



REPORT
ON
AUDIT & ASSESSMENT OF QUALITY OF SERVICE
OF
CELLULAR MOBILE TELEPHONE SERVICE
BASIC TELEPHONE SERVICE (WIRELIN)
&
BROADBAND SERVICE
FOR
TELECOM REGULATORY AUTHORITY OF INDIA
NORTH ZONE – PUNJAB SERVICE AREA
(APRIL 2014 – JUNE 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

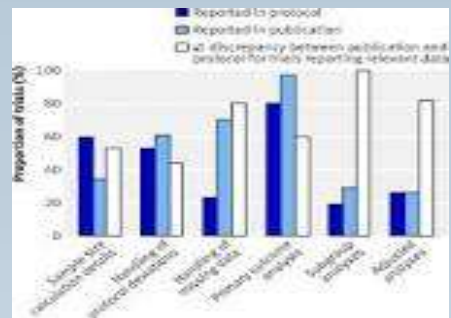
The primary objective is to audit and assess the Quality of Service being rendered by Basic, Cellular Mobile & Broadband service providers against the parameters notified by TRAI.

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 Punjab, Rajasthan & Gujarat circles during the quarter April – June 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
		April-14	May-14	June-14	
GSM Operators					
		April-14	May-14	June-14	Address
1	AIRCEL	13 to 15 April-14	13 to 15 May-14	10 to 12 June-14	Dishnet Wireless Ltd Office ,Phase -7 Industrial Area,Mohali
2	AIRTEL	8 to 10 April-14	12 to 14 May-14	9 to 11 June-14	Bharti Airtel Campus, Plot No 21, Rajiv Gandhi Information and Technilogy Park, Chandigarh, 160101
3	TATA GSM	11 to 12, 14 April-14	10, 12 to 13 May-14	6, 9 to 10 June-14	TTSL Office Phase-8,Industrial area Mohali
4	BSNL	16 to 18 April-14	10 to 12 May-14	13 to 15 June-14	BSNL Exchange Sector-49 Chandigarh
5	VIDEOCON	15 to 17 April-14	12 to 14 May-14	10 to 12 June-14	QTL Office Phase -7 Industrial Area, Mohali
6	RCOM GSM	6 to 8 April-14	8 to 10 May-14	4 to 6 June-14	Reliance Communications Ltd. Phase-8,Industrial area Mohali
7	IDEA	13 to 15 April-14	11 to 13 May-14	9 to 11 June-14	Idea Office Phase -7 Industrial Area,Mohali
8	VODAFONE	6 to 8 April-14	8 to 10 May-14	4 to 6 June-14	Vodafone Office Phase-8,Industrial area Mohali
CDMA Operators					
9	TATA CDMA	11 to 12, 14 April-14	10, 12 to 13 May-14	4 to 6 June-14	TTSL Office Phase-8,Industrial area Mohali
10	RCOM CDMA	6 to 8 April-14	8 to 10 May-14	6, 9 to 10 June-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 June 2014.

The data generated by monthly PMR and 3-days live measurements audit for the period April-2014 to June-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. Out of 1508 (present no. of BSNL exchanges), audit was done for 76 sampled (15-Urban and 61-Rural) exchanges, 1 exchange each of Bhatia, TTL, Vodafone & RCL and 2 exchanges of TTL. As Punjab Circle is having 56 SDCAs, so 76 BSNL exchanges spread over 6 SDCAs (10% of total 56 SDCAs) have been taken for audit. (List of BSNL exchanges undertaken for QoS audit attached as Annex-1)

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. Based on this criterion, total 76 PoPs (exchanges) i.e. 5% of 1505 PoPs/Exchanges have been taken for QoS audit.

Discussion with the private broadband service providers revealed that there is no concept of their PoPs on SDCA basis; they are maintaining their entire data on centralized basis so audit has been done for the centralized data.

4. EXECUTIVE SUMMARY



4. EXECUTIVE SUMMARY

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

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

Essence of compliance report of service providers with respect to the QoS:

1. Cellular Mobile Service:

(i) From month audit & 3 days live findings, it was concluded that on an average, performance of the operators in the Punjab Service Area was satisfactory for **Network Parameters** except for one parameter namely **‘Worst affected cells having > 3% TCH drop’** which could not be met by **Aircel, BSNL, Tata (GSM) and Tata (CDMA)**. The quarterly average performance of **Aircel, BSNL, Tata (GSM) and Tata (CDMA)** for this parameter was **4.48%, 18.69%, 4.46% and 4.81%** respectively.

Similar non-compliance was observed for **Aircel, BSNL, Tata (GSM) and Tata (CDMA)** during the live measurements in all three months of the Quarter ended June-2014 with their quarterly average performance as **3.60%, 17.42%, 4.40% and 4.47%** respectively.

(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, Response Time to Customers, Termination of Service and Time taken for refunds. However, only **BSNL** could not meet the benchmark for the parameter **‘% of billing complaints during the quarter - Post paid’** with its performance as **0.14%** against the benchmark of **<= 0.1%**.

Further, **BSNL** and **RCOM (GSM)** failed to meet the benchmark of **‘calls answered by Operators (voice to voice) within 60 seconds’**. They could achieve their performance level as **27.74%** and **78.27%** respectively against the benchmark of **>=90%**. Thus, performance of **BSNL** with respect to this parameter (**27.74%**) was very poor which needs special attention of BSNL.

In case of parameter ‘Closure within 7 days’, only **QTL** could achieve its performance level as **93.75%** against the benchmark of 100%.

(iii) With regard to the results of drive tests conducted in three SSAs namely Ludhiana, Ropar and Chandigarh, it was revealed that in general the performance of the services providers was satisfactory as they were largely meeting the benchmarks. Only one parameter i.e. Voice Quality was matter of concern as it could not be met by the service providers namely BSNL, Tata (GSM), RCOM (GSM) and Airtel across the above three SSAs.

Thus taking cognizance on overall performance of the Cellular mobile service providers, it is 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.

2. Basic (wire line) service:

From the audit findings, it was concluded that the performance of **BSNL** was not satisfactory in respect of the parameters MTTR, Metering & Billing, Response time to customer for assistance and Time taken for refund as it could perform as **10.01 Hrs, 0.21%, 58.31%, and 99.95%** respectively. TTL also remained short of benchmark for parameter '**Response Time to Customer**' with its achievement as **83.30%**. Hence, BSNL and TTL need to improve their services in respect of these parameters.

3. Broadband Service:

With regard to the audit of Broadband service, it was revealed that the performance of the broadband service providers, in general was satisfactory except for the parameter '**Response Time to customer for assistance by operator (Voice to Voice)**', the benchmark of which could not be met by **BSNL, TCL** and **TTL** with their performance as **65.43% (answer by operator within 90Seconds) / 48.97% (within 60 Seconds), 69.41% (within 90 Seconds)** and **76.65% (within 90 seconds)** respectively.

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	June -14	20:00 -21:00
2	AIRTEL	June -14	20:00 -21:00
3	BSNL	June -14	19:00 - 20:00
4	IDEA	June -14	20:00 -21:00
5	RCOM GSM	June -14	19:00 - 20:00
6	TATA GSM	June -14	20:00 -21:00
7	QUADRANT TELEVENTURES LTD	June -14	21:00 - 22:00
8	VODAFONE	June -14	20:00 -21:00
CDMA Operators			
9	RCOM CDMA	June -14	19:00 - 20:00
10	TATA CDMA	June -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	6	601	NSN	NSN
2	AIRTEL	24	54	5035	Ericsson	Ericsson
3	BSNL	15	51	3103	Ericsson & ZTE	Ericsson, ZTE & NSN
4	IDEA	9	50	4547	ZTE	ZTE & Huawei
5	RCOM GSM	3	8	1540	Huawei & Ericsson	ZTE
6	TATA GSM	2	12	1657	NSN	NSN
7	QTL	2	12	2061	Huawei & NSN	Huawei
8	VODAFONE	9	50	4551	Ericsson	Ericsson
CDMA Operators						
9	RCOM CDMA	4	3	625	Lucent, ZTE & Ericsson	Lucent & ZTE
10	TATA CDMA	3	4	460	Ericsson	Huawei & Motorola

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

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE- APRIL-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%	Apr-14	0.15%	0.06%	0.38%	0.05%	0.13%	0.08%	0.07%	0.03%	0.16%	0.03%
	b) Worst affected BTSs due to downtime	<=2%	Apr-14	0.00%	0.10%	1.96%	0.11%	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Apr-14	98.31%	99.39%	97.81%	98.68%	99.63%	99.20%	98.18%	99.86%	98.55%	98.33%
	b) SDCCH/PAGING Channel congestion	<=1%	Apr-14	0.02%	0.08%	0.78%	0.11%	0.02%	0.01%	0.06%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Apr-14	0.17%	0.10%	0.66%	0.23%	0.05%	0.03%	0.27%	0.14%	0.42%	0.54%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Apr-14	0.76%	0.45%	1.71%	0.56%	0.26%	0.57%	0.81%	0.52%	0.11%	0.59%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Apr-14	4.05%	0.86%	14.25%	0.52%	0.03%	4.39%	0.79%	1.21%	0.06%	4.89%
	c) Connections with good voice quality	>=95%	Apr-14	97.63%	98.60%	NP	97.49%	98.97%	97.37%	97.52%	98.14%	99.68%	98.97%
4	No. of POI's having >=0.5% POI congestion		Apr-14	0	0	0	0	0	0	0	0	0	0

5.1.4 QOS PERFORMANCE OF MONTHLY PMR – MAY-14 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE- MAY-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%	May-14	0.13%	0.06%	0.39%	0.09%	0.26%	0.10%	0.11%	0.06%	0.31%	0.05%
	b) Worst affected BTSs due to downtime	<=2%	May-14	0.00%	0.16%	1.79%	0.20%	0.36%	0.00%	0.24%	0.04%	0.33%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	May-14	98.36%	99.34%	97.05%	98.81%	99.59%	99.12%	97.93%	99.85%	98.19%	98.52%
	b) SDCCH/PAGING Channel congestion	<=1%	May-14	0.05%	0.15%	1.00%	0.14%	0.13%	0.03%	0.06%	0.03%	0.00%	0.00%
	c) TCH congestion	<=2%	May-14	0.29%	0.11%	1.25%	0.20%	0.06%	0.10%	0.23%	0.15%	0.49%	0.35%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	May-14	0.70%	0.41%	1.88%	0.51%	0.32%	0.66%	0.76%	0.51%	0.13%	0.53%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	May-14	3.49%	0.88%	20.42%	0.39%	0.05%	4.58%	0.73%	1.12%	0.14%	4.70%
	c) Connections with good voice quality	>=95%	May-14	97.58%	98.62%	95.35%	97.72%	98.86%	97.35%	97.65%	98.14%	99.70%	98.96%
4	No. of POI's having >=0.5% POI congestion		May-14	0	0	0	0	0	0	0	0	0	0

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

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE- JUNE-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%	Jun-14	0.23%	0.07%	0.42%	0.07%	0.35%	0.07%	0.17%	0.05%	0.50%	0.04%
	b) Worst affected BTSs due to downtime	<=2%	Jun-14	0.17%	0.14%	1.87%	0.07%	0.97%	0.12%	0.34%	0.02%	0.32%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Jun-14	98.18%	99.36%	96.95%	98.87%	99.59%	99.10%	97.60%	99.87%	98.08%	98.72%
	b) SDCCH/PAGING Channel congestion	<=1%	Jun-14	0.12%	0.14%	1.00%	0.09%	0.05%	0.02%	0.08%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Jun-14	0.73%	0.09%	1.50%	0.17%	0.05%	0.10%	0.33%	0.13%	0.58%	0.18%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Jun-14	0.96%	0.41%	2.00%	0.50%	0.32%	0.61%	0.88%	0.52%	0.16%	0.50%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Jun-14	5.90%	0.88%	21.41%	0.26%	0.02%	4.40%	1.00%	1.26%	0.27%	4.84%
	c) Connections with good voice quality	>=95%	Jun-14	97.34%	98.59%	95.80%	97.73%	98.83%	97.16%	97.38%	98.11%	99.71%	98.99%
4	No. of POI's having >=0.5% POI congestion		Jun-14	0	0	0	0	0	0	0	0	0	0

5.1.6 QOS PERFORMANCE OF QUARTERLY PMR –AVERAGE OF QE- JUNE-14 (APRIL TO JUNE MONTHS AUDITED DATA)

QUARTERLY QOS PERFORMANCE (AVERAGE OF QE-JUNE-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	0.17%	0.06%	0.40%	0.07%	0.25%	0.08%	0.12%	0.05%	0.32%	0.04%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.06%	0.13%	1.87%	0.13%	0.44%	0.04%	0.21%	0.02%	0.22%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	98.28%	99.36%	97.27%	98.79%	99.60%	99.14%	97.90%	99.86%	98.27%	98.52%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.06%	0.12%	0.93%	0.11%	0.07%	0.02%	0.07%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	0.40%	0.10%	1.14%	0.20%	0.05%	0.08%	0.28%	0.14%	0.50%	0.36%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	0.81%	0.42%	1.86%	0.52%	0.30%	0.61%	0.82%	0.52%	0.13%	0.54%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	4.48%	0.87%	18.69%	0.39%	0.03%	4.46%	0.84%	1.20%	0.16%	4.81%
	c) Connections with good voice quality	>=95%	Quarterly	97.52%	98.60%	95.58%	97.65%	98.89%	97.29%	97.52%	98.13%	99.70%	98.97%
4	No. of POI's having >=0.5% POI congestion		Quarterly	0	0	0	0	0	0	0	0	0	0

5.1.7 KEY FINDINGS ON MONTHLY PMR AUDIT REPORTS:

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

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

Network Service Quality Parameters:

- **Network Availability**

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

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

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

- **Connection Establishment (Accessibility)**

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

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

All the operators were meeting the benchmark on this parameter.

- **Parameters related to Network Congestion:**

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

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

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

Connection Maintenance (Retainability)

i. Call Drop Rate:

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

The audit of this parameter revealed that all the service providers were measuring this parameter as per the TRAI guidelines. Also, all the service providers were found to be meeting the TRAI specified benchmark. The lowest call drop rate (0.30 %) was for RCOM GSM during the quarter.

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

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

The audit with respect to this parameter revealed that all the operators met the benchmark for this parameter except **Aircel, BSNL, Tata (GSM) and Tata (CDMA)**. The quarterly averaged performance of **Aircel, BSNL, Tata (GSM) and Tata (CDMA)** for this parameter was **4.48%, 18.69%, 4.46% and 4.81%** respectively.

iii. Connections with good voice quality:

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

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

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

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



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

5.2.1 LIVE MEASUREMENT DATA (3-DAYS) – APRIL-14 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE- APRIL-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	0.14%	0.03%	0.48%	0.03%	0.09%	0.04%	0.05%	0.03%	0.10%	0.11%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.03%	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.68%	99.39%	97.35%	98.53%	99.63%	99.24%	98.06%	99.86%	99.07%	98.92%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.00%	0.10%	0.76%	0.11%	0.01%	0.01%	0.04%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.33%	0.09%	0.99%	0.30%	0.04%	0.02%	0.24%	0.14%	0.00%	0.02%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.73%	0.47%	1.71%	0.59%	0.25%	0.54%	0.77%	0.50%	0.02%	0.55%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	1.90%	0.85%	14.78%	0.45%	0.02%	4.28%	0.66%	1.15%	0.06%	4.76%
	c) Connections with good voice quality	>=95%	Live data	97.65%	98.57%	NP	97.36%	99.00%	97.44%	97.60%	98.20%	99.69%	99.02%
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) – MAY-14 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE- MAY-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	0.31%	0.03%	0.79%	0.18%	0.15%	0.20%	0.11%	0.04%	0.15%	0.25%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.27%	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	98.81%	99.12%	97.06%	98.74%	99.65%	99.05%	97.54%	99.87%	98.64%	98.23%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.19%	0.35%	1.00%	0.24%	0.06%	0.06%	0.18%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.11%	0.11%	1.44%	0.22%	0.05%	0.11%	0.28%	0.13%	0.01%	0.45%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.65%	0.44%	1.80%	0.62%	0.28%	0.78%	0.79%	0.48%	0.05%	0.57%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	2.71%	0.89%	19.62%	0.67%	0.00%	4.44%	0.81%	1.03%	0.06%	3.95%
	c) Connections with good voice quality	>=95%	Live data	97.70%	98.60%	96.02%	97.72%	98.96%	97.42%	97.61%	98.17%	99.70%	98.96%
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) – JUNE-14 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES PUNJAB CIRCLE- JUNE-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	0.18%	0.05%	0.54%	0.10%	0.43%	0.08%	0.18%	0.07%	0.55%	0.03%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.30%	0.00%	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.31%	99.07%	97.50%	98.90%	99.62%	99.13%	98.51%	99.87%	98.96%	98.69%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.55%	0.47%	1.01%	0.08%	0.02%	0.01%	0.06%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.67%	0.09%	0.83%	0.23%	0.06%	0.08%	0.23%	0.13%	0.00%	0.30%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Live data	1.15%	0.38%	1.66%	0.44%	0.27%	0.65%	0.73%	0.51%	0.05%	0.48%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	6.19%	0.86%	17.87%	0.25%	0.00%	4.47%	0.80%	1.21%	0.27%	4.71%
	c) Connections with good voice quality	>=95%	Live data	97.48%	98.65%	95.69%	97.91%	98.90%	97.21%	97.60%	98.14%	99.71%	98.99%
4	No. of POI having >=0.5% congestion		Live data	0	0	0	0	0	0	0	0	0	0

5.2.4 QUARTERLY QOS PERFORMANCE OF 3-DAYS LIVE MEASUREMENT AUDITED DATA (AVERAGE OF APRIL TO JUNE)

QUARTERLY QOS PERFORMANCE OF 3-DAYS LIVE MEASUREMENT (AVERAGE OF QE-JUNE-14) – 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	0.21%	0.04%	0.60%	0.10%	0.22%	0.11%	0.11%	0.05%	0.27%	0.13%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.00%	0.00%	0.20%	0.01%	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	98.60%	99.19%	97.30%	98.72%	99.63%	99.14%	98.04%	99.87%	98.89%	98.61%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.25%	0.31%	0.92%	0.14%	0.03%	0.03%	0.09%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	0.37%	0.10%	1.09%	0.25%	0.05%	0.07%	0.25%	0.13%	0.00%	0.26%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	0.84%	0.43%	1.72%	0.55%	0.27%	0.66%	0.76%	0.50%	0.04%	0.53%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	3.60%	0.87%	17.42%	0.46%	0.01%	4.40%	0.76%	1.13%	0.13%	4.47%
	c) Connections with good voice quality	>=95%	Quarterly	97.61%	98.61%	95.86%	97.66%	98.95%	97.36%	97.60%	98.17%	99.70%	98.99%
4	No. of POI having >=0.5% congestion		Quarterly	0	0	0	0	0	0	0	0	0	0

5.2.5 KEY FINDING ON 3 DAYS LIVE MEASUREMENTS:

From three days live measurement assessment, it was found that the performance of all operators was satisfactory as they were largely meeting the benchmarks except for the parameter ‘**Worst affected cells> 3 % TCH drops**’. The benchmark for this parameter was not met by **Aircel, BSNL, Tata (GSM) and Tata (CDMA)** during the live measurements in all three months of the Quarter ended June-2014. The quarterly average performance of **Aircel, BSNL, Tata (GSM) and Tata (CDMA)** was **3.60%, 17.42%, 4.40% and 4.47%** respectively, during the live measurements in three months of the quarter. *The similar non-compliance of Aircel, BSNL, Tata (GSM) and Tata (CDMA) has been observed in monthly audit.*

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

5.2.6 DETAILED NETWORK DATA ASSESSMENT OF CELLULAR MOBILE TELEPHONE SERVICES:

TABLE: 1

Detailed Network Data Assessment of Cellular Mobile Telephone Services- Punjab Circle- April 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													
1	Network Availability												
	a) Total no. of BTSs in the licensed service area		Apr-14	602	4967	3015	4547	1659	1654	2049	4485	900	459
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Apr-14	656	2166	8233	1554	1578	919	1095	1123	1007	102
	c) BTS Accumulated Downtime	<=2%	Apr-14	0.15%	0.06%	0.38%	0.05%	0.13%	0.08%	0.07%	0.03%	0.16%	0.03%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Apr-14	0	5	59	5	0	0	1	0	0	0
e) Worst affected BTSs due to downtime	<=2%	Apr-14	0.00%	0.10%	1.96%	0.11%	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%	
2	Connection Establishment (Accessibility)												
	a) CSSR (Call Setup Success Rate)	>=95%	Apr-14	98.31%	99.39%	97.81%	98.68%	99.63%	99.20%	98.18%	99.86%	98.55%	98.33%
	b) SDCCH/PAGING Congestion	<=1%	Apr-14	0.02%	0.08%	0.78%	0.11%	0.02%	0.01%	0.06%	0.02%	0.00%	0.00%
c) TCH congestion	<=2%	Apr-14	0.17%	0.10%	0.66%	0.23%	0.05%	0.03%	0.27%	0.14%	0.42%	0.54%	
3	Connection Maintenance (Retainability)												
	a) Call Drop Rate (CDR)	<=2%	Apr-14	0.76%	0.45%	1.71%	0.56%	0.26%	0.57%	0.81%	0.52%	0.11%	0.59%
	b) Worst affected cells>3% TCH drop	<=3%	Apr-14	4.05%	0.86%	14.25%	0.52%	0.03%	4.39%	0.79%	1.21%	0.06%	4.89%
	c) % of connections with good voice quality	>=95%	Apr-14	97.63%	98.60%	NP	97.49%	98.97%	97.37%	97.52%	98.14%	99.68%	98.97%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Apr-14	73	128	1268	70	1	218	51	166	2	71
e) Total no. of cells (Sector) in the licensed service area		Apr-14	1806	14877	8903	13678	4959	4958	6448	13784	2700	1450	
4	No. of POI's having >=0.5% POI congestion												
	No. of POI's having >=0.5% POI congestion		Apr-14	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Apr-14	0	0	0	0	0	0	0	0	0	0
5	Network Data												
	a) Equipped Capacity of Network in Erlang		Apr-14	23192	248930	343000	196372	72000	107854	89694	147002	53000	84706
	b) Total traffic in TCBH in erlang (Avg.)		Apr-14	8438	222453	104042	158080	58005	29330	40733	123944	13601	19792
c) Total no. of customers served (as per VLR) on last day of the month		Apr-14	446806	6701463	2419884	5809711	2507990	1118661	1136562	4371370	321995	198441	

TABLE: 2

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live- Punjab Circle- April -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	602	4954	3004	4547	1670	1639	2037	4474	900	459
	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	60	102	1039	91	104	51	68	111	67	35
	c) BTS Accumulated Downtime	<=2%	Live data	0.14%	0.03%	0.48%	0.03%	0.09%	0.04%	0.05%	0.03%	0.10%	0.11%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	1	1	0	0	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.03%	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.68%	99.39%	97.35%	98.53%	99.63%	99.24%	98.06%	99.86%	99.07%	98.92%
	b) SDCCCH/PAGING Congestion	<=1%	Live data	0.00%	0.10%	0.76%	0.11%	0.01%	0.01%	0.04%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.33%	0.09%	0.99%	0.30%	0.04%	0.02%	0.24%	0.14%	0.00%	0.02%
Connection Maintenance (Retainability)													
3	a) Call Drop Rate (CDR)	<=2%	Live data	0.73%	0.47%	1.71%	0.59%	0.25%	0.54%	0.77%	0.50%	0.02%	0.55%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	1.90%	0.85%	14.78%	0.45%	0.02%	4.28%	0.66%	1.15%	0.06%	4.76%
	c) % of connections with good voice quality	>=95%	Live data	97.65%	98.57%	NP	97.36%	99.00%	97.44%	97.60%	98.20%	99.69%	99.02%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	34	127	1332	61	1	212	42	159	2	69
	e) Total no. of cells (Sector) in the licensed service area		Live data	1806	14877	9012	13681	4969	4957	6405	13780	2700	1451
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- May 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													
1	Network Availability												
	a) Total no. of BTSs in the licensed service area		May-14	601	5002	3022	4550	1655	1657	2054	4512	900	459
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		May-14	586	2298	8860	3107	3147	1200	1680	1855	2086	181
	c) BTS Accumulated Downtime	<=2%	May-14	0.13%	0.06%	0.39%	0.09%	0.26%	0.10%	0.11%	0.06%	0.31%	0.05%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		May-14	0	8	54	9	6	0	5	2	3	0
e) Worst affected BTSs due to downtime	<=2%	May-14	0.00%	0.16%	1.79%	0.20%	0.36%	0.00%	0.24%	0.04%	0.33%	0.00%	
2	Connection Establishment (Accessibility)												
	a) CSSR (Call Setup Success Rate)	>=95%	May-14	98.36%	99.34%	97.05%	98.81%	99.59%	99.12%	97.93%	99.85%	98.19%	98.52%
	b) SDCCH/PAGING Congestion	<=1%	May-14	0.05%	0.15%	1.00%	0.14%	0.13%	0.03%	0.06%	0.03%	0.00%	0.00%
c) TCH congestion	<=2%	May-14	0.29%	0.11%	1.25%	0.20%	0.06%	0.10%	0.23%	0.15%	0.49%	0.35%	
3	Connection Maintenance (Retainability)												
	a) Call Drop Rate (CDR)	<=2%	May-14	0.70%	0.41%	1.88%	0.51%	0.32%	0.66%	0.76%	0.51%	0.13%	0.53%
	b) Worst affected cells>3% TCH drop	<=3%	May-14	3.49%	0.88%	20.42%	0.39%	0.05%	4.58%	0.73%	1.12%	0.14%	4.70%
	c) % of connections with good voice quality	>=95%	May-14	97.58%	98.62%	95.35%	97.72%	98.86%	97.35%	97.65%	98.14%	99.70%	98.96%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		May-14	63	133	1851	53	2	230	47	154	4	68
e) Total no. of cells (Sector) in the licensed service area		May-14	1803	15046	9066	13685	4935	5019	6460	13829	2700	1452	
4	No. of POI's having >=0.5% POI congestion												
	No. of POI's having >=0.5% POI congestion		May-14	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		May-14	0	0	0	0	0	0	0	0	0	0
5	Network Data												
	a) Equipped Capacity of Network in Erlang		May-14	23214	247432	343000	196541	72000	107608	89489	148917	53000	84788
	b) Total traffic in TCBH in erlang (Avg.)		May-14	9078	217237	101341	156907	53624	30233	39452	123034	13415	19542
c) Total no. of customers served (as per VLR) on last day of the month		May-14	458382	6601548	2414335	5825032	2445530	1130021	1103179	4303140	324982	19542	

TABLE: 4

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live- Punjab Circle- May-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	602	4967	3015	4547	1659	1656	2049	4486	900	460
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Live data	133	113	1706	576	182	240	158	145	98	81
	c) BTS Accumulated Downtime	<=2%	Live data	0.31%	0.03%	0.79%	0.18%	0.15%	0.20%	0.11%	0.04%	0.15%	0.25%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	8	0	0	0	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.27%	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	98.81%	99.12%	97.06%	98.74%	99.65%	99.05%	97.54%	99.87%	98.64%	98.23%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.19%	0.35%	1.00%	0.24%	0.06%	0.06%	0.18%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.11%	0.11%	1.44%	0.22%	0.05%	0.11%	0.28%	0.13%	0.01%	0.45%
Connection Maintenance (Retainability)													
3	a) Call Drop Rate (CDR)	<=2%	Live data	0.65%	0.44%	1.80%	0.62%	0.28%	0.78%	0.79%	0.48%	0.05%	0.57%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	2.71%	0.89%	19.62%	0.67%	0.00%	4.44%	0.81%	1.03%	0.06%	3.95%
	c) % of connections with good voice quality	>=95%	Live data	97.70%	98.60%	96.02%	97.72%	98.96%	97.42%	97.61%	98.17%	99.70%	98.96%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	49	133	1774	92	0	223	52	142	2	57
	e) Total no. of cells (Sector) in the licensed service area		Live data	1806	14877	9045	13684	4936	5020	6448	13818	2700	1453
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- June 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		Jun-14	601	5035	3103	4547	1540	1656	2061	4551	625	460
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Jun-14	1009	2717	9371	2414	3867	841	2556	1559	2232	130
	c) BTS Accumulated Downtime	<=2%	Jun-14	0.23%	0.07%	0.42%	0.07%	0.35%	0.07%	0.17%	0.05%	0.50%	0.04%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Jun-14	1	7	58	3	15	2	7	1	2	0
	e) Worst affected BTSs due to downtime	<=2%	Jun-14	0.17%	0.14%	1.87%	0.07%	0.97%	0.12%	0.34%	0.02%	0.32%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Jun-14	98.18%	99.36%	96.95%	98.87%	99.59%	99.10%	97.60%	99.87%	98.08%	98.72%
	b) SDCCH/PAGING Congestion	<=1%	Jun-14	0.12%	0.14%	1.00%	0.09%	0.05%	0.02%	0.08%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Jun-14	0.73%	0.09%	1.50%	0.17%	0.05%	0.10%	0.33%	0.13%	0.58%	0.18%
Connection Maintenance (Retainability)													
3	a) Call Drop Rate (CDR)	<=2%	Jun-14	0.96%	0.41%	2.00%	0.50%	0.32%	0.61%	0.88%	0.52%	0.16%	0.50%
	b) Worst affected cells>3% TCH drop	<=3%	Jun-14	5.90%	0.88%	21.41%	0.26%	0.02%	4.40%	1.00%	1.26%	0.27%	4.84%
	c) % of connections with good voice quality	>=95%	Jun-14	97.34%	98.59%	95.80%	97.73%	98.83%	97.16%	97.38%	98.11%	99.71%	98.99%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Jun-14	106	133	1993	35	1	221	65	176	6	70
	e) Total no. of cells (Sector) in the licensed service area		Jun-14	1803	15146	9309	13690	4709	5028	6495	13912	2189	1453
No. of POI's having >=0.5% POI congestion													
4	No. of POI's having >=0.5% POI congestion		Jun-14	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Jun-14	0	0	0	0	0	0	0	0	0	0
Network Data													
5	a) Equipped Capacity of Network in Erlang		Jun-14	23246	246306	343000	196607	72000	107419	89757	149176	53000	84993
	b) Total traffic in TCBH in erlang (Avg.)		Jun-14	8679	211739	60987	153401	51993	29462	39955	119494	12856	15936
	c) Total no. of customers served (as per VLR) on last day of the month		Jun-14	461465	7489302	2377305	5860346	2374914	1135851	1141360	4323320	311572	228249

TABLE: 6

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live- Punjab Circle- June-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													
1	Network Availability												
	a) Total no. of BTSs in the licensed service area		Live data	601	5002	3022	4551	1655	1656	2054	4512	900	459
	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	79	177	1166	344	515	91	271	214	354	11
	c) BTS Accumulated Downtime	<=2%	Live data	0.18%	0.05%	0.54%	0.10%	0.43%	0.08%	0.18%	0.07%	0.55%	0.03%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	9	0	0	0	1	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.30%	0.00%	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%
2	Connection Establishment (Accessibility)												
	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.31%	99.07%	97.50%	98.90%	99.62%	99.13%	98.51%	99.87%	98.96%	98.69%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.55%	0.47%	1.01%	0.08%	0.02%	0.01%	0.06%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.67%	0.09%	0.83%	0.23%	0.06%	0.08%	0.23%	0.13%	0.00%	0.30%
3	Connection Maintenance (Retainability)												
	a) Call Drop Rate (CDR)	<=2%	Live data	1.15%	0.38%	1.66%	0.44%	0.27%	0.65%	0.73%	0.51%	0.05%	0.48%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	6.19%	0.86%	17.87%	0.25%	0.00%	4.47%	0.80%	1.21%	0.27%	4.71%
	c) % of connections with good voice quality	>=95%	Live data	97.48%	98.65%	95.69%	97.91%	98.90%	97.21%	97.60%	98.14%	99.71%	98.99%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	112	130	1620	34	0	225	52	169	7	68
	e) Total no. of cells (Sector) in the licensed service area		Live data	1803	15046	9066	13696	4923	5027	6469	13899	2699	1452
4	No. of POI's having >=0.5% POI congestion												
	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0	0

CUSTOMER SERVICE QUALITY (CSD) PARAMETERS



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

5.3.1 CUSTOMER SERVICE DELIVERY (CSD) AUDITED DATA FOR CELLULAR MOBILE SERVICES (QE-JUNE 2014):

CSD DATA FOR CELLULAR MOBILE TELEPHONE SERVICES-QE JUNE-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													
1 Metering & Billing Credibility -Post Paid													
	A) No. of bills issued during the quarter		Punjab	10653	426593	39697	616638	38985	70047	3196	407779	56674	25541
	B) No. of bills disputed including billing complaints during the quarter		Punjab	1	335	57	268	34	2	2	286	51	0
	C)% of billing complaints during the quarter	<= 0.1%	Punjab	0.01%	0.08%	0.14%	0.04%	0.08%	0.00%	0.06%	0.07%	0.08%	0.00%
2 Metering & Billing Credibility -Pre Paid													
	A) Total No. of Pre-paid customers at the end of the quarter		Punjab	937921	6969412	4204345	5276196	2412563	1761229	2265739	4310687	263071	324038
	B) Total No. of complaints relating to charging, Credit and Validity during the quarter		Punjab	1	120	169	620	2407	1	17	275	106	0
	C) % of Pre-paid Charging Complaints	<= 0.1%	Punjab	0.00%	0.00%	0.00%	0.01%	0.10%	0.00%	0.00%	0.01%	0.04%	0.00%
3 Resolution of Billing/Charging Complaints and Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints													
	A) No. of Billing/Charging/Credit/Validity Complaints received during the quarter		Punjab	2	456	226	4032	2441	3	18	561	157	0
	B) No. of billing complaints for Post paid customers/Charging/Credit/Validity complaints for pre-paid customers resolved within 4 weeks during the quarter		Punjab	2	456	226	4032	2441	3	18	561	157	0
	C) % of billing complaints (for post paid customer) / Charging/Credit/Validity (for Pre paid customer) resolved within 4 weeks	100 % within 4 week	Punjab	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA
	D) % of Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints	<=1 week	Punjab	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA
4 Response time to customers for assistance													
	A) Total no of calls attempted to customer care/Call center		Punjab	750086	527040	62361	459117	2217253	176113	48243	3520069	104316	20671

CSD DATA FOR CELLULAR MOBILE TELEPHONE SERVICES-QE JUNE-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	
	B) Total no. of calls successfully established to customer care/Call center		Punjab	747179	527040	62361	458756	2184049	174415	48243	3520069	102769	20175
	C) % Accessibility of Call centre /customer Care (Total call successfully established *100 / Total call attempt)	>=95%	Punjab	99.61%	100.00%	100.00%	99.92%	98.50%	99.04%	100.00%	100.00%	98.52%	97.60%
	D) Total Calls reached to agent desk for Voice to Voice (Total call attempt)		Punjab	147182	1428419	152833	1210436	624065	278520	552216	871676	30410	25240
	E) Total number of calls answered by the operator (Voice to voice) within 60 seconds		Punjab	137008	1287796	42396	1105301	488425	257902	507512	866534	28743	24251
	F) % age of calls answered by operator (voice to voice) (Total call successfully established within 60 Sec.) *100/ Total call attempts	>=90%	Punjab	93.09%	90.16%	27.74%	91.31%	78.27%	92.60%	91.90%	99.41%	94.52%	96.08%
5	Termination/closure of service												
	A) Total No. of requests for Termination / Closure of service received during the quarter		Punjab	116	2950	332	8458	348	900	16	2015	218	348
	B) No. of requests for Termination / Closure of service complied within 7 days during the quarter		Punjab	116	2950	332	8458	348	900	15	2015	218	348
	C) % of Termination/ Closure of service within 7 days	<=7days	Punjab	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	93.75%	100.00%	100.00%	100.00%
6	Time taken for refunds of deposits after closures.												
	A) No. of Payments/ Refunds due during the quarter		Punjab	43	576	158	839	228	355	NA*	478	207	335
	B) No. of Payments/ Refunds Cleared during the quarter		Punjab	43	576	158	839	228	355	NA	478	207	335
	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%	NA	100.00%	100.00%	100.00%

NA: Not Applicable

NA*: QTL started their Post paid services in the month of April-14 and out of 16, they settled 15 cases of closures. For refunds, QTL was still within limit of 60 days, so not applicable for parameter 'refunds after closure'.

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

CSD 3 DAYS LIVE DATA FOR CELLULAR MOBILE TELEPHONE SERVICES-QE-JUNE-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	Total no of calls attempted to customer care/Call center		Punjab	26124	18410	1721	15328	61676	6317	1705	116437	3719	726
	Total no. of calls successfully established to customer care/Call center		Punjab	26087	18410	1721	15316	61196	6249	1705	116437	3686	723
	% Accessibility of Call centre /customer Care (Total call successfully established*100 / Total call attempt)	>=95%	Punjab	99.86%	100.00%	100.00%	99.92%	99.22%	98.92%	100.00%	100.00%	99.11%	99.59%
	Total Calls reached to agent desk for Voice to Voice (Total call attempt)		Punjab	4818	51870	5521	40526	14457	9927	18402	30500	959	915
	Total number of calls answered by the operator (Voice to voice) within 60 seconds		Punjab	4553	44444	2099	38764	14334	9125	16804	30126	922	859
	% age of calls answered by operator(voice to voice) (Total call successfully established within 60 Sec.*100 / Total call attempt)	>=90%	Punjab	94.50%	85.68%	38.02%	95.65%	99.15%	91.92%	91.32%	98.77%	96.14%	93.88%

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 is well within the prescribed bench mark of $\leq 0.1\%$ except **BSNL**. **BSNL** could not meet the benchmark for the parameter '**% of billing complaints during the quarter - Post paid**' with its performance as **0.14%** against the benchmark of $\leq 0.1\%$.

2. Resolution of Billing complaints and applying credits -

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

All operators were found meeting the benchmarks of the above parameters

3. Response Time to the Customer for assistance

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

All service providers are in compliance with respect to the parameter accessibility of call center. However, **BSNL** and **RCOM (GSM)** have not met the benchmark of '**calls answered by Operators (voice to voice) within 60 seconds**'. They could achieve their performance level as **27.74%** and **78.27%** respectively against the benchmark of $\geq 90\%$. Thus, performance of **BSNL** with respect to this parameter (**27.74%**) was very poor which needs special attention of **BSNL**.

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 except **QTL**. **QTL** could achieve its performance level as **93.75%** against the benchmark of 100%. **QTL** started its Post-paid connections in the month of April 2014. Out of 16, **QTL** settled 15 cases of closures, so its performance level was 93.75%.

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.

The results for three days live measurements reveal that all operators (except **Airtel** and **BSNL**) have met the benchmarks for the parameters '**Accessibility to call center and call connection to operators (Voice to voice) within 60 seconds**'. **Airtel** and **BSNL** have performed with **85.68%** and **38.02%** of calls connected to operator within 60 seconds respectively. **Thus performance of BSNL is very poor with respect to this parameter and similar to the results of quarterly audit.**

6. LIVE CALLING ASSESSMENT



6. LIVE CALLING ASSESSMENT:

6.1 INTER OPERATOR CALLS ASSESSMENT:

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

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

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

6.2 CUSTOMER CARE / HELPLINE ASSESSMENT:

LIVE CALLING TO CALL CENTRE											
Parameter	Circle Name	AIRCEL	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	QTL	VODAFONE	RCOM (CDMA)	TATA (CDMA)
Total No. of calls Attempted	Punjab	100	100	100	100	100	100	100	100	100	100
Total no of calls attempted to customer care/Call center	Punjab	100	100	100	100	100	100	100	100	100	100
Total no. of calls successfully established to customer care/Call center	Punjab	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 60 seconds	Punjab	100	100	46	100	90	100	100	100	100	100
% age of calls answered by operator(voice to voice) (Total call successfully established within 60 Sec.*100 / Total call attempt)	Punjab	100.00%	100.00%	46.00%	100.00%	90.00%	100.00%	100.00%	100.00%	100.00%	100.00%

In case of calls answered by operators (voice to voice) within 60 seconds when test calls were made to the call centers, all operators were able to connect the calls with their call center operators/agents successfully except BSNL and RCOM (GSM), they could achieve their performance as 46% and 90% 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	6	100	100	100	100	9	55	100	100	0
Total No. of calls Answered	Punjab	6	90	78	89	80	9	55	100	87	0
Resolution of billing Complaints	Punjab	6	90	78	89	80	9	55	100	87	0
% age of cases resolved	Punjab	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA

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

6.4 LEVEL -1 CALLING ASSESSMENT:

LEVEL 1 LIVE CALLING

Emergency no.	Circle Name	SDCA Name	No. of calls made	AIRCEL	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	VIDEOCON	VODAFONE	RCOM (CDMA)	TATA (CDMA)
100, 101, 108	Punjab	Ludhiana	15	√	√	√	√	√	√	√	√	√	√
100, 101, 108	Punjab	Jagraon	15	√	√	√	√	√	√	√	√	√	√
100, 101, 108	Punjab	Samrala	20	√	√	√	√	√	√	√	√	√	√
100, 101, 108	Punjab	Ropar	15	√	√	√	√	√	√	√	√	√	√
100, 101, 108	Punjab	Nangal	15	√	√	√	√	√	√	√	√	√	√
100, 101, 108	Punjab	Kharar	20	√	√	√	√	√	√	√	√	√	√
100,101,102/108,1091	Punjab	Chandigarh	15	√	√	√	√	√	√	√	√	√	√
100,101,102/108,1091	Punjab	Chandigarh	15	√	√	√	√	√	√	√	√	√	√
100,101,102/108,1091	Punjab	Chandigarh	20	√	√	√	√	√	√	√	√	√	√

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 ASSISTED 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 **Ludihana, Ropar and Chandigarh** in the months of April, May and June 2014 respectively. The total route Kms covered during the drive tests in the respective SSAs was **370 Kms, 410Kms, and 400Kms**. 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 LUDHIANA SSA IN APRIL-14 MONTH- PUNJAB CIRCLE

S/N	Parameter	Days of drive test	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	Day 1	166	10	147	10	179	10	176	10	165	10	191	12	174	10	156	11	186	11	177	10	
		Day 2	73	10	65	8	57	10	82	10	81	10	86	11	83	10	81	10	87	11	79	10	
		Day 3	99	10	77	10	130	10	108	10	103	10	126	12	117	12	118	10	119	12	102	11	
		Overall SSA	338	30	289	28	366	30	366	30	349	30	403	35	374	32	355	31	392	34	358	31	
2	Blocked Call Rate	Day 1	0.00%	0.00%	0.00%	0.00%	2.79%	0.00%	1.14%	0.00%	0.61%	0.00%	1.57%	0.00%	0.57%	0.00%	0.00%	0.00%	0.00%	0.00%	0.56%	0.00%	
		Day 2	0.00%	0.00%	0.00%	0.00%	7.02%	0.00%	1.23%	0.00%	1.23%	0.00%	1.16%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Day 3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.59%	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%	2.46%	0.00%	0.82%	0.00%	0.57%	0.00%	1.49%	0.00%	0.27%	0.00%	0.00%	0.00%	0.00%	0.00%	0.28%	0.00%	
3	Dropped Call Rate (<=2%)	Day 1	0.00%	0.00%	0.00%	0.00%	2.87%	0.00%	0.00%	0.00%	2.44%	0.00%	1.60%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Day 2	0.00%	0.00%	0.00%	0.00%	4.17%	0.00%	0.00%	0.00%	1.25%	0.00%	2.35%	0.00%	0.00%	0.00%	0.00%	0.00%	2.30%	0.00%	0.00%	0.00%	
		Day 3	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%	0.84%	0.00%	0.00%	0.00%	
		Overall SSA	0.00%	0.00%	0.00%	0.00%	1.99%	0.00%	0.00%	0.00%	1.44%	0.00%	1.26%	0.00%	0.00%	0.00%	0.00%	0.00%	0.77%	0.00%	0.00%	0.00%	
4	Percentage connections with good voice quality (=>95%)																						

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S/N	Parameter	Days of drive test	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)	Day 1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.86%	100%
Day 2	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.73%	100%	97.78%	99.22%	
Day 3	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.13%	100%	98.60%	99.96%	
Overall SSA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.63%	100%	98.57%	99.29%	
(b) 0-5 (with frequency hopping for GSM Operators)	Day 1	95.15%	98.66%	92.02%	99.08%	89.13%	99.69%	97.57%	99.76%	92.44%	91.04%	96.08%	99.86%	94.76%	97.56%	96.63%	98.94%	NA	NA	NA	NA	
	Day 2	96.85%	99.57%	91.10%	92.73%	91.31%	98.13%	96.54%	99.96%	96.05%	99.14%	96.54%	100%	95.39%	96.94%	97.72%	99.70%	NA	NA	NA	NA	
	Day 3	96.34%	99.53%	96.22%	98.92%	95.20%	93.14%	94.66%	98.80%	95.15%	96.04%	98.49%	99.60%	96.18%	95.49%	98.21%	99.24%	NA	NA	NA	NA	
	Overall SSA	95.70%	99.26%	93.70%	96.35%	91.51%	96.95%	96.49%	99.51%	94.06%	95.30%	96.92%	99.82%	95.32%	97.31%	97.38%	99.28%	NA	NA	NA	NA	
5	Service Coverage																					
	In door (>= -75dBm)	Day 1	67.54%	5.21%	79.52%	100%	99.82%	100%	91.78%	77.57%	89.18%	6.12%	65.42%	32.02%	80.35%	5.09%	99.54%	96.74%	96.70%	99.57%	64.62%	3.83%
		Day 2	28.69%	0.33%	78.61%	28.80%	100%	100%	76.17%	13.67%	32.83%	5.20%	42.28%	23.17%	65.32%	5.11%	87.56%	95.96%	76.16%	62.68%	42.44%	2.20%
		Day 3	34.20%	12.42%	89.13%	80.15%	99.92%	100%	91.19%	96.56%	52.22%	15.29%	33.10%	36.22%	56.70%	63.44%	84.98%	97.39%	77.71%	71.71%	29.49%	0.00%
		Overall SSA	53.05%	5.98%	83.52%	63.38%	99.92%	100%	88.09%	62.54%	65.66%	9.14%	50.45%	30.68%	69.96%	27.21%	92.16%	96.70%	87.29%	76.17%	49.70%	1.97%
	In-vehicle (>= -85dBm)	Day 1	99.02%	85.65%	99.52%	100%	99.99%	100%	99.80%	99.96%	99.77%	58.97%	93.20%	92.79%	98.73%	86.10%	100%	100%	99.99%	100%	96.65%	91.26%
		Day 2	87.39%	49.94%	98.49%	88.77%	100%	100%	99.17%	86.81%	85.01%	58.25%	73.85%	91.89%	94.36%	46.38%	98.60%	99.93%	95.13%	99.57%	74.73%	43.07%
		Day 3	87.10%	92.61%	99.23%	98.62%	100%	100%	99.68%	99.96%	92.15%	82.61%	73.67%	96.67%	94.95%	94.23%	98.76%	100%	92.11%	99.51%	65.81%	71.15%
Overall SSA		94.23%	75.99%	99.17%	94.80%	100%	100%	99.62%	95.57%	94.22%	67.20%	82.98%	93.85%	96.63%	76.74%	99.28%	99.98%	96.81%	99.66%	83.03%	68.83%	

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S/N	Parameter	Days of drive test	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)	Day 1	100%	100%	99.99%	100%	100%	100%	100%	100%	100%	98.54%	99.62%	100%	99.89%	99.22%	100%	100%	100%	100%	99.99%	100%
		Day 2	99.68%	99.56%	99.86%	99.90%	100%	100%	100%	100%	98.77%	97.80%	92.95%	99.93%	99.04%	95.51%	99.94%	100%	99.99%	100%	96.47%	100%
		Day 3	99.89%	100%	99.98%	100%	100%	100%	100%	100%	99.80%	99.89%	98.01%	100%	99.87%	99.94%	99.99%	100%	99.76%	100%	97.50%	100%
		Overall SSA	99.92%	99.85%	99.95%	99.96%	100%	100%	100%	100%	99.67%	98.80%	97.67%	99.98%	99.69%	98.33%	99.98%	100%	99.93%	100%	98.51%	100%
6	Call Setup Success Rate (>=95%)	Day 1	99.40%	100%	100%	100%	97.21%	100%	98.86%	100%	99.39%	100%	98.43%	100%	99.43%	100%	100%	100%	100%	100%	99.44%	100%
		Day 2	100%	100%	100%	100%	84.21%	90.00%	98.78%	100%	98.77%	100%	98.84%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Day 3	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	98.41%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Overall SSA	99.70%	100%	100%	100%	96.17%	96.67%	99.18%	100%	99.43%	100%	98.51%	100%	99.73%	100%	100%	100%	100%	100%	99.72%	100%
7	Hand Over Success Rate (HOSR)	Day 1	100%	100%	100%	100%	95.73%	100%	100%	100%	97.40%	97.92%	98.31%	100%	100%	100%	99.46%	100%	100%	100%	100%	100%
		Day 2	100%	100%	100%	100%	85.61%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Day 3	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Overall SSA	100%	100%	100%	100%	94.40%	100%	100%	100%	98.72%	98.00%	98.94%	100%	100%	100%	99.73%	100%	100%	100%	100%	100%

NA: Not Applicable

DRIVE TEST TABLE – 2

OPERATOR ASSISTED DRIVE TEST AT ROPAR SSA IN MAY-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	181	27	151	21	191	29	169	30	188	25	176	27	183	25	185	31	180	28	134	25	
		Highway	221	25	247	25	210	25	225	26	199	25	230	26	241	25	244	25	222	34	157	25	
		Within City	134	26	141	25	156	26	152	26	125	25	176	29	116	25	117	25	180	30	174	27	
		Overall SSA	536	78	539	71	557	80	546	82	512	75	582	82	540	75	546	81	582	92	465	77	
2	Blocked Call Rate	Major Road	0.00%	0.00%	0.00%	0.00%	3.14%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.57%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Highway	0.00%	0.00%	0.00%	0.00%	0.95%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	6.09%	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%	1.28%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.14%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Overall SSA	0.00%	0.00%	0.00%	0.00%	1.80%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.92%	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%	1.63%	0.00%	0.00%	0.00%	0.00%	0.00%	0.57%	0.00%	0.00%	0.00%	0.00%	0.00%	0.56%	0.00%	0.00%	0.00%	
		Highway	0.00%	0.00%	0.00%	0.00%	0.48%	0.00%	0.00%	0.00%	1.01%	0.00%	1.85%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Within City	0.00%	0.00%	0.00%	0.00%	0.66%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Overall SSA	0.00%	0.00%	0.00%	0.00%	0.92%	0.00%	0.00%	0.00%	0.39%	0.00%	0.88%	0.00%	0.00%	0.00%	0.00%	0.00%	0.17%	0.00%	0.00%	0.00%	
4	Percentage connections with good voice quality (=>95%)																						

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S/N	Parameter	Classification of route covered	AIRCEL		AIRTEL		BSNL		IDEA		TATA GSM		RCOM GSM		VIDEOCON		VODAFONE		RCOM CDMA		TATA CDMA	
			OUTDOOR	INDOOR	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	NA	99.53%
Highway	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.39%	99.96%	98.73%	97.38%
Within City	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.49%	100%	99.13%	100%
Overall SSA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.47%	99.98%	98.83%	99.16%
(b) 0-5 (with frequency hopping for GSM Operators)	Major Road	95.98%	99.31%	95.94%	96.98%	94.32%	93.74%	95.62%	95.49%	93.83%	98.69%	92.85%	97.26%	96.62%	99.92%	96.88%	98.60%	NA	NA	NA	NA	
	Highway	97.53%	99.13%	96.04%	96.78%	95.00%	97.70%	96.67%	96.36%	97.94%	96.17%	94.32%	93.21%	97.76%	99.64%	97.87%	99.60%	NA	NA	NA	NA	
	Within City	98.25%	99.49%	96.45%	99.31%	94.61%	99.29%	95.10%	97.82%	97.51%	95.02%	93.88%	99.78%	98.11%	99.71%	97.97%	99.40%	NA	NA	NA	NA	
	Overall SSA	97.17%	99.32%	96.12%	97.70%	94.66%	96.76%	95.88%	96.53%	96.53%	96.63%	93.73%	96.83%	97.46%	99.76%	97.58%	99.22%	NA	NA	NA	NA	
5	Service Coverage																					
	In door (>= -75dBm)	Major Road	47.58%	90.91%	80.17%	79.01%	69.47%	92.69%	90.83%	96.04%	72.60%	84.70%	35.09%	28.10%	43.32%	91.68%	58.58%	79.30%	74.95%	55.15%	14.65%	74.94%
		Highway	52.04%	0.00%	68.78%	72.50%	47.77%	84.23%	81.08%	90.58%	69.43%	8.56%	27.81%	0.91%	50.10%	36.10%	59.64%	89.20%	65.34%	30.76%	21.11%	0.05%
		Within City	65.67%	33.40%	80.81%	94.24%	77.81%	91.79%	80.32%	77.35%	78.63%	15.99%	39.63%	73.71%	57.74%	87.89%	64.43%	79.50%	79.30%	83.40%	44.66%	13.93%
		Overall SSA	53.85%	41.98%	75.14%	81.97%	63.62%	89.73%	83.75%	88.23%	72.77%	36.97%	33.80%	35.36%	49.49%	71.89%	60.32%	82.38%	72.78%	58.17%	28.87%	29.21%
	In-vehicle (>= -85dBm)	Major Road	83.29%	99.84%	96.16%	99.94%	95.41%	98.30%	99.01%	100%	95.93%	98.09%	70.00%	81.47%	76.26%	99.35%	91.74%	96.60%	95.10%	84.06%	56.10%	84.10%
		Highway	83.70%	74.07%	94.92%	98.33%	89.51%	99.94%	98.45%	96.80%	94.01%	77.97%	62.78%	13.98%	85.52%	95.38%	91.53%	99.50%	87.50%	62.69%	48.96%	99.89%
		Within City	86.81%	94.80%	98.01%	99.94%	98.14%	99.77%	98.51%	99.45%	96.74%	88.97%	81.83%	99.72%	92.03%	99.61%	95.31%	99.80%	94.10%	99.57%	76.02%	90.90%
Overall SSA		84.32%	89.98%	96.08%	99.41%	93.95%	99.29%	98.64%	98.79%	95.31%	88.58%	71.03%	65.90%	83.84%	98.11%	92.39%	98.66%	92.01%	83.39%	61.67%	91.58%	

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



S/N	Parameter	Classification of route covered	AIRCEL		AIRTEL		BSNL		IDEA		TATA GSM		RCOM GSM		VIDEOCON		VODAFONE		RCOM CDMA		TATA CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
	Outdoor-in city (>= 95dBm)	Major Road	96.83%	100%	99.89%	100%	99.67%	100%	100%	100%	99.87%	100%	94.93%	99.26%	96.50%	99.99%	99.66%	99.90%	99.95%	96.84%	95.94%	98.40%
		Highway	96.69%	96.68%	99.86%	100%	99.44%	100%	100%	100%	99.77%	99.36%	90.68%	92.39%	98.87%	99.40%	99.79%	99.90%	99.67%	98.51%	89.07%	100%
		Within City	98.32%	99.50%	99.97%	100%	99.91%	100%	100%	100%	99.95%	100%	98.33%	100%	99.83%	100%	99.93%	100%	99.50%	100%	98.24%	98.90%
		Overall SSA	97.14%	98.78%	99.90%	100%	99.65%	100%	100%	100%	99.84%	99.80%	94.42%	97.28%	98.29%	99.80%	99.78%	99.94%	99.71%	98.47%	94.53%	99.09%
6	Call Setup Success Rate (>=95%)	Major Road	100%	100%	100%	100%	96.34%	96.55%	98.82%	96.67%	100%	100%	99.43%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Highway	100%	100%	100%	100%	99.05%	100%	100%	100%	100%	100%	93.91%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Within City	100%	100%	100%	100%	97.44%	100%	100%	100%	100%	100%	98.86%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Overall SSA	100%	100%	100%	100%	97.67%	98.75%	99.63%	98.78%	100%	100%	97.08%	100%	100%	100%	100%	100%	100%	100%	100%	100%
7	Hand Over Success Rate (HOSR)	Major Road	100%	100%	100%	100%	98.71%	100%	98.23%	100%	96.93%	100%	99.47%	100%	98.90%	100%	98.78%	100%	100%	100%	100%	100%
		Highway	100%	100%	100%	100%	92.81%	100%	100%	100%	99.10%	100%	100%	100%	99.33%	100%	100%	100%	100%	100%	100%	100%
		Within City	100%	100%	100%	100%	99.24%	100%	98.86%	100%	97.40%	100%	99.39%	100%	99.36%	100%	99.68%	100%	100%	100%	100%	100%
		Overall SSA	100%	100%	100%	100%	97.10%	100%	98.97%	100%	97.72%	100%	99.61%	100%	99.18%	100%	99.50%	100%	100%	100%	100%	100%

NA: Not Applicable

DRIVE TEST TABLE – 3

OPERATOR ASSISTED DRIVE TEST AT CHANDIGARH SSA IN JUNE-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	115	30	164	25	130	28	132	25	145	25	142	26	137	25	119	25	146	26	130	25	
		Highway	141	26	128	25	137	26	144	25	136	25	133	27	145	25	134	25	138	27	139	27	
		Within City	313	26	266	25	315	26	321	27	301	26	308	27	307	25	304	25	305	27	328	26	
		Overall SSA	569	82	558	75	582	80	597	77	582	76	583	80	589	75	557	75	589	80	597	78	
2	Blocked Call Rate	Major Road	0.00%	0.00%	0.00%	0.00%	3.08%	0.00%	0.00%	0.00%	2.07%	0.00%	0.70%	0.00%	0.73%	0.00%	0.00%	0.00%	0.68%	0.00%	0.00%	0.00%	
		Highway	0.00%	0.00%	0.00%	0.00%	2.92%	0.00%	0.69%	0.00%	0.74%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.44%	0.00%	
		Within City	0.00%	0.00%	0.00%	0.00%	0.95%	0.00%	0.62%	0.00%	0.00%	0.00%	1.62%	0.00%	0.33%	0.00%	0.00%	0.00%	0.00%	0.00%	1.52%	0.00%	
		Overall SSA	0.00%	0.00%	0.00%	0.00%	1.89%	0.00%	0.50%	0.00%	0.69%	0.00%	1.03%	0.00%	0.34%	0.00%	0.00%	0.00%	0.17%	0.00%	1.17%	0.00%	
3	Dropped Call Rate (<=2%)	Major Road	0.00%	0.00%	0.00%	0.00%	0.00%	3.57%	0.00%	0.00%	0.00%	0.00%	1.42%	0.00%	0.00%	0.00%	0.00%	0.00%	0.69%	0.00%	0.00%	0.00%	
		Highway	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.74%	0.00%	3.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.72%	0.00%	0.00%	0.00%	
		Within City	0.00%	0.00%	0.00%	0.00%	0.32%	0.00%	0.00%	0.00%	0.33%	0.00%	1.32%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.31%	0.00%	
		Overall SSA	0.00%	0.00%	0.00%	0.00%	0.18%	1.25%	0.00%	0.00%	0.35%	0.00%	1.73%	0.00%	0.00%	0.00%	0.00%	0.00%	0.34%	0.00%	0.17%	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	99.72%	100%	99.50%	100%	
		Highway	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.26%	100%	97.10%	100%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.70%	100%	99.69%	100%
		Overall SSA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.60%	100%	99.03%	100%
	(b) 0-5 (with frequency hopping for GSM Operators)	Major Road	95.57%	98.27%	96.34%	98.30%	91.07%	99.75%	97.34%	97.71%	94.63%	99.35%	92.87%	99.67%	95.03%	99.83%	95.81%	98.93%	NA	NA	NA	NA	
		Highway	96.66%	99.73%	92.42%	96.59%	91.33%	99.02%	97.32%	99.35%	93.62%	97.22%	94.18%	99.97%	95.73%	99.76%	96.32%	99.35%	NA	NA	NA	NA	
		Within City	95.92%	96.38%	97.21%	99.02%	91.78%	93.89%	98.11%	97.04%	94.03%	98.09%	94.04%	99.91%	96.03%	98.60%	96.39%	99.76%	NA	NA	NA	NA	
		Overall SSA	96.03%	98.10%	95.95%	97.97%	91.52%	97.64%	97.76%	98.01%	94.07%	98.01%	93.79%	99.85%	95.72%	99.40%	96.25%	99.35%	NA	NA	NA	NA	
5	Service Coverage																						
	In door (>= - 75dBm)	Major Road	72.00%	40.75%	96.38%	99.74%	83.72%	99.53%	87.38%	0.00%	94.54%	0.32%	81.03%	99.94%	60.80%	32.82%	87.34%	79.86%	68.28%	100%	64.59%	97.19%	
		Highway	92.60%	99.39%	92.11%	99.73%	80.83%	98.97%	95.08%	99.56%	92.71%	60.13%	85.38%	99.42%	61.39%	84.00%	93.04%	58.91%	63.05%	100%	39.21%	96.96%	
		Within City	81.77%	93.44%	97.47%	97.95%	79.96%	84.53%	87.51%	9.17%	95.25%	0.01%	82.51%	98.76%	65.60%	30.92%	92.18%	96.25%	80.08%	100%	77.70%	88.18%	
		Overall SSA	82.45%	75.87%	95.72%	99.02%	81.04%	93.32%	89.16%	24.35%	94.44%	19.72%	82.81%	99.37%	63.44%	49.42%	91.35%	78.36%	72.06%	100%	65.82%	94.11%	
	In-vehicle (>= - 85dBm)	Major Road	99.21%	78.92%	99.75%	100%	99.02%	100%	99.74%	13.69%	99.84%	5.11%	98.88%	100%	92.57%	93.57%	99.69%	99.86%	99.39%	100%	91.82%	98.92%	
		Highway	99.39%	100%	99.41%	100%	98.11%	99.53%	99.71%	99.92%	99.67%	99.85%	98.85%	100%	89.03%	99.51%	99.62%	97.60%	95.58%	100%	79.76%	97.49%	
		Within City	99.18%	99.94%	99.82%	100%	98.05%	99.27%	99.74%	86.52%	99.87%	79.93%	98.17%	100%	94.39%	89.59%	99.84%	100%	96.85%	100%	94.08%	97.54%	
		Overall SSA	99.24%	92.20%	99.69%	100%	98.29%	99.57%	99.73%	61.30%	99.81%	78.59%	98.50%	100%	92.64%	94.27%	99.76%	99.15%	97.03%	100%	90.24%	97.97%	

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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	100%	97.53%	99.95%	100%	99.99%	100%	100%	100%	99.99%	92.63%	100%	100%	93.71%	99.84%	99.99%	100%	100%	100%	100%	97.73%	99.48%
		Highway	99.97%	100%	99.88%	100%	99.96%	100%	100%	100%	99.97%	100%	99.95%	100%	98.58%	99.95%	100%	100%	100%	100%	100%	93.97%	99.64%
		Within City	100%	100%	99.97%	100%	99.92%	99.97%	100%	100%	99.98%	100%	99.87%	100%	99.72%	99.73%	100%	100%	99.79%	100%	97.52%	99.96%	
		Overall SSA	99.99%	99.09%	99.94%	100%	99.95%	99.99%	100%	100%	99.98%	99.23%	99.92%	100%	98.03%	99.84%	100%	100%	99.90%	100%	96.74%	99.70%	
6	Call Setup Success Rate (>=95%)	Major Road	100%	100%	100%	100%	96.15%	100%	99.24%	100%	97.93%	100%	99.30%	100%	99.27%	100%	100%	100%	99.32%	100%	100%	100%	
		Highway	100%	100%	100%	100%	96.35%	100%	99.31%	100%	99.26%	100%	100%	100%	100%	100%	100%	100%	100%	100%	98.56%	100%	
		Within City	100%	100%	100%	100%	98.73%	100%	99.07%	100%	100%	100%	98.38%	100%	99.67%	100%	100%	100%	100%	100%	98.48%	100%	
		Overall SSA	100%	100%	100%	100%	97.59%	100%	99.16%	100%	99.31%	100%	98.97%	100%	99.66%	100%	100%	100%	99.83%	100%	98.83%	100%	
7	Hand Over Success Rate (HOSR)	Major Road	100%	100%	100%	100%	97.11%	100%	96.30%	100%	97.75%	100%	98.90%	100%	98.95%	100%	99.40%	100%	100%	100%	100%	100%	
		Highway	100%	100%	100%	100%	93.97%	100%	100%	100%	90.34%	100%	99.65%	100%	97.80%	100%	99.31%	100%	100%	100%	100%	100%	
		Within City	100%	100%	100%	100%	97.33%	99.44%	97.63%	100%	98.11%	100%	100%	100%	98.78%	100%	99.06%	100%	100%	100%	100%	100%	
		Overall SSA	100%	100%	100%	100%	96.55%	99.55%	97.96%	100%	96.08%	100%	99.65%	100%	98.62%	100%	99.20%	100%	100%	100%	100%	100%	

NA: Not Applicable

7.1 DETAIL OF THE ROUTES COVERED DURING THE DRIVE TESTS:

DRIVE TEST TABLE: 4

Name of SSA	Month of Drive Test	Day 1		Day 2		Day 3	
		Name of SDCA Covered/Route KMs	Route Covered	Name of SDCA Covered	Route Covered	Name of SDCA Covered/Route Kms	Route Covered
LUDHIANA	Apr-14	LUDHIANA CITY 140KM	BHARAT NAGAR CHOWK,PAKHOWAL ROAD,FULLEWAL,GILL ROAD,SHIMLA PURI,DHANDARI KALAN,FOCAL POINT,CHANDIGARH ROAD, THAN SINGH CHOWK, JAGRAON BRIDGE,CLOCK TOWER,DMC,HAMBRA ROAD,HAIBOWAL,MODEL TOWN,CHEEMA CHOWK,INDUSTRIAL AREA,SUDER NAGAR,JALANDHAR BYE PASS,FOUNTAIN CHOWK. INDOOR: ELITE ARCADE MALL	SAMRALA 110KM	SAMRALA CHOWK,CHANDIGARH ROAD,KOHARA, KOHARA TO MACHIWARA ROAD,KOHARA TO SAHNEWAL ROAD,KOHARA TO CHD ROAD,SHRI BHAINI SAHIB,SAMRALA,SAMRALA TO MACHIWARA ROAD,SAMRALA TO BIJA ROAD,SHAMASPUR,RAJEWAL,SAMRALA TO KHANNA ROAD, SAMRALA MAIN MARKET. INDOOR: KHURANA PLAZA	JAGRAON 120KM	LUDHIANA TO JAGRAON ROAD,MULLAPUR,GREATER MULLAPUR,DAKHAN,MULLAPUR TO RAIKOT ROAD,MULLAPUR TO MOGA ROAD,MAIN MARKET MULLAPUR,JAGRAON,MAIN BAZAR,NALKEWALA ,CHOWK,KAMAL CHOWK,RANI JHANSI ROAD,SIDHWAN ROAD, NANAKSAR ROAD. INDOOR: POST OFFICE
ROPAR	May-14	ROPAR 120KM	(A) WITHIN CITY- BSNL EXCHANGE,UCHA KHERA,CIVIL HOSPITAL,GZS NAGAR,BELA ROAD,COLLEGE ROAD, GOVT COLLEGE . (B) MAJOR ROAD- ROPAR,BACHAT CHOWK,SHIVALIK SCHOOL, DC OFFICE,DISTRICT COURT,MALIKPUR HIGHWAY,OLD BUS STAND, SHAMPURA. (C) HIGHWAY- ROPAR-TONGA- ROPAR,ROPAR-BELA CHOWK,MORINDA ROAD,AJIT SINGH ACADEMY,ROPAR NEW BUS STAND,RAILMAJRA. INDOOR: SOHANA HOSPITAL	NANGAL 150KM	(A) HIGHWAY...>ROPAR,MALIKPUR, GHAROLI,ROPAR THERMAL PLANT, SIRSA NANGAL, BHARATGARH,TAJPURA, GAVDLEY,KIRATPUR,KOTLA,GANGOWAL ,DHER,BHANOPAUL. (B) WITHIN CITY- SHRI ANANDPUR SAHIB, DASMESH ACADEMY, ANANDPUR CITY, NAYA NANGAL, NFL. (C) MAJOR ROAD...>AJOLI MAUR, SHIVALIK COLONY, BHAGOR SAHIB, MAIN MARKET NANAGAL, and BBMB OFFICE. INDOOR: BBMB OFFICE	KHARAR 140KM	(A)HIGHWAY- ROPAR OLD BUS STAND,RANGEELPUR,MIANPUR,B INDRAKH, KHIZRABAD,SIALTA MAJRI,NANGAL GHARIAN. (B) MAJOR ROAD-KURALI,BUS STAND,CHITAUURLI,DONGVALI,CH UNI ROAD MORINDA,RATANGARH. (C) WITHIN CITY- MORINDA CITY,KURALI,SINGH,TOLL PLAZAJHINGR, GHATAUR,KHARAR ,LANDRAN ROAD,KHARAR CITY,SHIVALIK ENCLAVE,SUNNY ENCLAVE. INDOOR: SUNNY PROPERTIES NEAR BSNL EXCHANGE

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

CHANDIGARH	Jun-14	CHANDIGARH 150KM	<p>(A) HIGHWAY-SECTOR-53 FURNITURE MARKET, SEC 41, SEC 39, DHANAS, SEC 38, SEC 37, SEC 35, DAKSHIN MARG, TTRIBUNE CHOWK, HALLOMAJRA, AIRPORT.</p> <p>(B) WITHIN CITY-CHD-AMBALA HIGHWAY, RAMDARBAR, DARIYA, MANI MAJRA, IT PARK, KISHANGARH, RAILWAY STATION, SEC 43 BUS STAND, SEC 45, BURAIL SEC 21, SEC 20, SEC 22, SEC 19, SEC 18, SEC 17, SEC 34.</p> <p>(C) MAJOR ROAD-MADHYA MARG, VIDYA PATH, JAN MARG, HIMALAYA MARG, SAROVAR PATH, SUKHNA PATH.</p> <p>INDOOR: PICADLY SQUARE</p>	CHANDIGARH 120KM	<p>(A) HIGHWAY-HOUSING BOARD PKL, CHANDI MANDIR, SEC 21, SEC 20, BALTANA RAILWAY BRIDGE.</p> <p>(B) MAJOR ROAD-SEC 12A, SEC 16, 15, 14, 17, MANSA DEVI COMPLEX, BELL FACTORY, IND AREA PH 1, PH 2, SEC 7, SECV5, BUS STAND, SEC 4, SEC 25, NADHA SAHIB, SEC 26.</p> <p>(C) WITHIN CITY- SEC 8, SEC 9, SEC 10, 11, 12, 14, 15, 16, 17, SEC 1 DISTRICT COURT, SEC 2, 4.</p> <p>INDOOR: HOTEL WESTERN COURT</p>	CHANDIGARH 130KM	<p>(A) HIGHWAY-PHASE 2, PHASE 6, VERKA CHOWK, BALONGI, IA PH 7, PTL, PH 5, PCL, QUARK CITY, LANDRAN, LAKHNAUR, SOHANA, MAULI BAIDWAN, IA PH 9, PH 11.</p> <p>(B) MAJOR ROAD-PGA, PH 9, 7, 3B2, 5, PH 6 IA, PH 1, SPICE CHOWK, PCL, KUMBRA, NIPER, PH 9, 10, SEC 67, 68, 69, 70, 71, PH 5.</p> <p>(C) WITHIN CITY-PH 3B1, 3B2, PH 7, 9, 10, 11, PH 9 IA, SEC 68, 67, 69, KUMBRA TO MATAUR, IA PH 8, 7, PH 5, 4.</p> <p>INDOOR: CRIME BRANCH</p>
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7.2 SSA WISE DRIVE TEST OBSERVATION:

DRIVE TEST TABLE: 5
DRIVE TEST OBSERVATION OF LUDHIANA SSA - APRIL-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	LUDHIANA CITY	Poor Level & Quality near Station	SAMRALA	Poor Level & Quality near kohara, Ghulal	JAGRAON	Poor Level & Quality at Mullanpur Outer
2	AIRTEL		Poor Level & Quality near Station		Poor Level & Quality near Samrala		Poor Level & Quality at Mullanpur Outer
3	BSNL		---		Poor Level & Quality near kohara		Poor Level & Quality at Mullanpur Outer, Jagroan Outer
4	TATA GSM		Poor Quality patches in overall city		Poor Quality near Kohara, Samrala		Poor Level & Quality near Jagroan
5	TATA CDMA		---		Poor Level & Quality near Kohara, Ghulal		They have coverage in only SDCAs
6	IDEA		Poor Level & Quality near Station		Poor Quality near Kohara, Samrala		Poor Level & Quality at Mullanpur Outer
7	RCOM GSM		Poor Level & Quality near Station		Poor Level & Quality near Samrala, Ghulal		Poor Level near Jagroan, Mullanpur, Poor Quality near Mullanpur Outer
8	RCOM CDMA		---		Poor Level near Samrala		No Coverage between Jagroan to Mullanpur, Poor Level & Quality near Mullanpur Outer
9	QTL		Poor Quality on all major road in city		Poor Quality at outer of Kohara Outer		Poor Level & Quality near Jagroan, Mullanpur Outer
10	VODAFONE		---		Poor Quality near Kohara, Samrala		Poor Level & Quality at Mullanpur Outer, Jagroan Outer

DRIVE TEST TABLE: 6

DRIVE TEST OBSERVATION OF ROPAR SSA - MAY-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	ROPAR	Poor Level & Quality near Kainpur, Balachaur Outer	NANGAL	Poor Level & Quality near Annadpur Sahib	KHARAR	Poor Level & Quality near Bhagwant Singh Village, Manakpura
2	AIRTEL		Poor Quality Patches at Ropar Outer, Marinda Outer		Poor Quality near Anadpur Sahib		Poor Quality near Marinda Outer, Manakpura, Kharar
3	BSNL		Poor Level in whole Ropar City and Poor Level & Quality between Ropar to Marinda HW, Poor Level Ropar to Nangal HW		Poor Level & Quality near Nehon, Anadpur Sahib Outer, Nangal Outer towards Anandpur Sahib		Poor Level & Quality between Kurali to Kharar, Manakpura, Till Plaza Ropar
4	TATA GSM		Poor Quality near Rojmajra, Morinda Outer		Poor Quality near Anadpur Sahib		Poor Quality near Khara Outer, Manakpura, Kurali Outer
5	TATA CDMA		They have coverage only in SDCAs or Major Towns		They have coverage only in SDCAs or Major Towns		They have coverage only in SDCAs or Major Towns
6	IDEA		Poor Quality near Rojmajra		Poor Quality near Kiratpur		Poor Quality at Kharar Outer, Morinda Outer
7	RCOM GSM		Poor Level & Quality near Ralmajra, Nehon, Rpoar Outer, Ropad to Morinda HW		Poor Level & Quality near Nangal Outer, Anandpur Sahib, Nehon		Poor Level & Quality near Morinda to kurali RD, Poor Quality near Kharar Outer, Toll Plaza Ropar
8	RCOM CDMA		Poor Level on Ropar to Nangal HW, Poor Level & Quality at Ropar Outer		Poor Level & Quality near Nehon, Anadpur Sahib Outer		Poor Quality & Level near Manakpura, Kurali Outer towards Kharar
9	QTL		Poor Quality near Bhagat Singh Nagar, Poor Level near Malikpur, Ranglipur		Poor Quality & Level near Majjari, Kiratpur		poor Level & Quality near Ramgarh Outer, Bazidpur
10	VODAFONE		Poor Quality at Ropar to Balachaur HW		Poor Quality near Kotla		Poor Quality near Kurali Outer, Marinda Outer, Kharar Outer

DRIVE TEST TABLE: 7

DRIVE TEST OBSERVATION OF CHANDIGARH SSA - JUNE-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 near Sec-9D, Poor Quality near 37C, Ph 3B1 Mohali,	CHANDIGARH	Poor Quality near Sec-18	CHANDIGARH	Poor Level near Phase-7, Sec-67 Mohali, Poor Quality near Shahi maira, Industrial Area Ph-8, PH-7 Mohali
2	AIRTEL		Poor Level & Quality near Sec-51, 52, Poor Quality on in all routes covered in day1		Poor Quality near Nada Sahib Rd, Sec-12 Market		Poor Level near Verka Chowk, Landran RD
3	BSNL		Poor Quality near Sec-51, 52, 32, Hallomajra, Ph-1 Chd		Poor Level & Quality near Transport Chowk, Surajpur, Sec-21,25		Poor Level & Quality near Sohana, Lakhnaur Rd, Sec-79, 77, 69
4	TATA GSM		Poor Quality near Sec-43, 44, PGI Sec-11, 4, Industrial Area, Railway Station, Sec-45 B		Poor Quality near Sec-12A, 16A, Chd to Panchkula Rd, Sec-4		Poor Quality near Ph-5 & Market, Ph-9, 77 Sohana
5	TATA CDMA		Poor Level & Quality near Manimajra, Hallomajra, Zirakpur Rd, Babhat		---		Poor Quality near Ph-5 & Market, Ph-9, Sec-68, Sohana
6	IDEA		Poor Quality near Maloya Rd, Sec-29 D		Poor Quality near Sec-2		Poor Quality near Ph-7
7	RCOM GSM		Poor Quality near Railway Station, Zirakpur Rd, Sec-4, 52, 31 D		Poor Level & Quality near Sec-16, 9, 25		Poor Level & Quality near Ph-3, 7, 2, 10
8	RCOM CDMA		Poor Level & Quality near Hallomajra		---		Poor Quality patches near Ph-10
9	QTL		Poor Level & Quality near Maloya Rd, Sec-16, 17, Sukhna, Sec-44, 29 D Zirakpur Rd, Mani Majra		Poor Level near Sec-2 Panchkula, Poor Quality near Sec-2, 15		Poor Level & Quality near Sec-71, 80 Baidwan Outer, Ph-7
10	VODAFONE		Poor Quality near Sec-16, 17, 44, Mani Majra		Poor Quality near Sec15		Poor Quality near Sec-80 Mauli Baidwan

7.3 KEY FINDINGS ON DRIVE TEST:

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

- (i) **In the Month of April-14**, drive tests were conducted across **Ludhiana SSA** covering Ludhiana City, Samrala, Jagraon SDCAs.. The performance of **Airtel, BSNL and Tata (GSM)** for parameter **Voice Quality** was below the benchmark on SSA level with their achieved values as **93.70%, 91.51% and 94.06%** respectively. With respect to the parameter **Call Drop rate, BSNL, Tata (GSM), RCOM (GSM) and RCOM (CDMA)** remained non-compliant during the drive tests conducted on one or the other day. However, they were within the benchmark on overall SSA basis. All other operators were found satisfactory in their performance during the drive tests.
- (ii) **In the Month of May -14**, drive tests were conducted across **Ropar SSA** covering Ropar, Nangal and Kharar SDCAs. The performance of the Service Providers across Ropar SSA was satisfactory as the operators were largely meeting the benchmarks. However, **BSNL and RCOM (GSM)** were under performed for parameter **Voice Quality**, having achieved the values as **94.66% and 93.73%** respectively.
- (iii) **In the month of June-14**, drive tests were conducted across **Chandigarh SSA**. In this SSA also, the performance of the service providers was satisfactory as they were largely meeting the benchmarks. Only the parameter '**Voice Quality**' remained non-complied by **BSNL Tata (GSM) and RCOM (GSM)** with their performance as **91.52%, 94.07% and 93.79%** respectively

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

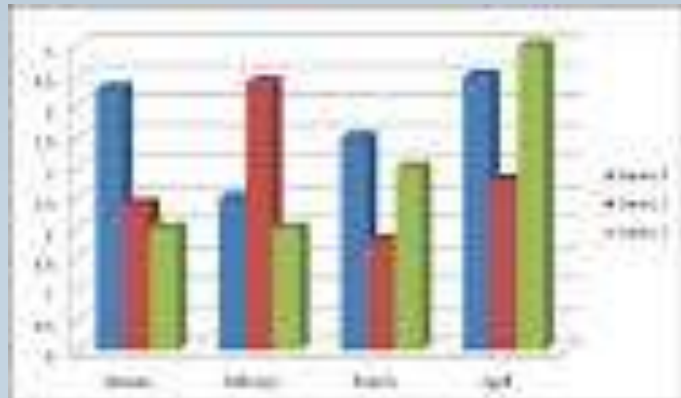
*The analysis of drive tests results revealed that the performance of the services providers was satisfactory as they were largely meeting the benchmarks. Only one parameter i.e. **Voice Quality** was matter of concern as it could not be met by the service providers namely **BSNL, Tata (GSM), RCOM (GSM) and Airtel** across the above three SSAs.*

8. GRAPHICAL REPRESENTATION (CELLULAR MOBILE SERVICE PROVIDERS)

AVERAGED QUARTERLY PMR

V/S

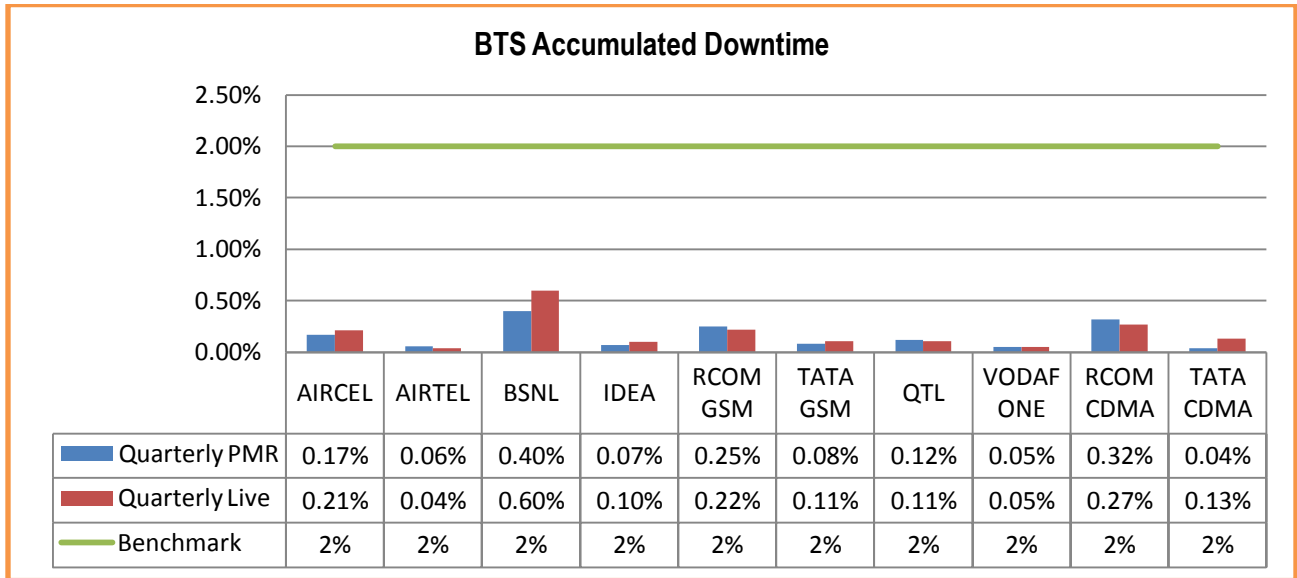
AVERAGED QUARTERLY 3-DAYs LIVE MEASUREMENT



8. GRAPHICAL REPRESENTATION (CMTS):

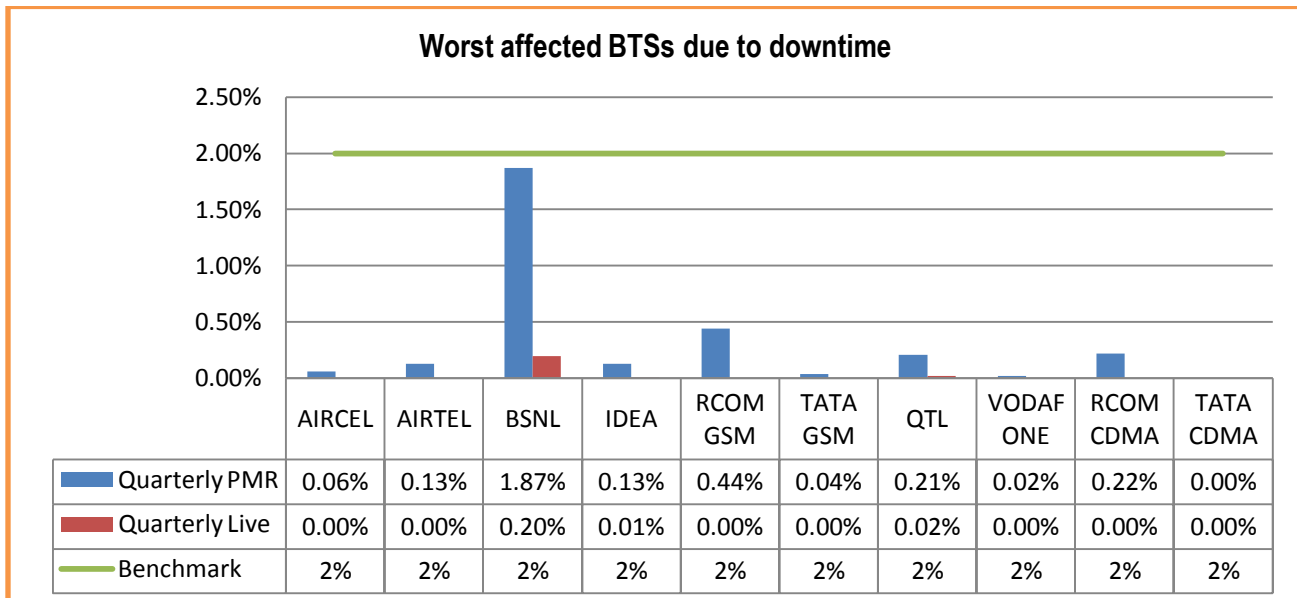
Graphical Representation of Performance of the Cellular Mobile Service Providers (PMR) V/S 3-Days Live Measurement (Quarterly Average Data):

I. BTS ACCUMULATED DOWNTIME:



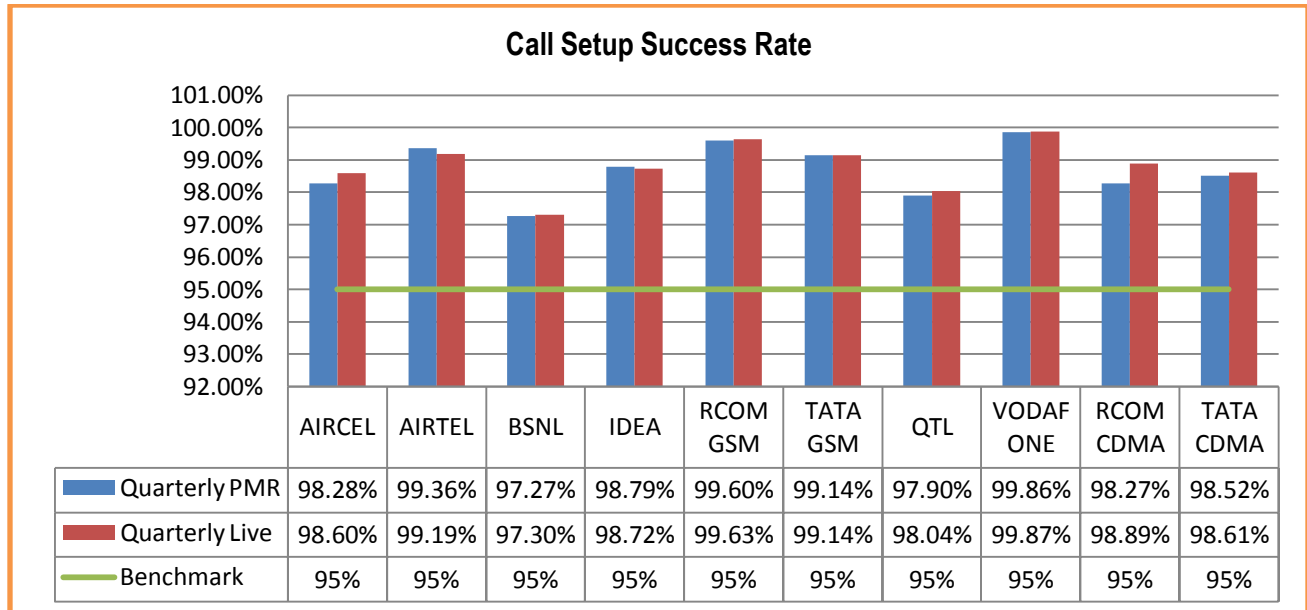
All operators are meeting the benchmarks.

II. WORST AFFECTED BTSS DUE TO DOWNTIME :



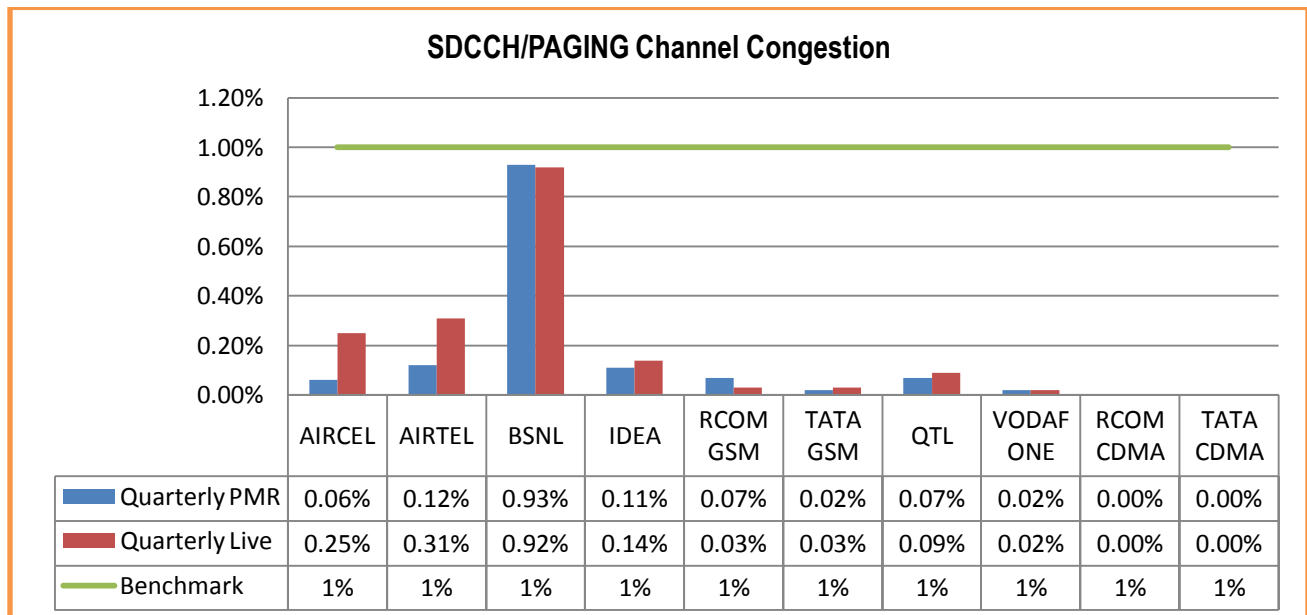
All operators are meeting the benchmarks.

III. CALL SETUP SUCCESS RATE :



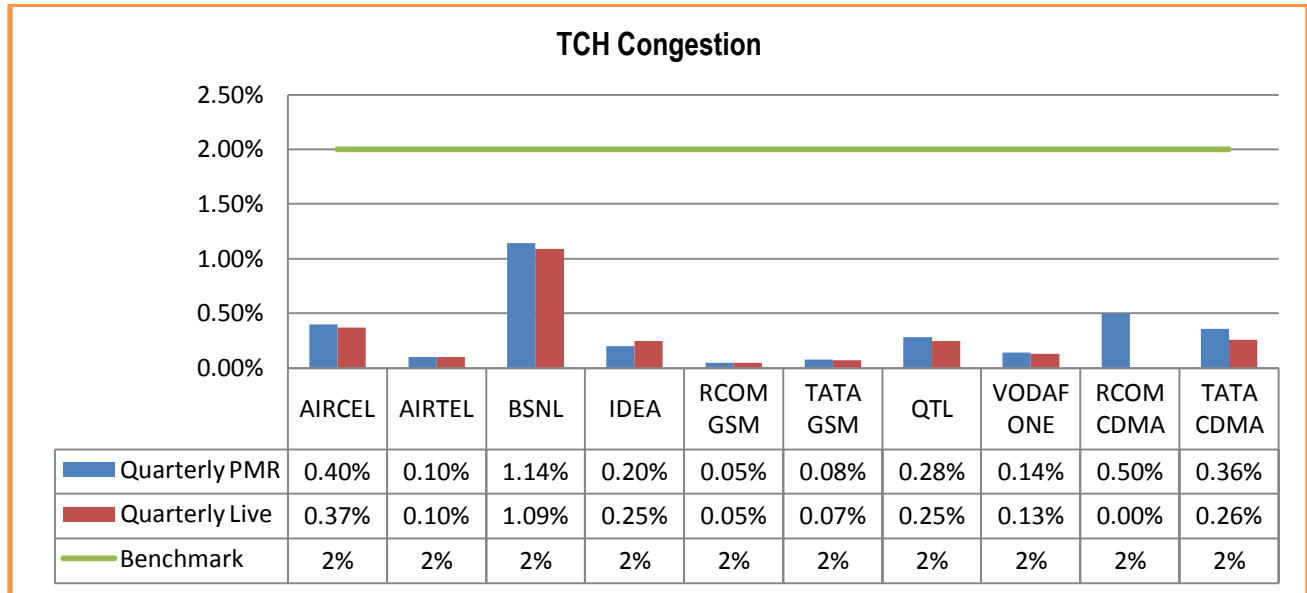
All operators are meeting the benchmarks.

IV. SDCCH/PAGING CHANNEL CONGESTION



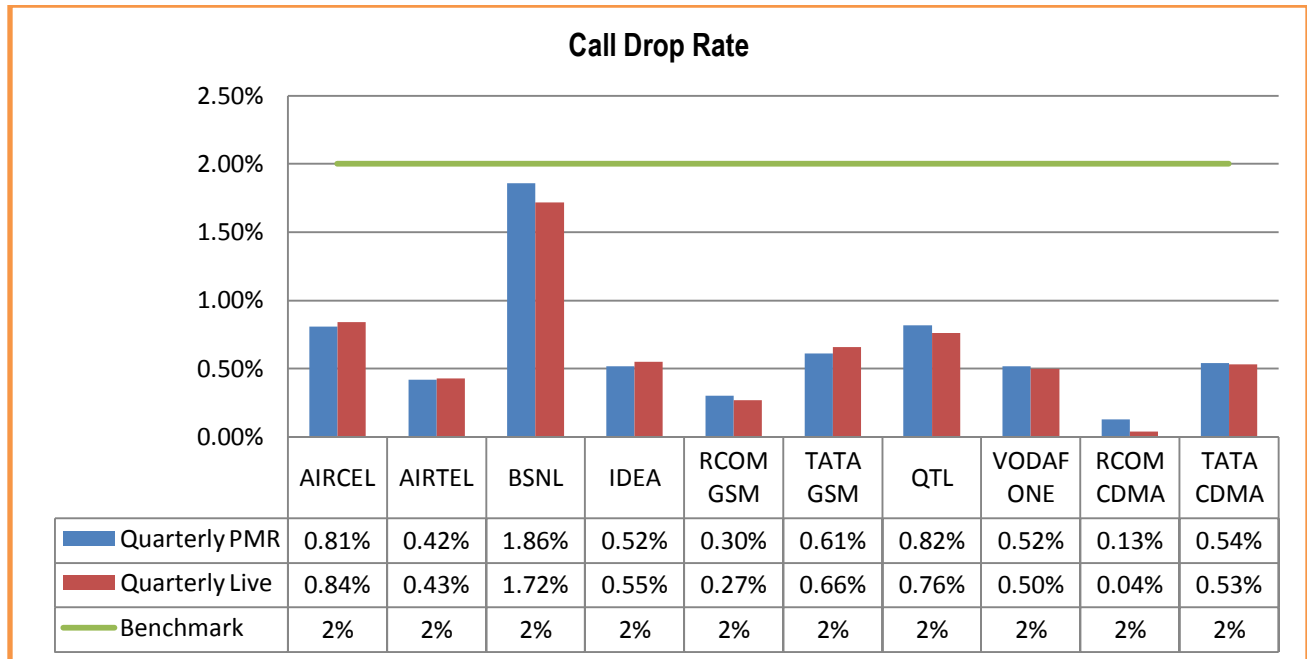
All operators are meeting the benchmarks.

V. TCH CONGESTION :



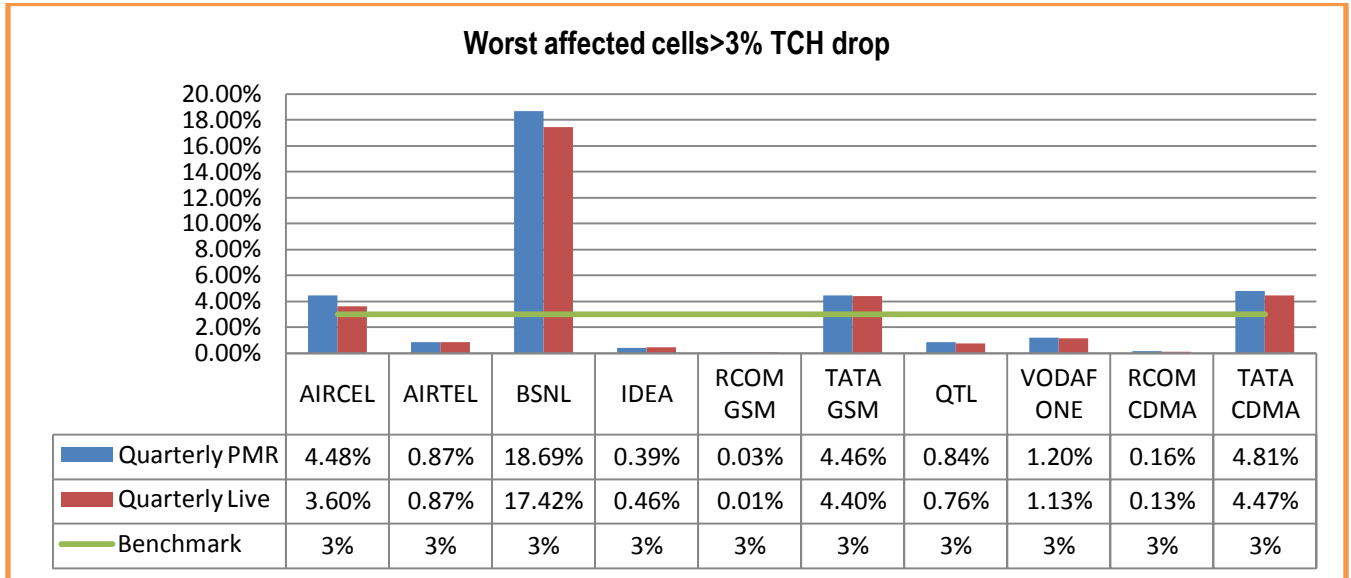
All operators are meeting the benchmarks.

VI. CALL DROP RATE :



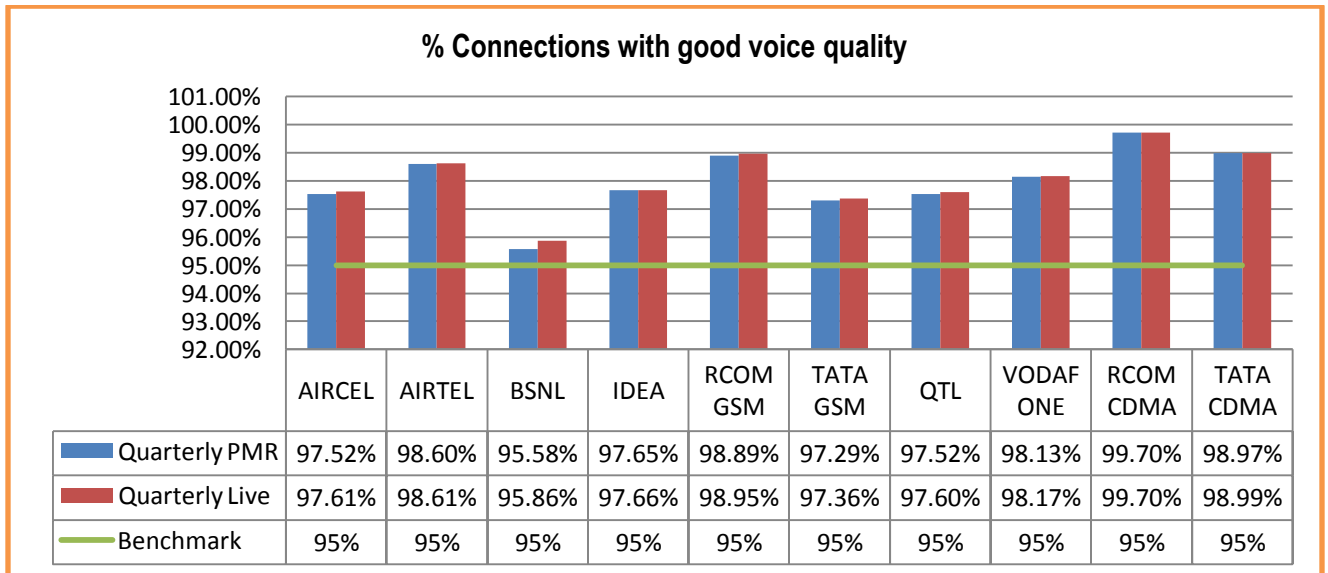
All operators are meeting the benchmarks.

VII. WORST AFFECTED CELLS>3% TCH DROP:



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

VIII. PERCENTAGE OF CONNECTIONS WITH GOOD VOICE QUALITY:



All operators are meeting the benchmarks.

9. QOS AUDIT OF BASIC (WIRELINER) SERVICE PROVIDERS



9. QOS AUDIT OF BASIC TELEPHONE SERVICE (WIRELINE)

- The QoS audit for basic (wire line) service was undertaken for assessment of quarterly performance of the service providers for quarter ended June-2014. As per the tender document **out of 1508 exchanges of BSNL, audit was done for 76 sampled (15-Urban and 61-Rural) exchanges**, 1 exchange each of Bhati Airtel, TTL & Reliance and 2 exchanges of HFCL. As Punjab Circle is having 56 SDCAs, so 76 BSNL exchanges spread over 6 SDCAs (10% of total 56 SDCAs) have been taken for audit. List of BSNL exchanges undertaken for QoS audit is attached as **Annex-1**. For BSNL exchanges, performance against each parameter has been evaluated by taking average of performance value of each parameter for all the audited exchanges. The average value of each parameter has been tabulated as follows:

Sr. No	Service Provider	Circle	Urban Exchange in Punjab	Rural Exchange in Punjab	Total Exchange in Punjab	No. of Urban Exchanges Covered for audit	No. of Rural Exchanges Covered for audit
1	BSNL	Punjab	295	1213	1508	15	61
2	Bharti-Airtel	Punjab	2	0	2	1	0
3	HFCL	Punjab	5	0	5	2	0
4	Reliance	Punjab	2	0	2	1	0
5	TTL	Punjab	1	0	1	1	0
6	Vodafone	Punjab	1	0	1	1	0
Total Exchanges			306	1213	1519	21	61

9.1 SERVICE PROVIDER PERFORMANCE REPORT BASED ON QUARTERLY MEASUREMENT DATA VERIFICATION FOR BASIC TELEPHONE SERVICE (WIRELINE) PROVIDERS:

Averaged Audited data for Wireline (Basic) Services – Punjab Circle

Sl. No.	Parameters	Benchmark	Period	BHARTI AIRTEL	BSNL	HFCL	RELIANCE	TTL	VODAFONE
1	Fault incidences								
	(No. of faults/100 subscribers /month)	< 5%	Quarterly	2.97%	3.67%	2.80%	0.35%	0.63%	0.93%
2	Faults Repair/Restoration Time								
	Fault repair by next working day(Urban Area)	>90%	Quarterly	96.39%	96.22%	98.80%	100.00%	93.94%	100.00%
	Within 3 days day	100%	Quarterly	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	Fault repair by next working day(Rural & hilly Area)	>90%	Quarterly	NA	98.28%	NA	NA	NA	NA
	Within 5 days	100%	Quarterly	NA	100.00%	NA	NA	NA	NA
	Mean time to Repair(MTTR)	≤8 Hrs	Quarterly	3.52	10.01	5.36	4.16	4.03	0.30
3	Rent Rebate								
	Fault pending > 3 days & <7 days	Rebate for 7 days	Quarterly	0	11	0	0	0	0
	Fault Pending > 7 days & < 15 days	Rebate for 15 days	Quarterly	0	14	0	0	0	0
	Fault pending > 15 days	Rebate for 1 month	Quarterly	0	32	0	0	0	0
4	Call Completion Ratio (CCR) & Answer to seizure Ratio(ASR)								
	CCR	> 55%	Quarterly	95.90%	59.97%	55.94%	NA	84.46%	96.46%
	ASR	> 75%	Quarterly	NA	NA	NA	93.73%	NA	NA
5	Metering & Billing Performance								
	% of disputed Bills over bills issued (Post Paid)	< 0.1%	Quarterly	0.01%	0.21%	0.01%	0.02%	0.00%	0.00%
	% of Pre-paid Charging Complaints	< 0.1%	Quarterly	NA	NA	NA	NA	NA	NA
	% of billing complaints resolved within 4 weeks	100%	Quarterly	100.00%	100.00%	100.00%	100.00%	NA	NA
	Period of all refunds/payments from the date of resolution of complaints within 1weeks	100%	Quarterly	100.00%	100.00%	100.00%	100.00%	NA	NA
6	POI Congestion								
	No. of POI's having congestion >0.5%		Quarterly	0	0	0	0	0	0
7	Response Time to customer for assistance								
	Accessibility of Call centre/customer Care	≥95%	Quarterly	95.10%	96.49%	95.61%	97.33%	100.00%	96.74%
	% age of calls answered by operator(voice to voice) within 60 seconds	≥90%	Quarterly	96.39%	58.38%	91.59%	98.66%	83.30%	96.88%
8	Customer care(promptness in attending to customers request)								
	Termination / Closures	100%	Quarterly	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	Time taken for refunds of deposit after closures	100%	Quarterly	100.00%	99.95%	100.00%	100.00%	NA	NA

• NA-Not Applicable

9.2 SERVICE PROVIDER PERFORMANCE REPORT BASED ON 3 DAYS LIVE MEASUREMENT DATA VERIFICATION FOR BASIC TELEPHONE SERVICE (WIRELIN) PROVIDERS:

3 days live data for Wireline (Basic) Services - Punjab Circle

SI No.	Parameters	Benchmark	Period	BHARTI AIRTEL	BSNL	HFCL	RELIANCE	TTL	VODAFONE
Call Completion Ratio (CCR) & Answer to seizure Ratio(ASR)									
1	CCR	> 55%	Quarterly	73.31%	62.67%	56.39%	NA	84.49%	94.80%
	ASR	> 75%	Quarterly	NA	NA	NA	92.96%	NA	NA
POI Congestion									
2	No. of POI's having congestion >0.5%		Quarterly	0	0	0	0	0	0
Response Time to customer for assistance									
3	Accessibility of Call centre/customer Care within 40 seconds	≥95%	Quarterly	100.00%	96.21%	95.82%	97.26%	100.00%	98.78%
	% age of calls answered by operator(voice to voice) within 60 seconds	≥90%	Quarterly	97.78%	47.99%	93.97%	97.26%	93.33%	96.90%

9.3 KEY FINDINGS: BASIC TELEPHONE SERVICES (WIRELINE)

Fault Incidences: The audit of the service providers revealed that the performance of all service providers was well within the benchmark.

Fault Repair/Restoration Time: All operators were found meeting the benchmark for this parameter.

Mean Time to Repair: Only **BSNL** failed to meet the benchmark for MTTR with their performance as **10.01 hrs** against the benchmark of ≤ 8 Hrs.

Call Completion Rate/Answer to seizure ratio: All the operators were found to have met the benchmark on this parameter at various exchanges.

Metering and Billing performance: For this parameter also, the performance of the service providers was found well within the compliance benchmarks except **BSNL**. **BSNL** could not meet the benchmark for the parameter '% of disputed Bills over bills issued (Post Paid)' with its performance as **0.21%** against the benchmark of $< 0.1\%$.

POI Congestion: All operators were found meeting the benchmark for this parameter.

Response Time to Customer for assistance: For percentage of calls getting connected to call center, the performance of the service providers was found well within the compliance.

With respect to the parameter of calls answered by operator (voice to voice), **BSNL** and **TTL** could not meet the benchmark with their performance as **58.38%** and **83.30%** respectively against the benchmark of $\geq 90\%$ and **BSNL** also failed to comply with the benchmark for this parameter during 3 days live measurements as **47.99%**. Thus performance of BSNL was poor with respect to this parameter.

Termination/Closures: All operators were found meeting the benchmark on this parameter.

Time taken for refund of deposit: **BSNL** could not meet the benchmark for the parameter 'Time taken for refunds of deposit after closures' with its performance as **99.95%** against the benchmark of 100%, very marginally below the benchmark.

Thus, from the above findings that, it was concluded that the performance of BSNL was not satisfactory in respect of the parameters MTTR, Metering & Billing, Response time to customer for assistance and Time taken for refund. Hence, BSNL need to improve their services in respect of these parameters.

9.4 INTER OPERATOR CALL ASSESSMENT (WIRELINE)

Inter operator call assessment with a sample of 2x50 test calls for each Service provider operating in Punjab Circle during the time 1000 to 1300 Hrs and 1500 to 1700 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.

INTER OPERATOR CALL ASSESSMENT BASED ON LIVE MEASUREMENT								
Calling Operators	Circle Name	Total No. of calls Made	BHARTI AIRTEL	BSNL	HFCL	RELIANCE	TTL	VODAFONE
BHARTI AIRTEL	Punjab	100	--	100.00%	100.00%	100.00%	100.00%	100.00%
BSNL	Punjab	100	100.00%	--	100.00%	96.00%	95.00%	100.00%
HFCL	Punjab	100	100.00%	100.00%	--	100.00%	100.00%	100.00%
RELIANCE	Punjab	100	100.00%	92.00%	100.00%	--	100.00%	100.00%
TTL	Punjab	100	100.00%	96.00%	100.00%	100.00%	--	100.00%
VODAFONE	Punjab	100	100.00%	100.00%	100.00%	100.00%	100.00%	--

The result of the testing revealed that the inter connection performance among the operators was quite satisfactory. However, in case where calls attempted from BSNL to Reliance, successful interconnection was 96.0%, BSNL to TTL was 95%, Reliance to BSNL was 92% and TTL to BSNL was 96%. Thus there was no remarkable problem in interconnection from one operator to other operators except in few cases where Service providers could not achieve 100% marks..

9.5 LEVEL-1 LIVE CALLING (WIRELINE)

LEVEL 1 LIVE CALLING										
Emergency no.	Circle Name	No. of calls made	BSNL- Chandigarh SSA	BSNL- Ferozepur SSA	BSNL- Ludhiana SSA	Bharti Airtel	HFCL	RELIANCE	TTL	VODAFONE
100	Punjab	40	✓	✓	✓	✓	✓	✓	✓	✓
101	Punjab	40	✓	✓	✓	✓	✓	✓	✓	✓
102	Punjab	40	✓	✓	✓	✓	✓	✓	✓	✓

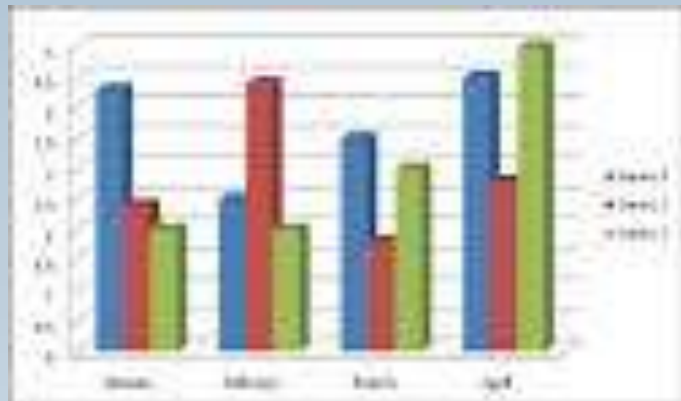
To assess the availability and efficiency of level 1 service such as police, fire, ambulance (emergency services) offered by BSNL, Bharti Airtel, HFCL, Reliance, TTL and Vodafone, the calls were made from telephone provided by service providers, these services were found functional in the networks of all the service providers.

9.6 CUSTOMER CARE / HELPLINE ASSESSMENT (WIRESERVICE)

LIVE CALLING TO CALL CENTRE									
Parameter.	Circle Name	BSNL- Chandigarh SSA	BSNL- Ferozepur SSA	BSNL- Ludihana SSA	Bharti Airtel	HFCL	RELIANCE	TTL	VODAFONE
Total No. of calls Attempted	Punjab	100	100	100	100	100	100	100	100
Total No. of calls connected to IVR	Punjab	100	100	100	100	100	100	100	100
Calls got connected to agent within 60 Sec	Punjab	75	78	85	100	100	100	90	100
%age of calls got answered	Punjab	75.00%	78.00%	85.00%	100.00%	100.00%	100.00%	90.00%	100.00%

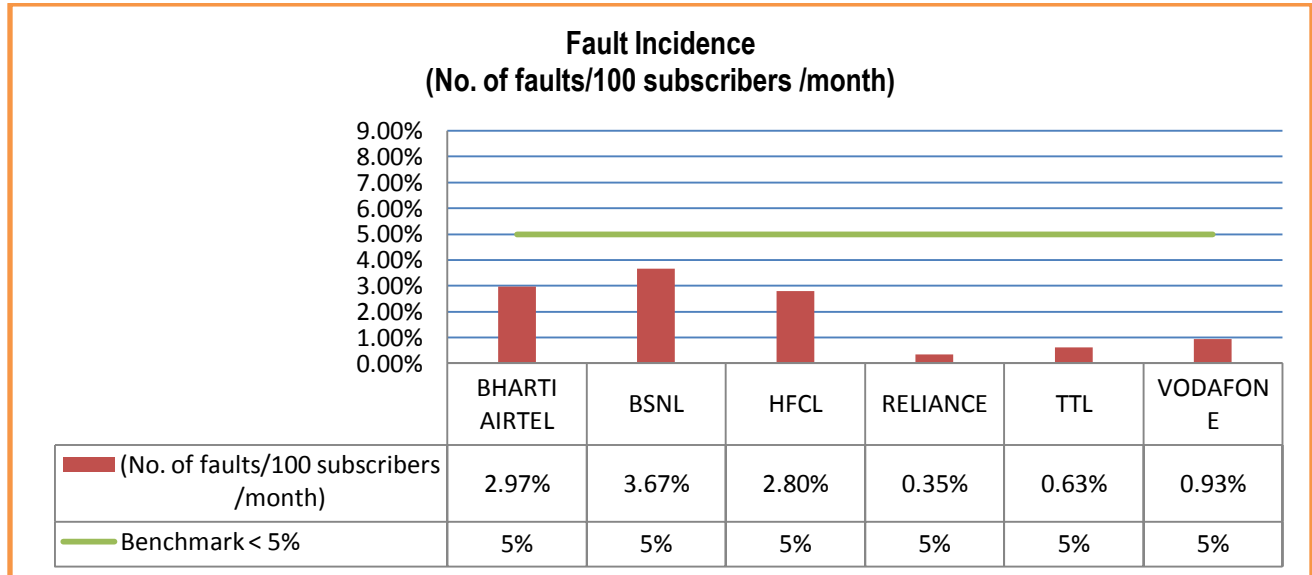
In case of calls answered by operators (voice to voice), when test calls were made to the call centers, BSNL in different SSAs could connect 75.00% (Chandigarh SSA), 78.00% (Ferozepur SSA) and 85.00 % (Ludhiana SSA) calls within 60 seconds. In Case of TTL, 90% of calls were connected to the call center within 60 seconds.

GRAPHICAL REPRESENTATION OF BASIC (WIRELINE) SERVICES



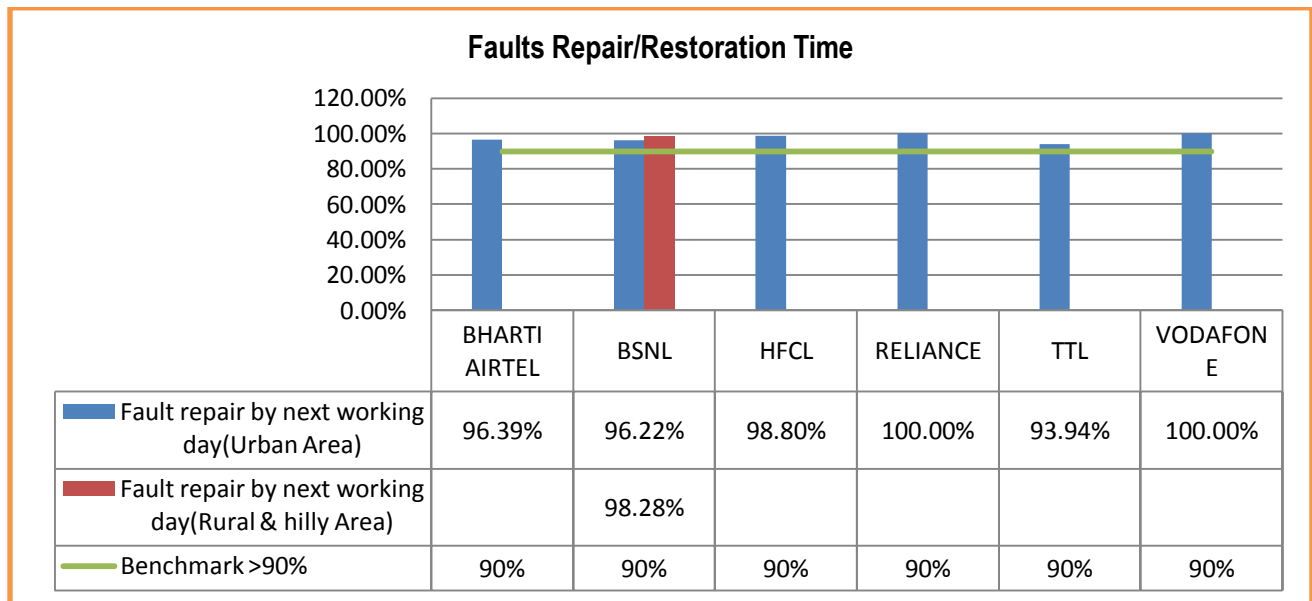
9.7 GRAPHICAL REPRESENTATION OF QUARTERLY PERFORMANCE OF THE BASIC TELEPHONE SERVICE (WIRELINE) PROVIDERS:

1) FAULT INCIDENCE:



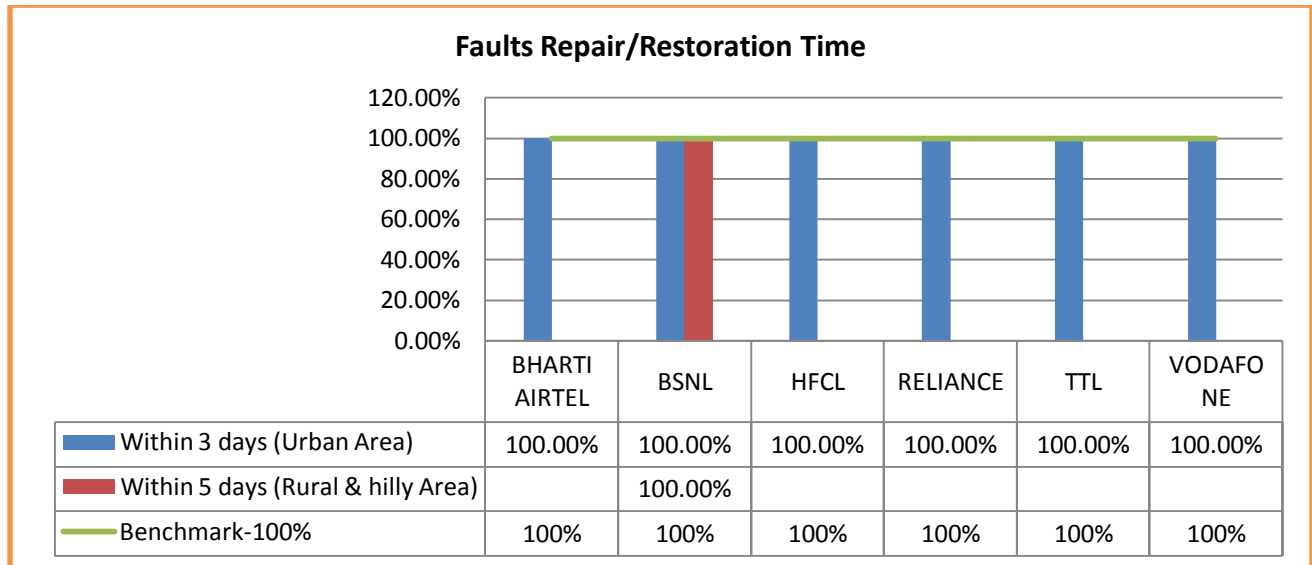
All Operators are meeting the benchmarks.

2) FAULTS REPAIR/RESTORATION TIME:



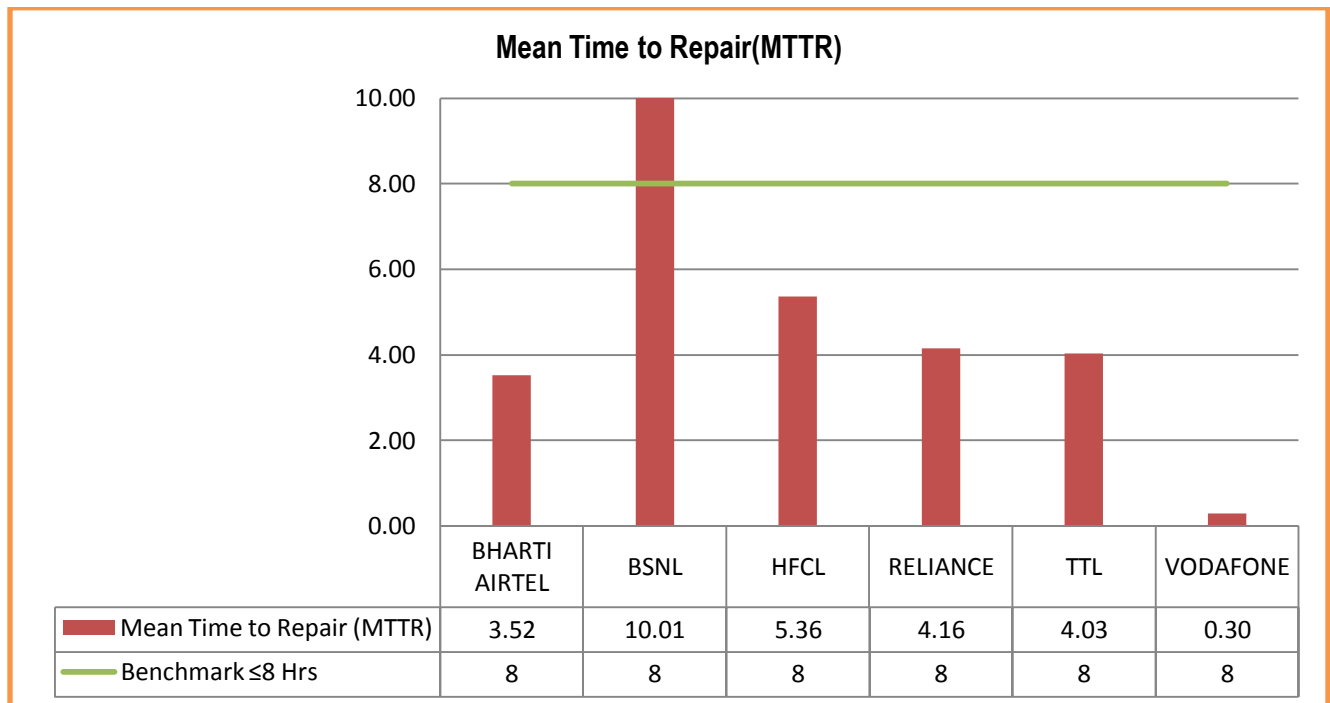
All Operators are meeting the benchmarks.

3) FAULTS REPAIR/RESTORATION TIME WITHIN 3 DAYS:



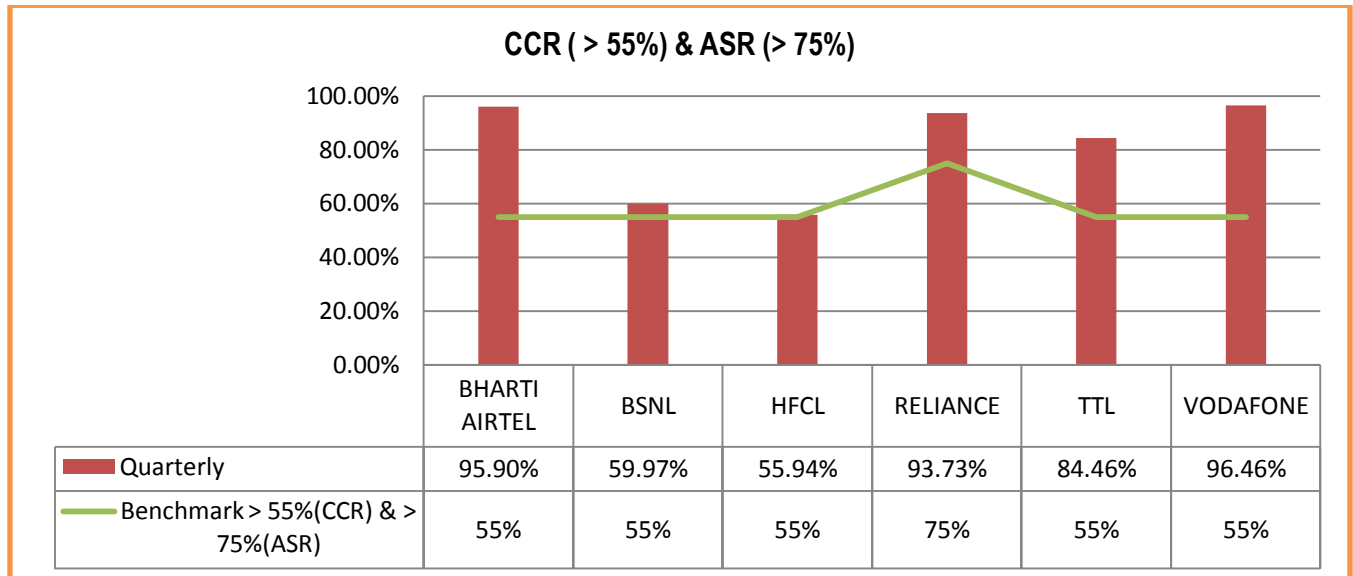
All Operators are meeting the benchmarks.

4) MEAN TIME TO REPAIR (MTTR):



All Operators are meeting the benchmarks except BSNL.

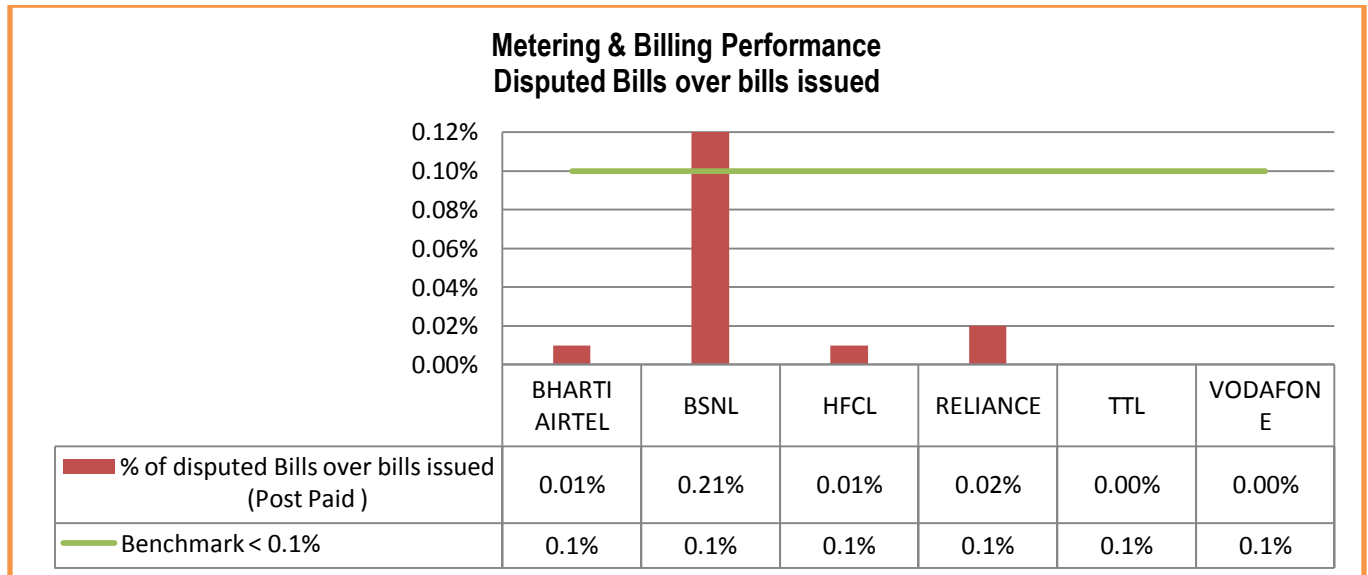
5) CALL COMPLETION RATIO (CCR) & ANSWER TO SEIZURE RATIO(ASR):



All Operators are meeting the benchmarks. Reliance has provided ASR instead of CCR.

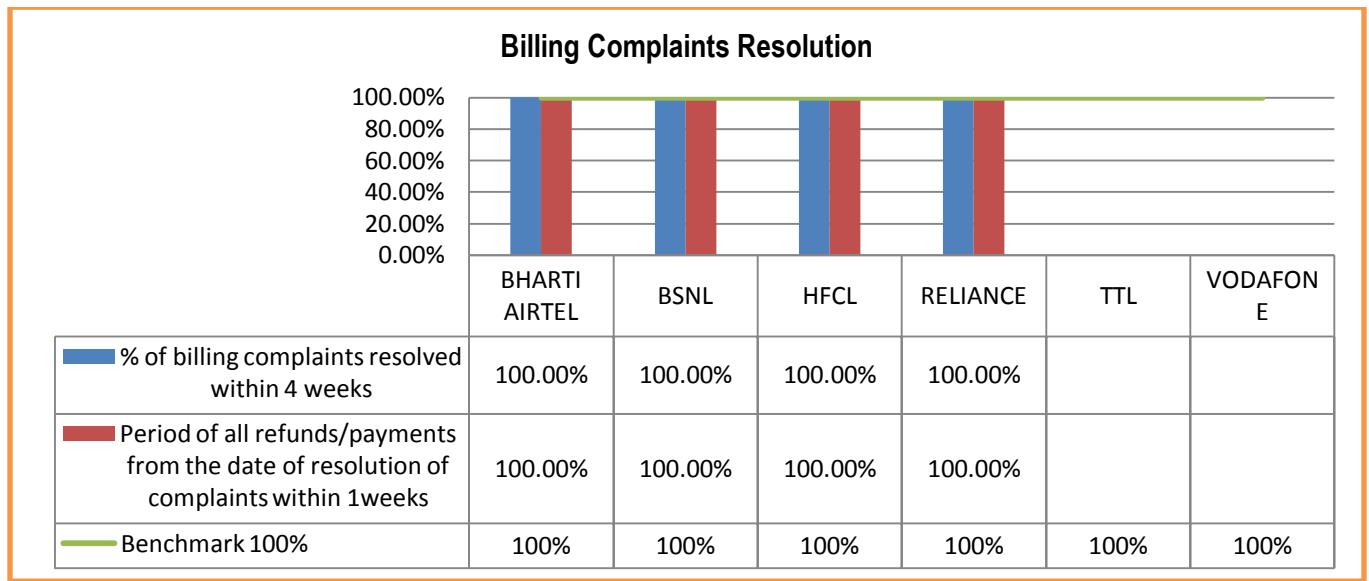
6) METERING & BILLING PERFORMANCE:

a) DISPUTED BILLS OVER BILL ISSUED :



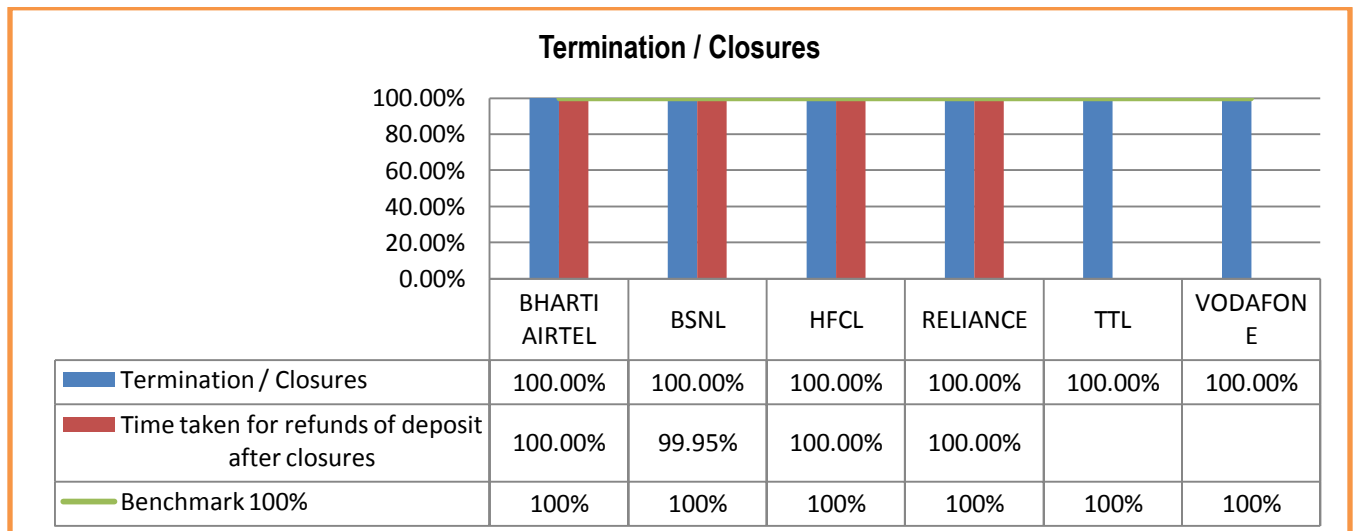
All Operators are meeting the benchmarks except BSNL.

b) BILLING COMPLAINT RESOLUTION:



All Operators are meeting the benchmarks.

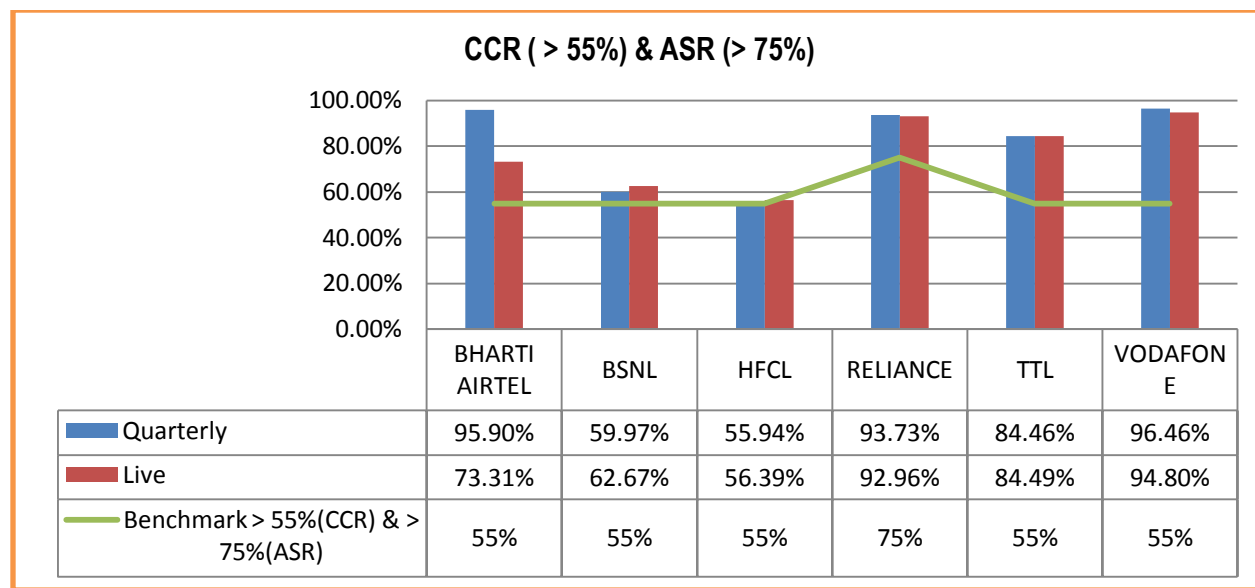
7) TERMINATION & CLOSURES:



All Operators are meeting the benchmarks except BSNL with its performance very marginally below the benchmark.

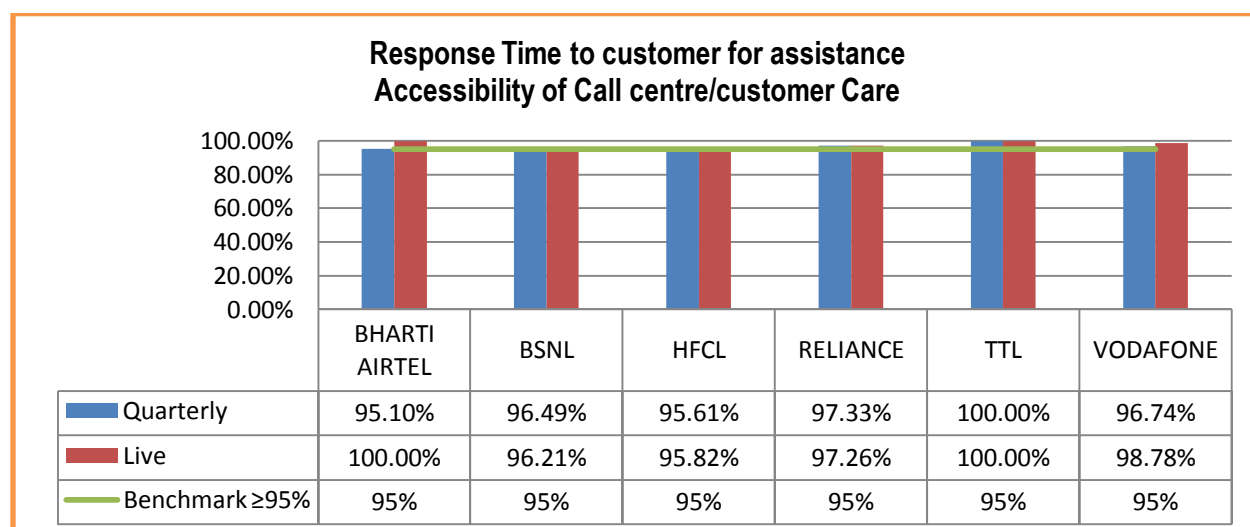
9.8 GRAPHICAL REPRESENTATION OF PERFORMANCE OF THE BASIC TELEPHONE SERVICE (WIRELINER) PROVIDERS V/S 3-DAYS LIVE MEASUREMENT:

1) CALL COMPLETION RATIO (CCR) & ANSWER TO SEIZURE RATIO(ASR):



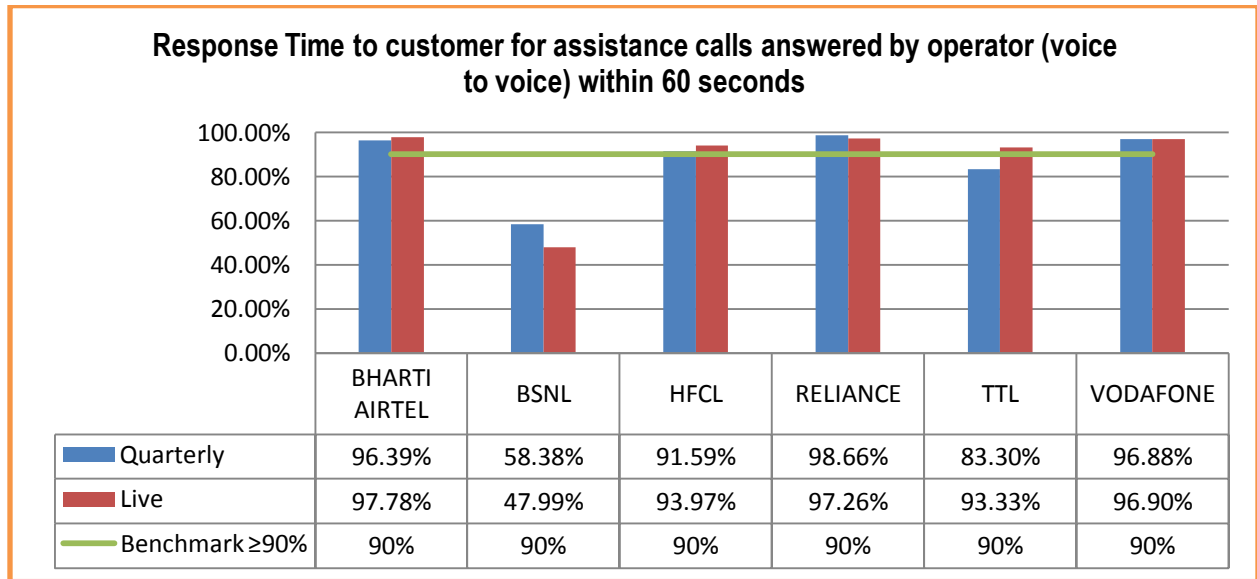
All Operators are meeting the benchmarks.

2) RESPONSE TIME TO CUSTOMER FOR ASSISTANCE ACCESSIBILITY OF CALL CENTRE/CUSTOMER CARE:



All Operators are meeting the benchmarks.

3) **RESPONSE TIME TO CUSTOMER FOR ASSISTANCE CALL ANSWERED BY OPERATORS :**



All Operators are meeting the benchmarks except BSNL (Quarterly and live) and TTL (Quarterly).

10. QOS AUDIT OF BROADBAND SERVICE PROVIDERS



10. QUALITY OF SERVICE AUDIT OF BROADBAND SERVICE PROVIDERS

TUV–SUD South Asia is to conduct the audit and assessment of Quality of Service of Broadband Service only in respect of the service providers who were having broadband subscriber base of more than 10,000 subscribers in their licensed service area, spread over 10 % SDCAs. Based on this criterion, total 76 PoPs (exchanges) i.e. 5% of 1505 PoPs / Exchanges have been taken for QoS audit. The list of BSNL PoPs location is attached in Annex-2. The following Broadband Service providers in Punjab Circle were audited for their quality of service assessment. Discussion with the private broadband service providers revealed that there is no concept of their PoPs on SDCA basis; they are maintaining their entire data on centralized basis so audit has been done for the centralized data.

Sl. No.	Name of Broadband Service Providers	Total PoPs	Location of Audit
1	BHARTI AIRTEL LIMITED	141	Plot No-21, Rajiv Gandhi Technology Park, Chandigarh
2	BSNL	1505 (76 PoPs Covered)	BSNL Office Chandigarh, Ludhiana, Ferozpur
3	D-VOIS BROADBAND	1	D-VOIS BROADBAND, Chandigarh
4	FIVE-NETWORKS	1	Five Network Solution (India) Limited
5	NSTPL	9	NSTPL, Nangal, Punjab, Bhatinda, Punjab
6	BROADBAND PACENET INDIA PVT. LTD	1	BROADBAND PACENET INDIA PRIVATE LIMITED, Jhalander, Punjab
7	RELIANCE COMMUNICATION LIMITED (RCL)	11	RELIANCE COMMUNICATION LIMITED, DAKC, Mumbai
8	TATA COMMUNICATION LIMITED (TCL)	22	C-125 , Industrial Area Ph-8 , Mohali - 160071
9	TATA TELESERVICES LIMITED (TTL)	28	C-125 , Industrial Area Ph-8 , Mohali - 160071
10	HFCL	1	HFCL, Mohali
11	HATHWAY	1	Hathway Cable and Datacom Pvt. Ltd., Chandigarh

10.1 QUARTERLY MEASUREMENT DATA FOR BROADBAND SERVICE PROVIDERS

AVERAGED QUARTERLY (APR TO JUN 14) AUDIT DATA FOR BROADBAND SERVICES - PUNJAB CIRCLE

Broadband Audit Data		Bench- mark	Circle Name	BHARTI AIRTEL	BSNL	DVOIS	FIVE NETWORK	NSTPL	PACENET	RCL	TCL	TTL	HFCL	HATHWAY	
S/ N	Name of Parameter			BROADBAND SERVICE PROVIDERS											
Service Provisioning/Activation Time															
1	A) No of connections registered during the period		Punjab	1130	451	7	10	3	54	204	0	67	4855	21	
	B) Total number of connections provided within 15 days of registration on demand during the period		Punjab	1130	451	7	10	3	54	204	0	67	4855	21	
	C) % age of connections provided within 15 days of registration on demand (subject to technical feasibility)	<15 days	Punjab	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%
	D) Total number of connections provided after 15 days of registration on demand		Punjab	0	0	0	0	0	0	0	0	0	0	0	0
	E) %age of connections provided after 15 days of registration on demand		Punjab	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	F) In all cases where payment towards installation charge & SD is taken and the Broadband connection is not provided within 15 working days	credit @ Rs.10/ per day.	Punjab	0	0	0	0	0	0	0	0	0	0	0	0
Fault Repair/Restoration Time															
2	A) Total number of faults registered during the period		Punjab	2148	2283	10	15	17	49	282	41	153	2163	149	
	B) Total number of faults repaired by next working day		Punjab	2090	2147	10	15	17	46	282	40	150	2104	144	
	C) % age of faults repaired by next working day	>90%	Punjab	97.27%	94.04%	100.00%	100.00%	100.00%	93.92%	100.00%	95.96%	98.04%	97.27%	96.38%	
	D) Total number of faults repaired within three working days		Punjab	2143	2283	10	15	17	48	282	41	153	2163	147	
	E) % age of faults repaired within three working days	≥99%	Punjab	99.79%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.20%	100.00%	100.00%	98.88%

Rent Rebate														
3	A) Faults Pending for > 3 working days and < 7 working days: (Rebate equivalent to 7 days of minimum monthly charge or equivalent usage allowance)		Punjab	0	0	0	0	0	0	0	0	0	0	3
	B) Faults Pending for > 7 working days and < 15 working days: (Rebate equivalent to 15 days of minimum monthly charge or equivalent usage allowance)		Punjab	0	0	0	0	0	0	0	0	0	0	2
	C) Faults Pending for > 15 working days: (Rebate equivalent to one month of minimum monthly charge or equivalent usage allowance)		Punjab	0	0	0	0	0	0	0	0	0	0	0
Billing Performance														
4	A) Total bills generated during period		Punjab	56277	40502	NA*	NA*	90	652	32613	161	3504	133967	344
	B) Total complaints received from customers/ Bills disputed		Punjab	6	79	NA*	NA*	0	0	88	0	0	10	3
	C) Billing complaints per 100 bills issued	<2%	Punjab	0.01%	0.20%	NA*	NA*	0.00%	0.00%	0.27%	0.00%	0.00%	0.01%	0.97%
	D) Total number of complaints resolved in 4 weeks from date of receipt		Punjab	6	79	NA*	NA*	0	0	88	0	0	10	3
	E) %age billing complaints resolved in 4 weeks	100%	Punjab	100.00%	100.00%	NA*	NA*	NA	NA	100.00%	NA	NA	100.00%	100.00%
	F) Total number of cases requiring refund of deposits after closure		Punjab	2	323	NA*	NA*	0	0	0	0	0	55	1
	G) Total number of cases where refund was made in <60 days		Punjab	2	323	NA*	NA*	0	0	0	0	0	55	1
	H) Percentage cases in which refund received within 60 days	100%	Punjab	100.00%	100.00%	NA*	NA*	NA	NA	NA	NA	NA	100.00%	100.00%
Response time to the customer for assistance % age of calls answered by operator (Voice to Voice)														
5	A) Total number of calls received by the operator		Punjab	14227	6282	10	39	1	49	30396	80830	227	53138	842
	B) Total number of calls answered by the operator within 60 seconds		Punjab	12997	3076	10	39	1	43	28995	53246	160	36898	532

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



	C) % age calls answered by the operator in 60 seconds	>60%	Punjab	91.35%	48.97%	100.00%	100.00%	100.00%	87.67%	95.39%	65.87%	70.48%	69.43%	63.16%
	D) Total number of calls answered by the operator within 90 seconds		Punjab	13308	4110	0	0	0	49	29641	56101	174	44793	842
	E) % age calls answered by the operator within 90 seconds	>80%	Punjab	93.54%	65.43%	NA	NA	NA	100.00%	97.52%	69.41%	76.65%	84.29%	100.00%
6	Bandwidth Utilization/ Throughput:													
	POP to ISP Gateway Node [Intra-network] Link(s)													
6.1	A) Total Bandwidth Available at the link for the period days		Punjab	5067	2357	47	24	15	129	NA	112640	1024	12529	90
	B) Total Bandwidth utilized during the period during TCBH (In Mbps)		Punjab	2813	1289	22	14	5	52	NA	59392	420	9722	63
	C) % age Bandwidth utilized during the period	<80%	Punjab	55.52%	54.69%	47.15%	59.16%	33.33%	40.42%	NA	52.73%	41.02%	77.59%	70.54%
	ISP Gateway Node to IGSP / NIXI Node upstream Link(s) for International connectivity													
6.2	A) Total number of upstream links for International connectivity		Punjab	1	NP	NA**	NA**	NA**	NA**	8	6	1	3	1
	B) Number of Links having Bandwidth utilization > 90% during TCBH		Punjab	0	NP	NA**	NA**	NA**	NA**	0	0	1	0	0
	C) Total international bandwidth available from ISP Node to IGSP/NIXI/NAP		Punjab	10000	NP	NA**	NA**	NA**	NA**	74000	284672	9900	9086	90
	D) Total international bandwidth utilization during peak hours (TCBH) in Mbps		Punjab	4953	NP	NA**	NA**	NA**	NA**	28503	168960	9583	7154	66.91
	E) %age International Bandwidth utilization during peak hours (TCBH)	<80%	Punjab	49.53%	NP	NA**	NA**	NA**	NA**	38.51%	59.35%	96.80%	78.74%	74.34%
	Broadband Connection Speed (download) - from ISP Node to User													
6.3	A) Total committed download speed to the sample subscribers (In mpbs)		Punjab	1	NP	NA	2	2	NP	3	256	16	NA	1.17
	B) Total average download speed observed for the sample subscribers during TCBH (In Mbps)		Punjab	1	NP	NA	1.95	1.85	NP	2.08	250	12.99	NA	1.05
	C) % age subscribed speed available to the subscriber during TCBH	>80%	Punjab	100.00%	NP	NA	97.50%	92.50%	NP	83.79%	97.66%	81.19%	NA	89.74%



Service Availability/Uptime														
7	A) Total operational Hours		Punjab	40970976	728	728	728	728	728	728	16192	17112	728	728
	B) Total downtime (In hours)		Punjab	2035	0	0	0	2	5	3	31	115	1	2
	C) Total time when the service was available (In Hrs)		Punjab	40968941	728	727.83	728	726	723	725	16161	16997	727	726
	D) % age of Service availability uptime	>98%	Punjab	99.99%	100.00%	99.97%	100.00%	99.73%	99.26%	99.61%	99.81%	99.33%	99.85%	99.72%
Packet Loss														
8	A) Total number of ping packets transmitted		Punjab	1000	NP	NA	30333	1000	NP	30333	30000	1300	NA	1000
	B) Total number of ping packets lost		Punjab	0	NP	NA	7	1	NP	227	0	3	NA	0
	C) % age packet loss	<1%	Punjab	0.00%	NP	NA	0.02%	0.10%	NP	0.75%	0.00%	0.23%	NA	0.00%
9 Network latency (for wired broadband access)														
Network Latency from User reference point at POP/ISP Node to IGSP/NIXI gateway														
9.1	A) Total number of ping packets transmitted		Punjab	1000	NP	NA	30333	1000	NA	1000	1000	1000	NA	1000
	B) Total round trip time for all the ping packets transmitted during the period		Punjab	780	NP	NA	2177000	24000	NA	16	24	59	NA	36000
	C) Average round trip time for all the ping transmitted	<120 ms	Punjab	29	NP	NA	71.76	24	NA	0.02	0.80	59	NA	36
Network Latency from User reference point at ISP Node to nearest NAP Port abroad (Terrestrial)														
9.2	A) Total number of ping packets transmitted		Punjab	1000	NP	NA	NA	NA	NP	1000	1000	1000	NA	1000
	B) Total round trip time for all the ping packets transmitted during the period		Punjab	2193	NP	NA	NA	NA	NP	14	282	115	NA	34600
	C) Average round trip time for all the ping transmitted	<350 ms	Punjab	87	NP	NA	NA	NA	NP	0.01	9	115	NA	34.60
Network Latency from User reference point at ISP Node to nearest NAP Port abroad (Satellite)														
9.3	A) Total number of ping packets transmitted		Punjab	NA**	NA**	NA**	NA**	NA**	NA**	NA**	NA**	NA**	NA**	NA**
	B) Total round trip time for all the ping packets transmitted during the period		Punjab	NA**	NA**	NA**	NA**	NA**	NA**	NA**	NA**	NA**	NA**	NA**
	C) Average round trip time for all the ping transmitted	<800 ms	Punjab	NA**	NA**	NA**	NA**	NA**	NA**	NA**	NA**	NA**	NA**	NA**

NA- Not Applicable

NA* : DVOIS and 5-network do not provide post paid service

NA** : No ISP Gateway Node to IGSP / NIXI Node upstream Link(s) for International connectivity and Satellite connectivity provided by these SPs.

NP-Not Provided- Monthly Data Not Monitored by ISPs

10.2 SERVICE PROVIDER PERFORMANCE REPORT BASED ON 3 DAYS MEASUREMENT DATA VERIFICATION FOR BROADBAND SERVICE PROVIDERS:

3 DAYS LIVE DATA FOR BROADBAND SERVICES - PUNJAB CIRCLE

3 days live Broadband Audit Data		Benchmark	Circle Name	BHARTI AIRTEL	BSNL	DVOIS	FIVE NETWORK	NSTPL	PACENET	RCL	TCL	TTL	HFCL	HATHWAY
S/N	Name of Parameter			BROADBAND SERVICE PROVIDERS										
Response time to the customer for assistance % age of calls answered by operator (Voice to Voice)														
1	A) Total number of calls received by the operator		Punjab	366	741	2	1	0	10	2236	2529	9	1987	30
	B) Total number of calls answered by the operator within 60 seconds		Punjab	356	422	2	1	0	8	2171	1905	8	1593	18
	C) % age calls answered by the operator in 60 seconds	>60%	Punjab	97.27%	56.95%	100.00%	100.00%	NA	83.30%	97.10%	75.33%	92.56%	80.17%	58.67%
	D) Total number of calls answered by the operator within 90 seconds		Punjab	356	536	2	1	0	100	2236	2010	8	1725	30
	E) % age calls answered by the operator within 90 seconds	>80%	Punjab	97.27%	72.33%	100.00%	100.00%	NA	100.00%	100.00%	79.48%	92.56%	86.81%	100.00%
2	Bandwidth Utilization/ Throughput:													
POP to ISP Gateway Node [Intra-network] Link(s)														
2.1	A) Total Bandwidth Available at the link for the period days		Punjab	5170	2691	40	24	15	130	9000	110	1024	13780	90
	B) Total Bandwidth utilized during the period during TCBH (In Mbps)		Punjab	2759	1847	26	9.56	6.90	56	2362	52	550	10768	70.88
	C) % age Bandwidth utilized during the period	<80%	Punjab	53.37%	68.63%	64.16%	39.84%	46.00%	42.82%	26.24%	47.27%	53.71%	78.14%	78.75%
ISP Gateway Node to IGSP / NIXI Node upstream Link(s) for International connectivity														
2.2	A) Total number of upstream links for International connectivity		Punjab	1	NP	NA	NA	NA	NA	8	6	1	3	1
	B) Number of Links having Bandwidth utilization >		Punjab	0	NP	NA	NA	NA	NA	0	0	1	0	0



3 DAYS LIVE DATA FOR BROADBAND SERVICES - PUNJAB CIRCLE

3 days live Broadband Audit Data		Bench-mark	Circle Name	BHARTI AIRTEL	BSNL	DVOIS	FIVE NETWORK	NSTPL	PACENET	RCL	TCL	TTL	HFCL	HATHWAY
S/N	Name of Parameter			BROADBAND SERVICE PROVIDERS										
	90% during TCBH													
	C) Total international bandwidth available from ISP Node to IGSP/NIXI/NAP		Punjab	10000	NP	NA	NA	NA	NA	74000	300032	9900	9241	90
	D) Total international bandwidth utilization during peak hours (TCBH) in Mbps		Punjab	56	NP	NA	NA	NA	NA	39140	165540	4400	7141	71
	E) %age International Bandwidth utilization during peak hours (TCBH)	<80%	Punjab	56.43%	NP	NA	NA	NA	NA	52.89%	55.17%	44.44%	77.27%	78.88%
Broadband Connection Speed (download) - from ISP Node to User														
2.3	A) Total committed download speed to the sample subscribers (In mpbs)		Punjab	1	2	2	2	2	2	1.50	1.50	1	2	1.17
	B) Total average download speed observed for the sample subscribers during TCBH (In Mpbs)		Punjab	1	1.71	1.97	1.87	1.84	1.72	1.30	1.57	1.01	1.99	1.10
	C) % age subscribed speed available to the subscriber during TCBH	>80%	Punjab	100.00%	85.50%	98.50%	93.50%	92.00%	86.00%	86.67%	104.67%	101.00%	99.83%	94.02%
Packet Loss														
3	A) Total number of ping packets transmitted		Punjab	1000	1667	1000	1000	1000	1000	1000	1000	1000	1000	1000
	B) Total number of ping packets lost		Punjab	0	3	3	0	0	2	0	0	6	0	0
	C) % age packet loss	<1%	Punjab	0.00%	0.20%	0.27%	0.00%	0.00%	0.16%	0.00%	0.00%	0.60%	0.00%	0.00%
4	Network latency (for wired broadband access)													
4.1	Network Latency from User reference point at POP/ISP Node to IGSP/NIXI gateway													

3 DAYS LIVE DATA FOR BROADBAND SERVICES - PUNJAB CIRCLE

3 days live Broadband Audit Data		Bench- mark	Circle Name	BHARTI AIRTEL	BSNL	DVOIS	FIVE NETWORK	NSTPL	PACENET	RCL	TCL	TTL	HFCL	HATHWAY
S/ N	Name of Parameter			BROADBAND SERVICE PROVIDERS										
	A) Total number of ping packets transmitted		Punjab	1000	1667	1000	1000	1000	1000	1000	1000	1000	1000	1000
	B) Total round trip time for all the ping packets transmitted during the period		Punjab	1000	1663	995	1000	1000	1000	NA	1000	1000	1000	1000
	C) Average round trip time for all the ping transmitted	<120 ms	Punjab	31	49	40	50	25	12	1	27	46	5	36
Network Latency from User reference point at ISP Node to nearest NAP Port abroad (Terrestrial)														
4.2	A) Total number of ping packets transmitted		Punjab	1000	1667	1000	1000	NA	1000	1000	1000	1000	1000	1000
	B) Total round trip time for all the ping packets transmitted during the period		Punjab	1000	1662	995	1000	NA	1000	NA	1000	1000	1000	1000
	C) Average round trip time for all the ping transmitted	<350 ms	Punjab	99	296	170	164	NA	63	2	277	115	279	36
Network Latency from User reference point at ISP Node to nearest NAP Port abroad (Satellite)														
4.3	A) Total number of ping packets transmitted		Punjab	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	B) Total round trip time for all the ping packets transmitted during the period		Punjab	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	C) Average round trip time for all the ping transmitted	<800 ms	Punjab	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Service Availability/Uptime														
5	A) Total operational Hours		Punjab	NA	72	72	72	72	72	72	1584	19008	72	72
	B) Total downtime (In hours)		Punjab	NA	0	0	0	0	0	0	10	129	0	0

3 DAYS LIVE DATA FOR BROADBAND SERVICES - PUNJAB CIRCLE

3 days live Broadband Audit Data		Bench- mark	Circle Name	BHARTI AIRTEL	BSNL	DVOIS	FIVE NETWORK	NSTPL	PACENET	RCL	TCL	TTL	HFCL	HATHWAY
S/ N	Name of Parameter			BROADBAND SERVICE PROVIDERS										
	C) Total time when the service was available (In Hrs)		Punjab	NA	72	72	72	72	72	72	1574	18879	72	72
	D) % age of Service availability uptime	>98%	Punjab	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.40%	99.32%	100.00%	99.90%

NA: Not Applicable
NP: Data not provided

10.3 KEY FINDINGS: BROADBAND SERVICES

Service Provisioning / Activation Time: The audit of the service providers revealed that all Broadband service providers were well within the benchmark.

Fault Repair/Restoration Time: With regards to this parameter, the performances of all Broadband service providers were within TRAI norms.

Billing Performance: For this parameter also the performance of the service providers was found well within the compliance benchmarks.

Response Time to Customer for assistance by operator (Voice to Voice): For percentage of calls getting connected to call center and answered, all service providers were found meeting the benchmark for this parameter except BSNL, TCL and TTL. BSNL, TCL and TTL could not meet the benchmark for the parameter “% age calls answered by the operator within 90 seconds”; their achievement level was 65.43%, 69.41 and 76.65% respectively. BSNL also failed to meet the benchmark for the parameter “% age calls answered by the operator in 60 seconds”; its achievement level was 48.97% against the benchmark >60%.

Bandwidth Utilization/ Throughput: All the service providers were found using Multiple Router Traffic Grapher (MRTG) and also it was observed that all service providers were reporting combined bandwidth utilization for corporate customers and household customers.

The performance of service providers with respect of these parameters was found satisfactory i.e. within benchmark during quarterly audit as well as 3 days live measurement.

Service Availability/Uptime: All service providers were found meeting the benchmark for this parameter.

Packet Loss and Network Latency: It was observed that almost all operators were measuring packet loss and latency by conducting ping test on random basis for their internal assessment.

However, the ping test conducted during live measurement revealed that all service providers were meeting the benchmark prescribed by TRAI.

10.4 CUSTOMER CARE / HELPLINE ASSESSMENT

LIVE CALLING TO CALL CENTRE FOR BROADBAND SERVICES												
Parameter	Circle Name	BHARTI AIRTEL	BSNL	DVOIS	FIVE NETWORK	NSTPL	PACENET	RCL	TCL	TTL	HFCL	HATHWAY
Total No. of calls Attempted	Punjab	100	100	100	100	100	100	100	100	100	100	100
Total number of calls answered by the operator within 60 seconds	Punjab	98	59	88	100	90	90	100	94	96	70	96
% age calls answered by the operator in 60 seconds	Punjab	98.00%	59.00%	88.00%	100.00%	90.00%	90.00%	100.00%	94.00%	96.00%	70.00%	96.00%
Total number of calls answered by the operator within 90 seconds	Punjab	100	89	100	0	100	100	0	100	100	80	100
% age calls answered by the operator within 90 seconds	Punjab	100.00%	89.00%	100.00%	NA	100.00%	100.00%	NA	100.00%	100.00%	80.00%	100.00%

In case of calls answered by operators (voice to voice) within 60 seconds and 90 seconds, when test calls were made to the call centers, all broadband service providers were found meeting the TRAI prescribed benchmark. BSNL could connect 59% calls within 60 seconds, which is marginally below the benchmark of >60%.

10.5 LIVE CALLING FOR BILLING COMPLAINTS

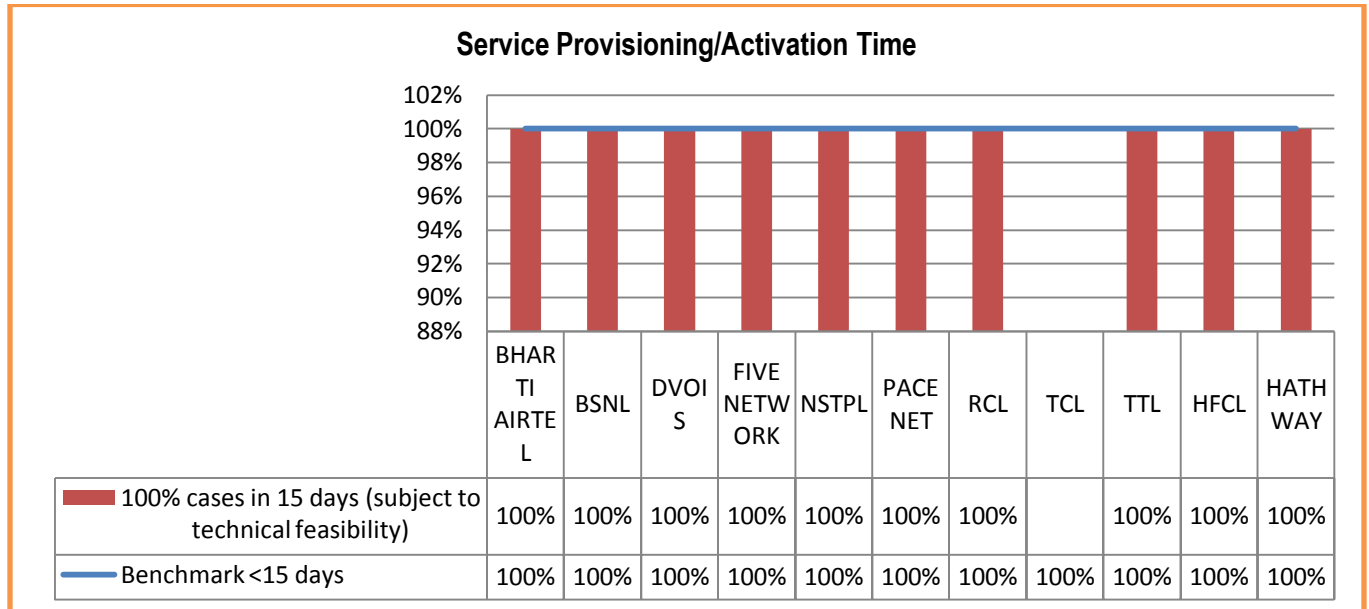
TELEPHONIC INTERVIEW FOR BILLING COMPLAINTS												
Parameter	Circle Name	BHARTI AIRTEL	BSNL	DVOIS	FIVE NETWORK	NSTPL	PACENET	RCL	TCL	TTL	HFCL	HATHWAY
Total No. of calls Attempted	Punjab	18	100	0	0	0	0	100	0	0	30	10
Total No. of calls Answered	Punjab	18	67	0	0	0	0	100	0	0	20	10
Cases resolved within 4 weeks	Punjab	18	67	0	0	0	0	100	0	0	20	10
%age of cases resolved	Punjab	100.00%	100.00%	NA	NA	NA	NA	100.00%	NA	NA	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 their complaints have been resolved but not sure of duration of their resolution. However, most of the customers reported their satisfaction on resolution of the billing complaints.

GRAPHICAL REPRESENTATION OF BROADBAND SERVICES

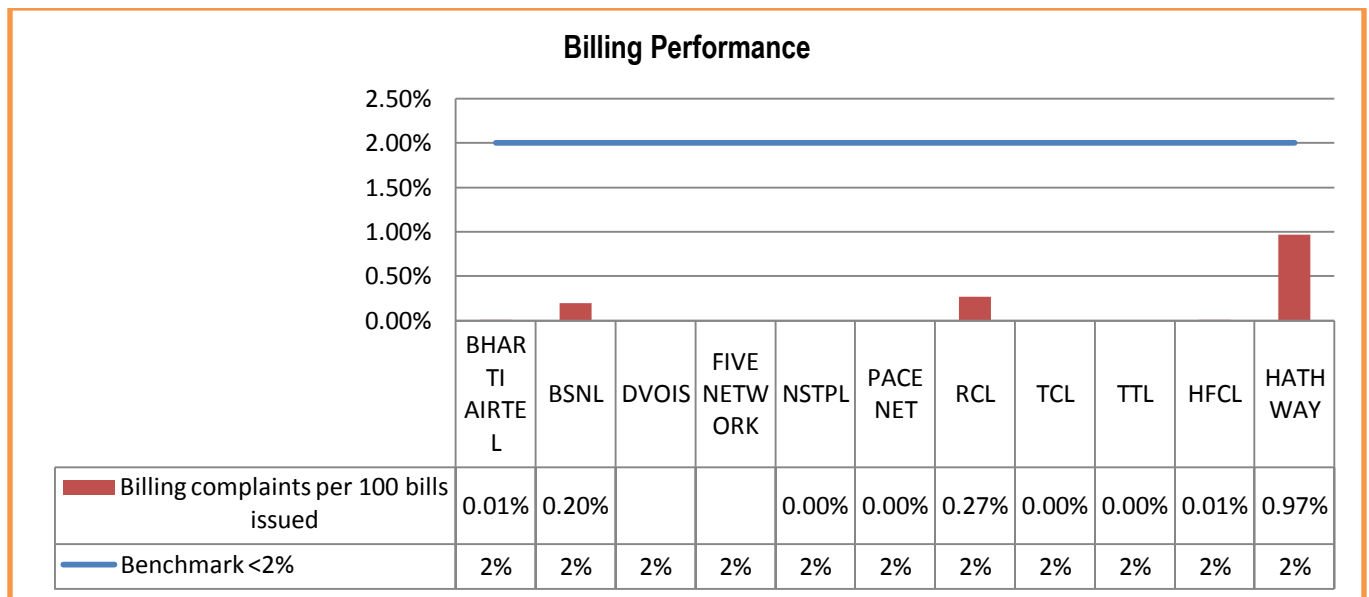
10.6 GRAPHICAL REPRESENTATION OF QUARTERLY PERFORMANCE OF BROADBAND SERVICE PROVIDERS:

1. SERVICE PROVISIONING/ACTIVATION TIME:



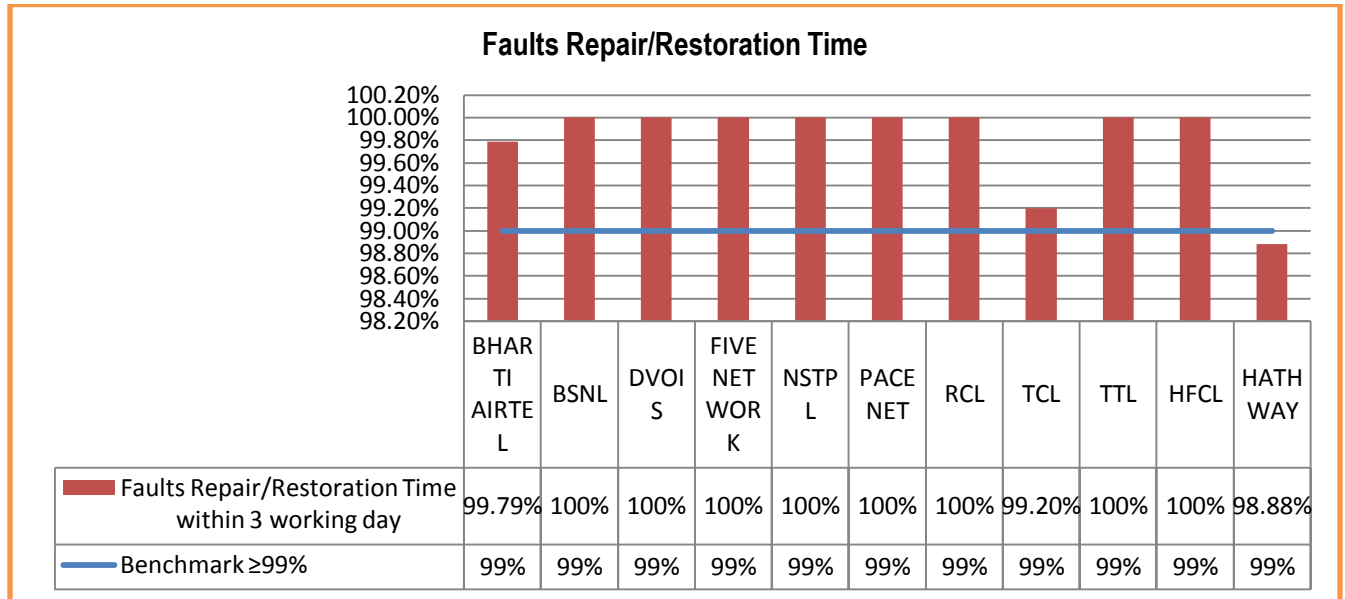
All Operators are meeting the benchmarks.

2. BILLING PERFORMANCE:



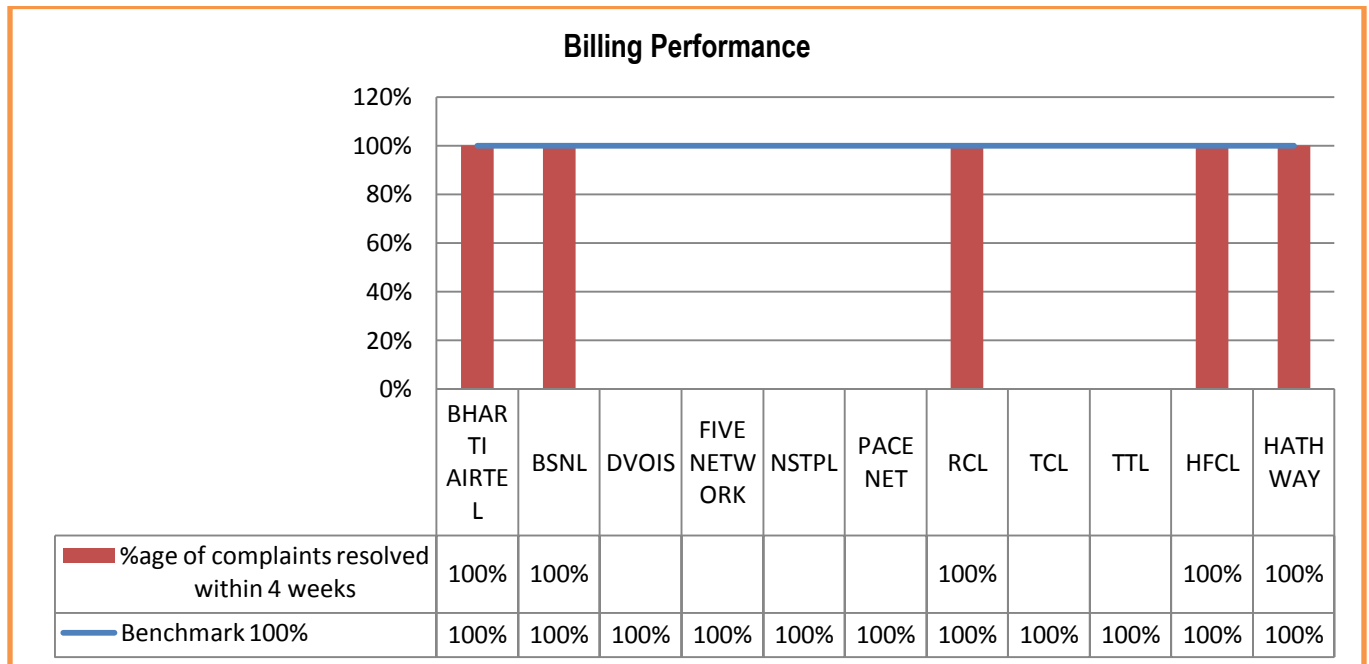
All Operators are meeting the benchmarks.

3. FAULTS REPAIR/RESTORATION TIME:



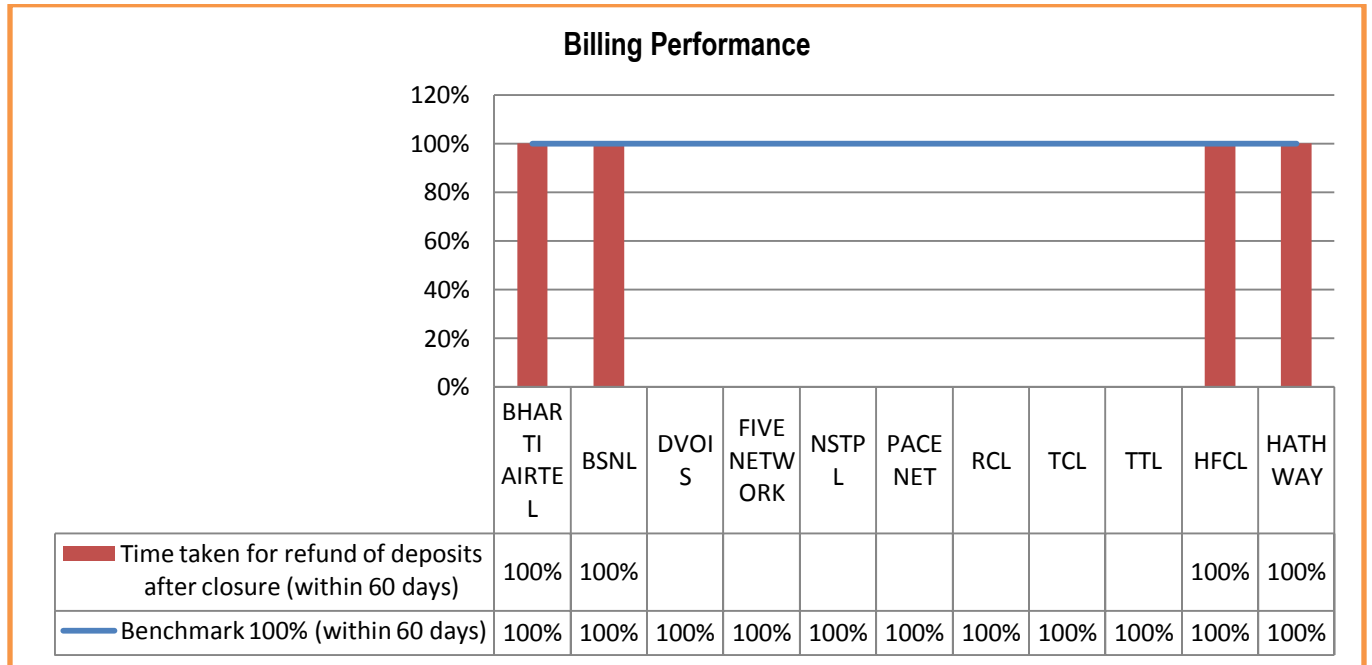
All Operators are meeting the benchmarks except HATHWAY.

4. COMPLAINT RESOLUTION:



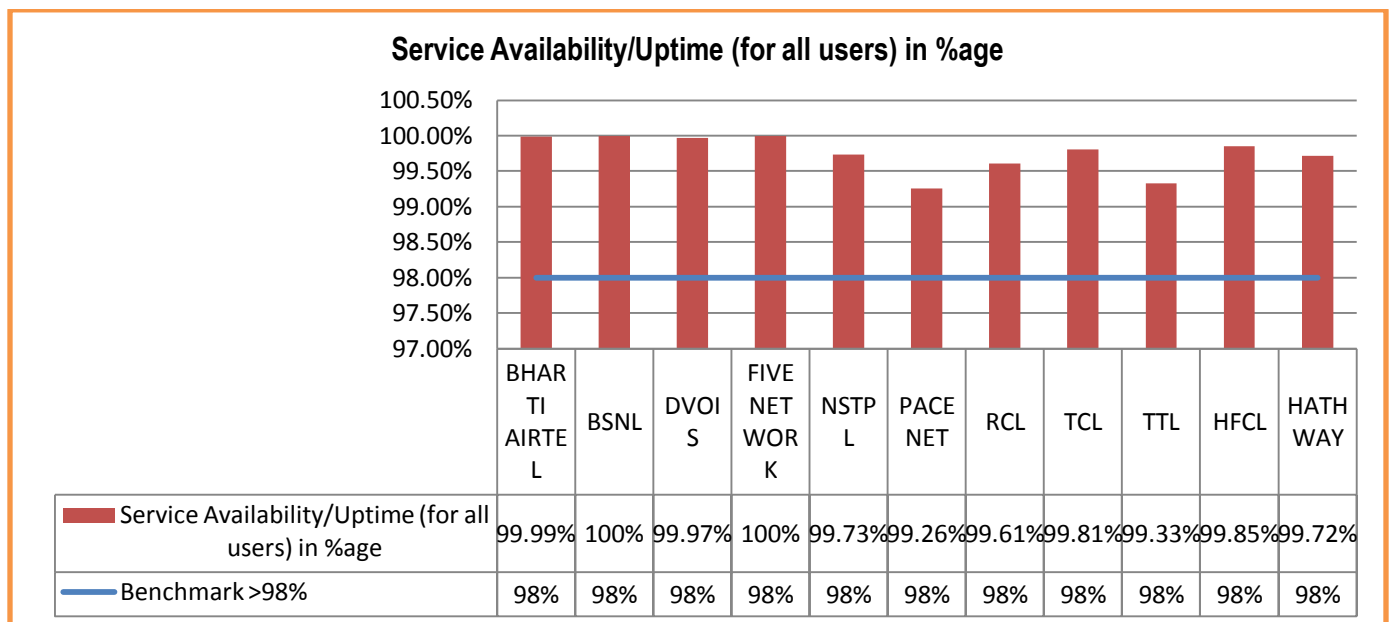
All Operators are meeting the benchmarks.

5. REFUND:



All Operators are meeting the benchmarks.

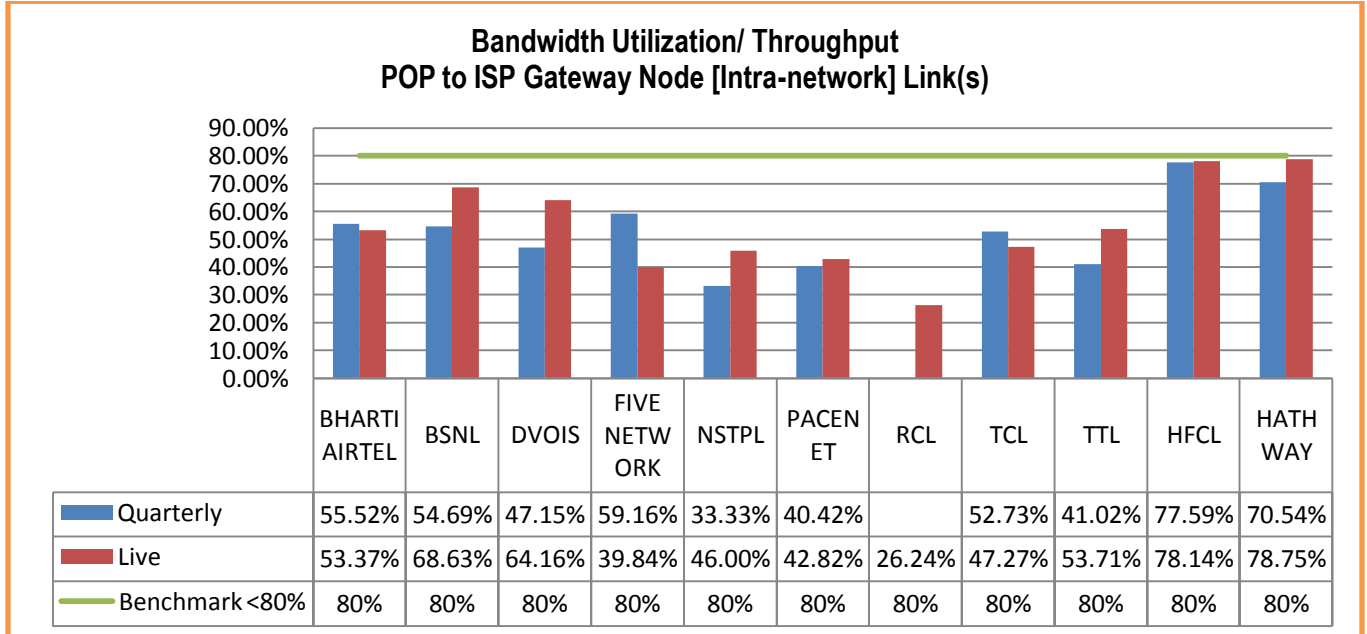
6. SERVICE AVAILABILITY/UPTIME:



All Operators are meeting the benchmarks.

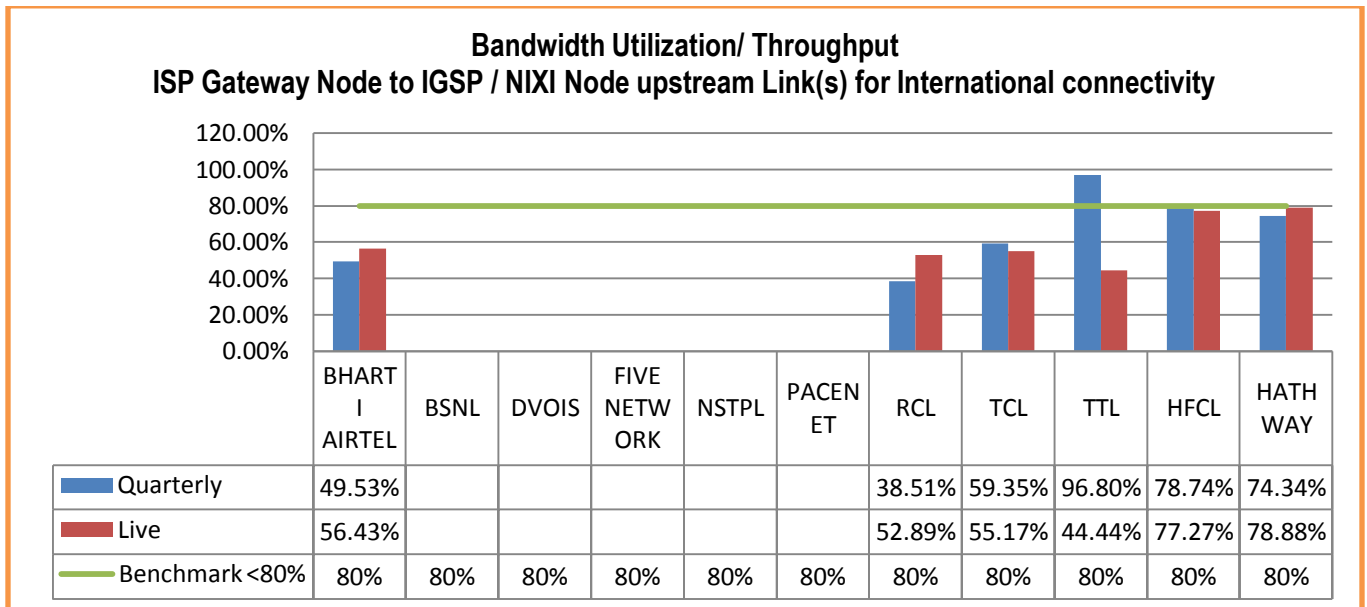
10.7 GRAPHICAL REPRESENTATION OF PERFORMANCE OF THE BROADBAND SERVICE PROVIDERS V/S 3-DAYS LIVE MEASUREMENT:

1. BROADBAND UTILIZATION/THROUGHPUT POP TO ISP GATEWAY NODE:



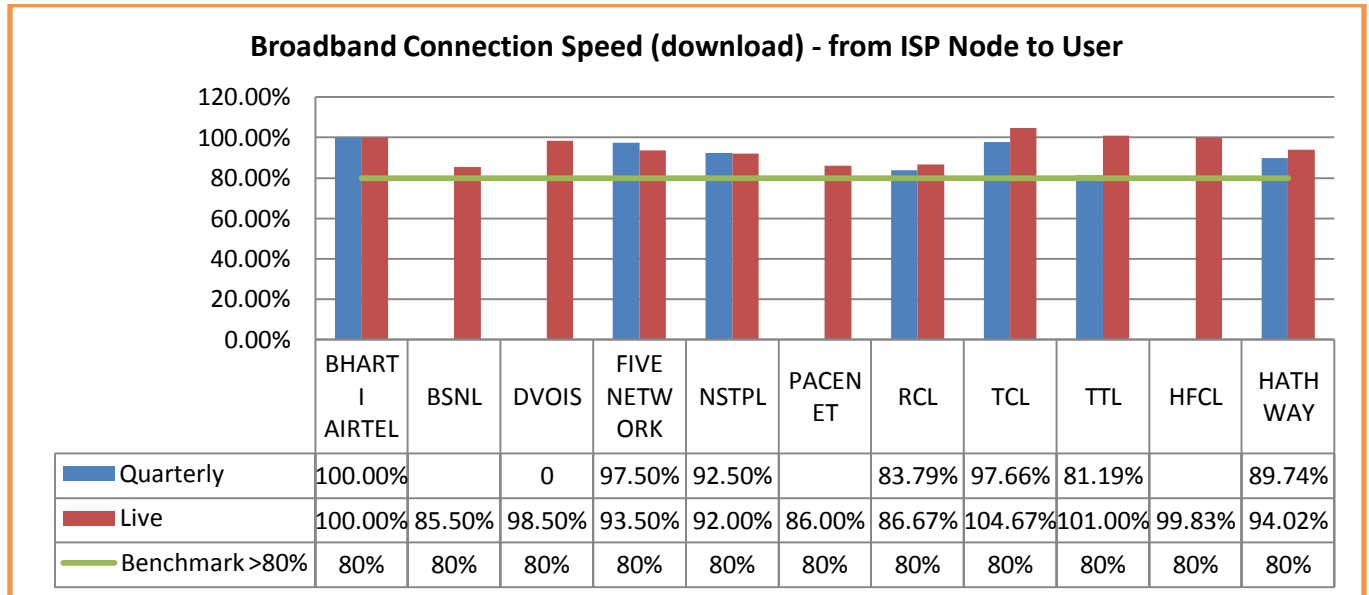
All Operators are meeting the benchmarks.

2. BROADBAND UTILIZATION/THROUGHPUT ISP GATEWAY NODE TO IGSP/NIXI NODE:



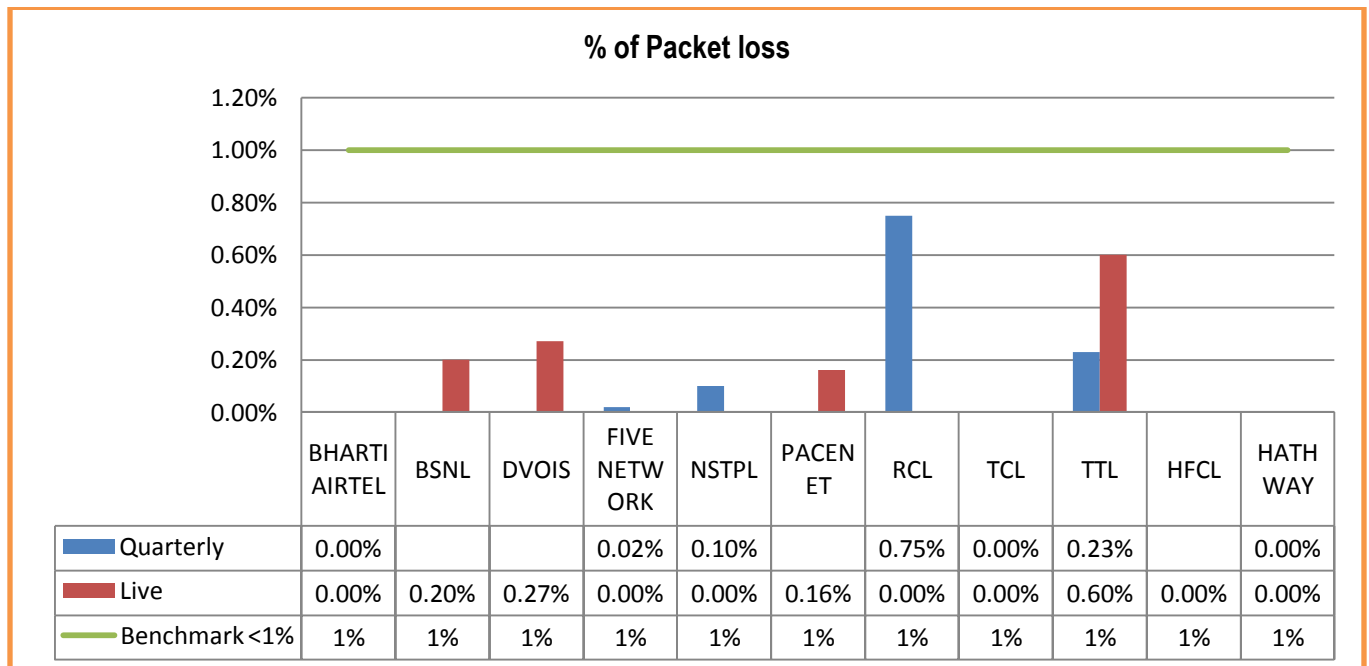
All Operators are meeting the benchmarks except TTL.

3. BROADBAND CONNECTION SPEED (DOWNLOAD) FROM ISP NODE TO USER:



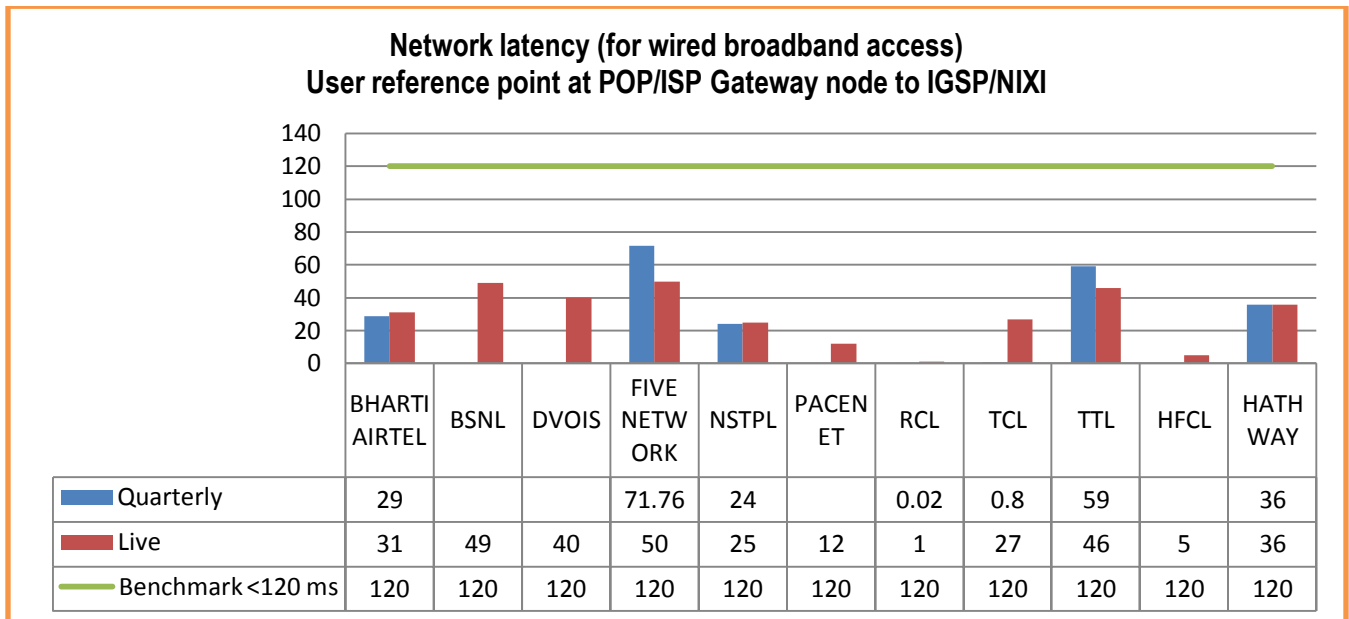
All Operators are meeting the benchmarks.

4. PACKET LOSS:



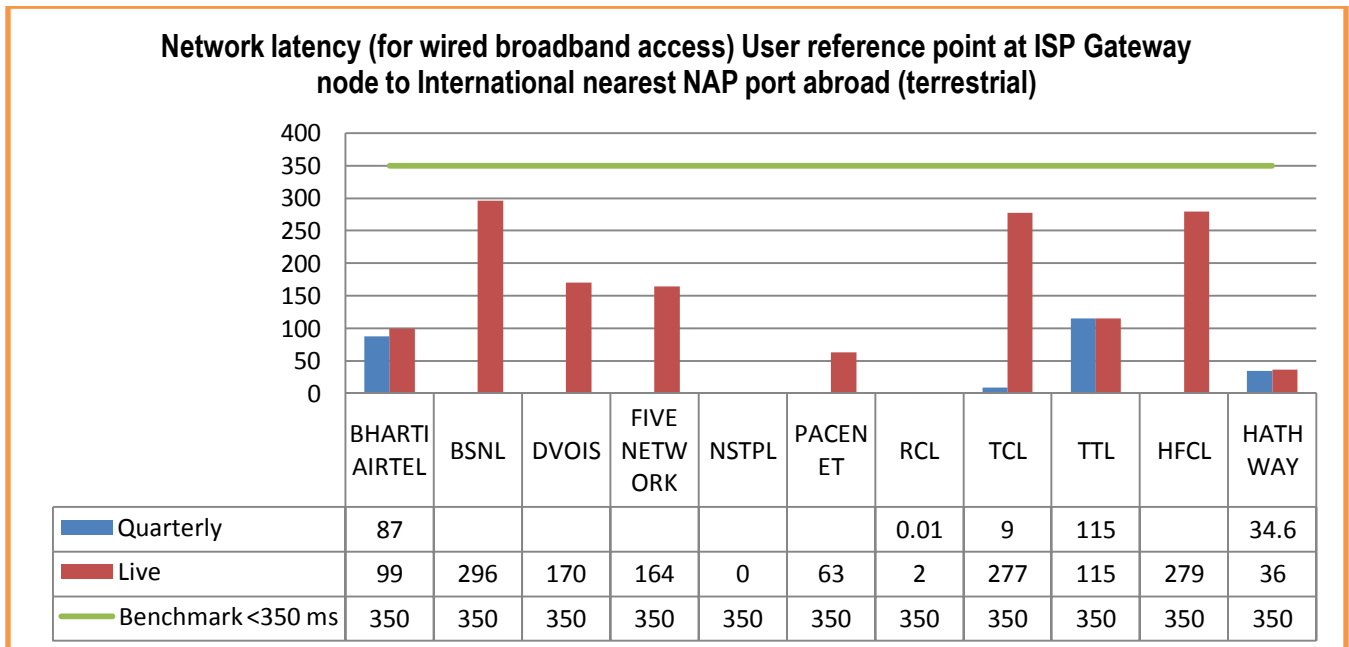
All Operators are meeting the benchmarks.

5. NETWORK LATENCY USER REFERENCE POINT AT POP/ISP GATEWAY NODE TO IGSP/NIXI:



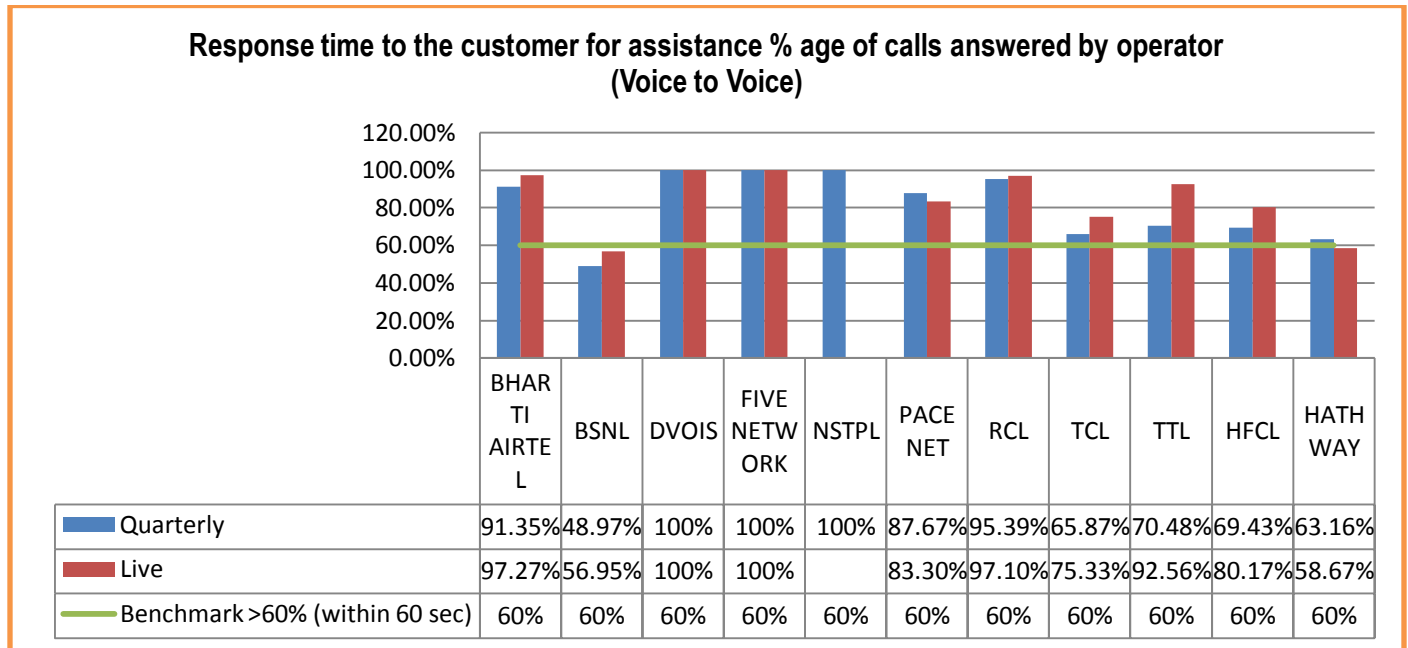
All Operators are meeting the benchmarks.

6. NETWORK LATENCY USER REFERENCE POINT AT ISP GATEWAY NODE TO INTERNATIONAL NEAREST NAP PORT ABROAD (TERRESTRIAL):



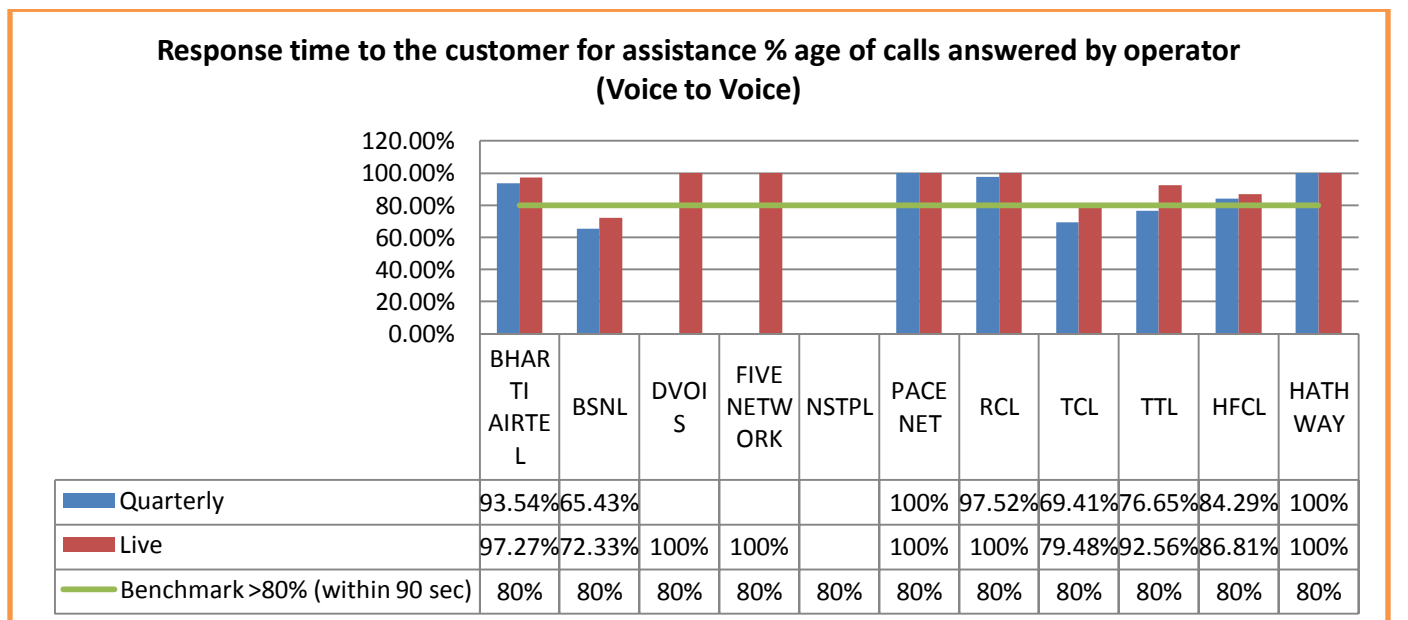
All Operators are meeting the benchmarks.

7. RESPONSE TIME TO THE CUSTOMER FOR ASSISTANCE ACCESSIBILITY BY OPERATOR WITHIN 60 SECONDS:



All Operators are meeting the benchmarks except BSNL.

8. RESPONSE TIME TO THE CUSTOMER FOR ASSISTANCE ACCESSIBILITY BY OPERATOR WITHIN 90 SECONDS:



All Operators are meeting the benchmarks except BSNL, TCL, TTL.

Annex-1

LIST OF THE EXCHANGER COVERED FOR QOS AUDIT FOR QE-JUNE 2014:

S. No	Service provider	SSA Name	SDCA	EXCHANGE NAME	Exchange Level	CAPACITY	DEL	Exchange Type
1	BSNL	Chandigarh	Chandigarh	K.A.Sher	0172-2789	2000	896	Rural
2	BSNL	Chandigarh	Chandigarh	K.Lahora	0172-2785 & 2786	1000	270	Rural
3	BSNL	Chandigarh	Chandigarh	Maloya	0172-2643 & 2644 & 2649	2000	569	Rural
4	BSNL	Chandigarh	Chandigarh	Maloya	0172-2220<2229 & 2260<2268 mix level	256	22	Rural
5	BSNL	Chandigarh	Chandigarh	MHL P-04		8000	2217	Urban
6	BSNL	Chandigarh	Chandigarh	MHL P-04		3000	2818	Urban
7	BSNL	Chandigarh	Chandigarh	MHL Sec-65	0172-2230<2234 & 2240,2241	3400	1739	Urban
8	BSNL	Chandigarh	Chandigarh	MHL Sec-65	0172-2210 <2215	2000	1386	Urban
9	BSNL	Chandigarh	Chandigarh	MHL Sec-70	0160-2216<2218	3000	1827	Urban
10	BSNL	Chandigarh	Kharar	BSF	0160-2260	1000	75	Rural
11	BSNL	Chandigarh	Kharar	Godana	0160-2256	480	24	Rural
12	BSNL	Chandigarh	Kharar	Landran	0160-2250 & 2252	1000	176	Rural
13	BSNL	Chandigarh	Kharar	Manauli	0160-2251	1000	46	Rural
14	BSNL	Chandigarh	Kharar	Ratwara.S	0160-2254 & 2255	1000	222	Rural
15	BSNL	Chandigarh	Kharar	Sohana	0160-2253 & 2258	2000	147	Rural
16	BSNL	Chandigarh	Kharar	Teor	0160-2259	480	114	Rural
17	BSNL	Ferozepur	Faridkot	CHAMELI	01639-233	1000	174	RURAL
18	BSNL	Ferozepur	Faridkot	DEEP SINGH WALA	01639-227-	304	59	RURAL
19	BSNL	Ferozepur	Faridkot	FARIDKOT	01639-251	8000	3554	URBAN
20	BSNL	Ferozepur	Faridkot	FARIDKOT RSU	01639-262	3000	1018	URBAN
21	BSNL	Ferozepur	Faridkot	GOLEWALA	01639-277	1000	289	RURAL
22	BSNL	Ferozepur	Faridkot	JHOKE SARKARI	01639-226	176	62	RURAL
23	BSNL	Ferozepur	Faridkot	KALER	01639-230	1000	321	RURAL
24	BSNL	Ferozepur	Faridkot	MACHAKI KALAN	01639-240	1000	173	RURAL
25	BSNL	Ferozepur	Faridkot	MACHAKI MAL SINGH	01639-277	352	121	RURAL
26	BSNL	Ferozepur	Faridkot	MALLEWALA	01639-276	248	99	RURAL
27	BSNL	Ferozepur	Faridkot	PINDI-BALOCHAN	01639-225	256	86	RURAL
28	BSNL	Ferozepur	Faridkot	PAKHI KALAN	01639-275	352	162	RURAL
29	BSNL	Ferozepur	Ferozepur	AKU-MASTE - KE	01632-278	752	202	RURAL
30	BSNL	Ferozepur	Ferozepur	BARE-KE	01632-280	400	82	RURAL
31	BSNL	Ferozepur	Ferozepur	CHUGGATE - WALA	01632-277	1000	132	RURAL
32	BSNL	Ferozepur	Ferozepur	FEROZEPUR CANTT	01632-241	6000	2035	URBAN
33	BSNL	Ferozepur	Ferozepur	FEROZEPUR CITY	01632-220	10000	3716	URBAN

S. No	Service provider	SSA Name	SDCA	EXCHANGE NAME	Exchange Level	CAPACITY	DEL	Exchange Type
34	BSNL	Ferozepur	Ferozepur	KARMU -WALA	01632-240	256	25	RURAL
35	BSNL	Ferozepur	Ferozepur	MALAWAL QADIM	01632-279	344	135	RURAL
36	BSNL	Ferozepur	Ferozepur	NIZAM WALA	01632-288	400	97	RURAL
37	BSNL	Ferozepur	Ferozepur	PALLA -MEGHA	01632-288	224	10	RURAL
38	BSNL	Ferozepur	Ferozepur	SANDE-HASHAM	01632-272	1000	162	RURAL
39	BSNL	Ferozepur	Ferozepur	SHER-KHAN-WALA	01632-270	1000	161	RURAL
40	BSNL	Ferozepur	Ferozepur	SAYIAN-WALA	01632-257	304	51	RURAL
41	BSNL	Ferozepur	Moga	CHANU-WALA	01636-284	616	194	Rural
42	BSNL	Ferozepur	Moga	GHOLIA KHURD	01636-245	1000	243	Rural
43	BSNL	Ferozepur	Moga	MOGA MAIN	01636-220	15300	7397	Urban
44	BSNL	Ferozepur	Moga	MOGA (DANA MANDI)	01636-235	5500	2761	Urban
45	BSNL	Ferozepur	Moga	MAHLA KALAN	01636-247	744	229	Rural
46	BSNL	Ferozepur	Moga	MARI MUSTAFA	01636-279	1000	298	Rural
47	BSNL	Ferozepur	Moga	MANU-KE	01636-248	1000	337	Rural
48	BSNL	Ferozepur	Moga	NATHU-WALA	01636-275	744	343	Rural
49	BSNL	Ferozepur	Moga	SEKHA-KHURD	01636-244	1000	262	Rural
50	BSNL	Ferozepur	Moga	SUKHANAND	01636-249	1000	213	Rural
51	BSNL	Ferozepur	Moga	SMADH-BHAI	01636-246	1000	260	Rural
52	BSNL	Ferozepur	Moga	SMALSAR	01636-280	2000	572	Rural
53	BSNL	Ludhiana	Ludhiana	Bhattian	0161-282	2000	522	Rural
54	BSNL	Ludhiana	Ludhiana	Balliawal	0161-283	500	261	Rural
55	BSNL	Ludhiana	Ludhiana	Bhaini Sahib	0161-283	2000	1027	Rural
56	BSNL	Ludhiana	Ludhiana	Ludhiana-BN	0161-225,240,241,242,243,244,277,288	10000	8015	Urban
57	BSNL	Ludhiana	Ludhiana	Ludhiana-BRS-I	0161-245,246,261	9000	4777	Urban
58	BSNL	Ludhiana	Ludhiana	Chaunta	0161-283	1000	246	Rural
59	BSNL	Ludhiana	Samrala	Dhamot	01628-27	1000	510	Rural
60	BSNL	Ludhiana	Ludhiana	Dhanansu	0161-283	1000	217	Rural
61	BSNL	Ludhiana	Samrala	Issru	01628-27,28	1500	690	Rural
62	BSNL	Ludhiana	Samrala	Jarg	01628-28	1400	588	Rural
63	BSNL	Ludhiana	Samrala	Jahangir	01628-24	1000	515	Rural
64	BSNL	Ludhiana	Samrala	Jaspalon	01628-24	1000	496	Rural
65	BSNL	Ludhiana	Samrala	Khanna-I	01628-22,23	7000	4537	Urban
66	BSNL	Ludhiana	Ludhiana	Koom Kalan	0161-283	1000	301	Rural
67	BSNL	Ludhiana	Samrala	Khanna-III	01628-23	6280	2493	Urban
68	BSNL	Ludhiana	Ludhiana	Kohara	0161-284	2000	1206	Rural
69	BSNL	Ludhiana	Samrala	Meharban	0161-269	3000	736	Rural
70	BSNL	Ludhiana	Ludhiana	Manupur	01628-28	1000	536	Rural

S. No	Service provider	SSA Name	SDCA	EXCHANGE NAME	Exchange Level	CAPACITY	DEL	Exchange Type
71	BSNL	Ludhiana	Ludhiana	Mattewara	0161-282	1000	223	Rural
72	BSNL	Ludhiana	Samrala	Panj Garaian	01628-24	1000	325	Rural
73	BSNL	Ludhiana	Samrala	Rampur	01628-28	1000	437	Rural
74	BSNL	Ludhiana	Samrala	Rara Sahib	01628-27	2000	874	Rural
75	BSNL	Ludhiana	Samrala	Rauni	01628-27	1000	456	Rural
76	BSNL	Ludhiana	Samrala	Sanghol	01628-25,26	1400	599	Rural
77	Bharti-Airtel	NA	NA	Chandigarh	NP	20280 Er.	91633	Urban
78	HFCL	NA	NA	Mohali	NP	300k	230639	Urban
79	Reliance	NA	NA	Mohali	NP	128k	21484	Urban
80	TTL	NA	NA	Mohali	NP	18000	3523	Urban
81	Vodafone	NA	NA	Chandigarh	NP	10000	360	Urban

Annex-2

LOCATION OF THE POPs COVERED FOR QOS AUDIT FOR QE-JUNE 2014:

S. No	Broadband Service provider	Location of PoP's Covered	Activity
1	BSNL	K.A.Sher	BB Audit
2	BSNL	K.Lahora	BB Audit
3	BSNL	Maloya	BB Audit
4	BSNL	Maloya	BB Audit
5	BSNL	MHL P-04	BB Audit
6	BSNL	MHL P-04	BB Audit
7	BSNL	MHL Sec-65	BB Audit
8	BSNL	MHL Sec-65	BB Audit
9	BSNL	MHL Sec-70	BB Audit
10	BSNL	BSF	BB Audit
11	BSNL	Godana	BB Audit
12	BSNL	Landran	BB Audit
13	BSNL	Manauli	BB Audit
14	BSNL	Ratwara.S	BB Audit
15	BSNL	Sohana	BB Audit
16	BSNL	Teor	BB Audit
17	BSNL	CHAMELI	BB Audit
18	BSNL	DEEP SINGH WALA	BB Audit
19	BSNL	FARIDKOT	BB Audit
20	BSNL	FARIDKOT RSU	BB Audit
21	BSNL	GOLEWALA	BB Audit
22	BSNL	JHOKE SARKARI	BB Audit
23	BSNL	KALER	BB Audit
24	BSNL	MACHAKI KALAN	BB Audit
25	BSNL	MACHAKI MAL SINGH	BB Audit
26	BSNL	MALLEWALA	BB Audit
27	BSNL	PINDI-BALOCHAN	BB Audit
28	BSNL	PAKHI KALAN	BB Audit
29	BSNL	AKU-MASTE - KE	BB Audit
30	BSNL	BARE-KE	BB Audit
31	BSNL	CHUGGATE - WALA	BB Audit
32	BSNL	FEROZEPUR CANTT	BB Audit
33	BSNL	FEROZEPUR CITY	BB Audit
34	BSNL	KARMU -WALA	BB Audit

S. No	Broadband Service provider	Location of PoP's Covered	Activity
35	BSNL	MALAWAL QADIM	BB Audit
36	BSNL	NIZAM WALA	BB Audit
37	BSNL	PALLA -MEGHA	BB Audit
38	BSNL	SANDE-HASHAM	BB Audit
39	BSNL	SHER-KHAN-WALA	BB Audit
40	BSNL	SAYIAN-WALA	BB Audit
41	BSNL	CHANU-WALA	BB Audit
42	BSNL	GHOLIA KHURD	BB Audit
43	BSNL	MOGA MAIN	BB Audit
44	BSNL	MOGA (DANA MANDI)	BB Audit
45	BSNL	MAHLA KALAN	BB Audit
46	BSNL	MARI MUSTAFA	BB Audit
47	BSNL	MANU-KE	BB Audit
48	BSNL	NATHU-WALA	BB Audit
49	BSNL	SEKHA-KHURD	BB Audit
50	BSNL	SUKHANAND	BB Audit
51	BSNL	SMADH-BHAI	BB Audit
52	BSNL	SMALSAR	BB Audit
53	BSNL	Bhattian	BB Audit
54	BSNL	Balliawal	BB Audit
55	BSNL	Bhaini Sahib	BB Audit
56	BSNL	Ludhiana-BN	BB Audit
57	BSNL	Ludhiana-BRS-I	BB Audit
58	BSNL	Chaunta	BB Audit
59	BSNL	Dhamot	BB Audit
60	BSNL	Dhanansu	BB Audit
61	BSNL	Issru	BB Audit
62	BSNL	Jarg	BB Audit
63	BSNL	Jahangir	BB Audit
64	BSNL	Jaspalon	BB Audit
65	BSNL	Khanna-I	BB Audit
66	BSNL	Koom Kalan	BB Audit
67	BSNL	Khanna-III	BB Audit
68	BSNL	Kohara	BB Audit
69	BSNL	Meharban	BB Audit
70	BSNL	Manupur	BB Audit
71	BSNL	Mattewara	BB Audit
72	BSNL	Panj Garaian	BB Audit

S. No	Broadband Service provider	Location of PoP's Covered	Activity
73	BSNL	Rampur	BB Audit
74	BSNL	Rara Sahib	BB Audit
75	BSNL	Rauni	BB Audit
76	BSNL	Sanghol	BB Audit
77	BHARTI AIRTEL LIMITED	Chandigarh	BB Audit
78	D-VOIS BROADBAND	Chandigarh	BB Audit
79	FIVE-NETWORKS	Bhatinda	BB Audit
80	NSTPL	Nangal	BB Audit
81	BROADBAND PACENET INDIA PVT. LTD	Jalandhar	BB Audit
82	RELIANCE COMMUNICATION LIMITED (RCL)	DAKC, Mumbai	BB Audit
83	TATA COMMUNICATION LIMITED (TCL)	Mohali	BB Audit
84	TATA TELESERVICES LIMITED (TTL)	Mohali	BB Audit
85	HFCL	Mohali	BB Audit
86	HATHWAY	Chandigarh	BB Audit