



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

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## PREFACE

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

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

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

## Table of Contents

1) BACKGROUND.....	6
2) OBJECTIVES AND METHODOLOGY:.....	9
3) SAMPLE SIZE: .....	11
3.1 SAMPLING FOR CELLULAR MOBILE (WIRELESS) SERVICE PROVIDERS.....	11
3.2 SAMPLING FOR BASIC (WIRE LINE) SERVICES .....	12
3.3 SAMPLING FOR BROADBAND SERVICE PROVIDERS.....	12
4) EXECUTIVE SUMMARY:.....	14
5) PMR AUDIT REPORTS: .....	17
5.1 MONTHLY PMR:.....	17
5.1.1 BUSY HOUR OF VARIOUS SERVICE PROVIDERS: .....	17
5.1.2 SWITCHES/BSC/BTS DETAILS OF SERVICE PROVIDERS: .....	17
5.1.3 QOS PERFORMANCE OF MONTHLY PMR – OCTOBER 14 MONTH:.....	18
5.1.4 QOS PERFORMANCE OF MONTHLY PMR – NOVEMBER 14 MONTH:.....	19
5.1.5 QOS PERFORMANCE OF MONTHLY PMR – DECEMBER 14 MONTH:.....	20
5.1.6 QOS PERFORMANCE OF QUARTERLY PMR –AVERAGE OF QE- DECEMBER 14 (OCT. TO DEC. 2014 MONTHS AUDITED DATA).....	21
5.1.7 KEY FINDINGS ON MONTHLY PMR AUDIT REPORTS:.....	22
5.2 LIVE MEASUREMENT DATA (3-DAYS) FOR CELLULAR MOBILE SERVICE PROVIDERS (NETWORK SERVICE QUALITY PARAMETER):.....	25
5.2.1 LIVE MEASUREMENT DATA (3-DAYS) – OCTOBER 14 MONTH:.....	25
5.2.2 LIVE MEASUREMENT DATA (3-DAYS) – NOVEMBER 14 MONTH:.....	26
5.2.3 LIVE MEASUREMENT DATA (3-DAYS) – DECEMBER 14 MONTH:.....	27
5.2.4 QUARTERLY QOS PERFORMANCE OF 3-DAYS LIVE MEASUREMENT AUDITED DATA (AVERAGE OF OCTOBER TO DECEMBER 2014 MONTHS AUDITED DATA).....	28
5.2.5 KEY FINDING ON 3 DAYS LIVE MEASUREMENTS:.....	28
5.2.6 DETAILED NETWORK DATA ASSESSMENT OF CELLULAR MOBILE TELEPHONE SERVICES:.....	29
5.3 CUSTOMER SERVICE QUALITY PARAMETERS MEASUREMENT FOR CMTS-QE DEC.-14:..	36
5.3.1 QUARTERLY CUSTOMER SERVICE DELIVERY (CSD) AUDITED DATA FOR CELLULAR MOBILE SERVICES (OCTOBER TO DECEMBER 2014 MONTHS AUDITED DATA):.....	36
5.3.2 3 DAYS LIVE CSD AUDITED DATA FOR CELLULAR MOBILE SERVICES (QE-DEC. 2014): .....	39
KEY FINDINGS .....	40
6) LIVE CALLING ASSESSMENT:.....	42
6.1 INTER OPERATOR CALLS ASSESSMENT: .....	42
6.2 CUSTOMER CARE / HELPLINE ASSESSMENT: .....	43
6.3 LIVE CALLING ASSESSMENT FOR BILLING COMPLIANTS:.....	43

6.4 LEVEL -1 CALLING ASSESSMENT: .....	44
7) OPERATOR ASSISTED DRIVE TEST .....	46
7.1 OPERATOR ASSISTED DRIVE TEST: NOIDA & GHAZIABAD AREA (OCTOBER-14).....	47
7.2 OPERATOR ASSISTED DRIVE TEST: SOUTH DELHI (MUNICIPAL AREA) – NOVEMBER 14 50	
7.3 OPERATOR ASSISTED DRIVE TEST: NORTH DELHI & NDMC AREA (DECEMBER 14).....	53
7.4 DETAIL OF THE ROUTES COVERED DURING THE DRIVE TESTS: .....	56
7.5 SSA WISE DRIVE TEST OBSERVATION: .....	58
7.6 KEY FINDINGS ON DRIVE TEST:.....	62
8) GRAPHICAL REPRESENTATION: .....	64
9) QOS AUDIT OF BASIC TELEPHONE SERVICE (WIRELIN) .....	69
9.1 SERVICE PROVIDER PERFORMANCE REPORT BASED ON QUARTERLY MEASUREMENT DATA VERIFICATION FOR BASIC TELEPHONE SERVICE (WIRELIN) PROVIDERS: .....	70
9.2 SERVICE PROVIDER PERFORMANCE REPORT BASED ON 3 DAYS LIVE MEASUREMENT DATA VERIFICATION FOR BASIC TELEPHONE SERVICE (WIRELIN) PROVIDERS: .....	71
9.3 KEY FINDINGS: BASIC TELEPHONE SERVICES (WIRELIN).....	72
9.4 INTER OPERATOR CALL ASSESSMENT (WIRELIN).....	73
9.5 LEVEL-1 LIVE CALLING (WIRELIN).....	73
9.6 CUSTOMER CARE / HELPLINE ASSESSMENT (WIRELIN SERVICES) .....	74
9.7 GRAPHICAL REPRESENTATION OF QUARTERLY PERFORMANCE OF THE BASIC TELEPHONE SERVICE (WIRELIN) PROVIDERS: .....	76
9.8 GRAPHICAL REPRESENTATION OF PERFORMANCE OF THE BASIC TELEPHONE SERVICE (WIRELIN) PROVIDERS V/S 3-DAYS LIVE MEASUREMENT: .....	80
10) QUALITY OF SERVICE AUDIT OF BROADBAND SERVICE PROVIDERS.....	82
10.1 QUARTERLY MEASUREMENT DATA FOR BROADBAND SERVICE PROVIDERS .....	83
10.2 SERVICE PROVIDER PERFORMANCE REPORT BASED ON 3 DAYS MEASUREMENT DATA VERIFICATION FOR BROADBAND SERVICE PROVIDERS: .....	89
10.3 KEY FINDINGS: BROADBAND SERVICES .....	92
10.4 CUSTOMER CARE / HELPLINE ASSESSMENT .....	93
10.5 LIVE CALLING FOR BILLING COMPLIANTS .....	93
10.6 GRAPHICAL REPRESENTATION OF QUARTERLY PERFORMANCE OF BROADBAND SERVICE PROVIDERS: .....	95
10.7 GRAPHICAL REPRESENTATION OF PERFORMANCE OF THE BROADBAND SERVICE PROVIDERS V/S 3-DAYS LIVE MEASUREMENT: .....	98



## **1. BACKGROUND**



## 1) BACKGROUND

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

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

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

TRAI, the regulatory watch dog for the Quality of Service for the telecom services – Basic (Wire line), Cellular Mobile (Wireless) and Broadband has commissioned **M/s TUV-SUD South Asia Pvt. Ltd.** for conducting audit and assessment of quality of service of service providers, in terms of the benchmarks specified in the “The Standards of Quality of Service of Basic Telephone Service (Wire line) and Cellular Mobile Telephone Service Regulations, 2009 (7 of 2009) dated 20<sup>th</sup> March, 2009 and the Quality of Service of Broadband Service Regulations, 2006 (11 of 2006) dated 6<sup>th</sup> October, 2006 on zonal basis for **North Zone and West Zone** comprising of the following Telecom Circles/Metro Service Areas”:

**North Zone:** Delhi, Jammu & Kashmir, Himachal Pradesh, Punjab, Haryana, Rajasthan, Uttar Pradesh-East and Uttar Pradesh-West (including Uttarakhand). For the cellular mobile telephone service the service area of Delhi includes Ghaziabad, Faridabad, Noida and Gurgaon.

**West Zone:** Mumbai, Maharashtra (including Goa and excluding Mumbai), Gujarat and Madhya Pradesh (including Chhattisgarh).

The Audit exercise would assess the Quality of Service of telecom operators providing Basic (Wire line), Cellular Mobile (Wireless) and Broadband services by auditing the relevant QoS records maintained by the operators, conducting drive tests as well as live measurements and comparing them with quality of service benchmarks stipulated by TRAI. The audit would be carried out by **TUV-SUD South Asia** every quarter across all the Circles/Service areas of North and West Zones for Cellular Mobile Service. However, in respect of Basic telephone service (wireline) and Broadband service, a circle would be audited once in a year.

## **2. OBJECTIVES AND METHODOLOGY**





## **2) OBJECTIVES AND METHODOLOGY:**

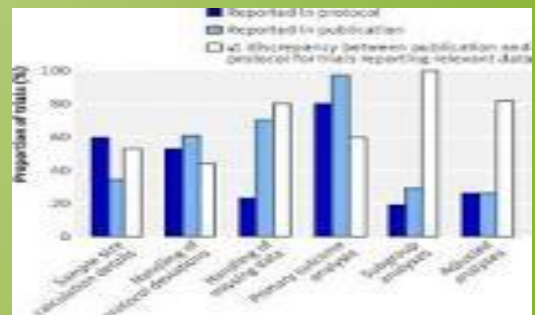
The primary objective is to audit and assess the Quality of Service being rendered by Basic, Cellular Mobile & Broadband service providers against the parameters notified by TRAI.

The audit and assessment of Quality of Service was carried out by **TUV SUD South Asia across all the Circles/Service areas of North and West Zones for Cellular Mobile Service. Apart from this, QoS audit for Basic (Wire line) and Broadband Services was also undertaken for Delhi, Haryana and Mumbai circles during the quarter October – December 2014.**

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

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

### 3. SAMPLE SIZE



### 3) SAMPLE SIZE:

#### 3.1 SAMPLING FOR CELLULAR MOBILE (WIRELESS) SERVICE PROVIDERS

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

Sl. No.	Name of Service Provider	Dates of live measurement Audit			Audit Location
		October-14	November-14	December-14	
<b>GSM Operators</b>					
1	AIRCEL	13 to 15 Oct-14	12 to 14 Nov-14	5, 8 & 9 Dec-14	Aircel Ltd, Near Sarita Vihar Metro Station, New Delhi
2	AIRTEL	15 to 17 Oct-14	19 to 21 Nov-14	8 to 10 Dec-14	Plot No 16 Udhog Vihar Ph-4 Gurgaon Haryana.
3	MTNL	20 to 22 Oct-14	21, 22 & 24 Nov-14	17 to 19 Dec-14	MTNL Exchange Karol Bagh Near Rajendra Place Metro Stn. New Delhi.
4	IDEA	15 to 17 Oct-14	11 to 13 Nov-14	18, 19 & 22 Dec-14	Idea Cellular Limited, E-5, Sector-63, Noida (UP)
5	RCOM GSM	16, 17 & 20 Oct-14	5 to 7 Nov-14	10 to 12 Dec-14	Reliance Center Maharaja Ranjit Singh Hotel, Maharaja Ranjit Singh Marg New Delhi.
6	VODAFONE	29 to 31 Oct-14	6, 7 & 10 Nov-14	3 to 5 Dec-14	A-19 Mohan Cooperative Industrial Estates, Mathura Road New Delhi.
<b>CDMA Operators</b>					
7	MTS	14 to 16 Oct-14	10 to 12 Nov-14	4, 5 & 8 Dec-14	A-194 Okhla Phase 1 New Delhi
8	RCOM CDMA	16, 17 & 20 Oct-14	5 to 7 Nov-14	10 to 12 Dec-14	Reliance Center Maharaja Ranjit Singh Hotel, Maharaja Ranjit Singh Marg New Delhi.
9	TATA CDMA	15 to 17 Oct-14	6, 7 & 10 Nov-14	16 to 18 Dec-14	TTSL 2 A Old Iswar Nagar Near NFC New Delhi

- For all the above operators, audit was conducted in all the three months of the Quarter ended Dec - 2014.
- The data generated by monthly PMR and 3-days live measurements audit for the period October 2014 to December 2014 has been successfully uploaded to the server located at TRAI premises.

### 3.2 SAMPLING FOR BASIC (WIRE LINE) SERVICES

The QoS audit for basic (wire line) service was to be done for the number of exchanges spread over in about 10% of SDCAs with each service providers in specified circles. Out of **364** (present no. of MTNL exchanges), audit was done for **18** sampled (**18-Urban**) exchanges, two exchanges each of Bharti & Vodafone and one exchange of each TTL & RCL. (List of 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.

Discussion with the 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:

(i) Based on monthly audit, it was concluded that the performance of the service providers was fairly satisfactory for **Network Parameters** in DELHI METRO service area as they were found to have met the benchmarks of most of the parameters during the quarter. Only **Aircel and Vodafone** were non-compliants in respect of the parameter ‘**Worst affected Cells > 3% TCH Drop**’ with its quarterly average performance as **6.06%, and 5.28%** respectively.

(ii) From three days live assessment, it was found that the performance of all operators was satisfactory as they were largely complying with the benchmarks of parameters except for the parameter ‘**Worst affected Cell having > 3% TCH drop**’ which could not be met by **Aircel and Vodafone** with their performance as **5.71% and 4.67%** (average of the quarter). The performance of **Aircel** for parameter **SDCCH Congestion** was **1.35%** in the month of November-14. Whereas the performance of **Tata CDMA** for parameters ‘**Worst Affected Cells** was **3.24% (Dec-14)**, though their quarterly average performance was well within the benchmark.

Aircel and Vodafone have shown the similar non compliance for this parameter in case of monthly audit.

(iii) With regard to the **Customer Service Quality Parameters**, service providers were found in well compliance of most of the parameters on Metering and Billing Credibility, Response Time to Customers, Termination of Service and Time taken

for refunds. However, Only **Idea** failed to meet the benchmark of '**% billing complaints – Postpaid**' with its performance as **0.16%** respectively.

In case of the parameter **Accessibility to Call Center** and **Calls answered by Operators (voice to voice)**, most of the service providers are in compliance with the benchmarks. However, **Aircel** has failed to meet the benchmark of **Accessibility** with its performance as **93.41%**. Further, **Airtel** could not meet the benchmark of '**calls answered by Operators (voice to voice) within 90 seconds**' having achieved its performance as **87.43%** against the benchmark of **>=95%**.

The results for three days live measurements reveal that all operators have met the benchmarks for the parameters 'Accessibility to call center' and 'calls connection to operators (Voice to voice) within 90 seconds'. Only **Aircel**, has not met the benchmark of **Accessibility** and '**calls answered by Operators (voice to voice) within 90 seconds**' having achieved its performance as **77.35%** and **93.75%** respectively against the benchmark of **>=95%**.

(iv) With regard to **Drive Test**, it was concluded that the performance of the service providers with respect to the parameter '**Voice Quality**' remained main area of concern as **majority of operators namely Aircel, MTNL, Idea, RCOM(GSM), RCOM(CDMA) and Vodafone** failed to comply with its bench mark. Apart from Voice Quality, **MTNL** remained non-compliant in respect of other parameters also like **Call Drop rate, Call setup success rate and Blocked Call rate**, in different areas of Delhi /NCR region. These operators need to take corrective action to improve their networks.

## 2. Basic (Wireline) Service:

(v) The audit of Basic (wire line) Service revealed that the performance of **MTNL** was not satisfactory in respect of the parameters **Fault Incidences, Fault Repair/Restoration Time, and Refund of deposit**. **RCL** also failed to meet the benchmarks of the parameters **Accessibility of call center**. Hence, **MTNL and RCL** need to improve their services in respect of these parameters

## 3. Broadband service:

(vi) The audit of Broadband service concluded that **MTNL, TTL, TCL** and **Hathway** could not meet the benchmarks for parameters **Fault repairs /Restoration time**. **MTNL** also remained non-complied for parameter '**International Bandwidth Utilisation**'. **Indus media** remained non-complied for parameter **Service provisioning**, whereas **Hathway** failed to meet the benchmark of parameters **Average round trip time for ping transmitted**. For rest of the parameters the services providers were meeting the benchmarks.

## **5. PMR AUDIT REPORT**





**5) PMR AUDIT REPORTS:**

**5.1 MONTHLY PMR:**

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

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

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

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

Sl. No.	Name of Service Provider	No. of MSC + GMSC	No. of BSC	No. of BTS	NSS make	BSS make
<b>GSM Operators</b>						
1	AIRCEL	4	23	3359	NSN	NSN
2	AIRTEL	35	54	5713	Ericsson	Ericsson
3	MTNL	6	31	1122	NSN	NSN
4	IDEA	10	38	4683	NSN	NSN
5	RCOM GSM	4	14	2528	Huawei	Huawei
6	VODAFONE	15	54	6003	Ericsson	Ericsson
<b>CDMA Operators</b>						
7	MTS	1	5	1008	ZTE	ZTE
8	RCOM CDMA	7	NA	990	Lucent & ZTE	Lucent
9	TATA CDMA	8	8	1502	Huawei	Huawei

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

CELLULAR MOBILE TELEPHONE SERVICES DELHI METRO CIRCLE- OCTOBER 14 MONTH												
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) BTS Accumulated Downtime	<=2%	Oct-14	0.34%	0.01%	0.35%	0.01%	0.27%	0.09%	0.09%	0.13%	0.13%
	b) Worst affected BTSs due to downtime	<=2%	Oct-14	1.28%	0.00%	1.60%	0.00%	0.47%	0.41%	0.20%	0.00%	0.27%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Oct-14	98.00%	99.82%	96.59%	99.97%	99.64%	99.70%	99.06%	97.83%	98.73%
	b) SDCCH/PAGING Channel congestion	<=1%	Oct-14	0.49%	0.03%	0.51%	0.41%	0.04%	0.03%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Oct-14	1.06%	0.12%	1.69%	0.53%	0.04%	0.08%	0.03%	0.04%	0.44%
<b>Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2%	Oct-14	0.97%	0.57%	1.82%	0.47%	0.36%	0.84%	0.64%	0.26%	0.36%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Oct-14	5.45%	0.77%	2.59%	1.33%	0.07%	2.69%	1.61%	1.16%	1.96%
	c) Connections with good voice quality	>=95%	Oct-14	97.75%	99.29%	97.09%	98.92%	98.78%	97.58%	99.21%	99.80%	99.13%
4	No. of POI's having >=0.5% POI congestion	<=0.5%	Oct-14	0	0	0	0	0	0	0	0	0

5.1.4 QOS PERFORMANCE OF MONTHLY PMR – NOVEMBER 14 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES DELHI METRO CIRCLE - NOVEMBER 14 MONTH												
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) BTS Accumulated Downtime	<=2%	Nov-14	0.40%	0.01%	0.27%	0.01%	0.36%	0.07%	0.10%	0.18%	0.05%
	b) Worst affected BTSs due to downtime	<=2%	Nov-14	1.94%	0.00%	1.87%	0.00%	0.67%	0.31%	0.50%	0.10%	0.07%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Nov-14	98.03%	99.80%	96.52%	99.96%	99.63%	99.55%	98.98%	97.86%	99.08%
	b) SDCCH/PAGING Channel congestion	<=1%	Nov-14	0.93%	0.05%	0.53%	0.49%	0.02%	0.11%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Nov-14	1.04%	0.12%	1.68%	0.56%	0.04%	0.16%	0.07%	0.04%	0.07%
<b>Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2%	Nov-14	1.01%	0.60%	1.85%	0.50%	0.35%	0.95%	0.69%	0.29%	0.39%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Nov-14	5.70%	0.76%	2.52%	1.50%	0.12%	4.66%	1.96%	0.96%	2.35%
	c) Connections with good voice quality	>=95%	Nov-14	97.67%	99.31%	97.10%	98.83%	98.76%	97.32%	99.21%	99.80%	99.11%
4	No. of POI's having >=0.5% POI congestion	<=0.5%	Nov-14	0	0	0	0	0	0	0	0	0

5.1.5 QOS PERFORMANCE OF MONTHLY PMR – DECEMBER 14 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES DELHI METRO CIRCLE - DECEMBER 14 MONTH												
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) BTS Accumulated Downtime	<=2%	Dec-14	0.44%	0.01%	0.17%	0.01%	0.37%	0.14%	0.12%	0.17%	0.05%
	b) Worst affected BTSs due to downtime	<=2%	Dec-14	2.05%	0.00%	0.89%	0.00%	0.51%	0.62%	0.35%	0.00%	0.20%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Dec-14	97.46%	99.85%	96.61%	99.97%	99.64%	99.48%	98.85%	97.89%	99.10%
	b) SDCCH/PAGING Channel congestion	<=1%	Dec-14	0.62%	0.02%	0.38%	0.53%	0.03%	0.04%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Dec-14	1.63%	0.10%	1.72%	0.49%	0.04%	0.08%	0.09%	0.04%	0.06%
<b>Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2%	Dec-14	1.17%	0.55%	1.88%	0.56%	0.37%	1.29%	0.69%	0.27%	0.37%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Dec-14	7.03%	0.69%	2.46%	1.73%	0.07%	8.48%	1.37%	1.28%	2.65%
	c) Connections with good voice quality	>=95%	Dec-14	97.41%	99.39%	97.24%	98.76%	98.77%	96.44%	99.20%	99.80%	99.12%
4	No. of POI's having >=0.5% POI congestion	<=0.5%	Dec-14	0	0	0	0	0	0	0	0	0

**5.1.6 QOS PERFORMANCE OF QUARTERLY PMR –AVERAGE OF QE- DECEMBER 14 (OCT. TO DEC. 2014 MONTHS AUDITED DATA)**

QUARTERLY QOS PERFORMANCE (AVERAGE OF QE-DECEMBER-14) OF DELHI METRO CIRCLE												
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) BTS Accumulated Downtime	<=2%	Quarterly	0.39%	0.01%	0.26%	0.01%	0.33%	0.10%	0.10%	0.16%	0.08%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	1.76%	0.00%	1.45%	0.00%	0.55%	0.45%	0.35%	0.03%	0.18%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	97.83%	99.82%	96.57%	99.97%	99.64%	99.58%	98.96%	97.86%	98.97%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.68%	0.03%	0.47%	0.48%	0.03%	0.06%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	1.24%	0.11%	1.70%	0.53%	0.04%	0.11%	0.06%	0.04%	0.19%
<b>Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	1.05%	0.57%	1.85%	0.51%	0.36%	1.03%	0.67%	0.27%	0.37%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	<b>6.06%</b>	0.74%	2.52%	1.52%	0.09%	<b>5.28%</b>	1.65%	1.13%	2.32%
	c) Connections with good voice quality	>=95%	Quarterly	97.61%	99.33%	97.14%	98.84%	98.77%	97.11%	99.21%	99.80%	99.12%
4	No. of POI's having >=0.5% POI congestion	<=0.5%	Quarterly	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 Delhi Metro circle, the audit with respect to this parameter revealed that **all the operators met the benchmark for this parameter.**

- **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 operators were in compliance on the benchmark for 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 TCH/SDCCH/Paging Channel congestion parameters.

**There was no congestion on individual POI links between a service provider vis-à-vis other service.**

- **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 (average 0.27%) was for RCOM (CDMA) during the quarter.

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

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

The audit results for this parameter indicate that all operators (**except Aircel and Vodafone**) have met the bench mark successfully during the quarter. Quarterly average performance of **Aircel** and **Vodafone** was **6.06%** and **5.28%** respectively.

- iii. Connections with good voice quality:

The audit results for this parameter indicate that **all operators have met the benchmark 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) – OCTOBER 14 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES DELHI METRO CIRCLE – OCTOBER 14 MONTH												
Live measurement Data		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) BTS Accumulated Downtime	<=2%	Live data	0.39%	0.01%	0.29%	0.00%	0.27%	0.08%	0.11%	0.14%	0.06%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.06%	0.00%	0.27%	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.04%	99.84%	96.99%	99.97%	99.64%	99.71%	99.09%	98.19%	99.15%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.36%	0.01%	0.39%	0.18%	0.02%	0.01%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.95%	0.13%	1.52%	0.36%	0.04%	0.04%	0.02%	0.03%	0.05%
<b>Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2%	Live data	1.01%	0.59%	1.73%	0.47%	0.37%	0.93%	0.63%	0.26%	0.34%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	5.30%	0.70%	2.58%	1.27%	0.02%	2.82%	1.45%	1.06%	1.29%
	c) Connections with good voice quality	>=95%	Live data	97.79%	99.26%	97.19%	98.93%	98.74%	97.42%	99.22%	99.80%	99.16%
4	No. of POI having >=0.5% congestion	<0.5%	Live data	0	0	0	0	0	0	0	0	0

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

CELLULAR MOBILE TELEPHONE SERVICES DELHI METRO CIRCLE - NOVEMBER 14 MONTH												
Live measurement Data		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) BTS Accumulated Downtime	<=2%	Live data	0.42%	0.01%	0.12%	0.00%	0.17%	0.10%	0.11%	0.06%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.06%	0.00%	0.09%	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.08%	99.84%	96.73%	99.95%	99.66%	99.69%	98.82%	97.90%	99.06%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	1.35%	0.01%	0.27%	0.62%	0.02%	0.04%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.81%	0.12%	1.57%	0.50%	0.03%	0.04%	0.04%	0.04%	0.06%
<b>Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2%	Live data	1.00%	0.62%	1.88%	0.50%	0.32%	0.92%	0.70%	0.29%	0.47%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	5.89%	0.78%	2.28%	1.41%	0.09%	4.24%	1.42%	1.07%	2.31%
	c) Connections with good voice quality	>=95%	Live data	97.75%	99.29%	97.13%	98.82%	98.80%	97.47%	99.20%	99.80%	99.09%
4	No. of POI having >=0.5% congestion	<0.5%	Live data	0	0	0	0	0	0	0	0	0

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

CELLULAR MOBILE TELEPHONE SERVICES DELHI METRO CIRCLE- DECEMBER 14 MONTH												
Live measurement Data		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) BTS Accumulated Downtime	<=2%	Live data	0.42%	0.01%	0.20%	0.01%	0.40%	0.10%	0.10%	0.13%	0.03%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.06%	0.00%	0.00%	0.00%	0.00%	0.03%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	97.92%	99.86%	96.96%	99.96%	99.66%	99.53%	98.86%	98.41%	99.00%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.53%	0.02%	0.37%	0.54%	0.02%	0.01%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	1.05%	0.10%	1.68%	0.41%	0.04%	0.04%	0.26%	0.02%	0.08%
<b>Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2%	Live data	1.05%	0.51%	1.82%	0.61%	0.36%	1.19%	0.65%	0.23%	0.54%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	5.93%	0.65%	2.35%	1.89%	0.07%	6.96%	1.43%	1.00%	3.24%
	c) Connections with good voice quality	>=95%	Live data	97.53%	99.42%	97.28%	98.72%	98.77%	95.84%	99.21%	99.80%	99.02%
4	No. of POI having >=0.5% congestion	<0.5%	Live data	0	0	0	0	0	0	0	0	0

**5.2.4 QUARTERLY QOS PERFORMANCE OF 3-DAYS LIVE MEASUREMENT AUDITED DATA (AVERAGE OF OCTOBER TO DECEMBER 2014 MONTHS AUDITED DATA)**

QUARTERLY QOS PERFORMANCE OF 3-DAYS LIVE MEASUREMENT (AVERAGE OF QE- DEC 14) - DELHI METRO CIRCLE												
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) BTS Accumulated Downtime	<=2%	Quarterly	0.41%	0.01%	0.20%	0.00%	0.28%	0.09%	0.11%	0.11%	0.04%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.06%	0.00%	0.12%	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	98.01%	99.85%	96.89%	99.96%	99.65%	99.64%	98.92%	98.17%	99.07%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.75%	0.01%	0.34%	0.45%	0.02%	0.02%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	0.94%	0.12%	1.59%	0.42%	0.04%	0.04%	0.11%	0.03%	0.06%
<b>Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	1.02%	0.57%	1.81%	0.53%	0.35%	1.01%	0.66%	0.26%	0.45%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	<b>5.71%</b>	0.71%	2.40%	1.52%	0.06%	<b>4.67%</b>	1.43%	1.04%	2.28%
	c) Connections with good voice quality	>=95%	Quarterly	97.69%	99.32%	97.20%	98.82%	98.77%	96.91%	99.21%	99.80%	99.09%
4	No. of POI's having >=0.5% POI congestion	<=0.5%	Quarterly	0	0	0	0	0	0	0	0	0

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

From three days live assessment, it was found that the performance of all operators was satisfactory as they were largely complying with the benchmarks of all parameters except for the parameter '**Worst affected Cell having > 3% TCH drop**' which could not be met by **Aircel** and **Vodafone** with their performance as **5.71%** and **4.67%** (average of the quarter). The performance of **Aircel** for parameter **SDCCH Congestion** was **1.35%** in the month of November-14. Whereas the performance of **Tata CDMA** for parameters '**Worst Affected Cells** was **3.24% (Dec-14)**, though their quarterly average performance was well within the benchmark.

**Aircel and Vodafone have shown the similar non compliance for this parameter in case of monthly audit.**

5.2.6 DETAILED NETWORK DATA ASSESSMENT OF CELLULAR MOBILE TELEPHONE SERVICES:

TABLE: 1

Detailed Network Data Assessment of Cellular Mobile Telephone Services - Delhi Metro Circle – October 14 month												
S/N	Name of Parameter	Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
				GSM Operators					CDMA Operators			
<b>Network Service Quality Parameter</b>												
1	<b>Network Availability</b>											
	a) Total no. of BTSs in the licensed service area		Oct-14	3201	5624	1122	4676	2528	5850	976	991	1500
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Oct-14	8000.95	339.93	2935.00	204.24	5068.62	3702.80	658.77	951.67	1415.20
	c) BTS Accumulated Downtime	<=2%	Oct-14	0.34%	0.01%	0.35%	0.01%	0.27%	0.09%	0.09%	0.13%	0.13%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Oct-14	41	0	18	0	12	24	2	0	4
e) Worst affected BTSs due to downtime	<=2%	Oct-14	1.28%	0.00%	1.60%	0.00%	0.47%	0.41%	0.20%	0.00%	0.27%	
2	<b>Connection Establishment (Accessibility)</b>											
	a) CSSR (Call Setup Success Rate)	>=95%	Oct-14	98.00%	99.82%	96.59%	99.97%	99.64%	99.70%	99.06%	97.83%	98.73%
	b) SDCCH/PAGING Congestion	<=1%	Oct-14	0.49%	0.03%	0.51%	0.41%	0.04%	0.03%	0.00%	0.00%	0.00%
c) TCH congestion	<=2%	Oct-14	1.06%	0.12%	1.69%	0.53%	0.04%	0.08%	0.03%	0.04%	0.44%	
3	<b>Connection Maintenance (Retainability)</b>											
	a) Call Drop Rate (CDR)	<=2%	Oct-14	0.97%	0.57%	1.82%	0.47%	0.36%	0.84%	0.64%	0.26%	0.36%
	b) Worst affected cells>3% TCH drop	<=3%	Oct-14	5.45%	0.77%	2.59%	1.33%	0.07%	2.69%	1.61%	1.16%	1.96%
	c) % of connections with good voice quality	>=95%	Oct-14	97.75%	99.29%	97.09%	98.92%	98.78%	97.58%	99.21%	99.80%	99.13%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Oct-14	497	110	83	170	5	393	54	34	101
e) Total no. of cells (Sector) in the licensed service area		Oct-14	9120	14285	3199	12836	6961	14603	3350	2925	5153	
4	<b>No. of POI's having &gt;=0.5% POI congestion</b>											
	No. of POI's having >=0.5% POI congestion		Oct-14	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Oct-14	0	0	0	0	0	0	0	0	0
5	<b>Network Data</b>											
	a) Equipped Capacity of Network in Erlang		Oct-14	124162	299139	100000	160992	96000	292901	42000	140000	292505
	b) Total traffic in TCBH in erlang (Avg.)		Oct-14	84956	199097	23924	136788	66312	221895	15381	94154	103649
c) Total no. of customers served (as per VLR) on last day of the month		Oct-14	2921174	8730945	1116346	5065667	4977364	9308832	447743	2745578	1443257	

NP: Data not provided

TABLE: 2

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live- Delhi Metro Circle- October 14 month												
S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
				GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) Total no. of BTSs in the licensed service area		Live data	3152	5607	1122	4676	2530	5850	972	994	1499
	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	888.85	30.76	237.00	7.58	163.00	349.46	76.88	97.33	65.23
	c) BTS Accumulated Downtime	<=2%	Live data	0.39%	0.01%	0.29%	0.00%	0.27%	0.08%	0.11%	0.14%	0.06%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	2	0	3	0	0	1	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.06%	0.00%	0.27%	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.04%	99.84%	96.99%	99.97%	99.64%	99.71%	99.09%	98.19%	99.15%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.36%	0.01%	0.39%	0.18%	0.02%	0.01%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.95%	0.13%	1.52%	0.36%	0.04%	0.04%	0.02%	0.03%	0.05%
<b>Connection Maintenance (Retainability)</b>												
3	a) Call Drop Rate (CDR)	<=2%	Live data	1.01%	0.59%	1.73%	0.47%	0.37%	0.93%	0.63%	0.26%	0.34%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	5.30%	0.70%	2.58%	1.27%	0.02%	2.82%	1.45%	1.06%	1.29%
	c) % of connections with good voice quality	>=95%	Live data	97.79%	99.26%	97.19%	98.93%	98.74%	97.42%	99.22%	99.80%	99.16%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	482	100	83	163	1	409	49	31	66
	e) Total no. of cells (Sector) in the licensed service area		Live data	9089	14317	3200	12841	6973	14509	3362	2934	5153
<b>No. of POI's having &gt;=0.5% POI congestion</b>												
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0

TABLE: 3

Detailed Network Data Assessment of Cellular Mobile Telephone Services- Delhi Metro Circle - November 14 month												
S/ N	Name of Parameter	Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
				GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) Total no. of BTSs in the licensed service area		Nov-14	3293	5660	1121	4678	2527	5864	997	990	1501
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Nov-14	9448.75	265.59	2152.00	282.17	6626.23	3121.68	738.33	1251.73	510.07
	c) BTS Accumulated Downtime	<=2%	Nov-14	0.40%	0.01%	0.27%	0.01%	0.36%	0.07%	0.10%	0.18%	0.05%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Nov-14	64	0	21	0	17	18	5	1	1
	e) Worst affected BTSs due to downtime	<=2%	Nov-14	1.94%	0.00%	1.87%	0.00%	0.67%	0.31%	0.50%	0.10%	0.07%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Nov-14	98.03%	99.80%	96.52%	99.96%	99.63%	99.55%	98.98%	97.86%	99.08%
	b) SDCCH/PAGING Congestion	<=1%	Nov-14	0.93%	0.05%	0.53%	0.49%	0.02%	0.11%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Nov-14	1.04%	0.12%	1.68%	0.56%	0.04%	0.16%	0.07%	0.04%	0.07%
<b>Connection Maintenance (Retainability)</b>												
3	a) Call Drop Rate (CDR)	<=2%	Nov-14	1.01%	0.60%	1.85%	0.50%	0.35%	0.95%	0.69%	0.29%	0.39%
	b) Worst affected cells>3% TCH drop	<=3%	Nov-14	5.70%	0.76%	2.52%	1.50%	0.12%	4.66%	1.96%	0.96%	2.35%
	c) % of connections with good voice quality	>=95%	Nov-14	97.67%	99.31%	97.10%	98.83%	98.76%	97.32%	99.21%	99.80%	99.11%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Nov-14	533	109	81	193	9	687	67	28	121
	e) Total no. of cells (Sector) in the licensed service area		Nov-14	9355	14416	3193	12843	6957	14735	3426	2920	5157
<b>No. of POI's having &gt;=0.5% POI congestion</b>												
4	No. of POI's having >=0.5% POI congestion		Nov-14	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Nov-14	0	0	0	0	0	0	0	0	0
<b>Network Data</b>												
5	a) Equipped Capacity of Network in Erlang		Nov-14	125300	287801	100000	160109	96000	304668	91766	140000	292771
	b) Total traffic in TCBH in Erlang (Avg.)		Nov-14	87299	202374	22611	141855	67473	228426	15402	89142	110413
	c) Total no. of customers served (as per VLR) on last day of the month		Nov-14	3132369	8963499	1131073	5379458	5129755	9580056	475104	2731115	1410258

NP: Data not provided

TABLE: 4

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live - Delhi Metro Circle – November 14 month												
S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
				GSM Operators					CDMA Operators			
<b>Network Service Quality Parameter</b>												
1	<b>Network Availability</b>											
	a) Total no. of BTSs in the licensed service area		Live data	3241	5657	1121	4677	2527	5850	984	987	1501
	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	982.70	26.88	99.00	16.73	316.88	415.55	76.67	45.75	25.48
	c) BTS Accumulated Downtime	<=2%	Live data	0.42%	0.01%	0.12%	0.00%	0.17%	0.10%	0.11%	0.06%	0.02%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	2	0	1	0	0	1	0	0	0
e) Worst affected BTSs due to downtime	<=2%	Live data	0.06%	0.00%	0.09%	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%	
2	<b>Connection Establishment (Accessibility)</b>											
	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.08%	99.84%	96.73%	99.95%	99.66%	99.69%	98.82%	97.90%	99.06%
	b) SDCCH/PAGING Congestion	<=1%	Live data	1.35%	0.01%	0.27%	0.62%	0.02%	0.04%	0.00%	0.00%	0.00%
c) TCH congestion	<=2%	Live data	0.81%	0.12%	1.57%	0.50%	0.03%	0.04%	0.04%	0.04%	0.06%	
3	<b>Connection Maintenance (Retainability)</b>											
	a) Call Drop Rate (CDR)	<=2%	Live data	1.00%	0.62%	1.88%	0.50%	0.32%	0.92%	0.70%	0.29%	0.47%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	5.89%	0.78%	2.28%	1.41%	0.09%	4.24%	1.42%	1.07%	2.31%
	c) % of connections with good voice quality	>=95%	Live data	97.75%	99.29%	97.13%	98.82%	98.80%	97.47%	99.20%	99.80%	99.09%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	550	113	73	180	6	626	49	31	119
e) Total no. of cells (Sector) in the licensed service area		Live data	9338	14443	3191	12833	6960	14756	3417	2919	5157	
4	<b>No. of POI's having &gt;=0.5% POI congestion</b>											
	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0



TABLE: 5

Detailed Network Data Assessment of Cellular Mobile Telephone Services- Delhi Metro Circle- December 14 month												
S/N	Name of Parameter	Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
				GSM Operators					CDMA Operators			
<b>Network Service Quality Parameter</b>												
1	<b>Network Availability</b>											
	a) Total no. of BTSs in the licensed service area		Dec-14	3359	5713	1122	4683	2528	5825	1008	990	1502
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Dec-14	10944.33	299.34	1437.00	405.82	6964.10	5912.63	865.54	1246.98	528.90
	c) BTS Accumulated Downtime	<=2%	Dec-14	0.44%	0.01%	0.17%	0.01%	0.37%	0.14%	0.12%	0.17%	0.05%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Dec-14	69	0	10	0	13	36	3	0	3
e) Worst affected BTSs due to downtime	<=2%	Dec-14	2.05%	0.00%	0.89%	0.00%	0.51%	0.62%	0.35%	0.00%	0.20%	
2	<b>Connection Establishment (Accessibility)</b>											
	a) CSSR (Call Setup Success Rate)	>=95%	Dec-14	97.46%	99.85%	96.61%	99.97%	99.64%	99.48%	98.85%	97.89%	99.10%
	b) SDCCH/PAGING Congestion	<=1%	Dec-14	0.62%	0.02%	0.38%	0.53%	0.03%	0.04%	0.00%	0.00%	0.00%
c) TCH congestion	<=2%	Dec-14	1.63%	0.10%	1.72%	0.49%	0.04%	0.08%	0.09%	0.04%	0.06%	
3	<b>Connection Maintenance (Retainability)</b>											
	a) Call Drop Rate (CDR)	<=2%	Dec-14	1.17%	0.55%	1.88%	0.56%	0.37%	1.29%	0.69%	0.27%	0.37%
	b) Worst affected cells>3% TCH drop	<=3%	Dec-14	7.03%	0.69%	2.46%	1.73%	0.07%	8.48%	1.37%	1.28%	2.65%
	c) % of connections with good voice quality	>=95%	Dec-14	97.41%	99.39%	97.24%	98.76%	98.77%	96.44%	99.20%	99.80%	99.12%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Dec-14	674	101	79	226	5	1266	49	38	137
e) Total no. of cells (Sector) in the licensed service area		Dec-14	9592	14552	3198	13043	6959	14926	3537	2920	5167	
4	<b>No. of POI's having &gt;=0.5% POI congestion</b>											
	No. of POI's having >=0.5% POI congestion		Dec-14	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Dec-14	0	0	0	0	0	0	0	0	0
5	<b>Network Data</b>											
	a) Equipped Capacity of Network in Erlang		Dec-14	128708	286117	NP	158791	96000	312643	94090	140000	292277
	b) Total traffic in TCBH in erlang (Avg.)		Dec-14	88887	197663	NP	137350	70498	223600	14944	96574	107225
c) Total no. of customers served (as per VLR) on last day of the month		Dec-14	3273244	9102605	NP	5391447	5132473	9569714	471408	2719110	1409309	

NP: Data not provided

TABLE: 6

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live - Delhi Metro Circle – Dec 14 month												
S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
				GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
1	<b>Network Availability</b>											
	a) Total no. of BTSs in the licensed service area		Live data	3304	5680	1123	4678	2527	5864	1007	990	1501
	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	999.14	26.40	165.00	34.79	734.48	418.45	72.48	89.95	30.53
	c) BTS Accumulated Downtime	<=2%	Live data	0.42%	0.01%	0.20%	0.01%	0.40%	0.10%	0.10%	0.13%	0.03%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	2	0	0	0	0	2	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.06%	0.00%	0.00%	0.00%	0.00%	0.03%	0.00%	0.00%	0.00%
2	<b>Connection Establishment (Accessibility)</b>											
	a) CSSR (Call Setup Success Rate)	>=95%	Live data	97.92%	99.86%	96.96%	99.96%	99.66%	99.53%	98.86%	98.41%	99.00%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.53%	0.02%	0.37%	0.54%	0.02%	0.01%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	1.05%	0.10%	1.68%	0.41%	0.04%	0.04%	0.26%	0.02%	0.08%
3	<b>Connection Maintenance (Retainability)</b>											
	a) Call Drop Rate (CDR)	<=2%	Live data	1.05%	0.51%	1.82%	0.61%	0.36%	1.19%	0.65%	0.23%	0.54%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	5.93%	0.65%	2.35%	1.89%	0.07%	6.96%	1.43%	1.00%	3.24%
	c) % of connections with good voice quality	>=95%	Live data	97.53%	99.42%	97.28%	98.72%	98.77%	95.84%	99.21%	99.80%	99.02%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	566	95	75	246	5	1022	50	29	167
	e) Total no. of cells (Sector) in the licensed service area		Live data	9547	14527	3199	13047	6957	14683	3507	2922	5158
4	<b>No. of POI's having &gt;=0.5% POI congestion</b>											
	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0

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



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

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

QUARTERLY CSD DATA FOR CELLULAR MOBILE TELEPHONE SERVICES - QE DECEMBER 14												
Quarterly CSD Audit Data		Bench- mark	Circle Name	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
S/ N	Name of Parameter			GSM Operators						CDMA Operators		
<b>Customer Service Quality Parameters</b>												
<b>Metering &amp; Billing Credibility -Post Paid</b>												
1	A) No. of bills issued during the quarter		Delhi	204415	4890509	404048	2225002	413001	5767647	2269	769489	417628
	B) No. of bills disputed including billing complaints during the quarter		Delhi	2	1242	194	3584	281	4935	2	464	18
	C)% of billing complaints during the quarter	<= 0.1%	Delhi	0.00%	0.03%	0.05%	0.16%	0.07%	0.09%	0.09%	0.06%	0.004%
<b>Metering &amp; Billing Credibility -Pre Paid</b>												
2	A) Total No. of Pre-paid customers at the end of the quarter		Delhi	4596308	8758407	2101273	5050403	5005103	7548763	1019213	2725025	2410832
	B) Total No. of complaints relating to charging, Credit and Validity during the quarter		Delhi	2	159	270	4216	4448	3981	501	1823	0
	C) % of Pre-paid Charging Complaints	<= 0.1%	Delhi	0.00%	0.002%	0.01%	0.08%	0.09%	0.05%	0.05%	0.07%	0.00%
<b>Resolution of Billing/Charging Complaints and Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints</b>												
3	A) No. of Billing/Charging/Credit/Validity Complaints received during the quarter		Delhi	4	1401	464	18055	4729	8916	503	2289	909
	B) No. of billing complaints for Post paid customers/Charging/Credit/Validity complaints for pre-paid customers resolved within 4 weeks during the quarter		Delhi	4	1401	464	18055	4729	8916	503	2289	909

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

Quarterly CSD Audit Data		Bench- mark	Circle Name	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
S/ N	Name of Parameter			GSM Operators						CDMA Operators		
	C) No. of billing complaints for Post paid customers/Charging/Credit/Validity complaints for pre-paid customers resolved within 6 weeks during the quarter		Delhi	4	1401	464	18055	4729	8916	503	2289	909
	D) % of billing complaints (for post paid customer) / Charging/Credit/Validity (for Pre paid customer) resolved within 4 weeks	>=98% within 4 weeks	Delhi	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	E) % of billing complaints (for post paid customer) / Charging/Credit/Validity (for Pre paid customer) resolved within 6 weeks	100% within 6 weeks	Delhi	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	F) % of Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints	<=1 week	Delhi	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
<b>Response time to customers for assistance</b>												
	A) Total no of calls attempted to customer care/Call center		Delhi	23244852	3301136	1075306	21550727	19582245	29176169	1633139	3763310	524250
	B) Total no. of calls successfully established to customer care/Call center.		Delhi	21712749	3301136	1030808	21393238	19189840	29176157	1623802	3707630	519557
4	C) % Accessibility of Call centre /customer Care (Total calls successfully established *100/ Total call attempts)	>=95%	Delhi	93.41%	100.00%	95.86%	99.27%	98.00%	100.00%	99.43%	98.52%	99.10%
	D) Total Calls reached to operator for Voice to Voice (Total call attempts)		Delhi	4363517	8833146	597678	6428939	1974596	8727209	1134516	434189	724735
	E) Total number of calls answered by the operator (Voice to voice) within 90 seconds		Delhi	4280510	7723154	581538	6403118	1939672	8641382	1108721	430520	691860
	F) % age of calls answered by operator (voice to voice) (Total calls successfully established within 90 Sec.*100 / Total call attempts )	>=95%	Delhi	98.10%	87.43%	97.30%	99.60%	98.23%	99.02%	97.73%	99.15%	95.46%
5	<b>Termination/closure of service</b>											

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

Quarterly CSD Audit Data		Bench- mark	Circle Name	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
S/ N	Name of Parameter			GSM Operators						CDMA Operators		
	A) Total No. of requests for Termination / Closure of service received during the quarter		Delhi	2136	17084	16	22730	5821	13016	7	6292	2990
	B) No. of requests for Termination / Closure of service complied within 7 days during the quarter		Delhi	2136	17084	16	22730	5821	13016	7	6292	2990
	C) % of Termination/ Closure of service within 7 days	<=7days	Delhi	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
<b>Time taken for refunds of deposits after closures.</b>												
6	A) No. of Payments/ Refunds due during the quarter		Delhi	2865	4808	137	7434	3943	13203	9	4128	603
	B) No. of Payments/ Refunds Cleared during the quarter		Delhi	2865	4808	137	7434	3943	13203	9	4128	602
	C) Time taken for refunds of deposits after closures.	100% within 60 days	Delhi	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.83%

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

CSD 3 DAYS LIVE DATA FOR CELLULAR MOBILE TELEPHONE SERVICES – QE – DECEMBER 14												
3 days live CSD Audit Data		Bench- mark	Circle Name	AIRCEL	AIRTEL	MTNL	IDEA	RCOM (GSM)	VODAFONE	MTS	RCOM (CDMA)	TATA (CDMA)
S/ N	Name of Parameter			GSM Operators						CDMA Operators		
<b>Response time to customers for assistance</b>												
1	A) Total no of calls attempted to customer care/Call center		Delhi	1054453	108677	35994	741146	869599	960757	8960	171767	15456
	B) Total no. of calls successfully established to customer care/Call center.		Delhi	815613	108677	34470	737079	859476	960757	8904	169929	15365
	C) % Accessibility of Call centre /customer Care (Total calls successfully established *100/ Total call attempts)	>=95%	Delhi	77.35%	100.00%	95.77%	99.45%	98.84%	100.00%	99.38%	98.93%	99.41%
	D) Total Calls reached to operator for Voice to Voice (Total call attempts)		Delhi	154442	280731	20005	203637	61531	305184	39581	9552	21816
2	E) Total number of calls answered by the operator (Voice to voice) within 90 seconds		Delhi	144797	274047	19531	203072	59991	294713	39443	9491	21420
	F) % age of calls answered by operator (voice to voice) (Total calls successfully established within 90 Sec.*100 / Total call attempts )	>=95%	Delhi	93.75%	97.62%	97.63%	99.72%	97.50%	96.57%	99.65%	99.36%	98.18%

## KEY FINDINGS:

### 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  $\leq 0.1\%$ . Only **Idea** failed to meet the benchmark of '% billing complaints – Postpaid' with its performance as **0.16%** respectively.

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

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

All operators have 100% resolved the billing complaints within stipulated period of 4/6 weeks and also have met the benchmark of 100% refund in one week where customers were due for credit / adjustment.

### 3. Response Time to the Customer for assistance

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

All service providers except **Aircel** are in compliance with respect to the parameter Accessibility of call center. **Aircel** failed to meet the benchmark with its performance as **93.41%**. Further, **Airtel** could not meet the benchmark of '**calls answered by Operators (voice to voice) within 90 seconds**' having achieved its performance as **87.43%** against the benchmark of  $\geq 95\%$ .

### 4. Termination/Closure of Service

In case of this parameters also, all service providers) have settled the '**closure/termination**' within the benchmark of 7 days.

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

All operators were found to have complied with the benchmark of 100% refund of deposits within 60 days of closure except **Tata (CDMA)** which was marginally below the benchmark with its achieved value as **99.83%**.

### Live Measurements

The results for three days live measurements reveal that all operators have met the benchmarks for the parameters 'Accessibility to call center' and 'calls connection to operators (Voice to voice) within 90 seconds'. Only **Aircel**, has not met the benchmark of **Accessibility and 'calls answered by Operators (voice to voice) within 90 seconds** having achieved its performance as **77.35% and 93.75%** respectively against the benchmark of  $\geq 95\%$ .



## **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 Delhi Metro 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	MTNL	IDEA	RCOM GSM	RCOM CDMA	TATA CDMA	MTS	VODAFONE
AIRCEL	Delhi	----	100.00%	95.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
AIRTEL	Delhi	100.00%	----	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
MTNL	Delhi	100.00%	100.00%	----	94.00%	100.00%	100.00%	100.00%	95.00%	100.00%
IDEA	Delhi	100.00%	100.00%	100.00%	----	100.00%	100.00%	100.00%	100.00%	100.00%
RCOM GSM	Delhi	96.00%	100.00%	97.00%	100.00%	----	100.00%	100.00%	100.00%	100.00%
RCOM CDMA	Delhi	100.00%	100.00%	100.00%	100.00%	100.00%	----	100.00%	100.00%	100.00%
TATA CDMA	Delhi	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	----	100.00%	100.00%
MTS	Delhi	100.00%	100.00%	96.00%	100.00%	100.00%	100.00%	100.00%	----	100.00%
VODAFONE	Delhi	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	----

The result of the testing revealed that the inter connection performance among the operators was quite satisfactory. However, when calls attempted from Aircel to MTNL, the interconnection was 95% successful, MTNL to Idea and MTS was 94% & 95%, RCOM (GSM) to Aircel and MTNL was 96% & 97% and MTS to MTNL, it was 96%. Thus there was no much problem in interconnection from one operator to other operators.

## 6.2 CUSTOMER CARE / HELPLINE ASSESSMENT:

LIVE CALLING TO CALL CENTRE										
Parameter	Circle Name	AIRCEL	AIRTEL	MTNL	IDEA	RCOM (GSM)	VODAFONE	MTS	RCOM (CDMA)	TATA (CDMA)
Total No. of calls Attempted	Delhi	100	100	100	100	100	100	100	100	100
Total no of calls attempted to customer care/Call center	Delhi	100	100	100	100	100	100	100	100	100
Total no. of calls successfully established to customer care/Call center	Delhi	100	100	100	100	100	100	100	100	100
% Accessibility of Call centre /customer Care (Total calls successfully established * 100 / Total call attempts)	Delhi	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)	Delhi	100	100	100	100	100	100	100	100	100
Total number of calls answered by the operator (Voice to voice) within 90 seconds	Delhi	100	97	96	100	93	100	97	94	99
% age of calls answered by operator(voice to voice) (Total call successfully established within 90 Sec.*100 / Total calls attempts)	Delhi	100.00%	97.00%	96.00%	100.00%	93.00%	100.00%	97.00%	94.00%	99.00%

In case of calls answered by operators (voice to voice) within 90 seconds when test calls were made to the call centers, Airtel, MTNL, RCOM (GSM), MTS and RCOM (CDMA) and Tata (CDMA) could connect 97%, 96%, 93%, 97%, 94% and 99% of calls to the operator .

## 6.3 LIVE CALLING ASSESSMENT FOR BILLING COMPLAINTS:

PERFORMANCE (LIVE CALLING FOR BILLING COMPLAINTS)										
Parameter	Circle Name	AIRCEL	AIRTEL	MTNL	IDEA	RCOM (GSM)	VODAFONE	MTS	RCOM (CDMA)	TATA (CDMA)
Total No. of calls Attempted	Delhi	4	100	100	100	100	100	100	100	100
Total No. of calls Answered	Delhi	4	65	47	59	68	61	49	63	40
Cases resolved within 4 weeks	Delhi	4	65	47	59	68	61	49	63	40
%age of cases resolved	Delhi	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

To test the Service Providers performance on billing related complaints and their resolutions, TUV-SUD auditors conducted a customer feedback calling number of customers. During live calling, some of the customers did not attend the calls while few others reported that they don't exactly remember about the resolution of complaints. However, majority of the customers reported that the billing complaints were resolved to their satisfaction.

**6.4 LEVEL -1 CALLING ASSESSMENT:**

LEVEL 1 LIVE CALLING												
Emergency no.	Circle Name	SSA Name	No. of calls made	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	RCOM CDMA	TATA CDMA	MTS	VODAFONE
100	Delhi	Noida & Ghaziabad	2	√	√	√	√	√	√	√	√	√
101			x	√	√	√	x	x	√	√	√	
102			2	√	√	√	√	√	√	√	√	√
1098			2	x	√	√	√	√	√	√	x	√
1091			2	√	√	√	√	√	√	√	√	√
1070			2	√	√	√	√	x	x	√	√	x
181			2	√	√	√	√	√	√	√	√	√
100			Delhi	South Delhi (Municipal Area)	2	√	√	√	√	√	√	√
101	2	√			√	√	√	√	√	√	√	√
102	2	√			√	√	√	√	√	√	√	√
1098	2	x			√	√	√	√	√	√	x	√
1091	2	√			√	√	√	√	√	√	√	√
1070	2	x			√	√	√	x	x	√	√	x
181	2	√			√	√	√	√	√	√	√	√
100	Delhi	North Delhi & NDMC Area			2	√	√	√	√	√	√	√
101			2	√	√	√	√	x	√	√	√	√
102			2	√	√	√	√	√	√	√	√	√
1098			2	√	√	√	√	√	√	√	x	√
1091			2	√	√	√	√	√	√	√	√	√
1070			2	√	√	√	√	x	x	√	√	x
181			2	√	√	√	√	√	√	√	√	√

To assess the availability and efficiency of level 1 services such as police, fire, ambulance (emergency services) offered by various mobile service providers, a number of calls were made from mobile phones provided by them during the drive test. In Delhi Metro service area, the emergency services as mentioned in the above table were largely found functional except for some of the service providers, level-1 calling was not matured at some of the places and have been ticked as “X”.

## 7. DRIVE TEST



## 7) OPERATOR ASSISTED DRIVE TEST

In terms of TRAI's letter dated 21<sup>st</sup> January, 2014, the drive tests were conducted for three consecutive days in one select SSA each month in each service area. Thus, the drive tests were carried out in three SSA's namely **Noida & Ghaziabad, South Delhi (Municipal Area) and North Delhi (NDMC Area)** in the months of October, November and December 2014 respectively, the total route Kms covered during the drive tests in respective SSAs was **287 Kms, 255 Kms and 340 Kms** respectively. 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 is considered to be good, where as Rx Qual beyond this benchmark is considered to be bad. Call drops were measured by the number of calls that were dropped to the total number of calls established during the drive test. Similarly CSSR was measured as the ratio of total calls established to the total call attempts made. Signal strength was measured in dBm at street level with strength  $\geq -75$  dBm for in-door coverage and  $\geq -85$  dBm for in-vehicle.

7.1 OPERATOR ASSISTED DRIVE TEST: NOIDA & GHAZIABAD AREA (OCTOBER-14)

DRIVE TEST TABLE: 1

S/N	Parameter	Classification of routes covered	AIRCEL		AIRTEL		MTNL		IDEA		RCOM GSM		VODAFONE		MTS		RCOM CDMA		TATA CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
1	Call Attempts	Major Roads	200	30	173	30	189	31	200	30	196	30	196	30	184	30	214	30	169	30	
		Highways	52	31	55	31	62	31	58	31	63	31	63	30	58	30	55	30	65	30	
		Within City	216	30	174	30	206	33	200	30	184	31	205	30	210	30	194	30	199	30	
		<b>Overall SSA</b>	<b>468</b>	<b>91</b>	<b>402</b>	<b>91</b>	<b>457</b>	<b>95</b>	<b>458</b>	<b>91</b>	<b>443</b>	<b>92</b>	<b>464</b>	<b>90</b>	<b>452</b>	<b>90</b>	<b>463</b>	<b>90</b>	<b>433</b>	<b>90</b>	
2	Blocked Call Rate	Major Roads	1.00%	0.00%	2.89%	0.00%	2.12%	0.00%	0.00%	0.00%	1.02%	0.00%	0.00%	0.00%	0.54%	0.00%	0.00%	0.00%	1.78%	0.00%	
		Highways	1.92%	0.00%	1.82%	3.23%	19.35%	0.00%	1.72%	3.23%	7.94%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Within City	0.46%	0.00%	0.00%	0.00%	11.17%	0.00%	1.50%	0.00%	0.00%	3.23%	0.49%	0.00%	0.48%	0.00%	0.00%	0.00%	0.00%	3.33%	
		<b>Overall SSA</b>	<b>0.85%</b>	<b>0.00%</b>	<b>1.49%</b>	<b>1.10%</b>	<b>8.53%</b>	<b>0.00%</b>	<b>0.87%</b>	<b>1.10%</b>	<b>1.58%</b>	<b>1.09%</b>	<b>0.22%</b>	<b>0.00%</b>	<b>0.44%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.69%</b>	<b>1.11%</b>	
3	Dropped Call Rate (<=2%)	Major Roads	1.02%	0.00%	0.00%	0.00%	10.50%	12.90%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.47%	0.00%	1.81%	0.00%	
		Highways	0.00%	0.00%	0.00%	0.00%	19.57%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	5.45%	0.00%	3.08%	0.00%	
		Within City	0.00%	0.00%	0.00%	0.00%	9.55%	0.00%	0.51%	0.00%	0.54%	3.33%	0.00%	0.00%	0.00%	0.00%	1.55%	0.00%	0.00%	6.90%	
		<b>Overall SSA</b>	<b>0.43%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>11.11%</b>	<b>4.21%</b>	<b>0.22%</b>	<b>0.00%</b>	<b>0.23%</b>	<b>1.10%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>1.51%</b>	<b>0.00%</b>	<b>1.16%</b>	<b>2.25%</b>	
4	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Percentage connections with good voice quality (=>95%)																			
		Major Roads	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.24%	99.86%	96.69%	100%	96.81%	99.99%
		Highways	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.69%	99.93%	90.25%	100%	97.10%	100%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.40%	99.97%	89.26%	100%	98.37%	97.57%
<b>Overall SSA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>99.13%</b>	<b>99.92%</b>	<b>92.68%</b>	<b>100%</b>	<b>97.58%</b>	<b>99.21%</b>		

AUDIT & ASSESSMENT OF QOS FOR QE-DECEMBER 2014-DELHI METRO CIRCLE



SIN	Parameter	Classification of routes covered	AIRCEL		AIRTEL		MTNL		IDEA		RCOM GSM		VODAFONE		MTS		RCOM CDMA		TATA CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
	(b) 0-5 ( with frequency hopping for GSM Operators)	Major Roads	90.59%	99.50%	95.54%	91.57%	94.84%	91.00%	92.23%	91.12%	93.57%	97.52%	97.17%	97.76%	NA	NA	NA	NA	NA	NA
		Highways	88.81%	98.45%	95.60%	98.59%	86.11%	99.94%	87.04%	93.06%	90.33%	99.07%	97.70%	97.98%	NA	NA	NA	NA	NA	NA
		Within City	93.79%	99.25%	95.84%	98.48%	92.77%	98.06%	92.06%	94.06%	94.51%	99.17%	97.37%	98.55%	NA	NA	NA	NA	NA	NA
		Overall SSA	91.86%	99.05%	95.67%	96.15%	93.00%	96.65%	91.61%	93.58%	93.63%	98.67%	97.33%	98.11%	NA	NA	NA	NA	NA	NA
<b>Service Coverage</b>																				
5	In door (>= -75dBm)	Major Roads	94.36%	100%	98.86%	100%	55.67%	40.47%	74.16%	94.65%	76.77%	40.31%	97.30%	100%	94.52%	100%	72.47%	100%	70.73%	100%
		Highways	80.32%	68.34%	95.34%	99.57%	51.65%	45.72%	72.28%	87.02%	55.75%	99.66%	98.75%	100%	79.79%	100%	79.68%	100%	90.18%	99.85%
		Within City	96.04%	84.85%	96.93%	100%	53.48%	56.15%	69.04%	26.52%	74.17%	99.85%	97.57%	100%	81.27%	96.17%	58.74%	0.78%	85.57%	99.80%
		Overall SSA	93.45%	84.11%	97.52%	99.86%	54.18%	47.85%	71.60%	42.17%	73.22%	82.06%	97.62%	100%	86.39%	98.78%	68.61%	67.17%	80.41%	99.88%
	In-vehicle (>= -85dBm)	Major Roads	98.76%	100%	99.68%	100%	90.04%	91.61%	98.02%	99.98%	96.15%	96.16%	99.63%	100%	99.16%	100%	96.50%	100%	97.04%	100%
		Highways	96.66%	99.91%	98.88%	100%	83.51%	87.01%	97.68%	99.87%	86.69%	100%	99.83%	100%	99.62%	100%	100%	100%	99.47%	100%
		Within City	99.38%	100%	99.55%	100%	91.55%	96.12%	97.53%	93.64%	90.01%	100%	99.82%	100%	99.84%	100%	96.25%	100%	98.79%	100%
		Overall SSA	98.79%	99.97%	99.51%	100%	90.06%	91.67%	97.76%	95.17%	92.30%	98.86%	99.74%	100%	99.54%	100%	97.06%	100%	98.20%	100%
	Outdoor- in city (>= -95dBm)	Major Roads	99.61%	100%	99.89%	100%	99.36%	99.77%	99.90%	100%	100%	100%	99.88%	100%	100%	100%	100%	100%	99.99%	100%
		Highways	99.45%	100%	99.69%	100%	97.89%	99.97%	99.90%	100%	100%	100%	99.98%	100%	100%	100%	100%	100%	100%	100%
		Within City	99.84%	100%	99.89%	100%	99.37%	99.97%	99.97%	100%	100%	100%	99.91%	100%	100%	100%	100%	100%	100%	100%
		Overall SSA	99.69%	100%	99.86%	100%	99.21%	99.91%	99.93%	100%	100%	100%	99.91%	100%	100%	100%	100%	100%	100%	100%
6	Call Setup Success Rate (>=95%)	Major Roads	98.50%	100%	95.95%	100%	95.77%	100%	100%	100%	98.98%	100%	100%	100%	99.46%	100%	100%	100%	98.22%	100%
		Highways	98.08%	100%	98.18%	96.77%	74.19%	100%	98.28%	96.77%	92.06%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Within City	99.54%	100%	100%	100%	86.41%	100%	98.50%	100%	100%	96.77%	99.51%	100%	99.52%	100%	100%	100%	100%	96.67%



SIN	Parameter	Classification of routes covered	AIRCEL		AIRTEL		MTNL		IDEA		RCOM GSM		VODAFONE		MTS		RCOM CDMA		TATA CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
			<b>Overall SSA</b>	98.93%	100%	98.01%	98.90%	88.62%	100%	99.13%	98.90%	98.42%	98.91%	99.78%	100%	99.56%	100%	100%	100%	99.31%
7	Hand Over Success Rate (HOSR)	Major Roads	97.48%	#DIV/0!	97.86%	100%	81.43%	85.19%	98.95%	100%	97.09%	100%	99.49%	100%	100%	100%	100%	100%	100%	100%
		Highways	95.96%	#DIV/0!	91.59%	100%	60.00%	100%	100%	100%	96.36%	100%	99.41%	100%	100%	100%	100%	100%	100%	100%
		Within City	95.95%	100%	100%	100%	77.92%	98.15%	99.64%	100%	98.30%	100%	99.40%	100%	100%	100%	100%	100%	100%	100%
		<b>Overall SSA</b>	96.67%	100%	97.61%	100%	77.66%	91.82%	99.36%	100%	97.49%	100%	99.44%	100%	100%	100%	100%	100%	100%	100%

NA-Not Applicable

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

7.2 OPERATOR ASSISTED DRIVE TEST: SOUTH DELHI (MUNICIPAL AREA) – NOVEMBER 14

DRIVE TEST TABLE: 2

S/N	Parameter	Classification of routes covered	AIRCEL		AIRTEL		MTNL		IDEA		RCOM GSM		VODAFONE		MTS		RCOM CDMA		TATA CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
1	Call Attempts	Major Roads	104	30	86	30	111	*	85	30	93	30	105	30	105	30	98	27	108	34	
		Highways	38	30	29	30	33	34	39	30	38	31	43	30	37	30	45	31	27	35	
		Within City	336	30	305	30	329	31	358	31	318	30	408	30	336	30	340	31	370	34	
		<b>Overall SSA</b>	<b>478</b>	<b>90</b>	<b>420</b>	<b>90</b>	<b>473</b>	<b>65</b>	<b>482</b>	<b>91</b>	<b>449</b>	<b>91</b>	<b>556</b>	<b>90</b>	<b>478</b>	<b>90</b>	<b>483</b>	<b>89</b>	<b>505</b>	<b>103</b>	
2	Blocked Call Rate	Major Roads	1.92%	0.00%	1.16%	0.00%	5.41%	*	0.00%	0.00%	7.53%	0.00%	0.95%	0.00%	0.95%	0.00%	0.00%	0.00%	1.85%	0.00%	
		Highways	2.63%	0.00%	0.00%	0.00%	3.03%	0.00%	0.00%	0.00%	5.26%	3.23%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Within City	1.19%	0.00%	0.00%	0.00%	11.25%	0.00%	1.12%	0.00%	2.83%	0.00%	0.74%	0.00%	0.30%	0.00%	0.00%	0.00%	0.27%	2.94%	
		<b>Overall SSA</b>	<b>1.46%</b>	<b>0.00%</b>	<b>0.24%</b>	<b>0.00%</b>	<b>9.30%</b>	<b>0.00%</b>	<b>0.83%</b>	<b>0.00%</b>	<b>4.01%</b>	<b>1.10%</b>	<b>0.72%</b>	<b>0.00%</b>	<b>0.42%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.59%</b>	<b>0.97%</b>	
3	Dropped Call Rate (<=2%)	Major Roads	0.00%	0.00%	0.00%	0.00%	14.29%	*	0.00%	0.00%	2.33%	0.00%	0.00%	0.00%	0.00%	0.00%	4.08%	0.00%	0.00%	0.00%	
		Highways	2.70%	0.00%	0.00%	0.00%	6.45%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Within City	0.00%	0.00%	0.00%	0.00%	15.27%	0.00%	0.56%	0.00%	0.32%	0.00%	0.00%	0.00%	0.00%	0.00%	2.94%	0.00%	0.27%	0.00%	
		<b>Overall SSA</b>	<b>0.21%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>14.32%</b>	<b>0.00%</b>	<b>0.42%</b>	<b>0.00%</b>	<b>0.70%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>2.90%</b>	<b>0.00%</b>	<b>0.20%</b>	<b>0.00%</b>	
4	Percentage connections with good voice quality (=>95%)																				
	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Major Roads	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.06%	99.76%	93.33%	69.18%	97.29%	100%
		Highways	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	94.22%	99.85%	92.68%	93.51%	92.87%	96.78%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.01%	99.99%	93.53%	84.21%	96.97%	99.88%
		<b>Overall SSA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>98.68%</b>	<b>99.87%</b>	<b>93.42%</b>	<b>75.79%</b>	<b>96.85%</b>	<b>98.89%</b>
	(b) 0-5 (with frequency hopping for	Major Roads	92.77%	99.41%	95.34%	96.31%	96.90%	ND	93.01%	92.83%	92.18%	99.34%	94.29%	99.07%	NA	NA	NA	NA	NA	NA	NA
Highways		89.38%	90.35%	96.03%	97.00%	93.93%	99.32%	91.05%	92.11%	84.01%	97.84%	96.23%	98.13%	NA	NA	NA	NA	NA	NA	NA	

AUDIT & ASSESSMENT OF QOS FOR QE-DECEMBER 2014-DELHI METRO CIRCLE



SIN	Parameter	Classification of routes covered	AIRCEL		AIRTEL		MTNL		IDEA		RCOM GSM		VODAFONE		MTS		RCOM CDMA		TATA CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
			GSM Operators)		Within City	92.83%	97.70%	95.31%	96.82%	96.23%	99.51%	92.74%	95.33%	89.74%	84.50%	94.53%	96.25%	NA	NA	NA
Overall SSA	92.53%	95.80%	95.39%	96.69%	96.20%	99.41%	92.66%	93.36%	89.74%	93.77%	94.65%	97.59%	NA	NA	NA	NA	NA	NA	NA	
<b>Service Coverage</b>																				
5	In door (>= -75dBm)	Major Roads	90.20%	56.86%	97.33%	100%	56.79%	69.33%	42.11%	4.84%	64.30%	99.86%	97.15%	100%	94.94%	100%	67.87%	99.64%	86.54%	82.40%
		Highways	84.46%	99.85%	97.55%	99.86%	63.31%	82.66%	57.86%	15.26%	35.66%	73.92%	94.74%	100%	91.72%	100%	87.13%	98.24%	70.55%	100%
		Within City	86.70%	92.36%	97.71%	100%	58.32%	50.07%	39.86%	32.94%	52.04%	23.63%	91.50%	100%	93.48%	100%	74.81%	100%	79.09%	99.96%
		Overall SSA	87.20%	83.28%	97.63%	99.96%	58.40%	67.45%	41.70%	17.12%	53.27%	65.09%	92.82%	100%	93.67%	100%	76.30%	99.27%	80.41%	93.75%
	In-vehicle (>= -85dBm)	Major Roads	98.50%	100%	99.12%	100%	89.10%	96.75%	86.94%	86.60%	93.04%	100%	99.38%	100%	99.97%	100%	92.33%	100%	99.73%	99.77%
		Highways	96.72%	99.99%	99.09%	100%	92.98%	99.62%	93.37%	93.18%	90.53%	99.81%	98.72%	100%	100%	100%	99.83%	100%	98.45%	100%
		Within City	97.40%	100%	99.55%	100%	91.45%	88.99%	88.35%	97.33%	83.02%	98.58%	98.94%	100%	99.99%	100%	97.88%	100%	97.93%	100%
		Overall SSA	97.56%	100%	99.44%	100%	91.10%	95.03%	88.49%	92.17%	85.71%	99.45%	98.99%	100%	99.98%	100%	97.19%	100%	98.37%	99.92%
	Outdoor- in city (>= -95dBm)	Major Roads	99.63%	100%	99.67%	100%	97.32%	99.98%	99.75%	99.78%	100%	100%	99.78%	100%	100%	100%	100%	100%	99.94%	100%
		Highways	98.75%	100%	99.54%	100%	99.42%	100%	99.79%	99.87%	100%	100%	99.75%	100%	100%	100%	99.99%	100%	99.67%	100%
		Within City	99.38%	100%	99.84%	100%	99.07%	100%	99.60%	99.87%	100%	100%	99.63%	100%	100%	100%	99.99%	100%	99.97%	100%
		Overall SSA	99.37%	100%	99.79%	100%	98.75%	99.99%	99.64%	99.88%	100%	100%	99.67%	100%	100%	100%	99.99%	100%	99.95%	100%
6	Call Setup Success Rate (>=95%)	Major Roads	98.08%	100%	97.67%	100%	81.98%	*	100%	100%	92.47%	100%	95.24%	100%	99.05%	100%	100%	100%	98.15%	100%
		Highways	97.37%	100%	100%	100%	93.94%	94.12%	100%	100%	94.74%	96.77%	100%	100%	100%	100%	100%	100%	100%	100%
		Within City	98.21%	100%	100%	100%	79.64%	96.77%	98.88%	100%	97.17%	100%	94.85%	100%	99.70%	100%	100%	100%	99.73%	97.06%
		Overall SSA	98.12%	100%	99.52%	100%	81.18%	95.38%	99.17%	100%	95.99%	98.90%	95.32%	100%	99.58%	100%	100%	100%	99.41%	99.03%
7	Hand Over Success Rate (HOSR)	Major Roads	99.39%	100%	99.51%	100%	94.53%	*	100%	100%	96.39%	100%	99.02%	100%	100%	100%	100%	100%	100%	100%
		Highways	97.87%	100%	97.40%	100%	87.30%	100%	100%	100%	92.45%	100%	98.61%	100%	100%	100%	100%	100%	100%	100%

AUDIT & ASSESSMENT OF QOS FOR QE-DECEMBER 2014-DELHI METRO CIRCLE



S/N	Parameter	Classification of routes covered	AIRCEL		AIRTEL		MTNL		IDEA		RCOM GSM		VODAFONE		MTS		RCOM CDMA		TATA CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
			Within City	98.70%	100%	96.41%	100%	75.08%	100%	99.63%	100%	96.24%	99.02%	98.25%	100%	64.47%	100%	100%	100%	100%
<b>Overall SSA</b>	<b>98.81%</b>	<b>100%</b>	<b>97.14%</b>	<b>100%</b>	<b>80.69%</b>	<b>100%</b>	<b>99.74%</b>	<b>100%</b>	<b>95.73%</b>	<b>99.11%</b>	<b>98.41%</b>	<b>100%</b>	<b>75.17%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

NA-Not Applicable

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

\*Call could not be established due to high external interference on MTNL serving site.

7.3 OPERATOR ASSISTED DRIVE TEST: NORTH DELHI & NDMC AREA (DECEMBER 14)

DRIVE TEST TABLE: 3

S/N	Parameter	Classification of routes covered	AIRCEL		AIRTEL		MTNL		IDEA		RCOM GSM		VODAFONE		MTS		RCOM CDMA		TATA CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
1	Call Attempts	Major Roads	277	30	274	30	275	31	291	30	276	30	297	30	298	30	304	31	300	30	
		Highways	36	31	33	30	35	31	31	30	39	30	47	30	41	29	39	30	42	30	
		Within City	205	20	191	20	212	21	210	20	198	21	178	20	188	20	210	20	212	21	
		<b>Overall SSA</b>	<b>518</b>	<b>81</b>	<b>498</b>	<b>80</b>	<b>522</b>	<b>83</b>	<b>532</b>	<b>80</b>	<b>513</b>	<b>81</b>	<b>522</b>	<b>80</b>	<b>527</b>	<b>79</b>	<b>553</b>	<b>81</b>	<b>554</b>	<b>81</b>	
2	Blocked Call Rate	Major Roads	0.72%	0.00%	0.73%	0.00%	8.00%	0.00%	0.34%	0.00%	1.45%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Highways	2.78%	0.00%	0.00%	0.00%	11.43%	0.00%	3.23%	0.00%	2.56%	0.00%	0.00%	0.00%	2.44%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Within City	2.44%	0.00%	1.57%	0.00%	10.38%	0.00%	0.48%	0.00%	1.52%	0.00%	0.56%	0.00%	0.53%	0.00%	0.00%	0.00%	0.94%	0.00%	
		<b>Overall SSA</b>	<b>1.54%</b>	<b>0.00%</b>	<b>1.00%</b>	<b>0.00%</b>	<b>9.20%</b>	<b>0.00%</b>	<b>0.56%</b>	<b>0.00%</b>	<b>1.56%</b>	<b>0.00%</b>	<b>0.19%</b>	<b>0.00%</b>	<b>0.38%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.36%</b>	<b>0.00%</b>	
3	Dropped Call Rate (<=2%)	Major Roads	0.36%	0.00%	0.00%	0.00%	10.48%	3.33%	0.34%	0.00%	1.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.33%	0.00%	1.00%	0.00%	
		Highways	0.00%	0.00%	0.00%	0.00%	13.33%	0.00%	0.00%	0.00%	2.63%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Within City	0.51%	0.00%	0.00%	0.00%	14.20%	0.00%	0.00%	0.00%	1.03%	0.00%	0.56%	0.00%	0.54%	0.00%	0.00%	0.00%	0.95%	0.00%	
		<b>Overall SSA</b>	<b>0.39%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>12.15%</b>	<b>1.25%</b>	<b>0.19%</b>	<b>0.00%</b>	<b>1.19%</b>	<b>0.00%</b>	<b>0.19%</b>	<b>0.00%</b>	<b>0.19%</b>	<b>0.00%</b>	<b>0.18%</b>	<b>0.00%</b>	<b>0.91%</b>	<b>0.00%</b>	
4	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Percentage connections with good voice quality (=>95%)																			
		Major Roads	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.30%	99.91%	95.77%	100%	96.08%	100%
		Highways	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	94.58%	99.97%	90.62%	100%	94.59%	99.88%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.02%	99.91%	96.36%	100%	95.46%	99.98%
<b>Overall SSA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>97.58%</b>	<b>99.94%</b>	<b>95.65%</b>	<b>100%</b>	<b>95.72%</b>	<b>99.95%</b>		

AUDIT & ASSESSMENT OF QOS FOR QE-DECEMBER 2014-DELHI METRO CIRCLE



SIN	Parameter	Classification of routes covered	AIRCEL		AIRTEL		MTNL		IDEA		RCOM GSM		VODAFONE		MTS		RCOM CDMA		TATA CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
	(b) 0-5 ( with frequency hopping for GSM Operators)	Major Roads	91.67%	88.32%	96.85%	98.95%	93.20%	97.15%	91.36%	91.21%	93.40%	92.24%	92.83%	97.92%	NA	NA	NA	NA	NA	NA
		Highways	91.74%	99.27%	97.37%	99.39%	93.90%	99.18%	87.43%	93.42%	93.60%	98.15%	92.95%	95.73%	NA	NA	NA	NA	NA	NA
		Within City	90.57%	99.24%	96.51%	99.72%	90.66%	99.32%	89.58%	91.57%	92.29%	97.91%	92.51%	95.79%	NA	NA	NA	NA	NA	NA
		Overall SSA	91.23%	94.91%	96.75%	99.30%	92.27%	98.47%	90.44%	92.11%	92.99%	95.75%	92.73%	96.60%	NA	NA	NA	NA	NA	NA
<b>Service Coverage</b>																				
5	In door (>= -75dBm)	Major Roads	94.74%	62.66%	98.36%	100%	60.82%	57.50%	66.24%	60.67%	68.17%	51.44%	93.95%	100%	86.88%	99.28%	84.41%	100%	95.33%	100%
		Highways	90.38%	98.42%	97.29%	100%	51.38%	87.00%	65.38%	82.32%	78.76%	99.20%	90.65%	100%	64.22%	99.33%	84.59%	100%	91.64%	100%
		Within City	89.65%	97.89%	98.04%	100%	46.21%	91.40%	60.10%	39.75%	66.37%	99.40%	91.27%	100%	90.18%	43.98%	85.78%	100%	92.62%	100%
		Overall SSA	92.06%	84.33%	98.17%	100%	54.50%	76.91%	63.79%	63.45%	68.28%	80.35%	92.78%	100%	86.51%	85.30%	85.00%	100%	94.01%	100%
	In-vehicle (>= -85dBm)	Major Roads	98.73%	99.95%	99.52%	100%	89.90%	93.80%	96.87%	99.36%	96.18%	99.23%	98.83%	100%	99.35%	99.69%	98.00%	100%	99.63%	100%
		Highways	97.40%	100%	99.58%	100%	89.51%	99.40%	95.94%	99.66%	97.50%	100%	98.79%	100%	99.42%	99.83%	99.90%	100%	99.96%	100%
		Within City	96.72%	99.98%	99.31%	100%	87.11%	99.50%	95.57%	95.25%	93.58%	100%	99.04%	100%	99.56%	99.62%	97.81%	100%	99.59%	100%
		Overall SSA	97.70%	99.98%	99.44%	100%	88.79%	97.31%	96.31%	98.46%	95.29%	99.69%	98.90%	100%	99.43%	99.72%	98.06%	100%	99.64%	100%
	Outdoor- in city (>= -95dBm)	Major Roads	99.51%	100%	99.83%	100%	99.21%	99.50%	99.93%	99.94%	100%	100%	99.85%	100%	99.96%	99.96%	99.99%	100%	99.89%	100%
		Highways	99.27%	100%	99.91%	100%	99.05%	100%	99.97%	100%	100%	100%	99.99%	100%	99.89%	100%	100%	100%	100%	100%
		Within City	99.08%	100%	99.83%	100%	95.90%	100%	99.66%	100%	100%	100%	99.70%	100%	99.94%	100%	99.91%	100%	99.89%	100%
		Overall SSA	99.29%	100%	99.84%	100%	97.91%	99.79%	99.83%	99.98%	100%	100%	99.81%	100%	99.95%	99.93%	99.96%	100%	99.90%	100%
6	Call Setup Success Rate (>=95%)	Major Roads	98.92%	100%	98.54%	100%	83.27%	96.77%	99.66%	100%	98.55%	100%	100%	100%	100%	100%	100%	100%	100%	
		Highways	97.22%	96.77%	100%	100%	85.71%	96.77%	96.77%	100%	97.44%	100%	100%	100%	97.56%	100%	100%	100%	100%	100%
		Within City	96.59%	100%	98.43%	100%	79.72%	95.24%	99.52%	100%	98.48%	100%	99.44%	100%	98.94%	100%	100%	100%	99.06%	100%

SIN	Parameter	Classification of routes covered	AIRCEL		AIRTEL		MTNL		IDEA		RCOM GSM		VODAFONE		MTS		RCOM CDMA		TATA CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
		Overall SSA	97.88%	98.77%	98.59%	100%	81.99%	96.39%	99.44%	100%	98.44%	100%	99.81%	100%	99.43%	100%	100%	100%	99.64%	100%
7	Hand Over Success Rate (HOSR)	Major Roads	98.48%	100%	99.21%	100%	82.31%	90.91%	100%	100%	95.56%	100%	99.89%	100%	100%	100%	100%	100%	100%	100%
		Highways	98.31%	100%	98.11%	100%	76.19%	79.49%	100%	100%	93.40%	87.50%	100%	100%	100%	100%	100%	100%	100%	100%
		Within City	96.12%	100%	99.02%	100%	84.31%	100%	99.18%	100%	97.02%	97.96%	99.83%	100%	100%	100%	100%	100%	100%	100%
		Overall SSA	97.51%	100%	99.05%	100%	82.55%	83.61%	99.66%	100%	95.95%	98.63%	99.88%	100%	100%	100%	100%	100%	100%	100%

NA-Not Applicable

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

**7.4 DETAIL OF THE ROUTES COVERED DURING THE DRIVE TESTS:**

**DRIVE TEST TABLE: 4**

DRIVE TEST ROUTE OF JULY TO OCTOBER 14 – DELHI METRO CIRCLE							
Name of SSA	Drive test Period	Day 1		Day 2		Day 3	
		Name of SDCA Covered	Route Covered	Name of SDCA Covered	Route Covered	Name of SDCA Covered	Route Covered
<b>Noida &amp; Ghaziabad</b>	<b>Oct-14</b>	Ghaziabad/97KM	Dilshad Garden, Ramprastha, Surya Nagar, Sahibabad, Mohan Nagar, Hindon Airways, Wazirabad, Shalimar Garden, Rajendra Nagar, Raj Nagar, Ghanta Ghar, Lal Kuan, Crossing Republic.  <b>Indoor:</b> Panchsheel Mall, Galleria Mall	G.Noida/ 102KM	Sec-15, Sec-16, Express way, Pari Chowk, Kasna, Swarn Nagri, Jaypee Greens, Sec Alfa, Sec Delta, Sec Delta, Sec Beta, Sec Gama, Ansal Plaza, Moser Baer, LG Chowk, Yamaha Chowk, Bhangale, Sec-37, Sec-18.  <b>Indoor:</b> Ansal Plaza, Expo Mart	Noida/ 88KM	Sec-15, Sec-5, Sec-6, Sec-21, Sec-19, Sec-18, Sec-26, Nithari Village, Gijore, Sec-54, Sec-61, Sec-51, Golf Course, Sec-40, Shopprix, Mamura Chowk, Sec-62, Khoda Village, Sec-64, Sec-71.  <b>Indoor:</b> Shopprix Mall, Spice Mall.
<b>South Delhi</b>	<b>Nov-14</b>	SDMC/ 90KM	Hauz Khas, Hauzkhas Village, Kalu Sarai, Bhikaji Kama Place, R.K Puram, Munrika, Vasant Vihar, JNU, Jia Sarai, Begumpur, AIIMS, South Ext., Moolchand, Nehru Place, Sangam Vihar, Tuglakabad Ext., Govindpuri, Kalkaji, TCIL, Masjid Mod, Narauji Nagar, Lajpat Nagar, Ashram, Badarpur.  <b>Indoor:</b> Hotel Vikrant, Moolchand Metro.	SDMC/ 85KM	Chattarpur, Mahipalpur, Rajaukri, Kapaseda, Bharthal Village, Brajwasan, Dwarka, Dwarka Mod, Navada, Matiyala, Dabri Mode, Dashrathpur, Janakpuri, Vikaspuri, Kesopur, Khyala, Subhash Nagar, Tilak Nagar, JJ Colony, Dhaula Kuan.  <b>Indoor:</b> H L Wings, Janakpuri District Center.	SDMC/ 80KM	Kashmiri Gate, Nigam Bodh Ghat, Geeta Colony Pull, IG Stadium, ITO, Sarai Kala Khan, Ashram, Jasola, Sarita Vihar, Jasola Village, Kalindi Kunj, Sahina Bagh, Jamia, Batla House, NFC, Saraijulena Gaon, Modi Mill, Okhla PH-3, PH-2, Tara Apartment, Alaknanda Appartment, CR Park, GK-2, Kaka ji, Kailash Colony, Lajpat Nagar, CGO.  <b>Indoor:</b> Omaxe Mall, Shri Ratnam



DRIVE TEST ROUTE OF JULY TO OCTOBER 14 – DELHI METRO CIRCLE							
Name of SSA	Drive test Period	Day 1		Day 2		Day 3	
		Name of SDCA Covered	Route Covered	Name of SDCA Covered	Route Covered	Name of SDCA Covered	Route Covered
North Delhi & NDMC Area	Dec-14	NDMC/ 120KM	<p>Kashmere gate, civil lines, vidhan sabha, viswavidyalya, GTB nagar, model town, azadpur, jahangirpuri, G.T karnal road, sindhu border, narela, bawana, pooth khurth, barwala, prahladpur, rohini sec-16, sec-15, sec-13, prashant vihar, burari, sant nagar, nathupura, ibrahimpur mod, kesav nagar mod, baktawarpur, palla mod, retreat resort, swarup nagar, mukarba chowk, gandhi vihar, gopalpur, timarpur, majnu ka teela, ISBT.</p> <p><b>Indoor:</b> Azadpur Metro, M2K building</p>	NDMC/ 95KM	<p>khan market, subhramaniyam bharti marg, delhi high court, india gate, haidrabad bhawan, baroda house, patiyala house, aga khan hall, mandi house, barakhamba road, canaught place, shivaji park, minto road (MTNL), delite cinema, delhi gate, dariyaganj, shantivan, shakti sthal, IG stadium, ITO, CAG, pahadganj, jhande walan, karolbagh, pusa road, BLK hospital, rajendra place metro, shankar road market, mandir marg, kalibari, gol market, ashoka road, janpath, lodhi road, pragati maidan, IP power station, rajghat, vijay ghat, kashmere gate.</p> <p><b>Indoor:</b> Rajendra Place Metro, ISBT</p>	NDMC/ 125KM	<p>Viswavidyalya, kingsway camp, dhaka gaon, coronation park, shalimar bagh, pitampura, rohini sec-8, sec-14, sec-13, sec-16, sec-11, rohini city center mall, saibaba chowk, naharpur village, pushpanjali enclave, kanjawla link road, mangolpuri, avantika main market, rithala mod, rithal metro, barwala, bawana, dariyapur kalan, auchandi, auchandi border, mangeshpur, katiwara, kutubgarh, tatrace village, ladpur, karola, madanpur dabas village, mundka, rajdhani park metro, nangloi, peeragadhi, pachim vihar, punjabi bagh, anand parvat, liberty cinema, karolbagh, azad market, tees hazari, kashmere gate metro.</p> <p><b>Indoor:</b> City Center Mall, North Mall.</p>

**7.5 SSA WISE DRIVE TEST OBSERVATION:**

**DRIVE TEST TABLE: 5**

**DRIVE TEST OBSERVATION OF NOIDA & GHAZIABAD AREA – OCTOBER 14**

S. NO	Name of SP	SDCA Covered in Day 1	Day 1 Observation	SDCA Covered in Day 2	Day 2 Observation	SDCA Covered in Day 3	Day 3 Observation
1	AIRCEL	Ghaziabad	Poor Quality near Sahibabad, Rajendra Gar, Budh Vihar	Greater Noida	Poor Level & Quality near Golf Course Noida, Surajpur, Pari Chowk, Greater Noida, Expressway	Noida	Poor Level & Quality near Bhisnupura, Noida Sec-31, Sec-16, Sec-55
2	AIRTEL		Poor Level & Quality near Mohan Nagar, Lalkaun, Poor Quality near Budh Vihar		Poor Level & Quality near Greater Noida, Sec-16		Poor Level & Quality near Noida Sec-63, Sec-59, Sec-56
3	MTNL		Poor Level & Quality near Sahibabad, Rajender Nagar, Budh Vihar		Poor Level & Quality near Greater Noida, Sec-34		Poor Level & Quality near Noida Sec-37, Sec-51
4	TATA CDMA		Poor Quality near Dilsad Garden, Sahibabad, ShahpurKoshambhi C Block		Poor Quality near Bhangal, NEPZ Noida, HCL Sec-126, Sec-127, Spice BPO, Greater Noida, Block C, Nangli Bajipur		Poor Quality near Sec-54, Sec-55, Bishanpur, Sec-34, Sec-27, Sec-37, Charel Bangar
5	IDEA		Poor Level & Quality near Dilsad Gardedn, Poor Quality near New Bus Stand GZB, Vijay Nagar, Sec-62		Poor Level & Quality near Surajpur, Sec-49, Poor Quality near Greater Noida, Sec-44		Poor Level & Quality near Sec-57 Noida, Poor Quality near Sec-62, Sec-64, Sec-58, Sec-2, New Ashok Nagar
6	RCOM GSM		Poor Level & Quality near Rajendra Gar, Mohan Nagar, Ramprastha, Bulandsehar Rd, Chirazi, Poor Quality near Vaishali Sec-5, Kach Mill Rd, Budh Vihar		Poor Level & Quality near Chhalera Bangar, Noida Sec-93, Surajpur, Safipur, Surajpur, Poor Quality near Botonical Garden		Poor Quality near Noida Sec-20, Sec-64, Sec-58
7	RCOM CDMA		Poor Quality near Dilsad Colony, Karhera, Delhi Gate, Shipra Suncity, Valshall		Poor Level & Quality near Filmcity, Ishanin8 Mgt		Poor Level & Quality near Noida Sec-63, Sec-59
8	MTS		Poor Quality near Kailash nagar		Poor Level near Bhangal, Poor Quality near Surajpur, Greater Noida, Dawat Nagar		Poor Level near Sec-62
9	VODAFONE		Poor Quality near Dilsad Garden		---		Poor Quality near Sec-6, Sec-55

**DRIVE TEST TABLE: 6**

**DRIVE TEST OBSERVATION OF SOUTH DELHI AREA (NOVEMBER-14)**

S. NO	Name of SP	SDCA Covered in Day 1	Day 1 Observation	SDCA Covered in Day 2	Day 2 Observation	SDCA Covered in Day 3	Day 3 Observation
1	AIRCEL	South Delhi	Poor Level & Quality near Sarita Vihar	South Delhi	Poor Level & Quality near Dwarka Sec-14	South Delhi	Poor Level & Quality near Vijay Ghat, Kashmere Gate, Alaknanda Rd, Kalkaji
2	AIRTEL		Poor Level & Quality near Tuglakabad Ext, Apollo Hopsital		Poor Level & Quality near Samalkha		Poor Level & Quality near Okhala PH-2, Poor Quality near Zamrudpur, Jasola, Alaknanda, CR Park
3	MTNL		Poor Quality near Adhchini, New Friend Colony		Poor Level & Quality near Dwarka Sec-19, Sec-21, Sec-13, Sec-5, Krishnapuri, Janakpuri		Poor Level & Quality near Defence Colony, Kalkaji, Poor Quality near Okhla PH-3, Abulfazal Enclave
4	TATA CDMA		Poor Level & Quality near Hauz Khas, Greater Kailash, Khanpur		Poor Quality near Janakpuri, Dwarka Sec-11, Sec-12, Sec-1, Vasant Kunj, Samalkha		Poor Quality near Pragati Maidan, Nizamudin, Jasola, Ishwar Nagar, Kalkaji
5	IDEA		Poor Level & Quality near Hauz Khas, Munirka, JNU, Vasant Kunj		Poor Level & Quality near Dwarka Sec-17, Sec-19		Poor Level & Quality near Kashmere Gate, Nizamudin
6	RCOM GSM		Poor Level & Quality near Vasant Vihar, RK Puram, Hauza Khas, RK Puram Sec-3, Kalkaji, Harkesh nagar, Tuglakabad Ext, Mohan Co-opreative		Poor Level & Quality near Bharat Vihar, Dwarka, Dwarka Naseempur, Dwarka Sec-5, Vasant Kunj, Dwarka Sec-19, Samalkha, Narayna Vihar, Hari Nagar		Poor Level & Quality near Panchkuian Rd, Nizamudin, Okhla PH-3, Abulfazal Enclave, Jangpura, GK-1, CR Park, Kalkaji, Alaknanda
7	RCOM CDMA		Poor Quality near Vasant Vihar, Safdarjung, Chirag Delhi, Shrinivasपुरi, Mathura Rd		Poor Level & Quality near Poshangipur, Hari nagar, Vasant Kunj, Rajokari		Poor Quality near Daryaganj, Harkesh Nagar, Abulfazal Enclave, Nizamudin, GK2
8	MTS		Poor Quality near Palika Bhawan		Poor Quality near Delhi Cantt, Bijwasan		Poor Quality near Sarai Kale Khan, Abulfazal Enclave, Ashram, Chirag Delhi
9	VODAFONE		Poor Quality near Sarita Vihar, Vasant Kunj, Munirka, Hauz Khas		Poor Quality near Janakpuri, Bijwasan		Poor Quality near Kashmere Gate, Okhla Ph-3

**DRIVE TEST TABLE: 7**

**DRIVE TEST OBSERVATION OF NORTH DELHI & NDMC AREA – DECEMBER 14**

S. NO	Name of SP	SDCA Covered in Day 1	Day 1 Observation	SDCA Covered in Day 2	Day 2 Observation	SDCA Covered in Day 3	Day 3 Observation
1	AIRCEL	North Delhi & NDMC Area	Poor Level & Quality near Swatantra Nagar, Narela Rd, Bakoli, Bawana Rd, NH1 Bypass, GTB Nagar, Bhalaswa	North Delhi & NDMC Area	Poor Level & Quality near Shankar rd, Jhandewalan, Vivekananad Rd, Vijay Ghat, DDU Marg, Zakir Hussain Rd, National Rd	North Delhi & NDMC Area	Poor Level & Quality near Quatabgarh, Rohini Sec-11, Sec-24
2	AIRTEL		Poor Level & Quality near Bakoli, Mukundpur, Majnu Ka Tila		Poor Level & Quality near Shankar Rd		Poor Level & Quality near Quatabgarh
3	MTNL		Poor Level & Quality near Alipur, Bawana, Narela, Rohini Sec-15, Nehru Vihar, Bhalaswa		Poor Level & Quality near Akbar Rd, Doordarshan, Vijay Ghat, Jorbagh, ITO, Minto Rd		Poor Level & Quality near Quatabgarh, Jatkhori, GTB Nagar, Punjabi Bagh, Rithala
4	TATA CDMA		Poor Quality near Narela, Mod, Bhalaswa, GTB Nagar, Mukundpur, Haiderpur		Poor Quality near Jhandewalan, Bangla Sahib, Mandi House, Paharganj, Vikas Minar, Ashaf Ali Rd, IP Estate, Jangpura Market, Jor Bagh		Poor Quality near Bawana, Katyan Vihar, Burari, Rohini Sec-13, Sec-14, Punjabi Bagh, Mundka, Jawalapuri
5	IDEA		Poor Level & Quality near Bawan Rd, Bakoli, GTB Nagar, Majnu Ka Tila		Poor Level & Quality near Shankar Rd, Jhandewalan, DDU Marg		Poor Level & Quality near Rohini Sec-11, Sec-24
6	RCOM GSM		Poor Level & Quality near Narela, Bakhtawarpur, Moolchand Nagar, Gopalpur		Poor Level & Quality near Talkatora Stadium, ITO, DhauraKaun, Gandhi Market, Bengali Market, Andrew Ganj, Patodi House, National Rd		Poor Level & Quality near Quatabgarh, Rithala, Azadpur Ind Area
7	RCOM CDMA		Poor Level & Quality near Bakhtawarpur		Poor Quality near Bhai Veer Singh Marg, Daryaganj, Jorbagh, WHO Office		Poor Quality near Indira Vikas Colony
8	MTS		Poor Quality near Jahangirpuri, Civillines, Narela		Poor Quality near Daryaganj, Firozsaha Kotla, Aurangzeb Rd, ITO, Jhandewalan		Poor Quality near Punjabi Bagh
9	VODAFONE		Poor Quality near Bakoli, Narela, Bhalaswa, Majnu Ka Tila, Bawana		Poor Quality near Jhandewalan, ITO, Jorbagh		Poor Quality near Quatabgarh, Rohini Sec-11, Sec-24

**DRIVE TEST TABLE: 8**

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

S No	Month of Drive Test	Circle	Name of Operators	SSA	Total SDCA Covered	Status of no network coverage area	ICR Status
1	Oct'14	Delhi	AIRCEL	Noida & Ghaziabad	Noida & Ghaziabad	---	NO
			AIRTEL			---	NO
			MTNL			No Coverage found at Yamuna expressway.	NO
			IDEA			---	NO
			RCOM (GSM)			---	NO
			VODAFONE			---	NO
			MTS			---	NO
			RCOM (CDMA)			---	NO
			TATA (CDMA)			---	NO
2	Nov'14	Delhi	AIRCEL	South Delhi (Municipal Area)	South Delhi (Municipal Area)	---	NO
			AIRTEL			---	NO
			MTNL			---	NO
			IDEA			---	NO
			RCOM (GSM)			---	NO
			VODAFONE			---	NO
			MTS			---	NO
			RCOM (CDMA)			---	NO
			TATA (CDMA)			---	NO
3	Dec'14	Delhi	AIRCEL	New Delhi & NDMC	New Delhi & NDMC	---	NO
			AIRTEL			---	NO
			MTNL			Near Mithapur Resort, At Ring Road Majnu ka Teela to ISBT, ITO, Auchandi Village, Mangeshpur, Qutub garh Road	NO
			IDEA			---	NO
			RCOM (GSM)			---	NO
			VODAFONE			---	NO
			MTS			---	NO
			RCOM (CDMA)			---	NO
			TATA (CDMA)			---	NO

## 7.6 KEY FINDINGS ON DRIVE TEST:

The drive tests conducted in different routes of Delhi/NCR region such as **Ghaziabad, Greater Noida, Noida, South Delhi Municipal Area and North Delhi & NDMC Area**, given above in table-4, during three months of the quarter ended December 2014 revealed that the performance of some of the service providers was not satisfactory as they remained non-compliant of different parameters in different areas of Delhi/NCR. The **overall non-compliance of the service providers on SSA level** with respect to the different parameters is summarized as follows:

### October-2014: (Ghaziabad, Greater Noida & Noida)

1. **MTNL:** Call Drop Rate: **11.11%** (Outdoor) / **4.21%** (Indoor), Voice Quality: **93.00%** (Outdoor), Call Setup success rate (CSSR): **88.62%** (outdoor) and Blocked call rate: **8.53%** (outdoor).
2. **Aircel, Idea, RCOM (GSM) & RCOM (CDMA):** Remained under performed for parameter **Voice Quality** with their performance as **91.86%** (Outdoor), **91.61%** (Outdoor)/ **93.58%** (Indoor), **93.63%** (Outdoor) and **92.68%** (Outdoor) respectively.
3. **Tata (CDMA):** Call Drop Rate (**2.25%**)

### November-2014 (South Delhi)

1. **MTNL:** Call Drop rate: **14.32%** (Outdoor), CSSR: **81.18%** (outdoor) and Blocked Call rate: **9.30%** (Outdoor).
2. **Aircel, Idea, RCOM (GSM), RCOM(CDMA) and Vodafone:** Remained under performed for parameter **Voice Quality** with their performance as **92.53%**, **92.66%** (Outdoor) / **93.36%** (Indoor), **89.74%** (Outdoor) / **93.77%** (Indoor), **93.42%** (Outdoor) / **75.79%** (Indoor) and **94.65%** (outdoor) respectively.

### December -2014 (North Delhi & NDMC Area):

1. **MTNL:** Call drop rate: **12.15%** (Outdoor), Voice Quality: **92.27%** (Outdoor), CSSR: **81.99%** (Outdoor) and Blocked Call rate: **9.20%** (Outdoor).
2. **Aircel, Idea, RCOM GSM and Vodafone:** Remained under performed for parameter **Voice Quality** with their performance as **91.23%** (Outdoor) / **94.91%** (Indoor), **90.44%** (Outdoor) / **92.11%** (Indoor), **92.99%** (Outdoor) and **92.73%** (Outdoor) respectively.

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

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

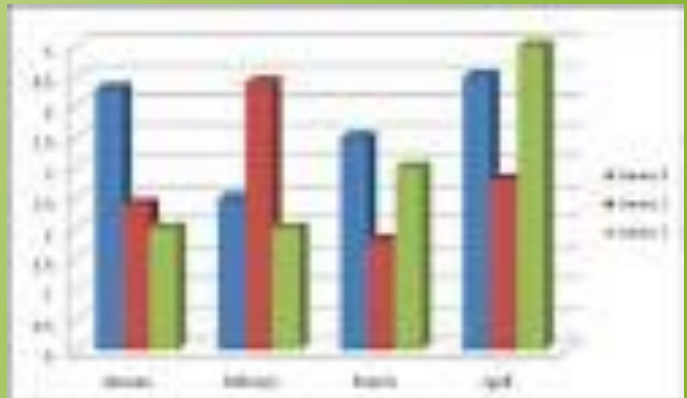
*From the above, it was concluded that the performance of the service providers with respect to the parameter 'Voice Quality' remained main area of concern as majority of operators failed to comply with its bench mark. However, apart from Voice Quality, MTNL remained non-compliant in respect of other parameters also like Call Drop rate, Call setup success rate and Blocked Call rate, in different areas of Delhi./NCR region. These operators need to take corrective action to improve their networks.*

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

AVERAGED QUARTERLY PMR

V/S

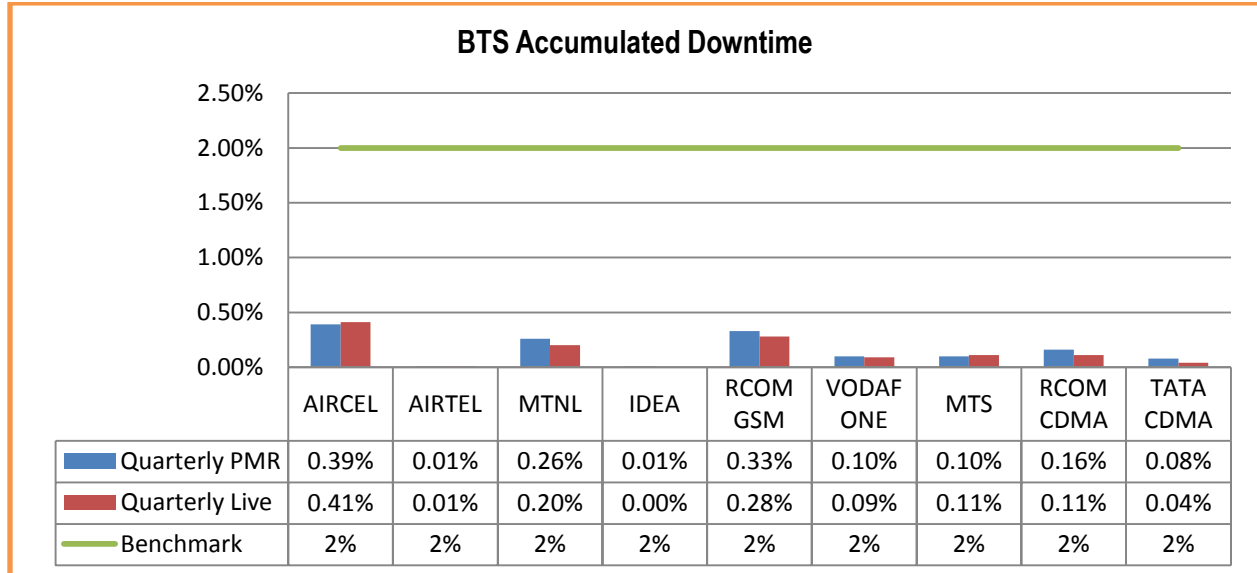
AVERAGED QUARTERLY 3-DAYs LIVE MEASURMENT



## 8) GRAPHICAL REPRESENTATION:

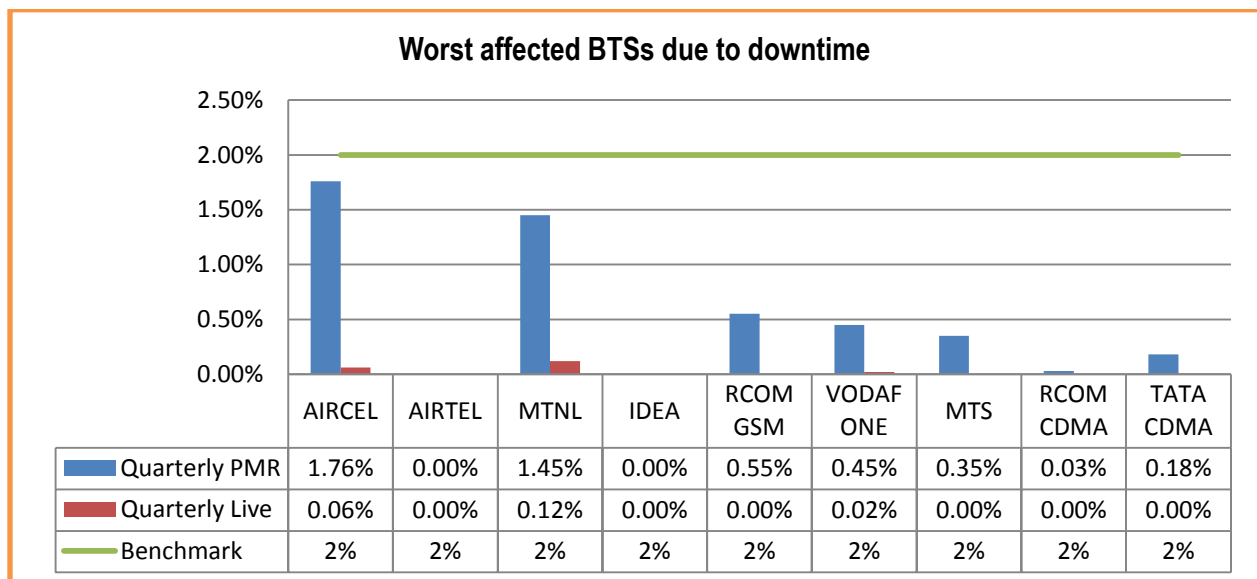
Graphical Representation of Performance of the Cellular Mobile Service Providers (PMR) V/S 3-Days Live Measurement (Quarterly Average Data):

### 1. BTS ACCUMULATED DOWNTIME :



All operators are meeting the benchmarks.

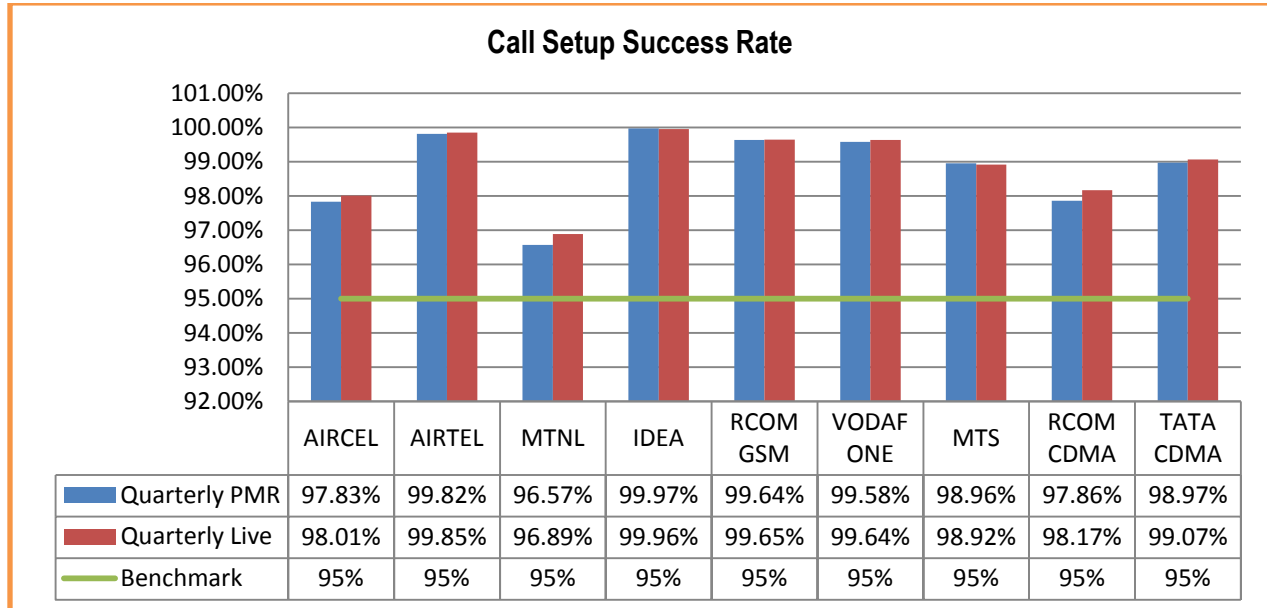
### 2. WORST AFFECTED BTSs DUE TO DOWNTIME :



All operators are meeting the benchmarks.

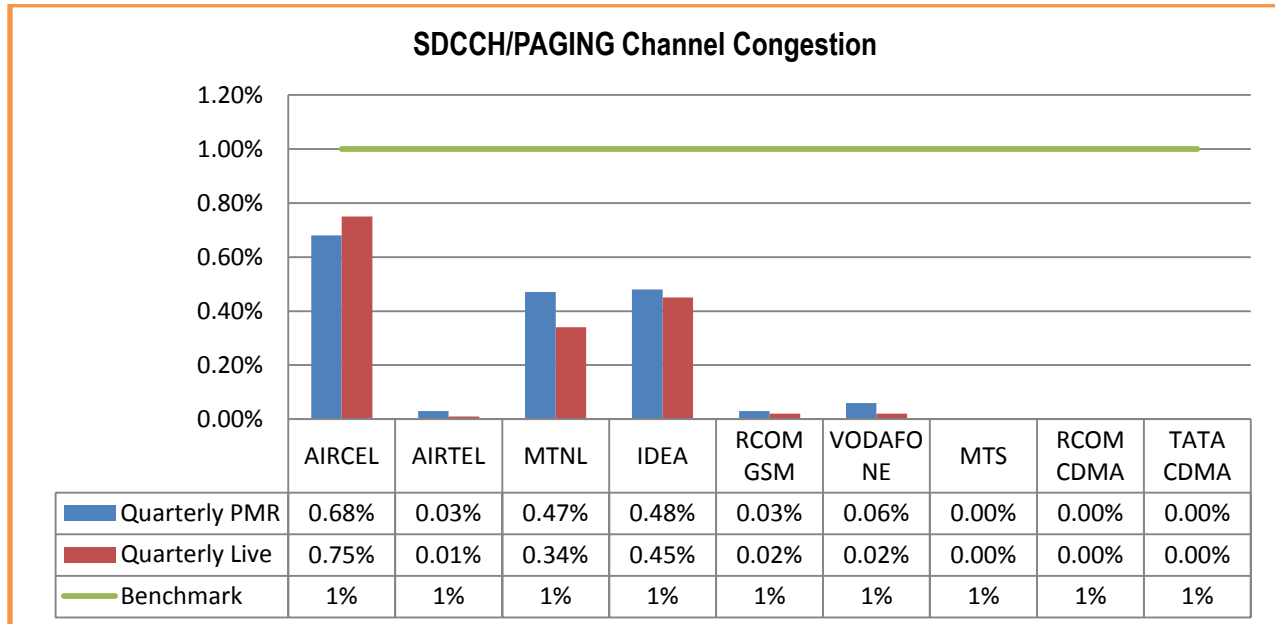


**3. CALL SETUP SUCCESS RATE :**



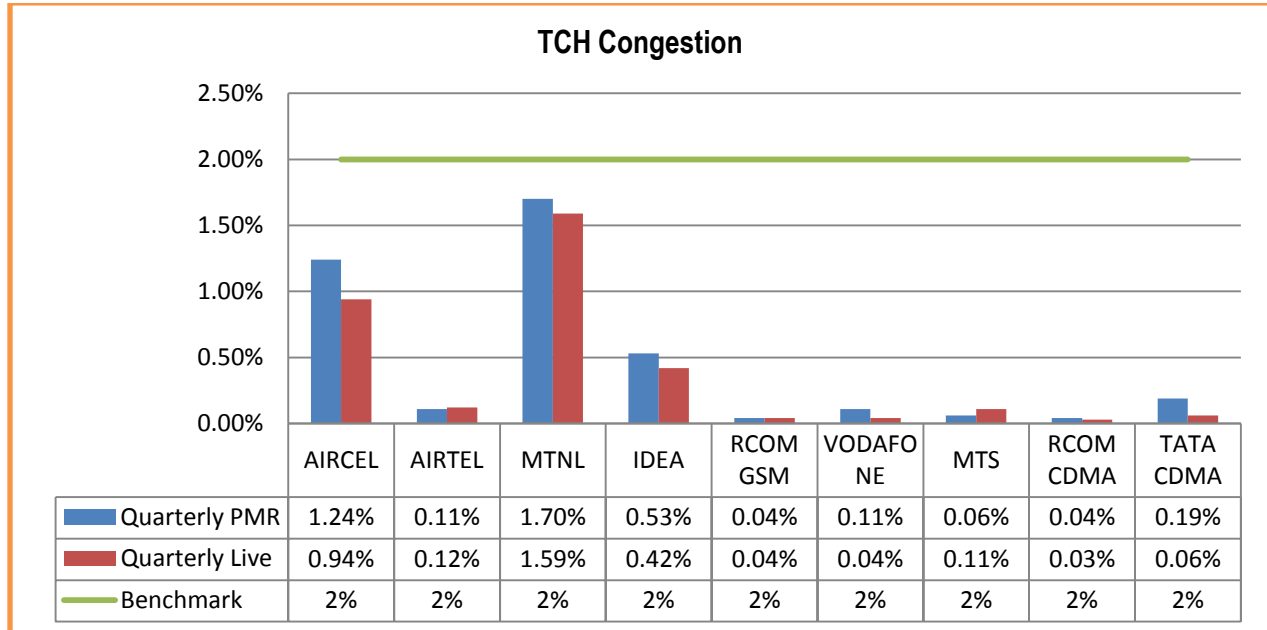
All operators are meeting the benchmarks.

**4. SDCCH/PAGING CHANNEL CONGESTION :**



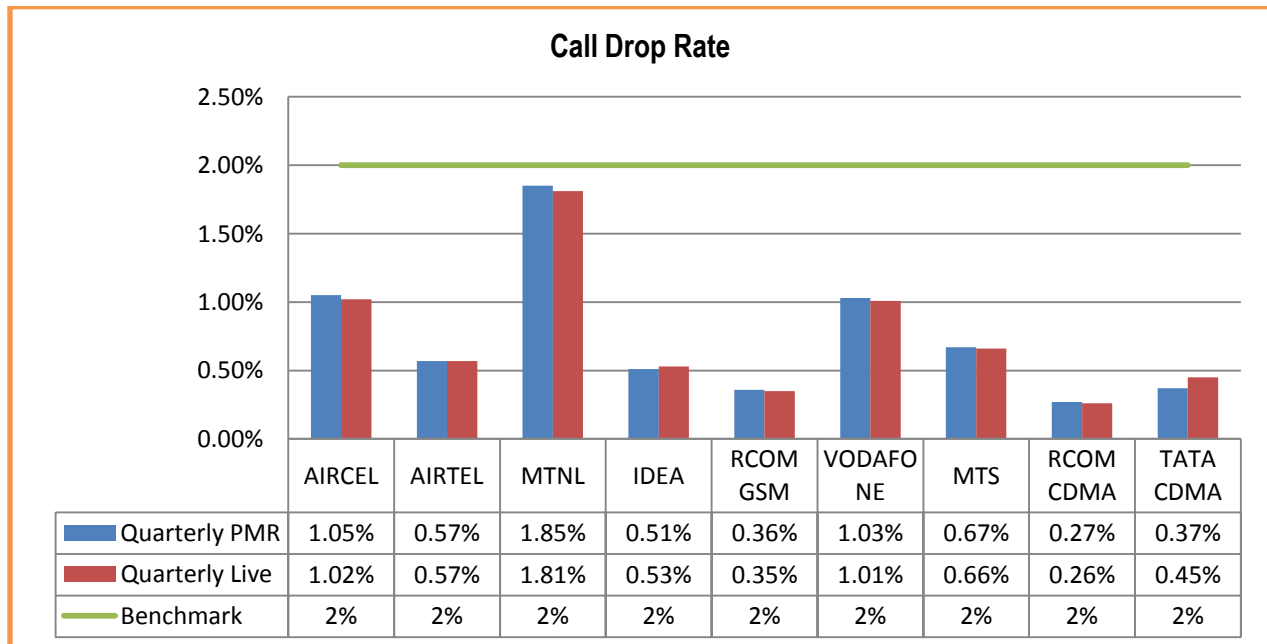
All operators are meeting the benchmarks.

**5. TCH CONGESTION :**



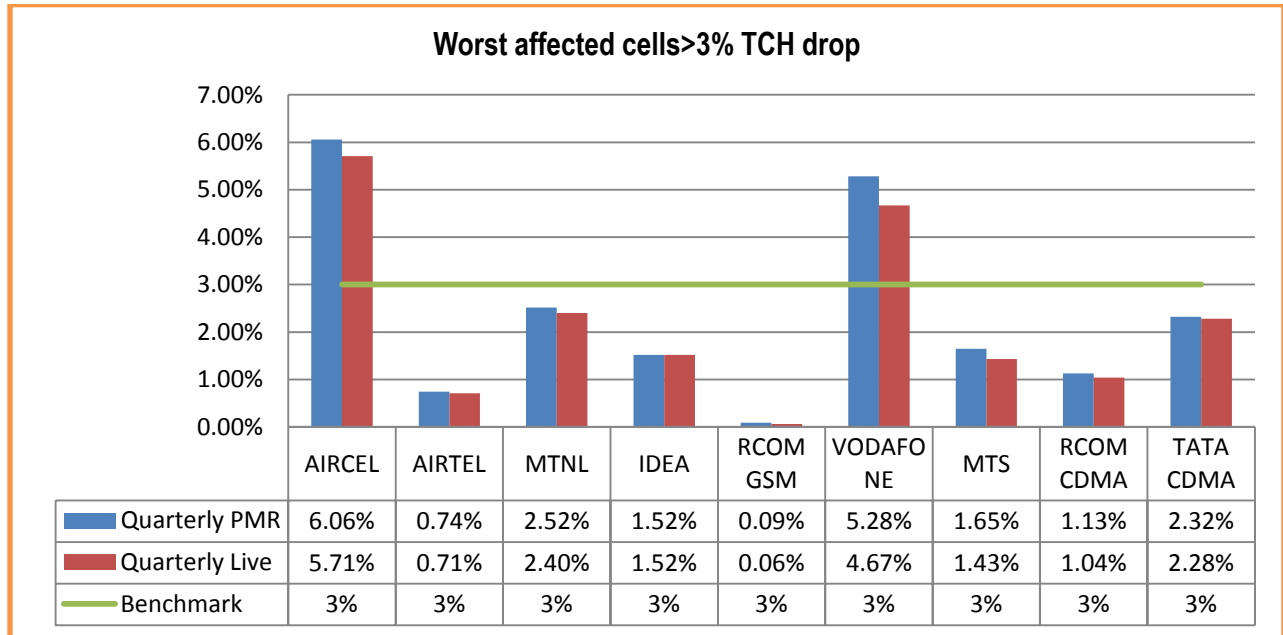
All operators are meeting the benchmarks.

**6. CALL DROP RATE :**



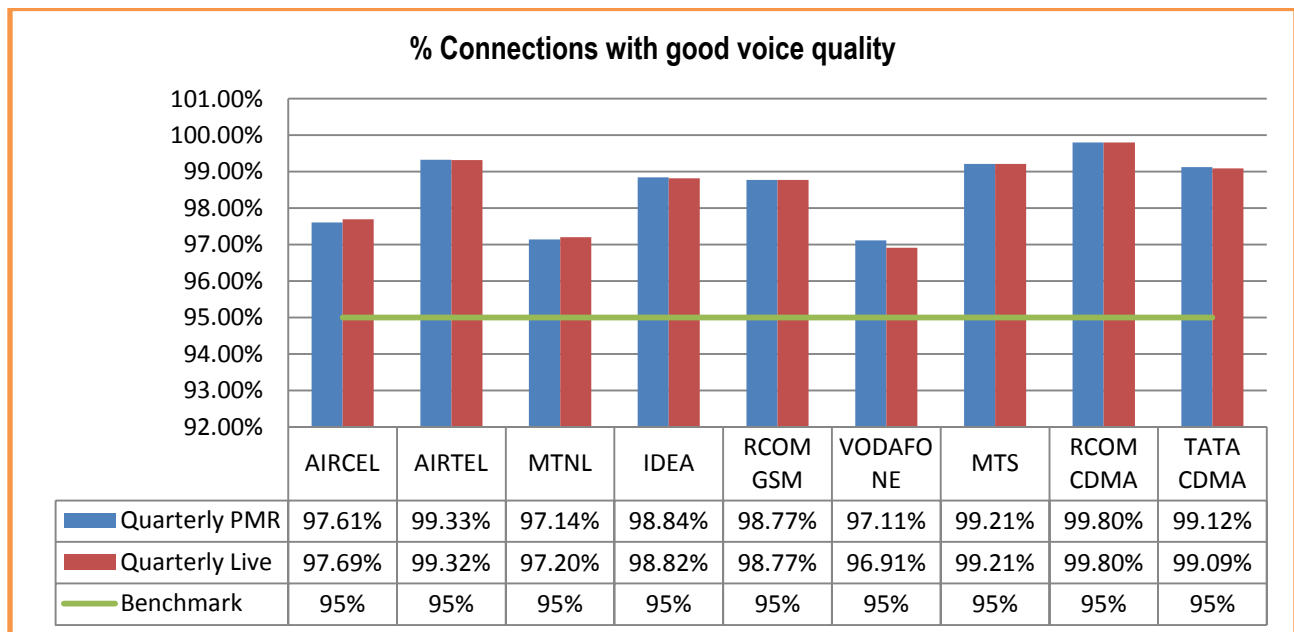
All operators are meeting the benchmarks.

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



All operators are meeting the benchmarks except Aircel & Vodafone.

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



All operators are meeting the benchmarks.

## **9. QOS AUDIT OF BASIC (WIRELINE) SERVICE PROVIDERS**



## 9) QOS AUDIT OF BASIC TELEPHONE SERVICE (WIRELINER)

The QoS audit for basic (wire line) service was to be done for the number of exchanges spread over in about 10% of SDCAs with each service providers in specified circles. Out of 364 in Delhi (present no. of MTNL exchanges), audit was done for 18 sampled (18-Urban) exchanges. In case of Private Service provider's two exchanges each of Bharti & Vodafone and one exchange of each TTL & RCL were covered for audit. (List of exchanges undertaken for QoS audit attached as Annex-1)

Sr. No	Service Provider	Circle	Urban Exchange	Rural Exchange	Total Exchange	No. of Urban Exchanges Covered for audit	No. of Rural Exchanges Covered for audit
1	MTNL	Delhi	364	0	364	18	0
2	Bharti-Airtel	Delhi	7	0	7	2	0
3	RCL	Delhi	2	0	2	1	0
4	TTL	Delhi	3	0	3	1	0
5	Vodafone	Delhi	6	0	6	2	0
<b>Total Exchanges</b>			<b>382</b>	<b>0</b>	<b>382</b>	<b>24</b>	<b>0</b>

For MTNL exchanges, performance against each parameter has been evaluated by taking average of performance value of each parameter for all the audited exchanges. The average performance value for each parameter has been given in Tables below.

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

AVERAGED QUARTERLY (OCT TO DEC 14) AUDIT DATA FOR WIRELINE (BASIC) SERVICES								
Sl. No.	Parameters	Benchmark	Period	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
1	<b>Fault incidences</b>							
	(No. of faults/100 subscribers /month)	< 7%	Quarterly	3.33%	7.03%	0.11%	0.71%	0.46%
2	<b>Faults Repair/Restoration Time</b>							
	Fault repair by next working day(Urban Area)	>85%	Quarterly	89.87%	87.49%	100.00%	93.48%	91.70%
	Within 5 days day	100%	Quarterly	100.00%	97.85%	100.00%	100.00%	100.00%
	Fault repair by next working day(Rural & hilly Area)	>75%	Quarterly	NA	NA	NA	NA	NA
	Within 5 days	100%	Quarterly	NA	NA	NA	NA	NA
	Mean time to Repair(MTTR)	≤10 Hrs	Quarterly	4.58	4.41	NP	5.00	4.42
3	<b>Rent Rebate</b>							
	Fault pending > 3 days & <7 days	Rebate for 7 days	Quarterly	2313	3121	0	0	0
	Fault Pending > 7 days & < 15 days	Rebate for 15 days	Quarterly	116	1447	0	0	0
	Fault pending > 15 days	Rebate for 1 month	Quarterly	4	1101	0	0	0
5	<b>Metering &amp; Billing Performance</b>							
	Disputed Bills over bills issued (Post Paid)	< 0.1%	Quarterly	0.01%	0.01%	0.01%	0.03%	0.00%
	% of Pre-paid Charging Complaints	< 0.1%	Quarterly	NA	NA	NA	NA	NA
	% of billing complaints resolved within 4 weeks	98% within 4 weeks	Quarterly	100.00%	98.44%	100.00%	100.00%	100.00%
	% of billing complaints (for post paid customer) / Charging/Credit/Validity (for Pre paid customer) resolved within 6 weeks	100% within 6 weeks	Quarterly	100.00%	100.00%	100.00%	100.00%	100.00%
	Period of applying credit/Waiver/Adjustment to customers	≤1 week	Quarterly	Within 1 Week	Within 1 Week	Within 1 Week	Within 1 Week	Within 1 Week
6	<b>POI Congestion</b>							
	No. of POI's having congestion >0.5%		Quarterly	0	0	0	0	0
7	<b>Response Time to customer for assistance</b>							
	Accessibility of Call centre/customer Care	≥95%	Quarterly	100.00%	99.79%	93.75%	97.90%	100.00%
	% age of calls answered by operator(voice to voice) within 90 seconds	≥95%	Quarterly	97.68%	99.75%	95.19%	95.86%	98.03%
8	<b>Customer care(promptness in attending to customers request)</b>							
	Termination / Closures	100%	Quarterly	100.00%	100.00%	100.00%	100.00%	100.00%
	Time taken for refunds of deposit after closures	100%	Quarterly	100.00%	95.62%	100.00%	100.00%	100.00%

NA-Not Applicable

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

3 DAYS LIVE DATA FOR WIRELINE (BASIC) SERVICES								
SI No.	Parameters	Benchmark	Period	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
1	<b>POI Congestion</b>							
	No. of POI's having congestion >0.5%		Quarterly	0	0	0	0	0
2	<b>Response Time to customer for assistance</b>							
	Accessibility of Call centre/customer Care within 40 seconds	≥95%	Quarterly	100.00%	99.81%	99.63%	100.00%	NP
	% age of calls answered by operator(voice to voice) within 60 seconds	≥95%	Quarterly	<b>94.21%</b>	98.58%	98.95%	97.30%	NP

NA-Not Applicable  
NP-Not Provided

### 9.3 KEY FINDINGS: BASIC TELEPHONE SERVICES (WIRELINER)

**Fault Incidences:** The audit of the service providers revealed that the performance of all service providers was well within the benchmark. However, **MTNL** was very marginally beyond the benchmark having its performed value as **7.03%**.

**Fault Repair/Restoration Time:** **MTNL** could not meet the benchmark of Fault repaired within 5 days by achieving its performance as **97.85%**.

**Mean Time to Repair:** All operators met the benchmark for this parameter.

**Metering and Billing performance:** For this parameter also, the performance of the service providers was found well within the compliance benchmarks.

**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 **RCL** only was found below the benchmark with its performance level as **93.75%** against the benchmark of >95%.

With respect to the parameter of **calls answered by operator (voice to voice)**, all operators met the benchmark

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

**Time taken for refund of deposit:** Only **MTNL** failed to meet the benchmark as it could settle **95.62%** of cases of refunds after closure against benchmark of 100%.

*Thus, from the above findings that, it was concluded that the performance of **MTNL** was not satisfactory in respect of the parameters **Fault Incidences, Fault Repair/Restoration Time, and Refund of deposit.** **RCL** also failed to meet the benchmarks of the parameters **Accessibility of call center.** Hence, **MTNL** and **RCL** need to improve their services in respect of these parameters*



### 9.4 INTER OPERATOR CALL ASSESSMENT (WIREFINE)

Inter operator call assessment with a sample of 2x50 test calls for each Service provider operating in Delhi Service Area 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	MTNL	RCL	TTL	VODAFONE
BHARTI AIRTEL	Delhi	100	--	100%	100%	100%	100%
MTNL	Delhi	100	99%	--	99%	100%	100%
RCL	Delhi	100	100%	98%	--	96%	100%
TTL	Delhi	100	100%	100%	100%	--	100%
VODAFONE	Delhi	100	100%	100%	100%	100%	--

The result of the testing revealed that the inter operator connection performance among the operators was quite satisfactory. However, in case where calls attempted from MTNL to Bharti Airtel and RCL, successful interconnection was 99%, Reliance to MTNL and TTL was 98% and 96% respectively. 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 (WIREFINE)

LEVEL 1 LIVE CALLING							
Emergency no.	Circle Name	No. of calls made	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
100	Delhi	20	√	√	√	√	√
101	Delhi	20	√	√	√	√	√
102	Delhi	20	√	√	√	√	√
1091	Delhi	20	√	√	√	√	√

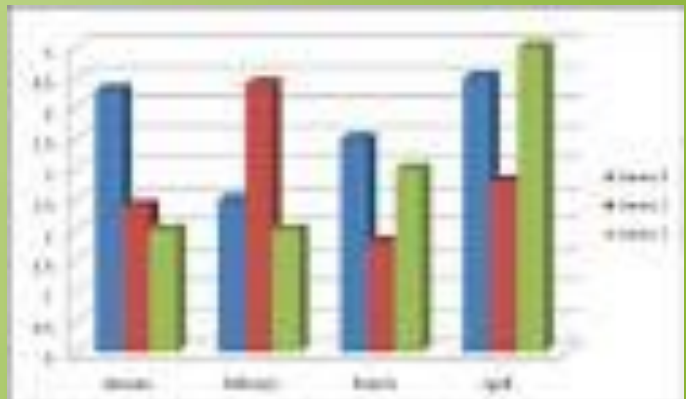
To assess the availability and efficiency of level 1 service such as police, fire, ambulance (emergency services) offered by MTNL, Bharti Airtel, Reliance, TTL and Vodafone, the calls were made from telephone provided by service providers , these services were found functional in the networks of all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

**9.6 CUSTOMER CARE / HELPLINE ASSESSMENT (WIRELINE SERVICES)**

LIVE CALLING TO CALL CENTRE						
	Circle	BHARTI AIRTEL	MTNL	RCL	TATA	VODAFONE
Total No. of calls Attempted	Delhi	100	100	100	100	100
A) Total no of calls attempted to customer care/Call center	Delhi	100	100	100	100	100
B) Total no. of calls successfully established to customer care/Call center	Delhi	100	100	100	100	100
C) % Accessibility of Call centre /customer Care (Total call attempt*100/ Total call successfully established)	Delhi	100.00%	100.00%	100.00%	100.00%	100.00%
D) Total Calls reached to agent desk for Voice to Voice (Total call attempt)	Delhi	99	98	100	100	98
E) Total number of calls answered by the operator (Voice to voice) within 90 seconds	Delhi	99	98	100	100	98
F) % age of calls answered by the operators (voice to voice) within 90 seconds (E *100/ D)	Delhi	99.00%	98.00%	100.00%	100.00%	98.00%

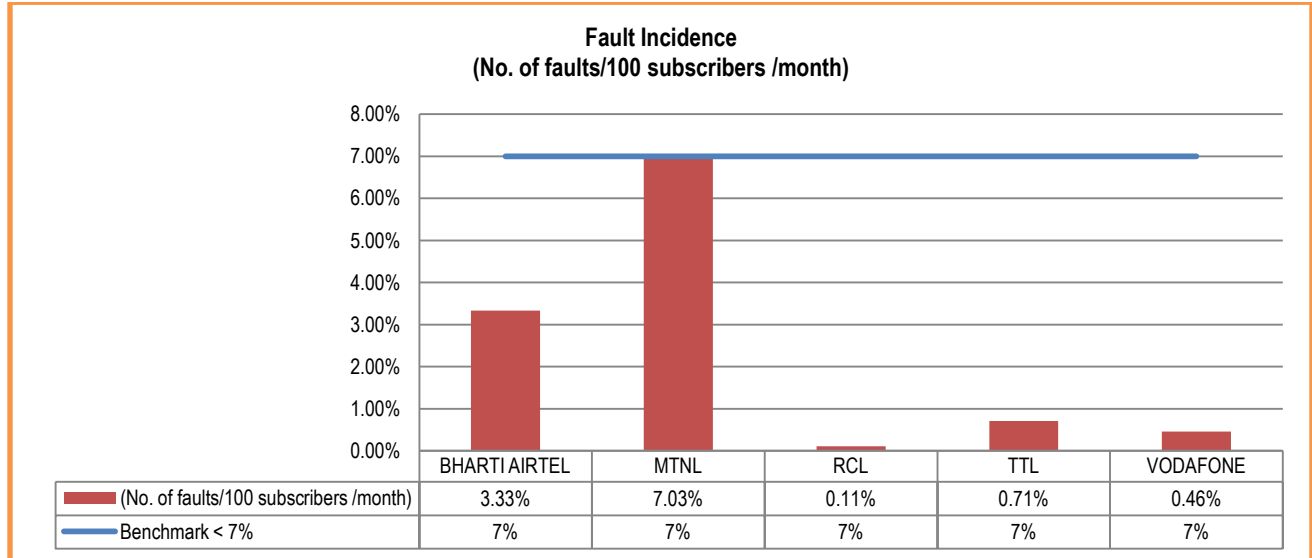
In case of calls answered by operators (voice to voice), when test calls were made to the call centers of different service providers, 98% to 100% of calls were answered by the call center operators within stipulated time.

## GRAPHICAL REPRESENTATION OF BASIC (WIRELINE) SERVICES



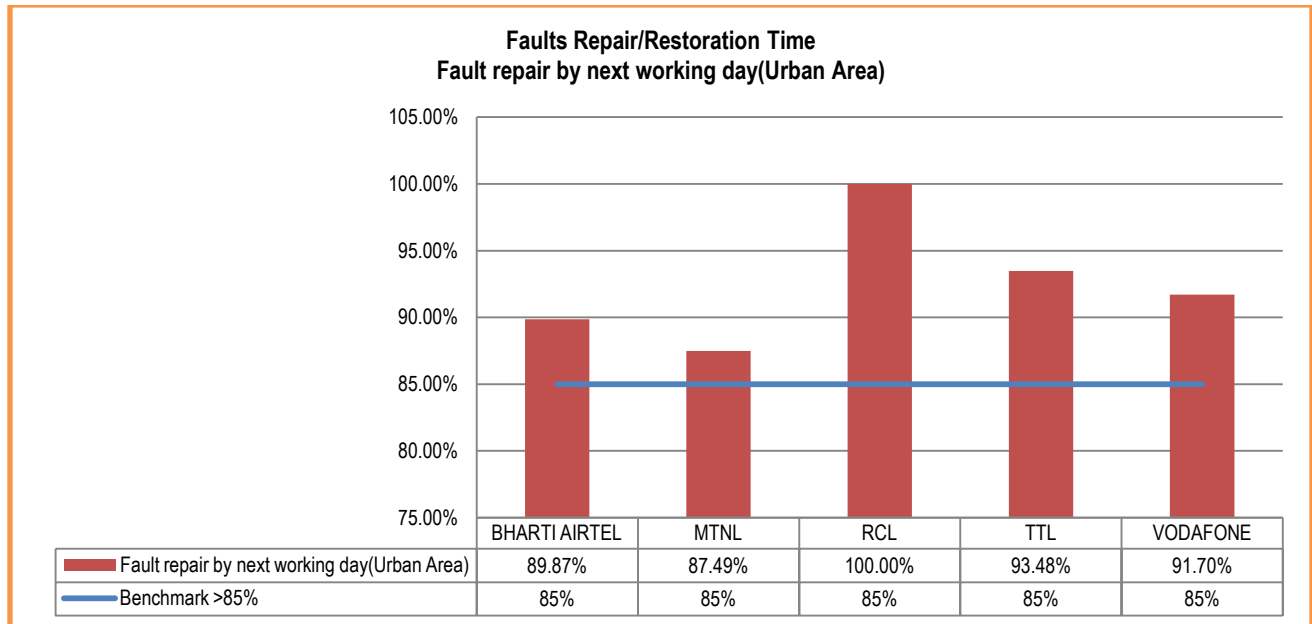
### 9.7 GRAPHICAL REPRESENTATION OF QUARTERLY PERFORMANCE OF THE BASIC TELEPHONE SERVICE (WIRELINE) PROVIDERS:

#### 1) FAULT INCIDENCE:



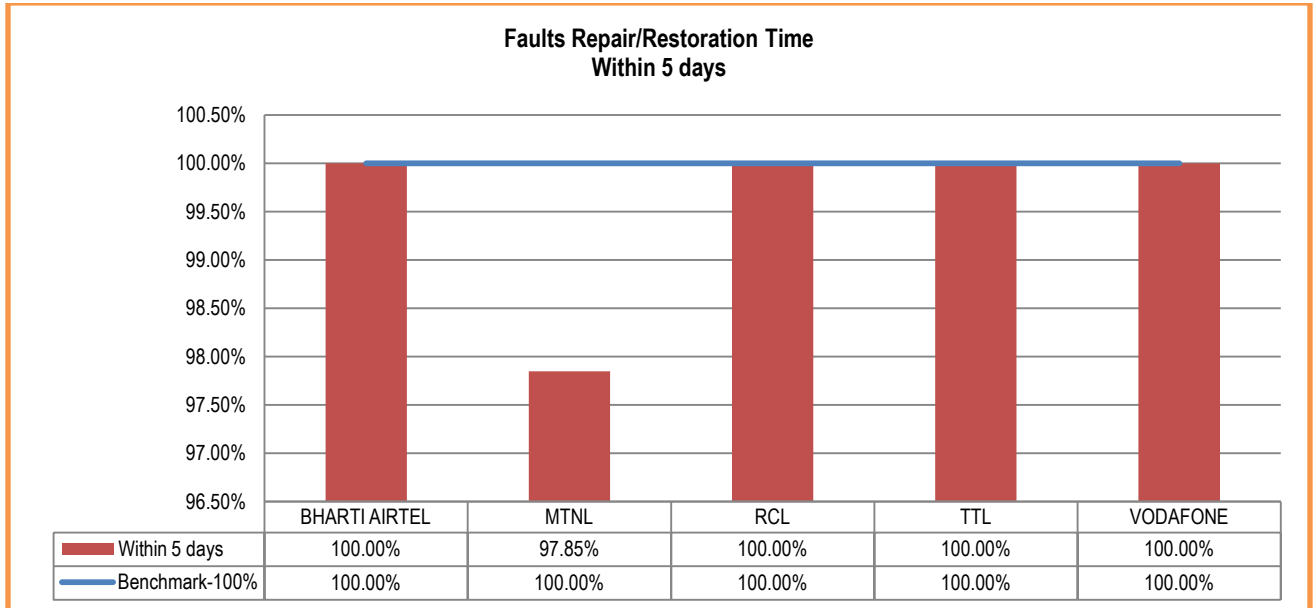
All Operators are meeting the benchmarks except MTNL.

#### 2) FAULTS REPAIR/RESTORATION TIME:



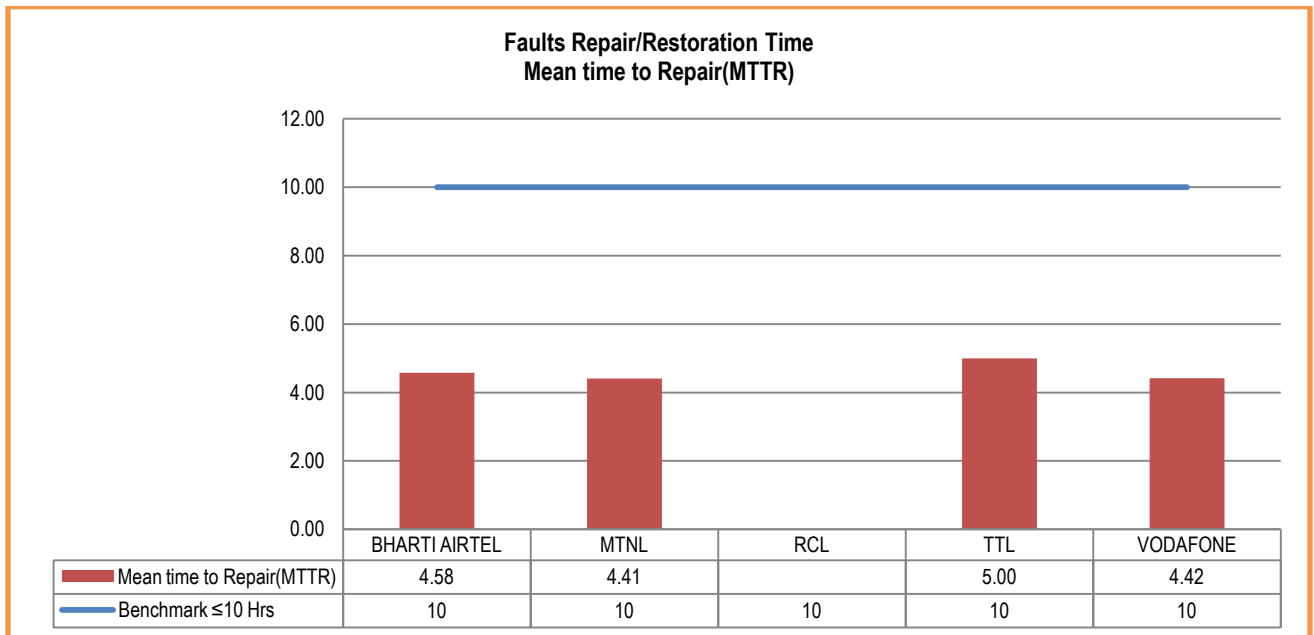
All Operators are meeting the benchmarks.

**3) FAULTS REPAIR/RESTORATION TIME WITHIN 5 DAYS:**



All Operators are meeting the benchmarks except MTNL.

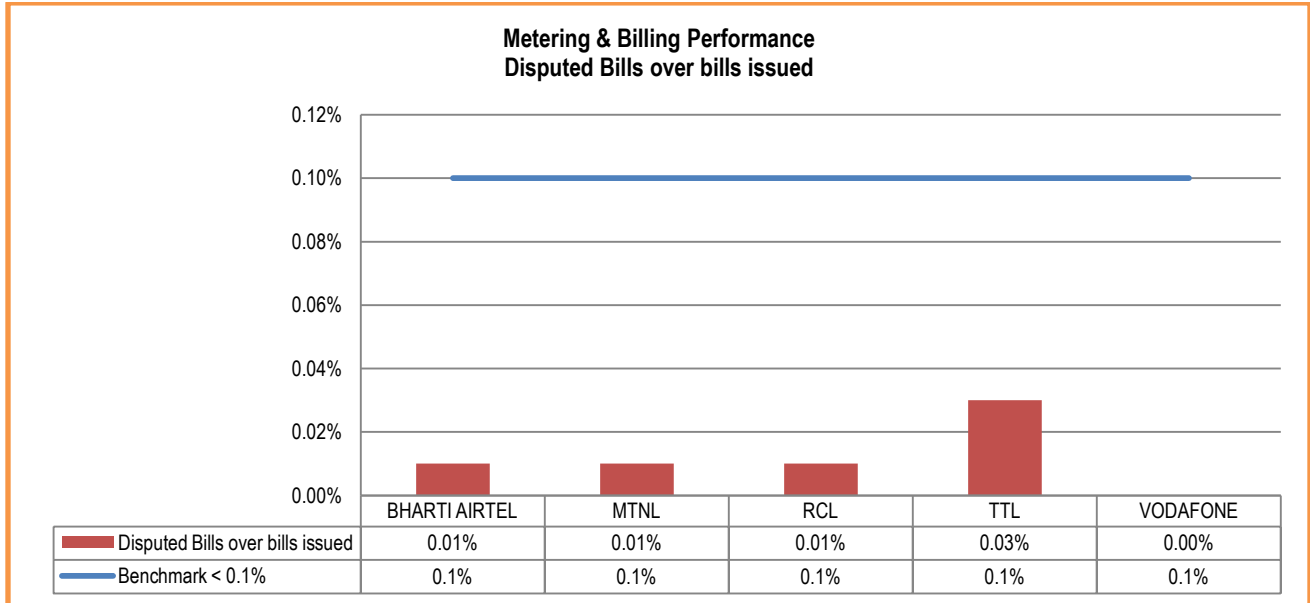
**4) MEAN TIME TO REPAIR (MTTR):**



All Operators are meeting the benchmarks and RCL do not have any fault during this quarter.

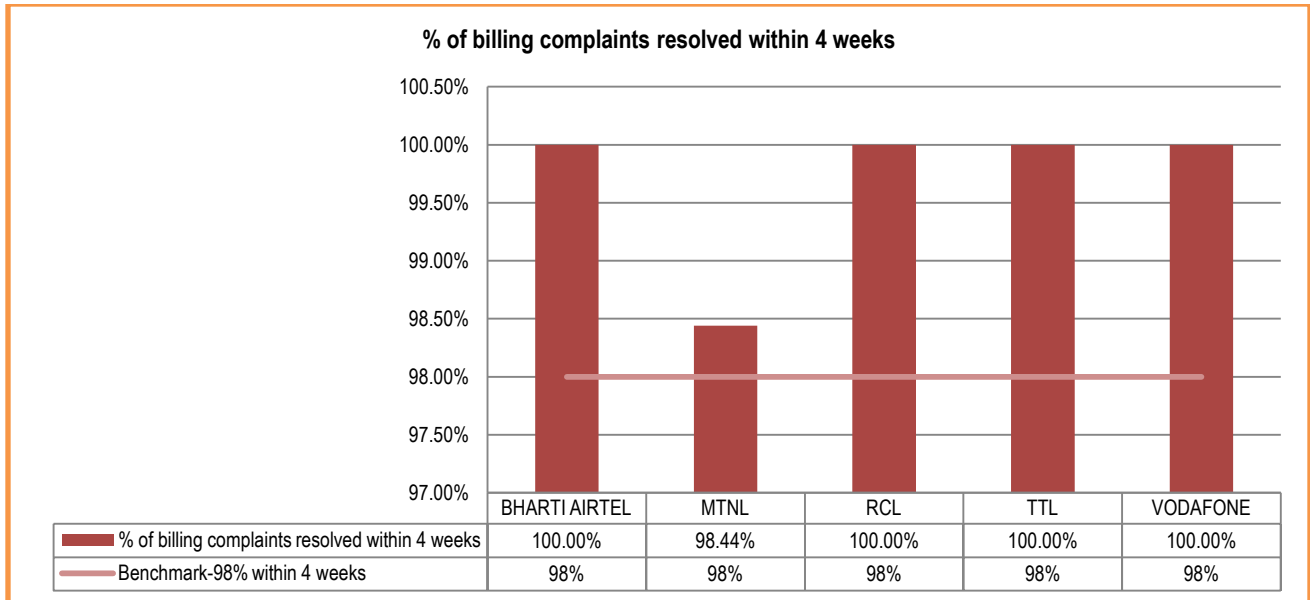
**5) METERING & BILLING PERFORMANCE:**

**a) DISPUTED BILLS OVER BILL ISSUED :**



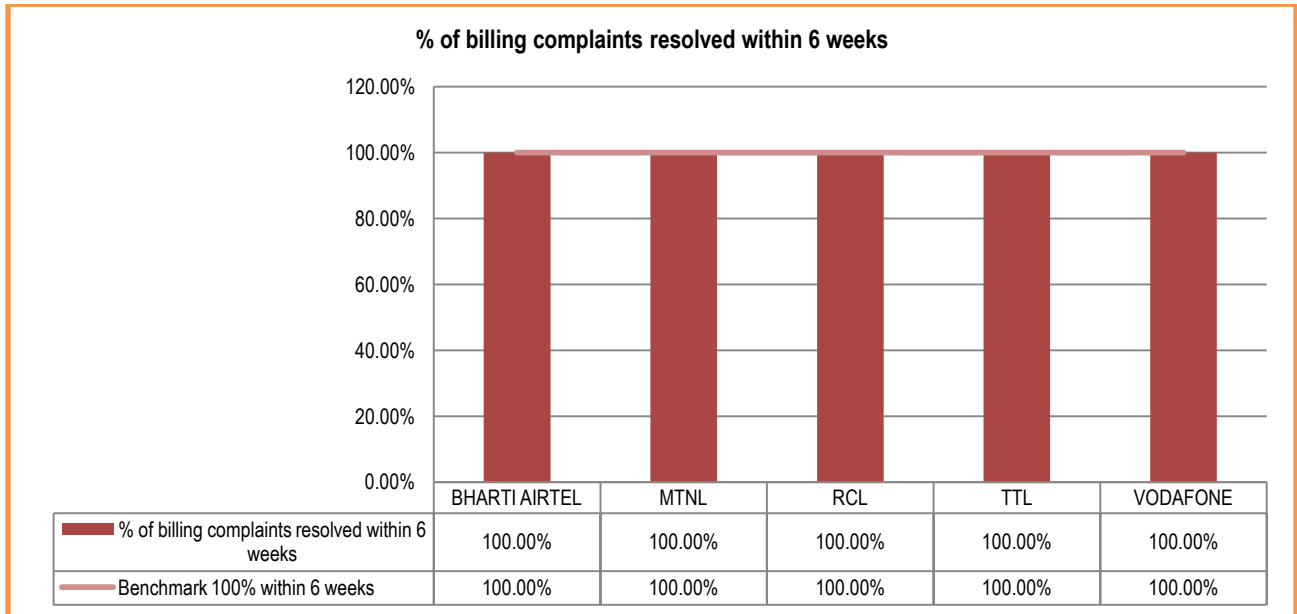
All Operators are meeting the benchmarks.

**b) BILLING COMPLAINT RESOLUTION WITHIN 4 WEEKS:**



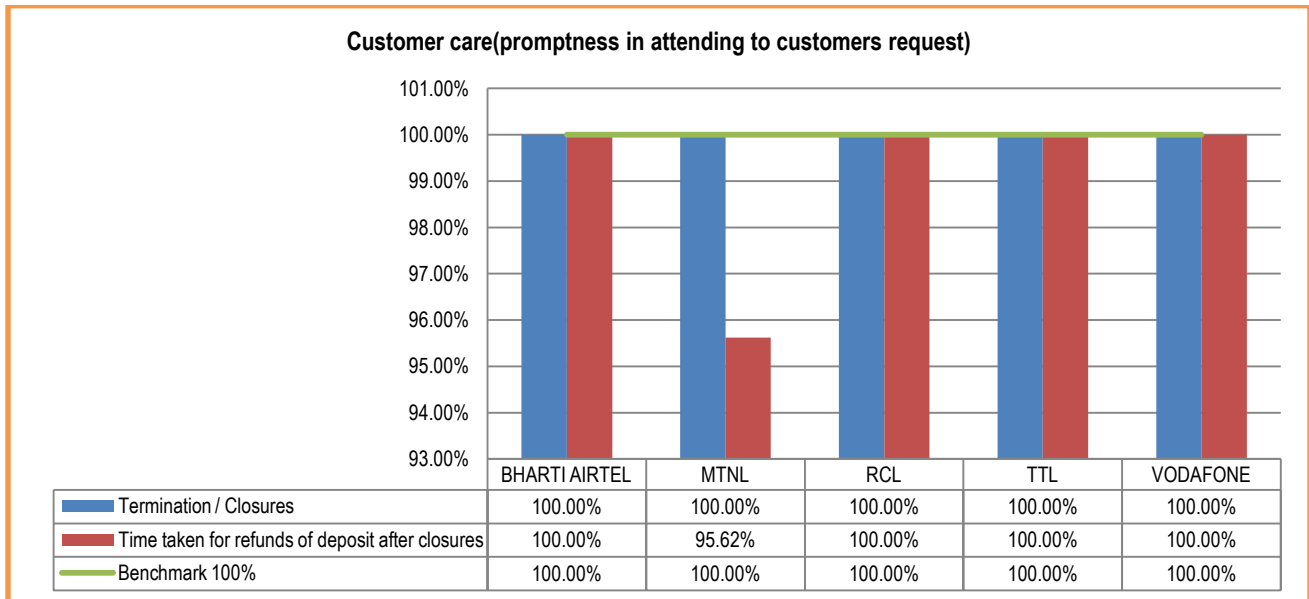
All Operators are meeting the benchmarks.

**c) BILLING COMPLAINT RESOLUTION WITHIN 6 WEEKS:**



All Operators are meeting the benchmarks.

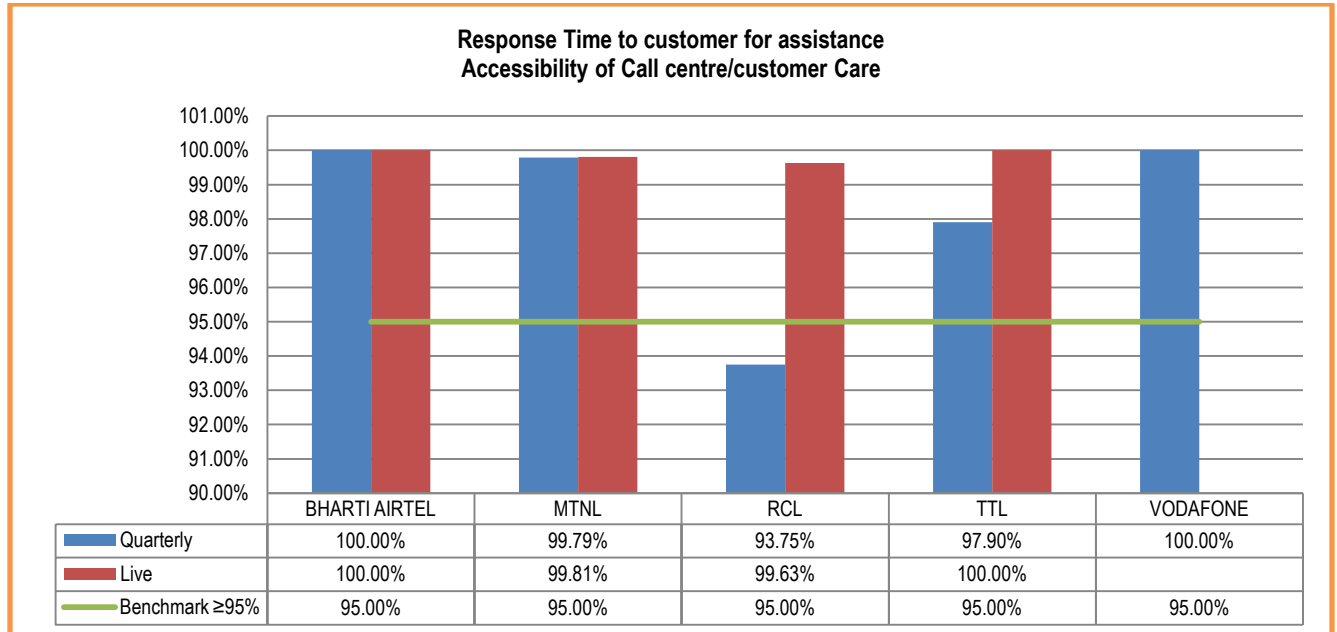
**6) TERMINATION & CLOSURES:**



All Operators are meeting the benchmarks except MTNL for the Parameter Time taken for Refund.

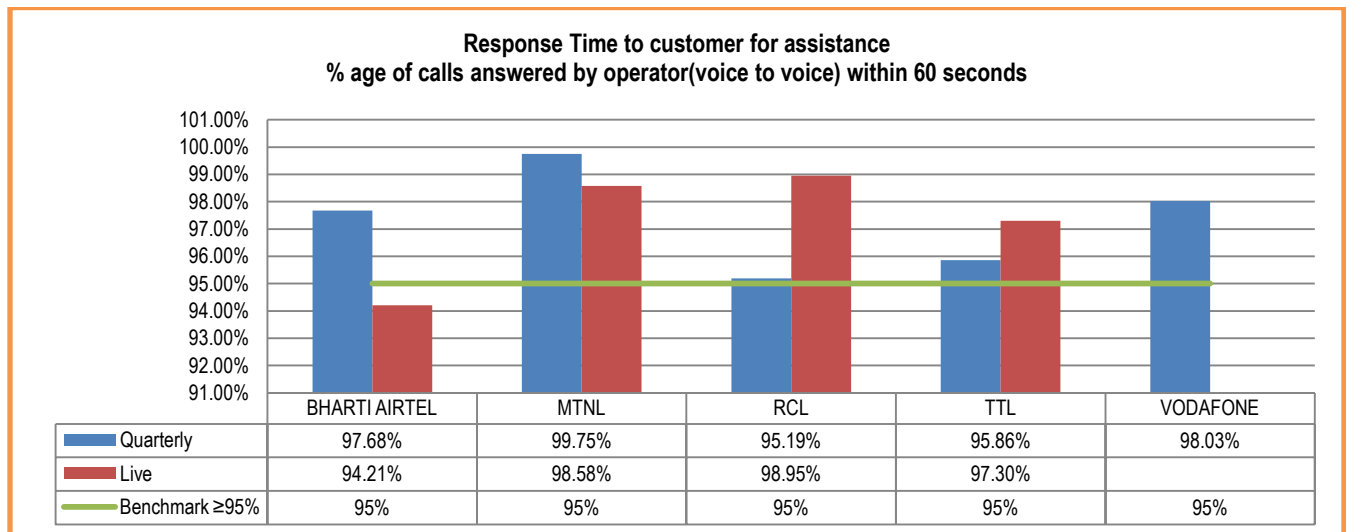
**9.8 GRAPHICAL REPRESENTATION OF PERFORMANCE OF THE BASIC TELEPHONE SERVICE (WIRELINE) PROVIDERS V/S 3-DAYS LIVE MEASUREMENT:**

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



All Operators are meeting the benchmarks except RCL and Vodafone has not provided data for this parameter (3 day live)

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



All Operators are meeting the benchmarks except Bharti Airtel (3 day live) and Vodafone has not provided data for this parameter (3 day live).



## **10. QOS AUDIT OF BROADBAND SERVICE PROVIDERS**



## 10) QUALITY OF SERVICE AUDIT OF 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. Location of PoPs, covered for QoS audit is attached as **Annex-2**.

Discussion with the 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	LOCATION OF AUDIT
1	BHARTI-AIRTEL	BHARTI AIRTEL LIMITED, GURGAON, HARYANA
2	INUDS	INDUSIND MEDIA & COMMUNICATIONS LTD, MOTI NAGAR, DELHI
3	HATHWAY	HATHWAY CABLE & DATACOM LTD., AB-17 FF SAFDERJUNG ENCLAVE, DELHI
4	MTNL	KIDWAI BHAVAN, NEW DELHI
5	NSTPL	NOIDA SOFTWARE TECHNOLOGY PARK LTD, NOIDA, UP
6	PACENET	BROADBAND PACENET INDIA PVT. LTD., SUBHASH NAGAR, DELHI
7	RCL	DAKC, MUMBAI
8	SPECTRANET	CITYCOM NETWORKS PRIVATE LIMITED, GURGAON, HARYANA
9	TCL	TTML, AL-AQMAR BUILDING, 5- GANESHKHIND ROAD,SHIVAJI NAGAR,PUNE, PUNE-411005,MHG
10	TTL	TTML, AL-AQMAR BUILDING, 5- GANESHKHIND ROAD,SHIVAJI NAGAR,PUNE, PUNE-411005,MHG
11	TIKONA	TIKONA DIGITAL NETWORKS PVT. LTD. ,N A-83, OKHLA INDUSTRIAL ESTATE, PHASE II, NEW DELHI 110020

**10.1 QUARTERLY MEASUREMENT DATA FOR BROADBAND SERVICE PROVIDERS**

AVERAGED QUARTERLY (OCT TO DEC 14) AUDIT DATA FOR BROADBAND SERVICES – DELHI METRO CIRCLE														
Broadband Audit Data		Benchmark	Circle Name	BHARTI AIRTEL	INDUS	HATHWAY	MTNL	NSTPL	PACENET	RCL	SPECTRANET	TCL	TTL	TIKONA
S/ N	Name of Parameter	BROADBAND SERVICE PROVIDERS												
1	Service Provisioning/Activation Time													
	A) No of connections registered during the period		Delhi	28264	146	2903	18070	40	1602	856	4743	0	1080	6125
	B) Total number of connections provided within 15 days of registration on demand during the period		Delhi	28264	139	2903	18070	40	1602	856	4743	0	1080	6125
	C) % age of connections provided within 15 days of registration on demand (subject to technical feasibility)	<15 days	Delhi	100.00%	95.21%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	D) Total number of connections provided after 15 days of registration on demand		Delhi	0	146	0	0	0	0	0	0	0	0	0
	E) %age of connections provided after 15 days of registration on demand		Delhi	0.00%	100.00%	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.	Delhi	0	0	0	0	0	0	0	0	0	0	0
2	Fault Repair/Restoration Time													
	A) Total number of faults registered during the period		Delhi	84403	554	25704	286041	438	2291	970	12257	2452	1096	10391
	B) Total number of faults repaired by next working day		Delhi	76654	542	25052	230978	438	2150	970	11943	2384	938	9383
C) % age of faults repaired by next working day	>90%	Delhi	90.82%	97.83%	97.46%	80.75%	100.00%	93.85%	100.00%	97.44%	97.23%	85.58%	90.30%	

AUDIT & ASSESSMENT OF QOS FOR QE-DECEMBER 2014-DELHI METRO CIRCLE



AVERAGED QUARTERLY (OCT TO DEC 14) AUDIT DATA FOR BROADBAND SERVICES – DELHI METRO CIRCLE														
Broadband Audit Data		Bench- mark	Circle Name	BHARTI	INDUS	HATHWAY	MTNL	NSTPL	PACENET	RCL	SPECTRANET	TCL	TTL	TIKONA
S/ N	Name of Parameter			BROADBAND SERVICE PROVIDERS										
	D) Total number of faults repaired within three working days		Delhi	83647	554	25432	270709	438	2291	970	12181	2424	1073	10303
	E)% age of faults repaired within three working days	≥99%	Delhi	99.10%	100.00%	<b>98.94%</b>	<b>94.64%</b>	100.00%	100.00%	100.00%	99.38%	<b>98.86%</b>	<b>97.90%</b>	99.15%
<b>Rent Rebate</b>														
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)		Delhi	0	0	25	7202	0	0	0	42	0	0	53
	B) Faults Pending for > 7 working days and < 15 working days: (Rebate equivalent to 15 days of minimum monthly charge or equivalent usage allowance)		Delhi	0	23	25	2617	0	0	0	0	0	0	41
	C) Faults Pending for > 15 working days:(Rebate equivalent to one month of minimum monthly charge or equivalent usage allowance)		Delhi	0	0	109	1055	0	0	0	0	0	0	33
<b>Billing Performance</b>														
4	A) Total bills generated during period		Delhi	1521034	1393	20825	1212518	9929	18922	40655	21930	4141	11142	71510
	B) Total complaints received from customers/ Bills disputed		Delhi	148	0	147	718	0	99	92	51	5	43	395
	C) Billing complaints per 100 bills issued	<2%	Delhi	0.01%	0.00%	0.71%	0.06%	0.00%	0.52%	0.23%	0.23%	0.12%	0.39%	0.55%
	D) Total number of complaints resolved in 4 weeks from date of receipt		Delhi	148	0	147	718	0	99	92	51	5	43	395
	E) %age billing complaints resolved in 4 weeks	100%	Delhi	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

**AUDIT & ASSESSMENT OF QOS FOR QE-DECEMBER 2014-DELHI METRO CIRCLE**



<b>AVERAGED QUARTERLY (OCT TO DEC 14) AUDIT DATA FOR BROADBAND SERVICES – DELHI METRO CIRCLE</b>														
<b>Broadband Audit Data</b>		<b>Bench- mark</b>	<b>Circle Name</b>	<b>BHARTI AIRTEL</b>	<b>INDUS</b>	<b>HATHWAY</b>	<b>MTNL</b>	<b>NSTPL</b>	<b>PACENET</b>	<b>RCL</b>	<b>SPECTRANET</b>	<b>TCL</b>	<b>TTL</b>	<b>TIKONA</b>
<b>S/ N</b>	<b>Name of Parameter</b>			<b>BROADBAND SERVICE PROVIDERS</b>										
	F) Total number of cases requiring refund of deposits after closure		Delhi	178	0	93	0	0	0	0	0	5	0	40
	G) Total number of cases where refund was made in <60 days		Delhi	178	0	93	0	0	0	0	0	5	0	40
	H) Percentage cases in which refund received within 60 days	100%	Delhi	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
<b>Response time to the customer for assistance % age of calls answered by operator (Voice to Voice)</b>														
5	A) Total number of calls received by the operator		Delhi	729818	556	84638	322259	438	2550	38705	74605	124656	2674	169980
	B) Total number of calls answered by the operator within 60 seconds		Delhi	682469	556	72055	321822	438	2350	36780	67119	108921	2186	109900
	C) % age calls answered by the operator in 60 seconds	>60%	Delhi	93.51%	100.00%	85.13%	99.86%	100.00%	92.16%	95.03%	89.97%	87.38%	81.75%	64.65%
	D) Total number of calls answered by the operator within 90 seconds		Delhi	696500	556	79842	322005	438	2510	37000	68672	110810	2267	136780
	E) % age calls answered by the operator within 90 seconds	>80%	Delhi	95.43%	100.00%	94.33%	99.92%	100.00%	98.43%	95.59%	92.05%	88.89%	84.78%	80.47%
6	<b>Bandwidth Utilization/ Throughput: (If on any link(s) / route bandwidth utilization exceeds 90%, then network is considered to have congestion. For this additional provisioning of Bandwidth on immediate basis, but not later than one month, is mandated.) &lt; 80% link(s) / route bandwidth utilization during peak hours (TCBH).</b>													
6.1	<b>POP to ISP Gateway Node [Intra-network] Link(s)</b>													
	A) Total Bandwidth Available at the link for the period days		Delhi	5878359	NA	2085	61440	1440	3035	27000	24876	87659942	NA	16632
	B) Total Bandwidth utilized during the period during TCBH (In Mbps)		Delhi	257753.80	NA	1340.14	27811.84	900.00	1645.60	3279	10441.80	365016	NA	11522
	C) % age Bandwidth utilized during the period	<80%	Delhi	4.38%	NA	64.28%	45.27%	62.50%	54.22%	12.14%	41.98%	41.64%	NA	69.28%

AVERAGED QUARTERLY (OCT TO DEC 14) AUDIT DATA FOR BROADBAND SERVICES – DELHI METRO CIRCLE														
Broadband Audit Data		Bench- mark	Circle Name	BHARTI	INDUS	HATHWAY	MTNL	NSTPL	PACENET	RCL	SPECTRANET	TCL	TTL	TIKONA
S/ N	Name of Parameter			BROADBAND SERVICE PROVIDERS										
6.2	A) ISP Gateway Node to IGSP / NIXI Node upstream Link(s) for International connectivity													
	A) Total number of upstream links for International connectivity		Delhi	36	NA	18	12	NA	NA	33	27	48	3	12
	B) Number of Links having Bandwidth utilization > 90% during TCBH		Delhi	0	NA	0	0	NA	NA	0	0	0	0	0
	C) Total international bandwidth available from ISP Node to IGSP/NIXI/NAP		Delhi	286500	NA	2267	5454257	NA	NA	312000	21837	955392	21700	5600
	D) Total international bandwidth utilization during peak hours (TCBH) in Mpbs		Delhi	224862	NA	1501.93	46470.27	NA	NA	156087.14	15556.10	456000	16646	4466.01
	E) %age International Bandwidth utilization during peak hours (TCBH)	<80%	Delhi	78.49%	NA	66.25%	85.20%	NA	NA	50.03%	71.24%	47.73%	76.71%	79.75%
6.3	Broadband Connection Speed (download) - from ISP Node to User													
	A) Total committed download speed to the sample subscribers (In mpbs)		Delhi	8.98	NP	3.51	6	6.00	NP	205.00	6.00	0.75	NP	6.00
	B) Total average download speed observed for the sample subscribers during TCBH (In Mpbs)		Delhi	10.70	NP	3.02	5.83	6.00	NP	317.00	5.60	0.72	NP	5.84
	C) % age subscribed speed available to the subscriber during TCBH	>80%	Delhi	119.15%	NP	86.04%	97.17%	100.00%	NP	154.63%	93.33%	96.00%	NP	97.33%
7	Service Availability/Uptime													
	A) Total operational Hours		Delhi	1119481488	2208	2208	1718601216	2208	2160	2208	18539640	951000	47112	2208
	B) Total downtime (In hours)		Delhi	215835	0	18.40	2551960	0	72	11.05	48832	448	53	1.22
	C) Total time when the service was available (In Hrs)		Delhi	1119265653	2208	2189.60	1716049256	2208	2088	2196.95	18490808	950552	47059	2206.78

AVERAGED QUARTERLY (OCT TO DEC 14) AUDIT DATA FOR BROADBAND SERVICES – DELHI METRO CIRCLE														
Broadband Audit Data		Bench- mark	Circle Name	BHARTI	INDUS	HATHWAY	MTNL	NSTPL	PACENET	RCL	SPECTRANET	TCL	TTL	TIKONA
S/ N	Name of Parameter			BROADBAND SERVICE PROVIDERS										
	D) % age of Service availability uptime	>98%	Delhi	99.98%	100.00%	99.17%	99.85%	100.00%	96.67%	99.50%	99.74%	99.95%	99.89%	99.94%
8	<b>Packet Loss</b>													
	A) Total number of ping packets transmitted		Delhi	3000	NP	3000	92000	3000	NP	92000	13000	92000	17070	3000
	B) Total number of ping packets lost		Delhi	0	NP	0	86	6	NP	452	6	0	33	0
	C) % age packet loss	<1%	Delhi	0.00%	NP	0.00%	0.09%	0.20%	NP	0.49%	0.05%	0.00%	0.19%	0.00%
9	<b>Network latency (for wired broadband access)</b>													
9.1	<b>Network Latency from User reference point at POP/ISP Node to IGSP/NIXI gateway</b>													
	A) Total number of ping packets transmitted		Delhi	3000	NP	3000	92000	3000	NA	3000	13000	3000	17070	NA
	B) Total round trip time for all the ping packets transmitted during the period		Delhi	101000	NP	76	1311	12	NA	48	13	46	728622	NA
	C) Average round trip time for all the ping transmitted	<120 ms	Delhi	101.00	NP	76.00	42.74	4.00	NA	16.00	4.35	7.00	44.00	NA
9.2	<b>Network Latency from User reference point at ISP Node to nearest NAP Port abroad (Terrestrial)</b>													
	A) Total number of ping packets transmitted		Delhi	3000	NP	3000	3000	NA	NP	3000	3000	3000	3600	NA
	B) Total round trip time for all the ping packets transmitted during the period		Delhi	247000.00	NP	566	708	NA	NP	52	503.50	268	257760	NA
	C) Average round trip time for all the ping transmitted	<350 ms	Delhi	247.00	NP	566.00	236.00	NA	NP	17.33	167.83	9.00	71.60	NA
9.3	<b>Network Latency from User reference point at ISP Node to nearest NAP Port abroad (Satellite)</b>													
	A) Total number of ping packets transmitted		Delhi	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

AVERAGED QUARTERLY (OCT TO DEC 14) AUDIT DATA FOR BROADBAND SERVICES – DELHI METRO CIRCLE														
Broadband Audit Data		Bench- mark	Circle Name	BHARTI AIRTEL	INDUS	HATHWAY	MTNL	NSTPL	PACENET	RCL	SPECTRANET	TCL	TTL	TIKONA
S/ N	Name of Parameter			BROADBAND SERVICE PROVIDERS										
	B) Total round trip time for all the ping packets transmitted during the period		Delhi	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	C) Average round trip tip time for all the ping transmitted	<800 ms	Delhi	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

NA- Not Applicable

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 - DELHI METROCIRCLE														
3 days live Broadband Audit Data		Bench- mark	Circle Name	BHARTI AIRTEL	INDUS	HATHWAY	MTNL	NSTPL	PACENET	RCL	SPECTRANET	TCL	TTL	TIKONA
S/ N	Name of Parameter			BROADBAND SERVICE PROVIDERS										
<b>Response time to the customer for assistance % age of calls answered by operator (Voice to Voice)</b>														
1	A) Total number of calls received by the operator		Delhi	29165	14	3593	12330	16	69	1397	2354	4077	63	5057
	B) Total number of calls answered by the operator within 60 seconds		Delhi	27872	14	2608	12308	16	60	1381	2105	3717	58	3499
	C) % age calls answered by the operator in 60 seconds	>60%	Delhi	95.57%	100.00%	72.59%	99.82%	100.00%	86.96%	98.85%	89.42%	91.17%	92.06%	69.19%
	D) Total number of calls answered by the operator within 90 seconds		Delhi	28419	14	3120	12316	16	69	1388	2179	3781	58	4441
	E) % age calls answered by the operator within 90 seconds	>80%	Delhi	97.44%	100.00%	86.84%	99.89%	100.00%	100.00%	99.36%	92.57%	92.74%	92.06%	87.82%
2	<b>Bandwidth Utilization/ Throughput: (If on any link(s) / route bandwidth utilization exceeds 90%, then network is considered to have congestion. For this additional provisioning of Bandwidth on immediate basis, but not later than one month, is mandated.) &lt; 80% link(s) / route bandwidth utilization during peak hours (TCBH).</b>													
<b>POP to ISP Gateway Node [Intra-network] Link(s)</b>														
2.1	A) Total Bandwidth Available at the link for the period days		Delhi	5819784	NA	2085	61440	1440	3075	138000	24876	1095948	NA	16992
	B) Total Bandwidth utilized during the period during TCBH (In Mpbs)		Delhi	277451.50	NA	1609.71	27463.68	1120	1839.59	36876	10981.60	554000	NA	10452.03
	C) % age Bandwidth utilized during the period	<80%	Delhi	4.77%	NA	77.20%	44.70%	77.78%	59.82%	26.72%	44.15%	50.59%	NA	61.51%
<b>A) ISP Gateway Node to IGSP / NIXI Node upstream Link(s) for International connectivity</b>														
2.2	A) Total number of upstream links for International connectivity		Delhi	36	NA	6	12	NA	NA	30	27	48	3	12

3 DAYS LIVE DATA FOR BROADBAND SERVICES - DELHI METROCIRCLE														
3 days live Broadband Audit Data		Bench- mark	Circle Name	BHARTI	INDUS	HATHWAY	MTNL	NSTPL	PACENET	RCL	SPECTRANET	TCL	TTL	TIKONA
S/ N	Name of Parameter			BROADBAND SERVICE PROVIDERS										
	B) Number of Links having Bandwidth utilization > 90% during TCBH		Delhi	0	NA	0	0	NA	NA	0	0	0	0	0
	C) Total international bandwidth available from ISP Node to IGSP/NIXI/NAP		Delhi	286500	NA	2523	54071	NA	NA	282000	21837	995392	24180	5850
	D) Total international bandwidth utilization during peak hours (TCBH) in Mbps		Delhi	224110	NA	1774.40	46484.47	NA	NA	186072	14401.80	603136	17393	4667.75
	E) %age International Bandwidth utilization during peak hours (TCBH)	<80%	Delhi	78.22%	NA	70.33%	85.97%	NA	NA	65.98%	65.95%	60.59%	71.93%	79.79%
<b>Broadband Connection Speed (download) - from ISP Node to User</b>														
2.3	A) Total committed download speed to the sample subscribers (In mpbs)		Delhi	6.00	12.00	3.51	6.00	3.00	8.00	3.60	6.00	0.75	NP	6.00
	B) Total average download speed observed for the sample subscribers during TCBH (In Mbps)		Delhi	6.51	11.81	3.02	5.91	2.97	8.00	3.30	5.70	0.72	NP	5.89
	C) % age subscribed speed available to the subscriber during TCBH	>80%	Delhi	108.50%	98.42%	85.88%	98.50%	99.00%	100.00%	91.67%	95.00%	96.00%	NP	98.17%
<b>Packet Loss</b>														
3	A) Total number of ping packets transmitted		Delhi	3000	3000	3000	3000	1000	3000	3000	3000	1000	15000	3000
	B) Total number of ping packets lost		Delhi	1	0	0	2	4	0	0	0	0	3	0
	C) % age packet loss	<1%	Delhi	0.03%	0.00%	0.00%	0.07%	0.40%	0.00%	0.00%	0.00%	0.00%	0.02%	0.00%
4	<b>Network latency (for wired broadband access)</b>													
<b>Network Latency from User reference point at POP/ISP Node to IGSP/NIXI gateway</b>														
4.1	A) Total number of ping packets transmitted		Delhi	3000	3000	3000	3000	1000	3000	3000	3000	3000	15000	NA
	B) Total round trip time for all the ping packets transmitted during the period		Delhi	2999	3000	3000	3000	982	3000	3000	3000	3000	14997	NA

3 DAYS LIVE DATA FOR BROADBAND SERVICES - DELHI METROCIRCLE														
3 days live Broadband Audit Data		Bench- mark	Circle Name	BHARTI AIRTEL	INDUS	HATHWAY	MTNL	NSTPL	PACENET	RCL	SPECTRANET	TCL	TTL	TIKONA
S/ N	Name of Parameter			BROADBAND SERVICE PROVIDERS										
	C) Average round trip tip time for all the ping transmitted	<120 ms	Delhi	29.00	46.00	33.00	42.00	4.00	2.00	4.60	4.36	21.00	34.00	NA
4.2	<b>Network Latency from User reference point at ISP Node to nearest NAP Port abroad (Terrestrial)</b>													
	A) Total number of ping packets transmitted		Delhi	3000	NA	9000	6000	NA	9000	9000	9000	6000	3600	NA
	B) Total round trip time for all the ping packets transmitted during the period		Delhi	3000	NA	8996	6000	NA	9000	9000	8997	6000	3598	NA
	C) Average round trip tip time for all the ping transmitted	<350 ms	Delhi	109.60	NA	243.33	240.33	NA	4.67	75.80	202.58	77.00	80.50	NA
4.3	<b>Network Latency from User reference point at ISP Node to nearest NAP Port abroad (Satellite)</b>													
	A) Total number of ping packets transmitted		Delhi	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		Delhi	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	C) Average round trip tip time for all the ping transmitted	<800 ms	Delhi	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5	<b>Service Availability/Uptime</b>													
	A) Total operational Hours		Delhi	36612792	72	72	56041344	72	72	72	619200	31392	1512	72
	B) Total downtime (In hours)		Delhi	115	0	5	77966	0	0	0	359	14.58	0	0
	C) Total time when the service was available (In Hrs)		Delhi	36612677	72	67	55963378	72	72	72	618841	31377.42	1512	72
	D) % age of Service availability uptime	>98%	Delhi	100.00%	100.00%	<b>93.06%</b>	99.86%	100.00%	100.00%	100.00%	99.94%	99.95%	100.00%	100.00%

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 except **Indus Media**, which could not meet the benchmarks with their performance as **95.21%**.

**Fault Repair/Restoration Time:** With regards to this parameter, the performances of majority of Broadband service providers were within TRAI norms. However, **MTNL and TTL** failed to meet the benchmark of parameter Fault repaired by next working day with their performance level as **80.75%** and **85.58%** against the benchmark of >90%. **Hathway, MTNL, TCL and TTL** also lagged behind the benchmark of parameter Fault repaired within 3 days. They could achieve the performance level as **98.94%, 94.64%, 98.86% and 97.90%** respectively against the benchmark of > 99%.

**Billing Performance:** For this parameter also the performance of the service providers was 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.

**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. However, in case of **International Bandwidth utilization**, only **MTNL** remained non-complied in quarterly as well as live measurements with its performance as **85.20%** and **85.97%** respectively, against the benchmark of <80%.

**Service Availability/Uptime:** All service providers were found meeting the benchmark for this parameter except **Pacenet** which remained short of benchmark with its performance as **96.67%** against the benchmark of >98%. During live measurement, **Hathway** remained short of benchmark with achieved value as **93.06%** against the benchmark of >98%.

**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. **Indus Media and Pacenet** are not monitoring the packet loss so they did not provide any data for audit.

Regarding parameter **Average round trip time for all the ping transmitted**, the performance of **Hathway** was non-complied with its achieved mark as **566.00 msec** against the benchmark of <350 msec.

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

*From the above analysis, it was concluded that **MTNL, TTL, TCL and Hathway** could not meet the benchmarks for parameters **Fault repairs /Restoration time**. **MTNL** also remained non-complied for parameter '**International Bandwidth Utilisation**'. **Indus media** remained non-complied for parameter **Service provisioning**, whereas **Hathway** also failed to meet the benchmark of parameters **Average round trip time for ping transmitted**. For rest of the parameters the services providers were meeting the benchmarks.*

## 10.4 CUSTOMER CARE / HELPLINE ASSESSMENT

LIVE CALLING TO CALL CENTRE FOR BROADBAND SERVICES												
	Circle Name	BHARTI AIRTEL	INDUS	HATHWAY	MTNL	NSTPL	PACENET	RCL	SPECTRANET	TCL	TTL	TIKONA
Total No. of calls Attempted	Delhi	100	100	100	100	100	100	100	100	100	100	100
Total number of calls answered by the operator within 60 seconds	Delhi	96	100	90	78	100	50	100	88	100	100	100
% age calls answered by the operator in 60 seconds	Delhi	96.00%	100.00%	90.00%	78.00%	100.00%	50.00%	100.00%	88.00%	100.00%	100.00%	100.00%
Total number of calls answered by the operator within 90 seconds	Delhi	100	100	100	90	100	96	100	100	100	100	100
% age calls answered by the operator within 90 seconds	Delhi	100.00%	100.00%	100.00%	90.00%	100.00%	96.00%	100.00%	100.00%	100.00%	100.00%	100.00%

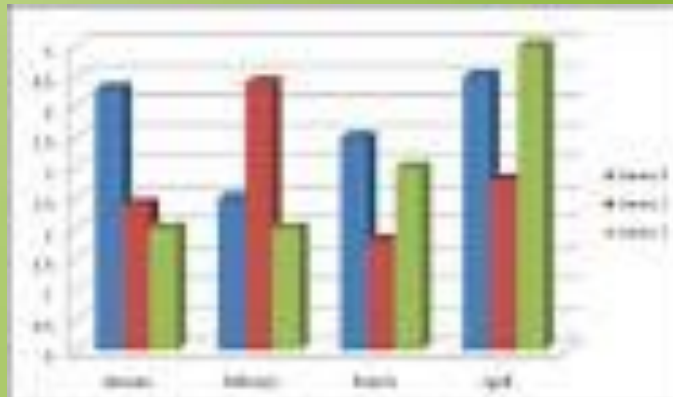
In case of calls answered by operators (voice to voice) within 60 seconds and 90 seconds, when test calls were made to the call centers, all broadband service providers (except Pacenet) were found meeting the TRAI prescribed benchmarks of >60% and >80%. Calls answered by operator within 60 seconds for Pacenet were 50% only against the benchmark of > 60%.

## 10.5 LIVE CALLING FOR BILLING COMPLIANTS

TELEPHONIC INTERVIEW FOR BILLING COMPLAINTS												
	Circle Name	BHARTI AIRTEL	INDUS	HATHWAY	MTNL	NSTPL	PACENET	RCL	SPECTRANET	TCL	TTL	TIKONA
Total No. of calls Attempted	Delhi	100	0	100	100	0	99	92	51	5	43	100
Total No. of calls Answered	Delhi	57	0	46	38	0	54	43	28	2	20	39
Cases resolved within 4 weeks	Delhi	57	0	46	38	0	54	43	28	2	20	39
%age of cases resolved	Delhi	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

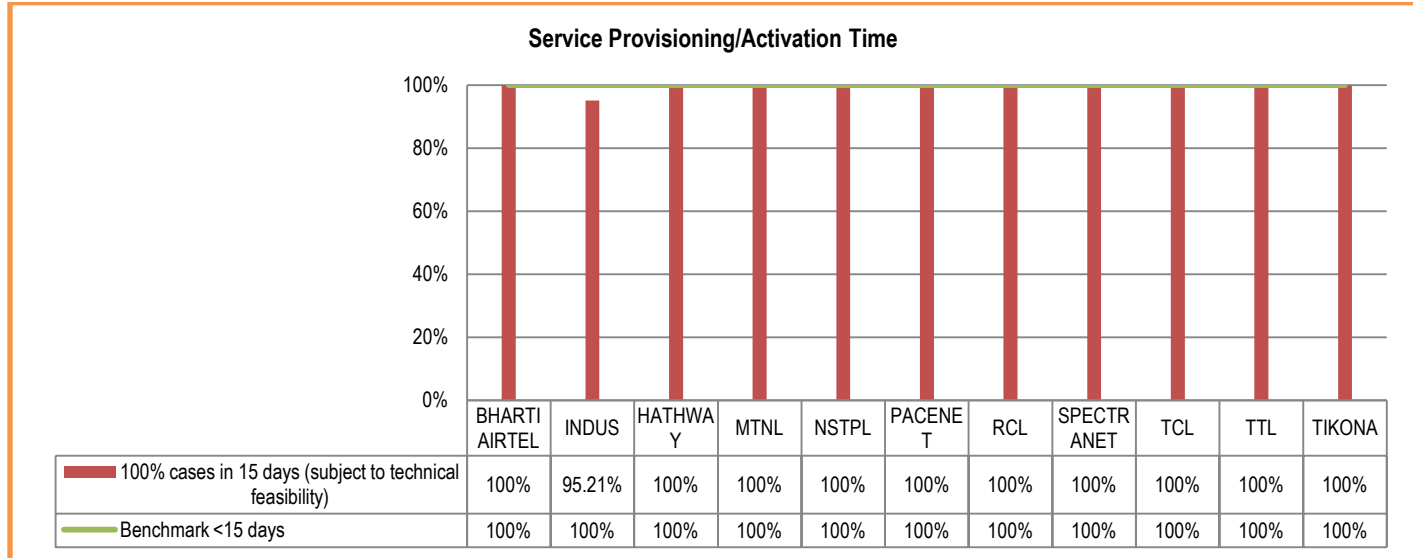
To test the Service Providers performance on billing related complaints and their resolutions, TUV-SUD auditors conducted a customer feedback calling the effected customers. However, in some cases, the number of customers contacted for verification was very less due to less number of billing complaints. Most of the customers reported their satisfaction on resolution of the billing complaints.

## GRAPHICAL REPRESENTATION OF BROADBAND SERVICES



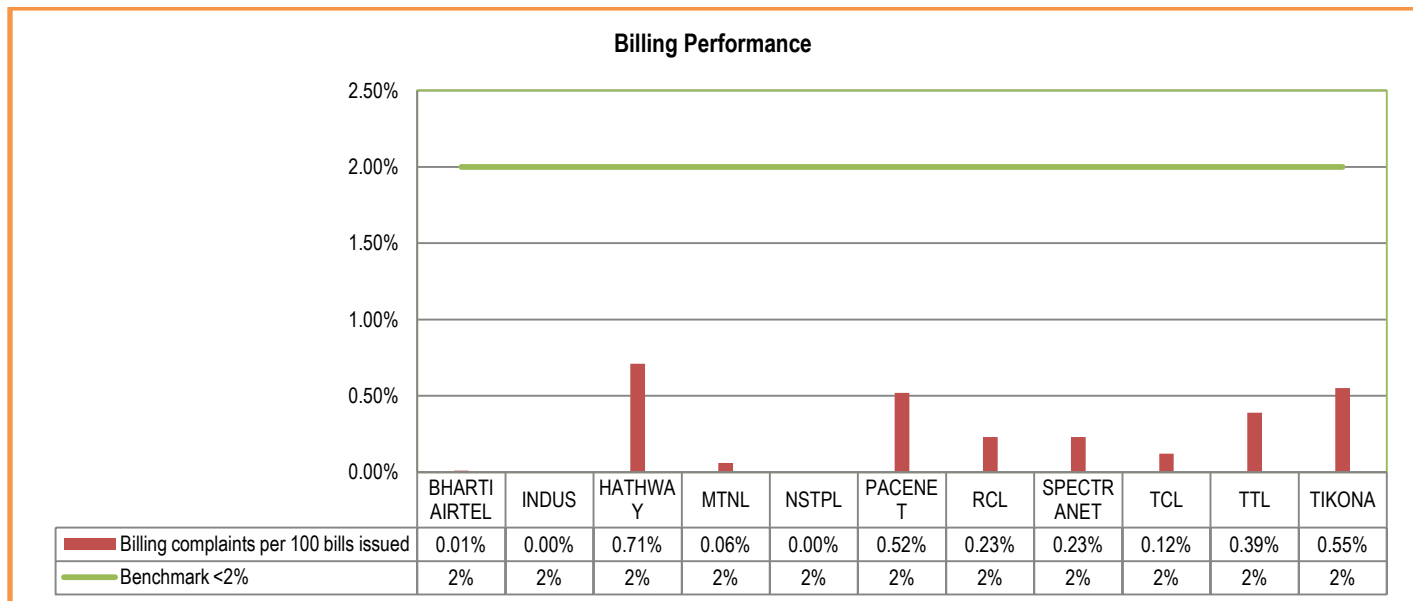
## 10.6 GRAPHICAL REPRESENTATION OF QUARTERLY PERFORMANCE OF BROADBAND SERVICE PROVIDERS:

### 1. SERVICE PROVISIONING/ACTIVATION TIME:



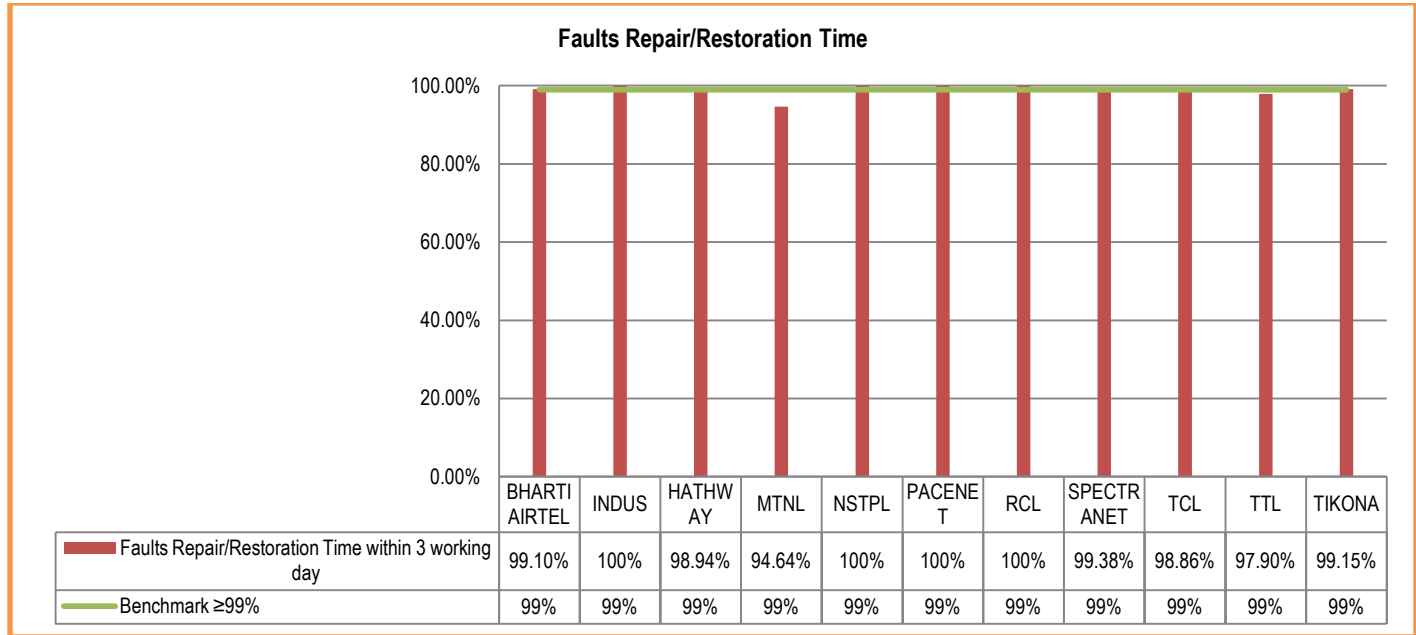
All Operators are meeting the benchmarks except Indus.

### 2. BILLING PERFORMANCE:



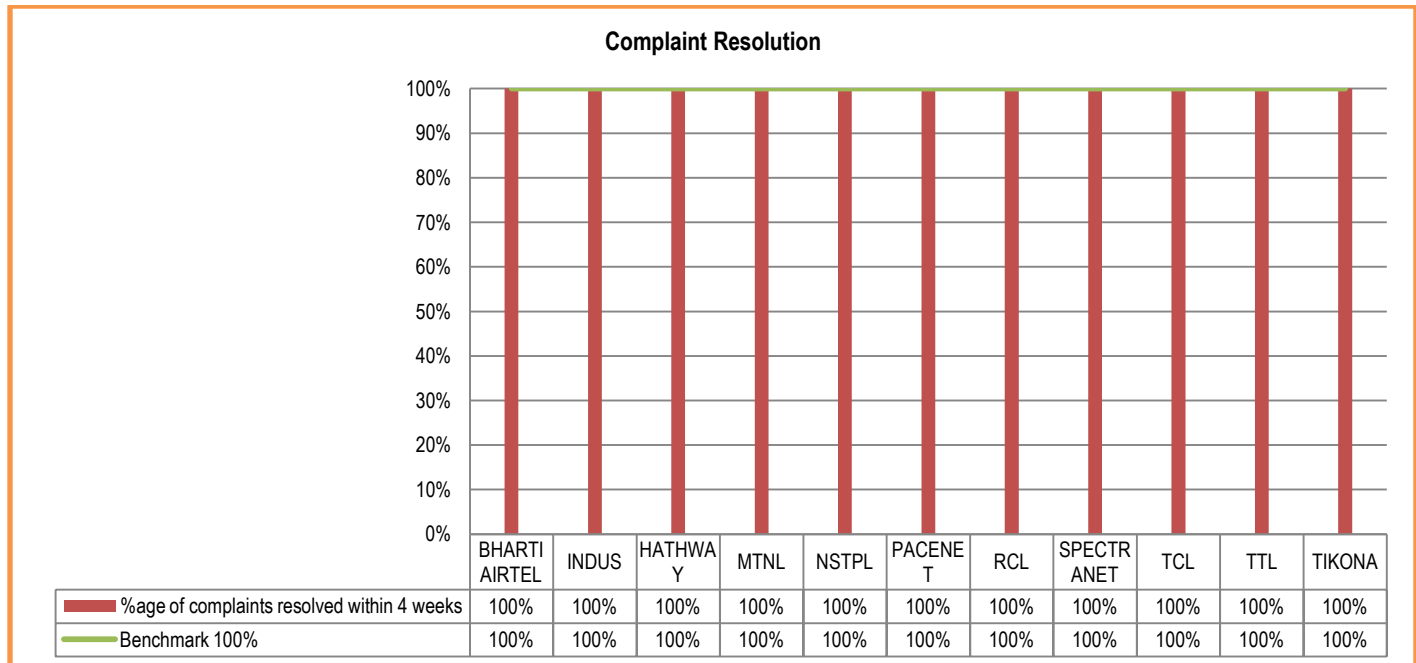
All Operators are meeting the benchmarks.

**3. FAULTS REPAIR/RESTORATION TIME:**



All Operators are meeting the benchmarks except Hathway, MTNL, TCL and TTL.

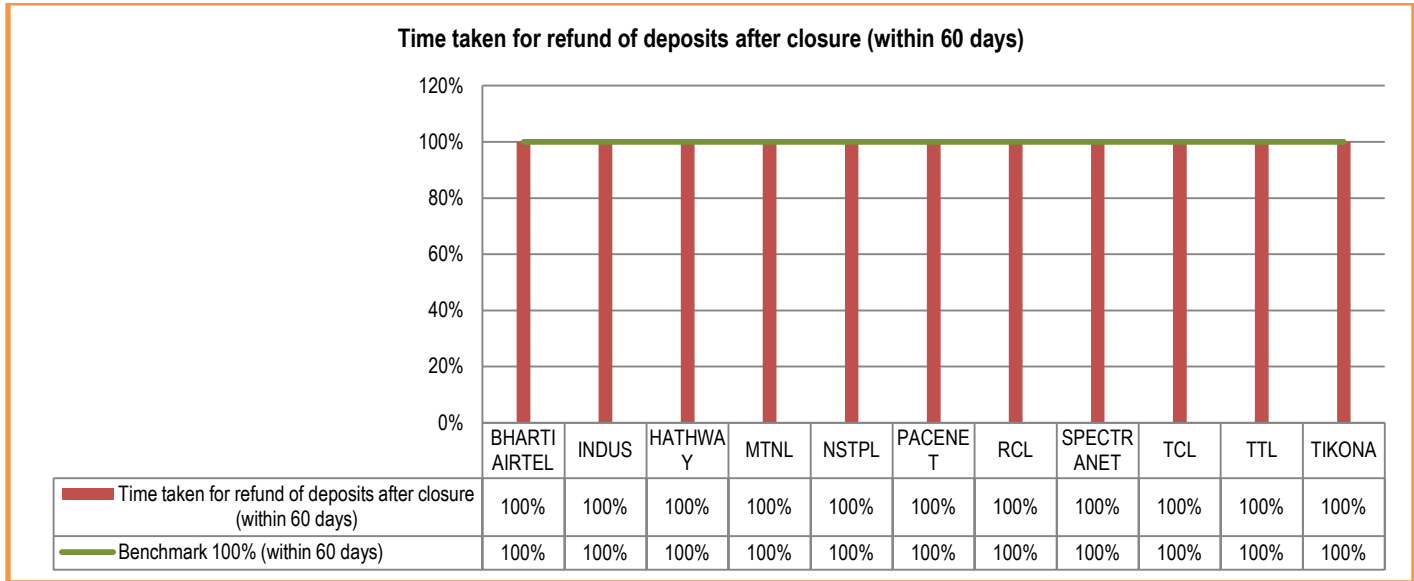
**4. COMPLAINT RESOLUTION:**



All Operators are meeting the benchmarks.

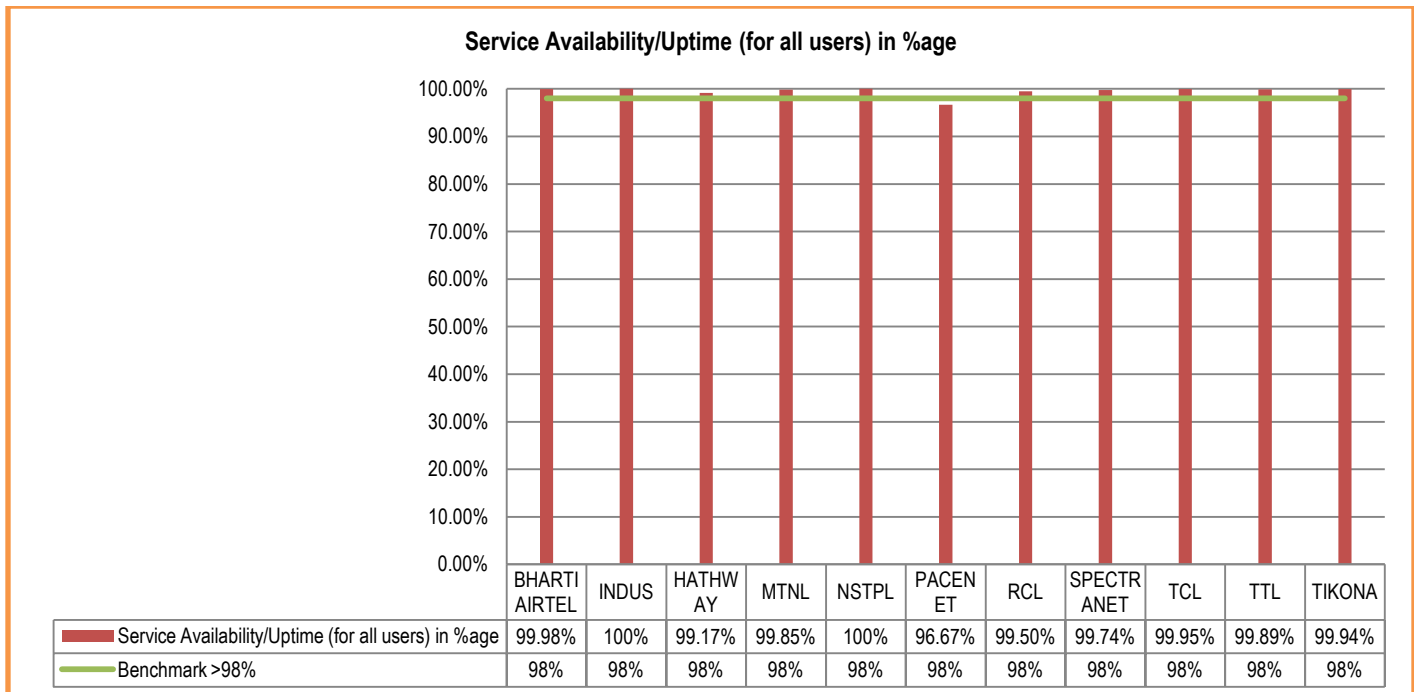


**5. REFUND:**



All Operators are meeting the benchmarks.

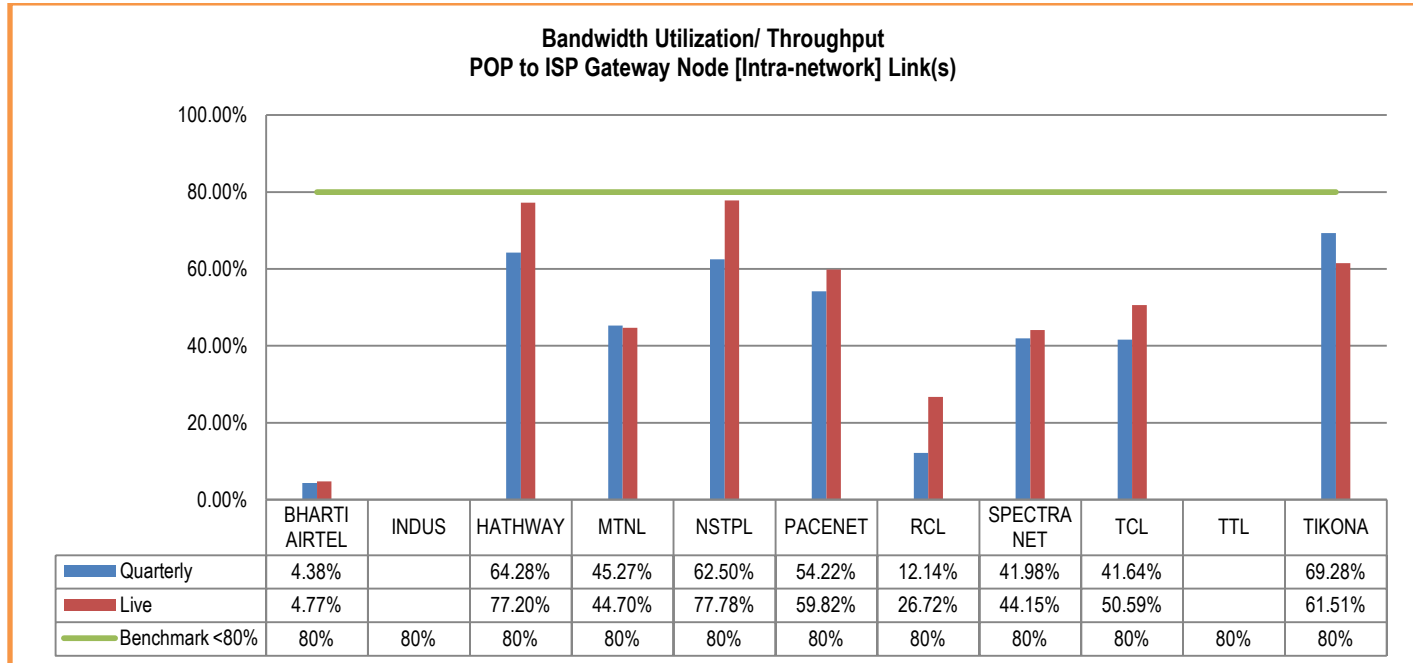
**6. SERVICE AVAILABILITY/UPTIME:**



All Operators are meeting the benchmarks except Pacenet..

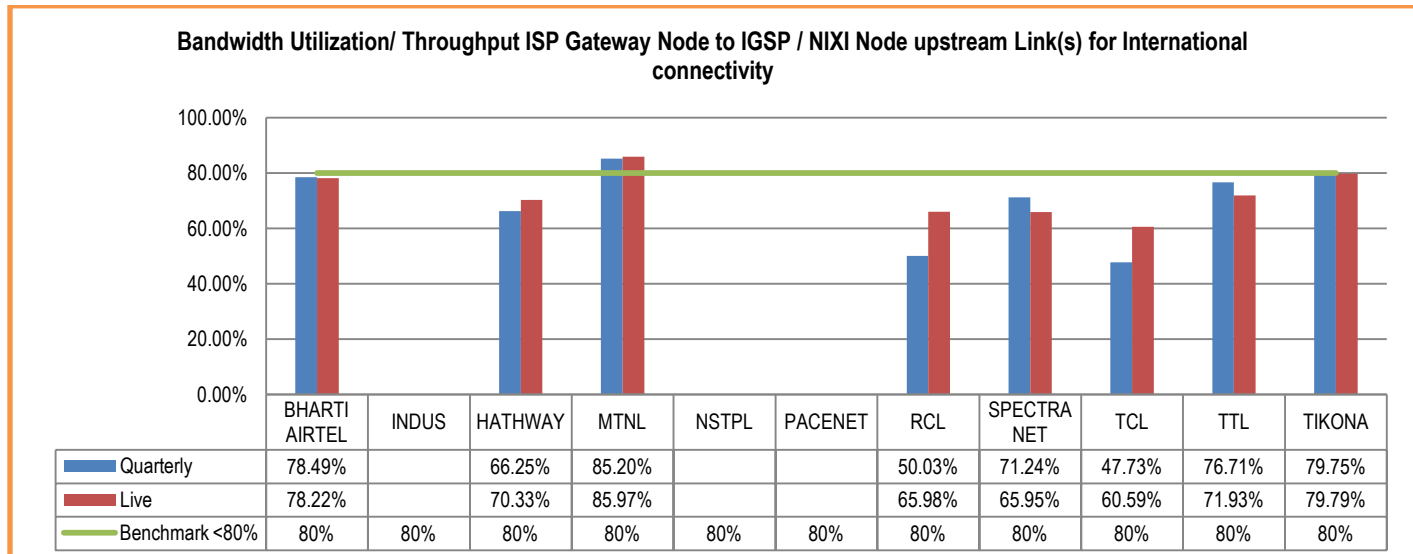
### 10.7 GRAPHICAL REPRESENTATION OF PERFORMANCE OF THE BROADBAND SERVICE PROVIDERS V/S 3-DAYS LIVE MEASUREMENT:

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



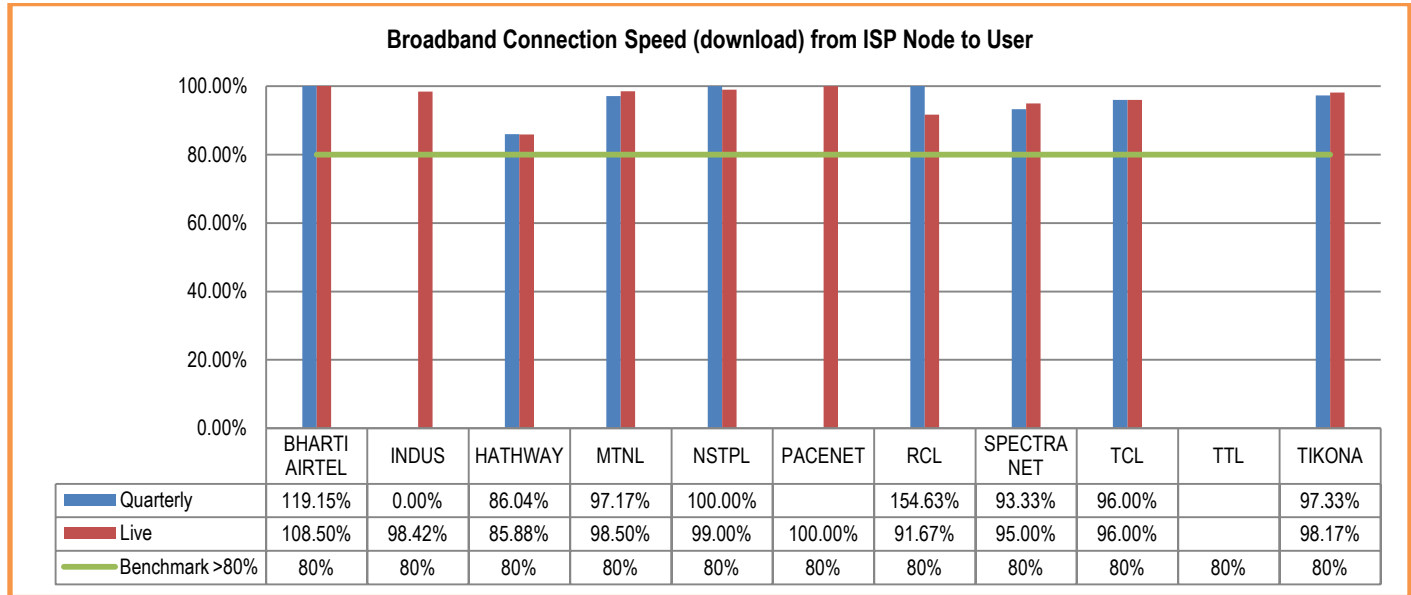
All Operators are meeting the benchmarks.

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



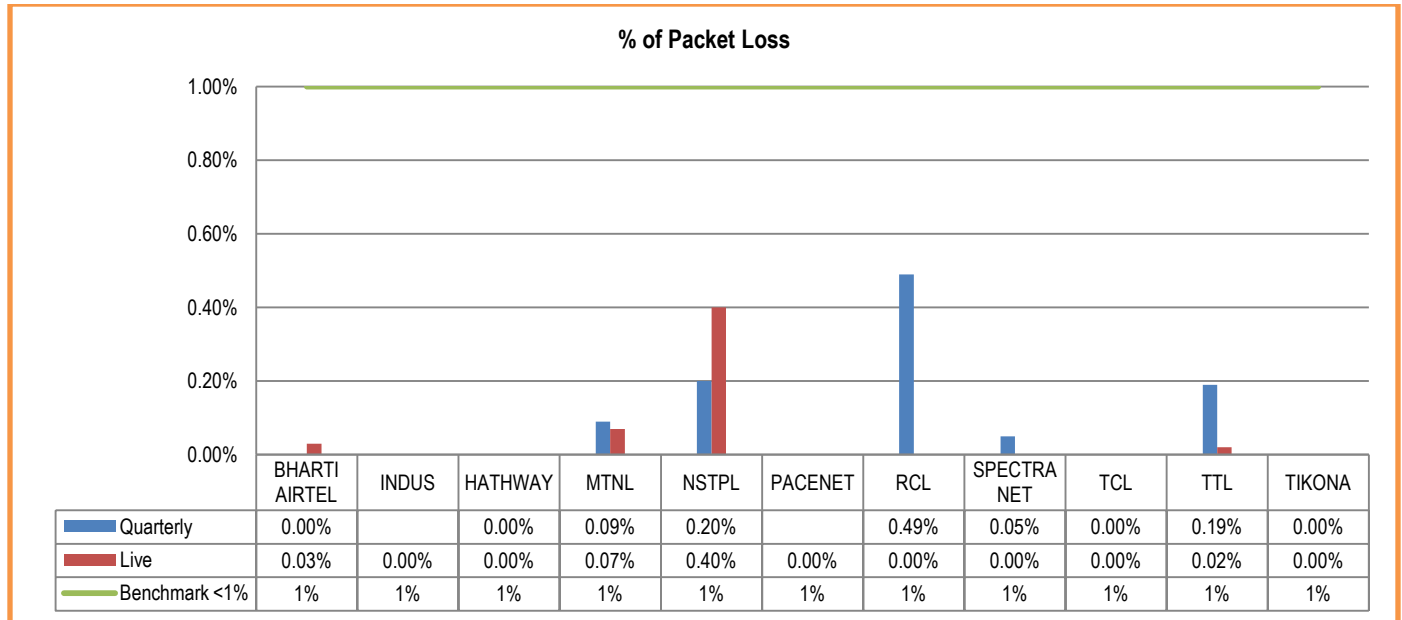
All Operators are meeting the benchmarks except MTNL.

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



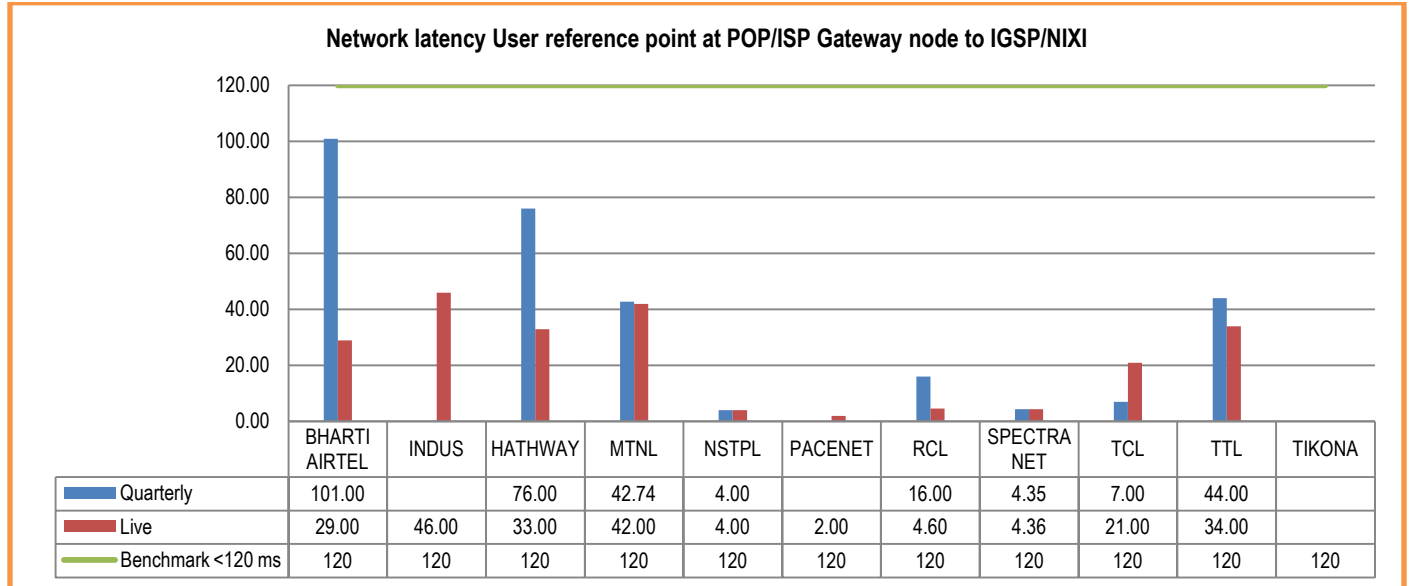
All Operators are meeting the benchmarks.

**4. PACKET LOSS:**



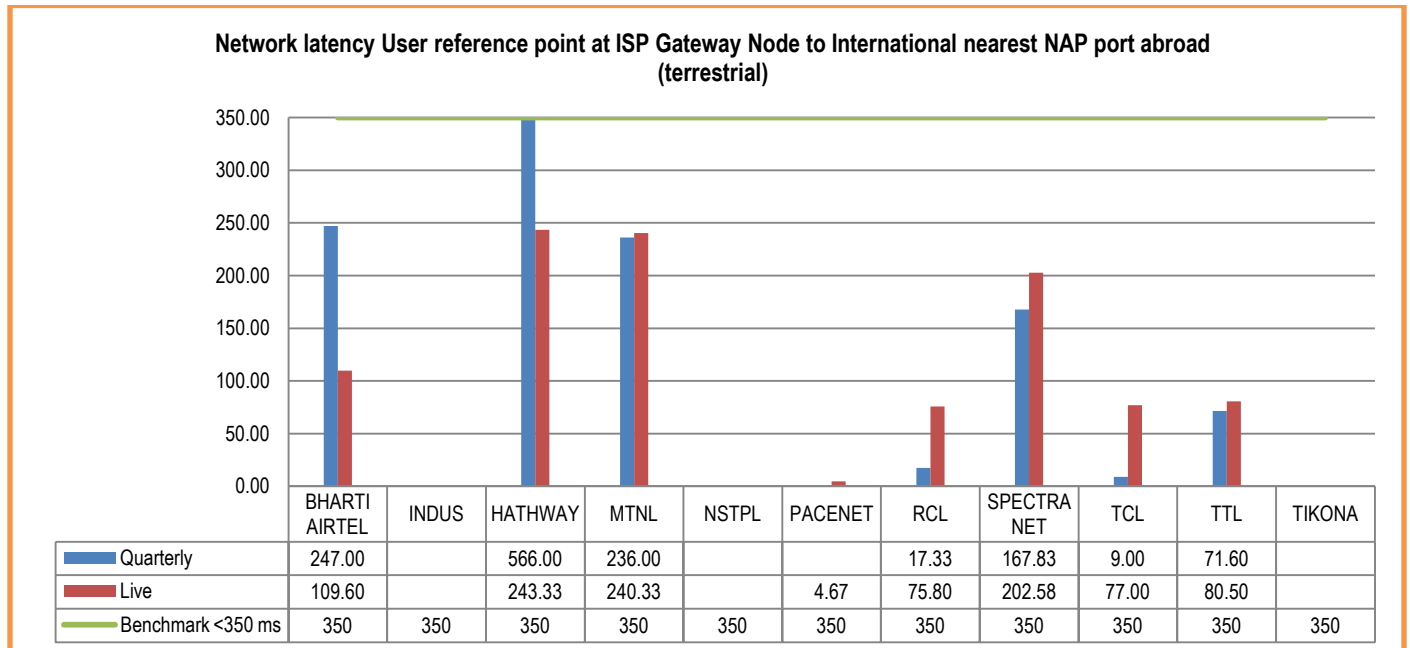
All Operators are meeting the benchmarks.

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



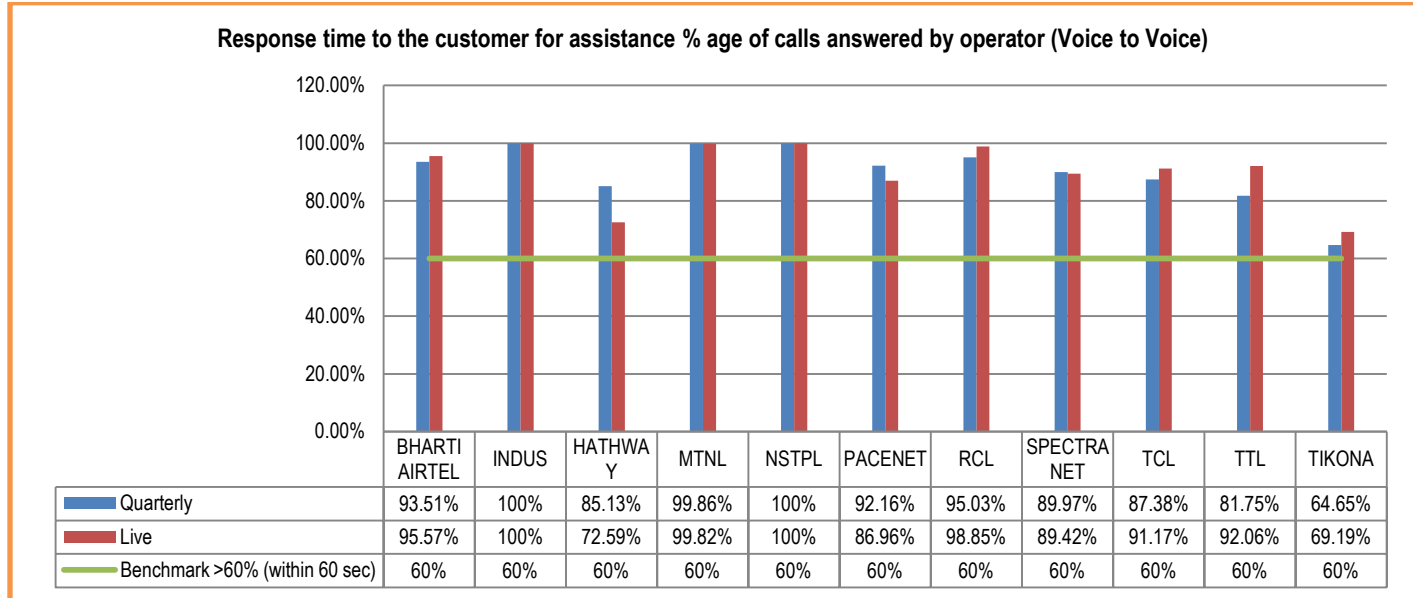
All Operators are meeting the benchmarks.

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



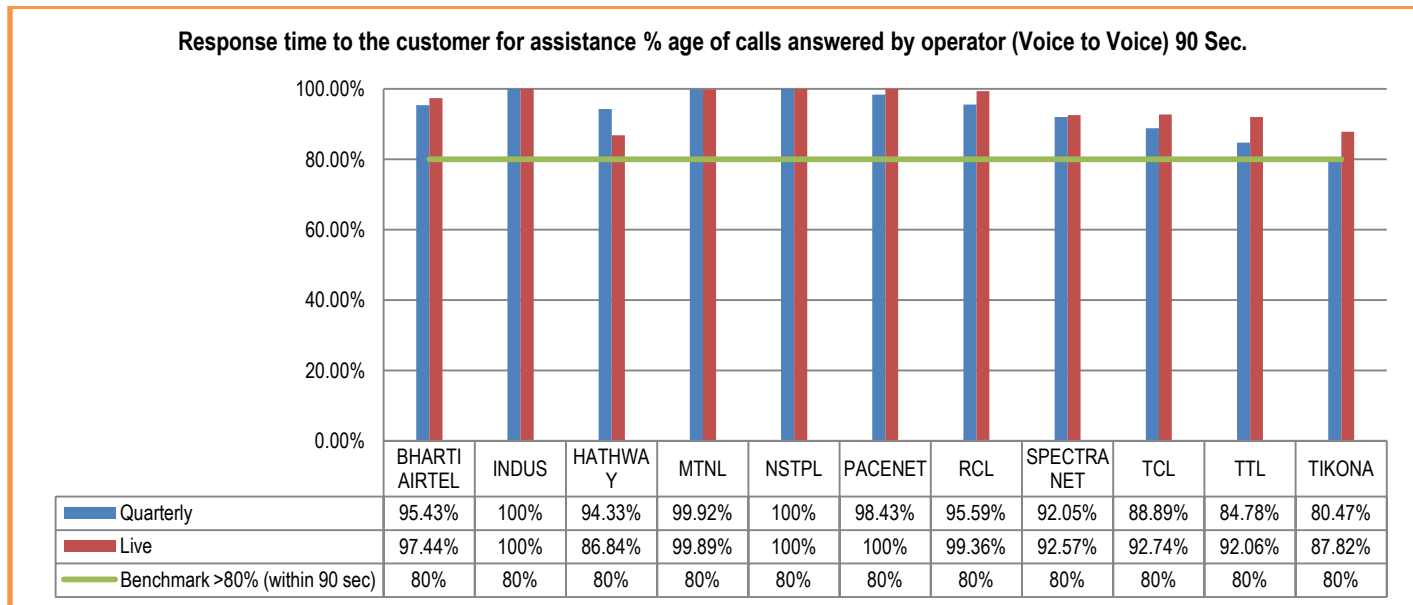
All Operators are meeting the benchmarks except Hathway.

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



All Operators are meeting the benchmarks.

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



All Operators are meeting the benchmarks.

Annex-1

S.N.	SERVICE PROVIDER	SSA NAME	EXCHANGE NAME	EXCHANGE TYPE
1	MTNL	NEHRU PLACE	5ESS D4 NP	URBAN
2	MTNL	NEHRU PLACE	OKHLA D4	URBAN
3	MTNL	NEHRU PLACE	EWSD D7 NP	URBAN
4	MTNL	NORTH	AXE-10 D4 (SHAKTI NAGAR)	URBAN
5	MTNL	NORTH	RHN D2 EWSD (SANCHAR PARISAR SECTOR 3 ROHINI)	URBAN
6	MTNL	WEST	RAJOURI GARDEN (MAIN EXCHANGE)	URBAN
7	MTNL	WEST	JANAKPURI (MAIN EXCHANGE)	URBAN
8	MTNL	WEST	DELHI CANT (MAIN EXCHANGE)	URBAN
9	MTNL	CENTRAL	JP OCB D-6	URBAN
10	MTNL	CENTRAL	LRD D-1 (5ESS)	URBAN
11	MTNL	CENTRAL	JB OCB D-2	URBAN
12	MTNL	EAST	DELHI GATE	URBAN
13	MTNL	EAST	TIS HAZARI	URBAN
14	MTNL	EAST	KAROL BAGH (PUSA ROAD)	URBAN
15	MTNL	TRANS YAMUNA (TY)	SHAHDARA (SHD D2 MAIN AND SHD D3 MAIN)	URBAN
16	MTNL	TRANS YAMUNA (TY)	YAMUNA VIHAR (YAMUNA VIHAR D1 (MAIN.))	URBAN
17	MTNL	BHICAJI KAMA PLACE (BCP)	BCPD1 MAIN (RSU: VASANT VIHAR, VASANT KUNJ)	URBAN
18	MTNL	BHICAJI KAMA PLACE (BCP)	BCPD2 MAIN	URBAN
19	BHARTI-AIRTEL	DELHI	GURGAON	URBAN
20	RCL	DELHI	DELHI	URBAN
21	TTL	DELHI	DELHI	URBAN
22	VODAFONE	DELHI	MOHAN CO-OPERATIVE	URBAN

**Annex-2**

<b>S.N.</b>	<b>CIRCLE</b>	<b>SERVICE PROVIDER</b>	<b>POPS LOCATION</b>	<b>ACTIVITY</b>
1	DELHI	BHARTI-AIRTEL	GAUGAON	BB AUDIT
2	DELHI	INUDS	MOTI NAGAR	BB AUDIT
3	DELHI	HATHWAY	SAFDARJUNG ENCLAVE	BB AUDIT
4	DELHI	MTNL	KIDWAI BHAWAN	BB AUDIT
5	DELHI	NSTPL	NOIDA	BB AUDIT
6	DELHI	PACENET	SUBHASH NAGAR	BB AUDIT
7	DELHI	RCL	DELHI	BB AUDIT
8	DELHI	SPECTRANET	GURGAON	BB AUDIT
9	DELHI	TCL	DELHI	BB AUDIT
10	DELHI	TTL	DELHI	BB AUDIT
11	DELHI	TIKONA	OKHLA	BB AUDIT