Audit & Assessment of Quality of Service
Of
Cellular Mobile Telephone Service
Basic Telephone Service (Wire line)
&
Broadband Service
For
Telecom Regulatory Authority of India

West Zone – Mumbai Service Area
(October 2014 – December 2014)

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 **Mumbai Metro circle** against the QoS bench marks laid down by TRAI in the respective regulations.

Table of Contents

TRAI

1. BACKGROUND

1. BACKGROUND

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

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

i) Create conditions for consumer satisfaction by making known the quality of service, which the Service provider is required to provide, and the user has a right to expect.

ii) Measure the Quality of Service provided by the Service Providers from time to time and to compare them with the norms so as to assess the level of performance.

iii) Generally protect the interests of consumers of telecommunication services.

TRAI, the regulatory watch dog for the Quality of Service for the telecom services – Basic (Wire line), Cellular Mobile (Wireless) and Broadband has commissioned **M/s TUV-SUD South Asia Pvt. Ltd**. for conducting audit and assessment of quality of service of service providers, in terms of the benchmarks specified in the "The Standards of Quality of Service of Basic Telephone Service (Wire line) and Cellular Mobile Telephone Service Regulations, 2009 (7 of 2009) dated 20th March, 2009 and the Quality of Service of Broadband Service Regulations, 2006 (11 of 2006) dated 6thOctober, 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 (wire line) and Broadband service, a circle would be audited once in a year**.

2. OBJECTIVES AND METHODOLOGY

2. <u>OBJECTIVES AND METHODOLOGY</u>

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
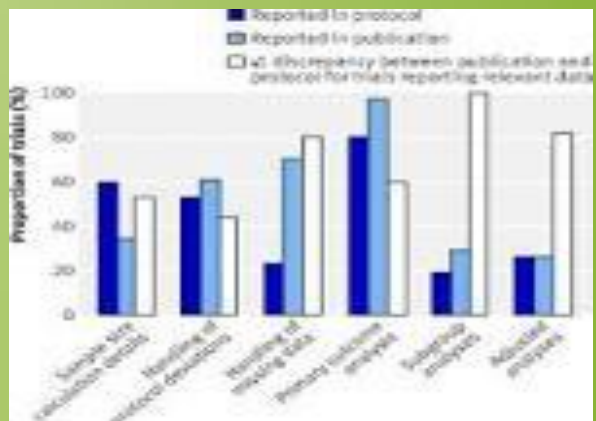
3. SAMPLE SIZE

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 Mumbai Metro circle

Sl. No.	Name of Service Provider	Dates of live measurement Audit			Audit Location
GSM Operators		October-14	November-14	December-14	
1	AIRCEL	8th to 10th Oct'14	5th to 7th Nov'2014	2nd to 4th Dec'14	Aircel Limited, Opus Center, Opp. Hotel Tunga Paradise, Near Speez,Andheri(E)
2	AIRTEL	8th to 10th Oct'14	5th to 7th Nov'2014	2nd to 4th Dec'14	7th Floor, Interface 7, Near IJMIMA Tower, Behind Infinity Mall, Malad (West), Mumbai-400064
3	MTNL	8th to 10th Oct'14	5th to 7th Nov'2014	2nd to 4th Dec'14	OMC-R unit, 10th Floor, Prabhadevi Telecom Bldg., V.S. Marg, Dadar(W),Mumbai-400028
4	TATA GSM	7th to 9th Oct'14	5th to 7th Nov'2014	2nd to 4th Dec'14	2nd Floor,TTML,Technopolis Park,Andheri(E),Mumbai
5	IDEA	7th to 9th Oct'14	6th to 8th Nov'2014	2nd to 4th Dec'14	3rd Floor Windsor ,Kalina CST Road,Santacruz East,Mumbai
6	RCOM GSM	8th to 10th Oct'14	5th to 7th Nov'2014	2nd to 4th Dec'14	Ai8, Reliance Infrastructure bldg,A-wing,MBP,mahape,Navi Mumbai.
7	VODAFONE	8th to 10th Oct'14	6th to 8th Nov'2014	1st to 3rd Dec'14	Skyline ikon, Near Mittal Industrial Estate, Andheri Kurla Road, Marol Naka, Andheri (E), Mumbai-59
CDMA Operators					
8	RCOM CDMA	8th to 10th Oct'14	5th to 7th Nov'2014	2nd to 4th Dec'14	Ai8, Reliance Infrastructure bldg,A-wing,MBP,mahape,Navi Mumbai.
9	TATA CDMA	7th to 9th Oct'14	5th to 7th Nov'2014	2nd to 4th Dec'14	2nd Floor,TTML,Technopolis Park,Andheri(E),Mumbai

- 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.**

- **Loop Mobile have closed its services in Mumbai service Area in the month of November 2014, so audit of Loop Mobile was not carried out for this quarter.**

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 **233** (present no. of MTNL exchanges), audit was done for **12** sampled (1**2-Urban**) exchanges, two exchanges each of TTL & Vodafone and one exchange each of Bharti Airtel & 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 reveled that they are maintaining their networks 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) From **monthly audit** it was concluded that on an average, performance of the operators in the Mumbai Metro Service area was satisfactory for **Network Parameters** except for one parameter namely **'Worst affected cells > 3% TCH drop"** which could not be met by **Aircel, Tata(GSM) and Tata(CDMA)** with their quarterly average performance as **6.21%, 4.63% and 3.80%** respectively**.**

(ii) From three days live assessment, it was found that the performance of all operators was satisfactory as they were largely meeting the benchmarks except for the parameter **'Worst affected cells> 3 % TCH drops".** This parameter was not complied with by **Aircel, Tata (GSM) and Tata (CDMA)** in all the three months of the quarter with their quarterly average performance as **6.19%, 4.63% and 3.51% respectively.**

(iii) With regard to the **Customer Service Quality Parameters,** it was revealed that the parameters namely 'Metering and Billing Credibility, Response Time to Customers, Termination of Service and Time taken for refunds' have been largely met by the operators. However, **RCOM (GSM), Tata (GSM), RCOM (CDMA) and Tata (CDMA)** have not met the benchmark of **Calls answered by Operators (voice to voice) within 90 seconds.** They have achieved their performance as **67.73%, 89.88%, 69.20% and 94.42%** respectively. The performance of RCOM (GSM) RCOM (CDMA) was very poor.

In case of parameter **Termination/closure within 7days, MTNL** was very marginally underperformed **(99.98%).**
The results for **three days live measurements** reveal that only Tata (GSM) has met the benchmarks for the parameters
Accessibility of call center **(90.29%).** In case of **calls connection to operators (Voice to voice),** performance of **Airtel,
RCOM (GSM)**, **Tata (GSM)** and **RCOM (CDMA)** was **92.16%, 81.82%** , **92.89%** and **94.07%** respectively, against the
benchmark of >=95%.

(iv) Based on the analysis of the **drive test results**, it was revealed **that MTNL, Idea, RCOM (GSM), RCOM (CDMA) and
Tata (CDMA)** were having non-complied performance for the parameters **Voice quality and Call drop Rate** across **Thane,
Central Mumbai and Navi Mumbai SSAs** where the drive tests were conducted during the quarter. **RCOM (CDMA)** also
could not perform well in respect of the parameters **CSSR/Blocked Call rate** in **Navi Mumbai** SSA. These operators need
improvement in their networks to remove the deficiencies with respect to non-complied parameters.

2. Basic (Wireline):

From the audit of Basic (Wire line) service, it was concluded that the performance of **MTNL** was not satisfactory in
respect of the parameters **Fault Incidences, Fault Repair / Restoration Time, Termination/Closure and Refunds
of Deposits. RCL and TTL** also failed to meet the benchmarks of the parameters **Accessibility of Call Center,
Calls answered by Operators (Voice to voice) and Termination/ Closures.** Hence, the concern operators need to
improve their services in respect of these parameters.

3. Broadband service:

From the audit of Broadband service, it was revealed that **MTNL, Hathway and Indus media** failed to meet the
benchmark of **Service provisioning**, **MTNL, TTL, TCL, Hathway, Pacenet and Honesty Net** remained short of
bench mark of **parameter Fault Repairs/Resoration**, and operators **namely MTNL, Pacenet and Honesty Net**
could not meet the benchmarks for parameters **Bandwidth Utilisation**. Also, **Honesty Net** remained
underperformed for parameter **Packet Loss**. Thus majority of Operators were not performing well enough to meet
the benchmark of one or the other parameters

5. PMR AUDIT REPORT

5. PMR AUDIT REPORTS:

5.1 MONTHLY PMR:

5.1.1 BUSY HOUR OF VARIOUS SERVICE PROVIDERS:

Sl. No.	Name of Service Provider	Month of Audit	Network TCBH Hour
GSM Operators			
1	AIRTEL	Dec.-14	20 Hrs-21 Hrs
2	AIRCEL	Dec.-14	20 Hrs-21 Hrs
3	MTNL	Dec.-14	19 Hrs-20 Hrs
4	IDEA	Dec.-14	19 Hrs-20 Hrs
5	RCOM GSM	Dec.-14	19 Hrs-20 Hrs
6	TATA GSM	Dec.-14	19 Hrs-20 Hrs
7	VODAFONE	Dec.-14	19 Hrs-20 Hrs
CDMA Operators			
8	RCOM CDMA	Dec.-14	19 Hrs-20 Hrs
9	TATA CDMA	Dec.-14	11 Hrs-12 Hrs

The TCBH reported by all the service providers matched the network busy hour calculated by TUV auditors for the Mumbai 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
GSM Operators						
1	AIRTEL	15	70	3875	NSN	NSN
2	AIRCEL	3	18	1811	NSN	NSN
3	MTNL	5	46	991	Alcatel	Motorola, Alcatel
4	IDEA	8	31	3341	Ericsson	Ericsson
5	RCOM GSM	3	11	2245	Huawei	Huawei
6	TATA GSM	4	16	1906	Huawei	Huawei
7	VODAFONE	21	63	4463	Ericsson	Ericsson
CDMA Operators						
8	RCOM CDMA	8	NA	873	Lucent, ZTE, Ericsson	Lucent.
9	TATA CDMA	5	6	952	Huawei	Huawei

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

				CELLULAR MOBILE TELEPHONE SERVICES MUMBAI METRO CIRCLE - OCT 14 MONTH								
PMR Generation Data		**Bench- mark**	**Audit Period**	**AIRCEL**	**AIRTEL**	**MTNL**	**IDEA**	**RCOM GSM**	**TATA GSM**	**VODAFONE**	**RCOM CDMA**	**TATA CDMA**
S/N	**Name of Parameter**			**GSM Operators**							**CDMA Operators**	
Network Service Quality Parameter												
1	**Network Availability**											
	a) BTS Accumulated Downtime	<=2%	Oct-14	0.06%	0.00%	0.52%	0.07%	0.24%	0.01%	0.01%	0.23%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	Oct-14	0.11%	0.00%	1.41%	0.06%	0.22%	0.00%	0.00%	0.11%	0.00%
2	**Connection Establishment (Accessibility)**											
	a) CSSR (Call Setup Success Rate)	>=95%	Oct-14	98.31%	99.99%	97.91%	98.51%	99.60%	99.51%	99.49%	98.32%	98.97%
	b) SDCCH/PAGING Channel congestion	<=1%	Oct-14	0.08%	0.00%	0.13%	0.66%	0.05%	0.13%	0.06%	0.00%	0.00%
	c) TCH congestion	<=2%	Oct-14	0.57%	0.00%	0.08%	0.77%	0.07%	0.26%	0.51%	0.02%	0.06%
3	**Connection maintenance (Retainability)**											
	a) CDR (Call Drop Rate)	<=2%	Oct-14	0.94%	0.27%	1.26%	1.88%	0.38%	0.57%	0.91%	0.65%	0.69%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Oct-14	**5.64%**	0.02%	1.65%	2.77%	0.03%	**4.45%**	2.45%	0.12%	**3.85%**
	c) Connections with good voice quality	>=95%	Oct-14	97.92%	99.96%	95.64%	95.69%	98.26%	97.73%	97.23%	99.79%	98.87%
4	No. of POI's having >=0.5% POI congestion		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 MUMBAI METRO CIRCLE - NOV 14 MONTH											
	PMR Generation Data	Bench-mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators							CDMA Operators	
Network Service Quality Parameter												
1	**Network Availability**											
	a) BTS Accumulated Downtime	<=2%	Nov-14	0.05%	0.00%	0.55%	0.06%	0.26%	0.01%	0.01%	0.26%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	Nov-14	0.00%	0.00%	1.41%	0.03%	0.22%	0.00%	0.00%	0.00%	0.00%
2	**Connection Establishment (Accessibility)**											
	a) CSSR (Call Setup Success Rate)	>=95%	Nov-14	98.03%	99.99%	97.77%	98.51%	99.58%	99.48%	99.50%	98.06%	98.98%
	b) SDCCH/PAGING Channel congestion	<=1%	Nov-14	0.22%	0.00%	0.34%	0.77%	0.06%	0.13%	0.07%	0.00%	0.00%
	c) TCH congestion	<=2%	Nov-14	0.80%	0.00%	0.10%	0.87%	0.07%	0.32%	0.50%	0.03%	0.06%
3	**Connection maintenance (Retainability)**											
	a) CDR (Call Drop Rate)	<=2%	Nov-14	1.06%	0.27%	1.24%	1.86%	0.38%	0.60%	0.91%	0.65%	0.69%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Nov-14	**6.47%**	0.02%	1.39%	2.73%	0.02%	**4.59%**	2.40%	0.08%	**4.35%**
	c) Connections with good voice quality	>=95%	Nov-14	97.80%	99.95%	95.37%	95.69%	98.94%	97.72%	97.42%	99.79%	99.10%
4	No. of POI's having >=0.5% POI congestion		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 MUMBAI METRO CIRCLE - DEC 14 MONTH											
PMR Generation Data		Bench-mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
S/N	**Name of Parameter**			**GSM Operators**							**CDMA Operators**	
Network Service Quality Parameter												
1	**Network Availability**											
	a) BTS Accumulated Downtime	<=2%	Dec-14	0.07%	0.00%	0.61%	0.06%	0.30%	0.02%	0.01%	0.32%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	Dec-14	0.00%	0.00%	1.41%	0.03%	0.40%	0.00%	0.00%	0.34%	0.11%
2	**Connection Establishment (Accessibility)**											
	a) CSSR (Call Setup Success Rate)	>=95%	Dec-14	97.95%	99.99%	98.42%	98.68%	99.57%	99.32%	99.33%	97.25%	98.90%
	b) SDCCH/PAGING Channel congestion	<=1%	Dec-14	0.34%	0.00%	0.34%	0.69%	0.04%	0.16%	0.05%	0.00%	0.00%
	c) TCH congestion	<=2%	Dec-14	0.83%	0.00%	0.10%	1.00%	0.07%	0.42%	0.67%	0.04%	0.06%
3	**Connection maintenance (Retainability)**											
	a) CDR (Call Drop Rate)	<=2%	Dec-14	1.06%	0.27%	1.20%	1.23%	0.41%	0.04%	0.87%	0.85%	0.58%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Dec-14	**6.53%**	0.01%	1.26%	2.55%	0.03%	**4.86%**	2.21%	0.08%	**3.21%**
	c) Connections with good voice quality	>=95%	Dec-14	97.67%	99.97%	95.58%	96.42%	99.88%	97.58%	97.62%	99.79%	99.08%
4	No. of POI's having >=0.5% POI congestion		Dec-14	0	0	0	0	0	0	0	0	0

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

				AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
PMR Generation Data		Bench- mark	Audit Period				GSM Operators				CDMA Operators	
S/N	Name of Parameter											
Network Service Quality Parameter												
	Network Availability											
1	a) BTS Accumulated Downtime	<=2%	Quarterly	0.06%	0.00%	0.56%	0.06%	0.27%	0.01%	0.01%	0.27%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.04%	0.00%	1.41%	0.04%	0.28%	0.00%	0.00%	0.15%	0.04%
	Connection Establishment (Accessibility)											
2	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	98.10%	99.99%	98.03%	98.57%	99.58%	99.44%	99.44%	97.88%	98.95%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.21%	0.00%	0.27%	0.71%	0.05%	0.14%	0.06%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	0.73%	0.00%	0.09%	0.88%	0.07%	0.33%	0.56%	0.03%	0.06%
	Connection maintenance (Retainability)											
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	1.02%	0.27%	1.23%	1.66%	0.39%	0.40%	0.90%	0.72%	0.65%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	**6.21%**	0.02%	1.43%	2.68%	0.03%	**4.63%**	2.35%	0.09%	**3.80%**
	c) Connections with good voice quality	>=95%	Quarterly	97.80%	99.96%	95.53%	95.93%	99.03%	97.68%	97.42%	99.79%	99.02%
4	No. of POI's having >=0.5% POI congestion		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 circle.

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

- **Connection Establishment (Accessibility)**

    i.   Call Set-up Success Rate(CSSR)

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

All the operators were comfortably meeting the benchmark on this parameter.

- **Parameters related to Network Congestion:**

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

In CDMA system, there is no direct counter defined for reporting Paging Channel Congestion as reported by Tata Teleservices. However, they have a defined counter for <u>Paging Channel Occupancy Ratio</u>   (**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 pegging channel in CDMA system.

With respect to this parameter, the performance of the operators is quite satisfactory as **all operators met the TRAI specified benchmarks on the congestion parameters**. There was no congestion on individual POI links between a service provider vis-à-vis other service providers.

- **Connection Maintenance (Retainability)**

    i.   Call Drop Rate:

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

The audit of this parameter revealed that all the service providers were measuring this parameter as per the TRAI guidelines. Also, **all the service providers were found to be meeting the TRAI specified benchmark**. The lowest call drop rate (0.27%) was for Airtel during the quarter.

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

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

The audit with respect to this parameter revealed that all the operators except **Aircel, Tata (GSM) and Tata (CDMA),** were in compliance of the benchmark for this parameter. The quarterly average performance of **Aircel, Tata (GSM) and Tata (CDMA)** with respect to this parameter was **6.21%, 4.63% and 3.80%** respectively.

    iii.   Connections with good voice quality:

All operators were found to have met the bench mark for the parameter 'Good Voice Quality'

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 MEASURMENT DATA (3-DAYS) – OCTOBER -14 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES - MUMBAI METRO CIRCLE- OCTOBER 14 MONTH												
Live measurement Data		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators							CDMA Operators	
Network Service Quality Parameter												
1	**Network Availability**											
	a) BTS Accumulated Downtime	<=2%	Live data	0.08%	0.00%	0.69%	0.07%	0.20%	0.00%	0.01%	0.25%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2	**Connection Establishment (Accessibility)**											
	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.31%	99.99%	97.34%	98.72%	99.65%	99.47%	99.43%	98.28%	98.89%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.03%	0.00%	0.35%	0.93%	0.04%	0.15%	0.07%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.45%	0.00%	0.07%	0.63%	0.07%	0.27%	0.57%	0.02%	0.07%
3	**Connection maintenance (Retainability)**											
	a) CDR (Call Drop Rate)	<=2%	Live data	0.96%	0.28%	1.35%	1.86%	0.39%	0.58%	1.06%	0.62%	0.66%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	**6.00%**	0.04%	2.52%	2.75%	0.09%	**4.27%**	2.71%	0.04%	**3.53%**
	c) Connections with good voice quality	>=95%	Live data	97.97%	99.95%	95.15%	95.62%	98.95%	97.58%	97.07%	99.76%	99.11%
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0

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

	CELLULAR MOBILE TELEPHONE SERVICES - MUMBAI METRO CIRCLE- NOVEMBER 14 MONTH										
Live measurement Data		**Bench-mark**	**Average of 3 Days**	**AIRCEL**	**AIRTEL**	**MTNL**	**IDEA**	**RCOM GSM**	**TATA GSM**	**VODAFONE**	**RCOM CDMA**	**TATA CDMA**
S/N	**Name of Parameter**			GSM Operators							CDMA Operators	
Network Service Quality Parameter												
1	**Network Availability**											
	a) BTS Accumulated Downtime	<=2%	Live data	0.07%	0.00%	0.48%	0.08%	0.23%	0.00%	0.01%	0.23%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.20%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2	**Connection Establishment (Accessibility)**											
	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.28%	99.99%	97.70%	98.81%	99.69%	99.56%	99.56%	98.36%	99.00%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.08%	0.00%	0.34%	0.67%	0.06%	0.12%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.38%	0.00%	0.05%	0.57%	0.06%	0.20%	0.44%	0.01%	0.05%
3	**Connection maintenance (Retainability)**											
	a) CDR (Call Drop Rate)	<=2%	Live data	1.01%	0.27%	1.28%	1.92%	0.36%	0.57%	0.90%	0.60%	0.65%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	**6.06%**	0.04%	1.28%	2.76%	0.01%	**4.01%**	2.24%	0.12%	**3.53%**
	c) Connections with good voice quality	>=95%	Live data	97.82%	99.96%	95.30%	95.83%	99.00%	97.66%	97.38%	99.77%	99.11%
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0

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

	CELLULAR MOBILE TELEPHONE SERVICES - MUMBAI METRO CIRCLE – DECEMBER 14 MONTH										
Live measurement Data		**Bench-mark**	**Average of 3 Days**	**AIRCEL**	**AIRTEL**	**MTNL**	**IDEA**	**RCOM GSM**	**TATA GSM**	**VODAFONE**	**RCOM CDMA**	**TATA CDMA**
S/N	**Name of Parameter**			**GSM Operators**							**CDMA Operators**	
Network Service Quality Parameter												
	Network Availability											
1	a) BTS Accumulated Downtime	<=2%	Live data	0.09%	0.00%	0.40%	0.07%	0.58%	0.04%	0.01%	0.46%	0.03%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Connection Establishment (Accessibility)											
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.15%	99.99%	98.29%	98.88%	99.47%	99.27%	99.34%	98.31%	98.83%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.23%	0.00%	0.34%	0.78%	0.04%	0.30%	0.07%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.68%	0.00%	0.07%	0.82%	0.07%	0.46%	0.66%	0.02%	0.08%
	Connection maintenance (Retainability)											
3	a) CDR (Call Drop Rate)	<=2%	Live data	1.01%	0.27%	1.21%	1.23%	0.40%	0.04%	1.01%	0.59%	0.57%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	**6.50%**	0.03%	1.45%	2.58%	0.04%	**5.62%**	2.63%	0.04%	**3.48%**
	c) Connections with good voice quality	>=95%	Live data	97.75%	99.97%	99.54%	96.58%	98.87%	97.67%	97.46%	98.81%	99.08%
4	No. of POI's having >=0.5% POI congestion		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)

				AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
QUARTERLY QOS PERFORMANCE OF 3-DAYS LIVE MEASUREMENT (AVERAGE OF THREE MONTHS) – MUMBAI CIRCLE											
Live measurement Data		Bench- mark	Average of 3 Days									
S/N	Name of Parameter							GSM Operators			CDMA Operators	
Network Service Quality Parameter												
1	**Network Availability**										
	a) BTS Accumulated Downtime	<=2%	Quarterly	0.08%	0.00%	0.52%	0.07%	0.34%	0.01%	0.01%	0.31%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.00%	0.00%	0.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2	**Connection Establishment (Accessibility)**										
	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	98.25%	99.99%	97.78%	98.80%	99.60%	99.43%	99.44%	98.32%	98.91%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.11%	0.00%	0.34%	0.79%	0.05%	0.19%	0.05%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	0.50%	0.00%	0.06%	0.67%	0.07%	0.31%	0.56%	0.02%	0.07%
3	**Connection maintenance (Retainability)**										
	a) CDR (Call Drop Rate)	<=2%	Quarterly	0.99%	0.27%	1.28%	1.67%	0.38%	0.40%	0.99%	0.60%	0.63%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	**6.19%**	0.04%	1.75%	2.70%	0.05%	**4.63%**	2.53%	0.07%	**3.51%**
	c) Connections with good voice quality	>=95%	Quarterly	97.85%	99.96%	96.66%	96.01%	98.94%	97.64%	97.30%	99.45%	99.10%
4	No. of POI's having >=0.5% POI congestion		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 meeting the benchmarks except for the parameter **'Worst affected cells> 3 % TCH drops".** This parameter was not complied with by **Aircel, Tata (GSM) and Tata (CDMA)** in all the three months of the quarter with their quarterly average performance as **6.19%, 4.63% and 3.51%** respectively**.**

5.2.6 DETAILED NETWORK DATA ASSESSMENT OF CELLULAR MOBILE TELEPHONE SERVICES:

TABLE: 1

S/N	Name of Parameter	Bench-mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
						GSM Operators					CDMA Operators	
Network Service Quality Parameter												
	Network Availability											
1	a) Total no. of BTSs in the licensed service area		Oct-14	1835	3867	996	3292	2242	2924	4417	873	947
	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	871.90	28.45	3860.65	1658.09	3924.00	122.31	343.88	1521.00	73.00
	c) BTS Accumulated Downtime	<=2%	Oct-14	0.06%	0.00%	0.52%	0.07%	0.24%	0.01%	0.01%	0.23%	0.01%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Oct-14	2	0	14	2	5	0	0	1	0
	e) Worst affected BTSs due to downtime	<=2%	Oct-14	0.11%	0.00%	1.41%	0.06%	0.22%	0.00%	0.00%	0.11%	0.00%
	Connection Establishment (Accessibility)											
2	a) CSSR (Call Setup Success Rate)	>=95%	Oct-14	98.31%	99.99%	97.91%	98.51%	99.60%	99.51%	99.49%	98.32%	98.97%
	b) SDCCH/PAGING Congestion	<=1%	Oct-14	0.08%	0.00%	0.13%	0.66%	0.05%	0.13%	0.06%	0.00%	0.00%
	c) TCH congestion	<=2%	Oct-14	0.57%	0.00%	0.08%	0.77%	0.07%	0.26%	0.51%	0.02%	0.06%
	Connection Maintenance (Retainability)											
3	a) Call Drop Rate (CDR)	<=2%	Oct-14	0.94%	0.27%	1.26%	1.88%	0.38%	0.57%	0.91%	0.65%	0.69%
	b) Worst affected cells>3% TCH drop	<=3%	Oct-14	**5.64%**	0.02%	1.65%	2.77%	0.03%	**4.45%**	2.45%	0.12%	**3.85%**
	c) % of connections with good voice quality	>=95%	Oct-14	97.92%	99.96%	95.64%	95.69%	98.26%	97.73%	97.23%	99.79%	98.87%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Oct-14	303	2	44	262	2	352	264	3	101
	e) Total no. of cells (Sector) in the licensed service area		Oct-14	5367	10339	2654	9457	6093	7919	10799	2551	2622
	No. of POI's having >=0.5% POI congestion											
4	No. of POI's having >=0.5% POI congestion		Oct-14	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Oct-14	0	0	0	0	0	0	0	0	0
	Network Data											
5	a) Equipped Capacity of Network in Erlang		Oct-14	63385	158255	37627	117607	72000	114219	275068	NP	106067
	b) Total traffic in TCBH in erlang (Avg.)		Oct-14	38851	100568	15658	98352	61012	50147	166919	NP	47104
	c) Total no. of customers served (as per VLR) on last day of the month		Oct-14	1327595	4211073	800447	3266551	3044078	1721696	6642325	NP	542787

Caption row: Detailed Network Data Assessment of Cellular Mobile Telephone Services- Mumbai Metro Circle- October 14 month

TABLE: 2

S/N	Name of Parameter	Bench-mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
							GSM Operators				CDMA Operators	
Network Service Quality Parameter												
	Network Availability											
1	a) Total no. of BTSs in the licensed service area		Live data	1840	3858	990	3270	2241	2911	4395	874	949
	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	108.45	5.7	495.11	169	329	0	20.32	157	0
	c) BTS Accumulated Downtime	<=2%	Live data	0.08%	0.00%	0.69%	0.07%	0.20%	0.00%	0.01%	0.25%	0.00%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	0	0	0	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Connection Establishment (Accessibility)											
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.31%	99.99%	97.34%	98.72%	99.65%	99.47%	99.43%	98.28%	98.89%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.03%	0.00%	0.35%	0.93%	0.04%	0.15%	0.07%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.45%	0.00%	0.07%	0.63%	0.07%	0.27%	0.57%	0.02%	0.07%
	Connection Maintenance (Retainability)											
3	a) Call Drop Rate (CDR)	<=2%	Live data	0.96%	0.28%	1.35%	1.86%	0.39%	0.58%	1.06%	0.62%	0.66%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	**6.00%**	0.04%	2.52%	2.75%	0.09%	**4.27%**	2.71%	0.04%	**3.53%**
	c) % of connections with good voice quality	>=95%	Live data	97.97%	99.95%	95.15%	95.62%	98.95%	97.58%	97.07%	99.76%	99.11%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	323	4	67	260	6	339	292	1	92
	e) Total no. of cells (Sector) in the licensed service area		Live data	5382	10332	2644	9444	6076	7945	10788	2554	2605
	No. of POI's having >=0.5% POI congestion											
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0

TABLE: 3

S/N	Name of Parameter	Bench-mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
	Detailed Network Data Assessment of Cellular Mobile Telephone Services - Mumbai Metro Circle- November 14 month											
							GSM Operators				CDMA Operators	
Network Service Quality Parameter												
1	**Network Availability**											
	a) Total no. of BTSs in the licensed service area		Nov-14	1822	3860	996	3319	2245	2911	4442	873	949
	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	711.91	29.10	3944.70	1448.00	4204.00	237.32	229.52	1608.00	165.60
	c) BTS Accumulated Downtime	<=2%	Nov-14	0.05%	0.00%	0.55%	0.06%	0.26%	0.01%	0.01%	0.26%	0.02%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Nov-14	0	0	14	1	5	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Nov-14	0.00%	0.00%	1.41%	0.03%	0.22%	0.00%	0.00%	0.00%	0.00%
2	**Connection Establishment (Accessibility)**											
	a) CSSR (Call Setup Success Rate)	>=95%	Nov-14	98.03%	99.99%	97.77%	98.51%	99.58%	99.48%	99.50%	98.06%	98.98%
	b) SDCCH/PAGING Congestion	<=1%	Nov-14	0.22%	0.00%	0.34%	0.77%	0.06%	0.13%	0.07%	0.00%	0.00%
	c) TCH congestion	<=2%	Nov-14	0.80%	0.00%	0.10%	0.87%	0.07%	0.32%	0.50%	0.03%	0.06%
3	**Connection Maintenance (Retainability)**											
	a) Call Drop Rate (CDR)	<=2%	Nov-14	1.06%	0.27%	1.24%	1.86%	0.38%	0.60%	0.91%	0.65%	0.69%
	b) Worst affected cells>3% TCH drop	<=3%	Nov-14	**6.47%**	0.02%	1.39%	2.73%	0.02%	**4.59%**	2.40%	0.08%	**4.35%**
	c) % of connections with good voice quality	>=95%	Nov-14	97.80%	99.95%	95.37%	95.69%	98.94%	97.72%	97.42%	99.79%	99.10%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Nov-14	345	2	37	260	1	362	262	2	113
	e) Total no. of cells (Sector) in the licensed service area		Nov-14	5330	10408	2659	9538	6097	7877	10907	2551	2605
4	**No. of POI's having >=0.5% POI congestion**											
	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
5	**Network Data**											
	a) Equipped Capacity of Network in Erlang		Nov-14	62860	157805	37627	117999	72000	113509	275993	168000	106067
	b) Total traffic in TCBH in erlang (Avg.)		Nov-14	39531	105957	16604	103423	68408	53868	176322	89793	48797
	c) Total no. of customers served (as per VLR) on last day of the month		Nov-14	1410186	4522650	828698	3510449	2628173	1814857	7032096	2769671	540809

TABLE: 4

S/N	Name of Parameter	Bench-mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live - Mumbai Metro Circle – November 14 month
				\multicolumn{7}{c}{GSM Operators}	\multicolumn{2}{c}{CDMA Operators}
Network Service Quality Parameter
	Network Availability											
1	a) Total no. of BTSs in the licensed service area		Live data	1835	3880	996	3292	2242	2926	4417	873	948
	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	98.99	5.9	346.96	185.03	364	3.4	18.73	142	9.82
	c) BTS Accumulated Downtime	<=2%	Live data	0.07%	0.00%	0.48%	0.08%	0.23%	0.00%	0.01%	0.23%	0.01%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	2	0	0	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.20%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Connection Establishment (Accessibility)											
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.28%	99.99%	97.70%	98.81%	99.69%	99.56%	99.56%	98.36%	99.00%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.08%	0.00%	0.34%	0.67%	0.06%	0.12%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.38%	0.00%	0.05%	0.57%	0.06%	0.20%	0.44%	0.01%	0.05%
	Connection Maintenance (Retainability)											
3	a) Call Drop Rate (CDR)	<=2%	Live data	1.01%	0.27%	1.28%	1.92%	0.36%	0.57%	0.90%	0.60%	0.65%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	**6.06%**	0.04%	1.28%	2.76%	0.01%	**4.01%**	2.24%	0.12%	**3.53%**
	c) % of connections with good voice quality	>=95%	Live data	97.82%	99.96%	95.30%	95.83%	99.00%	97.66%	97.38%	99.77%	99.11%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	325	3.67	34	263	0	317	244	3	92
	e) Total no. of cells (Sector) in the licensed service area		Live data	5367	10439	2659	9523	6076	7913	10890	2557	2603
	No. of POI's having >=0.5% POI congestion											
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0

TABLE: 5

S/N	Name of Parameter	Bench-mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
	Detailed Network Data Assessment of Cellular Mobile Telephone Services - Mumbai Metro Circle- December 14 month											
								GSM Operators			CDMA Operators	
Network Service Quality Parameter												
	Network Availability											
1	a) Total no. of BTSs in the licensed service area		Dec-14	1811	3875	991	3341	2245	2906	4463	873	952
	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	885	25	4519	1524	4982	339	238	2072	121
	c) BTS Accumulated Downtime	<=2%	Dec-14	0.07%	0.00%	0.61%	0.06%	0.30%	0.02%	0.01%	0.32%	0.02%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Dec-14	0	0	14	1	9	0	0	3	1
	e) Worst affected BTSs due to downtime	<=2%	Dec-14	0.00%	0.00%	1.41%	0.03%	0.40%	0.00%	0.00%	0.34%	0.11%
	Connection Establishment (Accessibility)											
2	a) CSSR (Call Setup Success Rate)	>=95%	Dec-14	97.95%	99.99%	98.42%	98.68%	99.57%	99.32%	99.33%	97.25%	98.90%
	b) SDCCH/PAGING Congestion	<=1%	Dec-14	0.34%	0.00%	0.34%	0.69%	0.04%	0.16%	0.05%	0.00%	0.00%
	c) TCH congestion	<=2%	Dec-14	0.83%	0.00%	0.10%	1.00%	0.07%	0.42%	0.67%	0.04%	0.06%
	Connection Maintenance (Retainability)											
3	a) Call Drop Rate (CDR)	<=2%	Dec-14	1.06%	0.27%	1.20%	1.23%	0.41%	0.04%	0.87%	0.85%	0.58%
	b) Worst affected cells>3% TCH drop	<=3%	Dec-14	**6.53%**	0.01%	1.26%	2.55%	0.03%	**4.86%**	2.21%	0.08%	**3.21%**
	c) % of connections with good voice quality	>=95%	Dec-14	97.67%	99.97%	95.58%	96.42%	99.88%	97.58%	97.62%	99.79%	99.08%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Dec-14	346	2	33	246	2	382	242	2	84
	e) Total no. of cells (Sector) in the licensed service area		Dec-14	5297	10413	2648	9626	6096	7862	10939	2557	2619
	No. of POI's having >=0.5% POI congestion											
4	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
	Network Data											
5	a) Equipped Capacity of Network in Erlang		Dec-14	62557	156995	37627	119493	72000	111750	288899	168000	106067
	b) Total traffic in TCBH in erlang (Avg.)		Dec-14	39978	109186	16459	107361	66380	55724	183357	89228	47579
	c) Total no. of customers served (as per VLR) on last day of the month		Dec-14	1489697	4730496	854989	3654308	2773277	1889132	7101355	2773764	522592

TABLE: 6

S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
	Detailed Network Data Assessment of Cellular Mobile Telephone Services -3 days live - Mumbai Metro Circle - December 14 month											
						GSM Operators					CDMA Operators	
Network Service Quality Parameter												
	Network Availability											
1	a) Total no. of BTSs in the licensed service area		Live data	1822	3868	996	3320	2245	2901	4442	873	954
	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	121.3	5.7	289.18	173.08	938	79.82	25.28	291	18.73
	c) BTS Accumulated Downtime	<=2%	Live data	0.09%	0.00%	0.40%	0.07%	0.58%	0.04%	0.01%	0.46%	0.03%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	1	0	0	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Connection Establishment (Accessibility)											
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.15%	99.99%	98.29%	98.88%	99.47%	99.27%	99.34%	98.31%	98.83%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.23%	0.00%	0.34%	0.78%	0.04%	0.30%	0.07%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.68%	0.00%	0.07%	0.82%	0.07%	0.46%	0.66%	0.02%	0.08%
	Connection Maintenance (Retainability)											
3	a) Call Drop Rate (CDR)	<=2%	Live data	1.01%	0.27%	1.21%	1.23%	0.40%	0.04%	1.01%	0.59%	0.57%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	**6.50%**	0.03%	1.45%	2.58%	0.04%	**5.62%**	2.63%	0.04%	**3.48%**
	c) % of connections with good voice quality	>=95%	Live data	97.75%	99.97%	99.54%	96.58%	98.87%	97.67%	97.46%	98.81%	99.08%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	347	3	39	248	2	442	288	1	91
	e) Total no. of cells (Sector) in the licensed service area		Live data	5330	10424	2659	9606	6096	7874	10955	2557	2621
	No. of POI's having >=0.5% POI congestion											
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0
	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:

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

	QUARTERLY CSD AUDITED DATA FOR CELLULAR MOBILE TELEPHONE SERVICES										
	Quarterly CSD Audit Data	Bench-mark	AIRTEL	AIRCEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
S/N	**Name of Parameter**		GSM Operators							CDMA Operators	
1	**Metering & Billing Credibility -Post Paid**										
	A) No. of bills issued during the quarter		2167557	104799	409210	1561028	494083	289248	6746052	1268306	144245
	B) No. of bills disputed including billing complaints during the quarter		177	0	82	1187	329	0	2900	1217	0
	C)% of billing complaints during the quarter	<= 0.1%	**0.01%**	**0.00%**	**0.02%**	**0.08%**	**0.07%**	**0.00%**	**0.04%**	**0.10%**	**0.00%**
2	**Metering & Billing Credibility -Pre Paid**										
	A) Total No. of Pre-paid customers at the end of the quarter		3889810	2264610	920830	3321182	2541842	2430398	6224800	2506198	701383
	B) Total No. of complaints relating to charging, Credit and Validity during the quarter		36	5	151	2851	2351	0	760	830	0
	C) % of Pre-paid Charging Complaints	<= 0.1%	**0.00%**	**0.00%**	**0.02%**	**0.09%**	**0.09%**	**0.00%**	**0.01%**	**0.03%**	**0.00%**
3	**Resolution of Billing/Charging Complaints and Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints**										
	A) No. of Billing/Charging/Credit/Validity Complaints received during the quarter		213	5	82	12119	2680	2667	3660	2047	337
	B) No. of billing complaints for Post paid customers/Charging/Credit/Validity complaints for pre-paid customers resolved within 4 weeks during the quarter		213	5	82	12119	2680	2667	3660	2047	336
	C) No. of billing complaints for Post paid customers/Charging/Credit/Validity complaints for pre-paid customers resolved within 6 weeks during the quarter		213	5	82	12119	2680	2667	3660	2047	337
	D) % of billing complaints (for post paid customer) / Charging/Credit/Validity (for Pre paid customer) resolved within 4 weeks	>=98% within 4 weeks	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**99.70%**
	E) % of billing complaints (for post paid customer) / Charging/Credit/Validity (for Pre paid customer) resolved within 6 weeks	100% within 6 weeks	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
	F) % of Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints	<=1 week	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

QUARTERLY CSD AUDITED DATA FOR CELLULAR MOBILE TELEPHONE SERVICES											
Quarterly CSD Audit Data		Bench- mark	AIRTEL	AIRCEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter		GSM Operators							CDMA Operators	
4	**Response time to customers for assistance**										
	A) Total no of calls attempted to customer care/Call center		1029302	10378165	NP	9634304	7203633	648762	15446007	1451929	166954
	B) Total no. of calls successfully established to customer care/Call center.		1029302	10262538	NP	9552331	7130422	635124	15415190	1440317	166063
	C) % Accessibility of Call centre /customer Care (Total calls successfully established *100/ Total call attempts)	>=95%	**100%**	**98.89%**	**NP**	**99.15%**	**98.98%**	**97.90%**	**99.80%**	**99.20%**	**99.47%**
	D) Total Calls reached to operator for Voice to Voice (Total call attempts)		3200063	1866726	1304863	3422678	1373647	913649	4991800	273158	142426
	E) Total number of calls answered by the operator (Voice to voice) within 90 seconds		3075844	1784174	1243018	3331856	930366	821144	4785058	189025	134474
	F) % age of calls answered by operator (voice to voice) (Total calls successfully established within 90 Sec.*100 / Total call attempts)	>=95%	**96.12%**	**95.58%**	**95.26%**	**97.35%**	**67.73%**	**89.88%**	**95.86%**	**69.20%**	**94.42%**
5	**Termination/closure of service**										
	A) Total No. of requests for Termination / Closure of service received during the quarter		7236	697	13132	9292	2379	2664	21685	4831	960
	B) No. of requests for Termination /Closure of service complied within 7 days during the quarter		7236	697	13130	9292	2379	2664	21685	4831	960
	C) % of Termination/ Closure of service within 7 days	<=7days	**100%**	**100%**	**99.98%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
6	**Time taken for refunds of deposits after closures.**										
	A) No. of Payments/ Refunds due during the quarter		4149	127	708	2674	1788	110	3896	3180	105
	B) No. of Payments/ Refunds Cleared during the quarter		4149	127	708	2674	1788	110	3896	3180	105
	C) Time taken for refunds of deposits after closures.	100% within 60 days	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

- NP-Not Provided: MTNL has not provided data for the parameter "Accessibility of call center / Customer care" due to IVR system was not functional at the time of audit.

5.3.2 3 DAYS LIVE CSD AUDITED DATA FOR CELLULAR MOBILE SERVICES:

							GSM Operators				CDMA Operators	
CSD 3 DAYS LIVE DATA FOR CELLULAR MOBILE TELEPHONE SERVICES – QE DECEMBER 2014												
	3 days live CSD Audit Data	Bench- mark	AIRTEL	AIRCEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
S/ N	**Name of Parameter**										
1	Response time to customers for assistance										
	Total no of calls attempted to customer care/Call center		9014	329653	NP	299433	184246	30426	493026	51520	5235
	Total no. of calls successfully established to customer care/Call center		9014	326628	NP	299433	182369	27471	492925	51256	4996
	% Accessibility of Call centre /customer Care (Total call successfully established *100 / Total call attempts)	>=95%	**100%**	**99.08%**	**NP**	**100%**	**98.98%**	**90.29%**	**99.98%**	**99.49%**	**95.43%**
2	Total Calls reached to operator for Voice to Voice (Total call attempts)		110464	60247	55309	104982	49516	154498	157889	9535	5038
	Total number of calls answered by the operator (Voice to voice) within 90 seconds.		101803	58466	52692	102993	40516	143509	156134	8970	5015
	% age of calls answered by operator(voice to voice) (Total calls successfully established within 90 sec. *100 / Total call attempts)	>=95%	**92.16%**	**97.04%**	**95.27%**	**98.11%**	**81.82%**	**92.89%**	**98.89%**	**94.07%**	**99.54%**

NP: * MTNL has not provided data for the parameter "Accessibility of call center / Customer care" due to IVR system was not functional at the time of audit.

5.3.3 KEY FINDINGS ON CUSTOMER SERVICE DELIVERY (CSD) PARAMETERS

1. *Metering and billing credibility-(Post paid & Pre-paid)*

The performance of the service providers with respect to the parameter metering and billing credibility for both post-paid and pre-paid was within the prescribed bench mark of <=0.1 %.

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

    i. *Resolution of billing /charging complaints*

    ii. *Period of applying credit/waiver/adjustment to customer's account from the date of resolution of complaints*

All operators have 100 % resolved the billing complaints within stipulated period of 4/6weeks. Apart from this, all service providers 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 are in compliance of the parameter Accessibility of call center. However, **RCOM (GSM), Tata (GSM), RCOM (CDMA) and Tata (CDMA)** have not met the benchmark of **Calls answered by Operators (voice to voice) within 90 seconds.** They have achieved their performance as **67.73%, 89.88%, 69.20% and 94.42%** respectively. The performance of **RCOM (GSM) RCOM (CDMA)** was very poor.

4. *Termination/Closure of Service*

In case of this parameters also, only one operator namely **MTNL** was not found to have settled 100 % closure/termination within 7 days. Their performance with respect to this parameter was **99.98%,** very marginally below the benchmark.

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

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

Live Measurements:

The results for **three days live measurements** reveal that only **Tata (GSM)** has met the benchmarks for the parameters **Accessibility to call center (90.29%).** In case of **calls connection to operators (Voice to voice),** performance of **Airtel, RCOM (GSM)**, **Tata (GSM)** and **RCOM (CDMA)** was **92.16%, 81.82%** , **92.89%** and **94.07%** respectively, against the benchmark of >=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 Mumbai 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										
CALLING OPERATORS	CIRCLE NAME	AIRTEL	AIRCEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
AIRTEL	*Mumbai Metro*	----	100%	100%	100%	100%	100%	100%	100%	100%
AIRCEL	*Mumbai Metro*	100%	----	100%	100%	100%	95%	100%	97%	100%
MTNL	*Mumbai Metro*	96%	100%	----	100%	100%	100%	97%	100%	100%
IDEA	*Mumbai Metro*	100%	95%	97%	---	100%	100%	100%	100%	100%
RCOM GSM	*Mumbai Metro*	100%	95%	100%	100%	---	100%	96%	100%	100%
TATA GSM	*Mumbai Metro*	100%	100%	100%	100%	96%	--	100%	100%	97%
VODAFONE	*Mumbai Metro*	100%	100%	100%	100%	100%	100%	---	100%	100%
RCOM CDMA	*Mumbai Metro*	100%	95%	96%	100%	100%	100%	100%	---	100%
TATA CDMA	*Mumbai Metro*	100%	96%	98%	100%	100%	95%	100%	100%	---

The result of the testing revealed that the inter connection performance among the operators was quite satisfactory. However, successful call attempts from Aircel to Tata (GSM) and RCOM (CDMA) were 95% and 97% respectively. In case from MTNL to Airtel and Vodafone were 96% and 97% respectively. Similarly, from Idea to Aircel and MTNL, the successful calls were 95% and 97%. From RCOM (GSM) to Aircel and Vodafone were 95% and 96%, from Tata (GSM) to RCOM (GSM) and Tata (CDMA) were 96% and 97% respectively, from RCOM (CDMA) to Aircel and MTNL were 95% and 96%. From Tata (CDMA) to Aircel and MTNL successful interconnections were 98% and 95% respectively. Thus there was no remarkable problem in interconnection from one operator to other operators.

6.2 CUSTOMER CARE / HELPLINE ASSESSMENT:

LIVE CALLING TO CALL CENTRE									
Parameter	Circle Name	AIRTEL	AIRCEL	MTNL	IDEA	RCOM (GSM)	TATA (GSM)	VODAFONE	RCOM (CDMA)	TATA (CDMA)
Total No. of calls Attempted	Mumbai Metro	100	100	IVR not functional	100	100	100	100	100	100
Total no. of calls successfully established to customer care/Call center	Mumbai Metro	100	100	IVR not functional	100	100	100	100	100	100
% Accessibility of Call centre /customer Care (Total call successfully established *100/ Total call attempt)	Mumbai Metro	**100%**	**100%**	**NA**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Total Calls reached to agent desk for Voice to Voice (Total call attempt)	Mumbai Metro	100	100	100	100	100	100	100	100	100
Total number of calls answered by the operator (Voice to voice) within 90 seconds.	Mumbai Metro	100	100	100	100	100	100	100	100	100
% age of calls answered by operator (voice to voice) (Total call successfully established within 90 Sec.*100 /Total call attempt)	Mumbai Metro	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

NA: Not Applicable

In case of calls answered by operators (voice to voice) within 90 seconds when test calls were made to the call centers, the performance with respect to the calls connection was satisfactory. IVR system of MTNL was not functional at the time of audit.

6.3 LIVE CALLING ASSESSMENT FOR BILLING COMPLIANTS:

TELEPHONIC INTERVIEW FOR BILLING COMPLAINTS										
Parameter	Circle Name	AIRTEL	AIRCEL	MTNL	IDEA	RCOM (GSM)	TATA (GSM)	VODAFONE	RCOM (CDMA)	TATA (CDMA)
Total No. of calls Attempted	Mumbai	100	5	82	100	100	100	100	100	100
Total No. of calls Answered	Mumbai	95	5	80	99	94	98	99	97	95
Resolution of Billing Complaints	Mumbai	95	5	80	99	93	98	99	97	94
%age of cases resolved	Mumbai	**100%**	**100%**	**100%**	**100%**	**98.94%**	**100%**	**100%**	**100%**	**98.95%**

NA: Not Applicable

To test the Service Providers performance on billing related complaints and their resolutions, TUV-SUD auditors conducted a customer feedback calling for about random 100 nos. of customers. However, in some cases, the number of customers contacted for verification was less due to less number of billing complaints. Most of the customers expressed their satisfaction on resolution of the billing complaints.

6.4 LEVEL -1 CALLING ASSESSMENT:

							LEVEL 1 LIVE CALLING				
Emergency no.	Name of SDCA	No. of calls made	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	RCOM CDMA	TATA GSM	TATA CDMA	VODAFONE
100-101-103-108-1091-1090	THANE	9	√	√	√	√	√	√	√	√	√
		9	√	√	√	√	√	√	√	√	√
		9	√	√	√	√	√	√	√	√	√
		9	√	√	√	√	√	√	√	√	√
		9	√	√	√	√	√	√	√	√	√
100-101-103-108-1091-1090	CENTRAL MUMBAI	9	√	√	√	√	√	√	√	√	√
		9	√	√	√	√	√	√	√	√	√
		9	√	√	√	√	√	√	√	√	√
		9	√	√	√	√	√	√	√	√	√
		9	√	√	√	√	√	√	√	√	√
100-101-103-108-1091-1090	NEW MUMBAI	9	√	√	√	√	√	√	√	√	√
		9	√	√	√	√	√	√	√	√	√
		9	√	√	√	√	√	√	√	√	√
		9	√	√	√	√	√	√	√	√	√
		9	√	√	√	√	√	√	√	√	√

To assess the availability and efficiency of level 1 services such as police, fire, ambulance, women help line and child help line (emergency services) offered by various mobile service providers, the calls were made during the drive test (Oct14 - Dec14) in different SDCAs. In Mumbai Metro service area, these services were found functional in the networks of all the service providers.

7. DRIVE TEST

7. OPERATOR ASSISTED DRIVE TEST

In terms of TRAI's letter dated 21st January, 2014, the drive tests were conducted for three consecutive days in one select SSA each month in each service area. Thus, the drive tests were carried out in three SSA's namely **Thane, Central Mumbai and Navi Mumbai** in the months of October, November and December 2014 respectively. The total route Kms covered during drive tests in respective SSAs was **326 Kms, 308 Kms and 316 Kms**. 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: THANE SSA (OCTOBER-14)

DRIVE TEST TABLE – 1

S/N	Parameter	Classification of Route covered	AIRCEL OUTDOOR	AIRCEL INDOOR	AIRTEL OUTDOOR	AIRTEL INDOOR	MTNL OUTDOOR	MTNL INDOOR	TATA GSM OUTDOOR	TATA GSM INDOOR	IDEA OUTDOOR	IDEA INDOOR	RCOM GSM OUTDOOR	RCOM GSM INDOOR	VODAFONE OUTDOOR	VODAFONE INDOOR	TATA CDMA OUTDOOR	TATA CDMA INDOOR	RCOM CDMA OUTDOOR	RCOM CDMA INDOOR
1	Call Attempts	Highways	75	30	78	30	88	30	63	30	87	30	80	30	81	31	65	30	85	30
		Major Roads	69	30	62	30	67	31	57	30	66	30	65	30	56	30	59	30	71	30
		Within City	379	30	322	30	340	30	333	30	344	30	381	30	349	30	326	30	414	30
		Overall SSA	523	90	462	90	495	91	453	90	497	90	526	90	486	91	450	90	570	90
2	Blocked Call Rate	Highways	1.33%	0.00%	0.00%	0.00%	4.55%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.54%	0.00%	0.00%	0.00%
		Major Roads	1.45%	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%	1.69%	0.00%	0.00%	0.00%
		Within City	1.58%	0.00%	0.00%	0.00%	1.18%	0.00%	2.40%	0.00%	1.16%	0.00%	0.79%	0.00%	0.00%	0.00%	0.61%	0.00%	2.90%	0.00%
		Overall SSA	1.53%	0.00%	0.00%	0.00%	1.62%	0.00%	1.77%	0.00%	0.80%	0.00%	0.57%	0.00%	0.00%	0.00%	0.89%	0.00%	2.11%	0.00%
3	Dropped Call Rate (<=2%)	Highways	2.70%	0.00%	0.00%	0.00%	5.95%	0.00%	0.00%	0.00%	1.15%	0.00%	0.00%	0.00%	0.00%	0.00%	3.13%	0.00%	2.35%	0.00%
		Major Roads	0.00%	0.00%	0.00%	0.00%	2.99%	0.00%	1.75%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.72%	0.00%	0.00%	0.00%
		Within City	1.34%	0.00%	0.00%	0.00%	3.27%	0.00%	1.54%	0.00%	0.59%	0.00%	0.26%	0.00%	0.00%	0.00%	2.47%	0.00%	1.00%	0.00%
		Overall SSA	1.36%	0.00%	0.00%	0.00%	3.70%	0.00%	1.35%	0.00%	0.61%	0.00%	0.19%	0.00%	0.00%	0.00%	2.47%	0.00%	1.08%	0.00%

S/N	Parameter	Classification of Route covered	AIRCEL OUTDOOR	AIRCEL INDOOR	AIRTEL OUTDOOR	AIRTEL INDOOR	MTNL OUTDOOR	MTNL INDOOR	TATA GSM OUTDOOR	TATA GSM INDOOR	IDEA OUTDOOR	IDEA INDOOR	RCOM GSM OUTDOOR	RCOM GSM INDOOR	VODAFONE OUTDOOR	VODAFONE INDOOR	TATA CDMA OUTDOOR	TATA CDMA INDOOR	RCOM CDMA OUTDOOR	RCOM CDMA INDOOR
4	**Percentage connections with good voice quality (=>95%)**																			
	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Highways	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.12%	99.31%	**91.83%**	100%
		Major Roads	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.88%	98.91%	**89.26%**	100%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	95.75%	99.89%	**92.02%**	100%
		Overall SSA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.09%	99.37%	**91.66%**	100%
	(b) 0-5 (with frequency hopping for GSM Operators)	Highways	95.31%	100%	95.80%	99.33%	**92.52%**	95.89%	97.18%	100%	**88.74%**	97.83%	**92.46%**	100%	95.87%	99.05%	NA	NA	NA	NA
		Major Roads	**94.68%**	99.82%	96.32%	99.70%	**93.82%**	96.23%	97.18%	97.44%	**89.57%**	99.75%	**91.86%**	100%	95.70%	98.37%	NA	NA	NA	NA
		Within City	96.26%	99.73%	95.60%	98.99%	**94.52%**	95.24%	96.48%	96.21%	**87.47%**	98.46%	**94.20%**	100%	95.04%	99.27%	NA	NA	NA	NA
		Overall SSA	96.01%	99.85%	95.72%	99.34%	**94.19%**	95.85%	96.68%	97.96%	**87.99%**	98.68%	**93.67%**	100%	95.26%	98.68%	NA	NA	NA	NA
5	**Service Coverage**																			
	In door (>= -75dBm)	Highways	94.78%	9477.54%	80.88%	98.16%	20.23%	24.65%	97.17%	96.56%	91.47%	99.87%	68.63%	100%	78.89%	97.96%	97.30%	100%	70.45%	100%
		Major Roads	92.07%	9207.06%	86.61%	97.82%	26.84%	28.93%	97.15%	99.65%	92.64%	90.22%	58.43%	100%	72.94%	99.73%	98.65%	100%	57.56%	100%
		Within City	94.47%	9447.47%	75.51%	99.94%	24.08%	24.15%	96.55%	99.40%	97.38%	99.84%	50.77%	100%	71.08%	99.96%	97.96%	100%	69.26%	100%
		Overall SSA	94.35%	94.35%	81.00%	98.64%	23.72%	25.91%	96.72%	98.48%	95.69%	96.99%	54.33%	100%	72.61%	99.22%	97.96%	100%	68.07%	100%
	In-vehicle (>= -85dBm)	Highways	99.45%	9944.91%	93.25%	99.97%	61.04%	69.87%	99.77%	100%	98.60%	100%	88.79%	100%	96.92%	99.99%	100%	100%	93.89%	100%
		Major Roads	99.72%	9972.04%	96.76%	100%	71.38%	70.61%	99.65%	100%	99.11%	99.59%	87.12%	100%	94.51%	100%	100%	100%	86.33%	100%
		Within City	99.57%	9956.67%	92.21%	99.80%	68.82%	82.98%	99.79%	100%	99.94%	100%	80.94%	100%	95.14%	100%	99.96%	100%	96.48%	100%
		Overall SSA	99.57%	99.57%	94.07%	99.92%	67.08%	74.49%	99.77%	100%	99.59%	99.88%	82.84%	100%	95.37%	100%	99.97%	100%	94.89%	100%
	Outdoor- in city (>= -95dBm)	Highways	99.77%	9976.51%	100%	100%	93.83%	99.02%	100%	100%	99.86%	100%	95.65%	100%	99.76%	100%	100%	100%	100%	100%
		Major Roads	99.94%	9994.32%	100%	100%	98.14%	99.87%	100%	100%	99.99%	100%	98.13%	100%	99.86%	100%	100%	100%	100%	100%
		Within City	99.93%	9992.86%	100%	100%	97.31%	100%	100%	100%	99.98%	100%	96.76%	100%	99.80%	100%	100%	100%	100%	100%
		Overall SSA	99.92%	99.92%	100%	100%	96.43%	99.63%	100%	100%	99.96%	100%	96.75%	100%	99.80%	100%	100%	100%	100%	100%

S/N	Parameter	Classification of Route covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		VODAFONE		TATA CDMA		RCOM CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
6	Call Setup Success Rate (>=95%)	Highways	98.67%	100%	100%	100%	95.45%	100%	100%	100%	100%	100%	100%	100%	100%	100%	98.46%	100%	100%	100%
		Major Roads	97.10%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	98.31%	100%	100%	100%
		Within City	98.15%	100%	100%	100%	99.41%	100%	97.60%	100%	98.55%	100%	99.21%	100%	100%	100%	99.39%	100%	97.10%	100%
		Overall SSA	98.09%	100%	100%	100%	98.79%	100%	98.23%	100%	98.99%	100%	99.43%	100%	100%	100%	99.11%	100%	97.89%	100%
7	Hand Over Success Rate (HOSR)	Highways	98.24%	100%	99.60%	100%	99.12%	100%	96.67%	100%	98.14%	100%	98.77%	100%	99.39%	100%	100%	100%	100%	100%
		Major Roads	100%	100%	96.75%	100%	97.40%	100%	96.86%	99.07%	99.45%	100%	96.84%	100%	98.70%	100%	100%	100%	100%	100%
		Within City	98.37%	100%	98.70%	100%	98.39%	100%	97.50%	98.86%	98.62%	100%	98.81%	100%	99.46%	100%	100%	100%	100%	100%
		Overall SSA	98.52%	100%	98.68%	100%	98.41%	100%	97.26%	98.98%	98.63%	100%	98.55%	100%	99.35%	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: CENTRAL MUMBAI SSA (NOVEMBER-14)

DRIVE TEST TABLE – 2

S/N	Parameter	Classification of Route covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		VODAFONE		TATA CDMA		RCOM CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
1	Call Attempts	Highways	55	30	53	30	60	32	46	30	78	30	51	30	46	30	51	30	57	30
		Major Roads	45	30	46	30	49	32	41	30	52	30	35	30	38	30	45	30	35	30
		Within City	350	30	303	30	340	32	323	30	350	30	361	30	384	30	326	30	402	30
		Overall SSA	450	90	402	90	449	96	410	90	480	90	447	90	468	90	422	90	494	90
2	Blocked Call Rate	Highways	1.82%	0.00%	0.00%	0.00%	5.00%	0.00%	2.17%	0.00%	2.56%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	5.26%	0.00%
		Major Roads	2.22%	0.00%	0.00%	0.00%	0.00%	0.00%	7.32%	0.00%	7.69%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		Within City	1.71%	0.00%	0.00%	0.00%	0.59%	0.00%	0.93%	0.00%	0.57%	0.00%	0.28%	0.00%	0.00%	0.00%	0.00%	0.00%	3.73%	0.00%
		Overall SSA	1.78%	0.00%	0.00%	0.00%	1.11%	0.00%	1.71%	0.00%	1.67%	0.00%	0.22%	0.00%	0.00%	0.00%	0.00%	0.00%	3.64%	0.00%
3	Dropped Call Rate (<=2%)	Highways	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	5.26%	0.00%	6.12%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		Major Roads	4.55%	0.00%	0.00%	0.00%	8.16%	0.00%	2.63%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		Within City	1.16%	0.00%	0.00%	0.00%	2.42%	0.00%	1.25%	0.00%	1.72%	0.00%	0.56%	0.00%	0.00%	0.00%	0.61%	0.00%	1.81%	0.00%
		Overall SSA	1.36%	0.00%	0.00%	0.00%	2.76%	0.00%	1.24%	0.00%	2.12%	0.00%	1.14%	0.00%	0.00%	0.00%	0.47%	0.00%	1.47%	0.00%
4	Percentage connections with good voice quality (=>95%)																				

S/N	Parameter	Classification of Route covered	AIRCEL OUTDOOR	AIRCEL INDOOR	AIRTEL OUTDOOR	AIRTEL INDOOR	MTNL OUTDOOR	MTNL INDOOR	TATA GSM OUTDOOR	TATA GSM INDOOR	IDEA OUTDOOR	IDEA INDOOR	RCOM GSM OUTDOOR	RCOM GSM INDOOR	VODAFONE OUTDOOR	VODAFONE INDOOR	TATA CDMA OUTDOOR	TATA CDMA INDOOR	RCOM CDMA OUTDOOR	RCOM CDMA INDOOR
	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Highways	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.70%	98.79%	95.14%	99.84%
		Major Roads	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.90%	99.83%	95.29%	99.84%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.57%	99.34%	93.69%	100%
		Overall SSA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.65%	99.32%	94.01%	99.90%
	(b) 0-5 (with frequency hopping for GSM Operators)	Highways	96.05%	99.77%	95.63%	97.37%	85.90%	99.81%	96.66%	100%	89.25%	99.71%	91.71%	100%	95.95%	99.36%	NA	NA	NA	NA
		Major Roads	95.45%	99.71%	96.03%	99.74%	85.26%	99.57%	97.05%	100%	87.19%	99.02%	91.47%	100%	95.14%	99.50%	NA	NA	NA	NA
		Within City	96.49%	99.57%	95.37%	99.30%	88.90%	99.64%	97.17%	100%	89.22%	99.44%	93.41%	99.87%	95.70%	98.10%	NA	NA	NA	NA
		Overall SSA	96.35%	99.68%	95.49%	98.80%	88.15%	99.68%	97.10%	100%	89.01%	99.39%	93.04%	99.95%	95.68%	99.00%	NA	NA	NA	NA
	Service Coverage																			
5	In door (>= -75dBm)	Highways	89.88%	94.04%	94.19%	51.35%	51.95%	21.46%	98.70%	98.47%	99.62%	99.82%	72.91%	100%	82.25%	100%	98.34%	100%	91.67%	100%
		Major Roads	93.01%	97.87%	88.62%	100%	47.67%	25.82%	96.51%	99.55%	94.84%	100%	60.07%	100%	76.86%	99.96%	99.21%	100%	83.49%	100%
		Within City	93.89%	94.02%	88.87%	98.04%	38.43%	27.98%	96.85%	100%	95.19%	98.57%	68.13%	100%	79.81%	85.36%	97.92%	100%	83.66%	100%
		Overall SSA	93.29%	95.31%	90.56%	83.13%	46.01%	25.09%	97.01%	99.34%	95.86%	99.91%	68.03%	100%	79.80%	99.22%	98.11%	100%	84.63%	100%
	In-vehicle (>= -85dBm)	Highways	99.75%	99.89%	98.54%	99.50%	88.99%	67.16%	99.98%	100%	99.96%	100%	95.47%	100%	97.69%	100%	99.99%	100%	99.64%	100%
		Major Roads	99.29%	100%	98.92%	100%	83.19%	81.70%	99.75%	100%	99.92%	100%	88.49%	100%	96.37%	100%	100%	100%	97.86%	100%
		Within City	99.58%	99.97%	97.19%	100%	79.08%	79.99%	99.95%	100%	99.73%	99.72%	92.11%	100%	95.99%	99.84%	100%	100%	97.96%	100%
		Overall SSA	99.58%	99.95%	98.21%	99.83%	83.75%	76.28%	99.93%	100%	99.78%	99.910%	92.22%	100%	96.19%	100%	100%	100%	98.16%	100%
	Outdoor- in city (>= -95dBm)	Highways	99.95%	100%	100%	100%	99.12%	100%	100%	100%	99.99%	100%	99.65%	100%	99.94%	100%	100%	100%	100%	100%
		Major Roads	99.96%	100%	100%	100%	98.70%	100%	100%	100%	99.99%	100%	98.25%	100%	99.93%	100%	100%	100%	100%	100%
		Within City	99.93%	100%	100%	100%	98.67%	100%	100%	100%	99.94%	100%	98.70%	100%	99.74%	100%	100%	100%	100%	100%
		Overall SSA	99.93%	100%	100%	100%	98.83%	100%	100%	100%	99.96%	100%	98.77%	100%	99.78%	100%	100%	100%	100%	100%
6	Call Setup Success	Highways	98.18%	100%	100%	100%	90.00%	100%	97.83%	100%	97.44%	100%	96.08%	100%	100%	100%	100%	100%	94.74%	100%

S/N	Parameter	Classification of Route covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		VODAFONE		TATA CDMA		RCOM CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
	Rate (>=95%)	Major Roads	97.78%	100%	100%	100%	100%	100%	92.68%	100%	92.31%	100%	97.14%	100%	100%	100%	100%	100%	100%	100%
		Within City	98.29%	100%	100%	100%	97.35%	93.75%	99.07%	100%	99.43%	100%	98.34%	100%	100%	100%	100%	100%	96.27%	100%
		Overall SSA	98.22%	100%	100%	100%	96.66%	97.92%	98.29%	100%	98.33%	100%	97.99%	100%	100%	100%	100%	100%	96.36%	100%
7	Hand Over Success Rate (HOSR)	Highways	98.17%	100%	97.93%	100%	99.32%	100%	98.65%	100%	96.50%	100%	93.94%	100%	97.74%	100%	100%	100%	100%	100%
		Major Roads	97.62%	100%	97.52%	100%	96.08%	100%	99.30%	100%	95.16%	100%	98.20%	100%	99.00%	100%	100%	100%	100%	100%
		Within City	97.01%	100%	96.05%	100%	98.61%	100%	98.56%	100%	97.42%	100%	98.33%	100%	99.00%	100%	100%	100%	100%	100%
		Overall SSA	97.24%	100%	96.55%	100%	98.33%	100%	98.65%	100%	97.02%	100%	97.67%	100%	98.82%	100%	100%	100%	100%	100%

*NA: Not Applicable

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

7.3 OPERATOR ASSISTED DRIVE TEST: NAVI MUMBAI (DECEMBER-14)

DRIVE TEST TABLE – 3

S/N	Parameter	Classification of Route covered	AIRCEL OUTDOOR	AIRCEL INDOOR	AIRTEL OUTDOOR	AIRTEL INDOOR	MTNL OUTDOOR	MTNL INDOOR	TATA GSM OUTDOOR	TATA GSM INDOOR	IDEA OUTDOOR	IDEA INDOOR	RCOM GSM OUTDOOR	RCOM GSM INDOOR	VODAFONE OUTDOOR	VODAFONE INDOOR	TATA CDMA OUTDOOR	TATA CDMA INDOOR	RCOM CDMA OUTDOOR	RCOM CDMA INDOOR
1	Call Attempts	Highways	101	30	88	30	80	30	80	30	98	30	88	30	108	30	73	30	134	30
		Major Roads	55	30	52	30	66	30	63	30	77	30	57	30	56	30	69	30	55	30
		Within City	196	30	172	30	186	30	162	30	232	30	184	30	181	30	162	30	205	30
		Overall SSA	352	90	312	90	332	90	305	90	407	90	329	90	345	90	304	90	394	90
2	Blocked Call Rate	Highways	4.95%	0.00%	0.00%	0.00%	3.75%	0.00%	1.25%	0.00%	0.00%	0.00%	5.68%	0.00%	0.00%	0.00%	2.74%	0.00%	26.12%	0.00%
		Major Roads	1.82%	0.00%	0.00%	0.00%	1.52%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		Within City	1.53%	0.00%	0.00%	0.00%	2.15%	0.00%	1.23%	0.00%	0.43%	0.00%	1.09%	0.00%	0.00%	0.00%	0.00%	0.00%	5.85%	0.00%
		Overall SSA	2.56%	0.00%	0.00%	0.00%	2.41%	0.00%	0.98%	0.00%	0.25%	0.00%	2.13%	0.00%	0.00%	0.00%	0.66%	0.00%	11.93%	0.00%
3	Dropped Call Rate (<=2%)	Highways	3.13%	0.00%	0.00%	0.00%	7.79%	0.00%	2.53%	0.00%	0.00%	0.00%	1.20%	0.00%	0.00%	0.00%	0.00%	0.00%	3.03%	0.00%
		Major Roads	0.00%	0.00%	0.00%	0.00%	3.08%	0.00%	0.00%	0.00%	0.00%	0.00%	1.75%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		Within City	0.00%	0.00%	0.00%	0.00%	4.40%	0.00%	0.63%	0.00%	0.87%	0.00%	1.65%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		Overall SSA	0.87%	0.00%	0.00%	0.00%	4.94%	0.00%	0.99%	0.00%	0.49%	0.00%	1.55%	0.00%	0.00%	0.00%	0.00%	0.00%	0.86%	0.00%

S/N	Parameter	Classification of Route covered	AIRCEL OUTDOOR	AIRCEL INDOOR	AIRTEL OUTDOOR	AIRTEL INDOOR	MTNL OUTDOOR	MTNL INDOOR	TATA GSM OUTDOOR	TATA GSM INDOOR	IDEA OUTDOOR	IDEA INDOOR	RCOM GSM OUTDOOR	RCOM GSM INDOOR	VODAFONE OUTDOOR	VODAFONE INDOOR	TATA CDMA OUTDOOR	TATA CDMA INDOOR	RCOM CDMA OUTDOOR	RCOM CDMA INDOOR
4	**Percentage connections with good voice quality (=>95%)**																			
	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Highways	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.89%	98.08%	**85.47%**	99.66%
		Major Roads	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.29%	97.68%	95.74%	100%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.83%	98.50%	95.53%	99.31%
		Overall SSA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.46%	98.09%	**93.11%**	99.67%
	(b) 0-5 (with frequency hopping for GSM Operators)	Highways	**94.70%**	99.71%	96.06%	96.88%	**87.95%**	98.96%	97.39%	98.87%	**92.35%**	99.83%	**86.49%**	100%	95.19%	99.33%	NA	NA	NA	NA
		Major Roads	**94.30%**	99.88%	96.99%	99.75%	**92.28%**	96.53%	97.41%	99.98%	**93.07%**	99.81%	**89.33%**	100%	96.91%	99.64%	NA	NA	NA	NA
		Within City	96.30%	99.84%	96.95%	99.18%	**91.27%**	99.43%	97.68%	99.99%	**92.76%**	99.85%	**92.71%**	99.77%	96.31%	99.76%	NA	NA	NA	NA
		Overall SSA	95.67%	99.81%	96.72%	98.60%	**90.75%**	98.38%	97.55%	99.55%	**92.72%**	99.83%	**90.58%**	99.92%	96.07%	99.58%	NA	NA	NA	NA
5	**Service Coverage**																			
	In door (>= -75dBm)	Highways	76.34%	97.87%	62.93%	91.14%	12.76%	35.17%	96.87%	99.87%	79.97%	100%	28.99%	100%	40.11%	95.90%	96.99%	98.20%	41.16%	100%
		Major Roads	81.13%	100%	78.06%	99.99%	26.54%	33.80%	97.56%	99.87%	93.53%	100%	48.84%	100%	65.95%	99.99%	98.72%	99.77%	87.90%	100%
		Within City	79.60%	93.53%	74.65%	75.92%	23.82%	32.89%	97.05%	97.75%	84.46%	100%	59.75%	100%	56.36%	99.97%	97.43%	100%	72.38%	100%
		Overall SSA	79.07%	97.14%	71.88%	89.02%	21.04%	33.95%	97.12%	99.36%	85.11%	100%	51.60%	100%	52.96%	98.62%	97.62%	99.34%	66.20%	100%
	In-vehicle (>= -85dBm)	Highways	93.69%	100%	85.77%	99.72%	63.24%	87.28%	99.79%	100%	98.34%	100%	62.08%	100%	78.76%	99.90%	100%	100%	60.63%	100%
		Major Roads	96.34%	100%	95.82%	100%	81.33%	86.69%	99.45%	100%	99.29%	100%	83.03%	100%	92.60%	100%	100%	100%	99.90%	100%
		Within City	96.05%	99.99%	93.27%	99.32%	80.80%	82.60%	99.79%	100%	99.21%	100%	87.87%	100%	86.97%	100%	100%	100%	95.72%	100%
		Overall SSA	95.54%	100%	91.62%	99.68%	75.12%	85.52%	99.71%	100%	99.02%	100%	81.66%	100%	85.38%	99.97%	100%	100%	86.56%	100%
	Outdoor- in city (>= -95dBm)	Highways	99.19%	100%	100%	100%	91.85%	100%	100%	100%	99.99%	100%	89.02%	100%	97.57%	99.93%	100%	100%	100%	100%
		Major Roads	99.60%	100%	100%	100%	98.21%	100%	100%	100%	99.90%	100%	97.16%	100%	99.21%	100%	100%	100%	100%	100%
		Within City	99.63%	100%	100%	100%	97.85%	100%	100%	100%	99.96%	100%	98.23%	100%	98.98%	100%	100%	100%	100%	100%
		Overall SSA	99.52%	100%	100%	100%	95.97%	100%	100%	100%	99.96%	100%	96.11%	100%	98.59%	99.98%	100%	100%	100%	100%

S/N	Parameter	Classification of Route covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		VODAFONE		TATA CDMA		RCOM CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
6	Call Setup Success Rate (>=95%)	Highways	95.05%	100%	100%	100%	96.25%	100%	98.75%	100%	100%	100%	94.32%	100%	100%	100%	97.26%	100%	73.88%	100%
		Major Roads	98.18%	100%	100%	100%	98.48%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Within City	98.47%	100%	100%	100%	97.85%	100%	98.77%	100%	99.14%	100%	98.91%	100%	100%	100%	100%	100%	94.15%	100%
		Overall SSA	97.44%	100%	100%	100%	97.59%	100%	99.02%	100%	99.51%	100%	97.87%	100%	100%	100%	99.34%	100%	88.07%	100%
7	Hand Over Success Rate (HOSR)	Highways	96.07%	100%	98.89%	100%	97.24%	100%	97.74%	100%	99.07%	100%	96.26%	100%	97.77%	100%	100%	100%	100%	100%
		Major Roads	100%	100%	100%	100%	97.73%	100%	96.83%	98.63%	95.43%	100%	97.48%	100%	99.65%	100%	100%	100%	100%	100%
		Within City	98.64%	100%	98.62%	100%	94.77%	100%	97.88%	100%	97.87%	100%	98.03%	100%	98.79%	100%	100%	100%	100%	100%
		Overall SSA	98.35%	100%	98.99%	100%	95.94%	100%	97.57%	99.47%	97.64%	100%	97.51%	100%	98.68%	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

		Day 1		Day 2		Day 3	
DRIVE TEST ROUTE OF OCTOBER TO DECEMBER 14 – MUMBAI METRO CIRCLE							
Name of SSA	**Drive test Period**	**Name of SDCA Covered**	**Route Covered**	**Name of SDCA Covered**	**Route Covered**	**Name of SDCA Covered**	**Route Covered**
THANE	**Oct-14**	Thane/ 119 KM	Korum Mall, Thane West, Vasant vihar ,pokhran rd, Thane station area , Navpada, Wagle estate, Ghodbunder rd, LBS road mulund , Bhandup, Gandhi nagar. **Indoor:** KORAM MALL, Eastern express way,Thane	Thane/ 103 KM	Korum Mall, Thane West, Vasant vihar ,pokhran rd, Wagle estate, Ghodbunder rd,Mumbra, kalwa rd, Kharegaon, LBS road mulund , Bhandup, Gandhi nagar.Mulund east, Mulund west, Bhandup west **Indoor:** INORBIT MALL, Malad	Thane / 104 KM	Korum Mall, Thane West, Vasant vihar ,pokhran rd, Thane station area ,Navpada, Wagle estate, Ghodbunder rd, LBS road mulund , Bhandup, Gandhi nagar.Brahmand, kopri, Brindavan.Mulund west. **Indoor:** Thakur Mall,Dahisar
CENTRAL MUMBAI	**Nov-14**	Central Mumbai / 105 KM	Matunga, Sion, Chunabhatti, Kurla, Wadala, Eastern Free Way, Mahul, Chembur, Vashi Naka, Deonar, Govandi, Mankhurd, Ghatkopar. **Indoor:** K STAR MALL CHEMBUR	Central Mumbai / 101 KM	Matunga, Sion, Dharavi, BKC, Bandra East and West,Pali Hill, Khardanda, Khar, Santacruz, Vileparle,Juhu, Andher East and West, Jog-Vikhroli Link Road, Powai, Vikhroli, Eastern Express Highway upto Matunga. **Indoor:** CINEMAX-SION CIRCLE	Central Mumbai / 102 KM	Matunga, Sion, Dharavi, BKC, Kalina, Khar, Santacruz, Vileparle, Juhu Versova Rd, Yari Rd, Versova, Sat Bangla, Versova Village, Andheri, Jog Vikhroli Link Rd,Powai, Chandivali, Park Site, Vikhroli, Eastern Express Highway upto Matunga. **Indoor:** Mega Mall Oshiwara

| NAVI MUMBAI | Dec-14 | Navi Mumbai / 112 KM | Uran Road, JNPT Road,Palm Beach Road, Sanpada Road, Nerul, Nagdevi Road, Sakaram patil Marg, Nirmala Devi Marg, Sion-Panvel Highway, Kalamboli,Thane-Belapur Road, Sakaram Patil Marg, Nirmala Devi Marg, Sion-Panvel Highway, Vashi Road.

Indoor: Raghuleela Mall, Kandivali | Navi Mumbai / 101 KM | Palm Beach Road, Nagdevi Road, Datta Tandel Marg, Uran Road, JNPT Road,Uran Road, Panvel City Road, Old Thane-Panvel Road, Kalamboli, Taloja, Panvel-Taloja Road, Kharghar, CISF Road, SC Road, Khanda Colony, City Park Road.

Indoor: Infinity Mall, Link Rd, Malad West | Navi Mumbai / 103 KM | Palm Beach Road, Sion-Panvel Highway,Vashi, Vashi-Turbhe Road, Kopar Khairane, Ghansoli, Rabale, Airoli, MAFCO Road, APMC Market, RS Regency Road.

Indoor: Center One Mall, Sector-30, Vashi |

7.5 SSA WISE DRIVE TEST OBSERVATION:

DRIVE TEST TABLE: 5

DRIVE TEST OBSERVATION OF THANE SSA (OCT-14)

S NO	Name of SP	Day 1 Observation	Day 2 Observation	Day 3 Observation
1	AIRTEL	Poor voice quality observed at : Bhiwandi road Landmark: Bhiwanid toll naka	Poor voice quality observed at : 90 feet road Landmark:Kelkar play ground	Poor voice quality observed at : khopat road Landmark:trivia sottware
2	AIRCEL	Poor voice quality observed at : kalava Road	---	---
3	MTNL	Poor voice quality observed at : Ghodbunder road and near Rmall ,Bansuri E-Exp Highway, Kolshet road,Pokhran road	Poor voice quality observed at : Reti bunder road,Upvan lake,near JV Link road,	Poor voice quality observed at : link road, Kopri area and Mulund east,Kolshet road and near Rmall
4	IDEA CELLULAR	Poor voice quality observed all over drive but worst at Eastern express highway,Nasik road, Road no 33,	Poor voice quality observed all over drive but worst at Eastern express highway,Bhandup,Kalwa Bridge	Poor voice quality observed all over drive but worst at Thane W,Maziwada,
5	VODAFONE	Poor voice quality observed at Wagale estate Thane W,Barve Road Thane,Sakhubai Apartment	Poor voice quality observed at Koros road, Laxmi park Thane W,Scheme road no 4 Mulund	Poor voice quality observed at Mahatma Phule Marg – Brahmand Thane,
6	TATA GSM	Poor voice quality observed at : Kolshet Road,Acharya Atre Marg,Kanjuwadi,Pipeline road.	Poor voice quality observed at : Ram Nagar Thane,JSD Rd, Ashok Nagar Mulund West	Poor voice quality observed at : Raigad Aali Marg, Panch Pakhadi, Thane West/Mental Hospital Road,Thane/Saket-Kalwa Road
7	TATA CDMA	---	---	Poor voice quality observed at : Gokhale road,Naupada
8	RCOM GSM	Poor Level & voice quality observed at : Majiwada,Wagle Industrial Estate,Upvan lake ,D Mart, Thane	Poor Level & voice quality observed at : Navghar road ,Kalwa road, E exp highway,	Poor Level & voice quality observed at : Ghodbunder Road,Panch Pakhadi,Panch Pakhadi
9	RCOM CDMA	Poor Level & voice quality observed at : LBS Road near MMRDA Colony ,Wagle Estate	Poor Level & voice quality observed at : Poor quality observed in Parsik Nagar, Kalwa,Cadbury Junction	Poor Level & voice quality observed at : Eastern Expressway ,Mulund West ,Balkum–Kalwa

Common observation Area: LBS Road, Wagle Estate, Eastern express highway.

DRIVE TEST TABLE: 6

DRIVE TEST OBSERVATION OF CENTRAL MUMBAI SSA (NOV-14)

S .No	Name of SP	Day 1 Observation	Day 2 Observation	Day 3 Observation
1	AIRTEL	Poor voice quality observed at : Road: Govandi Road Landmark:Ankur Cinema	Poor voice quality observed at : Road: JVLR road Landmark:IDBI bank	Poor voice quality observed at : SV Road
2	AIRCEL	Poor voice quality observed at : Chembure Area	Poor voice quality observed at : JVLR & Kalinga Road	Poor voice quality observed at : SV Road
3	MTNL	Poor voice quality observed at : Munciple road , Navbharat Office,Neelkanth Chembar, Aanik Bus Depot	Poor voice quality observed at :Near Trident Hotel BKC	Poor voice quality observed at :Powai Chandivali Marg ,Lal bahadur sastri marg
4	IDEA CELLULAR	Poor voice quality found all over SSA but Worst voice quality observed at :Eastern Express Highway(Matunga to Ghatkoper),Eastern free way (Wadala to Govandi),Sion Trombe road,Ghatkopar mankhurd link road,Ghtla Village.	Poor voice quality found all over SSA but Worst voice quality observed at :Western Express Highway (Vakola to JVLR Flyover),BKC Area	Poor voice quality found all over SSA but Worst voice quality observed at :Eastern Express Highway(Vikroli to Matunga),SV Road,BKC,Airport,JVLR
5	VODAFONE	Poor voice quality observed at : hingwala lane – saibaba nagar,Ujagar Compound,Eastern Freeway,Everald nagar,between matunga, dadar and Wellinkar College area	Poor voice quality observed at :between matunga, dadar and Wellinkar College area,Rainbow Apartment, Amar Mahal, Chembur	Poor voice quality observed at :Cliff Tower, Lokhandwala ,Santacruz SV Road,Sangharsh Nagar road,BKC area
6	TATA GSM	Poor voice quality observed at : Sewri-Chembur Road	Poor voice quality observed at :Road,S.V.Road,Santacruz(W),Sion-Bandra Link Rd, Dharavi,Sion,	Poor voice quality observed at : Swami Vivekanand Rd, Siddharth Nagar, Goregaon West,Sion-Bandra Link Rd, Dharavi,DP Road Number 9, Powai
7	TATA CDMA	---	---	---
8	RCOM GSM	Poor voice quality observed at :Eastern Free Flyover Tunnel,Sewri- Chembur Road,Poddar College,Lanmi narayan road,Diamond Garden	Poor voice quality observed at :Vithal bhai Patel Road,Carter Road,Maharashtra Nagar,Band stand Prominade.	Poor voice quality observed at Aram nagar.LBS Road,Eastern expway
9	RCOM CDMA	Poor quality observed on Jijabai Bhosale Road near Indian Oil nagar ,Gulab park colony,Sahyadri n	Poor voice quality observed at : Santakrux area ,BKC area	Poor quality observed in Lokhandwala complex area,International Airport area

Common observation Area: JVLR Road, SV Road, BKC Area, Eastern free way, Wellinkar College area, Sewri- Chembur Road, International Airport area.

DRIVE TEST TABLE: 7

DRIVE TEST OBSERVATION OF NEW MUMBAI SSA (DECEMBER-14)

S. NO	Name of SP	Day 1 Observation	Day 2 Observation	Day 3 Observation
1	AIRTEL	---	Poor voice quality found at Uran Road Landmark:Marine box care	---
2	AIRCEL	Poor voice quality found Near Nagdevi road	---	---
3	MTNL	Poor voice quality & Rx level found at Uran JNPT road,Uran panwrl road,Palm beach road ,Seawoods and belapur panwel road	Poor voice quality & Rx level found at Uran phata Nerul rd and near Belapur Palm beach junction, Palm Beach, Uran JNPT road.	Poor voice quality & Rx level found at Poor coverage patches: Koper Khairane Sea face area,Palm Beach rd, CBD Belapur
4	IDEA CELLULAR	Poor voice quality found atNagdevi road & Nirmala devi marg	Poor voice quality found atKhandla colony & Uran road	Poor voice quality found atJui nagar , Sion panwel highway
5	VODAFONE	Poor voice quality found at Belapur Road, Palm beach road ,Belaur – uran highway ,Panvel –Uran road	Poor voice quality found at Belapur _ Uran Highway	Poor voice quality found at Airoli area
6	TATA GSM	Uran Road,Nr Kalundre River	Central Park Road, Kharghar.	Temple Rd,Off Sion-Panvel Express Highway,Belapur./ Palm Beach Road, Sector 19D, Vashi Navi Mumbai
7	TATA CDMA	---	---	---
8	RCOM GSM	Poor voice quality & Rx level found at Bhendkhal, Navghar, Wahal, JNPT Road & Gavanphata	Poor voice quality & Rx level found at Sanjay Joshi chowk.(Nerul, sec-40), Palm beach Road, Gavan Phata,CBD & Narul flyway	Poor voice quality & Rx level found at Palm beach Road, CBD Belapur,Juhu Village, vashi, Airoli, Sec-15
9	RCOM CDMA	Worst Rx Power & FER found at Panwel to uran road,JNPT Plot no.40,Dhutumb village,Uran road,Turbhe Station	Poor Rx Poer & FER l found at Owe village , Khanda colony,Padmavati CHSL	Poor Rx Poer & FER l found at Palm Beach road ,Sec 11 belapur,

Common observation Area: Nagdevi road, Uran road, JNPT road, Palm Beach, Beapur Uran highway, Narul Flyway.

7.6 KEY FINDINGS ON DRIVE TEST:

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

(i) **In the Month of October-14**, drive tests were conducted across **Thane** SSA (Total Drive Test 326Kms). The analysis of the drive test results conducted during the three consecutive days in Thane SSA revealed that **MTNL, Idea, RCOM (GSM) and RCOM (CDMA)** remained under performed in respect of the parameter Good **Voice Quality** with their performance as **94.19%, 87.99%, 93.67% and 91.66%** respectively. Further, **MTNL** and **Tata (CDMA)** also failed to meet the benchmark of **Call drop rate** with their performance as **3.70% and 2.47%** respectively on overall SSA basis.

(ii) **In the Month of November-14**, drive tests were conducted across **Central Mumbai** SSA for three consecutive days (Total drive test 308 Kms). The performance of **MTNL, Idea, RCOM (GSM) and RCOM (CDMA)** on over all SSA basis, was not in compliance for parameter **'Voice Quality'** with their achieved level as **88.15%, 89.01%, 93.04%** and **94.01%** respectively. Further, performance of **MTNL** and **Idea** for parameters **Call Drop Rate** lagged behind the benchmark with their performance as **2.76% and 2.12%** respectively on overall SSA level.

(iii) **In the month of December-14**, drive tests were conducted across **Navi Mumbai** SSA (Total 316 Kms). The analysis of the drive test results at SSA level revealed that **MTNL, Idea, RCOM (GSM) and RCOM (CDMA)** remained underperformed for the parameter **Good Voice Quality** with their performance as **90.75%, 92.72%, 90.58% and 93.11%** respectively. Apart from this, **MTNL** and **RCOM (CDMA)** also remained non-complied for parameters **Call Drop rate and CSSR / Blocked Call rate** having achieved level as **4.94% and 88.07% / 11.93%** respectively**.** The poor performance with respect to the parameters CSSR / Blocked Call rate indicates that **RCOM (CDMA)** was having much congestion in its network in Navi Mumbai SSA.

*Thus, MTNL, Idea, RCOM (GSM), RCOM (CDMA) and Tata (CDMA) were having non-complied performance for the parameters **Call drop rate** and **Voice quality** across the above SSAs where the drive tests were conducted during the quarter. RCOM (CDMA) also could not perform well in respect of the parameters CSSR/Blocked Call rate in Navi Mumbai SSA. These operators need improvement in their networks to remove the deficiencies with respect to non-complied parameters.*

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.

8. GRAPHICAL REPRESENTATION (CELLULAR MOBILE SERVICE PROVIDERS)

AVERAGED QUARTERLY PMR

V/S

AVERAGED QUARTERLY 3-DAYs LIVE MEASURMENT
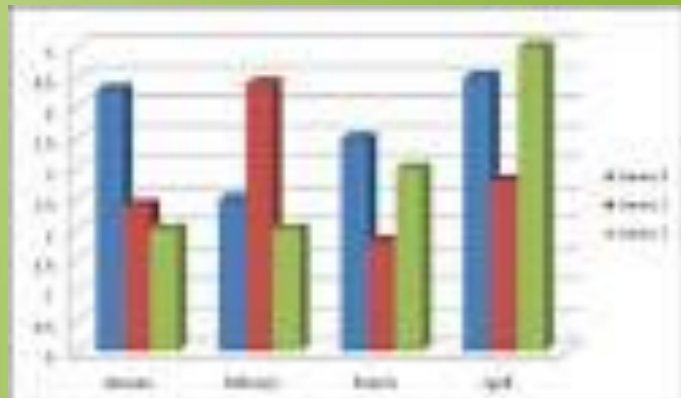
8. GRAPHICAL REPRESENTATION:

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

1) BTS ACCUMULATED DOWNTIME:

BTS Accumulated Downtime

	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFO NE	RCOM CDMA	TATA CDMA
Quarterly PMR	0.06%	0.00%	0.56%	0.06%	0.27%	0.01%	0.01%	0.27%	0.02%
Quarterly Live	0.08%	0.00%	0.52%	0.07%	0.34%	0.01%	0.01%	0.31%	0.01%
Benchmark	2%	2%	2%	2%	2%	2%	2%	2%	2%
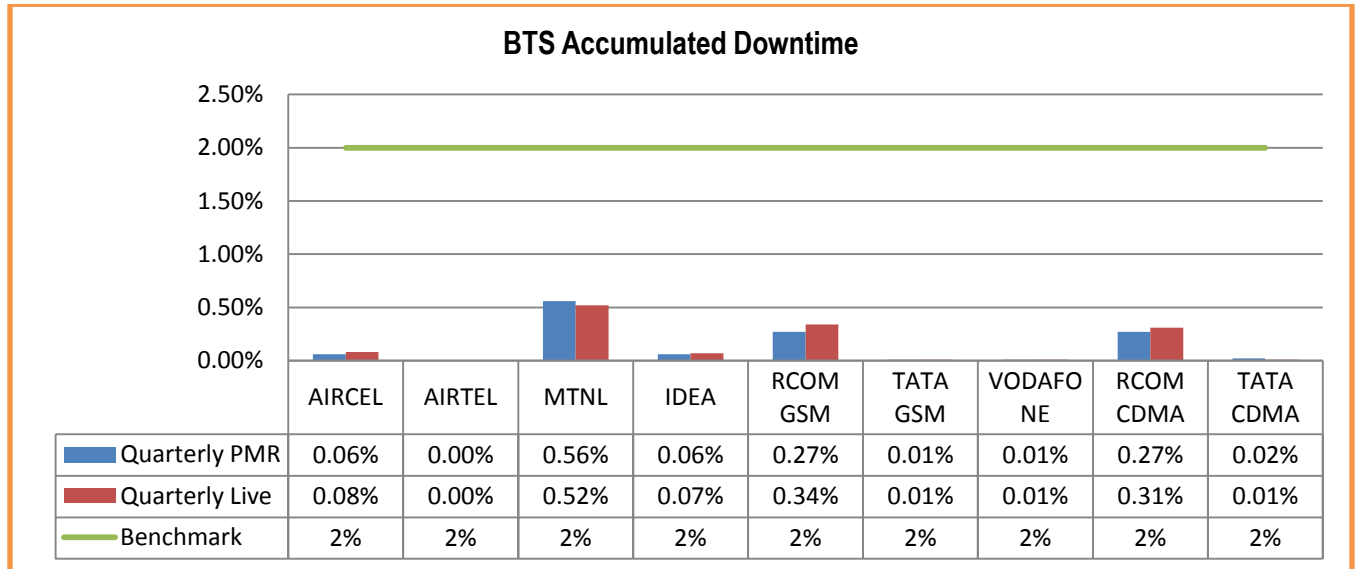
All operators are meeting the benchmarks.

2) WORST AFFECTED BTSs DUE TO DOWNTIME:

Worst affected BTSs due to downtime

	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFO NE	RCOM CDMA	TATA CDMA
Quarterly PMR	0.04%	0.00%	1.41%	0.04%	0.28%	0.00%	0.00%	0.15%	0.04%
Quarterly Live	0.00%	0.00%	0.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Benchmark	2%	2%	2%	2%	2%	2%	2%	2%	2%
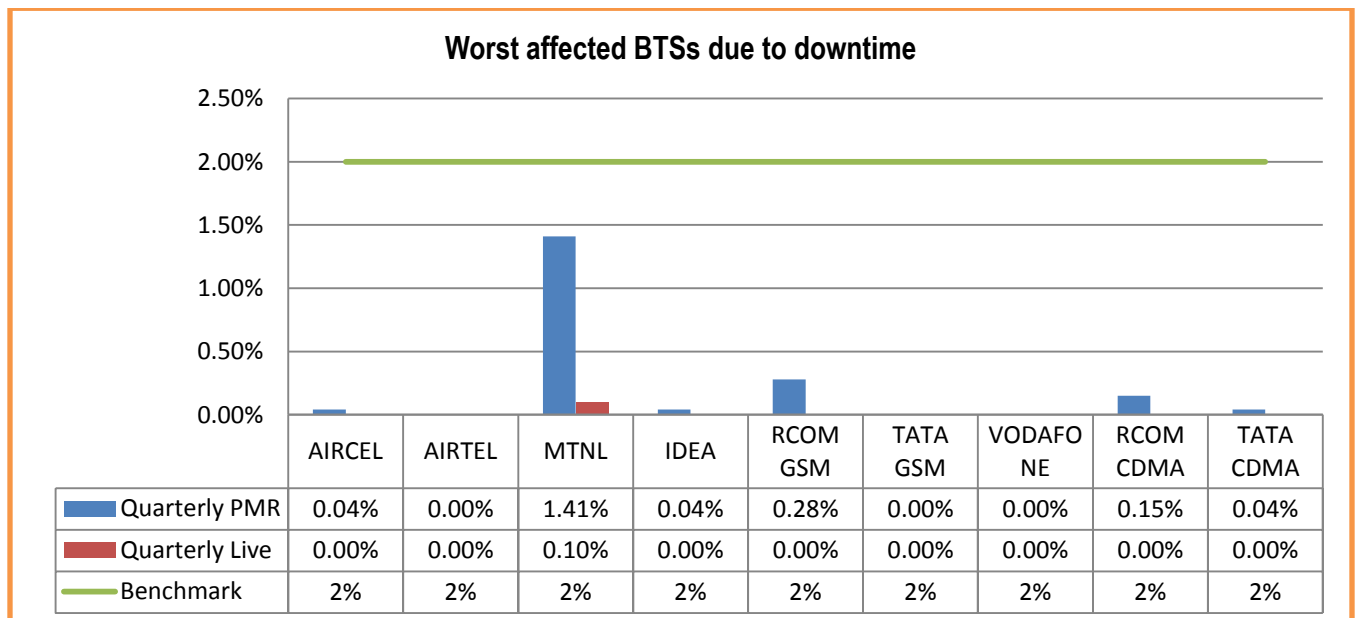
All operators are meeting the benchmarks.

3) CALL SETUP SUCCESS RATE:

Call Setup Success Rate

	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
Quarterly PMR	98.10%	99.99%	98.03%	98.57%	99.58%	99.44%	99.44%	97.88%	98.95%
Quarterly Live	98.25%	99.99%	97.78%	98.80%	99.60%	99.43%	99.44%	98.32%	98.91%
Benchmark	95%	95%	95%	95%	95%	95%	95%	95%	95%
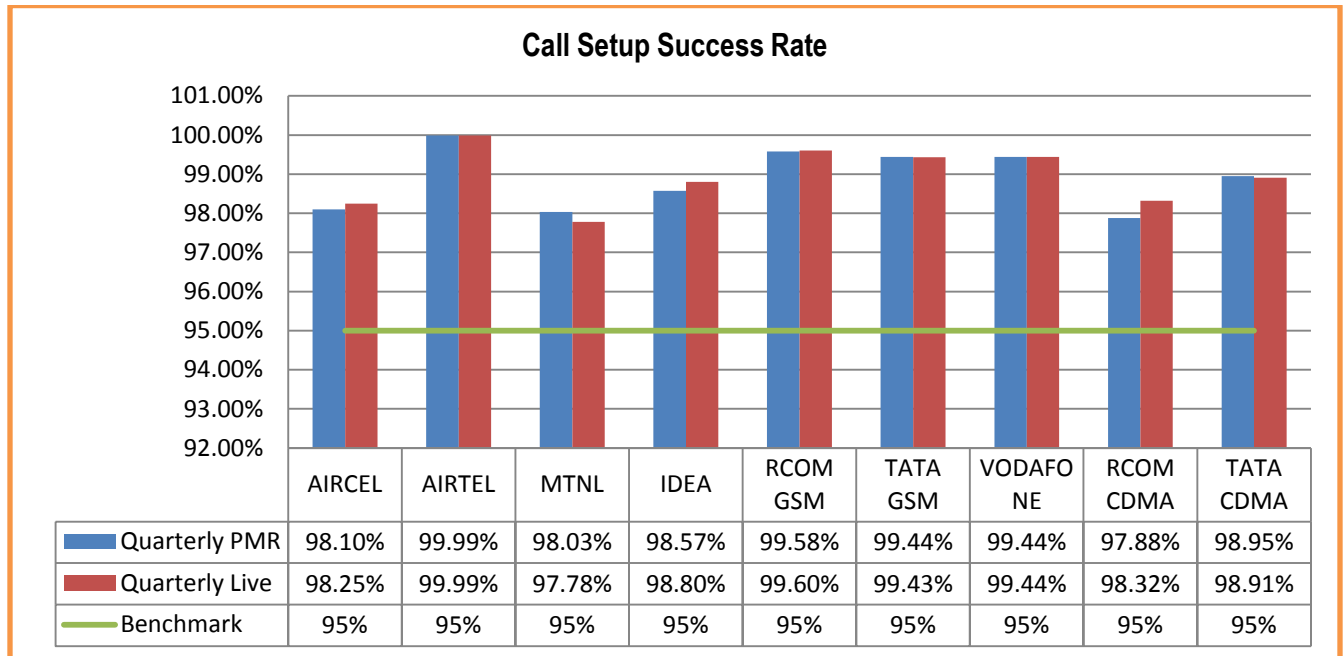
All operators are meeting the benchmarks.

4) SDCCH/PAGING CHANNEL CONGESTION:

SDCCH/PAGING Channel Congestion

	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
Quarterly PMR	0.21%	0.00%	0.27%	0.71%	0.05%	0.14%	0.06%	0.00%	0.00%
Quarterly Live	0.11%	0.00%	0.34%	0.79%	0.05%	0.19%	0.05%	0.00%	0.00%
Benchmark	1%	1%	1%	1%	1%	1%	1%	1%	1%
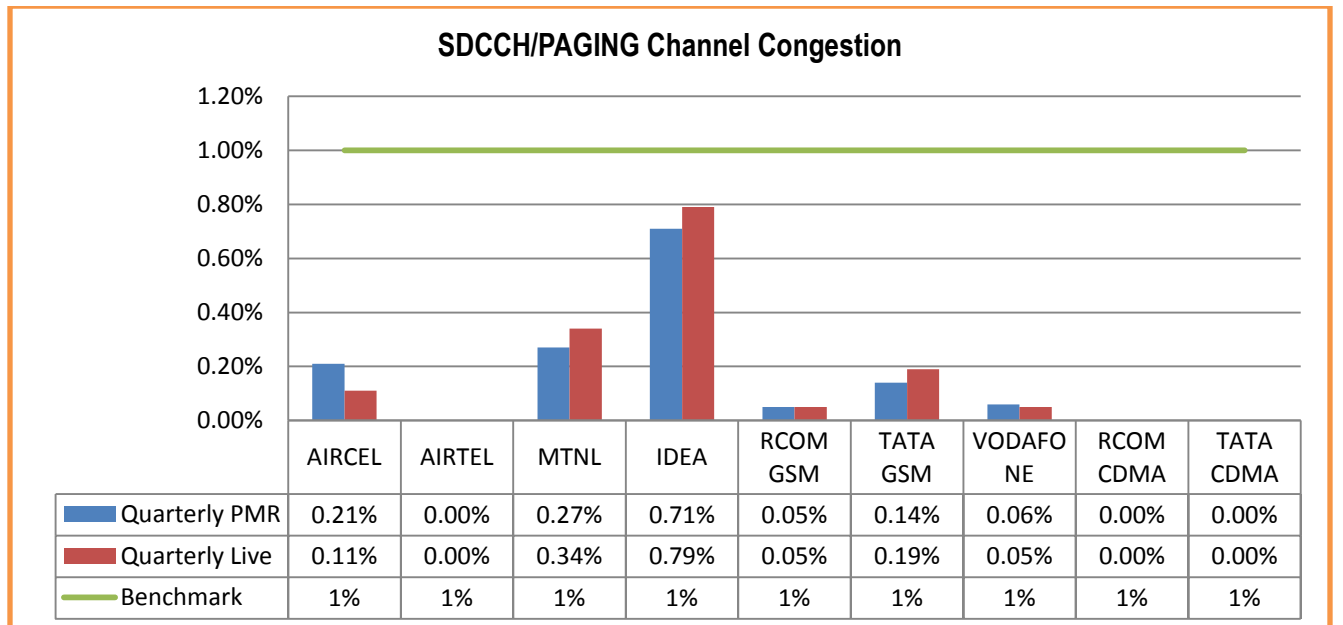
All operators are meeting the benchmarks.

5) TCH CONGESTION:

TCH Congestion

	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
Quarterly PMR	0.73%	0.00%	0.09%	0.88%	0.07%	0.33%	0.56%	0.03%	0.06%
Quarterly Live	0.50%	0.00%	0.06%	0.67%	0.07%	0.31%	0.56%	0.02%	0.07%
Benchmark	2%	2%	2%	2%	2%	2%	2%	2%	2%
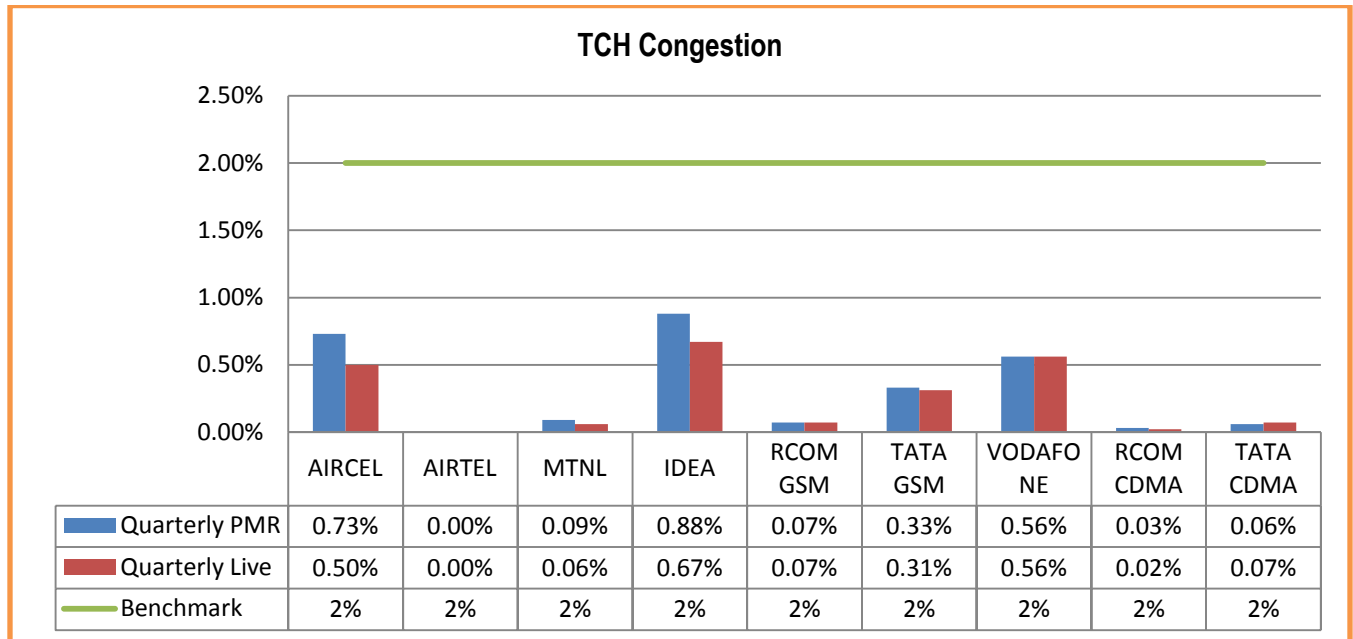
All operators are meeting the benchmarks.

6) CALL DROP RATE:

Call Drop Rate

	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
Quarterly PMR	1.02%	0.27%	1.23%	1.66%	0.39%	0.40%	0.90%	0.72%	0.65%
Quarterly Live	0.99%	0.27%	1.28%	1.67%	0.38%	0.40%	0.99%	0.60%	0.63%
Benchmark	2%	2%	2%	2%	2%	2%	2%	2%	2%
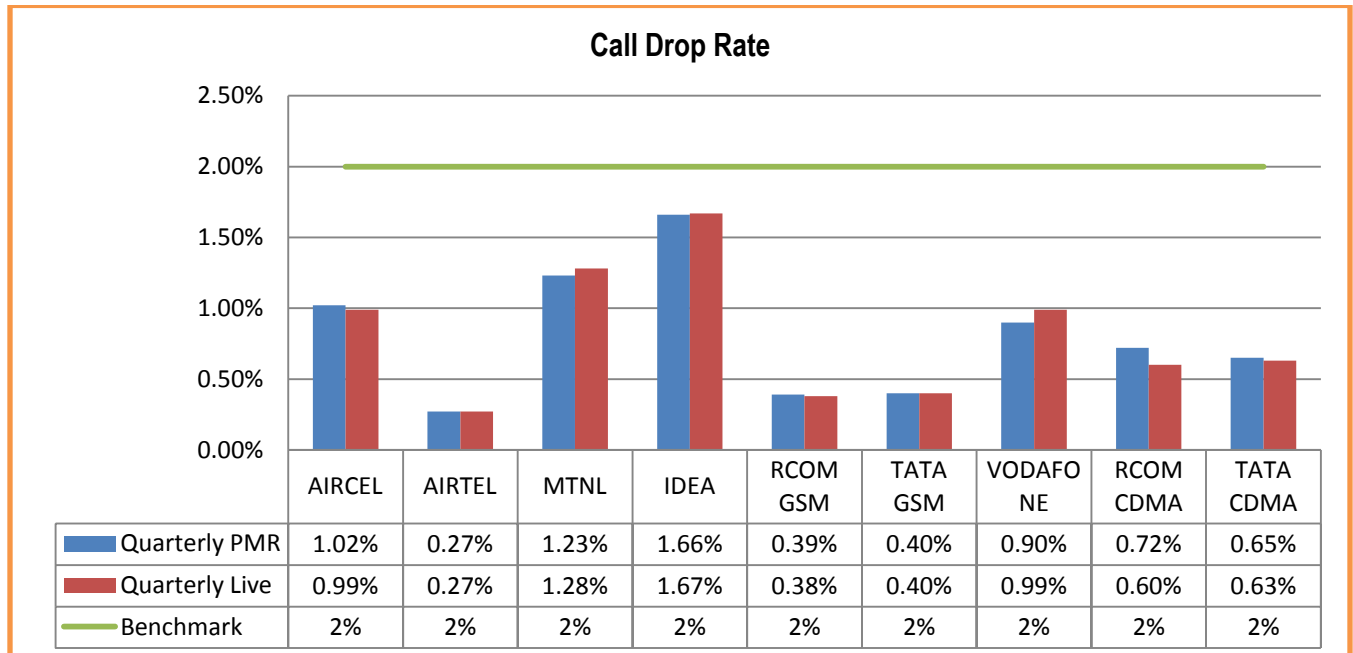
All operators are meeting the benchmarks.

7) WORST AFFECTED CELLS>3% TCH DROP :

Worst affected cells>3% TCH drop

	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
Quarterly PMR	6.21%	0.02%	1.43%	2.68%	0.03%	4.63%	2.35%	0.09%	3.80%
Quarterly Live	6.19%	0.04%	1.75%	2.70%	0.05%	4.63%	2.53%	0.07%	3.51%
Benchmark	3%	3%	3%	3%	3%	3%	3%	3%	3%
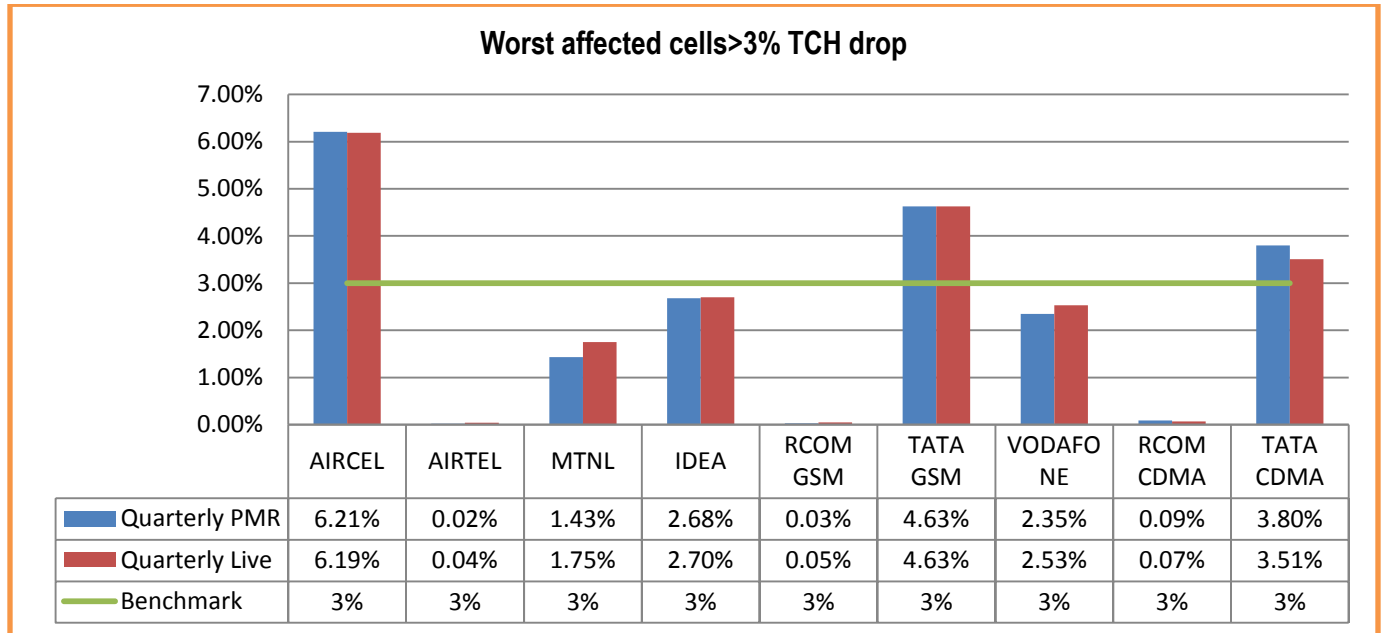
All operators are meeting the benchmarks except Aircel, Tata GSM and Tata CDMA.

8) PERCENTAGE OF CONNECTIONS WITH GOOD VOICE QUALITY:

% Connections with good voice quality

	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
Quarterly PMR	97.80%	99.96%	95.53%	95.93%	99.03%	97.68%	97.42%	99.79%	99.02%
Quarterly Live	97.85%	99.96%	96.66%	96.01%	98.94%	97.64%	97.30%	99.45%	99.10%
Benchmark	95%	95%	95%	95%	95%	95%	95%	95%	95%
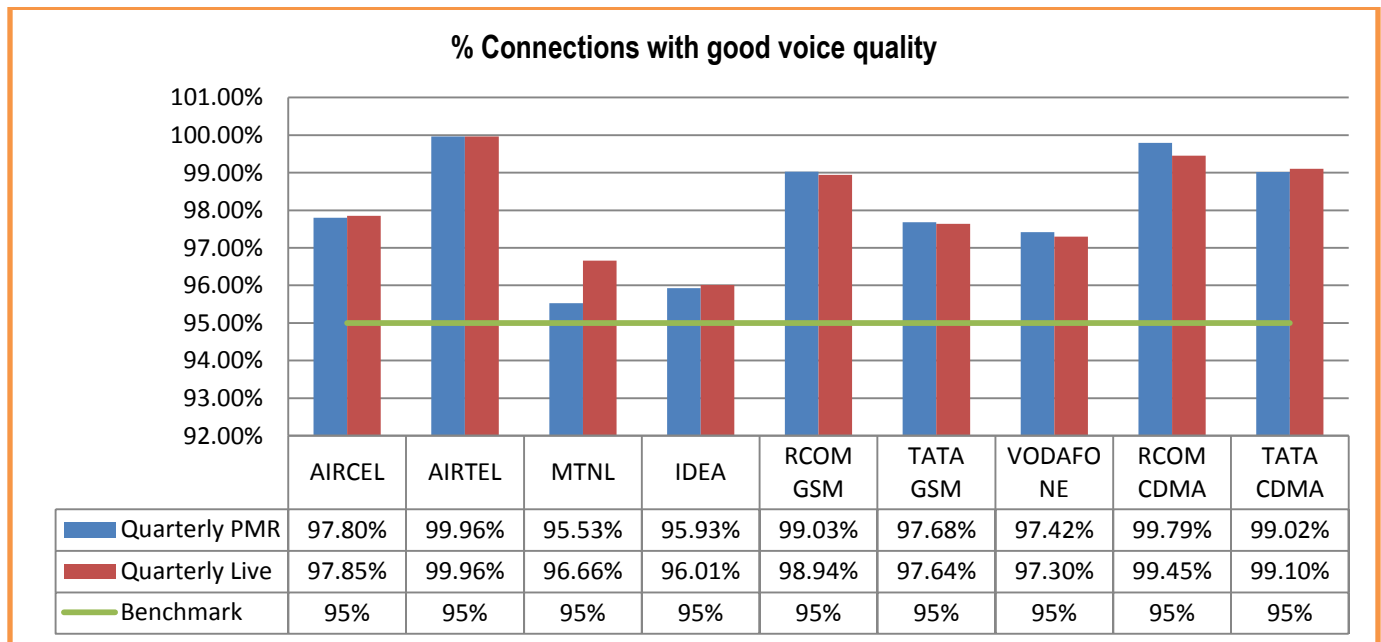
All operators are meeting the benchmarks.

9. QOS AUDIT OF BASIC (WIRELINE) SERVICE PROVIDERS

9. QOS AUDIT OF BASIC TELEPHONE SERVICE (WIRELINE)

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 233 in Mumbai (present no. of MTNL exchanges), audit was done for 12 sampled (12-Urban) exchanges. In case of Private Service provider's two exchanges each of TTL & Vodafone and one exchange each of Bharti Airtel & 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	Mumbai	233	0	233	12	0
2	Bharti-Airtel	Mumbai	2	0	2	1	0
3	TTL	Mumbai	6	0	6	2	0
4	RCL	Mumbai	2	0	2	1	0
5	VODAFONE	Mumbai	4	0	4	2	0
Total Exchanges			247	0	247	18	0

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 value of each parameter has been given in the Table below.

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

SI. No.	Parameters	Benchmark	Period	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
	AVERAGED QUARTERLY (OCT TO DEC 14) AUDIT DATA FOR WIRELINE (BASIC) SERVICES MUMBAI METRO CIRCLE							
1	**Fault incidences**							
	(No. of faults/100 subscribers /month)	< 7%	Quarterly	0.31%	**10.17%**	0.35%	1.55%	0.36%
2	**Faults Repair/Restoration Time**							
	Fault repair by next working day(Urban Area)	>85%	Quarterly	95.84%	92.28%	100%	94.00%	100%
	Within 5 days day	100%	Quarterly	100%	**99.85%**	100%	100%	100%
	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	3.92	6.17	2.59	6.00	2.12
3	**Rent Rebate**							
	Fault pending > 3 days & <7 days	Rebate for 7 days	Quarterly	0	3460	0	0	0
	Fault Pending > 7 days & < 15 days	Rebate for 15 days	Quarterly	0	504	0	3	0
	Fault pending > 15 days	Rebate for 1 month	Quarterly	0	124	0	0	0
5	**Metering & Billing Performance**							
	Disputed Bills over bills issued (Post Paid)	< 0.1%	Quarterly	0.00%	0.00%	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%	100%	100%	100%	100%
	% of billing complaints resolved within 6 weeks	*100% within 6 weeks*	Quarterly	100%	100%	100%	100%	100%
	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	**POI Congestion**							
	No. of POI's having congestion >0.5%		Quarterly	0	0	0	0	0
7	**Response Time to customer for assistance**							
	Accessibility of Call centre/customer Care	>=95%	Quarterly	99.97%	IVR Not Working	**93.78%**	**93.36%**	NP
	% age of calls answered by operator(voice to voice) within 90 seconds	>=95%	Quarterly	96.77%	95.89%	95.20%	**88.56%**	97.97%
8	**Customer care(promptness in attending to customers request)**							
	Termination / Closures	100% (within 7 days)	Quarterly	100%	**99.98%**	100%	**71.00%**	100%
	Time taken for refunds of deposit after closures	100% (within 60 days)	Quarterly	100%	**99.90%**	100%	NP	NA

NA-Not Applicable

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

SI No.	Parameters	Benchmark	Period	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
	3 DAYS LIVE DATA FOR WIRELINE (BASIC) SERVICES – MUMBAI METRO CIRCLE							
1	**POI Congestion**							
	No. of POI's having congestion >0.5%		Quarterly	0	0	0	0	0
2	**Response Time to customer for assistance**							
	Accessibility of Call centre/customer Care	≥95%	Quarterly	100%	IVR Not Working	98.85%	100%	NP
	% age of calls answered by operator(voice to voice) within 90 seconds	≥95%	Quarterly	97.61%	100%	98.92%	**91.93%**	99.90%

NA-Not Applicable

9.3 KEY FINDINGS: BASIC TELEPHONE SERVICES (WIRELINE)

Fault Incidences: The audit of the service providers revealed that the performance of all service providers was well within the benchmark. However, **MTNL** failed to meet the benchmark achieving its performance level as **10.17%**

Fault Repair/Restoration Time: Only MTNL could not meet the benchmark of Fault repaired within 5 days with its performance as **99.85%.**

Mean Time to Repair: All operators met the benchmark for MTTR.

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 and TTL** only was below the benchmark with their performance level as **93.78% and 93.36%** respectively against the benchmark of >95%.
With respect to the parameter of **calls answered by operator (voice to voice), only TTL** could not meet the benchmark with its performance as **88.56%** against the benchmark of >= 95% and also failed to comply with the benchmark for this parameter during 3 days live measurements as **91.93%** .

Termination/Closures: For this parameter, **MTNL** and **TTL** failed to meet the benchmark having achieved their performance as **99.98%** and **71.00%** respectively against the benchmark of 100% (within 7 days). Thus performance of **TTL** was way below the benchmark

Time taken for refund of deposit: In respect of this parameter, **MTNL** remained very marginally below the benchmark with its achieved value as **99.90%.**

*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, Termination/Closure and Refunds of Deposits.** **RCL and TTL** also failed to meet the benchmarks of the parameters **Accessibility of Call Center, Calls answered by Operators (Voice to voice) and Termination/ Closures.** Hence, the concern operators need to improve their services in respect of these parameters.*

9.4 INTER OPERATOR CALL ASSESSMENT (WIRELINE)

Inter operator call assessment with a sample of 2x50 test calls for each Service provider operating in Mumbai Circle during the time 1000 to 1300 Hrs and 1500 to 1700 was carried out by TUV auditors. The test calls were made from one operator to another within the same licensed area to judge the ease of connectivity amongst the operators.

INTER OPERATOR CALL ASSESSMENT BASED ON LIVE MEASUREMENT							
Calling Operators	Circle Name	Total No. of calls Made	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
BHARTI AIRTEL	Mumbai	100	--	100%	100%	100%	100%
MTNL	Mumbai	100	100%	--	100%	100%	**99%**
RCL	Mumbai	100	**99%**	100%	--	**98%**	100%
TTL	Mumbai	100	100%	**99%**	100%	--	100%
VODAFONE	Mumbai	100	100%	100%	**96%**	100%	--

The result of the testing revealed that the inter connection performance among the operators was quite satisfactory. However, in case where calls attempted from MTNL to Vodafone, successful interconnection was 99%, RCL to Bharti and TTL was 99% and 98%, TTL to MTNL was 99% and Vodafone to RCL was 96%.Thus there was no remarkable problem in interconnection from one operator to other operators except in few cases where Service providers could not achieve 100% marks.

9.5 LEVEL-1 LIVE CALLING (WIRELINE)

LEVEL 1 LIVE CALLING							
Emergency no.	Circle Name	No. of calls made	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
100	Mumbai	30	√	√	√	√	√
101	Mumbai	30	√	√	√	√	√
102	Mumbai	30	√	√	√	√	√
1098	Mumbai	30	√	√	√	√	√

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						
Name of Parameter	**Circle**	**BHARTI AIRTEL**	**MTNL**	**RCL**	**TTL**	**VODAFONE**
Total No. of calls Attempted	Mumbai	100	100	100	100	100
A) Total no of calls attempted to customer care/Call center	Mumbai	100	IVR Not Working	100	100	100
B) Total no. of calls successfully established to customer care/Call center	Mumbai	100	IVR Not Working	99	98	100
C) % Accessibility of Call centre /customer Care (Total call attempt*100/ Total call successfully established)	Mumbai	100%	IVR Not Working	99.00%	98.00%	100%
D) Total Calls reached to agent desk for Voice to Voice (Total call attempt)	Mumbai	100	100	100	100	100
E) Total number of calls answered by the operator (Voice to voice) within 90 seconds	Mumbai	99	97	98	97	100
F) % age of calls answered by the operators (voice to voice) within 90 seconds (E *100/ D)	Mumbai	**99.00%**	**97.00%**	**98.00%**	**97.00%**	100%

In case of calls answered by operators (voice to voice), when test calls were made to the call centers of different service providers, 99%, 97%, 98% and 97% of calls were answered by the call center operators within stipulated time in the network of Airtel, MTNL, RCL and TTL respectively. .

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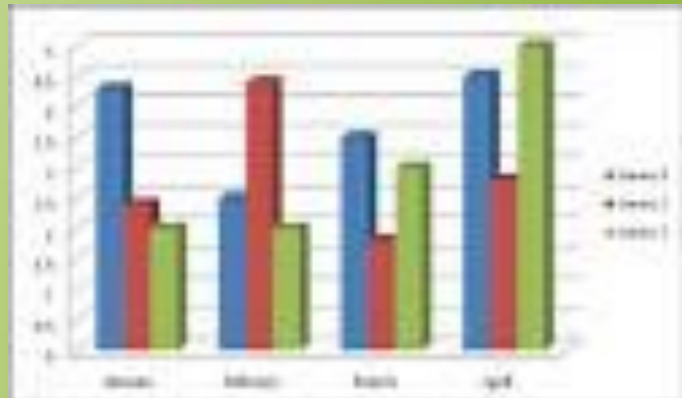
9.7 GRAPHICAL REPRESENTATION OF QUARTERLY PERFORMANCE OF THE BASIC TELEPHONE SERVICE (WIRELINE) PROVIDERS:

1) **FAULT INCIDENCE:**

Fault Incidence (No. of faults/100 subscribers /month)

	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
(No. of faults/100 subscribers /month)	0.31%	10.17%	0.35%	1.55%	0.36%
Benchmark < 7%	7%	7%	7%	7%	7%
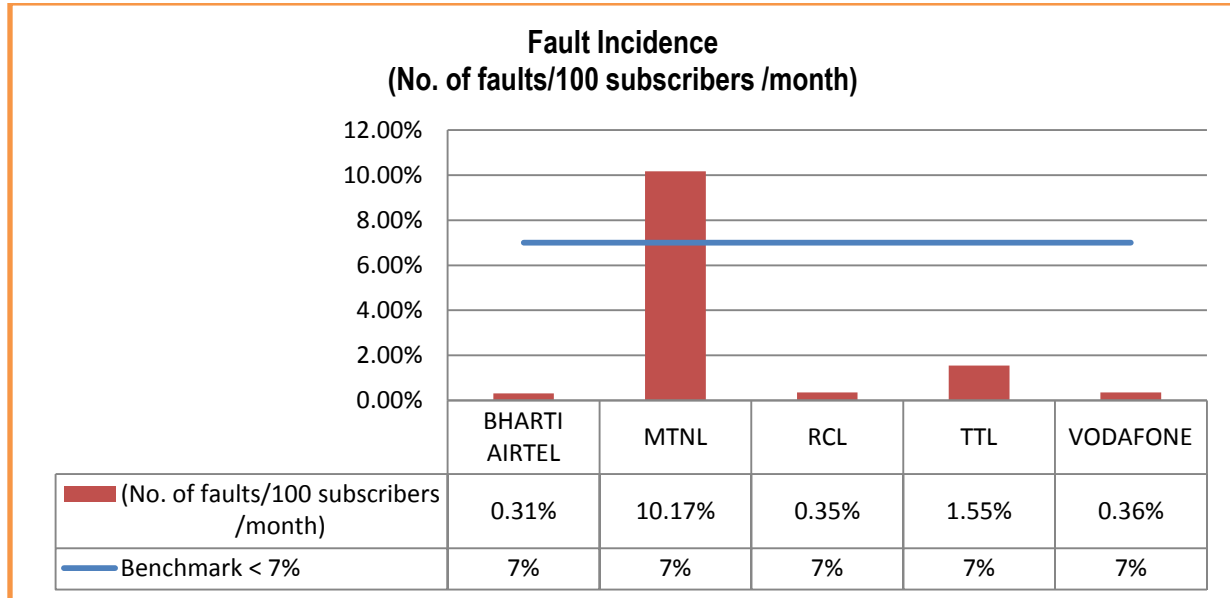
All Operators are meeting the benchmarks except MTNL.

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

Faults Repair/Restoration Time Fault repair by next working day(Urban Area)

	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
Fault repair by next working day(Urban Area)	95.84%	92.28%	100.00%	94.00%	100.00%
Benchmark >85%	85%	85%	85%	85%	85%
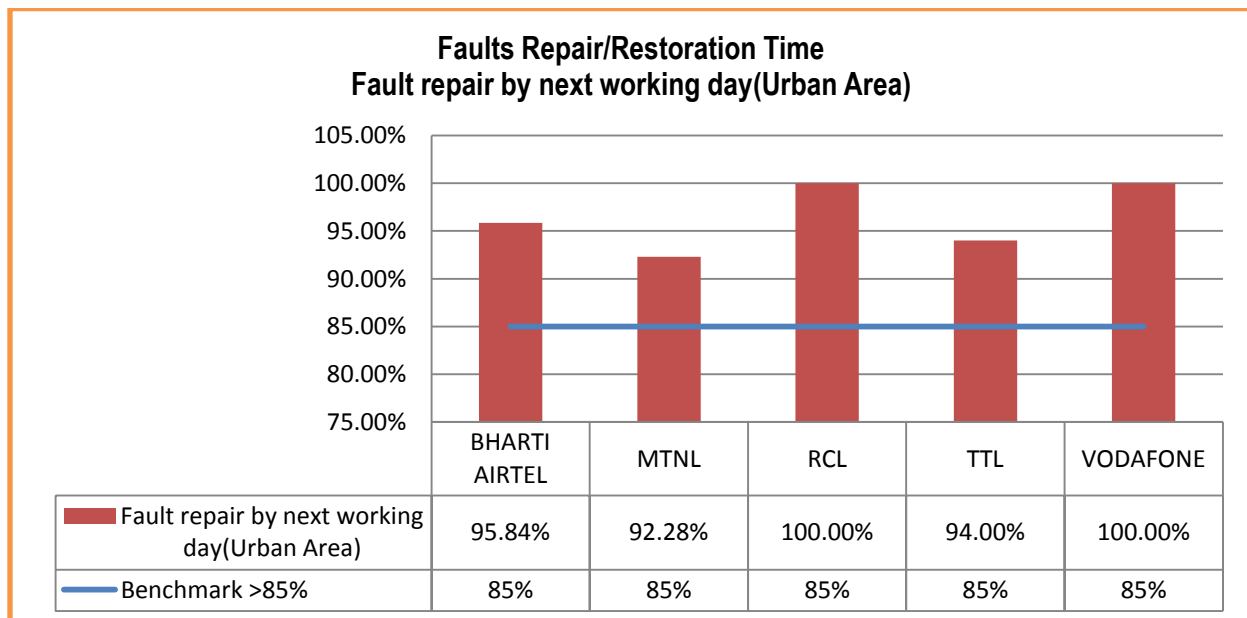
All Operators are meeting the benchmarks except .

3) FAULTS REPAIR/RESTORATION TIME WITHIN 5 DAYS:

Faults Repair/Restoration Time Within 5 days

	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
Within 3 days day	100.00%	99.85%	100.00%	100.00%	100.00%
Benchmark-100%	100.00%	100.00%	100.00%	100.00%	100.00%
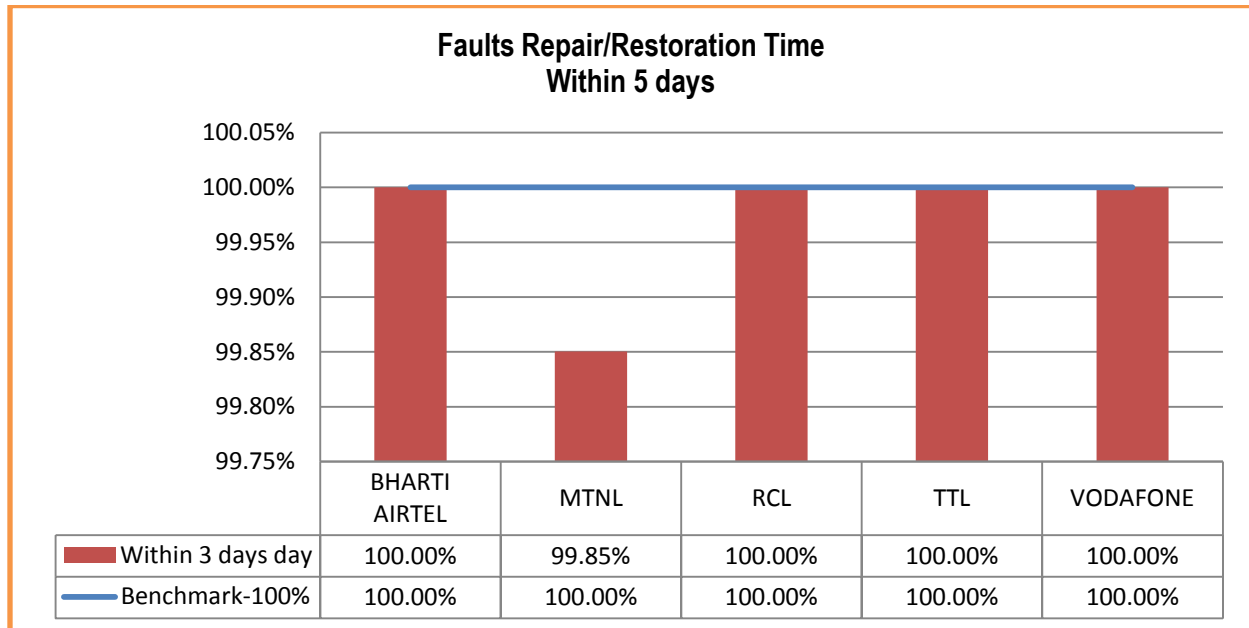
All Operators are meeting the benchmarks except MTNL.

4) MEAN TIME TO REPAIR (MTTR):

Faults Repair/Restoration Time Mean time to Repair(MTTR)

	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
Mean time to Repair(MTTR)	3.92	6.17	2.59	6.00	2.12
Benchmark ≤10 Hrs	10	10	10	10	10
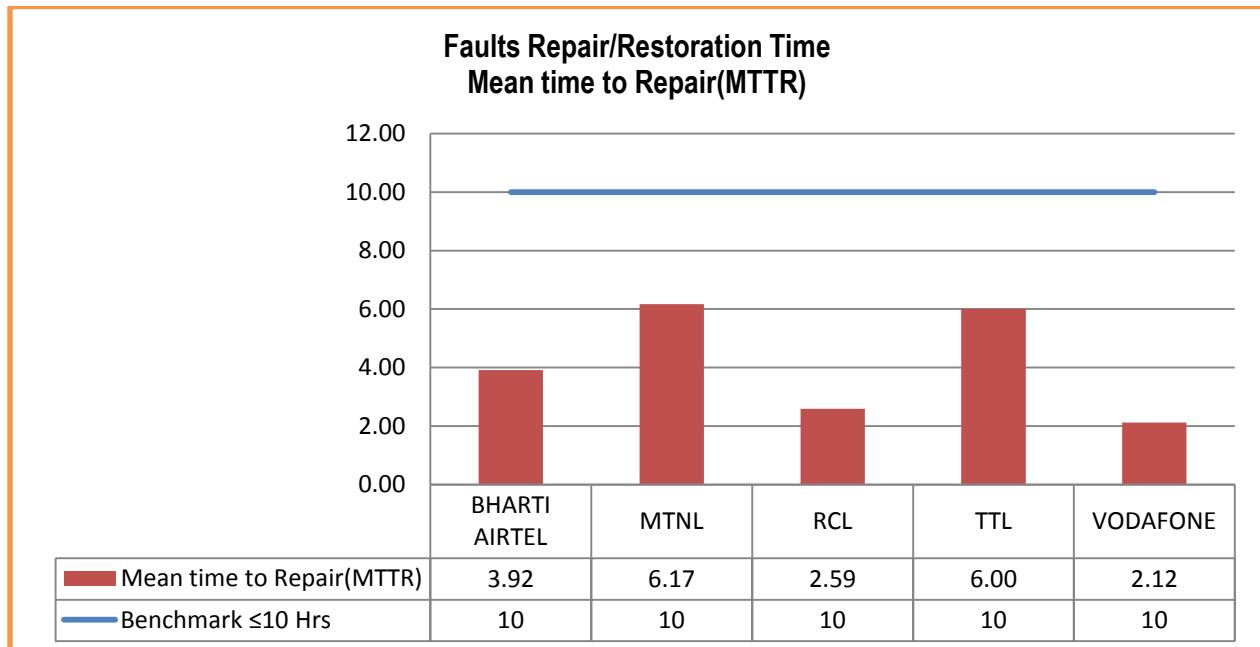
All Operators are meeting the benchmarks.

5) METERING & BILLING PERFORMANCE:

a) DISPUTED BILLS OVER BILL ISSUED :

Metering & Billing Performance
Disputed Bills over bills issued

	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
■ Disputed Bills over bills issued	0.00%	0.00%	0.01%	0.03%	0.00%
── Benchmark < 0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
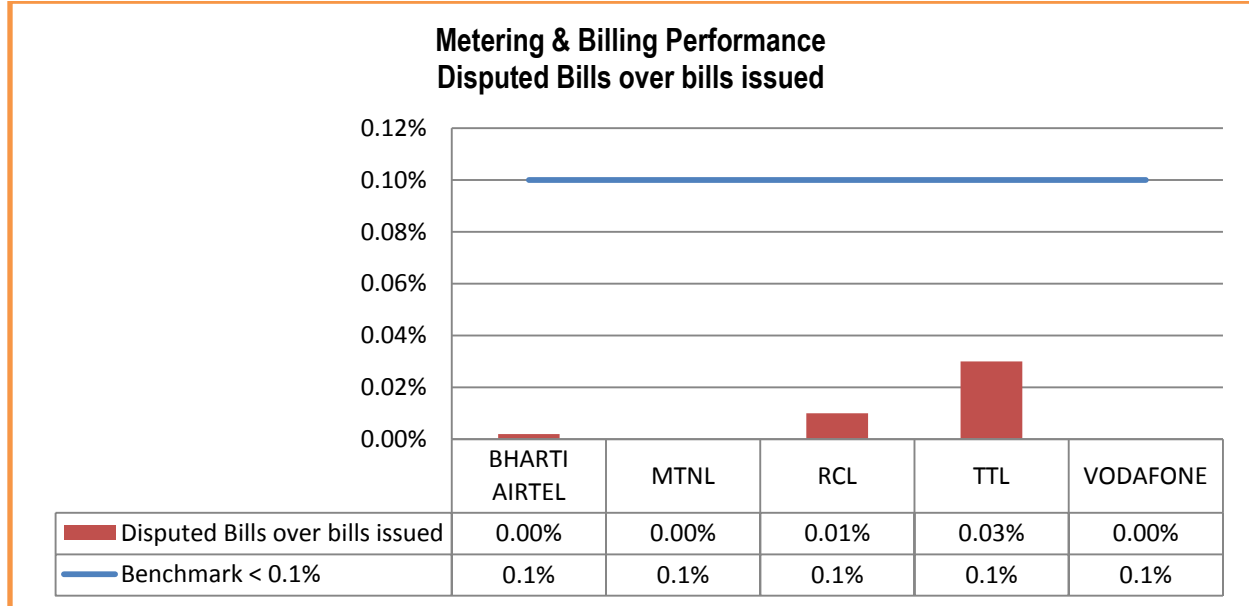
All Operators are meeting the benchmarks.

b) BILLING COMPLAINT RESOLUTION WITHIN 4 WEEKS:

% of billing complaints resolved within 4 weeks

	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
■ % of billing complaints resolved within 4 weeks	100.00%	100.00%	100.00%	100.00%	100.00%
── Benchmark-98% within 4 weeks	98%	98%	98%	98%	98%
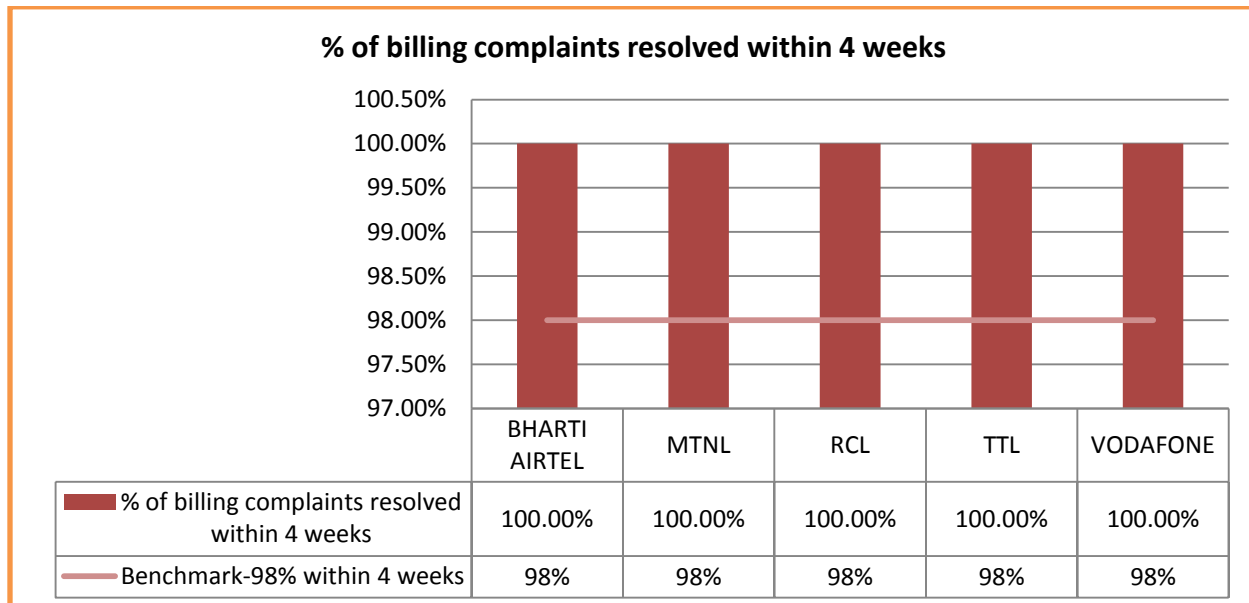
All Operators are meeting the benchmarks.

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

% of billing complaints resolved within 6 weeks

	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
% of billing complaints resolved within 6 weeks	100.00%	100.00%	100.00%	100.00%	100.00%
Benchmark 100% within 6 weeks	100.00%	100.00%	100.00%	100.00%	100.00%
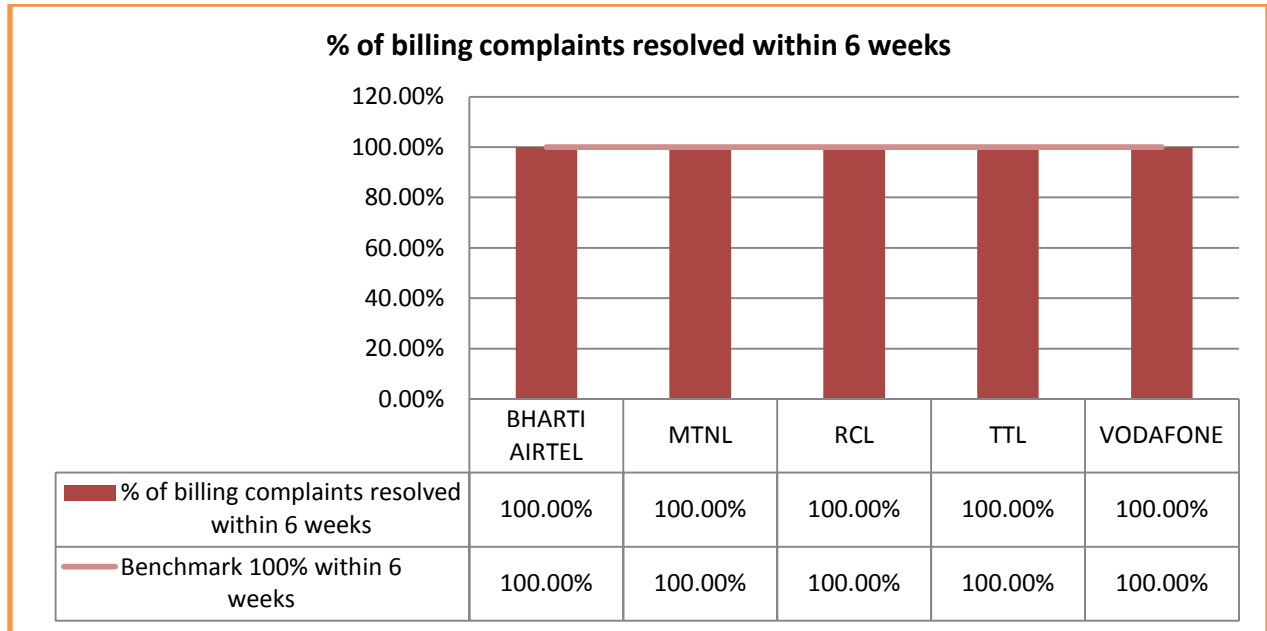
All Operators are meeting the benchmarks.

6) **TERMINATION & CLOSURES:**

Customer care(promptness in attending to customers request)

	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
Termination / Closures	100.00%	99.98%	100.00%	71.00%	100.00%
Time taken for refunds of deposit after closures	100.00%	99.90%	100.00%	100.00%	100.00%
Benchmark 100%	100.00%	100.00%	100.00%	100.00%	100.00%
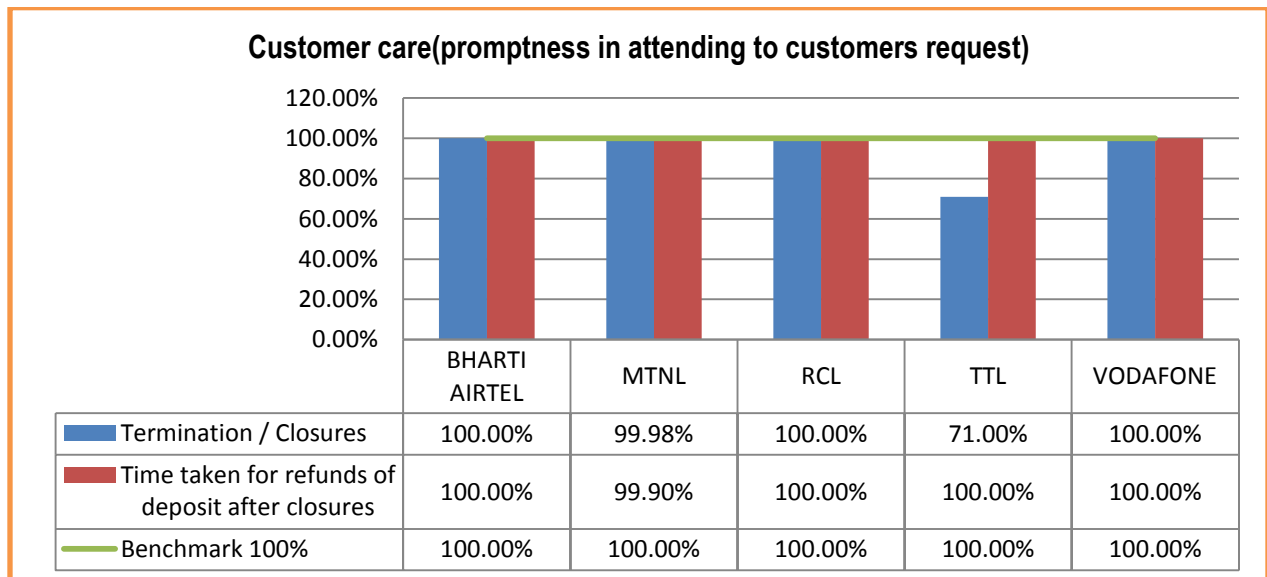
All Operators are meeting the benchmarks except TTL for the parameter Termination/Closure.

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:**

Response Time to customer for assistance
Accessibility of Call centre/customer

	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
Quarterly	99.97%		93.78%	93.36%	
Live	100.00%		98.85%	100.00%	
Benchmark ≥95%	95%	95%	95%	95%	95%
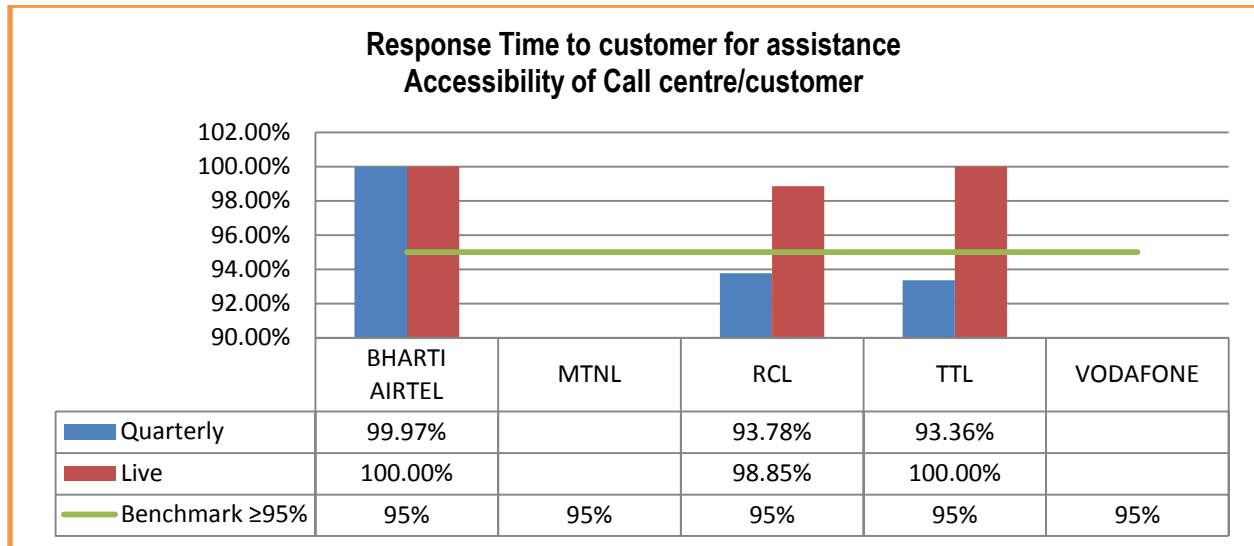
All Operators are meeting the benchmarks except RCL & TTL Whereas MTNL & Vodafone have not provided data for this parameter.

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

Response Time to customer for assistance
% age of calls answered by operator(voice to voice) within 60 seconds

	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
Quarterly	96.77%	95.89%	95.20%	88.56%	97.97%
Live	97.61%	100.00%	98.92%	91.93%	99.90%
Benchmark ≥95%	95%	95%	95%	95%	95%
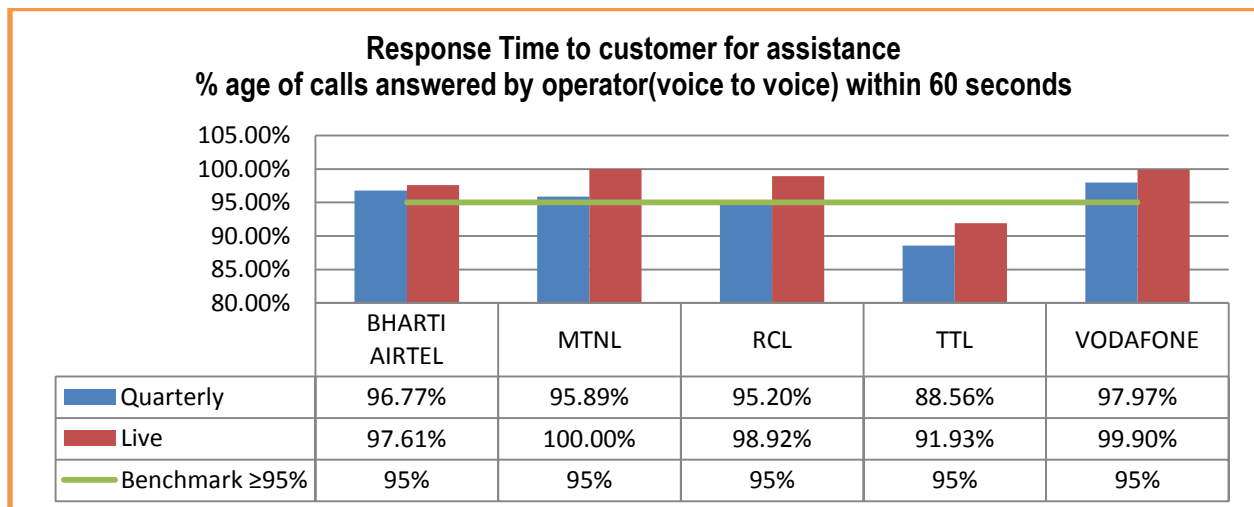
All Operators are meeting the benchmarks except TTL.

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 reveled that they are maintaining their networks 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 LTD, INTERFACE 7 MALAD, MUMBAI
2	PACENET	B/8,MAROL INDUSTRIAL AREA, NEXT TO MIDC POLICE STATION, ANDHERI(EAST),MUMBAI 400093
3	D-VOIS	D-VOIS BROADBAND PVT. LTD.10/12 LANDMARK SOCIETY. SECTOR 14, LAND MARK : NEXT TO GAVDEVI MANDIR PETROL PUMP, VASHI, NAVI MUMBAI – 400703
4	HATHWAY	HATHWAY CABLE & DATACOM LTD.TRADE WORLD, "B" WING, 10TH FLOOR, KAMALA MILLS COMPOUND, SENAPATI BAPAT MARG, LOWER PAREL (W),MUMBAI – 400 013.
5	HONESTY NET SOLUTION	HONESTY NET SOLUTIONS (I) PVT. LTD., A-2009, STATION PLAZA,2ND FLOOR, STATION RD,BHANDUP (W), MUMBAI- 400078
6	INDUSLAND MEDIA	IN CENTRE, 49/50,MIDC, 12TH ROAD, ANDHERI(E), OPP TUNGA PARADISE HOTEL MUMBAI-400 093
7	M/S FIVE NETWORK SOLUTION (INDIA) LTD	22/2, PLOT NO.275-B, NEAR GURU NANAK SCHOOL, SION (W), MUMBAI-400022
8	MTNL	PRABHADEVI TELEPHONE EXCHANGE/ BANDRA EXCHANGE, MUMBAI
9	RELIANCE	DAKC, MUMBAI
10	SPECTRANET (CITYCOM)	CITYCOM NETWORKS PRIVATE LIMITED, GURGAON, HARYANA
11	SYSCON INFOWAY	SYSCON INFOWAY PVT.LTD., 136, SHIV SHAKTI IND. PREMISES, ANDHERI KURLA ROAD, ANDHERI EAST, MUMBAI 400059
12	TCL	A1 AQMAR BUILDING 5 GANESH KHIND RD, SHIVAJI NAGAR PUNE 411005
13	TIKONA	TIKONA DIGITAL NETWORKS, 3RD FLOOR , 3A , CORPORA, LBS MARG, BHANDUP(W), MUMBAI - 400078
14	TTL	A1 AQMAR BUILDING 5 GANESH KHIND RD, SHIVAJI NAGAR PUNE 411005
15	YOU-BROADBAND	YOU BROADBAND INDIA PVT. LTD.,PLOT NO 54, MAROL CO-OP INDUSTRIAL AREA,MAKWANA, OFF ANDHERI KURLA ROAD,IN THE LANE OF SHEMAROO,MUMBAI 400059, MAHARASHTRA, INDIA

10.1 QUARTERLY MEASURMENT DATA FOR BROADBAND SERVICE PROVIDERS

S/N	Parameters	Benchmark	BHARTI AIRTEL	MTNL	RCL	TCL	TTL	TIKONA	HATHWAY	SYSCON	YOU BROADBAND	D-VOIS	5-NETWORKS	PACENET	HONESTY NET	INDUS MEDIA	CITYCOM
	BROADBAND SERVICES - MUMBAI METRO CIRCLE																
	Service Provisioning/Activation Time																
1	A) No of connections registered during the period		4261	16448	0	0	2944	7150	13515	15068	320	10975	9809	2038	4887	1810	754
	B) Total number of connections provided within 15 days of registration on demand during the period		4261	16429	0	0	2944	7150	13308	15068	320	10975	9809	2038	4887	1733	754
	C) % age of connections provided within 15 days of registration on demand (subject to technical feasibility)	*100% <15 days*	100%	**99.88%**	100%	100%	100%	100%	**98.47%**	100%	100%	100%	100%	100%	100%	**95.75%**	100%
	D)Total number of connections provided after 15 days of registration on demand		0	17	0	0	0	0	207	0	0	0	0	0	0	77	0
	E) %age of connections provided after 15 days of registration on demand		0.00%	0.10%	0.00%	0.00%	0.00%	0.00%	1.53%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	4.25%	0.00%

S/N	Parameters	Benchmark	BHARTI AIRTEL	MTNL	RCL	TCL	TTL	TIKONA	HATHWAY	SYSCON	YOU BROADBAND	D-VOIS	5-NETWORKS	PACENET	HONESTY NET	INDUS MEDIA	CITYCOM
	BROADBAND SERVICES - MUMBAI METRO CIRCLE																
	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.*	0	0	NA	NA	0	0	0	0	0	0	0	0	0	0	0
2	**Faults Repair/Restoration Time**																
	A) Total number of faults registered during the period		5364	332950	307	2260	16083	13390	81079	479	7845	65839	0	7033	5779	4882	2365
	B) Total number of faults repaired by next working day		5228	305874	307	2044	13861	12086	71264	479	7694	64253	0	3707	4877	4863	2245
	C) % age of faults repaired by next working day	*>90%*	97.46%	91.87%	100%	90.44%	**86.18%**	90.26%	**87.89%**	100%	98.08%	97.59%	100%	**52.71%**	**84.39%**	99.61%	94.93%
	D) Total number of faults repaired within three working days		5357	323267	307	2178	15396	13268	76226	479	7845	65521	0	6058	5525	4882	2349
	E)% age of faults repaired within three working days	≥99%	99.87%	**97.09%**	100%	**96.37%**	**95.72%**	99.09%	**94.01%**	100%	100%	99.52%	100%	**86.14%**	**95.60%**	100%	99.32%
2.1	**Rebate**																
	Faults Pending for > 3 working days and < 7 working days: (Rebate equivalent to 7 days of minimum monthly charge or equivalent usage allowance)		0	9683	0	NP	NP	38	1648	0	0	17	8	0	0	7	8
	Faults Pending for > 7 working days and < 15 working days: (Rebate equivalent to 15 days of minimum monthly charge or equivalent usage)		0	2601	0	NP	NP	39	1357	0	0	0	0	0	0	0	0

S/N	Parameters	Benchmark	BHARTI AIRTEL	MTNL	RCL	TCL	TTL	TIKONA	HATHWAY	SYSCON	YOU BROADBAND	D-VOIS	5-NETWORKS	PACENET	HONESTY NET	INDUS MEDIA	CITYCOM
	Faults Pending for > 15 working days:(Rebate equivalent to one month of minimum monthly charge or equivalent usage allowance)		0	0	0	NP	NP	38	1848	0	0	0	0	0	0	0	0
	Billing Performance																
	A) Total bills generated during period		147043	1601143	13182	2661	124012	97956	122085	NA	133	127396	NA	NA	NA	NA	8599
	B) Total complaints received from customers/ Bills disputed		1	0	31	4	270	597	1240	NA	2	0	NA	NA	NA	NA	30
	C) Billing complaints per 100 bills issued	<2%	0.00%	0.00%	0.24%	0.15%	0.22%	0.61%	1.02%	NA	1.50%	0.00%	NA	NA	NA	NA	0.35%
	D) Total number of complaints resolved in 4 weeks from date of receipt		1	0	31	4	270	597	1240	NA	2	0	NA	NA	NA	NA	30
3	E) %age billing complaints resolved in 4 weeks	100%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	NA	100.0%	100.0%	NA	NA	NA	NA	100.0%
	F) Total number of cases requiring refund of deposits after closure		0	NA	0	1	0	28	381	NA	32	0	NA	NA	NA	NA	0
	G) Total number of cases where refund was made in <60 days		0	NA	0	1	0	28	381	NA	32	0	NA	NA	NA	NA	0
	H) Percentage cases in which refund received within 60 days	100%	100%	NA	100%	100%	100%	100%	100%	NA	100%	100%	NA	NA	NA	NA	100%
	Response time to the customer for assistance % age of calls answered by operator (Voice to Voice)																
4	A) Total number of calls received by the operator		52582	809012	38705	124656	47053	176791	404388	675.00	62940	195278	NP	20150	NP	2252	74605

BROADBAND SERVICES - MUMBAI METRO CIRCLE

S/N	Parameters	Benchmark	BHARTI AIRTEL	MTNL	RCL	TCL	TTL	TIKONA	HATHWAY	SYSCON	YOU BROADBAND	D-VOIS	5-NETWORKS	PACENET	HONESTY NET	INDUS MEDIA	CITYCOM
	B) Total number of calls answered by the operator within 60 seconds		49979	599490	36780	108921	35409	118841	350052	637.00	56146	191537	NP	20150	NP	2252	67119
	C) % age calls answered by the operator in 60 seconds	>60%	95.05%	74.10%	95.02%	87.38%	75.25%	67.22%	86.56%	94.37%	89.20%	98.08%	NP	100%	NP	100%	89.97%
	D) Total number of calls answered by the operator within 90 seconds		51130	675826	37000	110810	37893	144826	363762	675.00	57198	195278	NP	NP	NP	NP	68672
	E) % age calls answered by the operator within 90 seconds	>80%	97.24%	83.54%	95.59%	88.89%	80.53%	81.92%	89.95%	100%	90.87%	100%	NP	NP	NP	NP	92.05%
5	**Bandwidth Utilization/ Throughput:**																
	POP to ISP Gateway Node [Intra-network] Link(s)	<80%	11.01%	52.99%	17.52%	40.90%	77.26%	70.16%	62.81%	45.53%	NP	72.70%	66.80%	**88.59%**	**81.85%**	NP	21.76%
	ISP Gateway Node to IGSP / NIXI Node upstream Link(s) for International connectivity	<80%	69.45%	**86.14%**	50.02%	41.64%	78.77%	78.66%	72.01%	65.53%	73.30%	60.98%	NP	**85.83%**	NA	NA	47.54%
	Broadband Connection Speed (download) - from ISP Node to User	>80%	100%	NP	89.46%	93.60%	97.23%	94.33%	92.50%	82.50%	87.50%	**26.63%**	NP	91.50%	89.32%	NP	91.67%
6	**Service Availability/Uptime (for all users) in %age**																
	Service Availability (%)	>98%	99.99%	99.91%	99.47%	98.68%	99.42%	99.997%	99.29%	100%	99.45%	100%	NP	99.27%	100%	100%	99.44%
7	**Packet Loss**																
	% of Packet loss	<1%	0.005%	0.00%	0.517%	0.00%	0.10%	0.00%	0.72%	0.00%	0.00%	0.50%	NP	0.00%	**1.16%**	NP	0.05%
8	**Network latency (for wired broadband access)**																
	User reference point at POP/ISP Gateway node to IGSP/NIXI	<120 ms	29.69	1	16	1	68.470	NA	1.00	1.86	8.2	2.00	NP	9	30	NA	4.35

BROADBAND SERVICES - MUMBAI METRO CIRCLE																
S/N	Parameters	Benchmark	BHARTI AIRTEL	MTNL	RCL	TCL	TTL	TIKONA	HATHWAY	SYSCON	YOU BROADBAND	D-VOIS	5-NETWORKS	PACENET	HONESTY NET	INDUS MEDIA	CITYCOM
	User reference point at ISP Gateway node to nternational nearest NAP port abroad (terrestrial)	<350 ms	62.22	271.95	17.33	258	200.95	NA	90.00	NA	276.78	NA	NP	174	65.97	NP	167.8
	User reference point at ISP Gateway node to International nearest NAP port abroad (satellite)	<800 ms	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Syscon, 5-Network, Indus Media, Honesty Net and Pacenet are providing their services with Pre-paid model of Billing. Hence no billing complaints.

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:

S/N	Parameters	Benchmark	BHARTI AIRTEL	MTNL	RCL	TCL	TTL	TIKONA	HATHWAY	SYSCON	YOU BROADBAND	D-VOIS	5-NETWORKS	PACENET	HONESTY NET	INDUS MEDIA	CITYCOM
3 DAYS LIVE DATA FOR BROADBAND SERVICES - MUMBAI METRO CIRCLE																
1	**Response time to the customer for assistance % age of calls answered by operator (Voice to Voice)**																
	within 60 sec	>60%	96.99%	85.07%	98.85%	91.16%	97.38%	69.86%	98.66%	100%	97.48%	98.13%	NP	100%	NP	100%	89.42%
	within 90 sec	>80%	98.90%	87.12%	99.35%	92.73%	98.86%	87.70%	99.35%	100%	98.20%	100%	NP	NP	NP	NP	92.57%
2	**Bandwidth Utilization/ Throughput:**																
	POP to ISP Gateway Node [Intra-network] Link(s)	<80%	38.25%	57.48%	26.70%	49.86%	77.00%	61.12%	41.22%	46.60%	NP	73.41%	**95.96%**	**88.68%**	71.69%	NP	22.61%
	ISP Gateway Node to IGSP / NIXI Node upstream Link(s) for International connectivity	<80%	65.91%	**87.73%**	65.90%	62.00%	78.50%	77.37%	63.69%	70.17%	69.09%	62.21%	NP	**85.32%**	NP	NA	44.16%
	Broadband Connection Speed (download) - from ISP Node to User	>80%	115.67%	NP	94.00%	93.00%	94.86%	94.33%	93.33%	84.83%	86.00%	80.53%	NP	91.60%	87.16%	97.00%	93.33%
3	**Packet Loss**																
	% of Packet loss	<1%	0.23%	0.00%	0.00%	0	0.20%	0.00%	0.77%	0.00%	0.00%	0.23%	NP	0.00%	**1.17%**	0.10%	0
4	**Network latency (for wired broadband access)**																
	User reference point at POP/ISP Gateway node to IGSP/NIXI	<120 ms	32.00	1	3.955	1	33.2	NA	1.00	1.86	2.33	1.33	NP	3	30	2.00	4.36
	User reference point at ISP Gateway node to International nearest NAP port abroad (terrestrial)	<350 ms	74.60	193.60	0.76	59	163.37	NA	90.00	NA	93	NA	NP	58	66	NP	204.58
	User reference point at ISP Gateway node to International nearest NAP port abroad (satellite)	<800 ms	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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 Broadband service providers namely **MTNL, Hathway** and **Indus Media** failed to meet the benchmark with their performance as **99.88%, 98.47% and 95.75%** respectively against the benchmark of 100% within 15 days.

Fault Repair/Restoration Time: With regards to this parameter, the performances of **TTL, Hathway, Pacenet and Honesty Net** failed to meet the benchmark of parameter **Fault repaired by next working day** with their performance level as **86.18%, 87.89%, 52.71% and 84.39%** respectively against the benchmark of >90%. In case of parameter **Fault repaired within 3 days, MTNL, TCL, TTL, Hathway, Pacenet and Honesty net** remained under performed with their achieved value as **97.09%, 96.37%, 95.72%, 94.01% , 86.14% and 95.60%** respectively against the benchmark of > 99%.

Billing Performance: For this parameter the performance of the service providers was well within the compliance benchmarks. Syscon, 5-Network, Indus Media, Honesty Net and Pacenet are providing their services with Pre-paid model of Billing. Hence no billing complaints.

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 During live measurements**,**

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 except the operators namely **Pacenet and Honesty Net** could not meet the benchmark of parameter **Bandwidth Utilisation/Throughput – POP to ISP Gateway Node** with their performance as **88.59% and 81.85%** respectively. For **ISP Gateway Node to IGSP/NIXI Node upstream links**, the operator namely **MTNL and Pacenet** failed to meet the benchmark having achieved value as **86.14% and 85.83%** respectively.

During live measurements also **5-Networks, Pacenet and MTNL** could not meet the benchmark of the above parameters.

Broadband Connection Speed: Only **D-Voise** failed to meet the benchmark with its performance as **26.63%** against the benchmark of >80%.

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

Packet Loss and Network Latency: It was observed that almost all operators were measuring packet loss and latency by conducting ping test on random basis for their internal assessment. Only **Honesty Net** failed to meet the benchmark of parameter **Packet Loss** with its achieved value as **1.16%. Five Network and Indus Media are** not monitoring the packet loss so they did not provide any data for audit.
However, the ping test conducted during live measurement revealed that all service providers were meeting the benchmark prescribed by TRAI.
During live measurement also **Honesty Net** failed to meet the benchmark.

From the above analysis, it was concluded that MTNL, Hathway and Indus media failed to meet the benchmark of Service provisioning, MTNL, TTL, TCL, Hathway, Pacenet and Honesty Net remained short of bench mark of parameter Fault Repairs/Resoration, and operators namely MTNL, Pacenet and Honesty Net could not meet the benchmarks for parameters Bandwidth Utilisation. Also, Honesty Net remained underperformed for parameter Packet Loss. Thus majority of Operators were not performing well enough to meet the benchmark of one or the other parameters.

10.4 CUSTOMER CARE / HELPLINE ASSESSMENT

LIVE CALLING TO CALL CENTRE FOR BROADBAND SERVICES														
Parameter	**BHARTI AIRTEL**	**You Broadband**	**Honesty net Solution**	**Pacenet**	**RCL**	**SPECTRANET**	**TCL**	**TTL**	**TIKONA**	**HATHWAY**	**DVOIS**	**SYSCON**	**INDUS**	**MTNL**
Total No. of calls Attempted	100	100	100	100	100	100	100	100	100	100	100	50	50	100
Total number of calls answered by the operator within 60 seconds	99	100	100	99	100	98	99	99	99	91	93	45	49	97
% age calls answered by the operator in 60 seconds	99%	100%	98%	99%	100%	98%	99%	99%	99%	91%	93%	90%	98%	97%
Total number of calls answered by the operator within 90 seconds	100	100	100	100	100	100	100	100	100	100	95	50	50	100
% age calls answered by the operator within 90 seconds	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	**95%**	100%	100%	100%

In case of calls answered by operators (voice to voice) within 60 seconds and 90 seconds, when test calls were made to the call centers, all broadband service providers were found meeting the TRAI prescribed benchmark. D-Vois could connect 95% calls only within 90 seconds.

10.5 LIVE CALLING FOR BILLING COMPLIANTS

TELEPHONIC INTERVIEW FOR BILLING COMPLAINTS									
Parameter	Circle Name	BHARTI AIRTEL	You Broadband	RCL	SPECTRANET	TCL	TTL	TIKONA	HATHWAY
Total No. of calls Attempted	Mumbai	1	2	31	30	4	100	100	100
Total No. of calls Answered	Mumbai	1	2	29	27	4	90	87	85
Cases resolved within 4 weeks	Mumbai	1	2	29	27	4	90	87	85
%age of cases resolved	Mumbai	100%	100%	100%	100%	100%	100%	100%	100%

NB: Syscon, 5-Network, Indus Media, Honesty Net and Pacenet are providing their services with Pre-paid model of Billing. Hence no billing complaints.

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
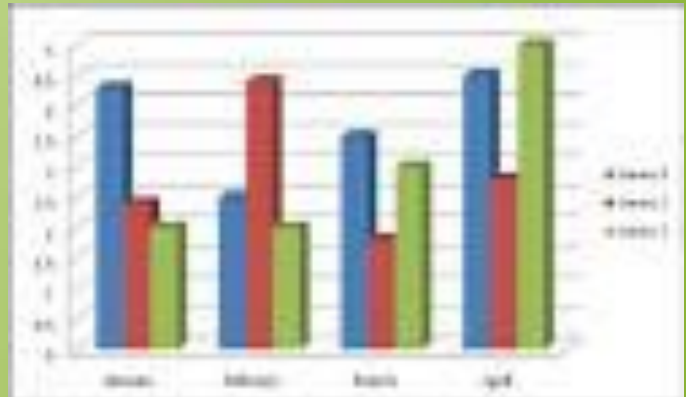
10.6 GRAPHICAL REPRESENTATION OF QUARTERLY PERFORMANCE OF BROADBAND SERVICE PROVIDERS:

1. SERVICE PROVISIONING/ACTIVATION TIME:

Service Provisioning/Activation Time

	Airtel	MTNL	RCL	TCL	TTL	TIKONA	HATH WAY	SYSCON	YOU BB	D-VOIS	5-NETW ORKS	PACEN ET	HONE STY NET	INDUS MEDIA	CITYC OM
100% cases in 15 days (subject to technical feasibility)	100%	99.88%	100%	100%	100%	100%	98.47%	100%	100%	100%	100%	100%	100%	95.75%	100%
Benchmark <15 days	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
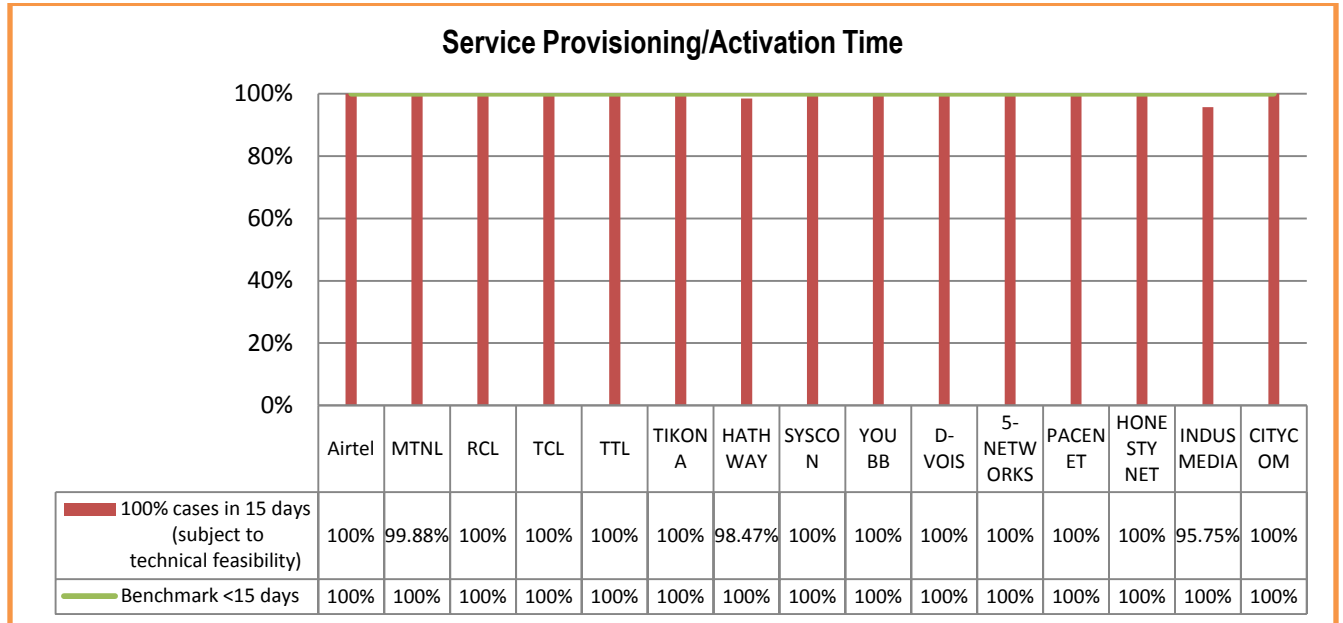
All Operators are meeting the benchmarks except MTNL, Hathway and Indus.

2. BILLING PERFORMANCE:
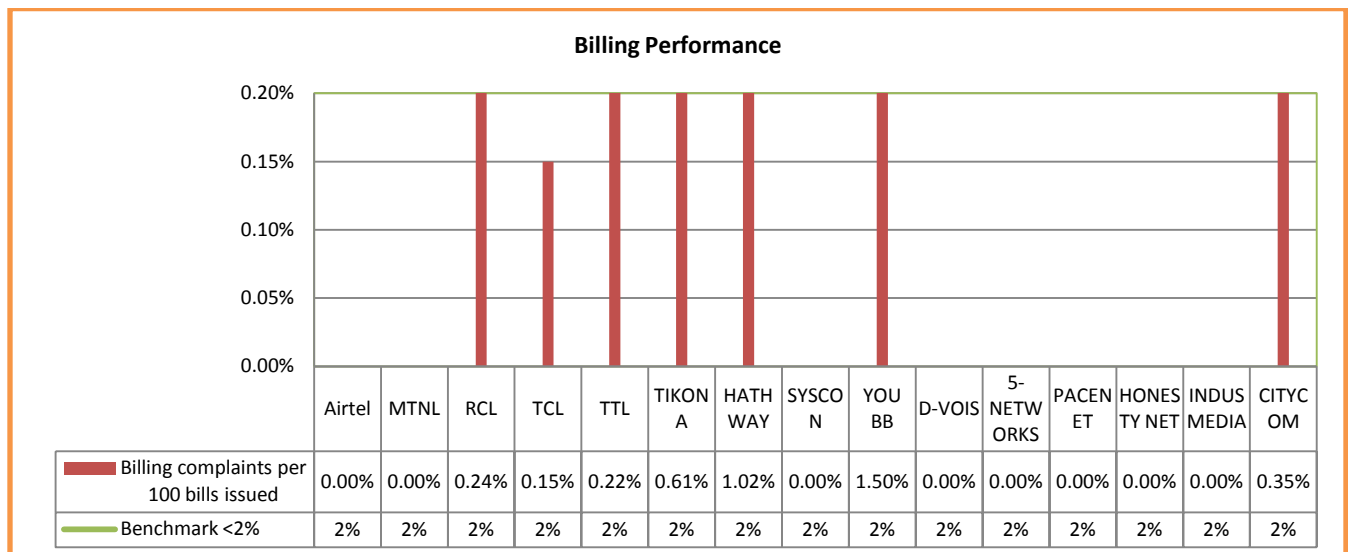
Billing Performance

	Airtel	MTNL	RCL	TCL	TTL	TIKONA	HATH WAY	SYSCON	YOU BB	D-VOIS	5-NETW ORKS	PACEN ET	HONES TY NET	INDUS MEDIA	CITYC OM
Billing complaints per 100 bills issued	0.00%	0.00%	0.24%	0.15%	0.22%	0.61%	1.02%	0.00%	1.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.35%
Benchmark <2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%

All Operators are meeting the benchmarks. Syscon, 5-Network, Indus Media, Honesty Net and Pacenet are providing their services with Pre-paid model. Hence no billing complaints.

3. FAULTS REPAIR/RESTORATION TIME:

Faults Repair/Restoration Time

	Airtel	MTNL	RCL	TCL	TTL	TIKONA	HATHWAY	SYSCON	YOU BB	D-VOIS	5-NETWORKS	PACENET	HONESTY NET	INDUS MEDIA	CITYCOM
Faults Repair / Restoration Time within 3 working day	99.87%	97.09%	100%	96.37%	95.72%	99.09%	94.01%	100%	100%	99.52%	100%	86.14%	95.60%	100%	99.32%
Benchmark ≥99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
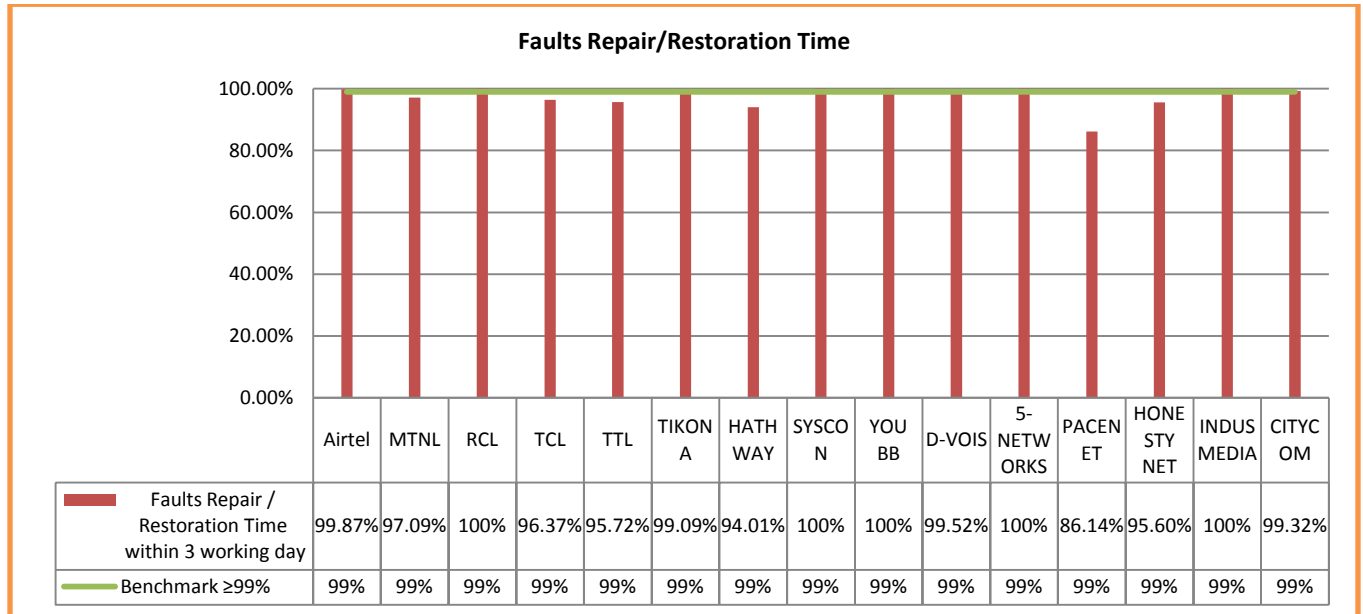
All Operators are meeting the benchmarks except MTNL, TCL, TTL, Hathway, Pacenet and Honesty Net.

4. COMPLAINT RESOLUTION:

Complaint Resolution

	Airtel	MTNL	RCL	TCL	TTL	TIKONA	HATHWAY	SYSCON	YOU BB	D-VOIS	5-NETWORKS	PACENET	HONESTY NET	INDUS MEDIA	CITYCOM
%age of complaints resolved within 4 weeks	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Benchmark 100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
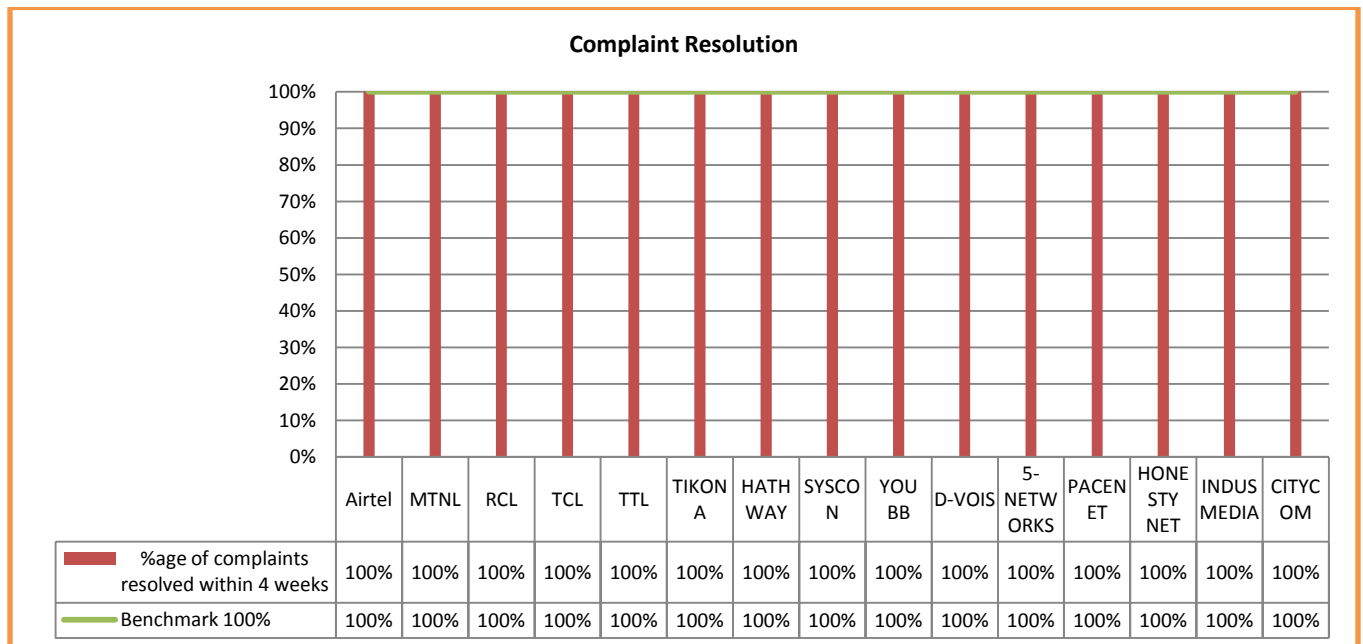
All Operators are meeting the benchmarks.

5. REFUND:
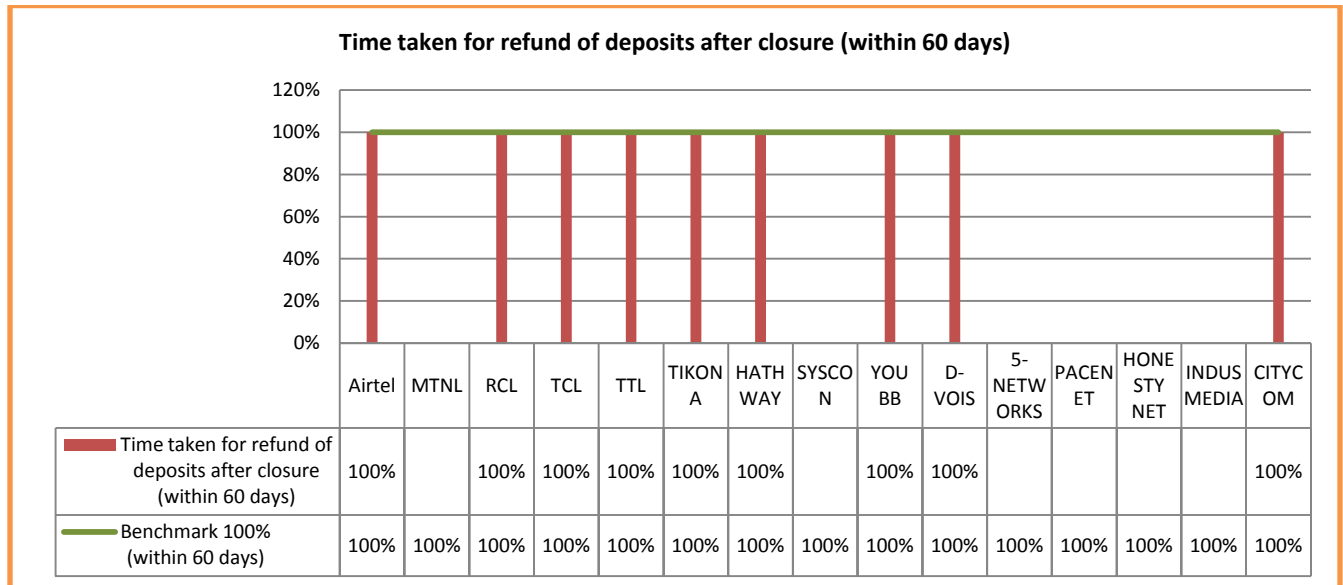
Time taken for refund of deposits after closure (within 60 days)

	Airtel	MTNL	RCL	TCL	TTL	TIKONA	HATH WAY	SYSCON	YOU BB	D-VOIS	5-NETW ORKS	PACEN ET	HONE STY NET	INDUS MEDIA	CITYC OM
Time taken for refund of deposits after closure (within 60 days)	100%		100%	100%	100%	100%	100%		100%	100%					100%
Benchmark 100% (within 60 days)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

All Operators are meeting the benchmarks. Syscon, 5-Network, Indus Media, Honesty Net and Pacenet are providing their services with Pre-paid model. Hence no refund cases. MTNL has not provided data of refund cases because this parameter is not applicable for them.

6. SERVICE AVAILABILITY/UPTIME:

Service Availability/Uptime (for all users) in %age

	Airtel	MTNL	RCL	TCL	TTL	TIKONA	HATH WAY	SYSCON	YOU BB	D-VOIS	5-NETW ORKS	PACE NET	HONE STY NET	INDUS MEDI A	CITYC OM
Service Availability/ Uptime (for all users) in %age	99.99%	99.91%	99.47%	98.68%	99.42%	100%	99.29%	100%	99.45%	100%		99.27%	100%	100%	99.44%
Benchmark >98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%
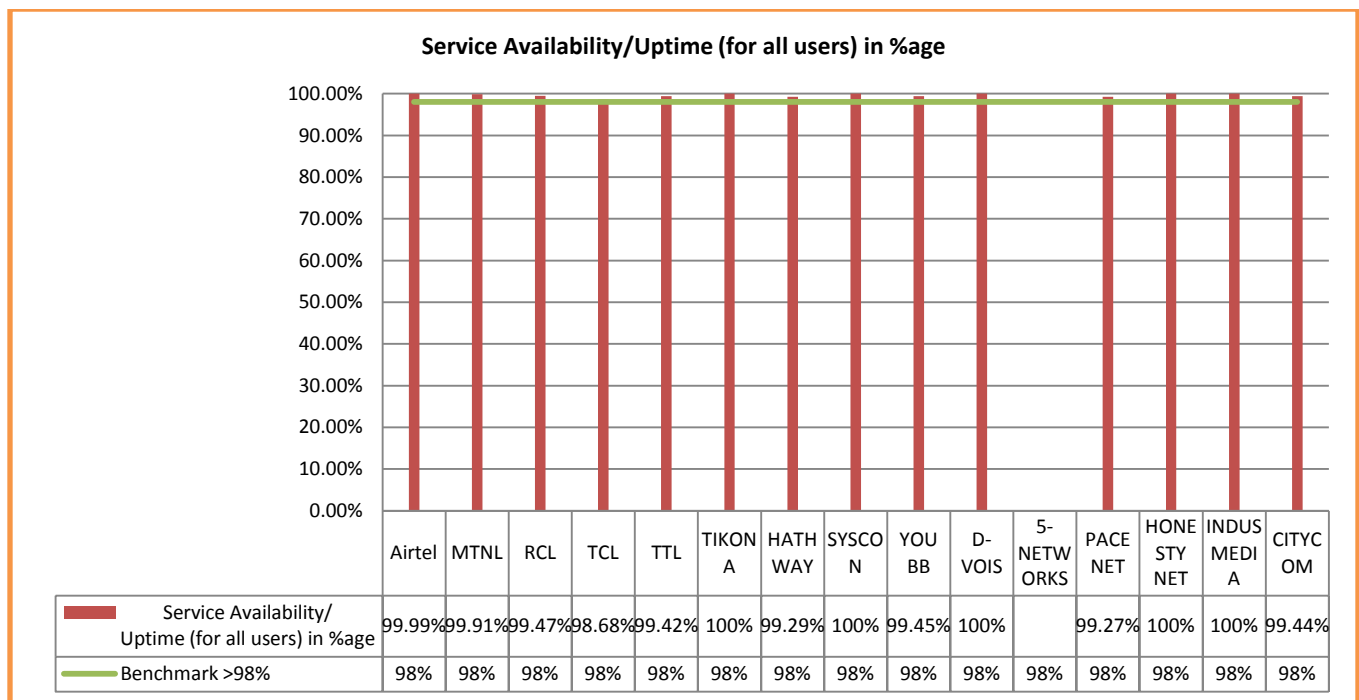
All Operators are meeting the benchmarks.5-Networks has not provided data for this parameter.

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

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

Bandwidth Utilization/ Throughput POP to ISP Gateway Node [Intra-network] Link(s)

	Airtel	MTNL	RCL	TCL	TTL	TIKONA	HATH WAY	SYSCON	YOU BB	D-VOIS	5-NETW ORKS	PACEN ET	HONES TY NET	INDUS MEDIA	CITYCO M
Quarterly	11.01%	52.99%	17.52%	40.90%	77.26%	70.16%	62.81%	45.53%		72.70%	66.80%	88.59%	81.85%		21.76%
Live	38.25%	57.48%	26.70%	49.86%	77.00%	61.12%	41.22%	46.60%		73.41%	95.96%	88.68%	71.69%		22.61%
Benchmark <80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
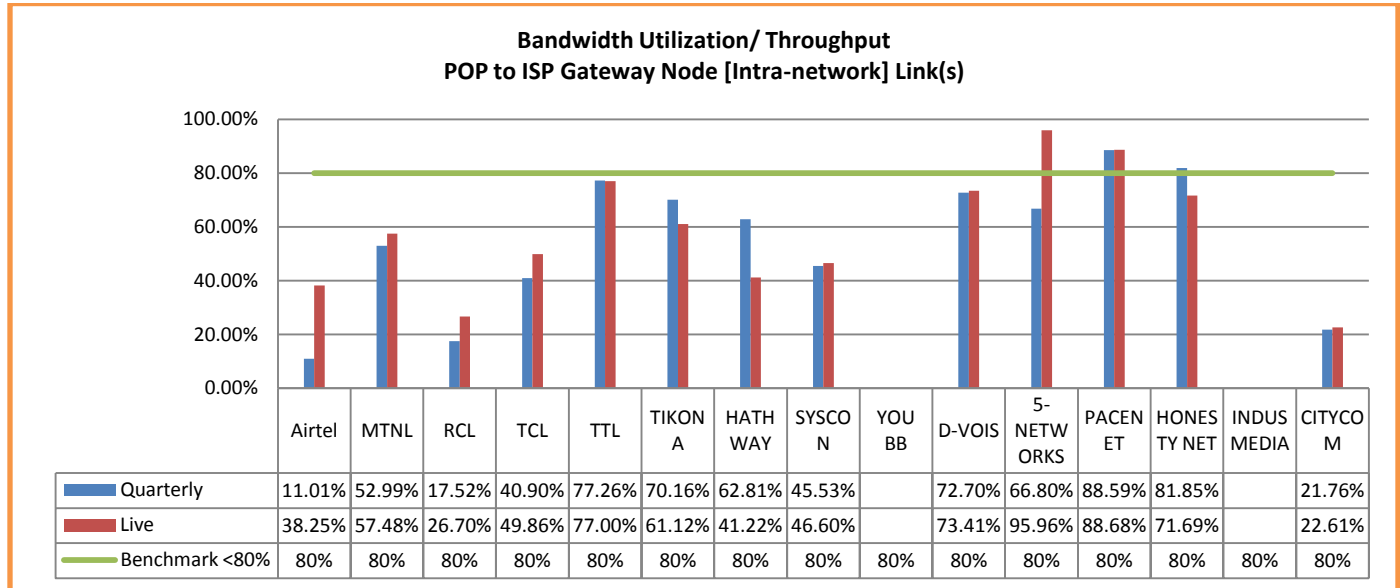
All Operators are meeting the benchmarks except Pacenet, Honesty Net and 5-Network (3 days live).You Broadband and Indus media have not provided data for this parameter.

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

Bandwidth Utilization/ Throughput ISP Gateway Node to IGSP / NIXI Node upstream Link(s) for International connectivity

	Airtel	MTNL	RCL	TCL	TTL	TIKONA	HATH WAY	SYSCON	YOU BB	D-VOIS	5-NETW ORKS	PACEN ET	HONES TY NET	INDUS MEDIA	CITYCO M
Quarterly	69.45%	86.14%	50.02%	41.64%	78.77%	78.66%	72.01%	65.53%	73.30%	60.98%		85.83%			47.54%
Live	65.91%	87.73%	65.90%	62.00%	78.50%	77.37%	63.69%	70.17%	69.09%	62.21%		85.32%			44.16%
Benchmark <80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
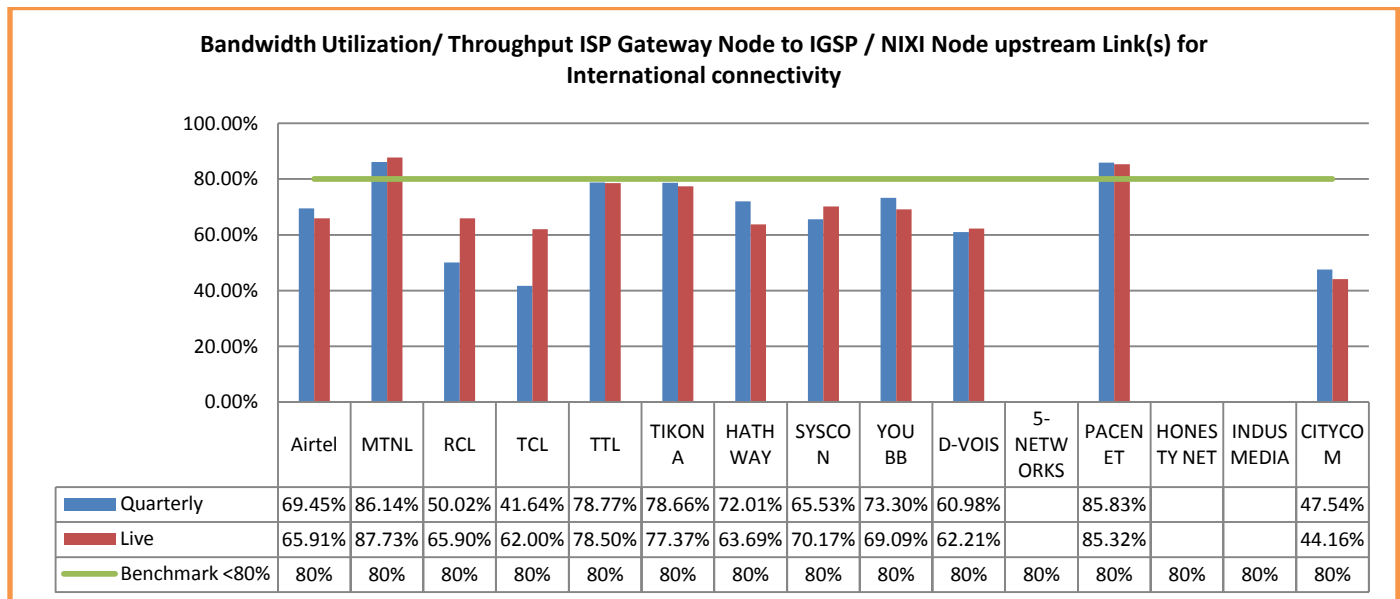
All Operators are meeting the benchmarks except MTNL and Pacenet. Honesty Net, Indus media and 5- Networks have not provided this data because this parameter is not applicable for them.

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

Broadband Connection Speed (download) from ISP Node to User

	Airtel	MTNL	RCL	TCL	TTL	TIKONA	HATH WAY	SYSCON	YOU BB	D-VOIS	5-NETWORKS	PACENET	HONESTY NET	INDUS MEDIA	CITYCOM
Quarterly	100.00%		89.46%	93.60%	97.23%	94.33%	92.50%	82.50%	87.50%	26.63%		91.50%	89.32%		91.67%
Live	115.67%		94.00%	93.00%	94.86%	94.33%	93.33%	84.83%	86.00%	80.53%		91.60%	87.16%	97.00%	93.33%
Benchmark >80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
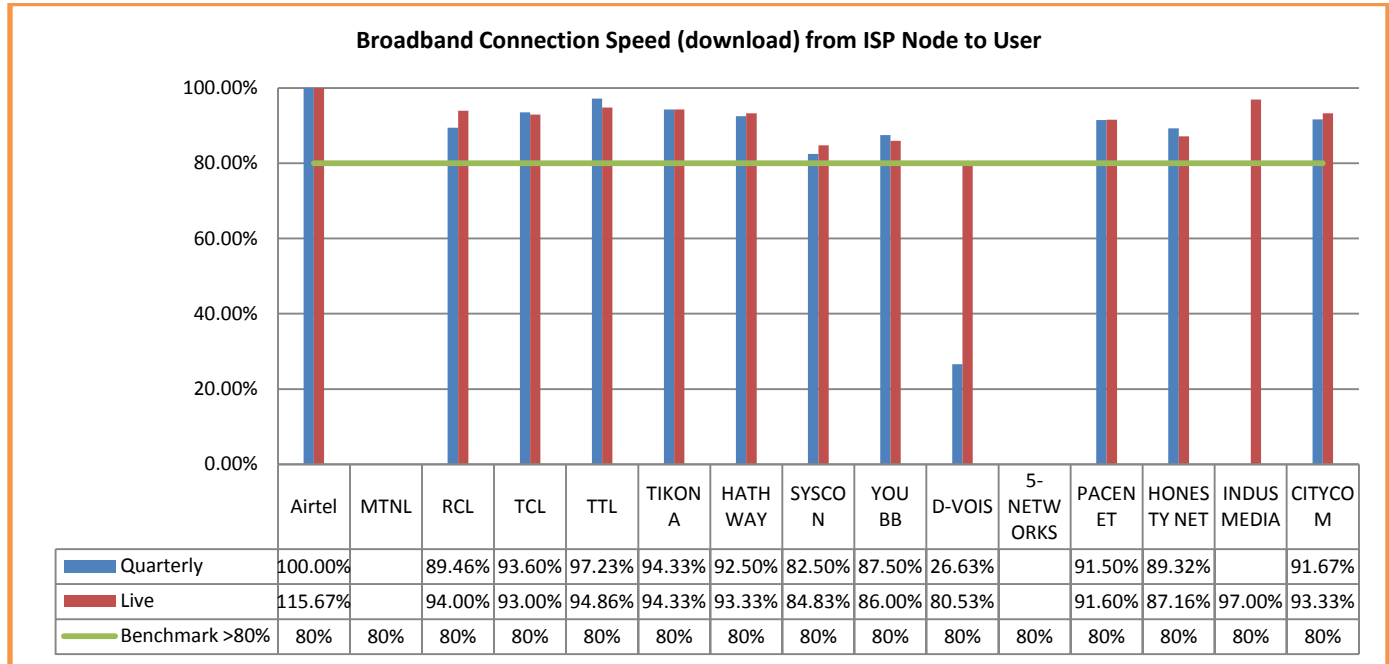
All Operators are meeting the benchmarks except D-Vois whereas MTNL, 5-Network and Indus have not provided data for this Parameter.

4. PACKET LOSS:

% of Packet Loss

	Airtel	MTNL	RCL	TCL	TTL	TIKONA	HATH WAY	SYSCON	YOU BB	D-VOIS	5-NETWORKS	PACENET	HONESTY NET	INDUS MEDIA	CITYCOM
Quarterly	0.01%	0.00%	0.52%	0.00%	0.10%	0.00%	0.72%	0.00%	0.00%	0.50%		0.00%	1.16%		0.05%
Live	0.23%	0.00%	0.00%	0.00%	0.20%	0.00%	0.77%	0.00%	0.00%	0.23%		0.00%	1.17%	0.10%	0.00%
Benchmark <1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
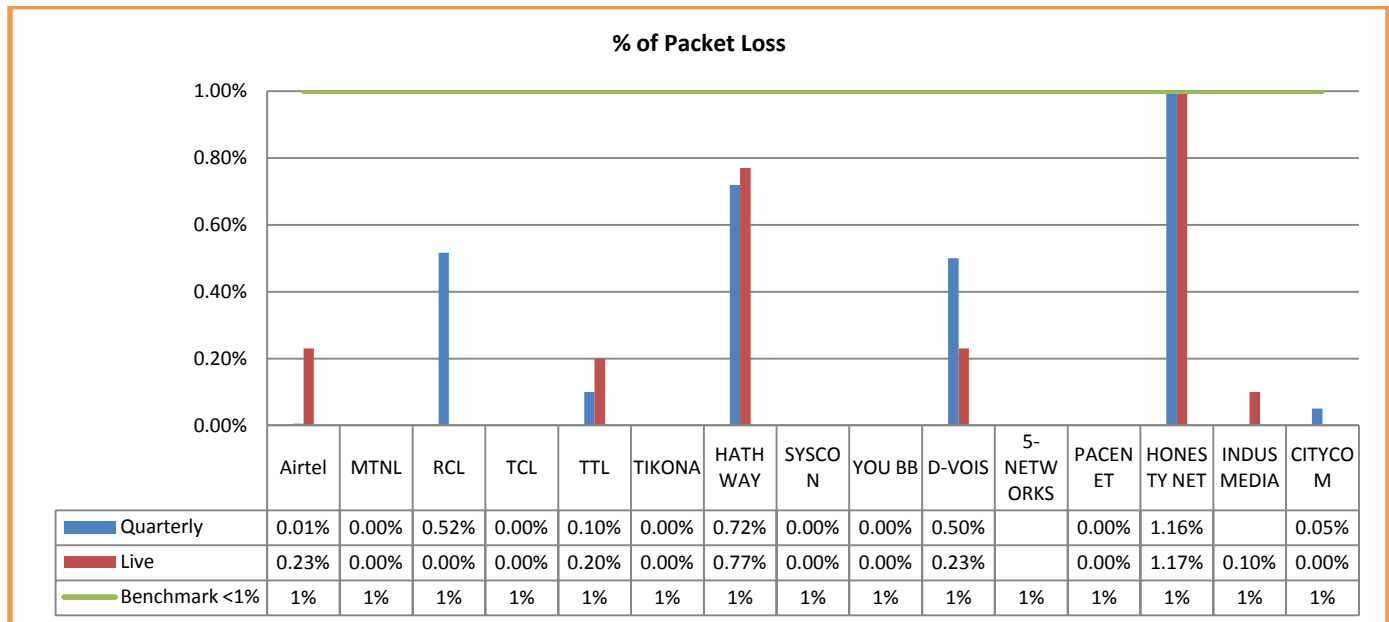
All Operators are meeting the benchmarks whereas 5-Network and Indus have not provided data for this Parameter.

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

Network latency User reference point at POP/ISP Gateway node to IGSP/NIXI

	Airtel	MTNL	RCL	TCL	TTL	TIKONA	HATH WAY	SYSCON	YOU BB	D-VOIS	5-NETWORKS	PACENET	HONESTY NET	INDUS MEDIA	CITYCOM
Quarterly	30	1	16	1	68		1	2	8	2		9	30		4
Live	32	1	4	1	33		1	2	2	1		3	30	2	4
Benchmark <120 ms	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
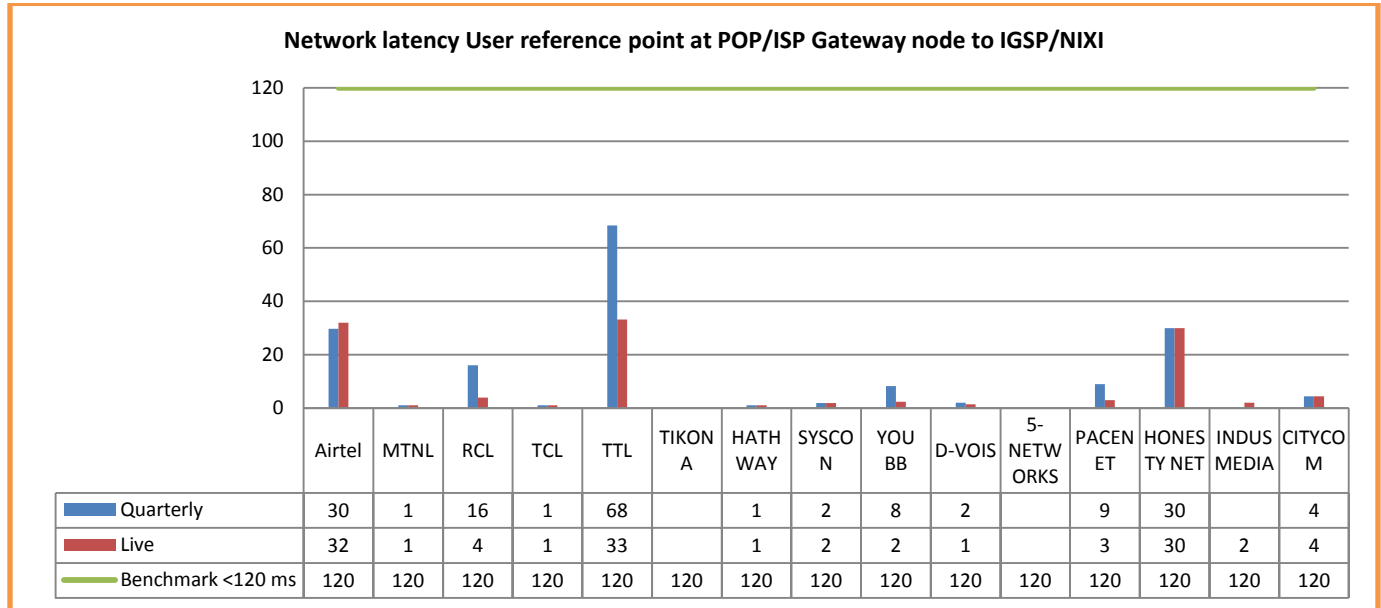
All Operators are meeting the benchmarks whereas Tikona, 5-Networks and Indus media have not provided data for this parameter.

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

Network latency User reference point at ISP Gateway Node to International nearest NAP port abroad (terrestrial)

	Airtel	MTNL	RCL	TCL	TTL	TIKONA	HATH WAY	SYSCON	YOU BB	D-VOIS	5-NETWORKS	PACENET	HONESTY NET	INDUS MEDIA	CITYCOM
Quarterly	62	272	17	258	201		90		277			174	66		167.8
Live	75	194	1	59	163		90		93			58	66		205
Benchmark <350 ms	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
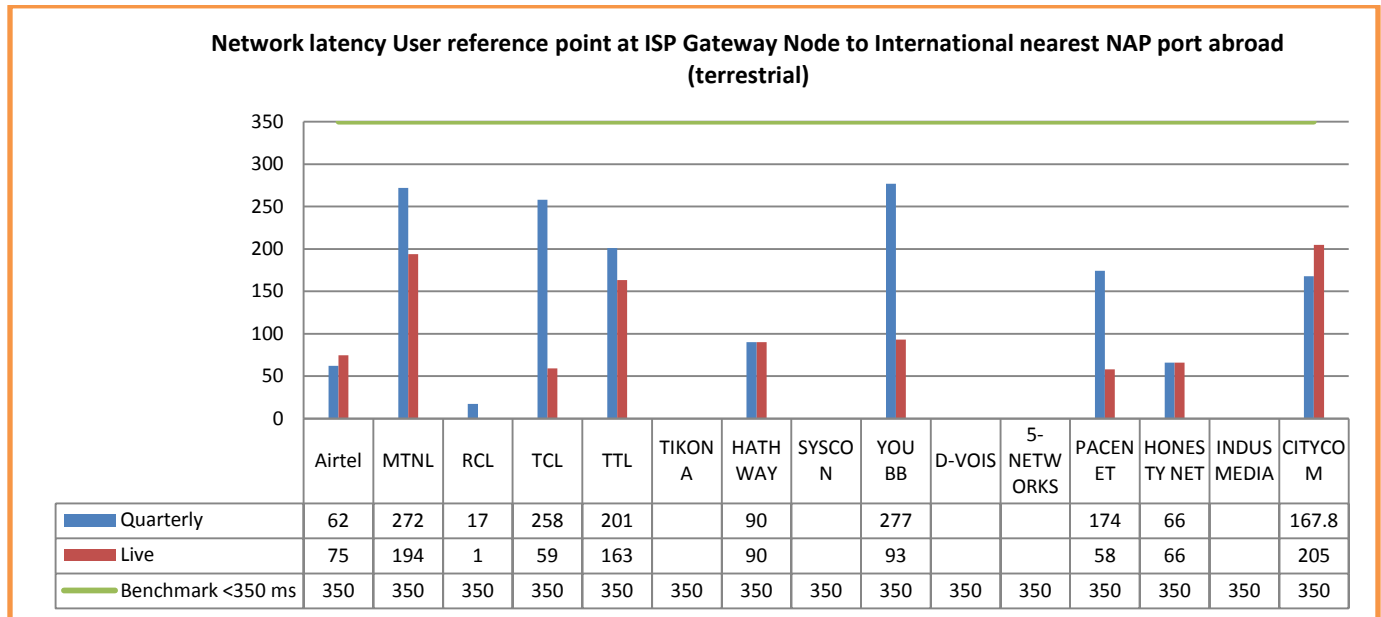
All Operators are meeting the benchmarks whereas Tikona, D-Vois, 5-Networks and Indus media have not provided data for this parameter.
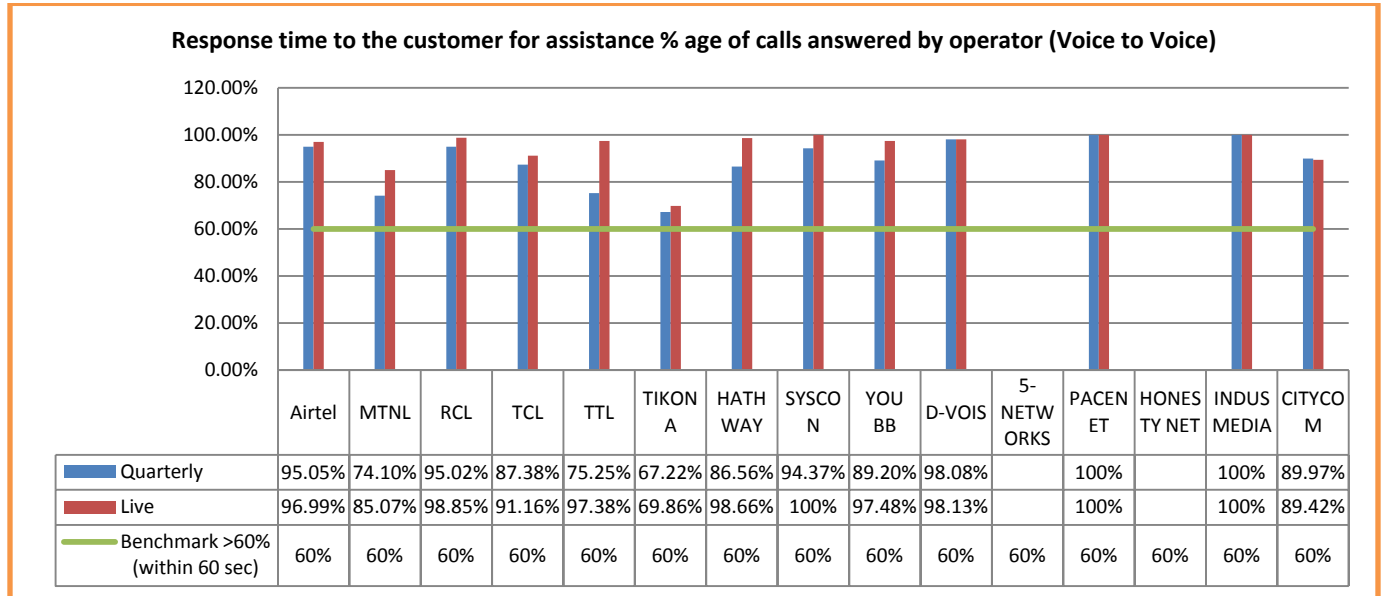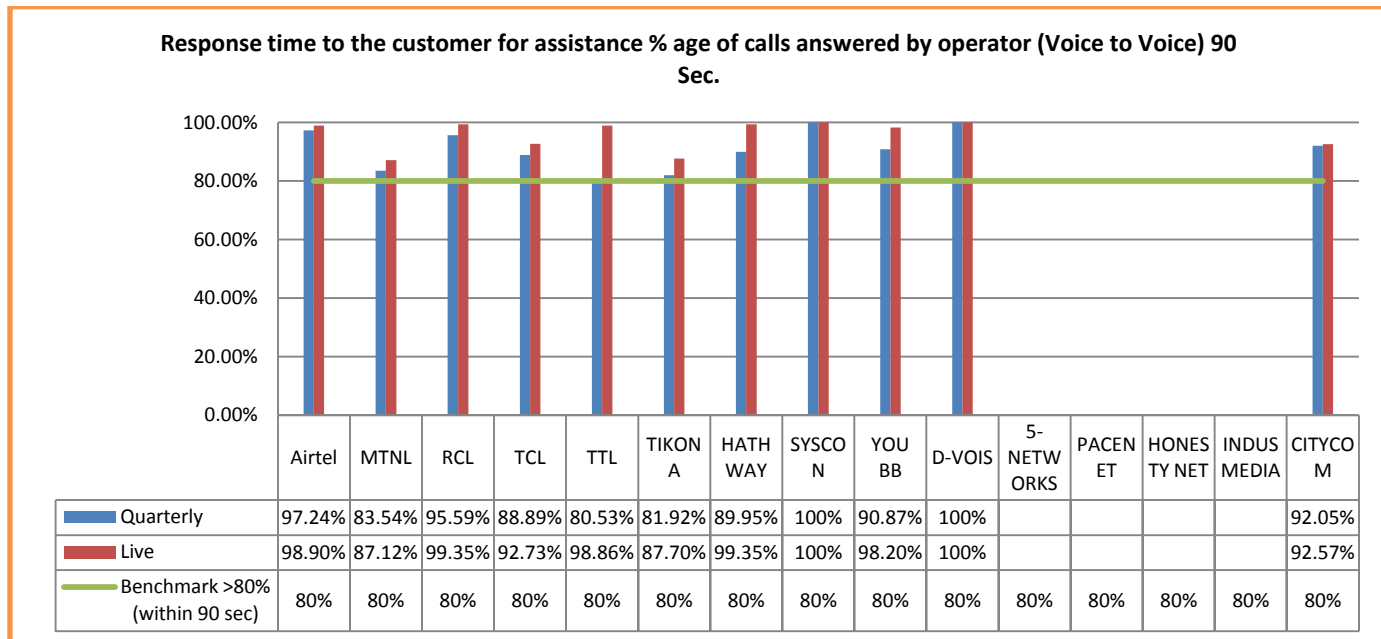
7. RESPONSE TIME TO THE CUSTOMER FOR ASSISTANCE ACCESSIBILITY BY OPERATOR WITHIN 60 SECONDS:

Response time to the customer for assistance % age of calls answered by operator (Voice to Voice)

	Airtel	MTNL	RCL	TCL	TTL	TIKONA	HATHWAY	SYSCON	YOU BB	D-VOIS	5-NETWORKS	PACENET	HONESTY NET	INDUS MEDIA	CITYCOM
Quarterly	95.05%	74.10%	95.02%	87.38%	75.25%	67.22%	86.56%	94.37%	89.20%	98.08%		100%		100%	89.97%
Live	96.99%	85.07%	98.85%	91.16%	97.38%	69.86%	98.66%	100%	97.48%	98.13%		100%		100%	89.42%
Benchmark >60% (within 60 sec)	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%

All Operators are meeting the benchmarks whereas 5-Network and Honesty Net have not provided data for this Parameter.

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

Response time to the customer for assistance % age of calls answered by operator (Voice to Voice) 90 Sec.

	Airtel	MTNL	RCL	TCL	TTL	TIKONA	HATHWAY	SYSCON	YOU BB	D-VOIS	5-NETWORKS	PACENET	HONESTY NET	INDUS MEDIA	CITYCOM
Quarterly	97.24%	83.54%	95.59%	88.89%	80.53%	81.92%	89.95%	100%	90.87%	100%					92.05%
Live	98.90%	87.12%	99.35%	92.73%	98.86%	87.70%	99.35%	100%	98.20%	100%					92.57%
Benchmark >80% (within 90 sec)	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%

All Operators are meeting the benchmarks whereas 5-Network, Pacenet, Honesty Net and Indus media have not provided data for this Parameter.

Annex-1

S.N.	SERVICE PROVIDER	SSA NAME	SDCA NAME	EXCHANGE NAME	EXCHANGE CODE/LEVEL	EXCHANGE TYPE
1	MTNL	MUMBAI	--	MTNL - BORIVALI	2833/54/70/90-95	URBAN
2	MTNL		--	MTNL - CUMBALLA HILL	2351/2/4/5,2363 2374/76-8/2388	URBAN
3	MTNL		--	MTNL - FOUTAIN	2261-4/8/9/70-1/5	URBAN
4	MTNL		--	MTNL - GOREGAON	2875/2840-3/9/71-74/76-79/2927	URBAN
5	MTNL		--	MTNL - KANDIVALI	2802/5/6/61-66/82/83,2801/7-9	URBAN
6	MTNL		--	MTNL - KHAR	2600/5/46/8-9/26/60-61,2604	URBAN
7	MTNL		--	MTNL - MULUND	2163/2560/65/68/90-6,2166/2561-4	URBAN
8	MTNL		--	MTNL - MUMBRA	2530-2/4/5/9/46/97-8/2549	URBAN
9	MTNL		--	MTNL - POWAI	2570/2572	URBAN
10	MTNL		--	MTNL - PRABHADEVI	2421-5-31-33/2445/7/2494/5	URBAN
11	MTNL		--	MTNL - TURBHE	2704-6/21-24/27/40-42/56-64/67-69/2977/78	URBAN
12	MTNL		--	MTNL - VASHI	2780-5/8-9/54/55/77/66	URBAN
13	BHARTI-AIRTEL		--	MUMBAI	--	URBAN
14	TTL		--	MUMBAI	--	URBAN
15	RCL		--	MUMBAI	--	URBAN
16	VODAFONE		--	MUMBAI	--	URBAN

Annex-2

S.N.	CIRCLE	SERVICE PROVIDER	POPS LOCATION	ACTIVITY
1	MUMBAI	MTNL	MUMBAI	BB AUDIT
2	MUMBAI	AIRTEL BHARTI	MUMBAI	BB AUDIT
3	MUMBAI	YOU-BROADBAND	MUMBAI	BB AUDIT
4	MUMBAI	HONESTY NET SOLUTION	MUMBAI	BB AUDIT
5	MUMBAI	PACENET	MUMBAI	BB AUDIT
6	MUMBAI	RELIANCE	MUMBAI	BB AUDIT
7	MUMBAI	SPECTRA-NET	MUMBAI	BB AUDIT
8	MUMBAI	TCL	MUMBAI	BB AUDIT
9	MUMBAI	TTL	MUMBAI	BB AUDIT
10	MUMBAI	TIKONA	MUMBAI	BB AUDIT
11	MUMBAI	HATHWAY	MUMBAI	BB AUDIT
12	MUMBAI	D-VOIS	MUMBAI	BB AUDIT
13	MUMBAI	SYSCON INFOWAY	MUMBAI	BB AUDIT
14	MUMBAI	FIVE NETWORK	MUMBAI	BB AUDIT
15	MUMBAI	INDUS MEDIA	MUMBAI	BB AUDIT