



**REPORT**  
**ON**  
**AUDIT & ASSESSMENT OF QUALITY OF SERVICE**  
**OF**  
**CELLULAR MOBILE TELEPHONE SERVICE**  
**BASIC (WIRELINE) SERVICE**  
**&**  
**BROADBAND SERVICE**  
**FOR**  
**TELECOM REGULATORY AUTHORITY OF INDIA**  
**WEST ZONE – MUMBAI METRO SERVICE AREA**  
**(JANUARY 2014 – MARCH 2014)**

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## PREFACE

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

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

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



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## 1. BACKGROUND

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## 1. BACKGROUND

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

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

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

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

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

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



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

## **2. OBJECTIVES AND METHODOLOGY**







## **2. OBJECTIVES AND METHODOLOGY**

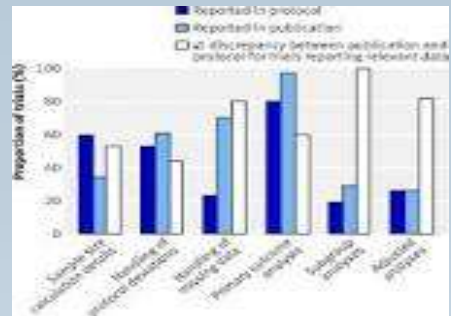
The primary objective is to audit and assess the Quality of Service being rendered by Basic, Cellular Mobile & Broadband service providers against the parameters notified by TRAI.

The audit and assessment of Quality of Service is 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) is undertaken for J&K , Himachal Pradesh & Mumbai circles and for Broadband service, the audit is done for J&K , Himachal Pradesh, Haryana, Delhi & Mumbai Circles during the quarter January – March 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
		January-14	February-14	March-14	
<b>GSM Operators</b>					
1	AIRCEL	15 to 17 Jan'14	10 to 12 Feb'14	5 to 7 Mar'14	Aircel Limited, Opus Center, Opp. Hotel Tunga Paradise, Near Speez,Andheri(E)
2	AIRTEL	15 to 17 Jan'14	17 to 19 Feb'14	5 to 7 Mar'14	7th Floor, Interface 7, Near IJMIMA Tower, Behind Infinity Mall, Malad (West), Mumbai-400064
3	MTNL	20 to 22 Jan'14	10 to 12 Feb'14	4 to 6 Mar'14	OMC-R unit, 10th Floor, Prabhadevi Telecom Bldg., V.S. Marg, Dadar(W),Mumbai-400028
4	LOOP MOBILE	15 to 17 Jan'14	5 to 7 Feb '14	1 to 3 Mar'14	7th Floor,Loop Mobile ,127 Manmala Tank Road,Taikalwadi,Mahim west,Mumbai
5	TATA GSM	13 to 15 Jan'14	5 to 7 Feb '14	3 to 5 Mar'14	Tata Teleservices (Maharashtra )limited Premco House A-26,Street No 3 MIDC Marol,Andheri East Mumbai 400093
6	IDEA	13 to 15 Jan'14	5 to 7 Feb '14	4 to 6 Mar'14	3rd Floor Windsor ,Kalina CST Road,Santacruz East,Mumbai
7	RCOM GSM	20 to 22 Jan'14	5 to 7 Feb '14	4 to 6 Mar'14	Reliance Infocom infrastructure Pvt ltd 1 st Floor A 8 Building,MBP Mahape 400701
8	VODAFONE	20 to 22 Jan'14	10 to 12 Feb'14	5 to 7 Mar'14	Skyline ikon, Near Mittal Industrial Estate, Andheri Kurla Road, Marol Naka, Andheri (E), Mumbai-59
<b>CDMA Operators</b>					
9	RCOM CDMA	20 to 22 Jan'14	5 to 7 Feb '14	4 to 6 Mar'14	Reliance Infocom infrastructure Pvt Ltd, 1 st Floor A 8 Building,MBP Mahape 400701
10	TATA CDMA	13 to 15 Jan'14	5 to 7 Feb '14	3 to 5 Mar'14	Tata Teleservices (Maharashtra )limited Premco House A-26,Street No 3 MIDC Marol,Andheri East Mumbai 400093

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

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



### 3.2 SAMPLING FOR BASIC (WIRELINER) SERVICES

- The QoS audit for basic (wireline) service is to be done for the number of exchanges spread over in about 10% of SDCAs with each service providers in specified circles. The following Service providers, providing the Basic (Wireline) service have been audited for their quality of service assessment.

Sl. No.	Name of Wireline Service Providers
1	BHARTI AIRTEL
2	MTNL
3	RCL
4	TTL

### 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. The following Service providers, providing broadband service in Mumbai Circle; have been audited for their quality of service assessment.



**NAME OF BROADBAND SERVICE PROVIDERS AUDITED IN MUMBAI METRO CIRCLE:**

<b>Sl. No.</b>	<b>Name of Broadband Service Providers</b>
1	BHARTI AIRTEL LIMITED
2	MTNL
3	RELIANCE COMMUNICATION LIMITED (RCL)
4	TATA COMMUNICATION LIMITED (TCL)
5	TATA TELESERVICES LIMITED (TTL)
6	TIKONA DIGITAL NETWORKS
7	HATHWAY
8	SYSCON INFOWAY PRIVATE LIMITED
9	YOU BROADBAND INDIA PVT. LTD.
10	D-VOIS BROADBAND
11	FIVE-NETWORKS
12	BROADBAND PACENET INDIA PVT. LTD
13	HONESTY NET SOLUTIONS
14	INDUS MEDIA & COMMUNICATION LTD.
15	CITYCOM NETWORKS PVT. LTD. (SPECTRANET)

## **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.

**4.1 MONTHLY DATA VERIFICATION FOR CELLULAR  
MOBILE SERVICE PROVIDERS  
(NETWORK SERVICE QUALITY PARAMETER)**







#### 4.1 SERVICE PROVIDER PERFORMANCE REPORT BASED ON MONTHLY DATA VERIFICATION: NETWORK SERVICE QUALITY PARAMETER- CELLULAR MOBILE SERVICES.

##### BUSY HOUR OF VARIOUS SERVICE PROVIDERS:

Sl. No.	Name of Service Provider	Month of Audit	Network TCBH Hour
<b>GSM Operators</b>			
1	AIRTEL	March-14	19 Hrs-20 Hrs
2	AIRCEL	March-14	20 Hrs-21 Hrs
3	MTNL	March-14	19 Hrs-20 Hrs
4	IDEA	March-14	20 Hrs-21 Hrs
5	RCOM GSM	March-14	19 Hrs-20 Hrs
6	TATA GSM	March-14	19 Hrs-20 Hrs
7	LOOP MOBILE	March-14	19 Hrs-20 Hrs
8	VODAFONE	March-14	19 Hrs-20 Hrs
<b>CDMA Operators</b>			
9	RCOM CDMA	March-14	19 Hrs-20 Hrs
10	TATA CDMA	March-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.

##### SWITCHES/BSC/BTS DETAILS OF OPERATORS:

Sl. No.	Name of Service Provider	No. of MSC + GMSC	No. of BSC	No. of BTS	NSS make	BSS make
<b>GSM Operators</b>						
1	AIRTEL	13	73	3929	NSN	NSN
2	AIRCEL	3	20	1919	NSN	NSN
3	MTNL	5	46	1000	Alcatel	Motorola & Alcatel
4	IDEA	8	30	3178	Ericsson	Ericsson
5	RCOM GSM	3	11	2326	Huawei	Huawei
6	TATA GSM	3	15	2704	Huawei	Huawei
7	LOOP MOBILE	3	23	2068	Huawei	Huawei & ZTE
8	VODAFONE	21	63	4248	Ericsson	Ericsson
<b>CDMA Operators</b>						
9	RCOM CDMA	8	NA	889	Lucent, ZTE & Ericsson	Lucent
10	TATA CDMA	5	6	962	Huawei	Huawei

# AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MUMBAI METRO CIRCLE



## TABLES OF MONTHLY QOS PERFORMANCE:

**TABLE: 1**

CELLULAR MOBILE TELEPHONE SERVICES MUMBAI METRO CIRCLE- JAN-14 MONTH													
PMR Generation Data		Bench- mark	Audit Period	AIRTEL	AIRCEL	MTNL	IDEA	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators								CDMA Operators	
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	Jan-14	0.00%	0.04%	0.59%	0.05%	0.25%	0.01%	0.01%	0.00%	0.32%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	Jan-14	0.00%	0.05%	1.30%	0.26%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Jan-14	99.99%	98.10%	98.18%	98.06%	99.65%	99.60%	99.27%	99.48%	98.70%	98.92%
	b) SDCCH/PAGING Channel congestion	<=1%	Jan-14	0.00%	0.13%	0.11%	0.65%	0.03%	0.08%	0.03%	0.10%	0.00%	0.00%
	c) TCH congestion	<=2%	Jan-14	0.00%	0.37%	0.03%	1.20%	0.07%	0.16%	0.03%	0.52%	0.01%	0.06%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Jan-14	0.30%	0.84%	1.22%	1.94%	0.38%	0.67%	0.62%	0.86%	0.40%	0.01%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Jan-14	0.00%	1.75%	2.29%	2.82%	0.02%	1.34%	0.76%	<b>3.89%</b>	0.11%	2.46%
	c) Connections with good voice quality	>=95%	Jan-14	99.97%	97.77%	96.70%	98.12%	99.06%	98.50%	98.12%	97.60%	99.79%	99.08%
4	No. of POI's having >=0.5% POI congestion		Jan-14	0	0	0	0	0	0	0	0	0	0

# AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MUMBAI METRO CIRCLE



**TABLE: 2**

CELLULAR MOBILE TELEPHONE SERVICES MUMBAI METRO CIRCLE- FEB-14 MONTH													
PMR Generation Data		Bench- mark	Audit Period	AIRTEL	AIRCEL	MTNL	IDEA	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators								CDMA Operators	
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	Feb-14	0.00%	0.08%	0.48%	0.05%	0.27%	0.00%	0.01%	0.00%	0.20%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	Feb-14	0.00%	0.00%	1.00%	0.09%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Feb-14	99.99%	98.32%	98.26%	98.05%	99.60%	99.57%	99.30%	99.52%	98.90%	98.91%
	b) SDCCH/PAGING Channel congestion	<=1%	Feb-14	0.00%	0.16%	0.23%	0.56%	0.03%	0.08%	0.02%	0.04%	0.00%	0.00%
	c) TCH congestion	<=2%	Feb-14	0.00%	0.42%	0.05%	1.21%	0.08%	0.02%	0.02%	0.48%	0.01%	0.04%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Feb-14	0.29%	0.88%	1.21%	1.92%	0.41%	0.64%	0.61%	0.85%	0.39%	0.01%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Feb-14	0.00%	2.05%	2.21%	2.82%	0.02%	1.32%	0.72%	<b>3.26%</b>	0.07%	2.64%
	c) Connections with good voice quality	>=95%	Feb-14	99.97%	97.74%	96.40%	97.95%	99.03%	98.52%	98.14%	97.60%	99.79%	99.11%
4	No. of POI's having >=0.5% POI congestion		Feb-14	0	0	0	0	0	0	0	0	0	0

**AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MUMBAI METRO CIRCLE**



**TABLE: 3**

<b>CELLULAR MOBILE TELEPHONE SERVICES MUMBAI METRO CIRCLE- MAR-14 MONTH</b>													
<b>PMR Generation Data</b>		<b>Bench- mark</b>	<b>Audit Period</b>	<b>AIRTEL</b>	<b>AIRCEL</b>	<b>MTNL</b>	<b>IDEA</b>	<b>RCOM GSM</b>	<b>TATA GSM</b>	<b>LOOP MOBILE</b>	<b>VODAFONE</b>	<b>RCOM CDMA</b>	<b>TATA CDMA</b>
<b>S/N</b>	<b>Name of Parameter</b>			<b>GSM Operators</b>								<b>CDMA Operators</b>	
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	Mar-14	0.00%	0.07%	0.47%	0.04%	0.16%	0.01%	0.01%	0.00%	0.19%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	Mar-14	0.00%	0.16%	1.10%	0.16%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Mar-14	99.99%	98.28%	98.12%	98.00%	99.61%	99.37%	99.29%	99.46%	98.87%	98.36%
	b) SDCCH/PAGING Channel congestion	<=1%	Mar-14	0.00%	0.11%	0.25%	0.58%	0.03%	0.09%	0.02%	0.07%	0.00%	0.00%
	c) TCH congestion	<=2%	Mar-14	0.00%	0.76%	0.05%	1.20%	0.09%	0.23%	0.02%	0.54%	0.01%	0.06%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Mar-14	0.28%	0.94%	1.10%	1.93%	0.39%	0.64%	0.59%	0.89%	0.46%	0.01%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Mar-14	0.00%	2.37%	1.98%	2.83%	0.03%	1.25%	0.74%	2.70%	0.07%	2.49%
	c) Connections with good voice quality	>=95%	Mar-14	99.97%	97.66%	96.40%	96.60%	98.98%	98.55%	98.13%	97.55%	99.79%	99.13%
4	No. of POI's having >=0.5% POI congestion		Mar-14	0	0	0	0	0	0	0	0	0	0

# AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MUMBAI METRO CIRCLE



## TABLE OF QUARTERLY QOS PERFORMANCE:

TABLE: 4

QUARTERLY QOS PERFORMANCE (AVERAGE OF QE-MARCH-14) OF MUMBAI METRO CIRCLE													
PMR Generation Data		Bench- mark	Audit Period	AIRTEL	AIRCEL	MTNL	IDEA	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators								CDMA Operators	
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	Quarterly	0.00%	0.06%	0.51%	0.05%	0.23%	0.01%	0.01%	0.00%	0.24%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.00%	0.07%	1.13%	0.17%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	99.99%	98.23%	98.19%	98.04%	99.62%	99.51%	99.29%	99.49%	98.82%	98.73%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.00%	0.13%	0.20%	0.60%	0.03%	0.08%	0.02%	0.07%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	0.00%	0.52%	0.04%	1.20%	0.08%	0.14%	0.02%	0.51%	0.01%	0.05%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	0.29%	0.89%	1.18%	1.93%	0.39%	0.65%	0.61%	0.87%	0.42%	0.01%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	0.00%	2.06%	2.16%	2.82%	0.02%	1.30%	0.74%	<b>3.28%</b>	0.08%	2.53%
	c) Connections with good voice quality	>=95%	Quarterly	99.97%	97.72%	96.50%	97.56%	99.02%	98.52%	98.13%	97.58%	99.79%	99.11%
4	No. of POI's having >=0.5% POI congestion		Quarterly	0	0	0	0	0	0	0	0	0	0



## KEY FINDINGS: CELLULAR MOBILE SERVICES

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 Paging Channel Occupancy Ratio (PCH Average Using Ratio) which is used to determine the Paging Channel Occupancy which on an average is < 50% on all sites in the network. When the value of this parameter is less than 100%, it is counted as 0% congestion. Thus, there is no congestion on the 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 (0.01 %) was for Tata (CDMA) during the quarter.

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

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

The audit with respect to this parameter revealed that all the operators except **Vodafone** were in compliance of the benchmark for this parameter. The quarterly average performance of **Vodafone** with respect to this parameter was **3.28%**.

iii. Connections with good voice quality:

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

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





# AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MUMBAI METRO CIRCLE



## 4.2 CUSTOMER SERVICE QUALITY PARAMETERS MEASUREMENT-QE MARCH-14:

### CSD Data for Cellular Mobile Telephone Services-QE March-14

<u>Quarterly CSD Audit Data</u>		Bench- mark	Circle Name	AIRTEL	AIRCEL	MTNL	IDEA	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
S/ N	Name of Parameter			GSM Operators							CDMA Operators		
1	<b>Metering &amp; Billing Credibility -Post Paid</b>												
	A) No. of bills issued during the quarter		<i>Mumbai Metro</i>	787737	25464	138513	454638	133501	102067	370330	1962598	453324	300417
	B) No. of bills disputed including billing complaints during the quarter		<i>Mumbai Metro</i>	124	0	46	200	127	131	25	1210	448	45
	C)% of billing complaints during the quarter	<= 0.1%	<i>Mumbai Metro</i>	0.02%	0.00%	0.03%	0.04%	0.10%	0.03%	0.01%	0.06%	0.10%	0.01%
2	<b>Metering &amp; Billing Credibility -Pre Paid</b>												
	A) Total No. of Pre-paid customers at the end of the quarter		<i>Mumbai Metro</i>	3567394	1599447	976143	2889099	2855846	1342066	2574055	5497068	2576226	371865
	B) Total No. of complaints relating to charging, Credit and Validity during the quarter		<i>Mumbai Metro</i>	183	93	10	384	2815	66	115	234	1261	9
	C) % of Pre-paid Charging Complaints	<= 0.1%	<i>Mumbai Metro</i>	0.01%	0.01%	0.00%	0.01%	0.10%	0.00%	0.00%	0.00%	0.05%	0.00%
3	<b>Resolution of Billing/Charging Complaints and Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints</b>												
	A) No. of Billing/Charging/Credit/Validity Complaints received during the quarter		<i>Mumbai Metro</i>	307	93	46	2488	2942	131	139	1444	1709	131
	B) No. of billing complaints for Post paid customers/Charging/Credit /Validity complaints for pre-paid customers resolved within 4 weeks during the quarter		<i>Mumbai Metro</i>	307	93	46	2488	2942	131	139	1444	1709	131
	C) % of billing complaints (for post paid customer) / Charging/Credit/Validity (for Pre paid customer) resolved within 4 weeks	100 % within 4 week	<i>Mumbai Metro</i>	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	D) % of Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints	<=1 week	<i>Mumbai Metro</i>	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
4	<b>Response time to customers for assistance</b>												

# AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MUMBAI METRO CIRCLE



	A) Accessibility of call centre/Customer Care	>=95%	Mumbai Metro	100.00%	97.42%	NP	100.00%	99.07%	99.40%	99.27%	98.02%	99.30%	99.63%
	B) % call answered by operators(voice to voice) within 60 sec.	>=90%	Mumbai Metro	91.62%	94.02%	95.81%	94.23%	72.71%	98.31%	99.74%	91.34%	85.34%	99.64%
5	<b>Termination/closure of service</b>												
	A) Total No. of requests for Termination / Closure of service received during the quarter		Mumbai Metro	3622	161	3998	3772	906	491	1088	7332	1730	164
	B) No. of requests for Termination / Closure of service complied within 7 days during the quarter		Mumbai Metro	3622	161	3994	3772	906	491	1088	7332	1730	164
	C) % of Termination/ Closure of service within 7 days	<=7days	Mumbai Metro	100.00%	100.00%	99.90%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
6	<b>Time taken for refunds of deposits after closures.</b>												
	A) No. of Payments/ Refunds due during the quarter		Mumbai Metro	1598	56	310	659	1088	87	293	1034	1462	18
	B) No. of Payments/ Refunds Cleared during the quarter		Mumbai Metro	1598	56	310	659	1088	87	293	1034	1462	18
	C)Time taken for refunds of deposits after closures.	100% within 60 days	Mumbai Metro	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

- NP-Not Provided: MTNL also 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.

## KEY FINDINGS:

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

The performance of the service providers with respect to the parameter metering and billing credibility for both post-paid and pre-paid is well within the prescribed bench mark of <=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 weeks. 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)** and **RCOM (CDMA)** have not met the benchmark of calls answered by Operators (voice to voice) within 60 seconds. They have achieved their performance as **72.71%** and **85.34%** respectively.

#### *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 **99.90 %**.

#### *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.

**4.3 3-DAYS LIVE MEASUREMENT DATA VERIFICATION FOR  
CELLULAR MOBILE SERVICE PROVIDERS  
(NETWORK SERVICE QUALITY PARAMETER)**





**4.3 SERVICE PROVIDER PERFORMANCE REPORT BASED ON 3-DAYS LIVE MEASUREMENT DATA VERIFICATION CONDUCTED IN EACH MONTH OF THE QUARTER:**

**A) NETWORK SERVICE QUALITY PARAMETER- CELLULAR MOBILE SERVICES**

**TABLE: 1**

CELLULAR MOBILE TELEPHONE SERVICES MUMBAI METRO CIRCLE- JAN-14 MONTH													
Live measurement Data		Bench- mark	Average of 3 Days	AIRTEL	AIRCEL	MTNL	IDEA	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators			
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	Live data	0.00%	0.11%	0.81%	0.06%	0.24%	0.00%	0.00%	0.00%	0.33%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.20%	0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	99.99%	98.04%	98.33%	97.98%	99.50%	99.61%	99.25%	99.54%	95.76%	98.93%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.00%	0.11%	0.12%	0.69%	0.03%	0.08%	0.05%	0.04%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.00%	0.20%	0.02%	1.26%	0.07%	0.13%	0.02%	0.46%	0.01%	0.02%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.30%	0.87%	1.27%	1.97%	0.38%	0.66%	0.66%	0.90%	0.40%	0.60%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	0.00%	2.73%	2.26%	2.84%	0.00%	1.23%	0.76%	<b>3.98%</b>	0.04%	2.48%
	c) Connections with good voice quality	>=95%	Live data	99.97%	97.78%	96.50%	98.10%	99.05%	98.51%	98.09%	97.59%	99.78%	99.13%
4	No. of POI having >=0.5% congestion		Live data	0	0	0	0	0	0	0	0	0	0



TABLE: 2

CELLULAR MOBILE TELEPHONE SERVICES MUMBAI METRO CIRCLE- FEB-14 MONTH													
Live measurement Data		Bench- mark	Average of 3 Days	AIRTEL	AIRCEL	MTNL	IDEA	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators									CDMA Operators
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	Live data	0.00%	0.05%	0.66%	0.06%	0.11%	0.00%	0.00%	0.00%	0.13%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.10%	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	99.99%	98.24%	98.21%	97.88%	99.66%	99.55%	99.29%	99.58%	99.02%	98.95%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.00%	0.15%	0.12%	0.62%	0.03%	0.11%	0.04%	0.03%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.00%	0.43%	0.06%	1.38%	0.06%	0.17%	0.02%	0.42%	0.01%	0.02%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.03%	0.88%	1.28%	1.97%	0.39%	0.66%	0.72%	0.87%	0.36%	0.61%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	0.00%	2.99%	2.55%	2.83%	0.01%	1.49%	0.73%	3.94%	0.04%	2.03%
	c) Connections with good voice quality	>=95%	Live data	99.97%	97.71%	96.30%	97.96%	99.04%	98.51%	98.12%	97.60%	99.78%	99.12%
4	No. of POI having >=0.5% congestion		Live data	0	0	0	0	0	0	0	0	0	0

**AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MUMBAI METRO CIRCLE**



**TABLE: 3**

<b>CELLULAR MOBILE TELEPHONE SERVICES MUMBAI METRO CIRCLE- MAR-14 MONTH</b>													
Live measurement Data		Bench- mark	Average of 3 Days	AIRTEL	AIRCEL	MTNL	IDEA	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators							CDMA Operators		
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	Live data	0.00%	0.08%	0.63%	0.05%	0.13%	0.01%	0.01%	0.00%	0.10%	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%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	99.99%	98.31%	97.90%	98.14%	99.62%	99.61%	99.30%	99.53%	99.15%	98.96%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.00%	0.08%	0.11%	0.62%	0.03%	0.08%	0.02%	0.07%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.00%	0.21%	0.04%	1.10%	0.06%	0.15%	0.02%	0.47%	0.00%	0.02%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.29%	0.89%	1.18%	1.97%	0.40%	0.65%	0.63%	0.90%	0.35%	0.58%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	0.00%	3.25%	2.17%	2.80%	0.02%	1.34%	0.70%	2.63%	0.04%	1.92%
	c) Connections with good voice quality	>=95%	Live data	99.97%	97.70%	96.50%	96.99%	99.03%	98.59%	98.14%	97.58%	99.79%	99.13%
4	No. of POI having >=0.5% congestion		Live data	0	0	0	0	0	0	0	0	0	0

# AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MUMBAI METRO CIRCLE



**TABLE OF QUARTERLY QOS PERFORMANCE BASED ON 3-DAYS LIVE MEASUREMENT:**

**TABLE: 4**

QUARTERLY QOS PERFORMANCE OF 3-DAYS LIVE MEASUREMENT (AVERAGE OF QE-MARCH-14) – MUMBAI CIRCLE													
Live measurement Data		Bench- mark	Average of 3 Days	AIRTEL	AIRCEL	MTNL	IDEA	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators			
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	Quarterly	0.00%	0.08%	0.70%	0.06%	0.16%	0.00%	0.00%	0.00%	0.19%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.00%	0.00%	0.17%	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	99.99%	98.20%	98.15%	98.00%	99.59%	99.59%	99.28%	99.55%	97.98%	98.95%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.00%	0.11%	0.12%	0.64%	0.03%	0.09%	0.04%	0.05%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	0.00%	0.28%	0.04%	1.25%	0.06%	0.15%	0.02%	0.45%	0.01%	0.02%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	0.21%	0.88%	1.24%	1.97%	0.39%	0.66%	0.67%	0.89%	0.37%	0.60%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	0.00%	2.99%	2.33%	2.82%	0.01%	1.35%	0.73%	<b>3.52%</b>	0.04%	2.14%
	c) Connections with good voice quality	>=95%	Quarterly	99.97%	97.73%	96.43%	97.68%	99.04%	98.54%	98.12%	97.59%	99.78%	99.13%
4	No. of POI having >=0.5% congestion		Quarterly	0	0	0	0	0	0	0	0	0	0





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

From three days live assessment, it is found that the performance of all operators is satisfactory as they are largely meeting the benchmarks except for the parameter "Worst affected cells> 3 % TCH drops". This parameter was not met by **Vodafone in the months of Jan-14 (3.98%) & Feb-14 (3.94%). Its performance was also beyond the benchmark when calculated taking average of three months of the quarter (3.54%). The performance of Aircel for this parameter was also found beyond the benchmark in the month of March-14 (3.25%).** However, it was within the benchmark when calculated taking average of three months (2.99%).

**B) CUSTOMER SERVICE QUALITY PARAMETER- CELLULAR MOBILE SERVICES**

CSD 3 days live data for Cellular Mobile Telephone Services-QE-March-14													
3 days live CSD Audit Data		Bench- mark	Circle Name	AIRTEL	AIRCEL	MTNL	IDEA	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
S/ N	Name of Parameter			GSM Operators							CDMA Operators		
Response time to customers for assistance													
1	A) Accessibility of call centre/Customer Care	>=95%	Mumbai Metro	99.63%	75.31%	NP	100.00%	99.01%	99.33%	98.47%	99.19%	99.27%	99.57%
	B) % call answered by operators(voice to voice) within 60 sec.	>=90%	Mumbai Metro	94.77%	82.48%	95.77%	96.74%	69.57%	99.35%	99.48%	93.56%	27.82%	99.54%

\* MTNL also 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.

**CUSTOMER CARE / HELPLINE ASSESSMENT**

LIVE CALLING TO CALL CENTRE											
	Circle Name	AIRTEL	AIRCEL	MTNL	IDEA	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
Total No. of calls Attempted	Mumbai Metro	100	100	100	100	100	100	100	100	100	100
Total No. of calls connected to IVR	Mumbai Metro	100	100	100	100	100	100	100	100	100	100
Calls got connected to agent within 60 Sec	Mumbai Metro	100	95	95	100	93	100	100	100	92	100
%age of calls got answered	Mumbai Metro	100.00%	95.00%	95.00%	100.00%	93.00%	100.00%	100.00%	100.00%	92.00%	100.00%



**KEY FINDINGS:** The results for three days live measurements reveal that all operators have met the benchmarks for the parameters 'Accessibility to call center' except **Aircel**. The performance of **Aircel (75.31%)** was way below the benchmark of  $\geq 95\%$ .

However, in case of calls connection to operators (Voice to voice) within 60 seconds, performance of **Aircel, RCOM (GSM)** and **RCOM (CDMA)** was **82.48 %**, **69.57%** and **27.82%** respectively, way below the benchmark of  $\geq 90\%$ .

In case of calls answered by operators (voice to voice) within 60 seconds when test calls were made to the call centers, **Aircel, MTNL, RCOM (GSM)** and **RCOM (CDMA)** could connect **95%**, **95%**, **93%** and **92%** respectively of calls to the operator within 60 Seconds.

## **INTER OPERATOR CALLS ASSESSMENT**





**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.

<b>INTER OPERATOR CALL ASSESSMENT BASED ON LIVE MEASUREMENT</b>											
<b>CALLING OPERATORS</b>	<b>CIRCLE NAME</b>	<b>AIRTEL</b>	<b>AIRCEL</b>	<b>MTNL</b>	<b>IDEA</b>	<b>RCOM GSM</b>	<b>TATA GSM</b>	<b>LOOP MOBILE</b>	<b>VODAFONE</b>	<b>RCOM CDMA</b>	<b>TATA CDMA</b>
AIRTEL	<i>Mumbai Metro</i>	--	100%	100%	100%	100%	100%	100%	100%	100%	100%
AIRCEL	<i>Mumbai Metro</i>	100%	--	100%	100%	100%	100%	100%	100%	100%	100%
MTNL	<i>Mumbai Metro</i>	100%	100%	--	100%	100%	100%	100%	100%	100%	100%
IDEA	<i>Mumbai Metro</i>	100%	100%	100%	--	100%	100%	100%	100%	100%	100%
RCOM GSM	<i>Mumbai Metro</i>	100%	100%	100%	100%	--	100%	100%	100%	100%	100%
TATA GSM	<i>Mumbai Metro</i>	100%	100%	100%	100%	100%	--	100%	100%	100%	100%
LOOP MOBILE	<i>Mumbai Metro</i>	100%	100%	100%	100%	100%	100%	--	100%	100%	100%
VODAFONE	<i>Mumbai Metro</i>	100%	100%	100%	100%	100%	100%	100%	--	100%	100%
RCOM CDMA	<i>Mumbai Metro</i>	100%	100%	100%	100%	100%	100%	100%	100%	--	100%
TATA CDMA	<i>Mumbai Metro</i>	100%	100%	100%	100%	100%	100%	100%	100%	100%	--

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

## LEVEL-1 LIVE CALLING





**LEVEL-1 LIVE CALLING**

LEVEL 1 LIVE CALLING												
Emergency no.	Circle Name	No. of calls made	AIRTEL	AIRCEL	MTNL	IDEA	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
100	Mumbai Metro	30	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
101	Mumbai Metro	30	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
102	Mumbai Metro	30	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
103	Mumbai Metro	30	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1098	Mumbai Metro	30	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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 (Jan-14 to Mar-14) in different SDCA. In Mumbai Metro service area, these services were found functional in the networks of all the service providers.

## 5. DRIVE TEST





## 5. DRIVE TEST

In terms of TRAI's letter dated 21<sup>st</sup> January, 2014, the drive tests were conducted for three consecutive days in one select SSA each month in each service area. Thus, the drive tests were carried out in three SSA's namely **Mumbai South, Kalyan and North Mumbai** in the months of January, February and March 2014 respectively, covering 179, 187 and 248 KMs distance in respective SSAs. The minimum requirement of 300 KM per SSA could not be fulfilled due to municipal boundaries limitations. If route KM exceeds the covered distance, the overlapping of next SSA municipal boundary take place. 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. The indoor drive test in Mumbai could not be conducted as building/Complex Owners did not allow the drive test inside the building because of security concerns.

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.



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## DRIVE TEST TABLE: 1

OPERATOR-ASSISTED DRIVE TEST AT MUMBAI SOUTH SSA IN JAN-14 MONTH- MUMBAI METRO CIRCLE														
S/N	Parameter	SSA Name: Mumbai South	Drive Test Period	Aircel	Airtel	MTNL	Idea	RCOM GSM	TATA GSM	LOOP Mobile	Vodafone	RCOM CDMA	Tata CDMA	
				GSM Operators									CDMA Operator	
1	Call Attempts	Day-1	Jan-14	97	114	94	107	137	110	109	93	121	94	
		Day-2	Jan-14	63	78	55	65	65	64	86	59	71	65	
		Day-3	Jan-14	116	131	113	148	141	138	129	126	142	107	
		<b>Over all SSA Result</b>	<b>Total</b>	<b>276</b>	<b>323</b>	<b>262</b>	<b>320</b>	<b>343</b>	<b>312</b>	<b>324</b>	<b>278</b>	<b>334</b>	<b>266</b>	
2	Blocked Call Rate	Day-1	Jan-14	0.00%	0.00%	1.06%	0.00%	2.92%	0.00%	0.00%	1.08%	0.00%	0.00%	
		Day-2	Jan-14	0.00%	0.00%	1.82%	1.54%	0.00%	1.56%	0.00%	0.00%	0.00%	0.00%	
		Day-3	Jan-14	0.86%	1.53%	1.77%	1.35%	1.42%	0.72%	0.78%	1.59%	0.00%	0.00%	
		<b>Over all SSA Result</b>	<b>Total</b>	<b>0.36%</b>	<b>0.62%</b>	<b>1.53%</b>	<b>0.94%</b>	<b>1.75%</b>	<b>0.64%</b>	<b>0.31%</b>	<b>1.08%</b>	<b>0.00%</b>	<b>0.00%</b>	
3	Dropped Call Rate (<=2%)	Day-1	Jan-14	3.09%	0.00%	2.15%	1.87%	3.65%	0.00%	2.75%	0.00%	4.96%	1.06%	
		Day-2	Jan-14	0.00%	0.00%	1.85%	1.56%	0.00%	0.00%	0.00%	0.00%	1.41%	0.00%	
		Day-3	Jan-14	0.00%	0.00%	2.70%	2.74%	2.88%	0.72%	3.13%	0.00%	4.93%	0.93%	
		<b>Over all SSA Result</b>	<b>Total</b>	<b>1.09%</b>	<b>0.00%</b>	<b>2.33%</b>	<b>2.21%</b>	<b>2.67%</b>	<b>0.32%</b>	<b>2.17%</b>	<b>0.00%</b>	<b>4.19%</b>	<b>0.75%</b>	
4	PERCENTAGE CONNECTIONS WITH GOOD VOICE QUALITY (=>95%)													
	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Day-1	Jan-14	NA	NA	NA	NA	NA	NA	NA	NA	NA	94.26%	95.69%
		Day-2	Jan-14	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.97%	96.16%
		Day-3	Jan-14	NA	NA	NA	NA	NA	NA	NA	NA	NA	93.48%	95.82%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>94.58%</b>	<b>95.82%</b>
	(b) 0-5 ( with frequency hopping for GSM Operators)	Day-1	Jan-14	93.66%	95.14%	94.35%	89.50%	91.46%	96.07%	95.00%	95.26%	NA	NA	
		Day-2	Jan-14	95.31%	95.23%	91.78%	90.00%	94.32%	96.21%	97.00%	95.69%	NA	NA	
		Day-3	Jan-14	94.84%	97.74%	94.34%	90.20%	90.56%	95.73%	97.00%	95.10%	NA	NA	
<b>Over all SSA Result</b>		<b>Total</b>	<b>94.56%</b>	<b>96.28%</b>	<b>93.85%</b>	<b>89.90%</b>	<b>91.73%</b>	<b>95.95%</b>	<b>96.41%</b>	<b>95.28%</b>	<b>NA</b>	<b>NA</b>		
5	SERVICE COVERAGE													
	In door (>= -75dBm)	Day-1	Jan-14	88.91%	89.15%	67.11%	97.80%	51.16%	96.28%	70.25%	88.10%	88.15%	99.10%	
		Day-2	Jan-14	92.32%	78.61%	49.92%	99.10%	74.33%	95.78%	71.33%	84.14%	89.32%	100.00%	
		Day-3	Jan-14	92.26%	77.49%	64.56%	99.00%	66.47%	95.15%	63.17%	78.02%	86.56%	100.00%	
		<b>Over all SSA Result</b>	<b>Total</b>	<b>91.17%</b>	<b>79.37%</b>	<b>62.59%</b>	<b>98.60%</b>	<b>62.10%</b>	<b>95.67%</b>	<b>67.74%</b>	<b>82.70%</b>	<b>87.78%</b>	<b>99.69%</b>	
In-vehicle (>= -85dBm)	Day-1	Jan-14	98.11%	98.29%	93.85%	99.90%	86.88%	98.90%	96.66%	98.00%	98.85%	100.00%		

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		Day-2	Jan-14	99.59%	98.69%	88.13%	99.99%	96.17%	98.89%	98.10%	97.18%	98.43%	100.00%
		Day-3	Jan-14	99.09%	98.06%	89.67%	99.98%	91.68%	98.76%	95.07%	95.62%	98.77%	100.00%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>98.89%</b>	<b>98.29%</b>	<b>90.74%</b>	<b>99.97%</b>	<b>90.34%</b>	<b>98.83%</b>	<b>96.42%</b>	<b>96.74%</b>	<b>98.71%</b>	<b>100.00%</b>
	<b>Outdoor- in city (&gt;= -95dBm)</b>	Day-1	Jan-14	99.54%	100.00%	99.84%	100.00%	96.54%	100.00%	99.98%	100.00%	100.00%	100.00%
		Day-2	Jan-14	99.93%	100.00%	99.00%	100.00%	99.56%	100.00%	99.98%	100.00%	100.00%	100.00%
		Day-3	Jan-14	99.86%	100.00%	99.43%	100.00%	98.52%	100.00%	99.79%	100.00%	100.00%	100.00%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>99.77%</b>	<b>100.00%</b>	<b>99.48%</b>	<b>100.00%</b>	<b>97.96%</b>	<b>100.00%</b>	<b>99.90%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>
<b>6</b>	<b>Call Setup Success Rate (&gt;=95%)</b>	Day-1	Jan-14	100.00%	97.37%	98.94%	100.00%	97.03%	100.00%	100.00%	98.92%	100.00%	100.00%
		Day-2	Jan-14	100.00%	98.72%	98.18%	98.46%	100.00%	98.44%	100.00%	100.00%	100.00%	100.00%
		Day-3	Jan-14	99.14%	97.71%	98.23%	98.65%	98.58%	99.28%	99.22%	98.41%	100.00%	100.00%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>99.64%</b>	<b>97.83%</b>	<b>98.47%</b>	<b>99.06%</b>	<b>98.25%</b>	<b>99.36%</b>	<b>99.22%</b>	<b>98.92%</b>	<b>100.00%</b>	<b>100.00%</b>
<b>7</b>	<b>Hand Over Success Rate (HOSR)</b>	Day-1	Jan-14	99.04%	98.78%	93.53%	99.03%	98.99%	98.58%	98.69%	97.25%	100.00%	100.00%
		Day-2	Jan-14	100.00%	98.28%	92.14%	97.84%	99.53%	98.13%	97.30%	97.87%	100.00%	100.00%
		Day-3	Jan-14	99.63%	99.08%	94.90%	96.73%	98.32%	99.38%	96.70%	98.27%	100.00%	100.00%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>99.52%</b>	<b>98.79%</b>	<b>93.67%</b>	<b>97.75%</b>	<b>98.83%</b>	<b>98.78%</b>	<b>97.61%</b>	<b>97.83%</b>	<b>100.00%</b>	<b>100.00%</b>

\* The indoor drive test in Mumbai could not be conducted as building/Complex Owners did not allow the drive test inside the building because of security concerns.

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**DRIVE TEST TABLE: 2**

**OPERATOR-ASSISTED DRIVE TEST AT KALYAN SSA IN FEB-14 MONTH- MUMBAI METRO CIRCLE**

S/N	Parameter	SSA Name: Kalyan	Drive Test Period	Aircel	Airtel	MTNL	Idea	RCOM GSM	TATA GSM	LOOP Mobile	Vodafone	RCOM CDMA	Tata CDMA
				GSM Operators								CDMA Operator	
1	Call Attempts	Day-1	Feb-14	75	69	74	69	88	75	82	68	66	72
		Day-2	Feb-14	134	146	119	107	134	148	143	137	107	160
		Day-3	Feb-14	84	83	79	89	99	103	102	80	78	82
		<b>Over all SSA Result</b>	<b>Total</b>	<b>293</b>	<b>298</b>	<b>272</b>	<b>265</b>	<b>321</b>	<b>326</b>	<b>327</b>	<b>285</b>	<b>251</b>	<b>314</b>
2	Blocked Call Rate	Day-1	Feb-14	1.33%	0.00%	2.70%	1.45%	2.27%	1.33%	2.44%	0.00%	1.52%	0.00%
		Day-2	Feb-14	0.00%	0.00%	1.68%	1.87%	1.49%	0.68%	0.00%	0.00%	0.93%	0.00%
		Day-3	Feb-14	1.19%	0.00%	2.53%	0.00%	2.02%	0.97%	0.00%	0.00%	<b>8.97%</b>	0.00%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>0.68%</b>	<b>0.00%</b>	<b>2.21%</b>	<b>1.13%</b>	<b>1.87%</b>	<b>0.92%</b>	<b>0.61%</b>	<b>0.00%</b>	<b>3.59%</b>	<b>0.00%</b>
3	Dropped Call Rate (<=2%)	Day-1	Feb-14	1.35%	0.00%	<b>2.78%</b>	<b>2.94%</b>	1.16%	0.00%	1.25%	0.00%	0.00%	1.38%
		Day-2	Feb-14	0.00%	0.00%	1.73%	1.90%	0.00%	0.68%	<b>2.80%</b>	0.00%	0.94%	0.00%
		Day-3	Feb-14	0.00%	0.00%	1.30%	<b>4.49%</b>	0.00%	0.00%	0.98%	0.00%	<b>4.23%</b>	1.22%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>0.00%</b>	<b>0.00%</b>	<b>1.88%</b>	<b>3.05%</b>	<b>0.32%</b>	<b>0.31%</b>	<b>1.85%</b>	<b>0.00%</b>	<b>1.65%</b>	<b>0.64%</b>
<b>PERCENTAGE CONNECTIONS WITH GOOD VOICE QUALITY (=&gt;95%)</b>													
4	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Day-1	Feb-14	NA	NA	NA	NA	NA	NA	NA	NA	<b>93.11%</b>	96.47%
		Day-2	Feb-14	NA	NA	NA	NA	NA	NA	NA	NA	95.13%	96.79%
		Day-3	Feb-14	NA	NA	NA	NA	NA	NA	NA	NA	<b>94.40%</b>	95.15%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>94.38%</b>	<b>96.30%</b>
	(b) 0-5 (with frequency hopping for GSM Operators)	Day-1	Feb-14	96.93%	95.35%	<b>93.23%</b>	<b>88.14%</b>	95.31%	96.76%	95.02%	95.56%	NA	NA
		Day-2	Feb-14	96.17%	96.25%	<b>92.19%</b>	<b>89.02%</b>	96.84%	95.68%	95.00%	96.28%	NA	NA
		Day-3	Feb-14	96.04%	95.04%	<b>94.34%</b>	<b>86.87%</b>	96.18%	96.28%	95.72%	95.47%	NA	NA
		<b>Over all SSA Result</b>	<b>Total</b>	<b>96.35%</b>	<b>95.66%</b>	<b>93.03%</b>	<b>88.10%</b>	<b>96.24%</b>	<b>96.13%</b>	<b>95.24%</b>	<b>95.88%</b>	<b>NA</b>	<b>NA</b>
<b>SERVICE COVERAGE</b>													
5	In-door (>= -75dBm)	Day-1	Feb-14	91.05%	88.53%	33.88%	99.77%	55.44%	95.39%	89.22%	73.20%	73.24%	98.90%
		Day-2	Feb-14	78.05%	87.38%	31.03%	99.03%	57.01%	95.04%	81.69%	84.83%	82.44%	97.80%
		Day-3	Feb-14	91.05%	95.77%	30.35%	99.42%	64.96%	96.15%	89.24%	81.54%	91.85%	95.63%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>84.78%</b>	<b>90.93%</b>	<b>31.57%</b>	<b>99.35%</b>	<b>58.95%</b>	<b>95.46%</b>	<b>86.27%</b>	<b>81.11%</b>	<b>82.80%</b>	<b>97.50%</b>
	In-vehicle (>= -85dBm)	Day-1	Feb-14	99.62%	99.25%	84.00%	99.98%	88.24%	99.22%	99.37%	96.59%	97.06%	100.00%

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		Day-2	Feb-14	98.74%	99.19%	83.50%	99.94%	87.98%	99.04%	98.96%	98.16%	99.46%	100.00%
		Day-3	Feb-14	98.37%	99.68%	83.55%	99.98%	93.21%	99.59%	99.39%	98.38%	100.00%	100.00%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>98.93%</b>	<b>99.39%</b>	<b>83.64%</b>	<b>99.96%</b>	<b>89.61%</b>	<b>99.25%</b>	<b>99.21%</b>	<b>97.84%</b>	<b>98.98%</b>	<b>100.00%</b>
	<b>Outdoor- in city (&gt;= -95dBm)</b>	Day-1	Feb-14	99.99%	100.00%	95.39%	100.00%	99.00%	100.00%	99.98%	100.00%	100.00%	100.00%
		Day-2	Feb-14	99.93%	100.00%	95.90%	100.00%	98.68%	100.00%	99.94%	100.00%	100.00%	100.00%
		Day-3	Feb-14	99.67%	100.00%	95.91%	100.00%	99.89%	100.00%	99.92%	100.00%	100.00%	100.00%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>99.89%</b>	<b>100.00%</b>	<b>95.77%</b>	<b>100.00%</b>	<b>99.12%</b>	<b>100.00%</b>	<b>99.94%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>
<b>6</b>	<b>Call Setup Success Rate (&gt;=95%)</b>	Day-1	Feb-14	98.67%	100.00%	97.30%	98.55%	97.73%	98.67%	97.56%	100.00%	98.48%	100.00%
		Day-2	Feb-14	100.00%	100.00%	98.32%	98.13%	98.51%	99.32%	100.00%	100.00%	99.07%	100.00%
		Day-3	Feb-14	98.81%	100.00%	97.47%	100.00%	97.88%	99.03%	100.00%	100.00%	<b>91.03%</b>	100.00%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>99.32%</b>	<b>100.00%</b>	<b>97.79%</b>	<b>98.87%</b>	<b>97.98%</b>	<b>99.08%</b>	<b>99.38%</b>	<b>100.00%</b>	<b>96.41%</b>	<b>100.00%</b>
<b>7</b>	<b>Hand Over Success Rate (HOSR)</b>	Day-1	Feb-14	96.30%	98.67%	99.31%	98.98%	99.04%	98.67%	99.59%	99.58%	100.00%	100.00%
		Day-2	Feb-14	100.00%	98.51%	100.00%	98.31%	100.00%	98.90%	99.58%	99.55%	100.00%	100.00%
		Day-3	Feb-14	98.95%	99.36%	93.20%	95.71%	99.15%	98.97%	98.93%	99.58%	100.00%	100.00%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>98.74%</b>	<b>98.76%</b>	<b>97.83%</b>	<b>97.66%</b>	<b>99.46%</b>	<b>98.86%</b>	<b>99.40%</b>	<b>99.56%</b>	<b>100.00%</b>	<b>100.00%</b>

\* The indoor drive test in Mumbai could not be conducted as building/Complex Owners did not allow the drive test inside the building because of security concerns

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**DRIVE TEST TABLE: 3**

**OPERATOR-ASSISTED DRIVE TEST AT NORTH MUMBAI SSA IN FEB-14 MONTH- MUMBAI METRO CIRCLE**

S/N	Parameter	SSA Name: North Mumbai	Drive Test Period	Aircel	Airtel	MTNL	Idea	RCOM GSM	TATA GSM	LOOP Mobile	Vodafone	RCOM CDMA	Tata CDMA
				GSM Operators								CDMA Operator	
1	Call Attempts	Day-1	Mar-14	155	165	147	136	178	153	150	159	158	160
		Day-2	Mar-14	83	89	91	96	90	83	83	86	89	82
		Day-3	Mar-14	100	110	106	111	131	118	104	113	124	110
		<b>Over all SSA Result</b>	<b>Total</b>	<b>338</b>	<b>364</b>	<b>344</b>	<b>343</b>	<b>399</b>	<b>354</b>	<b>337</b>	<b>358</b>	<b>371</b>	<b>352</b>
2	Blocked Call Rate	Day-1	Mar-14	1.29%	0.00%	0.00%	0.00%	1.12%	0.65%	0.00%	0.00%	0.63%	0.00%
		Day-2	Mar-14	0.00%	0.00%	1.10%	0.00%	0.00%	1.20%	0.00%	0.00%	1.12%	0.00%
		Day-3	Mar-14	0.00%	0.00%	0.00%	0.90%	<b>4.58%</b>	0.85%	2.90%	0.00%	0.00%	0.00%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>0.59%</b>	<b>0.00%</b>	<b>0.29%</b>	<b>0.29%</b>	<b>2.05%</b>	<b>0.85%</b>	<b>0.89%</b>	<b>0.00%</b>	<b>0.54%</b>	<b>0.00%</b>
3	Dropped Call Rate (<=2%)	Day-1	Mar-14	0.00%	0.00%	0.00%	1.47%	0.00%	0.00%	0.00%	0.00%	1.91%	0.63%
		Day-2	Mar-14	0.00%	0.00%	1.10%	<b>2.08%</b>	0.00%	1.22%	1.20%	0.00%	0.00%	0.00%
		Day-3	Mar-14	1.00%	0.00%	0.00%	1.83%	0.80%	0.85%	1.00%	0.00%	0.00%	0.91%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>0.30%</b>	<b>0.00%</b>	<b>0.29%</b>	<b>1.76%</b>	<b>0.26%</b>	<b>0.57%</b>	<b>0.60%</b>	<b>0.00%</b>	<b>0.81%</b>	<b>0.57%</b>
4	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Day-1	Mar-14	NA	NA	NA	NA	NA	NA	NA	NA	96.50%	95.91%
		Day-2	Mar-14	NA	NA	NA	NA	NA	NA	NA	NA	97.05%	99.49%
		Day-3	Mar-14	NA	NA	NA	NA	NA	NA	NA	NA	98.34%	98.84%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>97.27%</b>	<b>97.65%</b>
	(b) 0-5 ( with frequency hopping for GSM Operators)	Day-1	Mar-14	95.79%	95.54%	95.80%	<b>89.20%</b>	95.28%	96.20%	95.84%	95.00%	NA	NA
		Day-2	Mar-14	95.39%	95.08%	<b>93.58%</b>	<b>88.10%</b>	<b>93.98%</b>	96.55%	96.37%	95.47%	NA	NA
		Day-3	Mar-14	95.12%	95.29%	95.04%	<b>88.70%</b>	<b>94.64%</b>	95.17%	95.57%	95.05%	NA	NA
		<b>Over all SSA Result</b>	<b>Total</b>	<b>95.51%</b>	<b>95.35%</b>	<b>95.02%</b>	<b>88.71%</b>	<b>94.64%</b>	<b>95.95%</b>	<b>95.90%</b>	<b>95.13%</b>	<b>NA</b>	<b>NA</b>
5	In door (>= - 75dBm)	Day-1	Mar-14	92.96%	93.91%	41.88%	99.50%	76.15%	96.06%	91.00%	82.60%	98.04%	98.51%
		Day-2	Mar-14	95.47%	96.09%	50.18%	99.83%	78.50%	96.20%	96.00%	91.95%	99.24%	100.00%
		Day-3	Mar-14	89.20%	89.75%	36.97%	99.03%	62.92%	95.20%	84.23%	86.11%	95.03%	99.53%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>92.48%</b>	<b>93.19%</b>	<b>42.37%</b>	<b>99.46%</b>	<b>72.53%</b>	<b>95.82%</b>	<b>90.17%</b>	<b>86.02%</b>	<b>97.31%</b>	<b>99.35%</b>

# AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MUMBAI METRO CIRCLE



	In-vehicle (>= -85dBm)	Day-1	Mar-14	99.28%	99.27%	79.63%	99.97%	96.49%	99.62%	99.13%	98.92%	100.00%	100.00%
		Day-2	Mar-14	99.67%	99.62%	89.29%	99.96%	97.26%	99.94%	99.66%	99.74%	100.00%	100.00%
		Day-3	Mar-14	97.95%	98.27%	79.19%	99.96%	90.88%	99.47%	96.18%	99.00%	99.97%	100.00%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>98.98%</b>	<b>99.05%</b>	<b>81.84%</b>	<b>99.97%</b>	<b>94.90%</b>	<b>99.65%</b>	<b>98.30%</b>	<b>99.15%</b>	<b>99.99%</b>	<b>100.00%</b>
	Outdoor- in city (>= -95dBm)	Day-1	Mar-14	99.82%	100.00%	98.23%	100.00%	99.55%	100.00%	99.91%	100.00%	100.00%	100.00%
		Day-2	Mar-14	99.90%	100.00%	98.94%	100.00%	100.00%	100.00%	99.92%	100.00%	100.00%	100.00%
		Day-3	Mar-14	99.31%	100.00%	98.39%	100.00%	98.00%	100.00%	99.16%	100.00%	100.00%	100.00%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>99.69%</b>	<b>100.00%</b>	<b>98.45%</b>	<b>100.00%</b>	<b>99.17%</b>	<b>100.00%</b>	<b>99.67%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>
6	Call Setup Success Rate (>=95%)	Day-1	Mar-14	98.71%	98.18%	100.00%	100.00%	98.88%	99.35%	100.00%	100.00%	99.37%	100.00%
		Day-2	Mar-14	100.00%	97.75%	98.90%	100.00%	100.00%	98.80%	100.00%	100.00%	98.88%	100.00%
		Day-3	Mar-14	100.00%	100.00%	100.00%	98.20%	95.42%	99.15%	97.10%	100.00%	100.00%	100.00%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>99.41%</b>	<b>98.63%</b>	<b>99.71%</b>	<b>99.42%</b>	<b>97.99%</b>	<b>99.15%</b>	<b>99.11%</b>	<b>100.00%</b>	<b>99.46%</b>	<b>100.00%</b>
7	Hand Over Success Rate (HOSR)	Day-1	Mar-14	98.97%	99.56%	99.16%	98.26%	99.23%	98.91%	99.06%	99.30%	100.00%	100.00%
		Day-2	Mar-14	95.36%	100.00%	99.50%	96.67%	99.30%	99.42%	99.21%	99.09%	100.00%	100.00%
		Day-3	Mar-14	98.90%	98.98%	98.98%	98.11%	98.12%	98.87%	99.07%	98.46%	100.00%	100.00%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>98.00%</b>	<b>99.46%</b>	<b>99.18%</b>	<b>97.85%</b>	<b>98.99%</b>	<b>99.05%</b>	<b>98.82%</b>	<b>98.99%</b>	<b>100.00%</b>	<b>100.00%</b>

\* The indoor drive test in Mumbai could not be conducted as building/Complex Owners did not allow the drive test inside the building because of security concerns



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

**DRIVE TEST TABLE: 4**

<b>DRIVE TEST ROUTE OF JAN TO MAR - 14 – MUMBAI METRO CIRCLE</b>							
<b>Name of SSA</b>	<b>Drive test Period</b>	<b>Day 1</b>		<b>Day 2</b>		<b>Day 3</b>	
		<b>Name of SDCA Covered</b>	<b>Route Covered</b>	<b>Name of SDCA Covered</b>	<b>Route Covered</b>	<b>Name of SDCA Covered</b>	<b>Route Covered</b>
<b>SOUTH MUMBAI</b>	<b>Jan-14</b>	South Mimbai <b>(54 KM)</b>	Shivaji Park-Worli Sea Face- Maha Laxmi -Hajjali - Nepeansea Road - Walkeshwar - Marine Drive - Nariman Point - Navy Nagar- Cst-Shivaji Park Shivaji Park	South Mimbai <b>(60 KM)</b>	Shivaji Park- Marine Drive - Nariman Point - CST to Wadala Five Garden	South Mimbai <b>(65 KM)</b>	Shivaji Park - Walkeshwar - Marine Drive - CST - Wadala to Shivaji Park
<b>KALYAN</b>	<b>Feb-14</b>	Kalyan <b>(42 KM)</b>	Gopi Cinema - Dombivli West - Dombivli East - Kalyan West	Kalyan <b>(86 KM)</b>	Dombivli West – Dombivli East - MIDC- Kalyan - Dombivli to Sheelphata	Kalyan <b>(59 KM)</b>	Metro Cinema Kalyan - Old Kalyan - Kalyan West - Kalyan East to Sheelphata Rd
<b>NORTH MUMBAI</b>	<b>Mar-14</b>	North Mumbai <b>(88 KM)</b>	Malad West -Kandivali West- Borivali West -Borivali East- National Park-Andivali East- Malad East	North Mumbai <b>(90 KM)</b>	Malad Interface - Kandivali - Borivali -Dahisar -Miraroad- Bhaindar	North Mumbai <b>(70 KM)</b>	National Park-Dahisar-Borivali- Gorai-Kandivali



**SSA WISE DRIVE TEST OBSERVATION:**

**DRIVE TEST TABLE: 5**

**DRIVE TEST OBSERVATION OF MUMBAI SOUTH SSA (JAN-14)**

S NO	Name of SP	Month	SSA Covered	Main root covered in day-1	Day 1 Observation	Main root covered in day-2	Day 2 Observation	Main root covered in day-3	Day 3 Observation
1	AIRTEL	Jan-14	South Mumbai	SHIVAJI PARK-WORLI SEA FACE-MAHA LAXMI -HAJIALI - NEPEANSEA ROAD - WALKESHWAR - MARINE DRIVE - NARIMAN POINT - NAVY NAGAR-CST-SHIVAJI PARK SHIVAJI PARK	---	SHIVAJI PARK TO MARINE DRIVE TO NARIMAN POINT TO CST TO WADALA FIVE GARDEN	---	SHIVAJI PARK TO WALKESHWAR TO MARINE DRIVE TO CST TO WADALA TO SHIVAJI PARK	Poor level and quality observed near Malabar Hill area
2	MTNL				Poor level and Voice quality observed all covering area during day1 and highly notice at Malabar Hill , Nariman point ,Nariman lines		Poor level and Voice quality observed all covering area during day-2 and highly notice at wadala, Nariman point ,CST		Poor level and Voice quality observed all covering area during day-3 and highly notice at wadala, Siwaji park
3	TATA GSM				poor voice quality observed at Malabar Hill , Nariman point ,Nariman lines		poor voice quality observed at Prabha devi,Dr anni besent road		poor voice quality observed at MARINE DRIVE,CST,WADALA
4	TATA CDMA				poor voice quality observed at Malabar Hill , Nariman point.		---		poor voice quality observed at walkeshwar road,Basant bihar,malbar hill
5	IDEA				Poor Voice quality observed all covering area during day1 and highly notice at Mahrshi karwe road,E-moses road,nariman P.		Poor Voice quality observed all covering area during day-2 and highly notices at esnapati baba road and church gate.		Poor Voice quality observed all covering area during day-3 and highly notice at BG Kher road,JJ flyover, Bhagtsingh road
6	RCOM GSM				Poor Voice quality & Rx Level observed all covering area during day-1 and highly notice at Malabar Hill , Nariman point ,Nariman lines		Poor level and Voice quality observed all covering area during day-2 and highly notice at wadala, Nariman point , CST,esnapati baba road and churchgate.		Poor Voice quality observed all covering area during day-3 and highly noticed at JJ flyover,Bhagtsingh road, Kumbala hill.
7	RCOM CDMA				Poor Voice quality observed all covering area during day1 and highly notice at MARINE DRIVE ,NARIMAN POINT,Walkeswar,Malwar hill,mangal wadi		---		Poor Voice quality observed all covering area during day-3 and highly noticed at MARINE DRIVE,CST,WADALA
8	LOOP MOBILE				Poor level and voice quality from serving cell 15553 & 14102 and nariman point		Poor level and voice quality nearby Church gate ,SB Pawar marg		Poor level and voice quality nearby Church gate,kambala hill,Arya nagar
9	VODAFONE				Plots not provided as per instruction & not clear view		Plots not provided as per instruction & not clear view		Plots not provided as per instruction & not clear view
10	AIRCEL				Poor Voice quality observed all covering area during day1 and highly notice at Nepean Sea Road near Simla House ,Navy Nagar		---		Poor Voice quality observed all covering area during day-3 and highly notice at Kumbala hill,BG Kher road,JJ flyover,Bhagtsingh road





**DRIVE TEST TABLE: 6**

**DRIVE TEST OBSERVATION OF KALYAN SSA (FEB-14)**

S NO	Name of SP	Month	SSA Covered	Main root covered in day-1	Day 1 Observation	Main root covered in day-2	Day 2 Observation	Main root covered in day-3	Day 3 Observation
1	AIRTEL	Feb-14	Kalyan	Gopi cinema to Dombivli West to Dombivli east to Kalyan west	---	Dombivli-West to Dombivli-East to MIDC-Kalyan to Dombivli & Sheelphata	---	Metro cinema Kalyan to old kalyan to Kalyan west to Kalyan east to sheelphata rd	---
2	MTNL				Poor level and Voice quality observed all covering area during day1 and highly notice at Dombili and kalyan west		Poor level and Voice quality observed all covering area during day2 and highly notice at DombiliEast ,MIDC		Poor level and Voice quality observed all covering area during day3.
3	TATA GSM				---		poor quality patch observed at New kalyan road and statement that optimized later		---
4	TATA CDMA				---		---		---
5	IDEA				Poor Voice quality observed all covering area during day1 and highly notice at Walmik railway bridge,Datta nagar		Poor Voice quality observed all covering area during day-2 and highly notice at Kopar road ,MIDC		Poor Voice quality observed all covering area during day-3 and highly notice at OFF ADHARWADI ROAD,ADHARWADI JAIL ROAD,BAIL BAZAR ROAD,VALMIK BRIDGE KALYAN
6	RCOM GSM				Poor level and Voice quality observed at Dombil, kalyan west,Santi nagar		Poor Voice quality notice at Kopar road ,Sheelphata		---
7	RCOM CDMA				Poor Voice quality observed all covering area during day-1		Poor Voice quality notice at Kopar road , MIDC,DombiliEast		Poor Voice quality observed all covering area during day-3
8	LOOP MOBILE				Poor level and voice quality from serving cell 11622 Kalyan		---		---
9	VODAFONE				Plots not provided as per instruction & not clear view		Plots not provided as per instruction & not clear view		Plots not provided as per instruction & not clear view
10	AIRCEL				Poor level and voice quality observed at Katemanivali, Santi nagar, west kalyan		Poor level and voice quality observed at Kopar road , MIDC		---



**DRIVE TEST TABLE: 7**

**DRIVE TEST OBSERVATION OF NORTH MUMBAI SSA (MAR-14)**

S NO	Name of SP	Month	SSA Covered	Main root covered in day-1	Day 1 Observation	Main root covered in day-2	Day 2 Observation	Main root covered in day-3	Day 3 Observation
1	AIRTEL	Mar-14	North Mumbai	MALAD WEST -KANDIVALI WEST -BORIVALI WEST -BORIVALI EAST -NATIONAL PARK -ANDIVALI EAST-MALAD EAST	---	MALAD interface - KANDIVALI -BORIVALI-DAHISAR -MIRAROAD-BHAINDAR	---	National park-dahisar-borivali-gorai-kandivali	---
2	MTNL				Poor level and Voice quality observed all covering area during day-1 and highly noticed area is OLD kandiwali, Malad,Dimple hights,national park		Poor level and Voice quality observed all covering area during day-2 and highly noticed area is dahisar,miraroad		Poor level and Voice quality observed all covering area during day-3 and highly noticed area is SVP Engineering collage,national park ,kandiwali
3	TATA GSM				---		---		Poor voice quality patch observed at sai baba nagar,mahavir nagar,janta nagar
4	TATA CDMA				---		---		Poor Voice quality observed all covering area during day1 and highly notice at sv Road,Times of India Fly over Malad
5	IDEA				---		---		Poor voice quality observed at Malad,Dimple hights,national park
6	RCOM GSM				---		---		Poor voice quality observed at kandiwali,Boriwali west
7	RCOM CDMA				---		---		Poor level and voice quality from serving cell 32702 ,near meera bhayandar road ,srasti sector-2
8	LOOP MOBILE				---		---		Plots not provided as per instruction & not clear view
9	VODAFONE				---		---		---
10	AIRCEL				---		---		Voice quality observed at SVP Engineering collage, national park , kandiwali



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

- (i) **In the Month of January-14**, drive tests were conducted across **Mumbai South** SSA. The analysis of the drive test results conducted during the three days in Mumbai South SSA revealed that the performance of **MTNL, Idea, RCOM (GSM), RCOM (CDMA) and Loop Mobile** with respect to parameter Call Drop Rate (CDR) was beyond the bench mark ( $\leq 2\%$ ) with their performance as **2.33%, 2.21%, 2.67%, 4.19% and 2.17 %** respectively. Further, the performance of **Aircel, MTNL, Idea, RCOM (GSM) and RCOM (CDMA)** also remained underperformed for the parameter Good Voice Quality with their achievement of **94.56%, 93.85%, 89.90%, 91.73%, and 94.58%** respectively.
- (ii) **In the Month of February-14**, drive tests were conducted across **Kalyan** SSA for three consecutive days. The performance of **MTNL, Idea, Loop Mobile and RCOM (CDMA)** was beyond the benchmark during the drive tests conducted on one or the other day. During day 3 drive test , the performance of **Idea and RCOM (CDMA)** for parameter CDR was **4.49% and 4.23%** respectively, which is much beyond the benchmark of  $\leq 2\%$ . **MTNL, Idea mobile and RCOM (CDMA)** also failed to meet the benchmarks for the parameter Good Voice Quality with their achievement at SSA level as **93.03 %, 88.10 % and 94.38%** respectively. During day 3 drive test **RCOM (CDMA)** has shown poor performance for the parameters Blocked Call rate and Call Set up Success rate (CSSR) with its performance as **8.97% and 91.03%** which are way beyond the benchmarks.
- (iii) **In the month of March-14**, drive tests were conducted across **Mumbai North** SSA. The analysis of the drive test results at SSA level revealed that **Idea and RCOM (GSM)** remained underperformed for the parameter Good Voice Quality with their performance as **88.71% and 94.64%** respectively.

*Thus, MTNL, Idea, RCOM (GSM), RCOM (CDMA) and Loop Mobile repeated their non-complied performance for the parameters Call drop rate and Voice quality at Mumbai south and kalyan SSAs. These operators need improvement in their networks to remove the deficiencies with respect to non-complied parameters.*

**6. ESSENCE OF COMPLIANCE REPORT OF SERVICE PROVIDERS WITH RESPECT TO THE QOS**





## **6. ESSENCE OF COMPLIANCE REPORT OF SERVICE PROVIDERS WITH RESPECT TO THE QOS**

(i) From months audit & 3 days live findings, it can be concluded that on an average, performance of the operators in the Mumbai Metro Service area is satisfactory for **Network Parameters** except for one parameter namely '**Worst affected cells > 3% TCH drop**' which could not be met by **Vodafone** with its quarterly average performance as **3.28%**. In case of live measurements, **Vodafone** repeated the similar non-compliance for the same parameter with its average performance as **3.52%**. **Aircel** also failed to meet the benchmark for the same parameter during live measurements in the month of March-14 with its performance as **3.25%**.

(ii) With regard to the **Customer Service Quality Parameters**, it is revealed that the parameters namely 'Metering and Billing Credibility, Response Time to Customers, Termination of Service and Time taken for refunds' have been met by all operators. However, for parameter 'Calls answered by operator (Voice to Voice) within 60 seconds only two operators namely **RCOM (GSM) and RCOM(CDMA)** failed to meet the benchmark with their performance as **72% and 85.34%** respectively.

In case of parameter '% of termination/closure within 7days' 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 **99.90%**, very marginally below the benchmark.

The results for three days live measurements reveal that for the parameter 'Accessibility to call center', the performance of Aircel (**75.31%**) was way below the benchmark of  $\geq 95\%$ . However, in case of calls connection to operators (Voice to voice) within 60 seconds, performance of **Aircel, RCOM (GSM) and RCOM (CDMA)** was **82.48 %**, **69.57%** and **27.82%** respectively, way below the benchmark of  $\geq 90\%$ .

(iii) Based on the analysis of the drive test results, **MTNL, Idea, RCOM (GSM), RCOM (CDMA) and Loop Mobile** repeated their non-complied performance for the parameters Call drop rate and Voice quality at Mumbai south and kalian SSAs. These operators need improvement in their networks to remove the deficiencies with respect to the underperformed parameters.

## **7. DETAILED NETWORK DATA ASSESSMENT OF CELLULAR MOBILE TELEPHONE SERVICES**





## 7. DETAILED NETWORK DATA ASSESSMENT OF CELLULAR MOBILE TELEPHONE SERVICES MUMBAI METRO CIRCLE:

TABLE: 1

Detailed Network Data Assessment of Cellular Mobile Telephone Services- Mumbai Metro Circle- Jan-14 month													
S/N	Name of Parameter	Bench- mark	Audit Period	AIRTEL	AIRCEL	MTNL	IDEA Cellular	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) Total no. of BTSs in the licensed service area		Jan-14	3835	1923	998	3127	2330	2657	2082	4068	891	958
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Jan-14	29.2	640.33	4401	1161	4323	100	159.3	75.87	2125	84.22
	c) BTS Accumulated Downtime	<=2%	Jan-14	0.00%	0.04%	0.59%	0.05%	0.25%	0.01%	0.01%	0.00%	0.32%	0.01%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Jan-14	0	1	13	8	0	0	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Jan-14	0.00%	0.05%	1.30%	0.26%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Jan-14	99.99%	98.10%	98.18%	98.06%	99.65%	99.60%	99.27%	99.48%	98.70%	98.92%
	b) SDCCH/PAGING Congestion	<=1%	Jan-14	0.00%	0.13%	0.11%	0.65%	0.03%	0.08%	0.03%	0.10%	0.00%	0.00%
	c) TCH congestion	<=2%	Jan-14	0.00%	0.37%	0.03%	1.20%	0.07%	0.16%	0.03%	0.52%	0.01%	0.06%
<b>Connection Maintenance (Retainability)</b>													
3	a) Call Drop Rate (CDR)	<=2%	Jan-14	0.30%	0.84%	1.22%	1.94%	0.38%	0.67%	0.62%	0.86%	0.40%	0.01%
	b) Worst affected cells>3% TCH drop	<=3%	Jan-14	0.00%	1.75%	2.29%	2.82%	0.02%	1.34%	0.76%	3.89%	0.11%	2.46%
	c) % of connections with good voice quality	>=95%	Jan-14	99.97%	97.77%	96.70%	98.12%	99.06%	98.50%	98.12%	97.60%	99.79%	99.08%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Jan-14	0	98	61	253	1	97	46	388	3	64
	e) Total no. of cells (Sector) in the licensed service area		Jan-14	9846	5586	2666	8958	6315	7247	6028	9982	2673	2604
<b>No. of POI's having &gt;=0.5% POI congestion</b>													
4	No. of POI's having >=0.5% POI congestion		Jan-14	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Jan-14	0	0	0	0	0	0	0	0	0	0
5	<b>Network Data</b>												

## AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MUMBAI METRO CIRCLE

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a) Equipped Capacity of Network in Erlang		Jan-14	180837	66667	37627	117802	72000	108311	147643	263158	168000	320292
b) Total traffic in TCBH in erlang (Avg.)		Jan-14	110352	32576	16472	96479	63896	46630	51463	187831	112580	48639
c) Total no. of customers served (as per VLR) on last day of the month		Jan-14	4098825	1151667	830083	3189700	2873801	1593724	1436947	6466257	3038092	660664



# AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MUMBAI METRO CIRCLE



**TABLE: 2**

## Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live- Mumbai Metro Circle- Jan-14 month

S/N	Name of Parameter	Bench-mark	Average of 3 Days	AIRTEL	AIRCEL	MTNL	IDEA Cellular	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) Total no. of BTSs in the licensed service area		Live data	3857	1941	993	3101	2330	2643	2086	3965	891	967
	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	4	151.46	581	129.5	405	9	2.51	0	214	4
	c) BTS Accumulated Downtime	<=2%	Live data	0.00%	0.11%	0.81%	0.06%	0.24%	0.00%	0.00%	0.00%	0.33%	0.01%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	2	2	0	0	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.20%	0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	99.99%	98.04%	98.33%	97.98%	99.50%	99.61%	99.25%	99.54%	95.76%	98.93%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.00%	0.11%	0.12%	0.69%	0.03%	0.08%	0.05%	0.04%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.00%	0.20%	0.02%	1.26%	0.07%	0.13%	0.02%	0.46%	0.01%	0.02%
<b>Connection Maintenance (Retainability)</b>													
3	a) Call Drop Rate (CDR)	<=2%	Live data	0.30%	0.87%	1.27%	1.97%	0.38%	0.66%	0.66%	0.90%	0.40%	0.60%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	0.00%	2.73%	2.26%	2.84%	0.00%	1.23%	0.76%	3.98%	0.04%	2.48%
	c) % of connections with good voice quality	>=95%	Live data	99.97%	97.78%	96.50%	98.10%	99.05%	98.51%	98.09%	97.59%	99.78%	99.13%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	0	154	60	253	0	89	46	390	1	65
	e) Total no. of cells (Sector) in the licensed service area		Live data	9834	5639	2655	8906	6250	7237	6032	9808	2607	2616
<b>No. of POI's having &gt;=0.5% POI congestion</b>													
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0	0

# AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MUMBAI METRO CIRCLE



**TABLE: 3**

Detailed Network Data Assessment of Cellular Mobile Telephone Services- Mumbai Metro Circle- Feb-14 month													
S/N	Name of Parameter	Bench- mark	Audit Period	AIRTEL	AIRCEL	MTNL	IDEA	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
<b>Network Service Quality Parameter</b>													
1	<b>Network Availability</b>												
	a) Total no. of BTSs in the licensed service area		Feb-14	3857	1917	999	3159	2330	2698	2072	4168	891	956
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Feb-14	27.1	1041.93	3253.1	987	4223	51.07	145.5	100	1181	58.2
	c) BTS Accumulated Downtime	<=2%	Feb-14	0.00%	0.08%	0.48%	0.05%	0.27%	0.00%	0.01%	0.00%	0.20%	0.01%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Feb-14	0	0	10	3	0	0	0	0	0	0
e) Worst affected BTSs due to downtime	<=2%	Feb-14	0.00%	0.00%	1.00%	0.09%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
2	<b>Connection Establishment (Accessibility)</b>												
	a) CSSR (Call Setup Success Rate)	>=95%	Feb-14	99.99%	98.32%	98.26%	98.05%	99.60%	99.57%	99.30%	99.52%	98.90%	98.91%
	b) SDCCCH/PAGING Congestion	<=1%	Feb-14	0.00%	0.16%	0.23%	0.56%	0.03%	0.08%	0.02%	0.04%	0.00%	0.00%
c) TCH congestion	<=2%	Feb-14	0.00%	0.42%	0.05%	1.21%	0.08%	0.02%	0.02%	0.48%	0.01%	0.04%	
3	<b>Connection Maintenance (Retainability)</b>												
	a) Call Drop Rate (CDR)	<=2%	Feb-14	0.29%	0.88%	1.21%	1.92%	0.41%	0.64%	0.61%	0.85%	0.39%	0.01%
	b) Worst affected cells>3% TCH drop	<=3%	Feb-14	0.00%	2.05%	2.21%	2.82%	0.02%	1.32%	0.72%	3.26%	0.07%	2.64%
	c) % of connections with good voice quality	>=95%	Feb-14	99.97%	97.74%	96.40%	97.95%	99.03%	98.52%	98.14%	97.60%	99.79%	99.11%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Feb-14	0	114	59	255	1	97	43	330	2	69
e) Total no. of cells (Sector) in the licensed service area		Feb-14	9846	5568	2670	9027	6314	7374	6002	10123	2673	2611	
4	<b>No. of POI's having &gt;=0.5% POI congestion</b>												
	No. of POI's having >=0.5% POI congestion		Feb-14	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Feb-14	0	0	0	0	0	0	0	0	0	0

## AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MUMBAI METRO CIRCLE

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Network Data													
5	a) Equipped Capacity of Network in Erlang		Feb-14	181548	63541	37627	119886	72000	110062	146638	261512	168000	321153
	b) Total traffic in TCBH in erlang (Avg.)		Feb-14	104250	34579	16992	96695	63214	46643	50441	184406	109920	48295
	c) Total no. of customers served (as per VLR) on last day of the month		Feb-14	4066748	1163494	816163	3140466	2934790	1593724	1420860	6423899	3002938	643336

# AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MUMBAI METRO CIRCLE



**TABLE: 4**

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live- Mumbai Metro Circle- Feb-14 month													
S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRTEL	AIRCEL	MTNL	IDEA	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) Total no. of BTSs in the licensed service area		Live data	3847	1923	998	3128	2332	2669	6246	4068	892	965
	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	4.5	72.38	472.55	139	189	0	11.45	9.82	83	0
	c) BTS Accumulated Downtime	<=2%	Live data	0.00%	0.05%	0.66%	0.06%	0.11%	0.00%	0.00%	0.00%	0.13%	0.00%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	1	1	0	0	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.10%	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	99.99%	98.24%	98.21%	97.88%	99.66%	99.55%	99.29%	99.58%	99.02%	98.95%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.00%	0.15%	0.12%	0.62%	0.03%	0.11%	0.04%	0.03%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.00%	0.43%	0.06%	1.38%	0.06%	0.17%	0.02%	0.42%	0.01%	0.02%
<b>Connection Maintenance (Retainability)</b>													
3	a) Call Drop Rate (CDR)	<=2%	Live data	0.03%	0.88%	1.28%	1.97%	0.39%	0.66%	0.72%	0.87%	0.36%	0.61%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	0.00%	2.99%	2.55%	2.83%	0.01%	1.49%	0.73%	3.94%	0.04%	2.03%
	c) % of connections with good voice quality	>=95%	Live data	99.97%	97.71%	96.30%	97.96%	99.04%	98.51%	98.12%	97.60%	99.78%	99.12%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	0	167	68	255	0.33	109	44	391	1	53
	e) Total no. of cells (Sector) in the licensed service area		Live data	9868	5586	2666	8997	6315	7339	6031	9920	2607	2608
<b>No. of POI's having &gt;=0.5% POI congestion</b>													
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0	0

# AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MUMBAI METRO CIRCLE



**TABLE: 5**

Detailed Network Data Assessment of Cellular Mobile Telephone Services- Mumbai Metro Circle- Mar-14 month													
S/N	Name of Parameter	Bench- mark	Audit Period	AIRTEL	AIRCEL	MTNL	IDEA	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
<b>Network Service Quality Parameter</b>													
1	<b>Network Availability</b>												
	a) Total no. of BTSs in the licensed service area		Mar-14	3929	1919	1000	3178	2326	2704	2068	4248	891	963
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Mar-14	20.9	979.11	3507	932	2710	105.56	154.2	73	1258	47.09
	c) BTS Accumulated Downtime	<=2%	Mar-14	0.00%	0.07%	0.47%	0.04%	0.16%	0.01%	0.01%	0.00%	0.19%	0.01%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Mar-14	0	3	11	5	0	0	0	0	0	0
2	<b>Connection Establishment (Accessibility)</b>												
	a) CSSR (Call Setup Success Rate)	>=95%	Mar-14	99.99%	98.28%	98.12%	98.00%	99.61%	99.37%	99.29%	99.46%	98.87%	98.36%
	b) SDCCH/PAGING Congestion	<=1%	Mar-14	0.00%	0.11%	0.25%	0.58%	0.03%	0.09%	0.02%	0.07%	0.00%	0.00%
	c) TCH congestion	<=2%	Mar-14	0.00%	0.76%	0.05%	1.20%	0.09%	0.23%	0.02%	0.54%	0.01%	0.06%
3	<b>Connection Maintenance (Retainability)</b>												
	a) Call Drop Rate (CDR)	<=2%	Mar-14	0.28%	0.94%	1.10%	1.93%	0.39%	0.64%	0.59%	0.89%	0.46%	0.01%
	b) Worst affected cells>3% TCH drop	<=3%	Mar-14	0.00%	2.37%	1.98%	2.83%	0.03%	1.25%	0.74%	2.70%	0.07%	2.49%
	c) % of connections with good voice quality	>=95%	Mar-14	99.97%	97.66%	96.40%	96.60%	98.98%	98.55%	98.13%	97.55%	99.79%	99.13%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Mar-14	0	132	53	258	2	93	44	273	2	65
	e) Total no. of cells (Sector) in the licensed service area		Mar-14	10075	5574	2674	9103	6315	7423	5966	10118	2673	2608
4	<b>No. of POI's having &gt;=0.5% POI congestion</b>												

# AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MUMBAI METRO CIRCLE



	No. of POI's having >=0.5% POI congestion		Mar-14	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Mar-14	0	0	0	0	0	0	0	0	0	0
<b>Network Data</b>													
5	a) Equipped Capacity of Network in Erlang		Mar-14	181450	63156	37627	121339	72000	110626	146508	260463	168000	320209
	b) Total traffic in TCBH in erlang (Avg.)		Mar-14	102296	35757	15962	97968	64803	43774	49384	180891	111552	47854
	c) Total no. of customers served (as per VLR) on last day of the month		Mar-14	3984376	1165161	795552	3095843	3033290	1546888	1382380	6226702	3009885	601805

# AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MUMBAI METRO CIRCLE



**TABLE: 6**

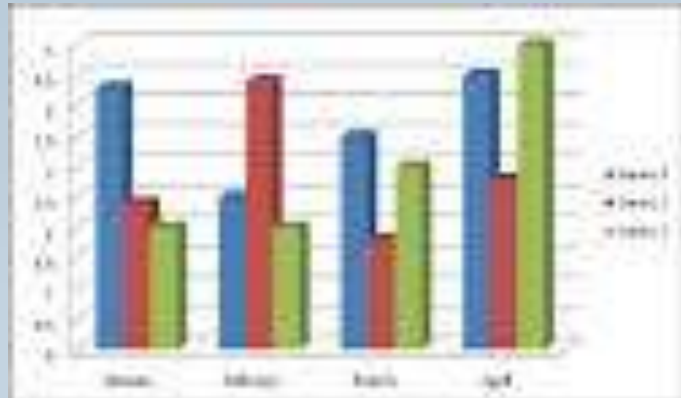
Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live- Mumbai Circle- Mar-14 month													
S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRTEL	AIRCEL	MTNL	IDEA Cellular	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators									CDMA Operators
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) Total no. of BTSs in the licensed service area		Live data	3860	1917	1000	3157	2329	2700	2072	4168	891	965
	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	1.3	112.69	452.73	103.63	219	11.13	13.26	1.38	66	3.53
	c) BTS Accumulated Downtime	<=2%	Live data	0.00%	0.08%	0.63%	0.05%	0.13%	0.01%	0.01%	0.00%	0.10%	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	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%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	99.99%	98.31%	97.90%	98.14%	99.62%	99.61%	99.30%	99.53%	99.15%	98.96%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.00%	0.08%	0.11%	0.62%	0.03%	0.08%	0.02%	0.07%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.00%	0.21%	0.04%	1.10%	0.06%	0.15%	0.02%	0.47%	0.00%	0.02%
<b>Connection Maintenance (Retainability)</b>													
3	a) Call Drop Rate (CDR)	<=2%	Live data	0.29%	0.89%	1.18%	1.97%	0.40%	0.65%	0.63%	0.90%	0.35%	0.58%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	0.00%	3.25%	2.17%	2.80%	0.02%	1.34%	0.70%	2.63%	0.04%	1.92%
	c) % of connections with good voice quality	>=95%	Live data	99.97%	97.70%	96.50%	96.99%	99.03%	98.59%	98.14%	97.58%	99.79%	99.13%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	0	181	58	255	1	98	42	265	1	50
	e) Total no. of cells (Sector) in the licensed service area		Live data	9919	5568	2674	9091	6315	7295	5993	10073	2611	2609
<b>No. of POI's having &gt;=0.5% POI congestion</b>													
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0	0

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

### AVERAGED QUARTERLY PMR

V/S

### AVERAGED QUARTERLY 3-DAYs LIVE MEASUREMENT

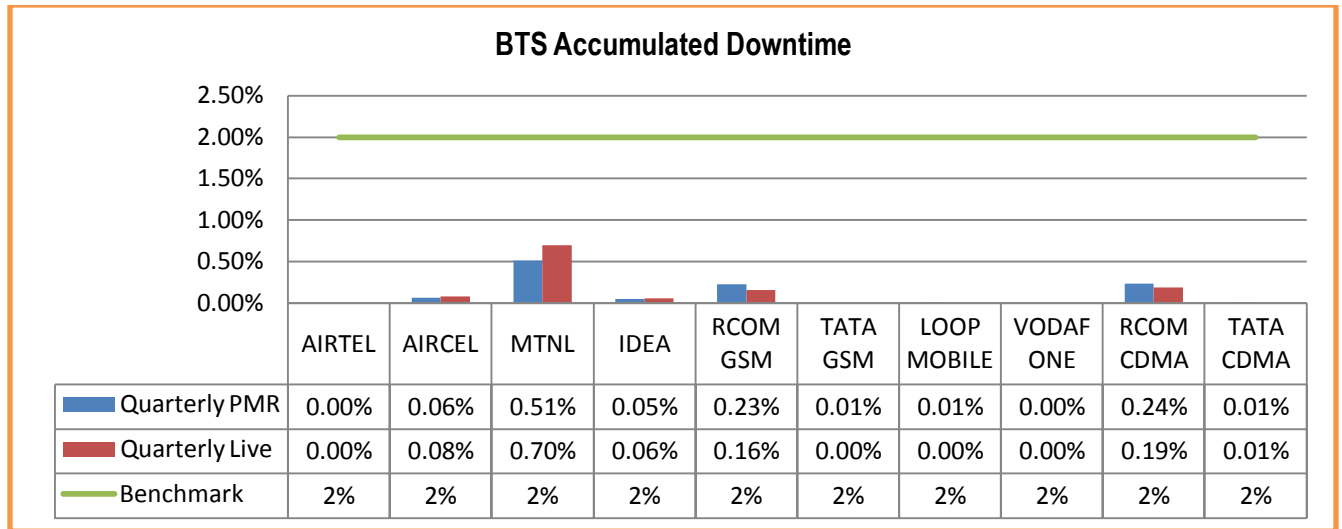






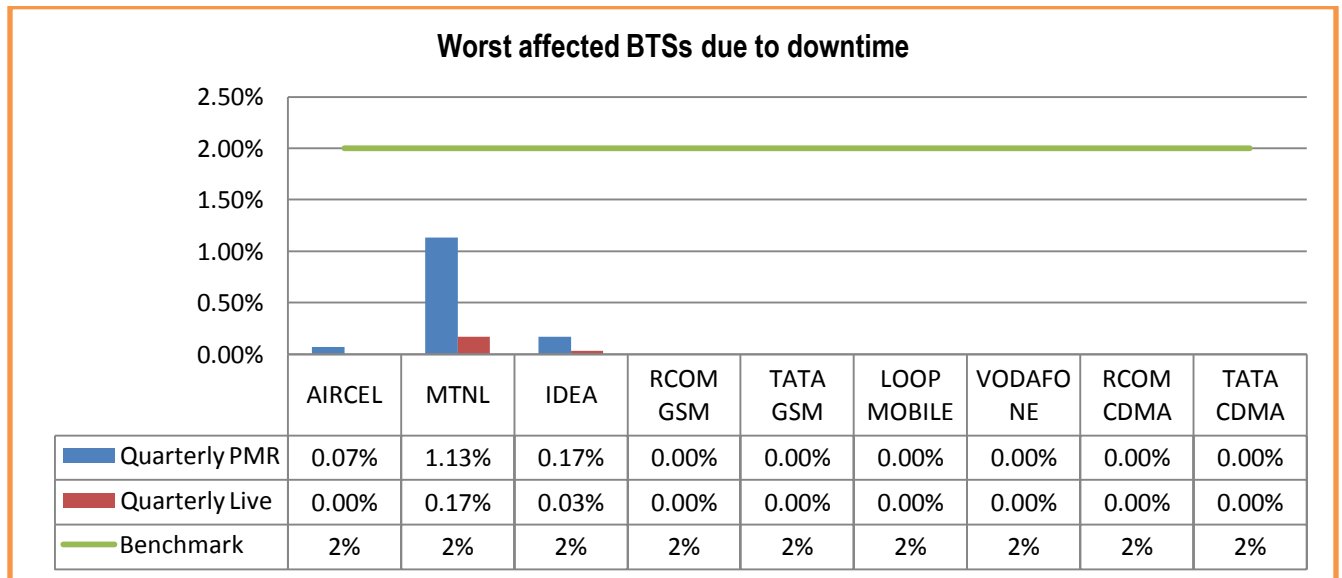
**8. GRAPHICAL REPRESENTATION OF PERFORMANCE OF THE CELLULAR MOBILE SERVICE PROVIDERS-MONTHLY V/S 3-DAYS LIVE MEASUREMENT:**

**1) BTS ACCUMULATED DOWNTIME:**



All operators are meeting the benchmarks.

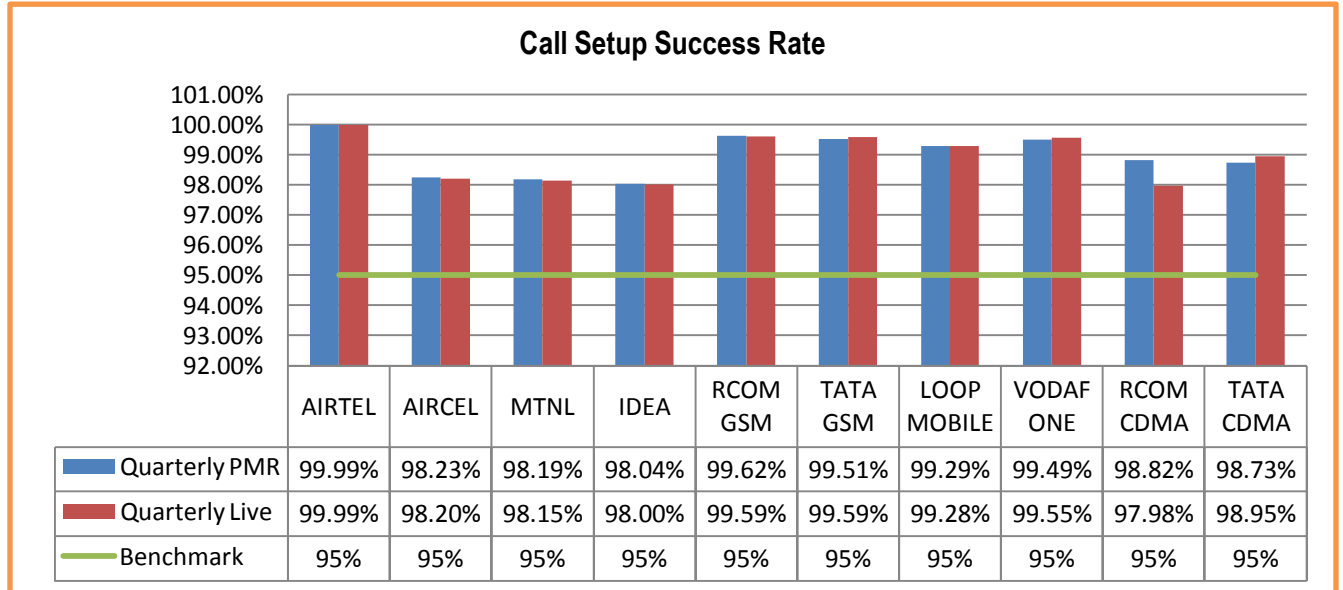
**2) WORST AFFECTED BTSs DUE TO DOWNTIME:**



All operators are meeting the benchmarks.

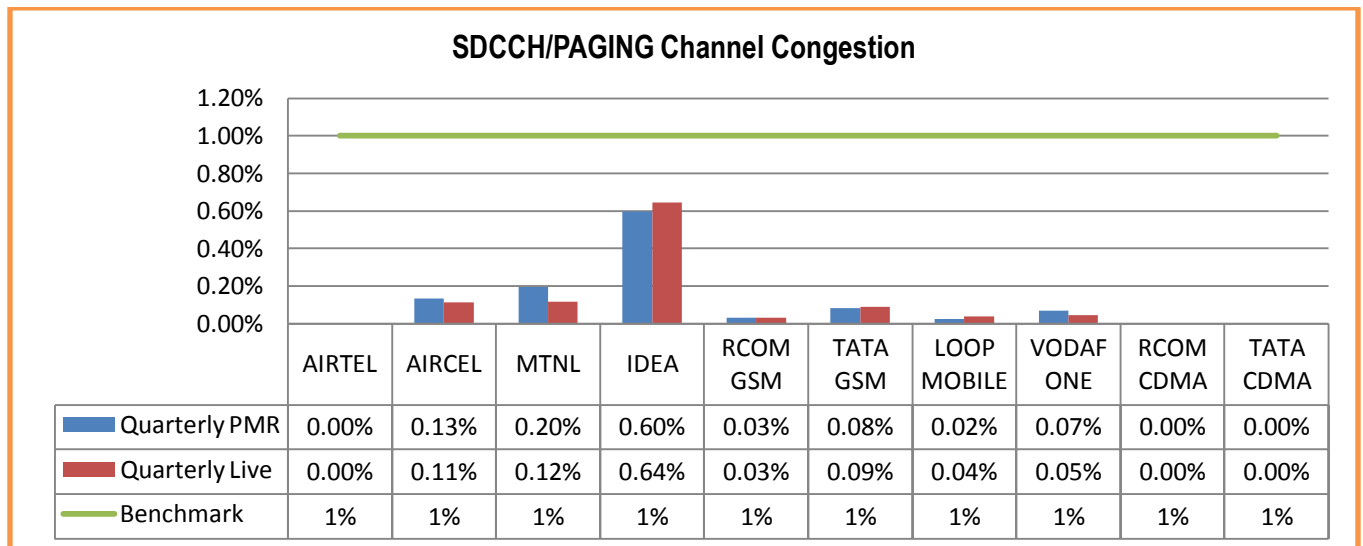


3) CALL SETUP SUCCESS RATE:



All operators are meeting the benchmarks.

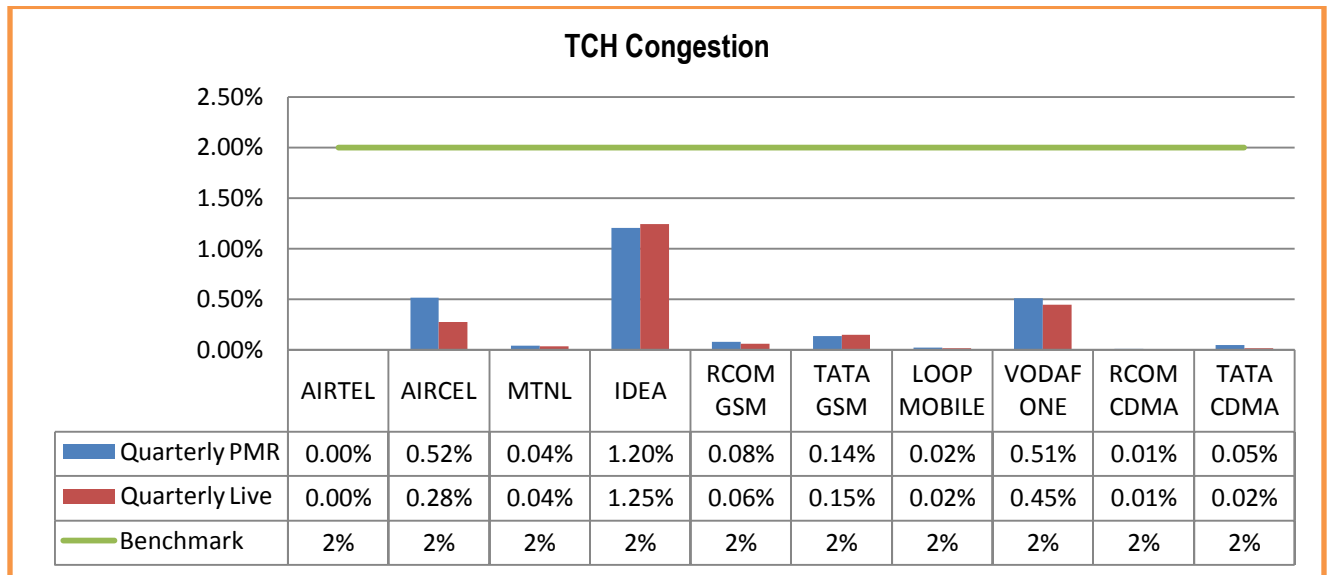
4) SDCCH/PAGING CHANNEL CONGESTION:



All operators are meeting the benchmarks.

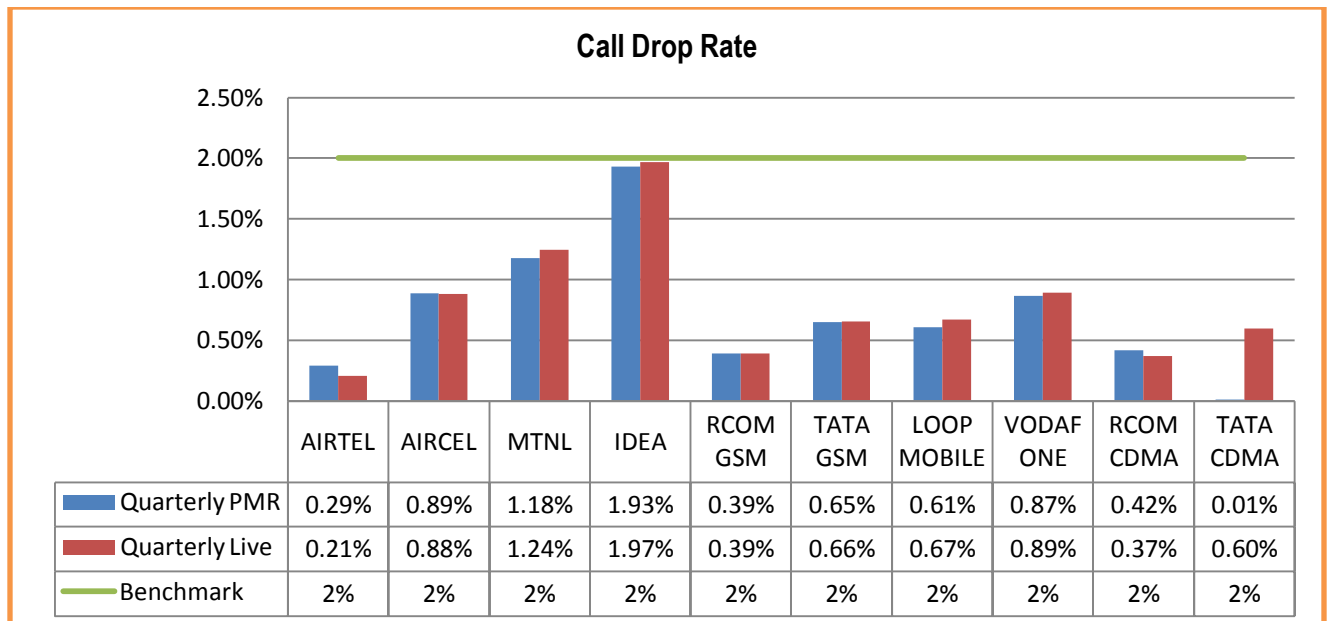


5) TCH CONGESTION:



All operators are meeting the benchmarks.

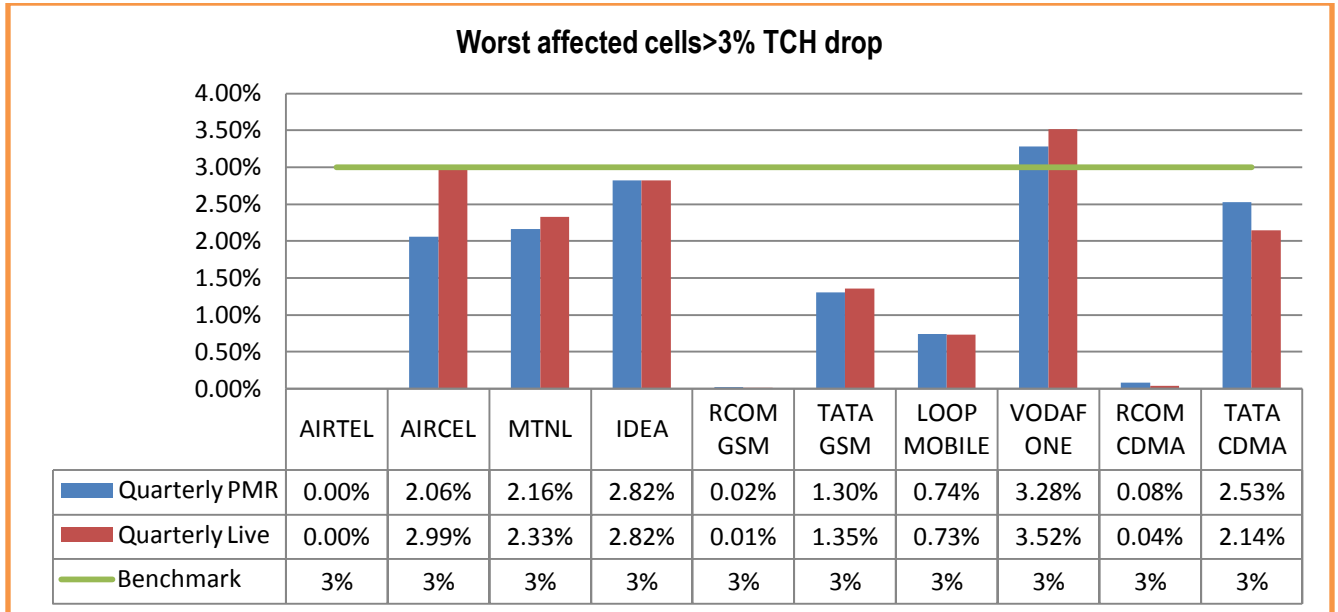
6) CALL DROP RATE:



All operators are meeting the benchmarks.

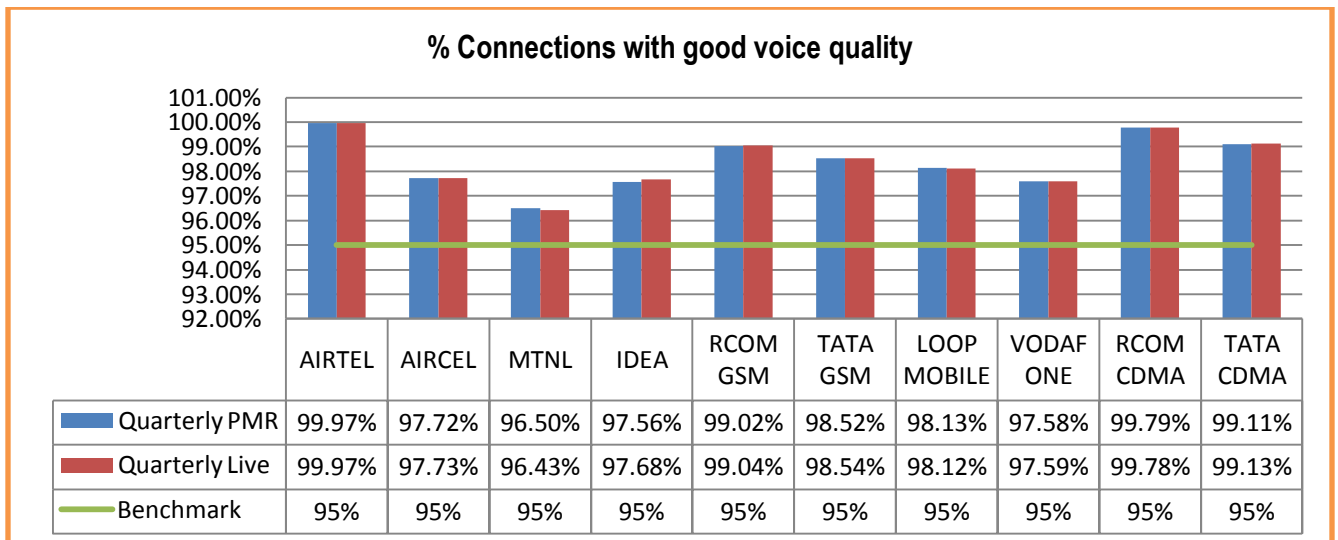


7) WORST AFFECTED CELLS>3% TCH DROP :



All operators are meeting the benchmarks except Vodafone.

8) PERCENTAGE OF CONNECTIONS WITH GOOD VOICE QUALITY:



All operators are meeting the benchmarks.

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





**9. QOS AUDIT OF BASIC TELEPHONE SERVICE (WIRELIN)**

- The QoS audit for basic (wire line) service was undertaken for assessment of quarterly performance of the service providers for quarter ended March-2014. Audit was done for sampled **12** exchanges of **MTNL**, **1** exchange of **Bharti-Airtel**, **2** exchange of **TTL** and **1** exchange of **RCL** as per requirement of TRAI. The detail of the exchanges audited during the quarter is attached as Annex-1. The performance of the Service providers against each parameter has been evaluated by taking average of performance value of each parameter for all the exchanges of the respective service providers. The averaged value of each parameter has been tabulated as follows:

<b>Averaged Audited data for Wireline (Basic) Services – Mumbai Metro Circle</b>							
Sl. No.	Parameters	Benchmark	Period	BHARTI AIRTEL	MTNL	RCL	TTL
1	<b>Fault incidences</b>						
	(No. of faults/100 subscribers /month)	< 5%	Quarterly	0.33%	3.65%	0.14%	0.25%
2	<b>Faults Repair/Restoration Time</b>						
	Fault repair by next working day(Urban Area)	>90%	Quarterly	98.20%	99.44%	100.00%	94.00%
	Fault repair Within 3 days (Urban Area)	100%	Quarterly	100%	<b>99.88%</b>	100.00%	100.00%
	Fault repair by next working day (Rural & hilly Area)	>90%	Quarterly	NA	NA	NA	NA
	Fault repair Within 5 days (Rural & hilly Area)	100%	Quarterly	NA	NA	NA	NA
	Mean time to Repair(MTTR)	≤8 Hrs	Quarterly	3.2 Hrs.	3.51 Hrs.	3.13 Hrs.	4.98 Hrs.
3	<b>Rent Rebate</b>						
	Fault pending > 3 days & <7 days	Rebate for 7 days	Quarterly	NA	NA	NA	NA
	Fault Pending > 7 days & < 15 days	Rebate for 15 days	Quarterly	NA	NA	NA	NA
	Fault pending > 15 days	Rebate for 1 month	Quarterly	NA	NA	NA	NA
4	<b>Call Completion Ratio (CCR) &amp; Answer to seizure Ratio (ASR)</b>						
	CCR	> 55%	Quarterly	83.81%	57.55%	-	98.13%
	ASR	> 75%	Quarterly	-	-	88.08%	-
5	<b>Metering &amp; Billing Performance</b>						
	% of disputed Bills over bills issued (Post Paid )	< 0.1%	Quarterly	0.00%	NP	0.00%	0.03%
	% of Pre-paid Charging Complaints	< 0.1%	Quarterly	NA	NA	NA	NA
	% of billing complaints (for post paid customer) / Charging/Credit/Validity (for Pre paid customer) resolved within 4 weeks	100% within 4 weeks	Quarterly	100.00%	NP	100.00%	100.00%

# AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MUMBAI METRO CIRCLE



	Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints	<=1 week	Quarterly	Within one week	NP	Within one week	Within one week
6	<b>POI Congestion</b>						
	No. of POI's having congestion >0.5%		Quarterly	0	0	0	0
7	<b>Response Time to customer for assistance</b>						
	Accessibility of Call centre/customer Care	>=95%	Quarterly	100.00%	100.00%	94.91%	100.00%
	% age of calls answered by operator(voice to voice) within 60 seconds	>=90%	Quarterly	95.00%	91.02%	95.00%	97.23%
8	<b>Customer care(promptness in attending to customers request)</b>						
	Termination / Closures	100% within 7 days	Quarterly	100.00%	100.00%	100.00%	100.00%
	Time taken for refunds of deposit after closures	100% within 60 days	Quarterly	100.00%	100.00%	100.00%	100.00%

- NA-Not Applicable
- NP-Not Provided

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

3 DAYS LIVE MEASUREMENT DATA FOR WIRELIN (BASIC) SERVICES- MUMBAI METRO CIRCLE							
Sl. No.	Parameters	Benchmark	Period	BHARTI AIRTEL	MTNL	RCL	TTL
1	<b>Call Completion Ratio (CCR) &amp; Answer to seizure Ratio(ASR)</b>						
	CCR	> 55%	Live	95.57%	57.05%	-	98.13%
	ASR	> 75%	Live	-	-	87.34%	-
2	<b>POI Congestion</b>						
	No. of POI's having congestion >0.5%		Live	0	0	0	0
3	<b>Response Time to customer for assistance</b>						

## AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MUMBAI METRO CIRCLE



Accessibility of Call centre/customer Care	≥95%	Live	100.00%	100.00%	96.00%	100.00%
% age of calls answered by operator(voice to voice) within 60 seconds	≥90%	Live	94.23%	91.29%	96.22%	NP

### KEY FINDINGS:

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

**Fault Repair/Restoration Time:** For this parameter also, MTNL failed to meet benchmark. **MTNL** marginally remained under performed for the parameter 'Fault repaired within 3 days in urban area' with its performance as **99.88%** against the benchmark of 100%.

**Mean Time to Repair:** All service providers were found to have met the benchmark for this parameter.

**Call Completion Rate/Answer to seizure ration:** All the operators were found to be comfortably meeting the benchmark on this parameter at various exchanges.

**Metering and Billing performance:** For this parameter also, the performance of the service providers was found well within the compliance benchmarks. MTNL have not provided data for this parameter.

**Response Time to Customer for assistance:** For percentage of calls getting connected to call center and answered, all operators except RCL managed to meet the TRAI benchmark. **RCL** could connect **94.91 %** of calls to its call center against the benchmark of 95 %.

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

**Time Taken for refunds of deposits after closures:** All operators were found meeting the benchmark for this parameter.

*Thus, from the above findings that, it was concluded that the performance of the service providers was satisfactory as all operators were largely found meeting the benchmarks, except MTNL and RCOM marginally lagged behind the benchmarks for parameters Fault Repairs and Response time to Customer.*





***INTER OPERATOR CALL ASSESSMENT***

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

<b>INTER OPERATOR CALL ASSESSMENT BASED ON LIVE MEASUREMENT</b>					
<b>Calling Operators</b>	<b>Circle Name</b>	<b>BHARTI AIRTEL</b>	<b>BSNL</b>	<b>RELIANCE</b>	<b>TTL</b>
<b>BHARTI AIRTEL</b>	<i>Mumbai</i>	--	100.00%	100.00%	100.00%
<b>MTNL</b>	<i>Mumbai</i>	100.00%	--	100.00%	100.00%
<b>RCL</b>	<i>Mumbai</i>	100.00%	100.00%	--	100.00%
<b>TTL</b>	<i>Mumbai</i>	100.00%	100.00%	100.00%	--

The result of the testing revealed that the inter connection performance among the operators was quite satisfactory as there was hardly any problem in interconnection from one operator to other operators.

**CUSTOMER CARE / HELPLINE ASSESSMENT**

<b>LIVE CALLING TO CALL CENTRE</b>					
	<b>Circle Name</b>	<b>BHARTI AIRTEL</b>	<b>MTNL</b>	<b>RCL</b>	<b>TTL</b>
<b>Total No. of calls Attempted</b>	<i>Mumbai</i>	100	100	100	100
<b>Total No. of calls connected to IVR</b>	<i>Mumbai</i>	100	NA	100	100
<b>Calls got connected to agent within 60 Sec</b>	<i>Mumbai</i>	100	100	100	92
<b>%age of calls got answered</b>	<i>Mumbai</i>	100.00%	100.00%	100.00%	<b>92.00%</b>

In case of calls answered by operators (voice to voice) within 60 seconds when test calls were made to the call centers, all service providers managed to connect 100% calls to their respective call center except TTL. TTL could connect 92.00% calls within 60 seconds.

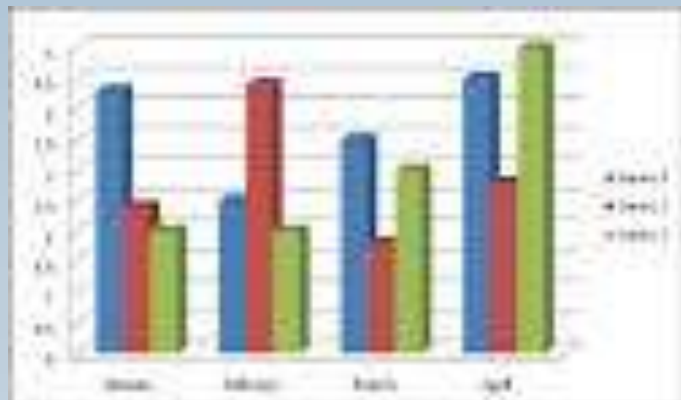


**LEVEL-1 LIVE CALLING**

LEVEL 1 LIVE CALLING						
Emergency no.	Circle Name	No. of calls made	BHARTI AIRTEL	MTNL	RCL	TTL
100	Mumbai	30	100.00%	100.00%	100.00%	100.00%
101	Mumbai	30	100.00%	100.00%	100.00%	100.00%
102	Mumbai	30	100.00%	100.00%	100.00%	100.00%
103	Mumbai	30	100.00%	100.00%	100.00%	100.00%
1098	Mumbai	30	100.00%	100.00%	100.00%	100.00%

To assess the availability and efficiency of level 1 services such as police, fire, ambulance (emergency services) offered by various service providers, the calls were made from telephone provided by the service providers. In Mumbai metro circle, these services were found functional in the networks of all the service providers.

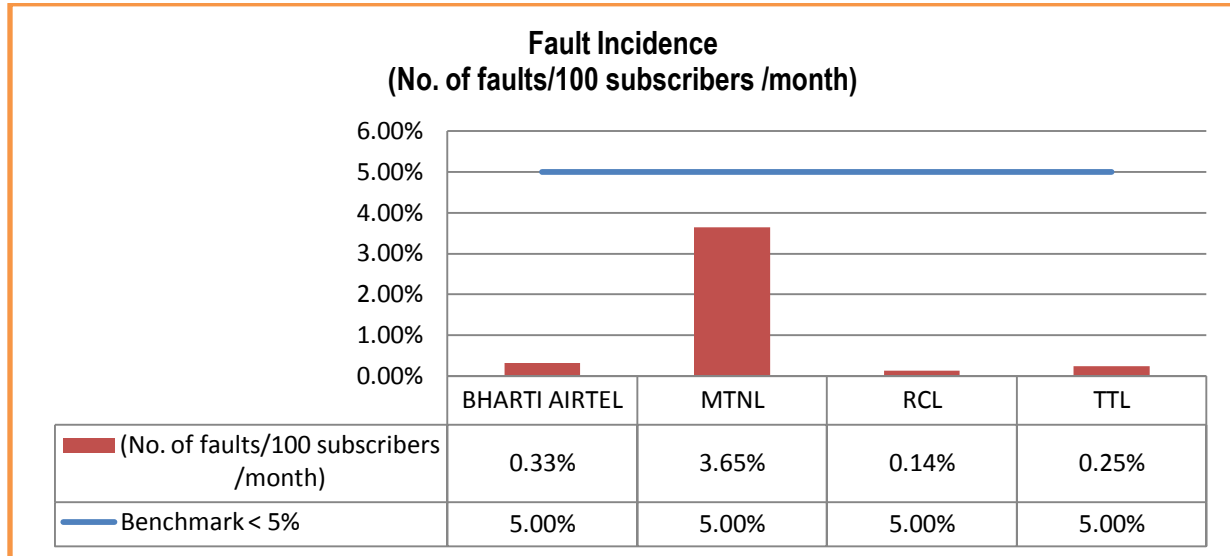
## 11. GRAPHICAL REPRESENTATION OF BASIS (WIRELINE) SERVICES





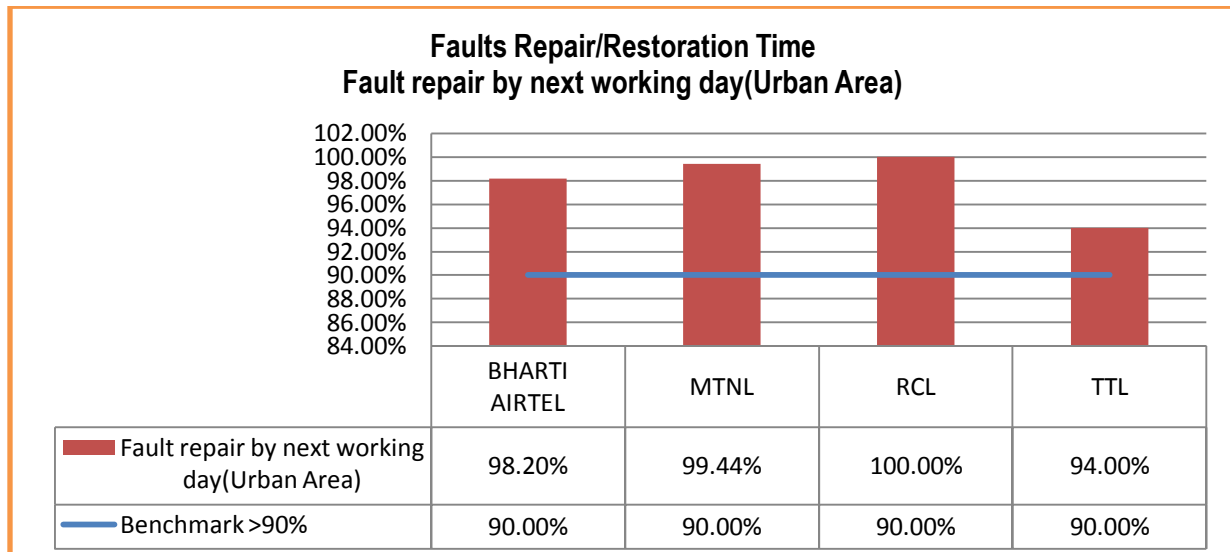
**11. GRAPHICAL REPRESENTATION OF QUARTERLY PERFORMANCE OF THE BASIC TELEPHONE SERVICE (WIRELIN) PROVIDERS:**

**1) FAULT INCIDENCE:**



All Operators are meeting the benchmarks.

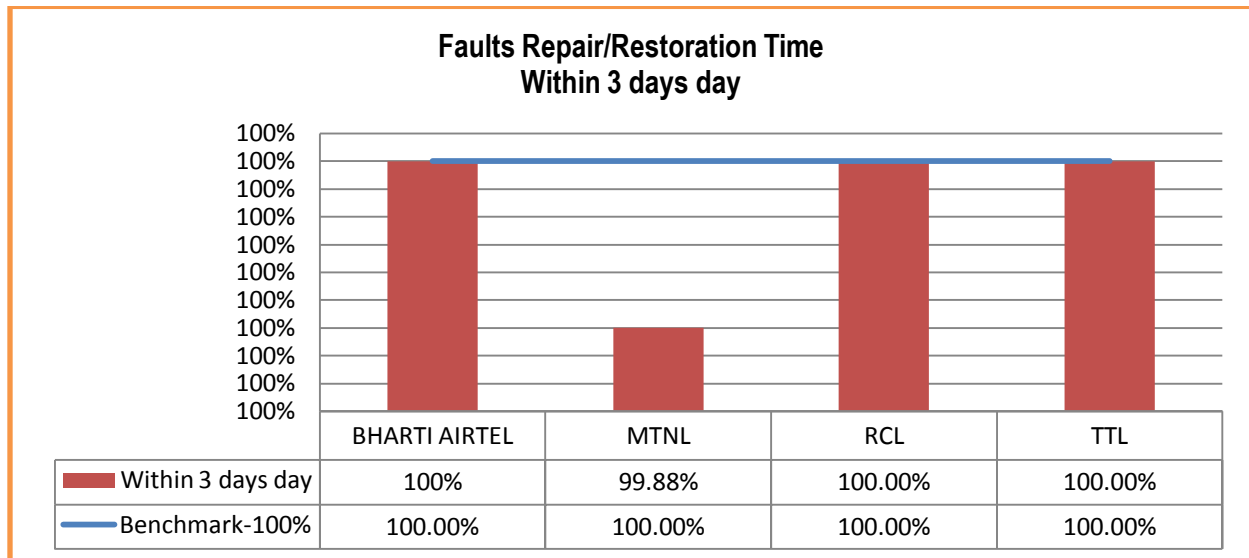
**2) FAULTS REPAIR/RESTORATION TIME:**



All Operators are meeting the benchmarks.

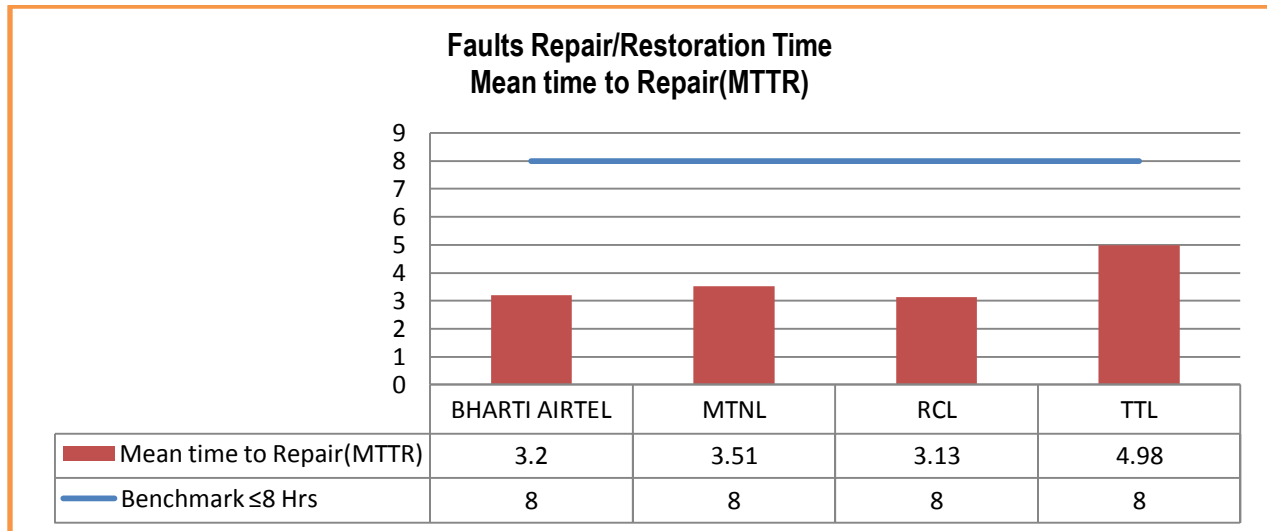


**3) FAULTS REPAIR/RESTORATION TIME WITHIN 3 DAYS:**



All Operators are meeting the benchmarks except MTNL against the benchmark of 100 %.

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

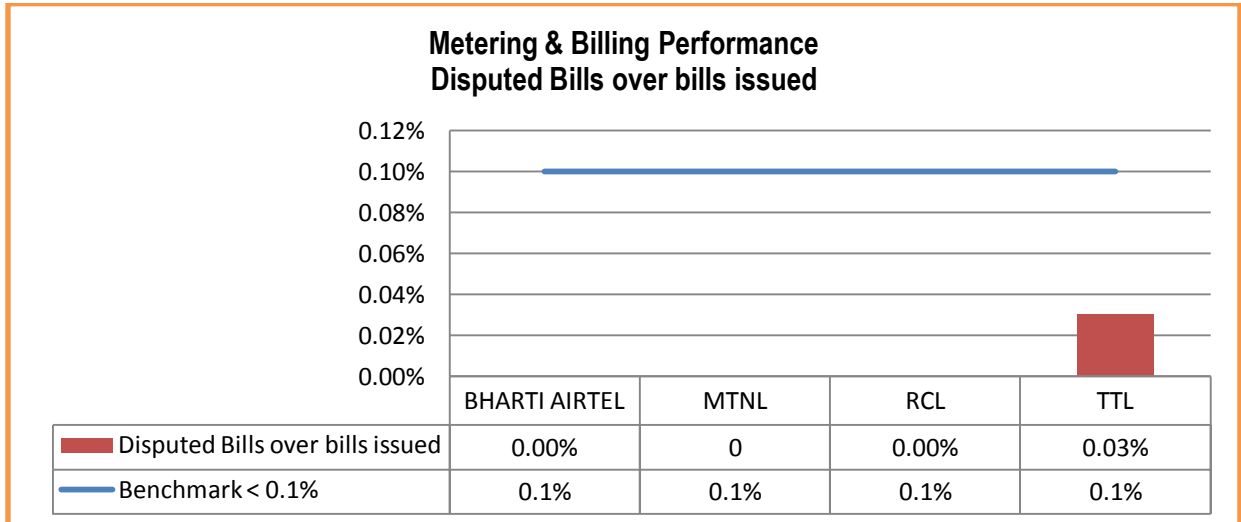


All Operators are meeting the benchmarks.



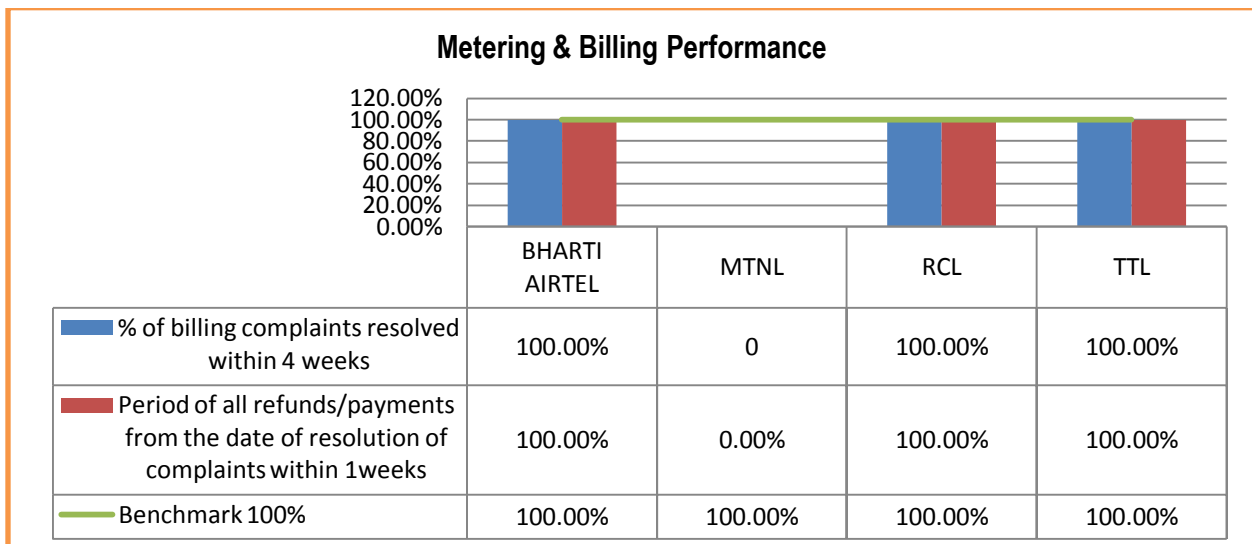
5) METERING & BILLING PERFORMANCE:

a) DISPUTED BILLS OVER BILL ISSUED :



All Operators are meeting the benchmarks. MTNL has not provided data for this parameter.

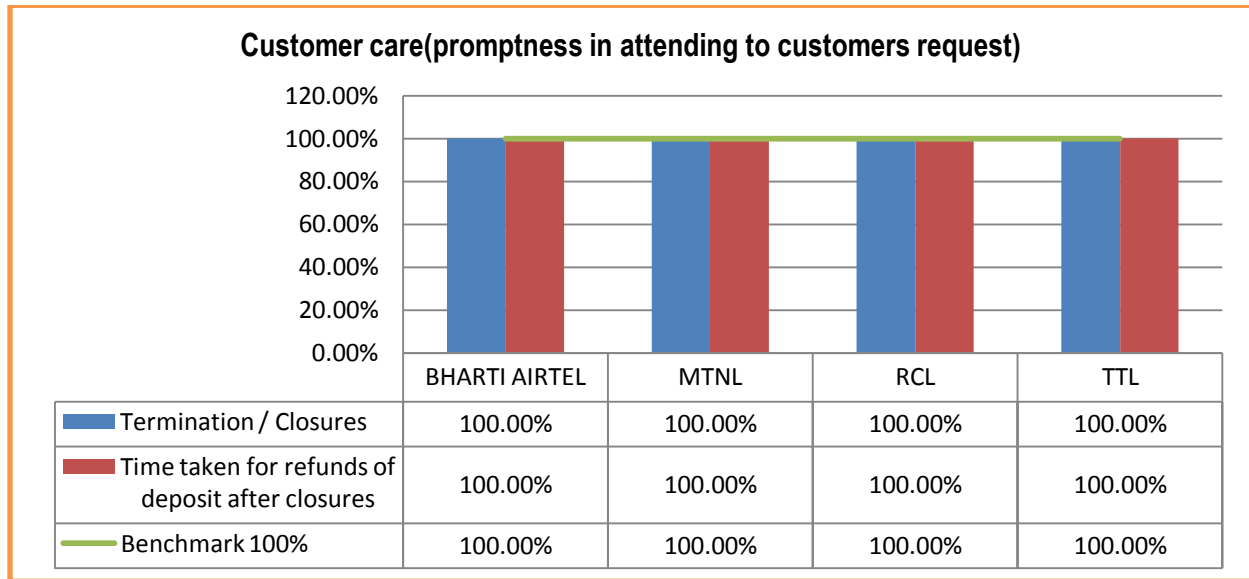
b) BILLING COMPLAINT RESOLUTION:



All Operators are meeting the benchmarks. MTNL has not provided data for this parameter.



6) TERMINATION & CLOSURES:

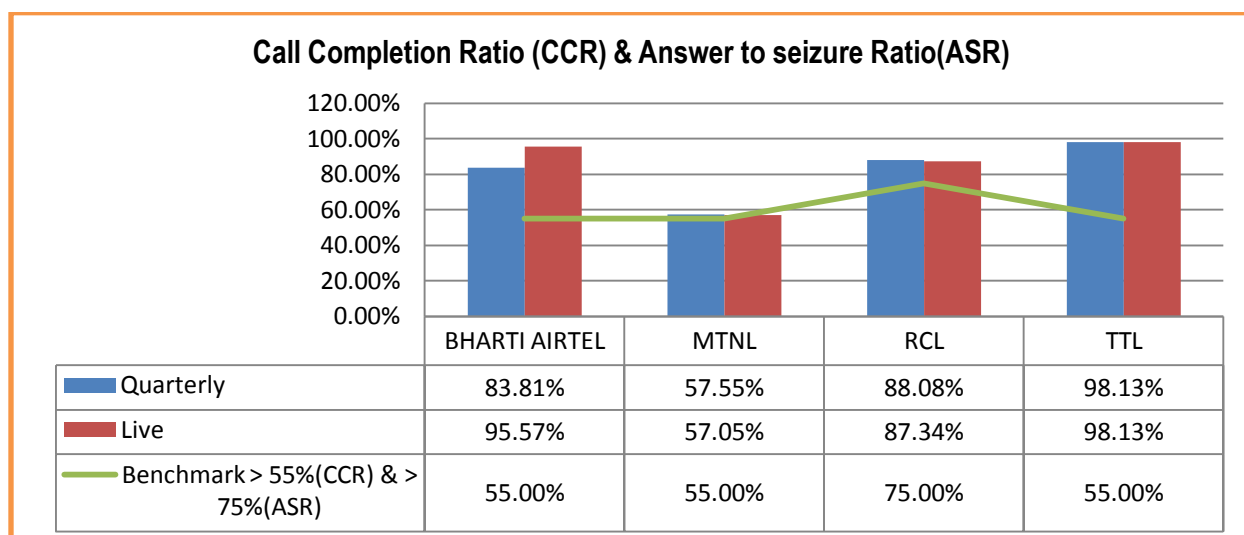


All Operators are meeting the benchmarks against the benchmark of 100 %.



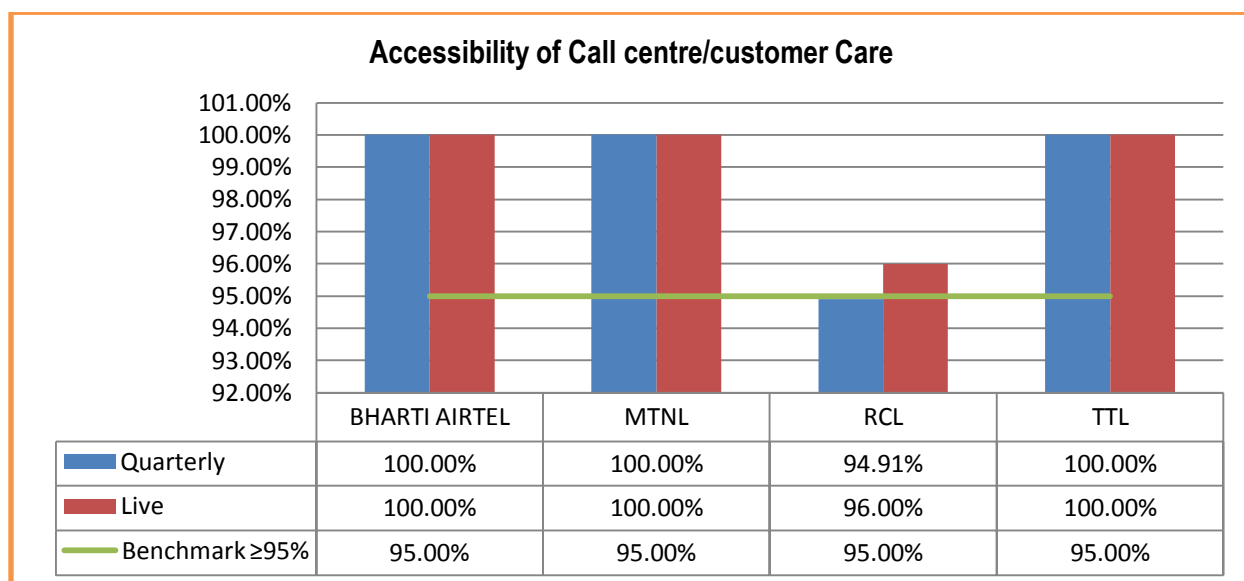
**12. GRAPHICAL REPRESENTATION OF PERFORMANCE OF THE BASIC TELEPHONE SERVICE (WIRELINE) PROVIDERS V/S 3-DAYS LIVE MEASUREMENT:**

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



All Operators except BSNL (3 days live), are meeting the benchmarks.

**2) ACCESSIBILITY OF CALL CENTRE/CUSTOMER CARE:**

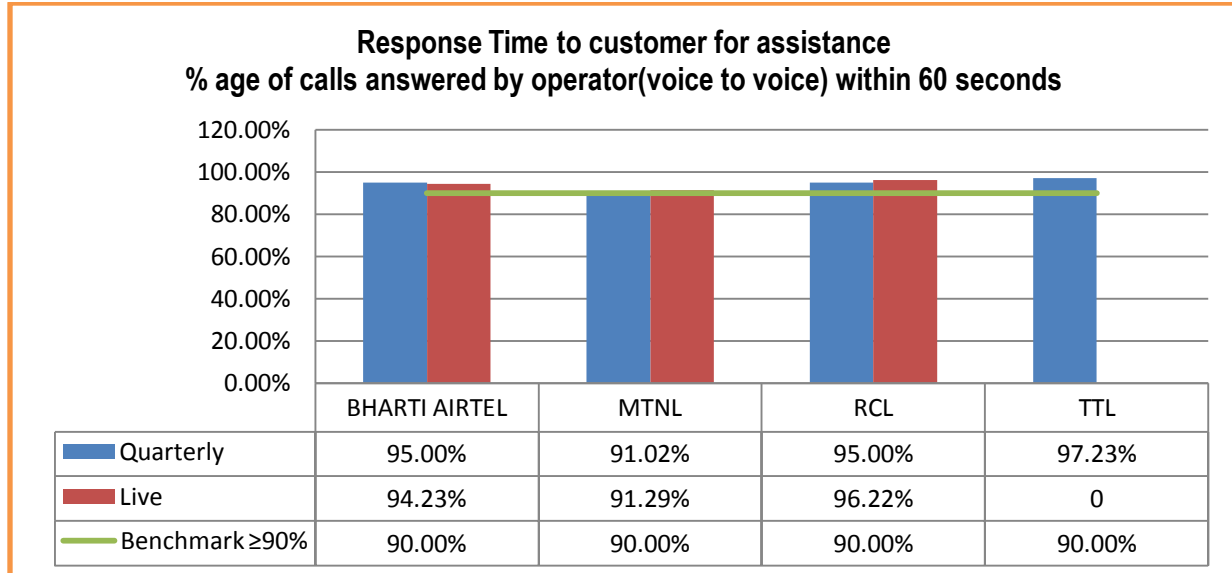


All Operators except RCL are meeting the benchmarks.





**3) RESPONSE TIME TO CUSTOMER FOR ASSISTANCE CALL ANSWERED BY OPERATORS WITHIN 60 SECONDS:**



All Operators are meeting the benchmarks against the benchmark of >90%. TTL has not provided data during 3 days live measurement.

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





### 13. 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. The following Service providers, providing broadband service in Mumbai metro circle; have been audited for their quality of service assessment. The following Broadband Service providers were audited for their quality of service assessment.

Sl. No.	Name of Broadband Service Providers
1	BHARTI AIRTEL LIMITED
2	MTNL
3	RELIANCE COMMUNICATION LIMITED (RCL)
4	TATA COMMUNICATION LIMITED (TCL)
5	TATA TELESERVICES LIMITED (TTL)
6	TIKONA DIGITAL NETWORKS
7	HATHWAY
8	SYSCON INFOWAY PRIVATE LIMITED
9	YOU BROADBAND INDIA PVT. LTD.
10	D-VOIS BROADBAND
11	FIVE-NETWORKS
12	BROADBAND PACENET INDIA PVT. LTD
13	HONESTY NET SOLUTIONS
14	INDUS MEDIA & COMMUNICATION LTD.
15	CITYCOM NETWORKS PVT. LTD. (SPECTRANET)

# AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MUMBAI METRO CIRCLE



The audited data has been given in the following table:

## Averaged Audited data for 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>Service Provisioning/Activation Time</b>																	
1	100% cases in 15 days (subject to technical feasibility)	<15 days	100.0%	96.34%	100.0%	100.0%	99.92%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	96.59%	100.0%
	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.	NA	0.00	NA	NA	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00
<b>2 Faults Repair/Restoration Time</b>																	
	By next working day	>90%	98.27%	94.23%	100.0%	NP	93.220%	91.88%	96.12%	96.64%	92.79%	96.64%	NA*	96.04%	96.89%	99.58%	97.60%
	within 3 working day	≥99%	99.73%	97.77%	NA	NP	100.00%	99.31%	99.01%	99.02%	99.57%	100.00%	NA*	98.87%	99.92%	100.0%	99.60%
<b>2.1 Rebate</b>																	
	Faults Pending for > 3 working days and < 7 working days: (Rebate equivalent to 7 days of minimum monthly charge or equivalent usage allowance)		NP	2948	0.	NP	0.00	59.	248	0.	11	0	NA	NP	NA	6	0
	Faults Pending for > 7 working days and < 15 working days: (Rebate equivalent to 15 days of minimum monthly charge or equivalent usage allowance)		NP	429	0	NP	0	30	43	0	2	0	NA	NP	NA	4	1

# AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MUMBAI METRO CIRCLE



	Faults Pending for > 15 working days:(Rebate equivalent to one month of minimum monthly charge or equivalent usage allowance)		NP	123	0	NP	0	40	13	0	0	0	NA	NP	NA	0	1
<b>3</b>	<b>Billing Performance</b>																
	Billing complaints per 100 bills issued	<2%	0.0084%	NP	0.12%	0.0762%	0.259%	0.30%	1.07%	0.00%	0.00%	0.00%	NA**	0.00%	NA**	NA**	0.5165%
	%age of complaints resolved within 4 weeks	100%	100.00%	NP	100%	100.00%	100.00%	100%	100%	NA	100%	NA	NA	NA	NA	NA	100.00%
	Time taken for refund of deposits after closure (within 60 days)	100%	100.00%	NP	100%	100.00%	NA	100%	100%	NA	100%	NA	NA	NA	NA	NA	NP
<b>4</b>	<b>Response time to the customer for assistance % age of calls answered by operator (Voice to Voice)</b>																
	within 60 sec	>60%	91.25%	78.04%	96.42%	90.46%	82.92%	61.10%	88.22%	NP	85.75%	83.65%	NA	87.29%	84.00%	100%	86.39%
	within 90 sec	>80%	94.51%	80.12%	98.59%	92.58%	86.32%	80.33%	91.30%	NP	87.78%	87.69%	NA	98.68%	100.00%	NA	89.88%
<b>5</b>	<b>Bandwidth Utilization/ Throughput:</b>																
	POP to ISP Gateway Node [Intra-network] Link(s)	<80%	42.93%	46.58%	20.10%	40.73%	77.13%	70.02%	<b>85.96%</b>	74.32%	NP	62.41%	47.52%	52.13%	68.10%	60.83%	72.67%
	ISP Gateway Node to IGSP / NIXI Node upstream Link(s) for International connectivity	<80%	67.85%	<b>84.80%</b>	46.15%	38.571%	76.04%	64.76%	<b>86.40%</b>	74.30%	70.70%	74.44%	NA	<b>82.82%</b>	NA	NA	63.708%
	Broadband Connection Speed (download) - from ISP Node to User	>80%	99.94%	NP	NP	80.67%	96.24%	<b>68.73%</b>	93.05%	98.00%	87.50%	97.33%	NA	91.72%	100.00%	NP	88.50%
<b>6</b>	<b>Service Availability/Uptime (for all users) in %age</b>																
	Service Availability (%)	>98%	99.98%	100%	99.59%	NP	99.87%	99.74%	99.37%	100.00%	99.79%	100%	NA	99%	100%	100%	99.50%
<b>7</b>	<b>Packet Loss</b>																
	% of Packet loss	<1%	0.17%	0.00%	0.45%	0.00%	0.11%	0.00%	0.00%	0.00%	0.00%	0.20	NA	<b>1.70%</b>	0.00%	NP	0.00%
<b>8</b>	<b>Network latency (for wired broadband access)</b>																
	User reference point at POP/ISP Gateway node to IGSP/NIXI	<120 ms	26.19ms	1ms	0.012ms	0.615ms	65.61ms	NA	1 ms	1ms	8.80ms	42 ms	NA	79 ms	9 ms	NP	2.80 ms

# AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MUMBAI METRO CIRCLE



User reference point at ISP Gateway node to International nearest NAP port abroad (terrestrial)	<350 ms	64.04ms	264ms	0.018ms	9.14ms	193.74ms	NA	227 ms	0.047ms	8.80ms	127ms	NA	285ms	279ms	NP	125.67ms
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/Not Available

NA\*: Data for this parameter was not available with M/s five networks because they have remarked "As per our business model franchisee are our customer, so we don't have direct interaction with the end customers. Hence the faults are being registered at franchisee end". Because of their franchisee business model, they don't monitor any technical parameter. That's why their technical data was not available with them for Mumbai Circle. M/S 5 NETWORKS have further reported that they are providing the data to TRAI on all india basis as in other circles they are giving connections of the broadband to the end users without having franchisee.

NA\*\*: 5 NETWORKS, HONESTY NET and INDUS MEDIA have prepaid customers only so no billing complaints.



**14. 3 DAYS LIVE MEASUREMENT FOR BROADBAND SERVICE PROVIDERS:**

3 days live data for 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
1	<b>Response time to the customer for assistance % age of calls answered by operator (Voice to Voice)</b>																
	within 60 sec	>60%	89.85%	84.97%	96.00%	97.67%	87.36%	69.65%	82.00%	NP	79.00%	95.12%	NP	86.39%	100%	100%	63.17%
	within 90 sec	>80%	94.839%	87.00%	98.00%	98.42%	92.73%	88.79%	88.00%	NP	86.00%	99.98%	NP	100.00%	NA	NA	68.19%
2	<b>Bandwidth Utilization/ Throughput:</b>																
	POP to ISP Gateway Node [Intra-network] Link(s)	<80%	15.733%	45.91%	38.49%	NP	77.00%	65.47%	71.17%	75.27%	NP	65.50	NP	57.14%	80.54%	71.00%	69.40%
	ISP Gateway Node to IGSP / NIXI Node upstream Link(s) for International connectivity	<80%	67.33%	84.99%	55.78%	NP	78.36%	62.69%	81.64%	75.00%	68.93%	75.86%	NP	87.55%	NA	NA	64.427%
	Broadband Connection Speed (download) - from ISP Node to User	>80%	100.45%	NP	91.33%	84.267%	95.429%	98.00%	93.16%	100%	91.67%	70.96%	NP	91.50%	100.00%	86.00%	90.00%
3	<b>Packet Loss</b>																
	% of Packet loss	<1%	0.00%	0.00%	0.00%	0.00%	0.10%	0.00%	0.00%	0.00%	0.00%	0.20%	NP	0.50%	0.00%	0.40%	0.267%
4	<b>Network latency (for wired broadband access)</b>																
	User reference point at POP/ISP Gateway node to IGSP/NIXI	<120 ms	26.33ms	1ms	0.8ms	1ms	72.57ms	NA	1ms	<1ms	2.33ms	12ms	NP	72ms	9ms	63ms	2.67ms
	User reference point at ISP Gateway node to International nearest NAP port abroad (terrestrial)	<350 ms	59.76ms	247ms	2.10ms	251.33ms	202.89ms	NA	105ms	47ms	176 ms	135ms	NP	22ms	270ms	NP	125.33ms
	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



## KEY FINDINGS: BROADBAND SERVICES

**Service Provisioning / Activation Time:** The audit of the service providers revealed that Broadband service providers namely MTNL, TTL, and Indus Media could not provide 100% connections within 15 days. Their performance with respect to this parameter was 96.34% , 99.92% and 96.59% respectively.

**Fault Repair/Restoration Time:** With regards to this parameter the performance of the service providers was within TRAI norms except **MTNL and Pacenet** lagged behind the benchmark of 99% by achieving their performance as 97.77% and 98.87% for faults repair within 3 days.

**Billing Performance:** For this parameter the performance of the service providers was found well within the compliance benchmarks. 5 NETWORKS, HONESTY NET and INDUS MEDIA have prepaid customers only so no billing complaints.

During live calling the response from the subscribers was of mixed nature. Some of the customers reported that the billing complaints were resolved to their satisfaction; some reported that they don't remember about the resolution of complaints. However, majority of the customer reported that their complaints were resolved satisfactorily.

**Response Time to Customer for assistance by operator (Voice to Voice):** For parameter percentage of calls getting connected to call center and answered, all operators were found meeting the benchmark. However, during live measurements, the performance of CITYCOM for parameter Calls answered by operator (Voice to Voice) within 90 seconds was 68.19%.

**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 as majority of the operators were found meeting the benchmark. However, for bandwidth utilization POP to ISP Gateway node , Hathway was beyond the benchmark with its performance as 85.96%. The performance of MTNL, Hathway and Pacenet for ISP Gateway Node to IGSP/NIXI Node was also non-complied with their performance as 84.80%, 86.40% and 82.82% respectively. The performance of Tikona for broadband connection speed was 68.73% against the benchmark of >80%. D-VOIS failed to meet the benchmark for parameter Broadband Connection Speed (download) - from ISP Node to User (70.96%).

During live measurements, the performance of Honesty Net for POP to ISP Gateway was 80.54% , whereas for ISP Gateway Node to IGSP/NIXI Node, the performance of MTNL and Pacenet remained non-complied (84.99% and 87.55% respectively)

**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. The performance of Pacenet was **1.70%** against the benchmark of < 1%. However, the ping test conducted during live measurement revealed that all service providers were meeting the benchmark prescribed by TRAI.





**CUSTOMER CARE / HELPLINE ASSESSMENT**

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.

<b>LIVE CALLING TO CALL CENTRE FOR BROADBAND SERVICES</b>															
<b>Parameter</b>	<b>Circle Name</b>	<b>BHARTI AIRTEL</b>	<b>MTNL</b>	<b>RCL</b>	<b>TCL</b>	<b>TTL</b>	<b>TIKONA</b>	<b>HATHWAY</b>	<b>SYSCON</b>	<b>YOU BROADBAND</b>	<b>D-VOIS</b>	<b>PACENET</b>	<b>HONESTY NET</b>	<b>INDUS</b>	<b>SPECTRANET</b>
<i>Total No. of calls Attempted</i>	Mumbai	100	100	100	100	100	100	100	100	100	100	100	100	100	100
<i>Total number of calls answered by the operator within 60 seconds</i>	Mumbai	100	100	100	100	92	100	100	100	100	100	100	100	100	100
<i>% age calls answered by the operator in 60 seconds</i>	Mumbai	100%	100%	100%	100%	92%	100%	100%	100%	100%	100%	100%	100%	100%	100%
<i>Total number of calls answered by the operator within 90 seconds</i>	Mumbai	100	100	100	100	96	100	100	100	100	100	100	100	100	100
<i>% age calls answered by the operator within 90 seconds</i>	Mumbai	100%	100%	100%	100%	96%	100%	100%	100%	100%	100%	100%	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. TTL could connect 96% of calls to the operator within 90 Seconds.



Annex-1

Details of the exchanges covered for QoS audit during QE-March 2014.

S No	Circle	Name of Provider	Name of Exchange	Type of Exchange
1	Mumbai Metro	MTNL	MTNL Chunnabatti	Urban
2	Mumbai Metro	MTNL	MTNL Mulund East	Urban
3	Mumbai Metro	MTNL	MTNL Saki vihar	Urban
4	Mumbai Metro	MTNL	MTNL City Telephone	Urban
5	Mumbai Metro	MTNL	MTNL Cooperage Exchange	Urban
6	Mumbai Metro	MTNL	MTNL Gamdevi (central)	Urban
7	Mumbai Metro	MTNL	MTNL Malabar Hill	Urban
8	Mumbai Metro	MTNL	MTNL Marol	Urban
9	Mumbai Metro	MTNL	MTNL Akroli	Urban
10	Mumbai Metro	MTNL	MTNL Panvel	Urban
11	Mumbai Metro	MTNL	MTNL Currey Road	Urban
12	Mumbai Metro	MTNL	MTNL Shivaji Park	Urban
13	Mumbai Metro	AIRTEL	BHARTI AIRTEL-Interface 7, malad West	Urban
14	Mumbai Metro	RCL	RCL (DAKC Mumbai)	Urban
15	Mumbai Metro	TTL	TTL- Pune	Urban