



**Audit & Assessment of Quality of Service  
Of  
Cellular Mobile Telephone Service  
For  
Telecom Regulatory Authority of India  
West Zone – Mumbai Service Area  
(April 2015 – June 2015)**

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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.

## Table of Contents

1.	BACKGROUND.....	6
2.	OBJECTIVES AND METHODOLOGY.....	8
3.	SAMPLE SIZE.....	10
3.1	SAMPLING FOR CELLULAR MOBILE (WIRELESS) SERVICE PROVIDERS .....	10
3.2	SAMPLING FOR BASIC (WIRE LINE) SERVICES.....	11
3.3	SAMPLING FOR BROADBAND SERVICE PROVIDERS .....	11
4.	EXECUTIVE SUMMARY .....	13
5.	PMR AUDIT REPORTS: .....	16
5.1	MONTHLY PMR:.....	16
5.1.1	BUSY HOUR OF VARIOUS SERVICE PROVIDERS: .....	16
5.1.2	SWITCHES/BSC/BTS DETAILS OF SERVICE PROVIDERS: .....	16
5.1.3	QOS PERFORMANCE OF MONTHLY PMR – APRIL-15 MONTH: .....	17
5.1.4	QOS PERFORMANCE OF MONTHLY PMR – MAY -15 MONTH:.....	18
5.1.5	QOS PERFORMANCE OF MONTHLY PMR – JUNE-15 MONTH: .....	19
5.1.6	QOS PERFORMANCE OF QUARTERLY PMR –AVERAGE OF QE- JUNE- 15(APRIL TO JUNE MONTHS AUDITED DATA).....	20
5.1.7	KEY FINDINGS ON MONTHLY PMR AUDIT REPORTS:.....	21
5.2	LIVE MEASUREMENT DATA (3-DAYS) FOR CELLULAR MOBILE SERVICE PROVIDERS (NETWORK SERVICE QUALITY PARAMETER):.....	24
5.2.1	LIVE MEASUREMENT DATA (3-DAYS) – APRIL -15 MONTH: .....	24
5.2.2	LIVE MEASUREMENT DATA (3-DAYS) – MAY-15 MONTH:.....	25
5.2.3	LIVE MEASUREMENT DATA (3-DAYS) – JUNE-15 MONTH: .....	26
5.2.4	QUARTERLY QOS PERFORMANCE OF 3-DAYS LIVE MEASUREMENT AUDITED DATA (AVERAGE OF APRIL TO JUNE 2015) .....	27
5.2.5	KEY FINDING ON 3 DAYS LIVE MEASUREMENTS:.....	27
5.2.6	DETAILED NETWORK DATA ASSESSMENT OF CELLULAR MOBILE TELEPHONE SERVICES:.....	28
5.3	CUSTOMER SERVICE QUALITY PARAMETERS MEASUREMENT FOR CMTS:.....	35
5.3.1	QUARTERLY CUSTOMER SERVICE DELIVERY (CSD) AUDITED DATA FOR CELLULAR MOBILE SERVICES (APRIL to JUNE 2015 MONTHS AUDITED DATA):.....	35
5.3.2	3 DAYS LIVE CSD AUDITED DATA FOR CELLULAR MOBILE SERVICES:.....	37
5.3.3	KEY FINDINGS ON CUSTOMER SERVICE DELIVERY (CSD) PARAMETERS .....	38
6.	LIVE CALLING ASSESSMENT:.....	40
6.1	INTER OPERATOR CALLS ASSESSMENT: .....	40
6.2	CUSTOMER CARE / HELPLINE ASSESSMENT: .....	41
6.3	LIVE CALLING ASSESSMENT FOR BILLING COMPLIANTS:.....	42
6.4	LEVEL -1 CALLING ASSESSMENT: .....	43

7.	OPERATOR ASSISTED DRIVE TEST .....	45
7.1	OPERATOR ASSISTED DRIVE TEST: THANE (APRIL-15).....	46
7.2	OPERATOR ASSISTED DRIVE TEST: CENTRAL MUMBAI (MAY-15) .....	49
7.3	OPERATOR ASSISTED DRIVE TEST: NAVI MUMBAI (JUNE-15) .....	52
7.4	DETAIL OF THE ROUTES COVERED DURING THE DRIVE TESTS: .....	55
7.5	SSA WISE DRIVE TEST OBSERVATION: .....	56
7.6	KEY FINDINGS ON DRIVE TEST:.....	59
8.	GRAPHICAL REPRESENTATION (CMTS):.....	61



## 1. BACKGROUND



## 1. BACKGROUND

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

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

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

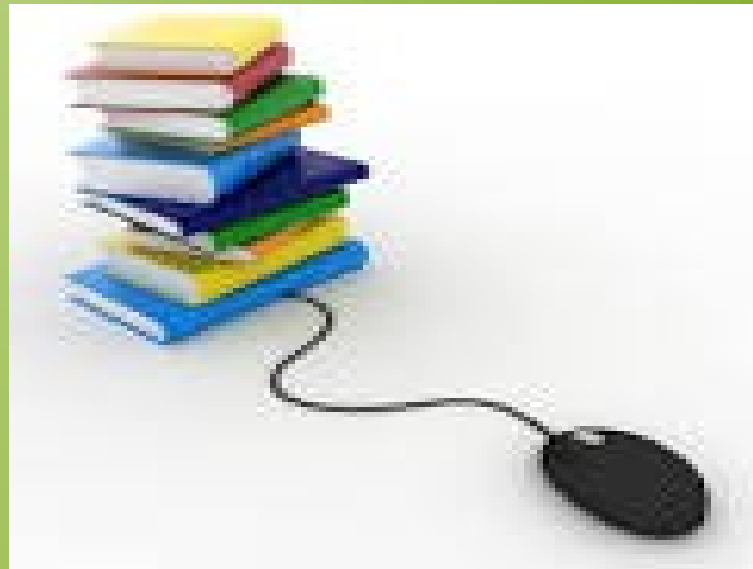
TRAI, the regulatory watch dog for the Quality of Service for the telecom services – Basic (Wire line), Cellular Mobile (Wireless) and Broadband has commissioned **M/s TUV-SUD South Asia Pvt. Ltd.** for conducting audit and assessment of quality of service of service providers, in terms of the benchmarks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

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

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

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

## **2. OBJECTIVES AND METHODOLOGY**



## **2. OBJECTIVES AND METHODOLOGY**

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

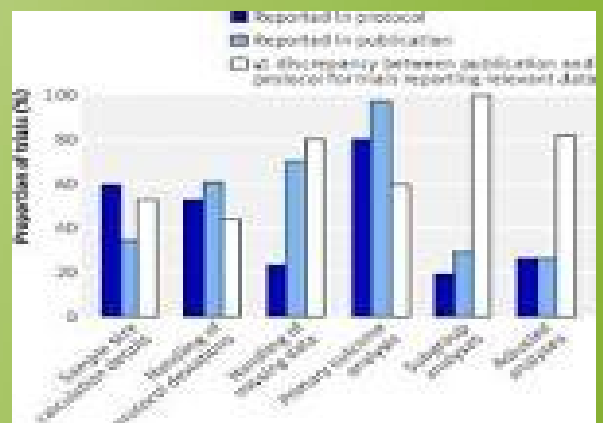
The audit and assessment of Quality of Service was carried out by **TUV SUD South Asia across all the Circles/Service areas of North and West Zones for Cellular Mobile Service. Apart from this, QoS audit for Basic (Wire line) and Broadband Services was also undertaken for Punjab, Rajasthan and Gujarat circles during the quarter April 2015 – June 2015.**

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
		April-15	May-15	June-15	
<b>GSM Operators</b>					
1	AIRCEL	6,7 & 8th April	4,5 & 6th May	3,4 & 5th June	Aircel Limited, Opus Center, Opp. Hotel Tunga Paradise, Near Speez ,Andheri(E)
2	AIRTEL	6,7 & 8th April	11,12 & 13th May	3,4 & 5th June	7th Floor, Interface 7, Near IJMIMA Tower, Behind Infinity Mall, Malad (West), Mumbai-400064
3	MTNL	1,2 & 3rd April	4,5 & 6th May	3,4 & 5th June	OMC-R unit, 10th Floor, Prabhadevi Telecom Bldg., V.S. Marg, Dadar(W),Mumbai-400028
4	TATA GSM	8,9 & 10th April	11,12 & 13th May	3,4 & 5th June	2nd Floor, TTML, Technopolis Park,Andheri(E),Mumbai
5	IDEA	6,7 & 8th April	6,7 & 8th May	3,4 & 5th June	3rd Floor Windsor ,Kalina CST Road,Santacruz East,Mumbai
6	RCOM GSM	13,14 & 15th April	6,7 & 8th May	--	Ai8, Reliance Infrastructure bldg,A-wing,MBP,mahape,Nav Mumbai.
7	VODAFONE	1,2 & 3rd April	4,5 & 6th May	3,4 & 5th June	Skyline ikon, Near Mittal Industrial Estate, Andheri Kurla Road, Marol Naka, Andheri (E), Mumbai-59
<b>CDMA Operators</b>					
8	RCOM CDMA	13,14 & 15th April	6,7 & 8th May	--	Ai8, Reliance Infrastructure bldg,A-wing,MBP,mahape,Nav Mumbai.
9	TATA CDMA	8,9 & 10th April	11,12 & 13th May	3,4 & 5th June	2nd Floor, TTML, Technopolis Park,Andheri(E),Mumbai

For all the above operators, audit was conducted in all the three months of the Quarter ended June 2015.

NB: 3 days live audit was not done for RCOM (GSM & CDMA) in the month of June-15 due to TTI server issue.

The data generated by monthly PMR and 3-days live measurements audit for the period April 2015 to June 2015 has been successfully uploaded to the server located at TRAI premises.

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

- The QoS audit for basic (wire line) service is to be done for the number of exchanges spread over in about 10% of SDCAs with each service providers in specified circles **once in a year**. **Based on this criterion, QoS audit for basic (wire line) service is not required to be done for Mumbai Circle in the quarter ended June - 2015, as the same has already been done during QE December 2014.**

### 3.3 SAMPLING FOR BROADBAND SERVICE PROVIDERS

- TUV–SUD South Asia has to conduct the audit and assessment of Quality of Service of Broadband Service only in respect of the service providers who are having broadband subscriber base of more than 10,000 subscribers in their licensed service area, for 5% of Point of Presence (PoPs) spread over in 10% SDCAs in specified Telecom Circle **once in a year**. **Based on this criterion, the QoS audit for Broadband service is not required to be done for Mumbai Circle in the quarter ended June - 2015, as the same has already been done during QE December 2014.**

## **4. EXECUTIVE SUMMARY**



## 4. EXECUTIVE SUMMARY

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

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

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

(i) From **monthly audit** it was concluded that on an average, performance of the operators in the Mumbai Metro Service area was satisfactory for **Network Parameters** except for one parameter namely **‘Worst affected cells > 3% TCH drop’** which could not be met by **Aircel, Tata(GSM) and Tata(CDMA)** with their quarterly average performance as **5.84%, 3.68% and 3.83%** respectively.

(ii) From three days live assessment, it was found that the performance of all operators was satisfactory as they were largely meeting the benchmarks except for the parameter **‘Worst affected cells> 3 % TCH drops’**. This parameter was not complied with by **Aircel, Tata (GSM) and Tata (CDMA)** in all the three months of the quarter with their quarterly average performance as **5.78%, 3.79% and 3.27%** respectively.

(iii) With regard to the **Customer Service Quality Parameters**, it was revealed that the parameters namely ‘Metering and Billing Credibility, Response Time to Customers, Termination of Service and Time taken for refunds’ have been largely met by the operators. However, **Vodafone** failed to meet the benchmark of **Billing Creditability for Post-paid** with its performance as **0.27%**.

Regarding response time to customer for assistance, all service providers are in compliance of the parameter Accessibility of call center. However, **Airtel, RCOM (GSM) and RCOM (CDMA)** have not met the benchmark of **Calls answered by**

**Operators (voice to voice) within 90 seconds.** They have achieved their performance as **81.98%, 79.04% and 79.08%** respectively. The parameter **Time taken for refunds after closure** remained underperformed by **Vodafone (88.38%)**.

The results for **three days live measurements** reveal that only **Airtel, RCOM GSM/RCOM CDMA** have not met the parameter **calls connection to operators (Voice to voice)**, with their performed value as **67.07%, 30.24% and 42.32%** respectively. The performance of **RCOM (GSM) / RCOM (CDMA)** was way below the benchmark.

(iv) Based on the analysis of the **drive test results**, it was revealed that **Aircel, MTNL, Idea, RCOM (GSM) and RCOM (CDMA)** were having non-complied performance for the parameters **Voice quality and Call drop rate** across the above SSAs where the drive tests were conducted during the quarter. **RCOM (CDMA)** also failed to do well with respect to the parameter **CSSR** across Central Mumbai SSA. These operators need improvement in their networks to remove the deficiencies with respect to non-complied parameters

## **5. PMR AUDIT REPORT**



## 5. PMR AUDIT REPORTS:

### 5.1 MONTHLY PMR:

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

Sl. No.	Name of Service Provider	Month of Audit	Network TCBH Hour
<b>GSM Operators</b>			
1	AIRTEL	June-15	20 Hrs-21 Hrs
2	AIRCEL	June-15	20 Hrs-21 Hrs
3	MTNL	June-15	19 Hrs-20 Hrs
4	IDEA	June-15	20 Hrs-21 Hrs
5	RCOM GSM	June-15	19 Hrs-20 Hrs
6	TATA GSM	June-15	19 Hrs-20 Hrs
7	VODAFONE	June-15	20 Hrs-21 Hrs
<b>CDMA Operators</b>			
8	RCOM CDMA	June-15	19 Hrs-20 Hrs
9	TATA CDMA	June-15	11 Hrs-12 Hrs

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

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

Sl. No.	Name of Service Provider	No. of MSC + GMSC	No. of BSC	No. of BTS	NSS make	BSS make
<b>GSM Operators</b>						
1	AIRTEL	15	70	4025	NSN	NSN
2	AIRCEL	3	19	1869	NSN	NSN
3	MTNL	5	46	990	Alcatel	Motorola, Alcatel
4	IDEA	8	32	3477	Ericsson	Ericsson
5	RCOM GSM	3	11	2178	Huawei	Huawei
6	TATA GSM	4	16	2887	Huawei	Huawei
7	VODAFONE	21	63	4543	Ericsson	Ericsson
<b>CDMA Operators</b>						
8	RCOM CDMA	8	NA	883	Lucent, ZTE, Ericsson	Lucent.
9	TATA CDMA	5	6	944	Huawei	Huawei



5.1.3 QOS PERFORMANCE OF MONTHLY PMR – APRIL-15 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES MUMBAI METRO CIRCLE - APRIL 15 MONTH												
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) BTS Accumulated Downtime	<=2%	Apr-15	0.06%	0.00%	0.52%	0.07%	0.16%	0.06%	0.02%	0.28%	0.07%
	b) Worst affected BTSs due to downtime	<=2%	Apr-15	0.17%	0.00%	1.21%	0.03%	0.14%	0.10%	0.00%	0.23%	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Apr-15	97.95%	99.99%	98.66%	98.90%	99.49%	99.35%	99.09%	98.23%	99.01%
	b) SDCCH/PAGING Channel congestion	<=1%	Apr-15	0.16%	0.00%	0.43%	0.38%	0.03%	0.11%	0.05%	0.00%	0.00%
	c) TCH congestion	<=2%	Apr-15	0.74%	0.00%	0.05%	0.75%	0.06%	0.22%	0.91%	0.02%	0.02%
<b>Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2%	Apr-15	1.04%	0.28%	1.30%	1.22%	0.32%	0.57%	1.22%	0.78%	0.60%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Apr-15	<b>6.30%</b>	0.03%	2.15%	2.13%	0.03%	<b>4.15%</b>	2.20%	0.08%	<b>3.86%</b>
	c) Connections with good voice quality	>=95%	Apr-15	97.10%	99.92%	95.53%	96.35%	98.94%	97.74%	96.75%	99.76%	99.09%
4	No. of POI's having >=0.5% POI congestion		Apr-15	0	0	0	0	0	0	0	0	0

**5.1.4 QOS PERFORMANCE OF MONTHLY PMR – MAY -15 MONTH:**

CELLULAR MOBILE TELEPHONE SERVICES MUMBAI METRO CIRCLE - MAY 15 MONTH												
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) BTS Accumulated Downtime	<=2%	May-15	0.08%	0.00%	0.54%	0.07%	0.13%	0.04%	0.03%	0.27%	0.04%
	b) Worst affected BTSs due to downtime	<=2%	May-15	0.05%	0.00%	1.21%	0.03%	0.09%	0.10%	0.00%	0.45%	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	May-15	98.30%	99.99%	98.94%	99.25%	99.58%	99.50%	99.42%	97.75%	99.05%
	b) SDCCH/PAGING Channel congestion	<=1%	May-15	0.07%	0.00%	0.54%	0.24%	0.03%	0.08%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	May-15	0.51%	0.00%	0.05%	0.43%	0.06%	0.11%	0.58%	0.04%	0.02%
<b>Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2%	May-15	0.83%	0.28%	1.26%	1.14%	0.33%	0.49%	1.08%	0.81%	0.57%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	May-15	<b>5.56%</b>	0.03%	2.38%	1.81%	0.12%	<b>3.36%</b>	2.44%	0.12%	<b>3.68%</b>
	c) Connections with good voice quality	>=95%	May-15	97.38%	99.93%	95.59%	96.31%	98.96%	97.87%	96.90%	99.76%	99.12%
4	No. of POI's having >=0.5% POI congestion		May-15	0	0	0	0	0	0	0	0	0

**5.1.5 QOS PERFORMANCE OF MONTHLY PMR – JUNE-15 MONTH:**

CELLULAR MOBILE TELEPHONE SERVICES MUMBAI METRO CIRCLE - JUNE 15 MONTH												
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) BTS Accumulated Downtime	<=2%	Jun-15	0.16%	0.01%	0.82%	0.11%	NP	0.07%	0.05%	NP	0.05%
	b) Worst affected BTSs due to downtime	<=2%	Jun-15	0.59%	0.00%	1.52%	0.03%	NP	0.00%	0.00%	NP	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Jun-15	98.02%	99.83%	98.69%	98.64%	NP	99.38%	99.17%	NP	98.92%
	b) SDCCH/PAGING Channel congestion	<=1%	Jun-15	0.14%	0.01%	0.41%	0.31%	NP	0.13%	0.06%	NP	0.00%
	c) TCH congestion	<=2%	Jun-15	1.23%	0.01%	0.09%	0.96%	NP	0.13%	0.83%	NP	0.06%
<b>Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2%	Jun-15	0.90%	0.31%	1.41%	1.35%	NP	0.56%	1.11%	NP	0.59%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Jun-15	<b>5.66%</b>	0.14%	2.04%	2.05%	NP	<b>3.53%</b>	2.20%	NP	<b>3.95%</b>
	c) Connections with good voice quality	>=95%	Jun-15	97.42%	97.54%	95.23%	96.00%	NP	97.51%	96.63%	NP	99.10%
4	No. of POI's having >=0.5% POI congestion		Jun-15	0	0	0	0	NP	0	0	NP	0

NP: Data not provided by RCOM (GSM & CDMA) due to TTI server issue.

**5.1.6 QOS PERFORMANCE OF QUARTERLY PMR –AVERAGE OF QE- JUNE- 15(APRIL TO JUNE MONTHS AUDITED DATA)**

QUARTERLY QOS PERFORMANCE (AVERAGE OF THREE MONTHS) OF MUMBAI METRO CIRCLE												
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) BTS Accumulated Downtime	<=2%	Quarterly	0.10%	0.00%	0.63%	0.08%	0.15%	0.06%	0.03%	0.28%	0.05%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.27%	0.00%	1.31%	0.03%	0.12%	0.07%	0.00%	0.34%	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	98.09%	99.94%	98.76%	98.93%	99.54%	99.41%	99.23%	97.99%	98.99%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.12%	0.00%	0.46%	0.31%	0.03%	0.11%	0.04%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	0.83%	0.00%	0.06%	0.71%	0.06%	0.15%	0.77%	0.03%	0.03%
<b>Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	0.92%	0.29%	1.32%	1.24%	0.33%	0.54%	1.14%	0.80%	0.59%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	<b>5.84%</b>	0.07%	2.19%	2.00%	0.08%	<b>3.68%</b>	2.28%	0.10%	<b>3.83%</b>
	c) Connections with good voice quality	>=95%	Quarterly	97.30%	99.13%	95.45%	96.22%	98.95%	97.71%	96.76%	99.76%	99.10%
4	No. of POI's having >=0.5% POI congestion		Quarterly	0	0	0	0	0	0	0	0	0

NB: Calculation for RCOM (GSM & CDMA) is done on the basis of two months (April & May 15) average data.

### 5.1.7 KEY FINDINGS ON MONTHLY PMR AUDIT REPORTS:

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

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

#### **Network Service Quality Parameters:**

- **Network Availability**

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

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

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

- **Connection Establishment (Accessibility)**

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

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

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

- **Parameters related to Network Congestion:**

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

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

With respect to this parameter, the performance of the operators is quite satisfactory as **all operators met the TRAI specified benchmarks on the congestion parameters.** 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 (0.20%) was for Airtel during the quarter.

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

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

The audit with respect to this parameter revealed that all the operators except **Aircel, Tata (GSM) and Tata (CDMA)** were in compliance of the benchmark for this parameter. The quarterly average performance of **Aircel, Tata (GSM) and Tata (CDMA)** with respect to this parameter was **5.84%, 3.68% and 3.83%** respectively.

- iii. Connections with good voice quality:

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

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



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

### 5.2.1 LIVE MEASUREMENT DATA (3-DAYS) – APRIL -15 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES - MUMBAI METRO CIRCLE- APRIL 15 MONTH												
Live measurement Data		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
1	<b>Network Availability</b>											
	a) BTS Accumulated Downtime	<=2%	Live data	0.01%	0.00%	0.31%	0.08%	0.41%	0.08%	0.01%	0.49%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2	<b>Connection Establishment (Accessibility)</b>											
	a) CSSR (Call Setup Success Rate)	>=95%	Live data	97.76%	99.99%	98.45%	98.63%	99.62%	99.34%	99.17%	98.50%	98.99%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.08%	0.00%	0.45%	0.52%	0.04%	0.23%	0.03%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.75%	0.00%	0.05%	1.03%	0.05%	0.21%	0.83%	0.01%	0.03%
3	<b>Connection maintenance (Retainability)</b>											
	a) CDR (Call Drop Rate)	<=2%	Live data	1.19%	0.28%	1.29%	1.26%	0.34%	0.04%	1.23%	0.64%	0.52%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	<b>6.95%</b>	0.06%	2.45%	2.26%	0.02%	<b>4.40%</b>	2.05%	0.12%	<b>3.23%</b>
	c) Connections with good voice quality	>=95%	Live data	97.11%	99.92%	95.47%	96.40%	98.95%	97.69%	96.71%	99.77%	99.10%
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0



**5.2.2 LIVE MEASUREMENT DATA (3-DAYS) – MAY-15 MONTH:**

CELLULAR MOBILE TELEPHONE SERVICES - MUMBAI METRO CIRCLE- MAY 15 MONTH												
Live measurement Data		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators							CDMA Operators	
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) BTS Accumulated Downtime	<=2%	Live data	0.03%	0.00%	0.85%	0.07%	0.00%	0.02%	0.04%	0.18%	0.03%
	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%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.18%	99.99%	98.83%	99.12%	99.64%	99.49%	99.40%	98.27%	99.05%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.02%	0.00%	0.45%	0.33%	0.03%	0.05%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.48%	0.00%	0.03%	0.55%	0.07%	0.10%	0.60%	0.03%	0.04%
<b>Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.91%	0.29%	1.32%	1.15%	0.32%	0.51%	1.16%	0.61%	0.55%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	<b>5.30%</b>	0.06%	1.99%	1.80%	0.03%	<b>3.52%</b>	2.63%	0.08%	<b>3.19%</b>
	c) Connections with good voice quality	>=95%	Live data	97.23%	99.94%	95.49%	96.37%	99.03%	97.81%	96.87%	99.77%	99.14%
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0

**5.2.3 LIVE MEASUREMENT DATA (3-DAYS) – JUNE-15 MONTH:**

CELLULAR MOBILE TELEPHONE SERVICES - MUMBAI METRO CIRCLE – JUNE 15 MONTH												
Live measurement Data		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) BTS Accumulated Downtime	<=2%	Live data	0.06%	0.00%	0.39%	0.08%	NP	0.03%	0.01%	NP	0.02%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.00%	0.00%	NP	0.00%	0.00%	NP	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.31%	99.99%	98.94%	99.16%	NP	99.48%	99.47%	NP	99.05%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.09%	0.00%	0.47%	0.27%	NP	0.12%	0.04%	NP	0.00%
	c) TCH congestion	<=2%	Live data	0.73%	0.00%	0.06%	0.53%	NP	0.12%	0.53%	NP	0.02%
<b>Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.76%	0.28%	1.32%	1.20%	NP	0.52%	1.02%	NP	0.56%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	<b>5.10%</b>	0.05%	2.38%	1.80%	NP	<b>3.45%</b>	1.85%	NP	<b>3.38%</b>
	c) Connections with good voice quality	>=95%	Live data	97.56%	99.95%	95.40%	96.22%	NP	97.82%	96.96%	NP	99.11%
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	NP	0	0	NP	0

NP: Data not provided by RCOM (GSM & CDMA) due to TTI server issue.

**5.2.4 QUARTERLY QOS PERFORMANCE OF 3-DAYS LIVE MEASUREMENT AUDITED DATA (AVERAGE OF APRIL TO JUNE 2015)**

QUARTERLY QOS PERFORMANCE OF 3-DAYS LIVE MEASUREMENT (AVERAGE OF THREE MONTHS) – MUMBAI CIRCLE												
Live measurement Data		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>1 Network Availability</b>												
1	a) BTS Accumulated Downtime	<=2%	Quarterly	0.03%	0.00%	0.52%	0.08%	0.21%	0.04%	0.02%	0.34%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.00%	0.00%	0.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>2 Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	98.08%	99.99%	98.74%	98.97%	99.63%	99.44%	99.35%	98.39%	99.03%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.06%	0.00%	0.46%	0.37%	0.04%	0.13%	0.03%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	0.65%	0.00%	0.05%	0.70%	0.06%	0.14%	0.65%	0.02%	0.03%
<b>3 Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	0.95%	0.28%	1.31%	1.20%	0.33%	0.36%	1.14%	0.63%	0.54%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	<b>5.78%</b>	0.06%	2.27%	1.95%	0.03%	<b>3.79%</b>	2.18%	0.10%	<b>3.27%</b>
	c) Connections with good voice quality	>=95%	Quarterly	97.30%	99.94%	95.45%	96.33%	98.99%	97.77%	96.85%	99.77%	99.12%
4	No. of POI's having >=0.5% POI congestion		Quarterly	0	0	0	0	0	0	0	0	0

NB: Calculation for RCOM (GSM & CDMA) is done on the basis of two months (April & May 15) average data.

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

From three days live assessment, it was found that the performance of all operators was satisfactory as they were largely meeting the benchmarks except for the parameter ‘**Worst affected cells> 3 % TCH drops**’. This parameter was not complied with by **Aircel, Tata (GSM) and Tata (CDMA)** in all the three months of the quarter with their quarterly average performance as **5.78%, 3.79% and 3.27%** respectively.

5.2.6 DETAILED NETWORK DATA ASSESSMENT OF CELLULAR MOBILE TELEPHONE SERVICES:

TABLE: 1

Detailed Network Data Assessment of Cellular Mobile Telephone Services- Mumbai Metro Circle- April 15 month												
S/N	Name of Parameter	Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators							CDMA Operators	
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) Total no. of BTSs in the licensed service area		Apr-15	1817	3976	992	3467	2203	2891	4498	883	944
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Apr-15	743	68	3711	1774	2612	1178	597	1763	480
	c) BTS Accumulated Downtime	<=2%	Apr-15	0.06%	0.00%	0.52%	0.07%	0.16%	0.06%	0.02%	0.28%	0.07%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Apr-15	3	0	12	1	3	3	0	2	0
	e) Worst affected BTSs due to downtime	<=2%	Apr-15	0.17%	0.00%	1.21%	0.03%	0.14%	0.10%	0.00%	0.23%	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Apr-15	97.95%	99.99%	98.66%	98.90%	99.49%	99.35%	99.09%	98.23%	99.01%
	b) SDCCH/PAGING Congestion	<=1%	Apr-15	0.16%	0.00%	0.43%	0.38%	0.03%	0.11%	0.05%	0.00%	0.00%
	c) TCH congestion	<=2%	Apr-15	0.74%	0.00%	0.05%	0.75%	0.06%	0.22%	0.91%	0.02%	0.02%
<b>Connection Maintenance (Retainability)</b>												
3	a) Call Drop Rate (CDR)	<=2%	Apr-15	1.04%	0.28%	1.30%	1.22%	0.32%	0.57%	1.22%	0.78%	0.60%
	b) Worst affected cells>3% TCH drop	<=3%	Apr-15	6.30%	0.03%	2.15%	2.13%	0.03%	4.15%	2.20%	0.08%	3.86%
	c) % of connections with good voice quality	>=95%	Apr-15	97.10%	99.92%	95.53%	96.35%	98.94%	97.74%	96.75%	99.76%	99.09%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Apr-15	335	3	57	214	2	334	247	2	101
	e) Total no. of cells (Sector) in the licensed service area		Apr-15	5318	10881	2653	10055	6061	8049	11204	2587	2604
<b>No. of POI's having &gt;=0.5% POI congestion</b>												
4	No. of POI's having >=0.5% POI congestion		Apr-15	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Apr-15	0	0	0	0	0	0	0	0	0
<b>Network Data</b>												
5	a) Equipped Capacity of Network in Erlang		Apr-15	62045	160966	37627	126777	72000	117141	285623	168000	106067
	b) Total traffic in TCBH in erlang (Avg.)		Apr-15	42052	101600	15651	107431	68681	59415	164537	82724	46406
	c) Total no. of customers served (as per VLR) on last day of the month		Apr-15	1406747	4500276	801042	3401203	2823572	1858469	6789117	2503306	476375

TABLE: 2

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live - Mumbai Metro Circle - April 15 month												
S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) Total no. of BTSs in the licensed service area		Live data	1804	3993	995	3462	2245	2889	4498	873	944
	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	18	11	221	190	659	170	36	306	12
	c) BTS Accumulated Downtime	<=2%	Live data	0.01%	0.00%	0.31%	0.08%	0.41%	0.08%	0.01%	0.49%	0.02%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	1	0	0	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	97.76%	99.99%	98.45%	98.63%	99.62%	99.34%	99.17%	98.50%	98.99%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.08%	0.00%	0.45%	0.52%	0.04%	0.23%	0.03%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.75%	0.00%	0.05%	1.03%	0.05%	0.21%	0.83%	0.01%	0.03%
<b>Connection Maintenance (Retainability)</b>												
3	a) Call Drop Rate (CDR)	<=2%	Live data	1.19%	0.28%	1.29%	1.26%	0.34%	0.04%	1.23%	0.64%	0.52%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	6.95%	0.06%	2.45%	2.26%	0.02%	4.40%	2.05%	0.12%	3.23%
	c) % of connections with good voice quality	>=95%	Live data	97.11%	99.92%	95.47%	96.40%	98.95%	97.69%	96.71%	99.77%	99.10%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	367	6	65	227	1	354	229	3	84
	e) Total no. of cells (Sector) in the licensed service area		Live data	5280	10860	2658	10045	6096	8051	11178	2557	2602
<b>No. of POI's having &gt;=0.5% POI congestion</b>												
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0

TABLE: 3

Detailed Network Data Assessment of Cellular Mobile Telephone Services - Mumbai Metro Circle- May 15 month												
S/N	Name of Parameter	Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators							CDMA Operators	
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) Total no. of BTSs in the licensed service area		May-15	1829	4010	992	3484	2178	2891	4512	883	945
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		May-15	1033	65	3993	1852	2042	809	925	1764	270
	c) BTS Accumulated Downtime	<=2%	May-15	0.08%	0.00%	0.54%	0.07%	0.13%	0.04%	0.03%	0.27%	0.04%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		May-15	1	0	12	1	2	3	0	4	0
	e) Worst affected BTSs due to downtime	<=2%	May-15	0.05%	0.00%	1.21%	0.03%	0.09%	0.10%	0.00%	0.45%	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	May-15	98.30%	99.99%	98.94%	99.25%	99.58%	99.50%	99.42%	97.75%	99.05%
	b) SDCCH/PAGING Congestion	<=1%	May-15	0.07%	0.00%	0.54%	0.24%	0.03%	0.08%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	May-15	0.51%	0.00%	0.05%	0.43%	0.06%	0.11%	0.58%	0.04%	0.02%
<b>Connection Maintenance (Retainability)</b>												
3	a) Call Drop Rate (CDR)	<=2%	May-15	0.83%	0.28%	1.26%	1.14%	0.33%	0.49%	1.08%	0.81%	0.57%
	b) Worst affected cells>3% TCH drop	<=3%	May-15	5.56%	0.03%	2.38%	1.81%	0.12%	3.36%	2.44%	0.12%	3.68%
	c) % of connections with good voice quality	>=95%	May-15	97.38%	99.93%	95.59%	96.31%	98.96%	97.87%	96.90%	99.76%	99.12%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		May-15	297	3	63	183	7	271	275	3	96
	e) Total no. of cells (Sector) in the licensed service area		May-15	5344	10944	2652	10086	6056	8059	11262	2590	2606
<b>No. of POI's having &gt;=0.5% POI congestion</b>												
4	No. of POI's having >=0.5% POI congestion		May-15	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		May-15	0	0	0	0	0	0	0	0	0
<b>Network Data</b>												
5	a) Equipped Capacity of Network in Erlang		May-15	56019	158295	37627	127889	72000	113062	291214	168000	106067
	b) Total traffic in TCBH in erlang (Avg.)		May-15	37979	93177	14076	97795	65385	54321	144593	82134	42250
	c) Total no. of customers served (as per VLR) on last day of the month		May-15	1352036	4473373	778382	3320519	2801498	1806738	6610045	2530175	457600

TABLE: 4

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live - Mumbai Metro Circle – May 15 month												
S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) Total no. of BTSs in the licensed service area		Live data	1817	4005	992	3471	2133	2885	4498	883	947
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Live data	44	9	605	181	0	52	146	116	19
	c) BTS Accumulated Downtime	<=2%	Live data	0.03%	0.00%	0.85%	0.07%	0.00%	0.02%	0.04%	0.18%	0.03%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	2	0	0	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.20%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.18%	99.99%	98.83%	99.12%	99.64%	99.49%	99.40%	98.27%	99.05%
	b) SDCCCH/PAGING Congestion	<=1%	Live data	0.02%	0.00%	0.45%	0.33%	0.03%	0.05%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.48%	0.00%	0.03%	0.55%	0.07%	0.10%	0.60%	0.03%	0.04%
<b>Connection Maintenance (Retainability)</b>												
3	a) Call Drop Rate (CDR)	<=2%	Live data	0.91%	0.29%	1.32%	1.15%	0.32%	0.51%	1.16%	0.61%	0.55%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	5.30%	0.06%	1.99%	1.80%	0.03%	3.52%	2.63%	0.08%	3.19%
	c) % of connections with good voice quality	>=95%	Live data	97.23%	99.94%	95.49%	96.37%	99.03%	97.81%	96.87%	99.77%	99.14%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	282	7	159	181	2	284	296	2	83
	e) Total no. of cells (Sector) in the licensed service area		Live data	5318	10912	7974	10083	5940	8058	11236	2587	2604
<b>No. of POI's having &gt;=0.5% POI congestion</b>												
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0

TABLE: 5

Detailed Network Data Assessment of Cellular Mobile Telephone Services - Mumbai Metro Circle- June 15 month												
S/N	Name of Parameter	Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) Total no. of BTSs in the licensed service area		Jun-15	1869	4025	990	3477	NP	2887	4543	NP	944
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Jun-15	2156	204	5865	2686	NP	1522	1487	NP	350
	c) BTS Accumulated Downtime	<=2%	Jun-15	0.16%	0.01%	0.82%	0.11%	NP	0.07%	0.05%	NP	0.05%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Jun-15	11	0	15	1	NP	0	0	NP	0
	e) Worst affected BTSs due to downtime	<=2%	Jun-15	0.59%	0.00%	1.52%	0.03%	NP	0.00%	0.00%	NP	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Jun-15	98.02%	99.83%	98.69%	98.64%	NP	99.38%	99.17%	NP	98.92%
	b) SDCCH/PAGING Congestion	<=1%	Jun-15	0.14%	0.01%	0.41%	0.31%	NP	0.13%	0.06%	NP	0.00%
	c) TCH congestion	<=2%	Jun-15	1.23%	0.01%	0.09%	0.96%	NP	0.13%	0.83%	NP	0.06%
<b>Connection Maintenance (Retainability)</b>												
3	a) Call Drop Rate (CDR)	<=2%	Jun-15	0.90%	0.31%	1.41%	1.35%	NP	0.56%	1.11%	NP	0.59%
	b) Worst affected cells>3% TCH drop	<=3%	Jun-15	5.66%	0.14%	2.04%	2.05%	NP	3.53%	2.20%	NP	3.95%
	c) % of connections with good voice quality	>=95%	Jun-15	97.42%	97.54%	95.23%	96.00%	NP	97.51%	96.63%	NP	99.10%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Jun-15	307	15	54	208	NP	285	250	NP	103
	e) Total no. of cells (Sector) in the licensed service area		Jun-15	5424	10956	2646	10127	NP	8068	11357	NP	2606
<b>No. of POI's having &gt;=0.5% POI congestion</b>												
4	No. of POI's having >=0.5% POI congestion		Jun-15	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Jun-15	0	0	0	0	0	0	0	0	0
<b>Network Data</b>												
5	a) Equipped Capacity of Network in Erlang		Jun-15	58789	158890	37627	127118	NP	115269	292288	NP	106067
	b) Total traffic in TCBH in erlang (Avg.)		Jun-15	40272	98236	15498	105212	NP	58350	145458	NP	42020
	c) Total no. of customers served (as per VLR) on last day of the month		Jun-15	1502697	4954122	871015	3739946	NP	2010327	7334014	NP	608850

NP: Data not provided by RCOM (GSM & CDMA) due to TTI server issue.



TABLE: 6

Detailed Network Data Assessment of Cellular Mobile Telephone Services -3 days live - Mumbai Metro Circle - June 15 month												
S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) Total no. of BTSs in the licensed service area		Live data	1829	4034	992	3485	NP	2886	4512	NP	945
	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	80	9	275	193	NP	52	28	NP	13
	c) BTS Accumulated Downtime	<=2%	Live data	0.06%	0.00%	0.39%	0.08%	NP	0.03%	0.01%	NP	0.02%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	0	0	NP	0	0	NP	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.00%	0.00%	NP	0.00%	0.00%	NP	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.31%	99.99%	98.94%	99.16%	NP	99.48%	99.47%	NP	99.05%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.09%	0.00%	0.47%	0.27%	NP	0.12%	0.04%	NP	0.00%
	c) TCH congestion	<=2%	Live data	0.73%	0.00%	0.06%	0.53%	NP	0.12%	0.53%	NP	0.02%
<b>Connection Maintenance (Retainability)</b>												
3	a) Call Drop Rate (CDR)	<=2%	Live data	0.76%	0.28%	1.32%	1.20%	NP	0.52%	1.02%	NP	0.56%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	5.10%	0.05%	2.38%	1.80%	NP	3.45%	1.85%	NP	3.38%
	c) % of connections with good voice quality	>=95%	Live data	97.56%	99.95%	95.40%	96.22%	NP	97.82%	96.96%	NP	99.11%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	273	6	63	183	NP	278	211	NP	88
	e) Total no. of cells (Sector) in the licensed service area		Live data	5356	11001	2652	10142	NP	8069	11376	NP	2607
<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	NP	0	0	NP	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	NP	0	0	NP	0

NP: Data not provided by RCOM (GSM & CDMA) due to TTI server issue.

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



### 5.3 CUSTOMER SERVICE QUALITY PARAMETERS MEASUREMENT FOR CMTS:

#### 5.3.1 QUARTERLY CUSTOMER SERVICE DELIVERY (CSD) AUDITED DATA FOR CELLULAR MOBILE SERVICES (APRIL to JUNE 2015 MONTHS AUDITED DATA):

QUARTERLY CSD AUDITED DATA FOR CELLULAR MOBILE TELEPHONE SERVICES											
Quarterly CSD Audit Data		Bench- mark	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
S/ N	Name of Parameter		GSM Operators						CDMA Operators		
<b>Metering &amp; Billing Credibility -Post Paid</b>											
1	A) No. of bills issued during the quarter		121831	2427420	401463	1892282	565027	324703	7263917	1210280	122922
	B) No. of bills disputed including billing complaints during the quarter		1	275	227	1280	503	5	19812	1086	2
	C)% of billing complaints during the quarter	<= 0.1%	0.001%	0.01%	0.06%	0.07%	0.09%	0.002%	0.27%	0.09%	0.002%
<b>Metering &amp; Billing Credibility -Pre Paid</b>											
2	A) Total No. of Pre-paid customers at the end of the quarter		2496315	3891717	1026893	3379301	2633085	2742786	6187810	2377517	706449
	B) Total No. of complaints relating to charging, Credit and Validity during the quarter		2	96	119	2480	2359	1	4750	775	0
	C) % of Pre-paid Charging Complaints	<= 0.1%	0.00%	0.002%	0.00	0.07%	0.09%	0.00%	0.08%	0.03%	0.00%
<b>Resolution of Billing/Charging Complaints and Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints</b>											
3	A) No. of Billing/Charging/Credit/Validity Complaints received during the quarter		3	371	227	18423	2862	6	24562	1861	2
	B) No. of billing complaints for Post paid customers/Charging/Credit/Validity complaints for pre-paid customers resolved within 4 weeks during the quarter		3	371	224	18423	2862	6	24562	1861	2
	C) No. of billing complaints for Post paid customers/Charging/Credit/Validity complaints for pre-paid customers resolved within 6 weeks during the quarter		3	371	227	18423	2862	6	24562	1861	2
	D) % of billing complaints (for post paid customer) / Charging/Credit/Validity (for Pre paid customer) resolved within 4 weeks	>=98% within 4 weeks	100.00%	100.00%	98.68%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	E) % of billing complaints (for post paid customer) / Charging/Credit/Validity (for Pre paid customer) resolved within 6 weeks	100% within 6 weeks	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	F) % of Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints	<=1 week	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

QUARTERLY CSD AUDITED DATA FOR CELLULAR MOBILE TELEPHONE SERVICES												
Quarterly CSD Audit Data		Bench- mark	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA	
S/ N	Name of Parameter		GSM Operators						CDMA Operators			
<b>Response time to customers for assistance</b>												
4	A) Total no of calls attempted to customer care/Call center		10470784	975932			8399266	3939436	508025	14897793	772961	110272
	B) Total no. of calls successfully established to customer care/Call center.		10386464	975932		IVR Not Functional	8317233	3899362	504923	14895327	755954	109726
	C) % Accessibility of Call centre /customer Care (Total calls successfully established *100/ Total call attempts)	>=95%	99.19%	100.00%			99.02%	98.98%	99.39%	99.98%	97.80%	99.50%
	D) Total Calls reached to operator for Voice to Voice (Total call attempts)		2112443	3125227	962851	2810265	1099825	871959	4370652	236945	111500	
	E) Total number of calls answered by the operator (Voice to voice) within 90 seconds		2050847	2561963	920197	2789194	869349	861911	4271931	187375	108944	
	F) % age of calls answered by operator (voice to voice) (Total calls successfully established within 90 Sec.*100 / Total call attempts )	>=95%	97.08%	81.98%	95.57%	99.25%	79.04%	98.85%	97.74%	79.08%	97.71%	
<b>Termination/closure of service</b>												
5	A) Total No. of requests for Termination / Closure of service received during the quarter		958	10065	11924	9725	2625	5767	25069	5279	2453	
	B) No. of requests for Termination /Closure of service complied within 7 days during the quarter		958	10065	11924	9725	2625	5767	25069	5279	2453	
	C) % of Termination/ Closure of service within 7 days	<=7days	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	
<b>Time taken for refunds of deposits after closures.</b>												
6	A) No. of Payments/ Refunds due during the quarter		221	2285	640	1702	1433	706	4052	1684	626	
	B) No. of Payments/ Refunds Cleared during the quarter		221	2285	640	1702	1433	706	3581	1684	626	
	C) Time taken for refunds of deposits after closures.	100% within 60 days	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	88.38%	100.00%	100.00%	

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

NB: Accessibility of call center / Customer care data of RCOM (GSM & CDMA) are based on average of two months' data i.e. April & May 15, June-15 month data has not provided by RCOM (GSM & CDMA) due to TTI server issue.

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

CSD 3 DAYS LIVE DATA FOR CELLULAR MOBILE TELEPHONE SERVICES – QE JUNE 2015											
3 days live CSD Audit Data		Bench- mark	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
S/ N	Name of Parameter		GSM Operators						CDMA Operators		
1	<b>Response time to customers for assistance</b>										
	Total no of calls attempted to customer care/Call center		393059	33327		296290	NP	17990	509560	NP	4041
	Total no. of calls successfully established to customer care/Call center		390047	33327		296285	NP	17859	509493	NP	4033
	% Accessibility of Call centre /customer Care (Total call successfully established *100 / Total call attempts)	>=95%	99.23%	100.00%	IVR Not Functional	100.00%	NP	99.27%	99.99%	NP	99.80%
2	Total Calls reached to operator for Voice to Voice (Total call attempts)		75146	111987	35762	98749	31127	31610	149390	7757	3591
	Total number of calls answered by the operator (Voice to voice) within 90 seconds.		73508	75113	34215	97873	9413	31267	146062	3283	3530
	% age of calls answered by operator(voice to voice) (Total calls successfully established within 90 sec. *100 / Total call attempts)	>=95%	97.82%	67.07%	95.67%	99.11%	30.24%	98.91%	97.77%	42.32%	98.30%

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

NP: RCOM (GSM & CDMA) has not provided data for the parameter “Accessibility of call center / Customer care” due to TTI server issue.

### 5.3.3 KEY FINDINGS ON CUSTOMER SERVICE DELIVERY (CSD) PARAMETERS

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

The performance of the service providers with respect to the parameter metering and billing credibility for both post-paid and pre-paid was within the prescribed bench mark of  $\leq 0.1\%$ . However, **Vodafone** failed to meet the benchmark of Billing Creditability for Post-paid with its performance as **0.27%**.

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

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

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

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

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

All service providers are in compliance of the parameter Accessibility of call center. However, **Airtel, RCOM (GSM) and RCOM (CDMA) have** not met the benchmark of **Calls answered by Operators (voice to voice) within 90 seconds**. They have achieved their performance as **81.98%, 79.04% and 79.08%** respectively.

#### 4. Termination/Closure of Service

In case of this parameters also, all operators have settled 100 % closure/termination within 7 days.

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

All operators (except **Vodafone**) were found to have complied with the benchmark of 100% refund of deposits within 60 days of closure. The performance of **Vodafone** was **88.38%**.

#### Live Measurements:

The results for **three days live measurements** reveal that only **Airtel, RCOM GSM and RCOM CDMA** have not met the benchmarks of parameter **calls connection to operators (Voice to voice)**, with their performance as **67.07%,30.24% and 42.32%** respectively, against the benchmark of  $\geq 95\%$ .

## **6. LIVE CALLING ASSESSMENT**



## 6. LIVE CALLING ASSESSMENT:

### 6.1 INTER OPERATOR CALLS ASSESSMENT:

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

INTER OPERATOR CALL ASSESSMENT										
Calling Operators	Circle Name	Aircel	Airtel	MTNL	Idea	RCOM (GSM)	Tata (GSM)	Vodafone	RCOM (CDMA)	Tata (CDMA)
Aircel	Mumbai	--	100%	100%	100%	100%	100%	100%	100%	100%
Airtel		100%	--	98%	100%	100%	100%	100%	99%	100%
MTNL		100%	99%	--	100%	98%	100%	99%	100%	100%
Idea		98%	100%	100%	--	100%	99%	100%	100%	99%
RCOM (GSM)		100%	100%	100%	100%	--	100%	100%	99%	100%
Tata (GSM)		99%	100%	100%	100%	100%	--	100%	100%	100%
Vodafone		100%	99%	99%	99%	100%	100%	--	100%	100%
RCOM (CDMA)		100%	100%	100%	100%	99%	98%	100%	--	100%
Tata (CDMA)		100%	100%	100%	100%	100%	100%	99%	100%	--

The result of the testing revealed that the inter connection performance among the operators was quite satisfactory. Thus there was no remarkable problem in interconnection from one operator to other operators.



## 6.2 CUSTOMER CARE / HELPLINE ASSESSMENT:

LIVE CALLING TO CALL CENTRE										
Parameter	Circle Name	AIRCEL	AIRTEL	MTNL	IDEA	RCOM (GSM)	TATA (GSM)	VODAFONE	RCOM (CDMA)	TATA (CDMA)
Total No. of calls Attempted	Mumbai Metro	100	100	IVR Not Function	100	100	100	100	100	100
Total no. of calls successfully established to customer care/Call center	Mumbai Metro	100	100		100	100	100	100	100	100
% Accessibility of Call centre /customer Care (Total call successfully established *100/ Total call attempt)	Mumbai Metro	100%	100%		100%	100%	100%	100%	100%	100%
Total Calls reached to agent desk for Voice to Voice (Total call attempt)	Mumbai Metro	100	100	100	100	100	100	100	100	100
Total number of calls answered by the operator (Voice to voice) within 90 seconds.	Mumbai Metro	100	100	100	100	99	100	100	100	100
% age of calls answered by operator (voice to voice) (Total call successfully established within 90 Sec.*100 /Total call attempt)	Mumbai Metro	100%	100%	100%	100%	99.00%	100%	100%	100%	100%

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

**6.3 LIVE CALLING ASSESSMENT FOR BILLING COMPLAINTS:**

TELEPHONIC INTERVIEW FOR BILLING COMPLAINTS										
Parameter	Circle Name	AIRCEL	AIRTEL	MTNL	IDEA	RCOM (GSM)	TATA (GSM)	VODAFONE	RCOM (CDMA)	TATA (CDMA)
Total No. of calls Attempted	Mumbai	3	100	100	100	100	6	100	100	2
Total No. of calls Answered	Mumbai	3	100	100	100	100	5	100	100	1
Resolution of Billing Complaints	Mumbai	3	100	100	100	100	5	100	100	1
%age of cases resolved	Mumbai	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

To test the Service Providers performance on billing related complaints and their resolutions, TUV-SUD auditors conducted a customer feedback calling for about random 100 nos. of customers. However, in some cases, the number of customers contacted for verification was very less due to less number of billing complaints. During live calling, some of the customers did not attend the calls, so shortfall was made good by taking other complaints to make verification of 100 Complaints. Some of the complainants reported that they didn't exactly remember about the resolution of complaints. However, majority of the customers reported that the billing complaints were resolved to their satisfaction

**6.4 LEVEL -1 CALLING ASSESSMENT:**

LEVEL 1 LIVE CALLING															
Emergency no.	Month	SSA Name	SDCA Name	No. of calls made	AIRCEL	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	UNINOR	VODAFONE	RCOM (CDMA)	TATA (CDMA)	
100, 101, 102,1098	April 15'	Thane	Thane Day 1	20	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
100, 101, 102,1098			Thane Day 2	20	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
100, 101, 102,1098			Thane Day 3	10	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
100, 101, 102,1098	May 15'	Central Mumbai	Central Mumbai Day 1	20	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
100, 101, 102,1098			Central Mumbai Day 2	20	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
100, 101, 102,1098			Central Mumbai Day 3	10	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
100, 101, 102,1098	June 15'	New Mumbai	New Mumbai Day 1	20	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
100, 101, 102,1098			New Mumbai Day 2	20	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
100, 101, 102,1098			New Mumbai Day 3	10	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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 (April15 – June15) in different SDCAs. In Mumbai Metro service area, these services were found functional in the networks of all the service providers.

## 7. DRIVE TEST



## **7. OPERATOR ASSISTED DRIVE TEST**

In terms of TRAI's letter dated 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 **Thane, Central Mumbai and Navi Mumbai** in the months of April, May and June 2015 respectively. The total route Kms covered during drive tests in respective SSAs was **315 Kms, 326 Kms and 353 Kms**. The performance of the operators has been highlighted below in the tables. The drive test was conducted simultaneously for all the operators following the same route of drive tests. The holding period for all test calls was 120 seconds. The drive test vehicle across all routes plied at a speed of about 30-50 km per hour

For measuring voice quality, Rx Qual samples on a scale from 0 to 7 for GSM operators and Frame Error Rate (FERs) for CDMA service providers were measured. As per the QoS norms, Rx Qual between 0- 5 for GSM operators and between 0-4 % FER value for CDMA operators is considered to be good, where as Rx Qual beyond this benchmark is considered to be bad. Call drops were measured by the number of calls that were dropped to the total number of calls established during the drive test. Similarly CSSR was measured as the ratio of total calls established to the total call attempts made. Signal strength was measured in dBm at street level with strength  $\geq -75$  dBm for in-door coverage and  $\geq -85$  dBm for in-vehicle.

7.1 OPERATOR ASSISTED DRIVE TEST: THANE (APRIL-15)

DRIVE TEST TABLE – 1

S/N	Parameter	Classification of Route covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		VODAFONE		TATA CDMA		RCOM CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
1	Call Attempts	Highways	97	30	74	30	66	30	91	30	95	30	82	30	72	30	78	30	88	30
		Major Roads	77	30	53	30	66	30	93	30	74	30	80	30	66	31	82	30	78	30
		Within City	359	30	307	30	279	34	377	30	374	30	376	30	347	30	379	30	409	30
		Overall SSA	533	90	434	90	411	94	561	90	543	90	538	90	485	91	539	90	575	90
2	Blocked Call Rate	Highways	1.03%	0.00%	0.00%	0.00%	1.52%	0.00%	1.10%	0.00%	0.00%	0.00%	2.44%	0.00%	0.00%	0.00%	0.00%	0.00%	3.41%	0.00%
		Major Roads	0.00%	0.00%	0.00%	0.00%	4.55%	0.00%	1.08%	0.00%	0.00%	0.00%	3.75%	0.00%	0.00%	0.00%	0.00%	0.00%	2.56%	0.00%
		Within City	2.51%	0.00%	0.00%	0.00%	0.72%	0.00%	2.12%	0.00%	0.27%	0.00%	2.39%	0.00%	0.00%	0.00%	0.26%	0.00%	2.93%	0.00%
		Overall SSA	1.88%	0.00%	0.00%	0.00%	1.46%	0.00%	1.78%	0.00%	0.18%	0.00%	2.60%	0.00%	0.00%	0.00%	0.19%	0.00%	2.96%	0.00%
3	Dropped Call Rate (<=2%)	Highways	1.05%	0.00%	0.00%	0.00%	4.62%	0.00%	0.00%	0.00%	1.05%	0.00%	1.25%	0.00%	0.00%	0.00%	0.00%	0.00%	12.94%	0.00%
		Major Roads	1.32%	0.00%	0.00%	0.00%	6.35%	0.00%	0.00%	0.00%	0.00%	0.00%	2.60%	0.00%	0.00%	0.00%	0.00%	0.00%	1.32%	0.00%
		Within City	0.57%	0.00%	0.00%	0.00%	1.08%	0.00%	1.08%	0.00%	0.00%	0.00%	2.72%	0.00%	0.00%	0.00%	0.53%	0.00%	5.79%	0.00%
		Overall SSA	0.77%	0.00%	0.00%	0.00%	2.47%	0.00%	0.72%	0.00%	0.18%	0.00%	2.48%	0.00%	0.00%	0.00%	0.37%	0.00%	6.27%	0.00%

**AUDIT & ASSESSMENT OF QOS FOR QE-JUNE-2015-MUMBAI METRO CIRCLE**



S/N	Parameter	Classification of Route covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		VODAFONE		TATA CDMA		RCOM CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
			<b>Percentage connections with good voice quality (=&gt;95%)</b>																	
4	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Highways	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	95.46%	96.95%	<b>88.37%</b>	100%
		Major Roads	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.16%	95.09%	<b>92.11%</b>	99.84%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	95.82%	97.53%	<b>90.38%</b>	98.72%
		Overall SSA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	95.81%	96.48%	<b>90.33%</b>	99.74%
	(b) 0-5 ( with frequency hopping for GSM Operators)	Highways	<b>94.44%</b>	98.98%	96.54%	99.59%	<b>86.71%</b>	99.30%	96.77%	99.67%	95.39%	97.64%	<b>89.98%</b>	<b>94.08%</b>	96.88%	99.76%	NA	NA	NA	NA
		Major Roads	<b>94.69%</b>	98.97%	96.79%	99.59%	<b>90.11%</b>	98.62%	97.29%	100%	<b>94.77%</b>	99.76%	<b>85.04%</b>	99.76%	95.20%	98.59%	NA	NA	NA	NA
		Within City	<b>94.02%</b>	98.39%	96.52%	99.11%	<b>91.40%</b>	<b>78.45%</b>	97.23%	99.76%	<b>94.03%</b>	99.84%	<b>88.47%</b>	99.55%	95.23%	99.77%	NA	NA	NA	NA
		Overall SSA	<b>94.20%</b>	98.78%	96.56%	99.43%	<b>90.54%</b>	<b>91.28%</b>	97.16%	99.81%	<b>94.36%</b>	99.08%	<b>88.20%</b>	97.20%	95.48%	99.38%	NA	NA	NA	NA
<b>Service Coverage</b>																				
5	In door (>= - 75dBm)	Highways	92.70%	99.91%	78.85%	39.84%	30.69%	24.10%	97.23%	99.84%	90.72%	98.68%	60.81%	97.24%	66.44%	91.68%	97.17%	100%	60.66%	100%
		Major Roads	89.10%	98.73%	74.86%	99.00%	38.23%	30.99%	96.63%	99.22%	95.37%	97.35%	47.77%	60.46%	59.44%	88.60%	98.62%	95.48%	54.93%	100%
		Within City	94.52%	99.97%	71.01%	73.80%	29.99%	29.82%	95.61%	98.95%	93.62%	99.99%	42.69%	31.15%	62.43%	97.60%	99.48%	100%	52.26%	100%
		Overall SSA	94.00%	99.53%	74.91%	70.88%	31.32%	28.50%	96.31%	97.63%	93.37%	98.67%	50.42%	70.97%	62.64%	92.66%	98.43%	98.49%	53.85%	100%
	In-vehicle (>= - 85dBm)	Highways	99.10%	100%	92.87%	60.16%	74.86%	74.78%	99.70%	100%	99.72%	100%	87.40%	100%	91.69%	99.87%	99.84%	100%	84.14%	100%
		Major Roads	98.29%	100%	92.72%	99.98%	80.23%	79.37%	99.88%	100%	99.90%	99.74%	75.59%	98.62%	88.65%	99.82%	99.99%	100%	86.51%	100%
		Within City	98.94%	100%	91.97%	99.90%	74.44%	79.77%	99.84%	99.98%	99.85%	100%	73.28%	100%	90.40%	99.76%	99.99%	100%	84.46%	100%
		Overall SSA	99.58%	100%	92.52%	86.68%	75.36%	78.15%	99.83%	100%	99.84%	99.91%	78.76%	99.51%	90.35%	99.81%	99.94%	100%	84.70%	100%
	Outdoor- in city (>= - 95dBm)	Highways	99.88%	100%	100%	100%	99.05%	100%	100%	100%	99.96%	100%	96.61%	100%	99.62%	100%	100%	100%	100%	100%
		Major Roads	99.76%	100%	100%	100%	98.52%	99.89%	100%	100%	100%	99.96%	93.73%	100%	99.08%	99.97%	100%	100%	100%	100%
		Within City	99.85%	100%	100%	100%	98.46%	99.87%	100%	100%	99.99%	100%	93.67%	100%	99.55%	100%	100%	100%	100%	100%
		Overall SSA	99.93%	100%	100%	100%	98.55%	99.91%	100%	100%	99.99%	99.99%	94.67%	100%	99.49%	99.99%	100%	100%	100%	100%

**AUDIT & ASSESSMENT OF QOS FOR QE-JUNE-2015-MUMBAI METRO CIRCLE**



S/N	Parameter	Classification of Route covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		VODAFONE		TATA CDMA		RCOM CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
6	Call Setup Success Rate (>=95%)	Highways	97.94%	100%	97.30%	100%	98.48%	100%	98.90%	100%	100%	100%	97.56%	100%	100%	100%	100%	100%	100%	96.59%	100%
		Major Roads	98.70%	100%	100%	100%	95.45%	100%	98.92%	100%	100%	100%	96.25%	100%	100%	100%	100%	100%	100%	97.44%	100%
		Within City	96.94%	100%	100%	100%	99.28%	100%	98.14%	100%	99.73%	100%	97.61%	100%	100%	100%	99.74%	100%	100%	97.07%	100%
		Overall SSA	97.37%	100%	99.54%	100%	98.54%	100%	98.40%	100%	99.82%	100%	97.40%	100%	100%	100%	99.81%	100%	100%	97.04%	100%
7	Hand Over Success Rate (HOSR)	Highways	99.08%	100%	96.98%	100%	99.47%	100%	98.76%	98.46%	99.29%	100%	98.19%	100%	99.02%	100%	100%	100%	100%	100%	100%
		Major Roads	100%	100%	96.58%	100%	96.40%	100%	97.72%	100%	99.51%	100%	100%	100%	98.83%	100%	100%	100%	100%	100%	100%
		Within City	98.34%	100%	97.95%	100%	97.86%	100%	99.37%	100%	98.73%	100%	98.38%	100%	98.67%	100%	100%	100%	100%	100%	100%
		Overall SSA	98.69%	100%	97.63%	100%	97.96%	100%	99.02%	100%	98.93%	100%	98.57%	100%	98.75%	100%	100%	100%	100%	100%	100%

NA: Not Applicable

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



7.2 OPERATOR ASSISTED DRIVE TEST: CENTRAL MUMBAI (MAY-15)

DRIVE TEST TABLE – 2

S/N	Parameter	Classification of Route covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		VODAFONE		TATA CDMA		RCOM CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
1	Call Attempts	Highways	117	30	89	30	89	33	98	30	109	30	67	32	89	30	86	30	115	31	
		Major Roads	49	30	40	30	42	31	36	30	47	30	37	30	40	30	38	30	44	32	
		Within City	311	30	266	30	314	34	301	30	301	30	303	30	279	30	267	30	323	30	
		Overall SSA	477	90	395	90	445	98	435	90	457	90	407	92	408	90	391	90	482	93	
2	Blocked Call Rate	Highways	0.00%	0.00%	0.00%	0.00%	2.25%	0.00%	2.04%	0.00%	1.83%	0.00%	1.49%	0.00%	0.00%	0.00%	0.00%	0.00%	4.35%	0.00%	
		Major Roads	2.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	18.18%	0.00%	
		Within City	0.64%	0.00%	0.00%	0.00%	1.27%	0.00%	1.66%	0.00%	1.33%	0.00%	1.32%	0.00%	0.00%	0.00%	0.00%	0.00%	8.05%	0.00%	
		Overall SSA	0.63%	0.00%	0.00%	0.00%	1.35%	0.00%	1.61%	0.00%	1.31%	0.00%	1.23%	0.00%	0.00%	0.00%	0.00%	0.00%	8.09%	0.00%	
3	Dropped Call Rate (<=2%)	Highways	0.00%	0.00%	0.00%	0.00%	1.15%	0.00%	2.08%	0.00%	0.00%	0.00%	4.55%	0.00%	0.00%	0.00%	0.00%	0.00%	5.45%	0.00%	
		Major Roads	0.00%	0.00%	0.00%	0.00%	2.38%	0.00%	0.00%	0.00%	0.00%	0.00%	5.41%	0.00%	0.00%	0.00%	0.00%	0.00%	5.56%	0.00%	
		Within City	0.00%	0.00%	0.00%	0.00%	2.26%	0.00%	0.68%	0.00%	0.00%	0.00%	2.01%	0.00%	0.72%	0.00%	0.37%	0.00%	6.06%	0.00%	
		Overall SSA	0.00%	0.00%	0.00%	0.00%	2.05%	0.00%	0.93%	0.00%	0.00%	0.00%	2.74%	0.00%	0.49%	0.00%	0.26%	0.00%	5.87%	0.00%	
4	Percentage connections with good voice quality (=>95%)																				

**AUDIT & ASSESSMENT OF QOS FOR QE-JUNE-2015-MUMBAI METRO CIRCLE**



S/N	Parameter	Classification of Route covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		VODAFONE		TATA CDMA		RCOM CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
			(a) 0-4 (w/o frequency hopping for CDMA Operators)	Highways	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.81%	97.10%
Major Roads	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.77%	98.23%	<b>89.30%</b>	97.90%	
Within City	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.80%	98.09%	<b>91.87%</b>	98.50%	
Overall SSA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.71%	97.80%	<b>91.75%</b>	98.31%	
(b) 0-5 ( with frequency hopping for GSM Operators)	Highways	<b>94.74%</b>	98.21%	96.32%	99.39%	<b>90.78%</b>	98.23%	97.70%	100%	<b>94.63%</b>	99.80%	<b>88.03%</b>	99.56%	95.02%	99.81%	NA	NA	NA	NA	
	Major Roads	95.00%	97.77%	96.66%	98.38%	<b>92.41%</b>	97.72%	97.37%	100%	95.03%	99.85%	<b>88.64%</b>	100%	95.86%	99.84%	NA	NA	NA	NA	
	Within City	<b>94.56%</b>	97.12%	96.05%	99.09%	<b>93.91%</b>	99.39%	97.96%	100%	<b>93.49%</b>	99.63%	<b>91.42%</b>	99.36%	95.18%	99.53%	NA	NA	NA	NA	
	Overall SSA	<b>94.65%</b>	97.70%	96.17%	98.95%	<b>93.21%</b>	98.42%	97.86%	100%	<b>93.92%</b>	99.76%	<b>90.59%</b>	99.67%	95.21%	99.72%	NA	NA	NA	NA	
<b>Service Coverage</b>																				
5	In door (>= -75dBm)	Highways	82.61%	97.34%	86.12%	97.60%	43.74%	21.17%	97.94%	100%	95.29%	100%	59.84%	98.26%	77.23%	99.28%	99.72%	100%	77.42%	7.97%
		Major Roads	77.45%	78.34%	76.64%	75.75%	32.20%	28.54%	97.62%	100%	92.28%	99.45%	54.93%	99.49%	66.56%	96.82%	98.53%	100%	62.78%	95.78%
		Within City	77.97%	92.85%	80.93%	74.17%	22.82%	16.12%	96.91%	100%	91.00%	99.96%	58.14%	100%	64.32%	95.08%	98.57%	100%	68.81%	93.56%
		Overall SSA	79.11%	89.50%	81.23%	82.51%	27.42%	22.06%	97.19%	100%	92.15%	99.81%	58.13%	99.37%	67.24%	97.06%	98.80%	100%	70.56%	100%
5	In-vehicle (>= -85dBm)	Highways	93.51%	100%	96.90%	99.93%	85.36%	73.76%	99.98%	100%	99.47%	100%	88.90%	100%	95.65%	100%	100%	100%	95.24%	96.79%
		Major Roads	92.94%	99.68%	94.28%	99.18%	71.49%	79.33%	99.98%	100%	99.43%	100%	82.45%	99.74%	91.29%	99.99%	100%	100%	91.37%	100%
		Within City	95.09%	99.98%	94.98%	99.59%	70.13%	71.13%	99.85%	100%	99.48%	100%	86.28%	100%	91.92%	99.90%	100%	100%	91.11%	100%
		Overall SSA	94.47%	99.88%	95.38%	99.57%	72.91%	74.81%	99.89%	100%	99.47%	100%	86.36%	99.89%	92.64%	99.96%	100%	100%	92.21%	100%
5	Outdoor- in city (>= -95dBm)	Highways	99.03%	100%	100%	100%	99.12%	99.93%	100%	100%	99.85%	100%	99.11%	100%	99.74%	100%	100%	100%	100%	100%
		Major Roads	99.17%	100%	100%	100%	97.41%	100%	100%	100%	99.93%	100%	95.38%	100%	98.96%	100%	100%	100%	100%	100%
		Within City	99.33%	100%	100%	100%	97.49%	99.92%	100%	100%	99.94%	100%	97.66%	100%	99.49%	100%	100%	100%	100%	100%
		Overall SSA	99.24%	100%	100%	100%	97.77%	99.95%	100%	100%	99.92%	100%	97.69%	100%	99.49%	100%	100%	100%	100%	100%
6	Call Setup Success	Highways	100%	100%	100%	100%	97.75%	100%	97.96%	100%	98.17%	100%	98.51%	100%	100%	100%	100%	100%	95.65%	100%

AUDIT & ASSESSMENT OF QOS FOR QE-JUNE-2015-MUMBAI METRO CIRCLE



S/N	Parameter	Classification of Route covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		VODAFONE		TATA CDMA		RCOM CDMA			
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR		
			Rate (>=95%)	Major Roads	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Within City	99.36%	100%	99.25%	100%	98.73%	100%	98.34%	100%	98.34%	100%	98.68%	100%	100%	100%	100%	100%	100%	100%	91.95%	100%	
	Overall SSA	99.58%	100%	99.49%	100%	98.65%	100%	98.39%	100%	98.47%	100%	98.77%	100%	100%	100%	100%	100%	100%	100%	91.91%	100%	
7	Hand Over Success Rate (HOSR)	Highways	98.52%	100%	97.37%	100%	97.42%	100%	99.03%	100%	98.92%	100%	96.84%	100%	97.46%	100%	100%	100%	100%	100%	100%	100%
		Major Roads	96.72%	100%	96.83%	100%	96.58%	100%	99.25%	100%	99.35%	100%	100%	100%	99.02%	100%	100%	100%	100%	100%	100%	100%
		Within City	99.61%	100%	98.64%	100%	96.55%	100%	99.40%	100%	95.63%	100%	98.05%	100%	98.21%	100%	99.82%	100%	100%	100%	100%	100%
		Overall SSA	99.11%	100%	98.11%	100%	96.71%	100%	99.29%	100%	96.83%	100%	97.97%	100%	98.11%	100%	99.88%	100%	100%	100%	100%	100%

\*NA: Not Applicable

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

7.3 OPERATOR ASSISTED DRIVE TEST: NAVI MUMBAI (JUNE-15)

DRIVE TEST TABLE – 3

S/N	Parameter	Classification of Route covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		VODAFONE		TATA CDMA		RCOM CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
1	Call Attempts	Highways	125	30	111	30	66	31	134	30	166	30	109	30	149	31	102	30	151	30
		Major Roads	101	30	69	30	66	34	76	30	84	30	83	31	70	30	89	30	71	30
		Within City	167	30	160	30	279	34	184	30	191	30	160	30	200	30	145	30	174	37
		Overall SSA	393	90	340	90	411	99	394	90	441	90	352	91	419	91	336	90	396	97
2	Blocked Call Rate	Highways	1.60%	0.00%	0.00%	0.00%	4.55%	0.00%	0.75%	0.00%	0.60%	0.00%	1.83%	0.00%	0.00%	0.00%	0.00%	0.00%	3.97%	0.00%
		Major Roads	0.00%	0.00%	0.00%	0.00%	4.55%	0.00%	0.00%	0.00%	0.00%	0.00%	3.61%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		Within City	0.60%	0.00%	0.00%	0.00%	0.36%	0.00%	0.54%	0.00%	1.05%	0.00%	1.25%	0.00%	0.00%	0.00%	0.69%	0.00%	1.15%	0.00%
		Overall SSA	0.76%	0.00%	0.00%	0.00%	1.70%	0.00%	0.51%	0.00%	0.68%	0.00%	1.99%	0.00%	0.00%	0.00%	0.30%	0.00%	2.02%	0.00%
3	Dropped Call Rate (<=2%)	Highways	0.00%	0.00%	0.00%	0.00%	3.08%	0.00%	0.75%	0.00%	1.82%	0.00%	1.87%	0.00%	0.00%	0.00%	0.00%	0.00%	16.55%	0.00%
		Major Roads	0.00%	0.00%	0.00%	0.00%	6.35%	0.00%	0.00%	0.00%	0.00%	0.00%	5.00%	0.00%	1.43%	0.00%	0.00%	0.00%	1.41%	0.00%
		Within City	0.61%	0.00%	0.00%	0.00%	1.08%	0.00%	0.00%	0.00%	0.53%	0.00%	0.63%	0.00%	0.00%	0.00%	0.00%	0.00%	8.14%	2.70%
		Overall SSA	0.26%	0.00%	0.00%	0.00%	2.22%	0.00%	0.26%	0.00%	0.91%	0.00%	2.03%	0.00%	0.24%	0.00%	0.00%	0.00%	10.05%	0.00%

AUDIT & ASSESSMENT OF QOS FOR QE-JUNE-2015-MUMBAI METRO CIRCLE



S/N	Parameter	Classification of Route covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		VODAFONE		TATA CDMA		RCOM CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
<b>Percentage connections with good voice quality (=&gt;95%)</b>																				
4	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Highways	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.40%	97.71%	<b>87.69%</b>	99.44%
		Major Roads	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.35%	97.84%	95.00%	99.64%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.71%	97.35%	95.03%	98.50%
		Overall SSA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.52%	97.63%	<b>92.50%</b>	99.19%
	(b) 0-5 ( with frequency hopping for GSM Operators)	Highways	95.05%	98.33%	96.18%	99.61%	<b>80.76%</b>	99.82%	96.94%	100%	<b>93.06%</b>	98.81%	<b>89.92%</b>	99.39%	95.13%	96.83%	NA	NA	NA	NA
		Major Roads	<b>94.59%</b>	98.42%	96.47%	99.62%	<b>86.62%</b>	99.86%	97.45%	100%	<b>93.71%</b>	99.23%	<b>87.15%</b>	98.27%	95.71%	99.70%	NA	NA	NA	NA
		Within City	<b>94.21%</b>	95.88%	96.98%	99.67%	<b>90.99%</b>	99.85%	97.45%	100%	<b>93.97%</b>	99.20%	<b>89.69%</b>	99.72%	95.11%	99.15%	NA	NA	NA	NA
		Overall SSA	<b>94.58%</b>	97.54%	96.62%	99.63%	<b>86.48%</b>	99.84%	97.28%	100%	<b>93.57%</b>	99.08%	<b>89.18%</b>	99.19%	95.21%	98.56%	NA	NA	NA	NA
<b>Service Coverage</b>																				
5	In door (>= -75dBm)	Highways	85.55%	99.99%	44.18%	99.94%	10.55%	11.33%	96.44%	100%	85.22%	99.95%	40.33%	21.55%	77.23%	36.82%	97.75%	99.93%	29.78%	96.75%
		Major Roads	92.31%	97.93%	72.67%	99.35%	20.74%	11.37%	98.06%	100%	93.48%	100%	49.61%	1.73%	66.56%	99.82%	99.02%	99.88%	56.15%	54.61%
		Within City	86.51%	96.93%	64.40%	100%	18.56%	15.84%	97.29%	100%	91.14%	99.89%	52.37%	4.91%	64.32%	93.18%	97.80%	99.57%	51.98%	93.56%
		Overall SSA	87.75%	98.28%	60.41%	99.76%	16.32%	12.83%	97.27%	100%	89.32%	99.95%	48.11%	8.86%	49.35%	76.70%	98.08%	99.80%	45.07%	100%
5	In-vehicle (>= -85dBm)	Highways	96.23%	100%	73.83%	80.21%	50.46%	63.58%	99.76%	100%	99.26%	100%	71.02%	86.75%	95.65%	98.06%	100%	100%	51.41%	100%
		Major Roads	98.16%	99.98%	91.92%	99.99%	74.57%	59.55%	99.81%	100%	99.79%	100%	82.73%	59.59%	91.29%	100%	100%	100%	91.18%	100%
		Within City	96.61%	100%	91.98%	100%	72.76%	68.31%	99.86%	100%	99.68%	100%	82.58%	77.52%	91.92%	99.97%	100%	100%	81.69%	100%
		Overall SSA	96.90%	99.99%	85.91%	93.40%	65.64%	63.73%	99.81%	100%	99.54%	100%	79.13%	74.83%	84.44%	99.35%	100%	100%	73.01%	100%
5	Outdoor- in city (>= -95dBm)	Highways	99.37%	100%	100%	100%	85.34%	99.69%	100%	100%	99.93%	100%	90.81%	100%	99.74%	100%	100%	100%	100%	100%
		Major Roads	99.45%	100%	100%	100%	96.83%	99.63%	100%	100%	99.96%	100%	97.05%	99.48%	98.96%	100%	100%	100%	100%	100%
		Within City	99.25%	100%	100%	100%	95.45%	99.78%	100%	100%	99.97%	100%	96.25%	100%	99.49%	100%	100%	100%	100%	100%
		Overall SSA	99.34%	100%	100%	100%	92.33%	99.70%	100%	100%	99.95%	100%	94.79%	99.84%	98.80%	100%	100%	100%	100%	100%

# AUDIT & ASSESSMENT OF QOS FOR QE-JUNE-2015-MUMBAI METRO CIRCLE



S/N	Parameter	Classification of Route covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		VODAFONE		TATA CDMA		RCOM CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
6	Call Setup Success Rate (>=95%)	Highways	98.40%	100%	99.10%	100%	98.48%	100%	99.25%	100%	99.40%	100%	98.17%	100%	100%	100%	100%	100%	100%	96.03%	100%
		Major Roads	100%	100%	100%	100%	95.45%	100%	100%	100%	100%	100%	96.39%	100%	100%	100%	100%	100%	100%	100%	100%
		Within City	98.20%	100%	100%	100%	99.28%	100%	99.46%	100%	98.95%	100%	98.75%	100%	100%	100%	99.31%	100%	100%	98.85%	100%
		Overall SSA	98.73%	100%	99.71%	100%	98.54%	100%	99.49%	100%	99.32%	100%	98.01%	100%	100%	100%	99.70%	100%	100%	97.98%	100%
7	Hand Over Success Rate (HOSR)	Highways	98.14%	100%	98.92%	100%	94.88%	100%	99.07%	100%	99.70%	100%	97.66%	100%	98.69%	100%	100%	100%	100%	100%	100%
		Major Roads	98.90%	100%	98.77%	100%	97.16%	100%	99.15%	100%	98.62%	100%	97.49%	100%	97.07%	100%	100%	100%	100%	100%	100%
		Within City	98.31%	100%	97.39%	100%	96.97%	100%	99.31%	100%	96.29%	100%	97.15%	100%	99.32%	100%	100%	100%	100%	100%	100%
		Overall SSA	98.43%	100%	98.11%	100%	96.24%	100%	99.20%	100%	97.93%	100%	97.36%	100%	98.64%	100%	100%	100%	100%	100%	100%

NA: Not Applicable

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

7.4 DETAIL OF THE ROUTES COVERED DURING THE DRIVE TESTS:

DRIVE TEST TABLE: 4

DRIVE TEST ROUTE OF APRIL TO JUNE 15 – MUMBAI METRO CIRCLE

Name of SSA	Drive test Period	Day 1		Day 2		Day 3	
		Name of SDCA Covered / KM covered	Route Covered	Name of SDCA Covered / KM covered	Route Covered	Name of SDCA Covered / KM covered	Route Covered
Thane	Apr-15	Thane Mumbai / 110 Kms	Thane Ghodbandar Road,Wagle Estate, Upvan, Mulund(W), Mulund-Goregoan Link Road, Thane(East & West), Majiwada,Kolshet Road, Easter Express Highway, Saket Road, Forest Road, Balkum Rd, Kharegaon Bypass, Old Pune Highway  <b>Indoor:</b> Korum Mall Eastern Express Highway	Thane Mumbai / 100 Kms	Thane Ghodbandar Road,Wagle Estate, Upvan, Mulund(W), Mulund-Goregoan Link Road, Thane(East & West), Majiwada,Kolshet Road, Easter Express Highway, Saket Road, Forest Road, Balkum Rd, Kharegaon Bypass, Old Pune Highway  <b>Indoor:</b> Viva City Mall Eastern Express Highway	Thane Mumbai / 105 Kms	Eastern Express Highway, Mumbai-Pune Road,Wagle Estate, Upvan, Mulund (East & West),Bhandup (W), LBS Road, MAJOR ROUTE- Mumbai-Pune Highway, Kalwa Bridge, Old Pune Road, Shivaji Path, Ambedkar Road, Khopat Road, EEHW from Kanjur to Thane, Kopri,Thane East, Ghodbunder Road.  <b>Indoor:</b> R-Mall Mulund
Central Mumbai	May-15	Central Mumbai / 113 Kms	Highway- Eastern Express Highway. Incity- Andheri (E&W), Goregaon (W), Juhu, Matunga, Powai, Versova, Jogeshwari (W), Vile Parle(W), Santacruz, Bandra. Major Road-JVLR, LBS Road, Powai, Chandivali  <b>Indoor:</b> Mega Mall Osiwara	Central Mumbai / 108 Kms	Highway- Eastern Express Highway, Eastern Freeway / Incity- Andheri, Ghatkopar, Chembur, Matunga, Wadala, Govandi, Mankhurd, Kurla / MAJOR ROUTE- Eastern Express Highway, Chembur-Sewree Road.  <b>Indoor:</b> K-star mall ,Chembur	Central Mumbai / 105 Kms	Highway- Eastern Express Highway, Western Express Highway / INCITY- Eastern Exp Highway, Santacruz, Juhu, Vile Parle(W), Khar(W), Bandra, Matunga, BKC, SV Road / Major Road-JVLR, Chandivali Powai, Hiranandani  <b>Indoor:</b> Galleria Mall, Powai
Navi Mumbai	Jun-15	Navi Mumbai / 123 Kms	Vashi, KoperKhairane, Airoli ,Nerul ,Ghansoli,Vashi station,palam beach roadNarul east,Vashi city,Kopar kherne , Airoli,Ghansoli.  <b>Indoor:</b> Raghuleela Mall	Navi Mumbai / 123 Kms	Vashi, KoperKhairane, Airoli ,Nerul , Ghansoli, Vashi station, palam beach road Narul east, Vashi city, Kopar kherne , Airoli,Ghansoli.  <b>Indoor:</b> Little wonder Mall	Navi Mumbai / 107 Kms	Vashi,Taloja,Nerul ,Panvel , Uran, palam beach road Narul east,Vashi city,Kopar kherne , Airoli, Ghansoli, Khar city,Thane belapur road, ThurbeVashi.  <b>Indoor:</b> Inorbit Mall

**7.5 SSA WISE DRIVE TEST OBSERVATION:**

**DRIVE TEST TABLE: 5**

**DRIVE TEST OBSERVATION OF THANE SSA (APRIL-15)**

S NO	Name of SP	Day 1 Observation	Day 2 Observation	Day 3 Observation
1	AIRTEL	Poor Rx Level near Chandan wadi, Thane mumbra road. Poor Rx Quality near Thane mumbra road.	Poor Rx Level near Thane mumbra road, LBS road. Poor Rx Quality near Thane mumbra road, Gokhle road	Poor Rx Level near Thane mumbra road, LBS road.
2	AIRCEL	--	--	--
3	MTNL	Poor Rx Level & Rx Quality near R mall, LBS Rd Mulund West, Kolshet Road.	Poor Rx Level & Rx Quality near Bhandup East, R mall, Thane-Bhivandi Bypass Rd.	Poor Rx Level & Rx Quality near Tambe Nagar, Kalwa-Mumbra Rd, Mulund-Airoli Bridge
4	IDEA	--	Poor Rx Quality on Thane Ghodbandar Road.	--
5	VODAFONE	Poor Rx Quality near Shree Gokuldharm CHS, Reti Bandar Kharigaon, Cadbury Company, Prabhakar Hegade Marg, Veer Baji Prabhu Deshpande Road, Deep Mandir Theatre.	Poor Rx Level near Central Jail Road Thane W. Poor Rx Quality near Pokhran Road No 2, Reti Bandar Kharigaon, Central Jail Road, Ashar Estate Thane W, Akruiti Park, LBS Marg.	Poor Rx Level near Thane Creek Bridge. Poor Rx Quality near Thane Creek Bridge Near Saket, Pokhran Road No 2, Eastern Express Highway Near FOB.
6	TATA GSM	Poor Rx Quality near Waghle Estate, Manorama Nagar.	Poor Rx Quality near NH3,Majiwada, Nahur (East)	Poor Rx Quality near LBS Road, Mulund (W).
7	TATA CDMA	--	Poor Rx Quality near Devram Nagar, Majiwada.	Poor Rx Quality near Mahakali Nagar.
8	RCOM GSM	Poor Rx Level & Rx Quality near Shinde Gymkhana, Ghodbandar Road, Shreyanand, Balkum road, Saket road, Santosh Appt, Atre Marg, Jayant Indl Est, Everest Chsl, GMLR Flyover.	Poor Rx Level & Rx Quality near Ghodbandar Road, Kumdini Apt, Amey Apt, Rachana Chsl, Laxmi Apt, Yashoree Appt, Old Agra Road, Saket road.	Poor Rx Level & Rx Quality near GMLR Flyover, Gagangiri Construction, Shreeji Dham, Rajasthan Minerals & Yashoree Appt CHSL, Soham House, Nahur Station.
9	RCOM CDMA	Poor Rx Level & Rx Quality near Wagle Estate, P&T Staff colony, Dhokli Naka, Saket-Kalwa Road and on NH4 near Kharegaon, Khajupada.	Poor Rx Level & Rx Quality near Devdaya Nagar, Kolshet Rd, old Agra Rd, Saket Rd, NH3, NH 4, Wagle Estate, Eastern Expressway near Ganeshwadi, LBS road near MMRDA Colony, Khajupada, Dhokli Naka.	Poor Rx Level & Rx Quality near Wagle Estate, Devdaya Nagar, LBS road near MMRDA Colony and Govind Nagar, Asha Nagar, Vishwakarma Nagar, Parsik Nagar, Reti Bunder, Moti Baug, Rashid Compound, NH4 near Sanjay Nagar

**Common observation Area:** Waghle Estate, Ghodbandar Road, NH4 near Kharegaon, LBS Road, Dhokli Naka, Pokhran Road No 2, Reti Bandar Kharigaon, Kolshet Road, Thane mumbra road, GMLR Flyover.



**DRIVE TEST TABLE: 6**

**DRIVE TEST OBSERVATION OF CENTRAL MUMBAI SSA (MAY-15)**

S.No	Name of SP	Day 1 Observation	Day 2 Observation	Day 3 Observation
1	AIRTEL	---	Poor Rx Quality observed at : Govandi Road (Near by Patil wadi)	Poor Rx Quality observed at : BKC Road (Near by:Sapt shringi soc)
2	AIRCEL	Poor Rx Quality observed at : Yari road , South Ave air India road,	Poor Rx Quality observed at : Eastern express highway (JK Baisin Marg)	Poor Rx Quality observed at : Near KC Marg
3	MTNL	Poor Rx Quality observed at : Near S V rd Goregaon-W,Near Versova Village (Aaram Nagar) ,Vikhroli-E BMC park area	Poor Rx Quality observed at : Near Diamond clny chembur,Sion-Trombe road	Poor Rx Quality observed at : KC Marg Bandra E ,L&T Sakivihar JVLR
4	IDEA	Poor Rx Quality observed at : Eastren express highway before sion flyway,Andheri kurla road and sakinaka area,lok milan colony area , LBS Road	Poor Rx Quality observed at : Eastern free way , Tilak nagar area,Mankhurd , Sion panwel expressway,HP Nagar	Poor Rx Quality observed at : CST Road, BKC Area, Hill road Bandra west
5	VODAFONE	Poor Rx Quality observed at : Near link road , V nike road ,Lokhandwala BMC road, L&T flyover,Near Metropolitan Building_BKC	Poor Rx Quality observed at : Dadar Hindu Colony	--
6	TATA GSM	Poor Rx Quality observed at : Near Marol naka ,	Poor Rx Quality observed at : Tilak Nagar, Chembur	--
7	TATA CDMA	--	--	--
8	RCOM GSM	Poor Rx Quality observed at : Eastern Expressway Near Trachand hospital,JVLR, Lok milan colony, CST Road, BKC Road,near Juhu,Link road goregaon west	Poor Rx Quality observed at : Near eastern free way,Sevari chembure road , Eastern free way,Sion panwel express way,Kurla terminus	Poor Rx Quality observed at : JVLR ( Darul Islam Masjid ),Santacruz Chembur link ,BKC Area,Reclamation Flyover,Carter road (Santacruz west area)
9	RCOM CDMA	Poor Rx Level and Quality observed at Swami Vivekanand Rd near ICICI Colony ,Varsova area,Sahar Elevated Road ,LBS Road near Gandhi Nagar ,Hiranandani Gardens ,Sangharsha Nagar Chandivli ,JVLR near Poonam Nagar	Poor Rx Level and Quality observed at Mysore colony ,Chembur-Sewri Road ,observed inside tunnel on Eastern Expressway .	Poor Rx Level and Quality observed at ,Chimbi Village Bandra area ,BKC area ,JVLR near Poonam Nagar ,western Express highway near Gujarati Socirty

**Common observation Area:** Eastern Expressway Near Trachand hospital, JVLR, Lok milan colony, CST Road, BKC Road, near Juhu, Link road goregaon west, JVLR near Poonam Nagar ,Tilak Nagar, Chembur, Chembur-Sewri Road.

**DRIVE TEST TABLE: 7**

**DRIVE TEST OBSERVATION OF NAVI MUMBAI SSA (JUNE-15)**

S. NO	Name of SP	Day 1 Observation	Day 2 Observation	Day 3 Observation
1	AIRTEL	Poor Rx Quality observed at:observed at: Palm Beach Road	Poor Rx Quality observed at: Uran Road	Poor Rx Quality observed at: Palm Beach Road,JNPT Road
2	AIRCEL	Poor Rx Quality observed at: JNPT road Vashi, Palm Beach Road Nerul	Poor Rx Quality observed at: Palm Beach Road and JNPT Roa, Sect 34 Kharghar,Kharghar	Poor Rx Quality observed at: JNPT Road,Palm Beach Road,Nerul, Panvel
3	MTNL	Poor Rx Quality observed at: Koparkhairane sea face and Koperkhairane stn , on palm beach rd and nerul uran phata rd	Poor Rx Quality: Nerul Uran phata road,JNPT road,and panvel road, Kharghar sect 34	Poor Rx Quality observed at: Panvel Sector 7, JNPT Road, Panvel Road, Koparkharne Station East
4	IDEA	Poor Rx Quality observed at: few palces on JNPT road, Vashi-Turbhe road, Palm Beach Road, Nerul	Poor Rx Quality observed at: Palm Beach Road, JNPT Road, Panvel-Taloja Road, Sect 34 Kharghar	Poor Rx Quality observed at: Palm Beach Road, JNPT Road, Nerul, Panvel
5	VODAFONE	Poor Rx Quality observed at: Sector 5, 13 and 19 Airoli, Sector 2 kopar Khairane, Palm Beach Road, sector 28 and 34 Nerul	Poor Rx Quality observed at : Palm beach road, Sector 38 Seawood Dharawe,Sector 34 kharghar, Chinchpada , Bhendkhal Rd Uran	Poor Rx Quality observed at: Palm beach road, Sector 38 Seawood Dharawe, Name-Sector 13 Panvel,Chinchpada, Bhendkhal Rd Uran, Uran
6	TATA GSM	Poor Rx Quality observed at: Palm Beach Road, JNPT Road,Nerul	Poor Rx Quality observed at: Uran, Palm Beach Road, Kharghar,Seawood	Poor Rx Quality observed at: Palm beach road, Uran, Panvel,JNPT Road
7	TATA CDMA	Poor Rx Quality observed at: Palm Beach Road, JNPT Road,Airoli, Nerul	Poor Rx Quality observed at: Kharghar, Uran, Kharghar	Poor Rx Quality observed at: Palm Beach Road, JNPT Road
8	RCOM GSM	Poor Coverage & quality observed at Thane-Belapur Road-Near Simens Company ,Palam beach road,Aroli sector-13,Bagade area ,Sanpada station ,Palm Beach road ,Wonders Garden	Poor Coverage & quality observed at Near D.Y Patil dental College ,Wonder Garden ,Kharghar sector-20	Poor Coverage & quality observed atUran Rd area ,Bhenkhal area,Taloja Flyover ,Sector 4C
9	RCOM CDMA	Poor Coverage observed at Ghansoli Naka ,Savoli Ghansoli ,Koparkhairane Gaonthan ,Rabale Station ,MAFCO road near sector 26,Sector 18 Nerul ,DY Patl Stadium Nerul ,Sanpada Station ,S Central Road, Turbhe MIDC	Poor Coverage & quality observed at over all area of Uran highway, Ulwe and Dronagiri-Uran-JNPT,Savatri Sadan,Owe village and sector 36 Kharghar ,Navade village ,Poor coverage observed in Sector 12, 20 and 21, Kharghar ,near Belapur Bus depot	Poor Coverage observed at Uran highway, Ulwe and Dronagiri-Uran-JNPT,Khanda Colony Bridge , S Central Road, Turbhe MIDC ,Sector 18 Nerul,Dhutum Village' ,Dhutum and Ranjanpada Marshaling yard

**Common observation Area:** Palm Beach Road, JNPT Road, Kharghar sect-34, Uran, Panvel area,Nerul area

## 7.6 KEY FINDINGS ON DRIVE TEST:

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

- (i) **In the Month of April -15**, drive test was conducted across **Thane SSA** (Total Drive Test 315Kms). The analysis of the drive test conducted during the three consecutive days in Thane SSA revealed that **Aircel, MTNL, Idea, RCOM (GSM) and RCOM (CDMA)** remained under performed in respect of the parameter **Good Voice Quality** with their performance as **94.20%, 90.54%, 94.36%, 88.20% and 90.33%** respectively. Further, **MTNL, RCOM (GSM) and RCOM (CDMA)** also failed to meet the benchmark of **Call drop rate** with their performance as **2.47%, 2.48% and 6.27%** respectively on overall SSA basis.
- (ii) **In the Month of May-15**, drive test was conducted across **Central Mumbai SSA** for three consecutive days (Total drive test 326 Kms). In this SSA also, performance of **Aircel, MTNL, Idea, RCOM (GSM) and RCOM (CDMA)** on over all SSA basis, was not in compliance for parameter '**Voice Quality**' with their achieved level as **94.65%, 93.21%, 93.92% , 90.59% and 91.75 %** respectively. Further, **MTNL, RCOM (GSM) and RCOM (CDMA)** also could not meet the benchmark for parameters **Call Drop Rate** with their achieved value as **2.05%, 2.74% and 5.87%** respectively on overall SSA level. Apart from this, **RCOM (CDMA)** also failed to meet the benchmark of **CSSR (91.91%)**.
- (iii) **In the month of June-15**, drive tests were conducted across **Navi Mumbai SSA** (Total 353 Kms). The analysis of the drive test results at SSA level revealed that **Aircel, MTNL, Idea, RCOM (GSM) and RCOM (CDMA)** remained underperformed for the parameter **Good Voice Quality** with their performance as **94.58%, 86.48%, 93.57%, 89.18% and 92.50%** respectively. Apart from this, **MTNL, RCOM (GSM) and RCOM (CDMA)** also remained non-complied for parameter **Call Drop rate** having their achieved level as **2.22%, 2.03% and 10.05%** respectively. Thus performance of **RCOM (CDMA)** for parameter **CDR** was way beyond the benchmark.

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

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

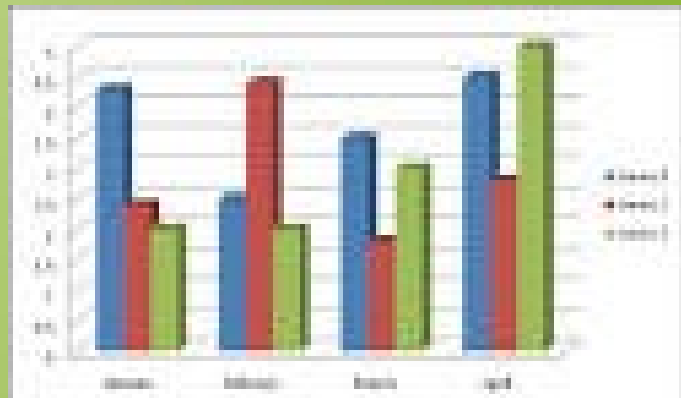
*Thus, **Aircel, MTNL, Idea, RCOM (GSM) and RCOM (CDMA)** were having non-complied performance for the parameters **Voice quality and Call drop rate** across the above SSAs where the drive tests were conducted during the quarter. **RCOM (CDMA)** also failed to do well with respect to the parameter **CSSR** across Central Mumbai SSA. These operators need improvement in their networks to remove the deficiencies with respect to non-complied parameters.*

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

**AVERAGED QUARTERLY PMR**

**V/S**

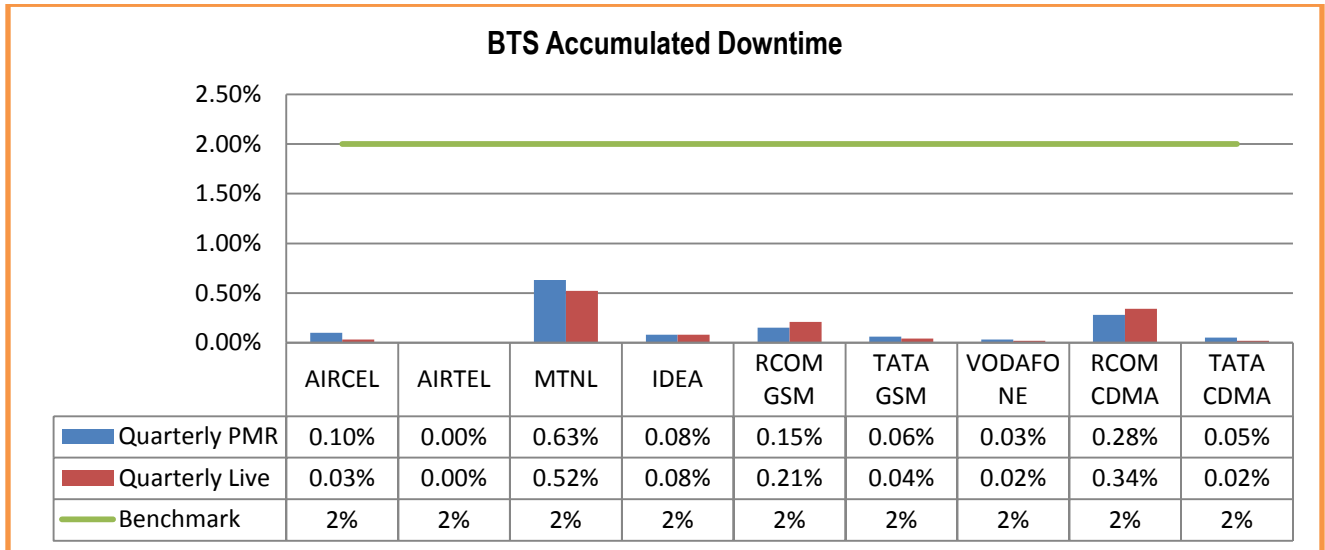
**AVERAGED QUARTERLY 3-DAYs LIVE MEASURMENT**



**8. GRAPHICAL REPRESENTATION (CMTS):**

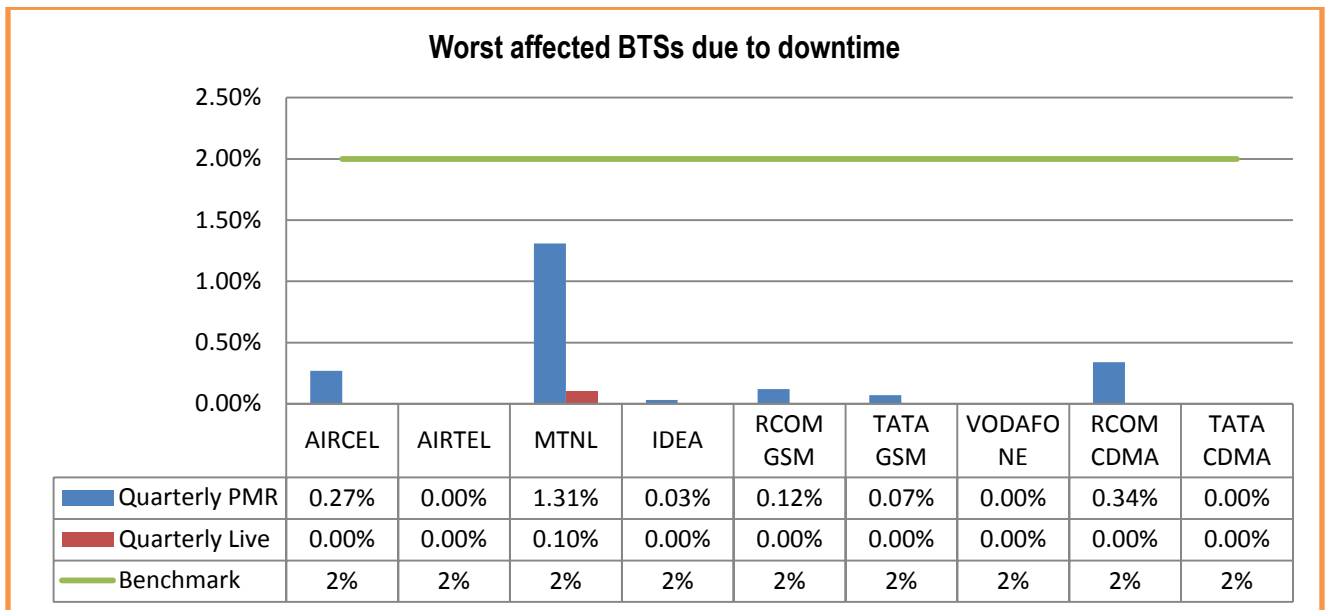
Graphical Representation of Performance of the Cellular Mobile Service Providers (PMR) V/S 3-Days Live Measurement (Quarterly Average Data):

**1) BTS ACCUMULATED DOWNTIME:**



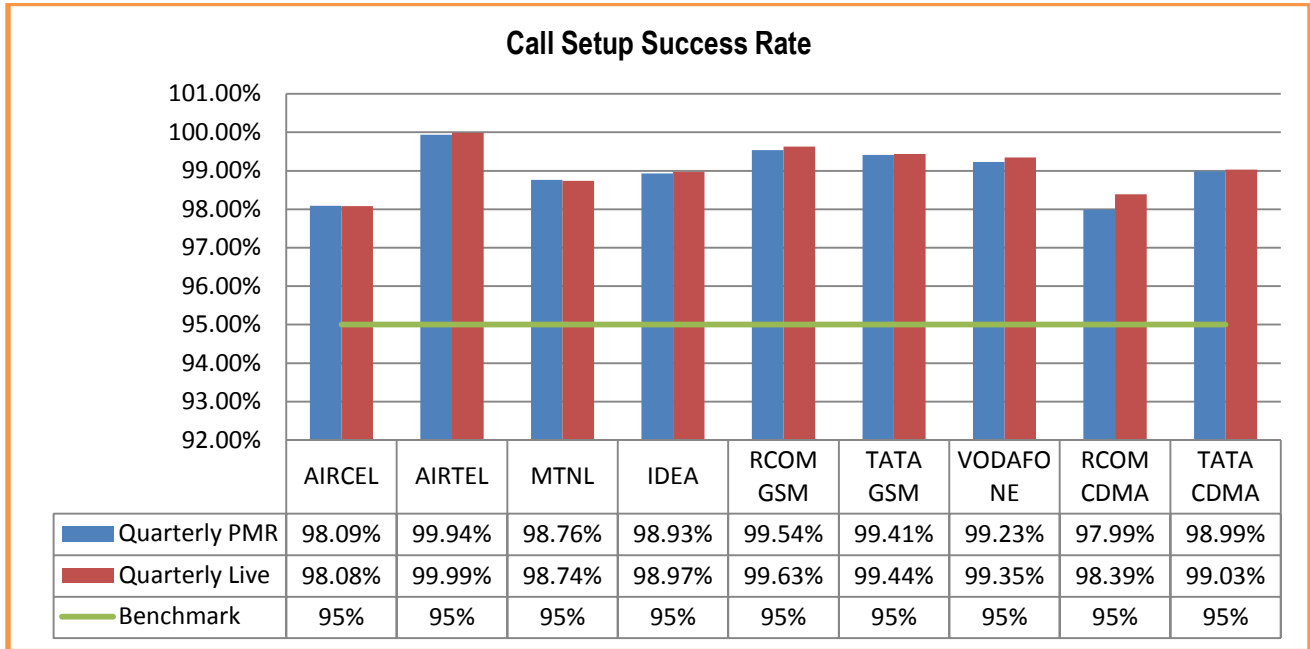
All operators are meeting the benchmarks.

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



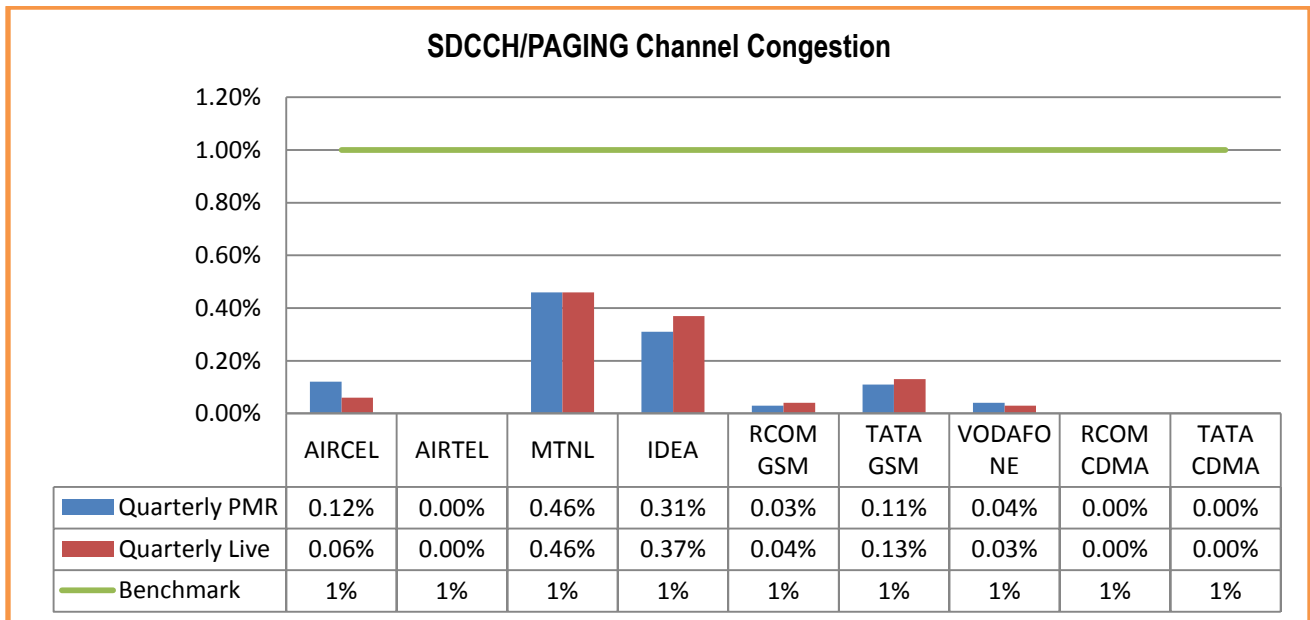
All operators are meeting the benchmarks.

3) CALL SETUP SUCCESS RATE:



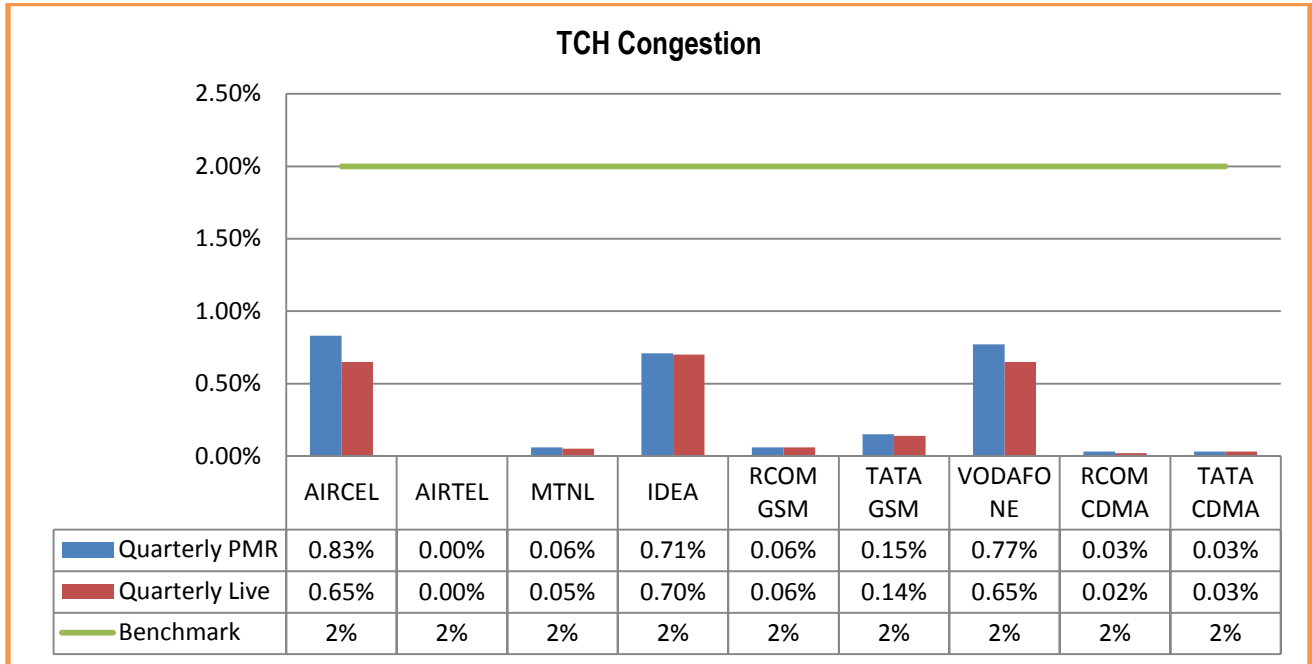
All operators are meeting the benchmarks.

4) SDCCH/PAGING CHANNEL CONGESTION:



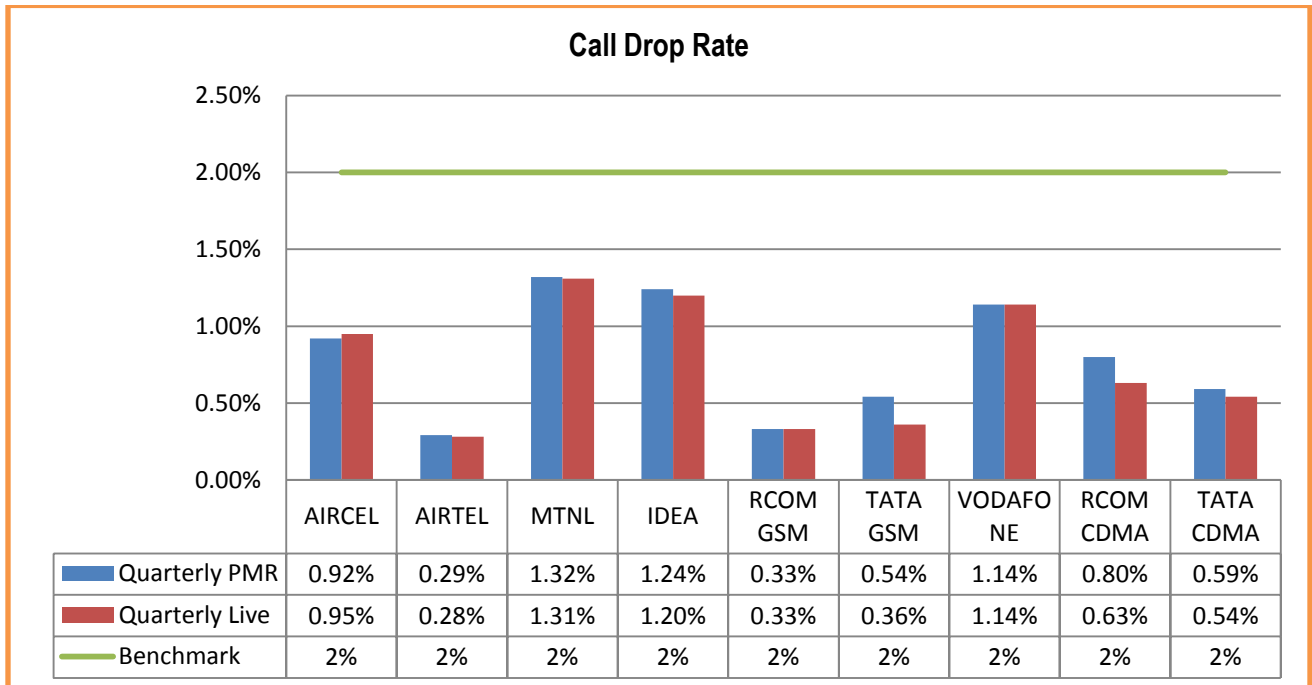
All operators are meeting the benchmarks.

5) TCH CONGESTION:



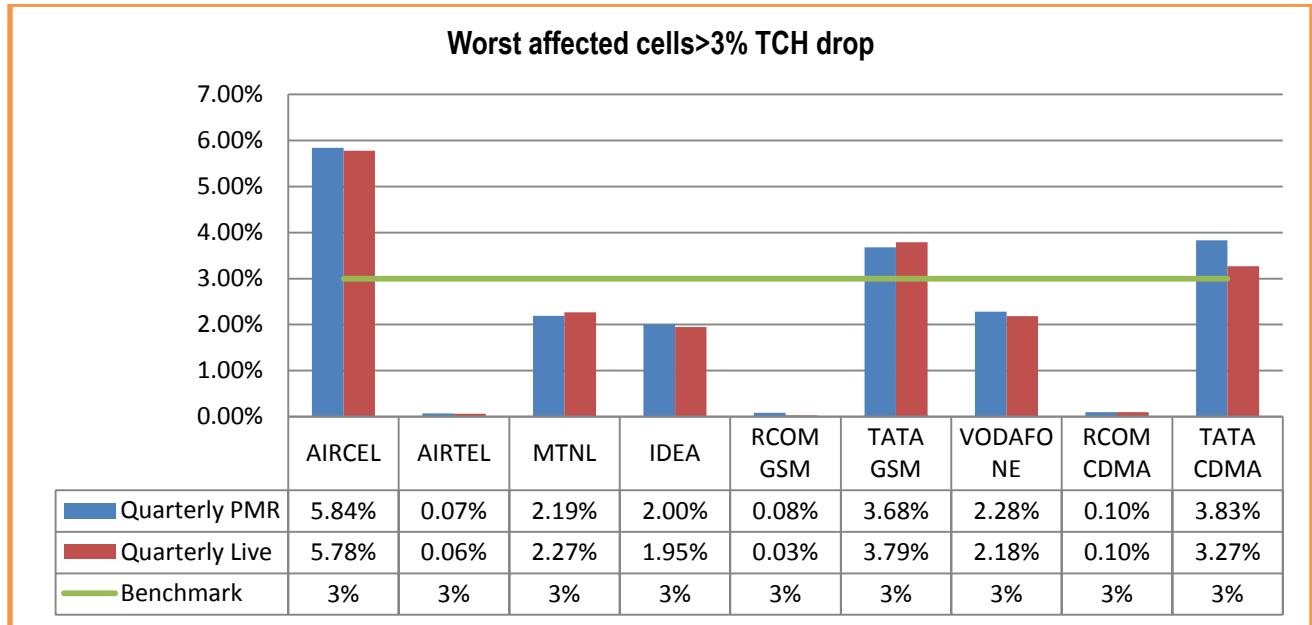
All operators are meeting the benchmarks.

6) CALL DROP RATE:



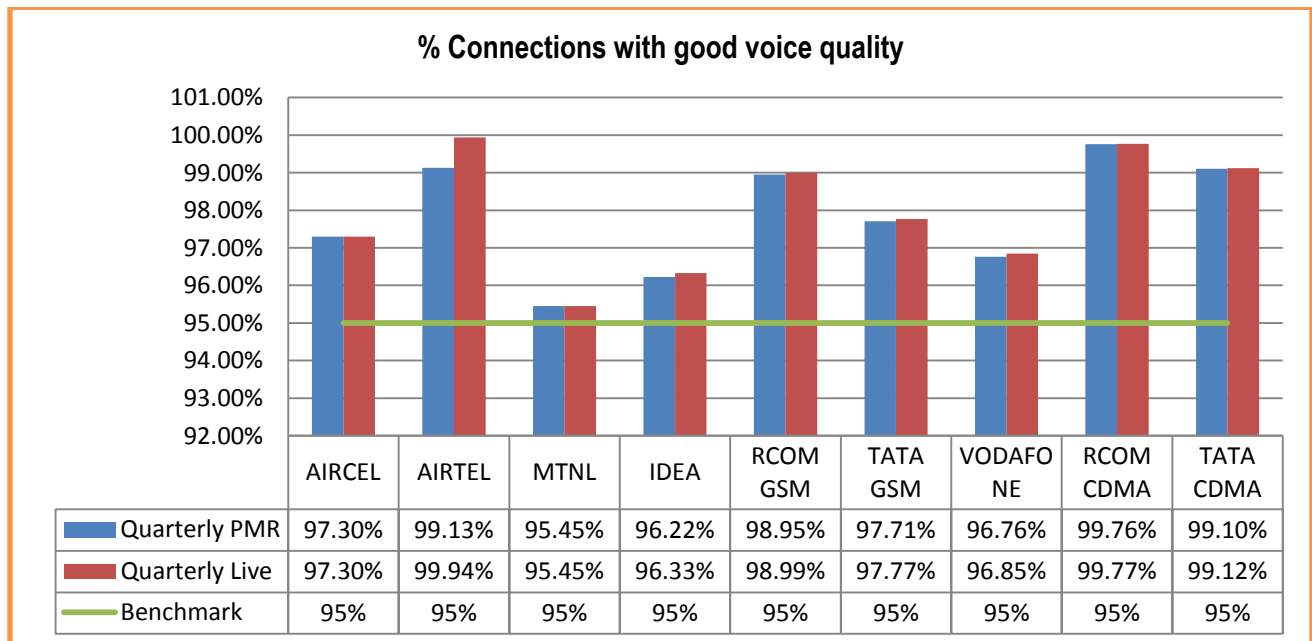
All operators are meeting the benchmarks.

7) WORST AFFECTED CELLS>3% TCH DROP :



All operators are meeting the benchmarks except Aircel, Tata GSM and Tata CDMA.

8) PERCENTAGE OF CONNECTIONS WITH GOOD VOICE QUALITY:



All operators are meeting the benchmarks.