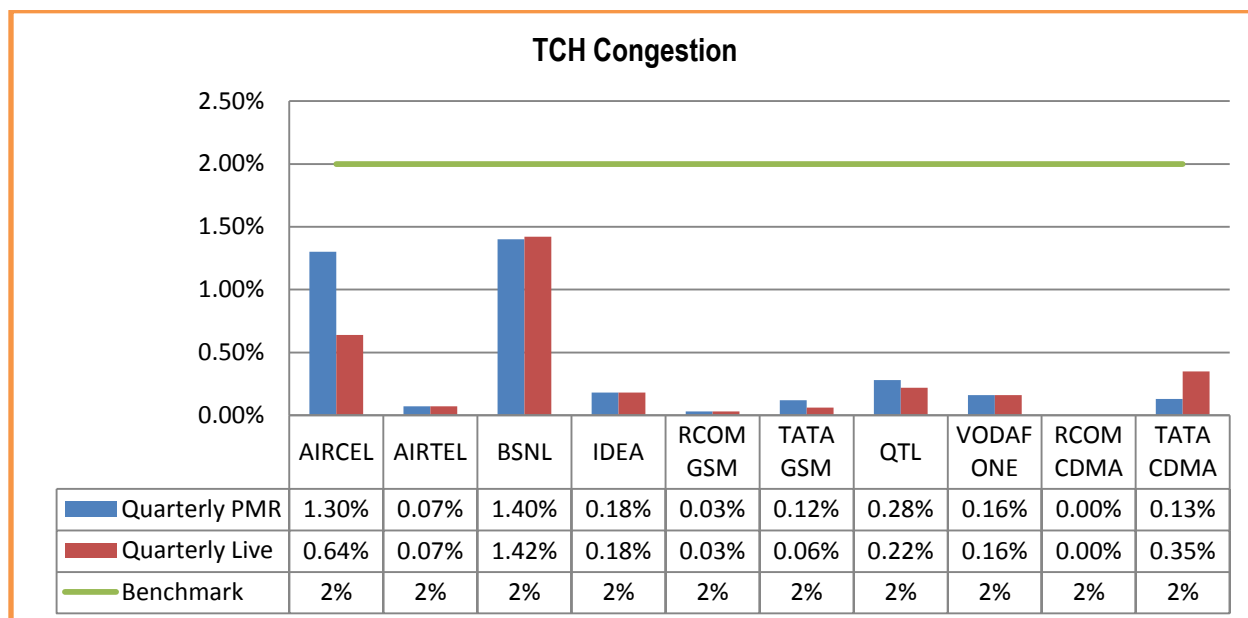
All operators are meeting the benchmarks.

IV. SDCCH/PAGING CHANNEL CONGESTION



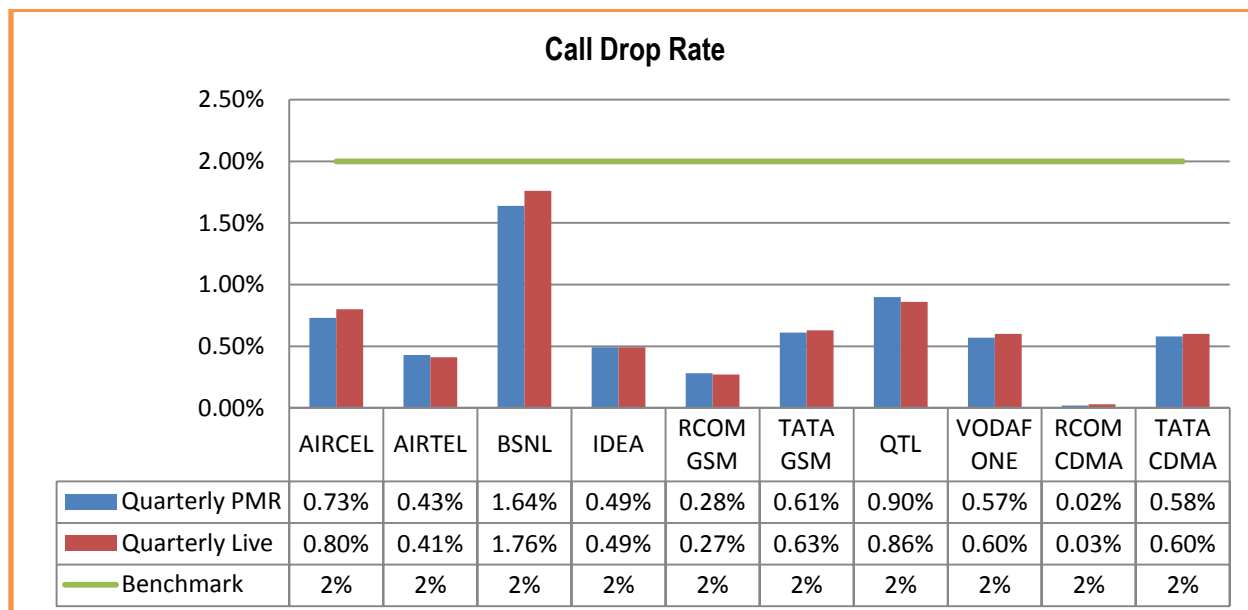
All operators are meeting the benchmarks.

V. TCH CONGESTION :



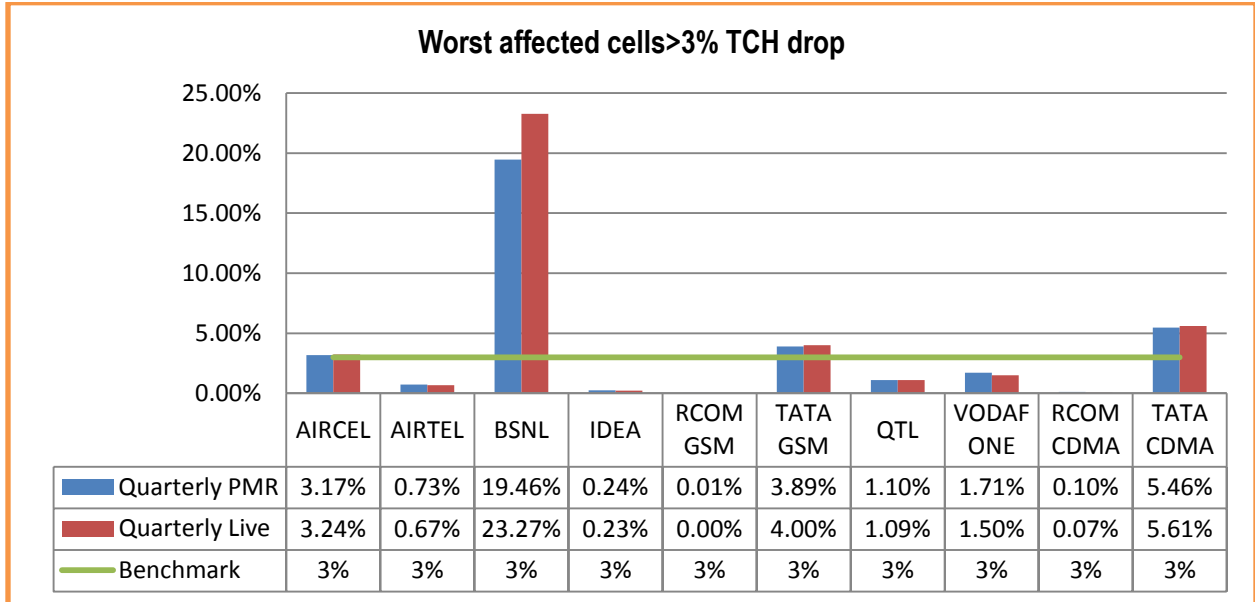
All operators are meeting the benchmarks.

VI. CALL DROP RATE :



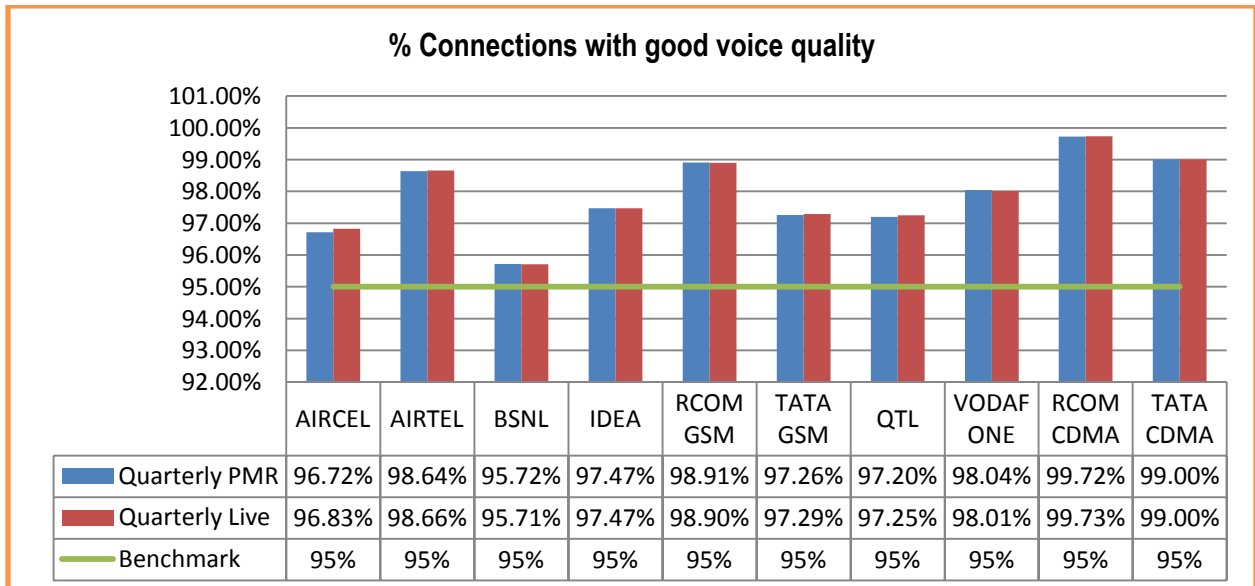
All operators are meeting the benchmarks.

VII. WORST AFFECTED CELLS>3% TCH DROP:



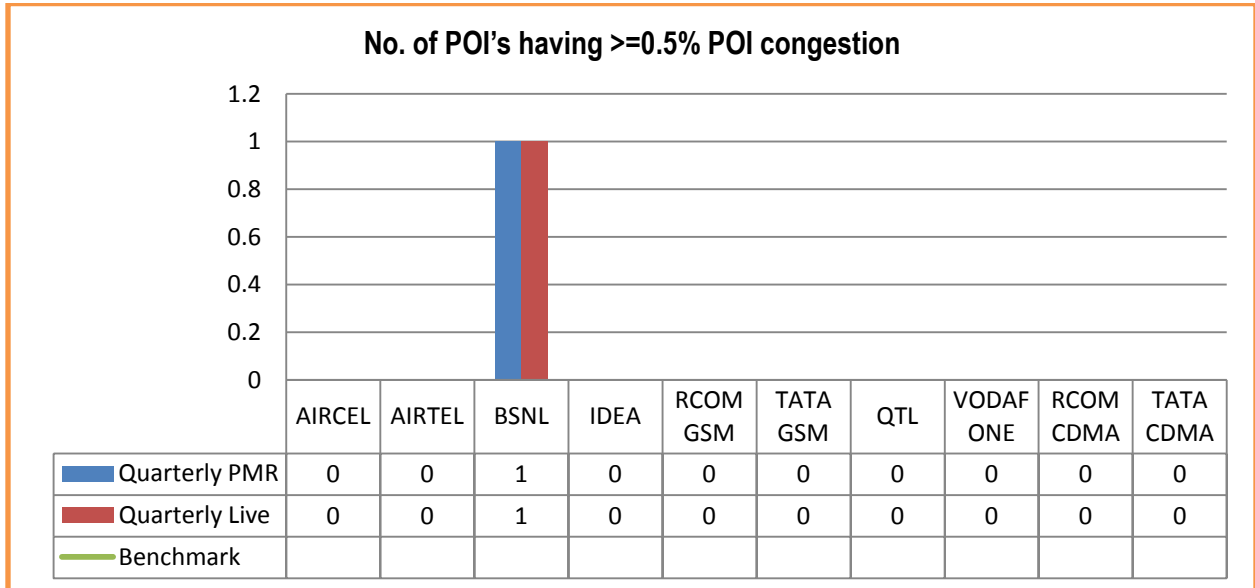
Aircel, BSNL, Tata (GSM) and Tata (CDMA) could not meet the benchmark.

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.