



**Audit & Assessment of Quality of Service  
Of  
Cellular Mobile Telephone Service  
For  
Telecom Regulatory Authority of India  
West Zone – Mumbai Metro Service Area  
(July 2014 – September 2014)**

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## PREFACE

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

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

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



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## **1. BACKGROUND**



## 1. BACKGROUND

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

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

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

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

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

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

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

## **2. OBJECTIVES AND METHODOLOGY**



## **2. OBJECTIVES AND METHODOLOGY**

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

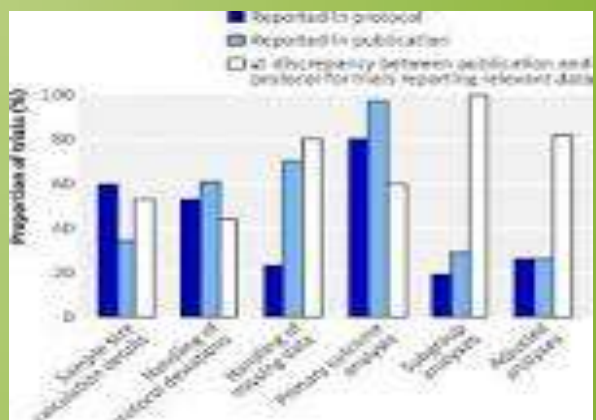
The audit and assessment of Quality of Service was carried out by **TUV SUD South Asia across all the Circles/Service areas of North and West Zones for Cellular Mobile Service. Apart from this, QoS audit for Basic (Wire line) and Broadband Services was also undertaken for UP (E), UP (W) and MP&CG circles during the quarter July – September 2014.**

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

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



### 3. SAMPLE SIZE



### 3. SAMPLE SIZE

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

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

Sl. No.	Name of Service Provider	Dates of live measurement Audit			Audit Location
		July-14	August-14	September-14	
<b>GSM Operators</b>					
1	<b>AIRCEL</b>	09 <sup>th</sup> to 11 <sup>th</sup> July'2014	6 <sup>th</sup> to 8 <sup>th</sup> Aug'2014	3 <sup>rd</sup> to 5 <sup>th</sup> Sept'2014	Aircel Limited, Opus Center, Opp. Hotel Tunga Paradise, Near Speez,Andheri(E)
2	<b>AIRTEL</b>	09 <sup>th</sup> to 11 <sup>th</sup> July'2014	6 <sup>th</sup> to 8 <sup>th</sup> Aug'2014	3 <sup>rd</sup> to 5 <sup>th</sup> Sept'2014	7th Floor, Interface 7, Near IJMIMA Tower, Behind Infinity Mall, Malad (West), Mumbai-400064
3	<b>MTNL</b>	09 <sup>th</sup> to 11 <sup>th</sup> July'2014	6 <sup>th</sup> to 8 <sup>th</sup> Aug'2014	3 <sup>rd</sup> to 5 <sup>th</sup> Sept'2014	OMC-R unit, 10th Floor, Prabhadevi Telecom Bldg., V.S. Marg, Dadar(W),Mumbai-400028
4	<b>LOOP MOBILE</b>	2 <sup>nd</sup> to 4 <sup>th</sup> July'2014	4 <sup>th</sup> to 6 <sup>th</sup> Aug'2014	1 <sup>st</sup> to 3 <sup>rd</sup> Sept'2014	7th Floor,Loop Mobile ,127 Manmala Tank Road,Taikalwadi,Mahim west,Mumbai
5	<b>TATA GSM</b>	2 <sup>nd</sup> to 4 <sup>th</sup> July'2014	4 <sup>th</sup> to 6 <sup>th</sup> Aug'2014	1 <sup>st</sup> to 3 <sup>rd</sup> Sept'2014	2nd Floor,TTML,Technopolis Park,Andheri(E),Mumbai
6	<b>IDEA</b>	2 <sup>nd</sup> to 4 <sup>th</sup> July'2014	6 <sup>th</sup> to 8 <sup>th</sup> Aug'2014	3 <sup>rd</sup> to 5 <sup>th</sup> Sept'2014	3rd Floor Windsor ,Kalina CST Road,Santacruz East,Mumbai
7	<b>RCOM GSM</b>	09 <sup>th</sup> to 11 <sup>th</sup> July'2014	4,6,7 <sup>th</sup> Aug '2014	1 <sup>st</sup> to 3 <sup>rd</sup> Sept'2014	Ai8, Reliance Infrastructure bldg,A-wing,MBP,mahape,Nav Mumbai.
8	<b>VODAFONE</b>	07 <sup>th</sup> to 09 <sup>th</sup> July'2014	6 <sup>th</sup> to 8 <sup>th</sup> Aug'2014	3 <sup>rd</sup> to 5 <sup>th</sup> Sept'2014	Skyline ikon, Near Mittal Industrial Estate, Andheri Kurla Road, Marol Naka, Andheri (E), Mumbai-59
<b>CDMA Operators</b>					
9	<b>RCOM CDMA</b>	09 <sup>th</sup> to 11 <sup>th</sup> July'2014	4,6,7 <sup>th</sup> Aug '2014	1 <sup>st</sup> to 3 <sup>rd</sup> Sept'2014	Ai8, Reliance Infrastructure bldg,A-wing,MBP,mahape,Nav Mumbai.
10	<b>TATA CDMA</b>	2 <sup>nd</sup> to 4 <sup>th</sup> July'2014	4 <sup>th</sup> to 6 <sup>th</sup> Aug'2014	1 <sup>st</sup> to 3 <sup>rd</sup> Sept'2014	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 Sept 2014.

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

### 3.2 SAMPLING FOR BASIC (WIRELINER) SERVICES

- The QoS audit for basic (wireline) service is to be done for the number of exchanges spread over in about 10% of SDCAs with each service providers in specified circles. As per the clause 17.3 of the tender document, the QoS audit of Basis Telephone Service (Wireline) in a service area / circle is to be done only once in a year. **Since it has already been done during the QE March 2014, hence QoS audit of Wireline service in Mumbai circle is not required to be done during QE September-14.**

### 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. As per the clause 17.3 of the tender document, the QoS audit of Broadband service in a service area / circle is to be done only once in a year. **Since it has already been done during the QE March 2014, hence QoS audit of broadband service in Mumbai circle is not required to be done during QE September-14.**

## **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 **6.16, 6.04% and 3.53%** respectively.

(ii) From three days live assessment, it was found that the performance of all operators was satisfactory as they were largely meeting the benchmarks except for the parameter **‘Worst affected cells> 3 % TCH drops’**. This parameter was not complied with by **Aircel, Tata (GSM) and Tata (CDMA)** in all the three months of the quarter with their quarterly average performance as **6.01%, 6.58% and 3.31% 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. Only **RCOM (GSM)** lagged behind meeting the benchmark of parameter **Billing Complaints – Prepaid** with its performance of **0.30%**. Whereas, with regard to the parameter **‘Calls answered by Operators (voice to voice) within 60 seconds, Aircel, RCOM (GSM) and RCOM (CDMA)** achieved their performance as **84.85%, 86.18% and 83.07%** respectively. In case of parameter **‘Time taken for refunds’**, **Tata (GSM) and Tata (CDMA)** remained marginally

short of benchmark with their achieved level as **98.42%** and **99.38%** respectively. **Aircel** was very marginally underperformed (**99.83%**) for parameter '**Termination/closure within 7days**'.

The results of live measurements also exposed that for parameter '**Calls connection to operators (Voice to voice) within 60 seconds**', performance of **RCOM (GSM)**, **RCOM (CDMA)** and **Tata (CDMA)** was **89.64 %**, **87.87%** and **79.42%** respectively.

(iv) Based on the analysis of the **drive test results**, it was revealed that **Aircel, MTNL, Idea, RCOM (GSM), RCOM (CDMA), Tata (CDMA) and Loop Mobile** were having non-complied performance for the parameters **Call drop rate** and **Voice quality** across the SSAs where the drive tests were conducted during the quarter. Some operators also could not perform well in respect of the parameters **CSSR** and **Blocked Call rate**. 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	Sept-14	20 Hrs-21 Hrs
2	AIRCEL	Sept-14	20 Hrs-21 Hrs
3	MTNL	Sept-14	19 Hrs-20 Hrs
4	IDEA	Sept-14	20 Hrs-21 Hrs
5	RCOM GSM	Sept-14	19 Hrs-20 Hrs
6	TATA GSM	Sept-14	19 Hrs-20 Hrs
7	LOOP MOBILE	Sept-14	19 Hrs-20 Hrs
8	VODAFONE	Sept-14	20 Hrs-21 Hrs
<b>CDMA Operators</b>			
9	RCOM CDMA	Sept-14	19 Hrs-20 Hrs
10	TATA CDMA	Sept-14	11 Hrs-12 Hrs

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

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

Sl. No.	Name of Service Provider	No. of MSC + GMSC	No. of BSC	No. of BTS	NSS make	BSS make
<b>GSM Operators</b>						
1	AIRTEL	13	74	3865	NSN	NSN
2	AIRCEL	3	19	1840	NSN	NSN
3	MTNL	5	46	990	Alcatel	Motorola, Alcatel
4	IDEA	8	32	3271	Ericsson	Ericsson
5	RCOM GSM	3	11	2242	Huawei	Huawei
6	TATA GSM	3	15	2895	Huawei	Huawei
7	LOOP MOBILE	3	23	2022	Huawei	Huawei, ZTE
8	VODAFONE	21	63	4395	Ericsson	Ericsson
<b>CDMA Operators</b>						
9	RCOM CDMA	8	NA	878	Lucent, ZTE, Ericsson	Lucent.
10	TATA CDMA	5	6	947	Huawei	Huawei



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

CELLULAR MOBILE TELEPHONE SERVICES MUMBAI METRO CIRCLE- JULY 14 MONTH													
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCCOM 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%	July-14	0.17%	0.00%	0.73%	0.07%	0.33%	0.01%	0.01%	0.01%	0.44%	0.03%
	b) Worst affected BTSs due to downtime	<=2%	July-14	0.49%	0.00%	1.41%	0.09%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	July-14	97.89%	99.99%	97.61%	97.47%	99.53%	99.51%	99.03%	99.40%	97.90%	98.77%
	b) SDCCH/PAGING Channel congestion	<=1%	July-14	0.49%	0.00%	0.16%	0.39%	0.04%	0.09%	0.05%	0.04%	0.00%	0.00%
	c) TCH congestion	<=2%	July-14	1.87%	0.00%	0.10%	1.71%	0.14%	0.46%	0.03%	0.60%	0.03%	0.27%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	July-14	1.12%	0.03%	1.25%	1.94%	0.50%	0.67%	0.67%	0.98%	0.79%	0.67%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	July-14	<b>6.50%</b>	0.02%	1.79%	2.83%	0.01%	<b>6.40%</b>	1.18%	2.86%	0.11%	<b>3.36%</b>
	c) Connections with good voice quality	>=95%	July-14	97.45%	99.97%	95.69%	95.34%	98.76%	98.30%	98.00%	97.04%	99.77%	99.09%
4	No. of POI's having >=0.5% POI congestion		July-14	0	0	0	0	0	0	0	0	0	0

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

CELLULAR MOBILE TELEPHONE SERVICES MUMBAI METRO CIRCLE- AUG 14 MONTH													
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators							CDMA Operators		
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	Aug-14	0.09%	0.00%	0.54%	0.07%	0.32%	0.01%	0.01%	0.01%	0.38%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	Aug-14	0.11%	0.00%	1.31%	0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Aug-14	98.14%	99.99%	97.08%	98.23%	99.65%	99.51%	99.14%	99.51%	98.21%	98.95%
	b) SDCCH/PAGING Channel congestion	<=1%	Aug-14	0.20%	0.00%	0.20%	0.05%	0.04%	0.09%	0.05%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Aug-14	0.58%	0.00%	0.11%	1.07%	0.07%	0.21%	0.03%	0.49%	0.03%	0.09%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Aug-14	1.04%	0.27%	1.25%	1.92%	0.44%	0.70%	0.67%	0.94%	0.68%	0.68%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Aug-14	6.24%	0.02%	1.59%	2.81%	0.02%	6.09%	1.22%	2.67%	0.09%	3.52%
	c) Connections with good voice quality	>=95%	Aug-14	97.61%	99.97%	95.21%	95.58%	98.94%	98.09%	98.00%	97.12%	99.78%	99.08%
4	No. of POI's having >=0.5% POI congestion		Aug-14	0	0	0	0	0	0	0	0	0	0

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

CELLULAR MOBILE TELEPHONE SERVICES MUMBAI METRO CIRCLE- SEP 14 MONTH													
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators								CDMA Operators	
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	Sep-14	0.13%	0.00%	0.65%	0.06%	0.22%	0.01%	0.01%	0.06%	0.22%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	Sep-14	0.33%	0.00%	1.52%	0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Sep-14	98.19%	99.99%	96.46%	98.20%	99.57%	99.46%	99.17%	99.46%	98.10%	98.86%
	b) SDCCH/PAGING Channel congestion	<=1%	Sep-14	0.17%	0.00%	0.55%	0.59%	0.03%	0.15%	0.08%	0.08%	0.00%	0.00%
	c) TCH congestion	<=2%	Sep-14	0.62%	0.00%	0.11%	0.98%	0.07%	0.30%	0.06%	0.54%	0.02%	0.20%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Sep-14	1.00%	0.28%	1.31%	1.92%	0.39%	0.71%	0.68%	0.97%	0.63%	0.65%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Sep-14	5.74%	0.02%	2.21%	2.79%	0.01%	5.62%	1.27%	2.42%	0.06%	3.71%
	c) Connections with good voice quality	>=95%	Sep-14	97.95%	99.96%	95.23%	95.45%	98.96%	97.78%	97.98%	97.18%	99.78%	98.85%
4	No. of POI's having >=0.5% POI congestion		Sep-14	0	0	0	0	0	0	0	0	0	0

**5.1.6 QOS PERFORMANCE OF QUARTERLY PMR –AVERAGE OF QE- SEPTEMBER-14 (JULY TO SEPTEMBER 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	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators									CDMA Operators
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	Quarterly	0.13%	0.00%	0.64%	0.07%	0.29%	0.01%	0.01%	0.03%	0.35%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.31%	0.00%	1.41%	0.07%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	98.07%	99.99%	97.05%	97.97%	99.58%	99.49%	99.11%	99.46%	98.07%	98.86%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.29%	0.00%	0.30%	0.34%	0.04%	0.11%	0.06%	0.05%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	1.02%	0.00%	0.11%	1.25%	0.09%	0.32%	0.04%	0.54%	0.03%	0.19%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	1.05%	0.19%	1.27%	1.93%	0.44%	0.69%	0.67%	0.96%	0.70%	0.67%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	<b>6.16%</b>	0.02%	1.86%	2.81%	0.01%	<b>6.04%</b>	1.22%	2.65%	0.09%	<b>3.53%</b>
	c) Connections with good voice quality	>=95%	Quarterly	97.67%	99.97%	95.38%	95.46%	98.89%	98.06%	97.99%	97.11%	99.78%	99.01%
4	No. of POI's having >=0.5% POI congestion		Quarterly	0	0	0	0	0	0	0	0	0	0

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

The audit of network related parameters for cellular mobile service providers was conducted at their respective MSCs in the 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 (0.19%) was for Airtel during the quarter.

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

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

The audit with respect to this parameter revealed that all the operators except **Aircel, Tata (GSM) and Tata (CDMA)**, were in compliance of the benchmark for this parameter. The quarterly average performance of **Aircel, Tata (GSM) and Tata (CDMA)** with respect to this parameter was **6.16%, 6.04% and 3.53%** 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) – JULY-14 MONTH:**

CELLULAR MOBILE TELEPHONE SERVICES MUMBAI METRO CIRCLE- JULY-14 MONTH													
Live measurement Data		Bench-mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators							CDMA Operators		
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	Live data	0.27%	0.00%	1.09%	0.09%	0.28%	0.01%	0.01%	0.85%	0.21%	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%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	97.89%	99.99%	97.47%	97.25%	99.53%	99.46%	99.13%	99.45%	98.20%	98.96%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.75%	0.00%	0.20%	0.54%	0.04%	0.11%	0.04%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	<b>2.02%</b>	0.00%	0.07%	1.38%	0.13%	0.51%	0.04%	0.55%	0.02%	0.03%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Live data	1.09%	0.27%	1.25%	1.95%	0.49%	0.69%	0.72%	0.98%	0.71%	0.69%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	<b>6.16%</b>	0.05%	1.78%	2.84%	0.01%	<b>6.95%</b>	1.22%	2.82%	0.00%	2.92%
	c) Connections with good voice quality	>=95%	Live data	97.47%	99.97%	95.49%	95.38%	98.75%	98.44%	98.02%	97.09%	99.76%	99.07%
4	No. of POI having >=0.5% congestion		Live data	0	0	0	0	0	0	0	0	0	0



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

CELLULAR MOBILE TELEPHONE SERVICES MUMBAI METRO CIRCLE- AUGUST-14 MONTH													
Live measurement Data		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators							CDMA Operators		
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	Live data	0.18%	0.00%	0.58%	0.08%	0.26%	0.00%	0.01%	0.00%	0.21%	1.39%
	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%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.18%	99.77%	96.66%	98.29%	99.67%	99.54%	99.10%	99.49%	98.20%	98.93%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.05%	0.00%	0.43%	0.54%	0.02%	0.11%	0.03%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.37%	0.00%	0.10%	1.06%	0.05%	0.17%	0.02%	0.51%	0.02%	0.11%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Live data	1.05%	0.02%	1.33%	1.93%	0.43%	0.70%	0.72%	1.01%	0.71%	0.64%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	6.22%	0.05%	1.54%	2.82%	0.01%	6.20%	1.21%	2.66%	0.07%	3.12%
	c) Connections with good voice quality	>=95%	Live data	97.55%	96.51%	95.20%	95.56%	98.90%	98.15%	97.95%	97.04%	99.76%	99.07%
4	No. of POI having >=0.5% congestion		Live data	0	0	0	0	0	0	0	0	0	0

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

CELLULAR MOBILE TELEPHONE SERVICES MUMBAI METRO CIRCLE- SEP-14 MONTH													
Live measurement Data		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators									CDMA Operators
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	Live data	0.19%	0.00%	0.65%	0.07%	0.76%	0.01%	0.02%	0.01%	0.73%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.20%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.24%	99.99%	97.22%	98.60%	99.58%	99.46%	99.10%	99.49%	97.51%	98.94%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.02%	0.00%	0.29%	0.47%	0.03%	0.25%	0.28%	0.05%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.29%	0.00%	0.13%	0.65%	0.08%	0.30%	0.11%	0.51%	0.05%	0.16%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Live data	1.01%	0.27%	1.29%	1.84%	0.39%	0.95%	0.68%	0.99%	0.69%	0.66%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	5.66%	0.03%	1.84%	2.79%	0.01%	6.59%	1.20%	2.47%	0.05%	3.89%
	c) Connections with good voice quality	>=95%	Live data	97.97%	99.96%	95.13%	95.27%	98.92%	98.00%	97.90%	97.07%	99.78%	99.14%
4	No. of POI having >=0.5% congestion		Live data	0	0	0	0	0	0	0	0	0	0

**5.2.4 QUARTERLY QOS PERFORMANCE OF 3-DAYS LIVE MEASUREMENT AUDITED DATA (AVERAGE OF JULY TO SEPTEMBER 2014)**

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	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators			
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	Quarterly	0.21%	0.00%	0.77%	0.08%	0.43%	0.01%	0.01%	0.29%	0.38%	0.48%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.00%	0.00%	0.17%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	98.10%	99.92%	97.12%	98.05%	99.59%	99.49%	99.11%	99.48%	97.97%	98.94%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.27%	0.00%	0.31%	0.52%	0.03%	0.16%	0.12%	0.03%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	0.89%	0.00%	0.10%	1.03%	0.09%	0.33%	0.06%	0.52%	0.03%	0.10%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	1.05%	0.19%	1.29%	1.91%	0.44%	0.78%	0.71%	0.99%	0.70%	0.66%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	<b>6.01%</b>	0.04%	1.72%	2.82%	0.01%	<b>6.58%</b>	1.21%	2.65%	0.04%	<b>3.31%</b>
	c) Connections with good voice quality	>=95%	Quarterly	97.66%	98.81%	95.27%	95.40%	98.86%	98.20%	97.96%	97.07%	99.77%	99.09%
4	No. of POI having >=0.5% congestion		Quarterly	0	0	0	0	0	0	0	0	0	0

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

From three days live assessment, it is found that the performance of all operators is satisfactory as they are largely meeting the benchmarks except for the parameter 'Worst affected cells> 3 % TCH drops'. This parameter was not complied with by **Aircel, Tata (GSM) and Tata (CDMA)** in all the three months of the quarter with their quarterly average performance as **6.01%, 6.58% and 3.31%** 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- July-14 month													
S/N	Name of Parameter	Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) Total no. of BTSs in the licensed service area		July-14	1848	3789	993	3230	2239	2809	2038	4353	874	956
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		July-14	2327	33	5360	1654	5429	235	157	224	2862	237
	c) BTS Accumulated Downtime	<=2%	July-14	0.17%	0.00%	0.73%	0.07%	0.33%	0.01%	0.01%	0.01%	0.44%	0.03%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		July-14	9	0	14	3	0	0	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	July-14	0.49%	0.00%	1.41%	0.09%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	July-14	97.89%	99.99%	97.61%	97.47%	99.53%	99.51%	99.03%	99.40%	97.90%	98.77%
	b) SDCCH/PAGING Congestion	<=1%	July-14	0.49%	0.00%	0.16%	0.39%	0.04%	0.09%	0.05%	0.04%	0.00%	0.00%
	c) TCH congestion	<=2%	July-14	1.87%	0.00%	0.10%	1.71%	0.14%	0.46%	0.03%	0.60%	0.03%	0.27%
<b>Connection Maintenance (Retainability)</b>													
3	a) Call Drop Rate (CDR)	<=2%	July-14	1.12%	0.03%	1.25%	1.94%	0.50%	0.67%	0.67%	0.98%	0.79%	0.67%
	b) Worst affected cells>3% TCH drop	<=3%	July-14	6.50%	0.02%	1.79%	2.83%	0.01%	6.40%	1.18%	2.86%	0.11%	3.36%
	c) % of connections with good voice quality	>=95%	July-14	97.45%	99.97%	95.69%	95.34%	98.76%	98.30%	98.00%	97.04%	99.77%	99.09%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		July-14	351	2	47	262	1	494	68	301	3	87
	e) Total no. of cells (Sector) in the licensed service area		July-14	5401	10129	2645	9271	6184	7714	5787	10522	2634	2586
<b>No. of POI's having &gt;=0.5% POI congestion</b>													
4	No. of POI's having >=0.5% POI congestion		July-14	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		July-14	0	0	0	0	0	0	0	0	0	0
<b>Network Data</b>													
5	a) Equipped Capacity of Network in Erlang		July-14	63313	167362	37627	116979	72000	111247	143882	275899	168000	105821
	b) Total traffic in TCBH in erlang (Avg.)		July-14	39847	104329	15486	97955	59990	43615	36814	168148	105423	57309
	c) Total no. of customers served (as per VLR) on last day of the month		July-14	1316459	4164893	821291	3289936	2964661	1610987	1180494	6799290	2926649	590005

TABLE: 2

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

S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) Total no. of BTSs in the licensed service area		Live data	1856	3760	993	3216	2241	2799	2045	4320	875	952
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Live data	356	5	778	204	452	28	14	2648	131	21
	c) BTS Accumulated Downtime	<=2%	Live data	0.27%	0.00%	1.09%	0.09%	0.28%	0.01%	0.01%	0.85%	0.21%	0.03%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.20%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	97.89%	99.99%	97.47%	97.25%	99.53%	99.46%	99.13%	99.45%	98.20%	98.96%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.75%	0.00%	0.20%	0.54%	0.04%	0.11%	0.04%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	2.02%	0.00%	0.07%	1.38%	0.13%	0.51%	0.04%	0.55%	0.02%	0.03%
<b>Connection Maintenance (Retainability)</b>													
3	a) Call Drop Rate (CDR)	<=2%	Live data	1.09%	0.27%	1.25%	1.95%	0.49%	0.69%	0.72%	0.98%	0.71%	0.69%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	6.16%	0.05%	1.78%	2.84%	0.01%	6.95%	1.22%	2.82%	0.00%	2.92%
	c) % of connections with good voice quality	>=95%	Live data	97.47%	99.97%	95.49%	95.38%	98.75%	98.44%	98.02%	97.09%	99.76%	99.07%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	334	5	47	263	1	536	71	295	0	75
	e) Total no. of cells (Sector) in the licensed service area		Live data	5425	10081	2645	9274	6042	7712	5830	10472	2555	2583
<b>No. of POI's having &gt;=0.5% POI congestion</b>													
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0	0



TABLE: 3

Detailed Network Data Assessment of Cellular Mobile Telephone Services- Mumbai Metro Circle- August-14 month													
S/N	Name of Parameter	Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) Total no. of BTSs in the licensed service area		Aug-14	1844	3838	990	3244	2241	2838	2028	4374	874	948
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Aug-14	1260	34	3955	1726	5346	158	145	344	2469	96
	c) BTS Accumulated Downtime	<=2%	Aug-14	0.09%	0.00%	0.54%	0.07%	0.32%	0.01%	0.01%	0.01%	0.38%	0.01%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Aug-14	2	0	13	2	0	0	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Aug-14	0.11%	0.00%	1.31%	0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Aug-14	98.14%	99.99%	97.08%	98.23%	99.65%	99.51%	99.14%	99.51%	98.21%	98.95%
	b) SDCCCH/PAGING Congestion	<=1%	Aug-14	0.20%	0.00%	0.20%	0.05%	0.04%	0.09%	0.05%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Aug-14	0.58%	0.00%	0.11%	1.07%	0.07%	0.21%	0.03%	0.49%	0.03%	0.09%
<b>Connection Maintenance (Retainability)</b>													
3	a) Call Drop Rate (CDR)	<=2%	Aug-14	1.04%	0.27%	1.25%	1.92%	0.44%	0.70%	0.67%	0.94%	0.68%	0.68%
	b) Worst affected cells>3% TCH drop	<=3%	Aug-14	6.24%	0.02%	1.59%	2.81%	0.02%	6.09%	1.22%	2.67%	0.09%	3.52%
	c) % of connections with good voice quality	>=95%	Aug-14	97.61%	99.97%	95.21%	95.58%	98.94%	98.09%	98.00%	97.12%	99.78%	99.08%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Aug-14	336.61	2	42	262	1	473	71	286	2	91
	e) Total no. of cells (Sector) in the licensed service area		Aug-14	5391	10176	2644	9327	6184	7767	5797	10694	2634	2591
<b>No. of POI's having &gt;=0.5% POI congestion</b>													
4	No. of POI's having >=0.5% POI congestion		Aug-14	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Aug-14	0	0	0	0	0	0	0	0	0	0
<b>Network Data</b>													
5	a) Equipped Capacity of Network in Erlang		Aug-14	63782	163261	37627	116125	72000	111855	143225	271705	168000	106115
	b) Total traffic in TCBH in erlang (Avg.)		Aug-14	38868	98677	15439	95206	62724	45040	36482	164131	101921	47580
	c) Total no. of customers served (as per VLR) on last day of the month		Aug-14	1329264	4245452	736420	3290880	2993240	1578993	1040737	6595077	2875852	503010

TABLE: 4

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live- Mumbai Metro Circle- August-14 month													
S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) Total no. of BTSs in the licensed service area		Live data	1848	3795	993	3234	2239	2809	2038	4353	875	952
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Live data	238	4	414	186	412	0	13	8	131	951
	c) BTS Accumulated Downtime	<=2%	Live data	0.18%	0.00%	0.58%	0.08%	0.26%	0.00%	0.01%	0.00%	0.21%	1.39%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	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%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.18%	99.77%	96.66%	98.29%	99.67%	99.54%	99.10%	99.49%	98.20%	98.93%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.05%	0.00%	0.43%	0.54%	0.02%	0.11%	0.03%	0.02%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.37%	0.00%	0.10%	1.06%	0.05%	0.17%	0.02%	0.51%	0.02%	0.11%
<b>Connection Maintenance (Retainability)</b>													
3	a) Call Drop Rate (CDR)	<=2%	Live data	1.05%	0.02%	1.33%	1.93%	0.43%	0.70%	0.72%	1.01%	0.71%	0.64%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	6.22%	0.05%	1.54%	2.82%	0.01%	6.20%	1.21%	2.66%	0.07%	3.12%
	c) % of connections with good voice quality	>=95%	Live data	97.55%	96.51%	95.20%	95.56%	98.90%	98.15%	97.95%	97.04%	99.76%	99.07%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	336	5	41	263	1	482	70	284	2	81
	e) Total no. of cells (Sector) in the licensed service area		Live data	5403	10144	2645	9320	6092	7778	5819	10673	2555	2592
<b>No. of POI's having &gt;=0.5% POI congestion</b>													
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0	0



TABLE: 5

Detailed Network Data Assessment of Cellular Mobile Telephone Services- Mumbai Metro Circle- September-14 month													
S/N	Name of Parameter	Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) Total no. of BTSs in the licensed service area		Sep-14	1840	3865	990	3271	2242	2895	2022	4395	875	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		Sep-14	1713	30	4605	1529	3515	110	159	1817	1405	50
	c) BTS Accumulated Downtime	<=2%	Sep-14	0.13%	0.00%	0.65%	0.06%	0.22%	0.01%	0.01%	0.06%	0.22%	0.01%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Sep-14	6	0	15	2	0	0	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Sep-14	0.33%	0.00%	1.52%	0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Sep-14	98.19%	99.99%	96.46%	98.20%	99.57%	99.46%	99.17%	99.46%	98.10%	98.86%
	b) SDCCH/PAGING Congestion	<=1%	Sep-14	0.17%	0.00%	0.55%	0.59%	0.03%	0.15%	0.08%	0.08%	0.00%	0.00%
	c) TCH congestion	<=2%	Sep-14	0.62%	0.00%	0.11%	0.98%	0.07%	0.30%	0.06%	0.54%	0.02%	0.20%
<b>Connection Maintenance (Retainability)</b>													
3	a) Call Drop Rate (CDR)	<=2%	Sep-14	1.00%	0.28%	1.31%	1.92%	0.39%	0.71%	0.68%	0.97%	0.63%	0.65%
	b) Worst affected cells>3% TCH drop	<=3%	Sep-14	5.74%	0.02%	2.21%	2.79%	0.01%	5.62%	1.27%	2.42%	0.06%	3.71%
	c) % of connections with good voice quality	>=95%	Sep-14	97.95%	99.96%	95.23%	95.45%	98.96%	97.78%	97.98%	97.18%	99.78%	98.85%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Sep-14	309	2	59	262	1	444	73	259	2	96
	e) Total no. of cells (Sector) in the licensed service area		Sep-14	5377	10293	2644	9381	6093	7902	5772	10732	2634	2592
<b>No. of POI's having &gt;=0.5% POI congestion</b>													
4	No. of POI's having >=0.5% POI congestion		Sep-14	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Sep-14	0	0	0	0	0	0	0	0	0	0
<b>Network Data</b>													
5	a) Equipped Capacity of Network in Erlang		Sep-14	63637	159896	37627	116542	72000	113831	143110	275488	168000	106067
	b) Total traffic in TCBH in erlang (Avg.)		Sep-14	40360	102420	15555	98342	61012	49655	35205	170883	99790	47959
	c) Total no. of customers served (as per VLR) on last day of the month		Sep-14	1379862	4313041	821845	3382078	3044078	1753159	1037860	6855040	2871207	572243



TABLE: 6

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live- Mumbai Circle- September-14 month													
S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) Total no. of BTSs in the licensed service area		Live data	1844	3849	990	3246	2241	2873	2028	4374	874	949
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Live data	254	5	466	172	1230	12	29	20	460	9
	c) BTS Accumulated Downtime	<=2%	Live data	0.19%	0.00%	0.65%	0.07%	0.76%	0.01%	0.02%	0.01%	0.73%	0.01%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.20%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.24%	99.99%	97.22%	98.60%	99.58%	99.46%	99.10%	99.49%	97.51%	98.94%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.02%	0.00%	0.29%	0.47%	0.03%	0.25%	0.28%	0.05%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.29%	0.00%	0.13%	0.65%	0.08%	0.30%	0.11%	0.51%	0.05%	0.16%
<b>Connection Maintenance (Retainability)</b>													
3	a) Call Drop Rate (CDR)	<=2%	Live data	1.01%	0.27%	1.29%	1.84%	0.39%	0.95%	0.68%	0.99%	0.69%	0.66%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	5.66%	0.03%	1.84%	2.79%	0.01%	6.59%	1.20%	2.47%	0.05%	3.89%
	c) % of connections with good voice quality	>=95%	Live data	97.97%	99.96%	95.13%	95.27%	98.92%	98.00%	97.90%	97.07%	99.78%	99.14%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	305	3	49	261	0	518	69	266	1	101
	e) Total no. of cells (Sector) in the licensed service area		Live data	5393	10265	2644	9365	6086	7863	5737	10738	2554	2595
<b>No. of POI's having &gt;=0.5% POI congestion</b>													
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0	0

## **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 (JULY to SEPTEMBER 2014 MONTHS AUDITED DATA):

#### QUARTERLY CSD AUDITED DATA FOR CELLULAR MOBILE TELEPHONE SERVICES

Quarterly CSD Audit Data		Bench- mark	Circle Name	AIRTEL	AIRCEL	MTNL	IDEA	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
S/ N	Name of Parameter			GSM Operators						CDMA Operators			
<b>Metering &amp; Billing Credibility -Post Paid</b>													
1	A) No. of bills issued during the quarter		Mumbai Metro	1862006	90265	410738	1478340	434308	271104	886848	6404345	1305037	148186
	B) No. of bills disputed including billing complaints during the quarter		Mumbai Metro	195	0	104	953	423	0	90	3540	1292	0
	C)% of billing complaints during the quarter	<= 0.1%	Mumbai Metro	0.01%	0.00%	0.03%	0.06%	0.10%	0.00%	0.01%	0.06%	0.10%	0.00%
<b>Metering &amp; Billing Credibility -Pre Paid</b>													
2	A) Total No. of Pre-paid customers at the end of the quarter		Mumbai Metro	3670727	2176388	874042	3102951	2848578	2341091	1353047	5842896	2503130	715402
	B) Total No. of complaints relating to charging, Credit and Validity during the quarter		Mumbai Metro	113	8	241	2600	8481	1	286	752	1575	0
	C) % of Pre-paid Charging Complaints	<= 0.1%	Mumbai Metro	0.00%	0.00%	0.03%	0.08%	0.30%	0.00%	0.02%	0.01%	0.06%	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		Mumbai Metro	308	8	104	13156	8904	1471	376	4292	2867	285
	B) No. of billing complaints for Post paid customers/Charging/Credit/Validity complaints for pre-paid customers resolved within 4 weeks during the quarter		Mumbai Metro	308	8	104	13156	8904	1471	376	4292	2867	285
	C) % of billing complaints (for post paid customer) / Charging/Credit/Validity (for Pre paid customer) resolved within 4 weeks	100 % within 4 week	Mumbai Metro	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	D) % of Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints	<=1 week	Mumbai Metro	100.00%	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	Circle Name	AIRTEL	AIRCEL	MTNL	IDEA	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
S/ N	Name of Parameter			GSM Operators							CDMA Operators		
<b>Response time to customers for assistance</b>													
4	A) Total no of calls attempted to customer care/Call center		Mumbai Metro	1104594	13165087	NP	10104626	7154512	593693	2319707	15263223	1627353	206185
	B) Total no. of calls successfully established to customer care/Call center		Mumbai Metro	1095544	12960465	NP	9925967	7082004	590004	2306230	15261473	1616207	205378
	C) % Accessibility of Call centre /customer Care (Total call successfully established *100/ Total call attempt)	>=95%	Mumbai Metro	99.181%	98.446%	NP	98.232%	98.987%	99.379%	99.419%	99.989%	99.315%	99.609%
	D) Total Calls reached to agent desk for Voice to Voice (Total call attempt)		Mumbai Metro	2909931	2076806	1066472	3805475	1673076	793894	2303046	5051745	336153	146253
	E) Total number of calls answered by the operator (Voice to voice) within 60/90 seconds		Mumbai Metro	2766155	1762157	1018033	3129361	1441858	763542	2299412	4582425	279237	136192
	F) % age of calls answered by operator(voice to voice) (Total call successfully established within 60 Sec/90 sec.*100 / Total call attempts )	>=90% (60 Sec.) & >=95% (90 Sec.)	Mumbai Metro	95.06%	84.85%	95.46%	95.74%	86.18%	96.18%	99.84%	90.71%	83.07%	93.12%
<b>Termination/closure of service</b>													
5	A) Total No. of requests for Termination / Closure of service received during the quarter		Mumbai Metro	8262	599	14197	10651	2222	2118	1842	21320	4934	785
	B) No. of requests for Termination / Closure of service complied within 7 days during the quarter		Mumbai Metro	8262	598	14197	10651	2222	2118	1842	21320	4934	785
	C) % of Termination/ Closure of service within 7 days	<=7days	Mumbai Metro	100.00%	99.83%	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		Mumbai Metro	5225	46	789	2772	993	698	506	3604	2318	481
	B) No. of Payments/ Refunds Cleared during the quarter		Mumbai Metro	5225	46	789	2772	993	687	506	3604	2318	478
	C) Time taken for refunds of deposits after closures.	100% within 60 days	Mumbai Metro	100.00%	100.00%	100.00%	100.00%	100.00%	98.42%	100.00%	100.00%	100.00%	99.38%

- NP-Not Provided: MTNL also has not provided data for the parameter "Accessibility of call center / Customer care" due to IVR system was not functional at the time of audit.
- Note: For the parameter "% age of calls answered by operator (voice to voice)" – All Service Providers except **Aircel, MTNL, Idea and Loop Mobile** have given the data for 90 seconds as per TRAI QoS Regulation (Third amendment) dated 21<sup>st</sup> August 2014.

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

CSD 3 DAYS LIVE DATA FOR CELLULAR MOBILE TELEPHONE SERVICES – QE SEPTEMBER 2014

CSD 3 DAYS LIVE DATA FOR CELLULAR MOBILE TELEPHONE SERVICES – QE SEPTEMBER 2014													
3 days live CSD Audit Data		Bench- mark	Circle Name	AIRTEL	AIRCEL	MTNL	IDEA	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
S/ N	Name of Parameter			GSM Operators							CDMA Operators		
<b>Response time to customers for assistance</b>													
1	Total no of calls attempted to customer care/Call center		Mumbai Metro	35655	476566	NP	309798	311382	21117	74076	497532	89232	6672
	Total no. of calls successfully established to customer care/Call center		Mumbai Metro	35655	472565	NP	309782	308231	20989	73711	497481	88085	6614
	% Accessibility of Call centre /customer Care (Total call successfully established *100 / Total call attempt)	>=95%	Mumbai Metro	100.000%	99.160%	NP	100.00%	98.988%	99.394%	99.507%	99.990%	98.715%	99.131%
2	Total Calls reached to agent desk for Voice to Voice (Total call attempt)		Mumbai Metro	89311	76153	40611	113990	129534	28399	73572	171348	32705	5627
	Total number of calls answered by the operator (Voice to voice) within 60/90 seconds		Mumbai Metro	87529	60003	38699	104215	116111	25877	69069	169634	28740	4469
	% age of calls answered by operator(voice to voice) (Total call successfully established within 60 /90Sec.*100 / Total call attempt)	>=90% (60 Sec.) & >=95% (90 Sec.)	Mumbai Metro	98.00%	78.79%	95.29%	95.00%	89.64%	91.12%	93.88%	99.00%	87.87%	79.42%

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

Note: For the parameter "% age of calls answered by operator (voice to voice)" – All Service Providers except Aircel, MTNL, Idea and Loop Mobile have given the data for 90 seconds as per TRAI QoS Regulation (Third amendment) dated 21<sup>st</sup> August 2014.

### 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 largely within the prescribed bench mark of  $\leq 0.1\%$ . Only **RCOM (GSM)** lagged behind meeting the benchmark of parameter **Billing Complaints – Prepaid** with its performance of **0.30%**.

#### 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 4weeks. 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, **Aircel, RCOM (GSM) and RCOM (CDMA)** have not met the benchmark of **Calls answered by Operators (voice to voice) within 60 seconds by Aircel & within 90 seconds by RCOM (GSM) and RCOM (CDMA)**. They have achieved their performance as **84.85%, 86.18% and 83.07%** respectively.

#### 4. Termination/Closure of Service

In case of this parameters also, only one operator namely **Aircel** was not found to have settled 100 % closure/termination within 7 days. Their performance with respect to this parameter was **99.83%**.

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

All operators except **Tata (GSM) and Tata (CDMA)**, were found to have complied with the benchmark of 100% refund of deposits within 60 days of closure. The performance of these operators was **98.42%, 99.38%** respectively.

#### Live Measurements:

The results for **three days live measurements** reveal that all operators have met the benchmarks for the parameters 'Accessibility to call center.' However, in case of calls connection to operators (Voice to voice), performance of **RCOM (GSM)**, **RCOM (CDMA)** and **Tata (CDMA)** was **89.64%, 87.87% and 79.42%** respectively, against the benchmark of  $\geq 90\%$ .

## **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 BASED ON LIVE MEASUREMENT											
CALLING OPERATORS	CIRCLE NAME	AIRTEL	AIRCEL	MTNL	IDEA	RCOM GSM	TATA GSM	LOOP MOBILE	VODAFONE	RCOM CDMA	TATA CDMA
AIRTEL	<i>Mumbai Metro</i>	---	100%	100%	100%	100%	100%	100%	100%	100%	100%
AIRCEL	<i>Mumbai Metro</i>	100%	---	100%	99%	100%	98%	100%	100%	98%	100%
MTNL	<i>Mumbai Metro</i>	100%	100%	---	100%	98%	100%	99%	99%	100%	97%
IDEA	<i>Mumbai Metro</i>	100%	100%	97%	---	100%	99%	98%	100%	100%	100%
RCOM GSM	<i>Mumbai Metro</i>	100%	97%	100%	100%	---	100%	100%	96%	100%	100%
TATA GSM	<i>Mumbai Metro</i>	99%	100%	100%	100%	97%	--	100%	100%	100%	98%
LOOP MOBILE	<i>Mumbai Metro</i>	98%	100%	100%	100%	100%	100%	---	100%	100%	100%
VODAFONE	<i>Mumbai Metro</i>	100%	100%	100%	100%	100%	100%	100%	---	100%	100%
RCOM CDMA	<i>Mumbai Metro</i>	100%	100%	96%	97%	100%	100%	100%	100%	---	100%
TATA CDMA	<i>Mumbai Metro</i>	100%	99%	99%	100%	100%	98%	97%	100%	100%	---

The result of the testing revealed that the inter connection performance among the operators was quite satisfactory. However, successful call attempts from Aircel to Idea, Tata (GSM) and RCOM (CDMA) were 99%, 98% and 98% respectively. In case from MTNL to RCOM (GSM), Loop Mobile, Vodafone and Tata (CDMA) were 98%, 99%, 99%, and 97% respectively. Similarly, from Idea to MTNL, Tata (GSM), Loop Mobile, the successful calls were 97%, 99%, 98%. From RCOM (GSM) to Aircel and Vodafone were 97% and 96%, from Tata (GSM) to Airtel, RCOM (GSM) and Tata (CDMA) were 99%, 97% and 98% respectively, from RCOM (CDMA) to MTNL and Idea were 96% and 97%. From Tata (CDMA) to Aircel, MTNL, Tata (GSM) and Loop Mobile successful interconnections were 99%, 99%, 98% and 97% respectively. Thus there was no remarkable problem in interconnection from one operator to other operators.



**6.2 CUSTOMER CARE / HELPLINE ASSESSMENT:**

<b>LIVE CALLING TO CALL CENTRE</b>											
<b>Parameter</b>	<b>Circle Name</b>	<b>AIRTEL</b>	<b>AIRCEL</b>	<b>MTNL</b>	<b>IDEA</b>	<b>RCOM (GSM)</b>	<b>TATA (GSM)</b>	<b>LOOP</b>	<b>VODAFONE</b>	<b>RCOM (CDMA)</b>	<b>TATA (CDMA)</b>
Total No. of calls Attempted	Mumbai Metro	100	100	IVR not functional	100	100	100	100	100	100	100
Total no. of calls successfully established to customer care/Call center	Mumbai Metro	99	98	IVR not functional	98	98	99	99	99	98	99
% Accessibility of Call centre /customer Care (Total call successfully established *100/ Total call attempt)	Mumbai Metro	<b>99.00%</b>	<b>98.00%</b>	<b>NA</b>	<b>98.00%</b>	<b>98.00%</b>	<b>99.00%</b>	<b>99.00%</b>	<b>99.00%</b>	<b>98.00%</b>	<b>99.00%</b>
Total Calls reached to agent desk for Voice to Voice (Total call attempt)	Mumbai Metro	99	98	94	98	98	99	99	99	98	99
Total number of calls answered by the operator (Voice to voice) within 60 seconds.	Mumbai Metro	96	89	90	92	90	95	97	92	89	93
% age of calls answered by operator (voice to voice) (Total call successfully established within 60 Sec.*100 /Total call attempt)	Mumbai Metro	<b>96.97%</b>	<b>90.82%</b>	<b>95.74%</b>	<b>93.88%</b>	<b>91.84%</b>	<b>95.96%</b>	<b>97.98%</b>	<b>92.93%</b>	<b>90.82%</b>	<b>93.94%</b>

NA: Not Applicable

In case of calls answered by operators (voice to voice) within 60 seconds when test calls were made to the call centers, the performance with respect to the calls connection was in the range of 90.82% to 97.98%. 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)	LOOP	VODAFONE	RCOM (CDMA)	TATA (CDMA)
Total No. of calls Attempted	Mumbai	8	100	100	100	100	1	100	100	100	0
Total No. of calls Answered	Mumbai	7	94	90	91	95	1	96	92	87	0
Resolution of Billing Complaints	Mumbai	7	94	90	91	95	1	96	92	87	NA
%age of cases resolved	Mumbai	100%	100%	100%	100%	100%	100%	100%	100%	100%	NA

NA: Not Applicable

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

**6.4 LEVEL -1 CALLING ASSESSMENT:**

LEVEL 1 LIVE CALLING														
Emergency no.	Circle Name	SSA Name	Name of SDCA	No. of calls made	AIRCEL	AIRTEL	MTNL	LOOP	IDEA	RCOM GSM	RCOM CDMA	TATA GSM	TATA CDMA	VODAFONE
100	MUMBAI	MUMBAI	SOUTH MUMBAI	10	10	10	10	10	10	10	10	10	10	10
101	MUMBAI	MUMBAI	SOUTH MUMBAI	10	10	10	10	10	10	10	10	10	10	10
102	MUMBAI	MUMBAI	SOUTH MUMBAI	10	10	10	10	10	10	10	10	10	10	10
103	MUMBAI	MUMBAI	SOUTH MUMBAI	10	10	10	10	10	10	10	10	10	10	10
1098	MUMBAI	MUMBAI	SOUTH MUMBAI	10	10	10	10	10	10	10	10	10	10	10
100	MUMBAI	MUMBAI	KALYAN MUMBAI	10	10	10	10	10	10	10	10	10	10	10
101	MUMBAI	MUMBAI	KALYAN MUMBAI	10	10	10	10	10	10	10	10	10	10	10
102	MUMBAI	MUMBAI	KALYAN MUMBAI	10	10	10	10	10	10	10	10	10	10	10
103	MUMBAI	MUMBAI	KALYAN MUMBAI	10	10	10	10	10	10	10	10	10	10	10
1098	MUMBAI	MUMBAI	KALYAN MUMBAI	10	10	10	10	10	10	10	10	10	10	10
100	MUMBAI	MUMBAI	NORTH MUMBAI	10	10	10	10	10	10	10	10	10	10	10
101	MUMBAI	MUMBAI	NORTH MUMBAI	10	10	10	10	10	10	10	10	10	10	10
102	MUMBAI	MUMBAI	NORTH MUMBAI	10	10	10	10	10	10	10	10	10	10	10
103	MUMBAI	MUMBAI	NORTH MUMBAI	10	10	10	10	10	10	10	10	10	10	10
1098	MUMBAI	MUMBAI	NORTH MUMBAI	10	10	10	10	10	10	10	10	10	10	10
			<b>Total Calls</b>	<b>150</b>										

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 (July14 - Sept14) 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 **South Mumbai, Kalyan and North Mumbai** in the months of July, August and September 2014 respectively. The total route Kms covered during drive tests in respective SSAs was **308 Kms, 310 Kms and 325 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: SOUTH MUMBAI SSA (JULY-14)

DRIVE TEST TABLE – 1

S/N	Parameter	Classification of Route covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		LOOP MOBILE		VODAFONE		TATA CDMA		RCOM CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
1	Call Attempts	Highways	112	25	104	25	137	25	103	30	119	25	121	32	112	30	128	30	94	30	151	32
		Major Roads	148	25	118	25	139	25	123	30	131	25	141	26	138	30	135	25	125	30	126	27
		Within City	410	25	330	25	391	25	286	30	377	25	403	25	386	31	289	26	318	30	407	30
		Overall SSA	670	75	552	75	667	75	512	90	627	75	665	83	636	91	552	81	537	90	684	89
2	Blocked Call Rate	Highways	2.68%	0.00%	0.00%	0.00%	1.46%	0.00%	6.80%	0.00%	2.52%	0.00%	1.65%	0.00%	0.89%	0.00%	0.00%	0.00%	0.00%	0.00%	1.99%	0.00%
		Major Roads	2.03%	0.00%	0.00%	0.00%	2.88%	0.00%	0.81%	0.00%	0.76%	0.00%	2.84%	0.00%	1.45%	0.00%	0.00%	0.00%	0.00%	0.00%	3.97%	0.00%
		Within City	1.71%	0.00%	0.00%	0.00%	0.77%	0.00%	1.05%	0.00%	1.33%	0.00%	1.24%	0.00%	1.81%	0.00%	0.00%	0.00%	0.00%	0.00%	0.49%	0.00%
		Overall SSA	1.94%	0.00%	0.00%	0.00%	1.35%	0.00%	2.15%	0.00%	1.44%	0.00%	1.65%	0.00%	1.57%	0.00%	0.00%	0.00%	0.00%	0.00%	1.46%	0.00%
3	Dropped Call Rate (<=2%)	Highways	2.75%	0.00%	0.00%	0.00%	3.76%	0.00%	1.03%	0.00%	0.86%	0.00%	0.00%	0.00%	4.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.68%	0.00%
		Major Roads	2.07%	0.00%	0.00%	0.00%	4.51%	0.00%	1.64%	0.00%	3.08%	0.00%	2.19%	0.00%	2.94%	0.00%	0.00%	0.00%	0.80%	0.00%	1.65%	0.00%
		Within City	0.99%	0.00%	0.00%	0.00%	1.30%	0.00%	0.35%	0.00%	0.54%	0.00%	0.75%	0.00%	2.11%	0.00%	0.00%	0.00%	0.63%	0.00%	0.49%	0.00%
		Overall SSA	1.52%	0.00%	0.00%	0.00%	2.45%	0.00%	0.80%	0.00%	1.13%	0.00%	0.92%	0.00%	2.72%	0.00%	0.00%	0.00%	0.56%	0.00%	0.74%	0.00%

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



S/N	Parameter	Classification of Route covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		LOOP MOBILE		VODAFONE		TATA CDMA		RCOM CDMA	
			OUTDOOR	INDOOR	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	NA	NA	96.73%	97.75%	93.22%	97.26%
		Major Roads	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.65%	95.11%	93.43%	97.88%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.15%	97.05%	94.26%	95.10%
		Overall SSA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.38%	96.79%	93.94%	96.77%
	(b) 0-5 (with frequency hopping for GSM Operators)	Highways	95.40%	99.83%	96.05%	99.70%	92.27%	95.17%	97.28%	100%	92.34%	96.13%	92.48%	99.90%	93.97%	99.66%	95.01%	99.73%	NA	NA	NA	NA
		Major Roads	96.16%	99.75%	95.63%	98.96%	90.30%	97.77%	95.98%	99.99%	89.91%	94.31%	91.80%	99.64%	94.96%	99.59%	95.54%	90.65%	NA	NA	NA	NA
		Within City	95.65%	98.55%	96.46%	99.58%	93.77%	97.21%	96.30%	99.59%	90.72%	95.15%	94.06%	99.25%	95.41%	99.49%	95.23%	98.76%	NA	NA	NA	NA
		Overall SSA	95.74%	99.38%	95.60%	99.41%	92.76%	96.59%	96.40%	99.87%	90.86%	95.20%	93.31%	99.70%	94.95%	99.60%	95.26%	96.60%	NA	NA	NA	NA
<b>Service Coverage</b>																						
5	In door (>= -75dBm)	Highways	90.53%	99.98%	92.49	91.05%	49.11%	31.19%	95.91%	98.23%	90.63%	66.12%	61.70%	90.09%	85.20%	99.97%	82.96%	99.88%	95.85%	100%	78.20%	64.08%
		Major Roads	94.30%	94.55%	90.79	98.46%	46.83%	16.22%	96.00%	99.52%	89.12%	70.09%	64.11%	98.54%	82.18%	99.97%	73.76%	98.26%	96.98%	96.27%	78.20%	100%
		Within City	91.87%	93.37%	90.18	95.92%	52.77%	22.41%	95.24%	100%	93.69%	26.06%	69.20%	98.42%	79.87%	99.95%	80.68%	79.22%	97.83%	100%	86.85%	92.69%
		Overall SSA	92.26%	95.97%	91.15	100%	49.57%	23.27%	95.54%	99.27%	92.14%	53.76%	66.85%	94.19%	81.75%	99.97%	79.57%	92.92%	97.28%	98.99%	84.51%	81.82%
	In-vehicle (>= -85dBm)	Highways	97.33%	100%	97.47	99.57%	84.83%	80.06%	98.84%	100%	98.35%	98.52%	86.56%	100%	96.10%	100%	98.07%	100%	100%	100%	96.33%	100%
		Major Roads	98.59%	100%	98.01	99.65%	80.67%	62.70%	98.63%	99.96%	98.87%	91.10%	87.93%	100%	97.40%	100%	95.53%	100%	100%	100%	96.33%	100%
		Within City	98.58%	99.92%	98.00	99.95%	87.82%	55.57%	99.43%	100%	99.45%	99.55%	90.81%	100%	97.71%	100%	97.25%	99.83%	100%	100%	98.70%	100%
		Overall SSA	98.37%	99.97%	97.83	100%	84.44%	66.11%	99.14%	99.99%	99.12%	96.38%	89.48%	100%	97.24%	100%	97.03%	99.95%	100%	100%	98.21%	100%

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



S/N	Parameter	Classification of Route covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		LOOP MOBILE		VODAFONE		TATA CDMA		RCOM CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
	Outdoor-in city (>= 95dBm)	Highways	99.72%	100%	100%	100%	98.19%	99.13%	100%	100%	100%	100%	95.87%	100%	99.79%	100%	99.91%	100%	100%	100%	100%	100%
		Major Roads	99.70%	100%	100%	100%	96.63%	99.16%	99.98%	100%	100%	100%	96.98%	100%	99.87%	100%	99.90%	100%	100%	100%	100%	100%
		Within City	99.59%	100%	100%	100%	99.04%	98.94%	100%	100%	100%	100%	97.99%	100%	99.86%	100%	99.92%	100%	100%	100%	100%	100%
		Overall SSA	99.64%	100%	100%	100%	97.95%	99.08%	100%	100%	100%	100%	97.42%	100%	99.85%	100%	99.91%	100%	100%	100%	100%	100%
6	Call Setup Success Rate (>=95%)	Highways	97.32%	100%	100%	100%	97.08%	100%	93.20%	100%	97.48%	100%	98.35%	100%	99.11%	100%	100%	100%	100%	100%	98.01%	100%
		Major Roads	97.97%	100%	100%	100%	95.68%	100%	99.19%	100%	99.24%	100%	97.16%	100%	98.55%	100%	100%	100%	100%	100%	96.03%	100%
		Within City	98.29%	100%	100%	100%	98.72%	100%	98.95%	100%	98.41%	100%	98.76%	100%	98.19%	100%	100%	100%	100%	100%	99.51%	100%
		Overall SSA	98.06%	100%	100%	100%	97.75%	100%	97.85%	100%	98.41%	100%	98.35%	100%	98.43%	100%	100%	100%	100%	100%	98.54%	100%
7	Hand Over Success Rate (HOSR)	Highways	95.40%	100%	99.57%	100%	94.38%	100%	100%	100%	100%	100%	99.30%	100%	97.02%	100%	100%	100%	100%	100%	100%	100%
		Major Roads	98.63%	100%	98.66%	100%	97.06%	100%	98.19%	100%	98.55%	100%	97.31%	100%	97.08%	100%	99.48%	100%	100%	100%	100%	100%
		Within City	96.94%	100%	99.87%	100%	98.57%	100%	98.12%	100%	97.19%	100%	99.18%	100%	97.78%	100%	99.22%	100%	100%	100%	100%	100%
		Overall SSA	97.03%	100%	98.86%	100%	97.54%	100%	98.39%	100%	97.95%	100%	98.77%	100%	97.52%	100%	99.46%	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: KALYAN SSA (AUGUST-14)

DRIVE TEST TABLE – 2

S/N	Parameter	Classification of Route covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		LOOP MOBILE		VODAFONE		TATA CDMA		RCOM CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
1	Call Attempts	Highways	79	30	70	30	104	34	71	30	80	30	98	30	77	30	76	30	73	30	106	30	
		Major Roads	133	30	119	30	145	30	120	30	136	30	153	30	136	30	130	30	133	30	157	30	
		Within City	303	30	259	30	328	30	247	30	249	30	287	30	286	30	274	30	260	30	320	30	
		Overall SSA	515	90	448	90	577	94	438	90	465	90	538	90	499	90	480	90	466	90	583	90	
2	Blocked Call Rate	Highways	2.53%	0.00%	0.00%	0.00%	2.88%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.60%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Major Roads	0.75%	0.00%	0.00%	0.00%	2.07%	0.00%	1.67%	0.00%	2.21%	0.00%	3.92%	0.00%	2.94%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.91%	0.00%
		Within City	0.00%	0.00%	0.00%	0.00%	1.22%	0.00%	1.62%	0.00%	0.40%	0.00%	0.00%	0.00%	2.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	5.94%	0.00%
		Overall SSA	0.58%	0.00%	0.00%	0.00%	1.73%	0.00%	1.37%	0.00%	0.86%	0.00%	1.12%	0.00%	2.40%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	3.77%	0.00%
3	Dropped Call Rate (<=2%)	Highways	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.41%	0.00%	2.50%	0.00%	2.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	4.11%	0.00%	0.00%	0.00%
		Major Roads	1.52%	0.00%	0.00%	0.00%	1.44%	0.00%	1.67%	0.00%	2.26%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.50%	0.00%	1.30%	0.00%
		Within City	0.00%	0.00%	0.00%	0.00%	1.90%	0.00%	0.40%	0.00%	0.40%	0.00%	1.05%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.77%	0.00%	1.33%	0.00%
		Overall SSA	0.39%	0.00%	0.00%	0.00%	1.47%	0.00%	0.91%	0.00%	1.30%	0.00%	0.94%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.50%	0.00%	1.07%	0.00%

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



S/N	Parameter	Classification of Route covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		LOOP MOBILE		VODAFONE		TATA CDMA		RCOM CDMA		
			OUTDOOR	INDOOR	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	NA	NA	96.27%	96.54%	<b>94.98%</b>	100%	
		Major Roads	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	95.52%	97.56%	<b>88.68%</b>	99.83%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.73%	96.21%	<b>87.72%</b>	100%
		Overall SSA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.32%	96.77%	<b>89.26%</b>	99.93%
	(b) 0-5 (with frequency hopping for GSM Operators)	Highways	<b>92.90%</b>	99.62%	96.58%	99.31%	<b>85.75%</b>	99.83%	98.24%	99.98%	<b>88.80%</b>	97.65%	99.04%	99.79%	97.92%	99.44%	96.99%	96.87%	NA	NA	NA	NA	
		Major Roads	<b>92.98%</b>	99.70%	95.52%	98.78%	<b>86.56%</b>	100%	95.97%	99.30%	<b>87.79%</b>	<b>88.03%</b>	<b>92.43%</b>	100%	95.16%	99.17%	95.03%	99.86%	NA	NA	NA	NA	
		Within City	97.38%	99.84%	96.19%	99.07%	<b>89.68%</b>	97.21%	96.84%	98.69%	<b>91.16%</b>	97.43%	95.79%	99.56%	95.14%	99.79%	96.44%	98.83%	NA	NA	NA	NA	
		Overall SSA	96.34%	99.72%	96.07%	99.05%	<b>88.30%</b>	99.57%	96.84%	99.30%	<b>89.79%</b>	<b>94.38%</b>	95.40%	99.80%	95.50%	99.46%	96.15%	98.52%	NA	NA	NA	NA	
<b>Service Coverage</b>																							
5	In door (>= -75dBm)	Highways	85.07%	96.61%	92.49%	91.05%	29.60%	11.84%	98.77%	100%	93.03%	91.65%	65.74%	100%	68.12%	98.33%	77.49%	54.10%	65.69%	96.77%	73.76%	100%	
		Major Roads	85.58%	99.99%	90.79%	98.46%	30.85%	5.53%	96.09%	100%	94.25%	100%	45.99%	100%	65.69%	94.74%	72.30%	100%	95.95%	100%	46.76%	100%	
		Within City	90.03%	93.53%	90.18%	95.92%	24.06%	7.49%	96.02%	100%	96.22%	96.00%	45.47%	100%	79.39%	98.99%	71.02%	98.77%	95.79%	100%	52.94%	100%	
		Overall SSA	88.60%	96.71%	91.15%	100%	28.17%	8.29%	96.47%	100%	95.11%	96.15%	49.02%	100%	72.82%	97.24%	72.38%	84.27%	95.87%	98.92%	54.68%	100%	
	In-vehicle (>= -85dBm)	Highways	93.50%	99.97%	97.47%	99.57%	89.54%	67.56%	99.64%	100%	99.58%	99.94%	91.38%	100%	96.44%	100%	98.24%	94.91%	100%	100%	97.57%	100%	
		Major Roads	95.54%	100%	98.01%	99.65%	85.34%	43.54%	99.15%	100%	99.83%	100%	76.90%	100%	93.18%	100%	94.51%	100%	100%	100%	83.64%	100%	
		Within City	98.29%	99.99%	98.00%	99.95%	81.75%	64.07%	99.55%	100%	99.85%	100%	75.69%	100%	96.56%	100%	95.08%	100%	100%	100%	92.79%	100%	
		Overall SSA	97.19%	99.99%	97.83%	100%	85.55%	58.39%	99.46%	100%	99.80%	99.98%	78.67%	100%	94.65%	100%	95.43%	98.30%	100%	100%	90.95%	100%	

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

S/N	Parameter	Classification of Route covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		LOOP MOBILE		VODAFONE		TATA CDMA		RCOM CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
	Outdoor-in city (>= 95dBm)	Highways	99.45%	100%	100%	100%	98.82%	100%	100%	100%	100%	100%	99.29%	100%	99.99%	100%	99.99%	99.99%	104.14%	100%	100%	100%
		Major Roads	99.46%	100%	100%	100%	99.12%	100%	100%	100%	99.97%	100%	94.93%	100%	99.63%	100%	99.84%	100%	100%	100%	100%	100%
		Within City	99.76%	100%	100%	100%	98.76%	100%	100%	100%	99.98%	100%	94.55%	100%	99.83%	100%	99.89%	100%	100%	100%	100%	100%
		Overall SSA	99.66%	100%	100%	100%	98.90%	100%	100%	100%	99.98%	100%	95.46%	100%	99.74%	100%	99.90%	100%	100%	100%	100%	100%
6	Call Setup Success Rate (>=95%)	Highways	97.47%	100%	100%	100%	87.50%	97.06%	100%	100%	100%	100%	100%	100%	97.40%	100%	100%	100%	100%	100%	100%	100%
		Major Roads	99.25%	100%	100%	100%	95.86%	100%	98.33%	100%	97.79%	100%	96.08%	100%	97.06%	100%	100%	100%	100%	100%	98.09%	100%
		Within City	100%	100%	100%	100%	96.34%	100%	98.38%	100%	99.60%	100%	100%	100%	97.90%	100%	100%	100%	100%	100%	94.06%	100%
		Overall SSA	99.42%	100%	100%	100%	94.63%	98.94%	98.63%	100%	99.14%	100%	98.88%	100%	97.60%	100%	100%	100%	100%	100%	100%	96.23%
7	Hand Over Success Rate (HOSR)	Highways	99.30%	100%	99.54%	100%	100%	100%	100%	100%	96.79%	100%	100%	100%	100%	100%	99.29%	100%	100%	100%	100%	100%
		Major Roads	96.28%	100%	99.02%	100%	99.53%	100%	97.52%	100%	96.56%	100%	99.63%	100%	98.73%	100%	99.20%	100%	100%	100%	100%	100%
		Within City	99.21%	100%	99.48%	100%	99.79%	100%	98.19%	100%	97.62%	100%	99.60%	100%	97.30%	100%	99.74%	100%	100%	100%	100%	100%
		Overall SSA	98.36%	100%	99.40%	100%	99.75%	100%	98.28%	100%	97.19%	100%	99.69%	100%	98.10%	100%	99.51%	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: NORTH MUMBAI (SEPTEMBER-14)

DRIVE TEST TABLE – 3

S/N	Parameter	Classification of routes covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		LOOP MOBILE		VODAFONE		TATA CDMA		RCOM CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
			1	Call Attempts	Highways	61	30	64	30	63	31	44	30	67	30	51	30	135	30	42	30	83
		Major Roads	145	30	135	30	107	32	118	30	146	30	136	30	43	30	124	30	101	30	143	30
		Within City	366	30	383	30	361	30	324	30	377	30	400	30	385	30	349	30	350	30	413	30
		Overall SSA	572	90	582	90	531	93	486	90	590	90	587	90	563	90	515	90	534	90	609	91
2	Blocked Call Rate	Highways	1.64%	0.00%	0.00%	0.00%	3.17%	0.00%	11.36%	3.33%	1.49%	0.00%	0.00%	0.00%	2.22%	0.00%	0.00%	0.00%	0.00%	0.00%	3.77%	0.00%
		Major Roads	0.00%	0.00%	0.00%	0.00%	1.87%	0.00%	8.47%	0.00%	1.37%	0.00%	1.47%	0.00%	2.33%	0.00%	0.81%	0.00%	0.99%	0.00%	6.29%	0.00%
		Within City	1.91%	0.00%	0.00%	0.00%	1.39%	0.00%	2.78%	0.00%	0.80%	0.00%	0.50%	0.00%	1.82%	0.00%	0.00%	0.00%	0.00%	0.00%	0.48%	0.00%
		Overall SSA	1.40%	0.00%	0.00%	0.00%	1.69%	0.00%	4.94%	1.11%	1.02%	0.00%	0.68%	0.00%	1.95%	0.00%	0.19%	0.00%	0.19%	0.00%	2.13%	0.00%
3	Dropped Call Rate (<=2%)	Highways	0.00%	0.00%	0.00%	0.00%	4.84%	0.00%	5.13%	3.45%	1.52%	0.00%	0.00%	0.00%	1.52%	0.00%	0.00%	0.00%	2.41%	0.00%	1.96%	0.00%
		Major Roads	0.00%	0.00%	0.00%	0.00%	1.90%	0.00%	0.00%	0.00%	0.69%	0.00%	0.75%	0.00%	0.00%	0.00%	0.00%	0.00%	2.97%	0.00%	0.75%	0.00%
		Within City	0.00%	0.00%	0.00%	0.00%	0.84%	0.00%	0.63%	0.00%	0.53%	0.00%	0.75%	0.00%	1.59%	0.00%	0.00%	0.00%	2.86%	0.00%	0.73%	0.00%
		Overall SSA	0.00%	0.00%	0.00%	0.00%	1.53%	0.00%	0.87%	1.12%	0.68%	0.00%	0.69%	0.00%	1.45%	0.00%	0.00%	0.00%	2.81%	0.00%	0.84%	0.00%
4	Percentage connections with good voice quality (=>95%)																					
	(a) 0-4 (w/o frequency)	Highways	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.62%	99.34%	94.48%	100%
		Major Roads	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.85%	99.13%	88.99%	100%

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



S/N	Parameter	Classification of routes covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		LOOP MOBILE		VODAFONE		TATA CDMA		RCOM CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
	hopping for CDMA Operators)	Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.33%	97.08%	93.76%	97.86%
		Overall SSA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.49%	98.49%	92.86%	99.51%
(b) 0-5 ( with frequency hopping for GSM Operators)	Highways	96.21%	89.85%	95.75%	98.12%	84.29%	97.39%	96.81%	96.88%	85.01%	98.01%	95.06%	100%	95.45%	99.95%	95.36%	99.71%	NA	NA	NA	NA	
	Major Roads	96.84%	92.21%	95.37%	97.27%	89.51%	99.69%	96.79%	100%	91.04%	99.82%	93.70%	100%	95.61%	99.82%	95.59%	99.68%	NA	NA	NA	NA	
	Within City	95.70%	91.48%	95.38%	97.78%	87.72%	97.21%	95.62%	100%	90.72%	99.76%	94.14%	100%	94.97%	99.74%	95.11%	99.92%	NA	NA	NA	NA	
	Overall SSA	95.98%	91.18%	95.43%	97.73%	87.69%	98.50%	96.04%	98.92%	90.24%	99.20%	94.14%	100%	95.16%	99.83%	95.25%	99.77%	NA	NA	NA	NA	
5	<b>Service Coverage</b>																					
	In door (>= - 75dBm)	Highways	99.51%	96.80%	92.49%	66.72%	35.84%	0.00%	99.55%	99.65%	99.77%	81.32%	90.38%	100%	78.02%	96.42%	84.41%	99.39%	100%	100%	99.46%	100%
		Major Roads	97.58%	96.00%	90.79%	59.47%	25.22%	21.40%	97.74%	99.98%	95.08%	92.16%	65.71%	100%	92.40%	84.11%	75.79%	88.08%	97.75%	100%	72.63%	100%
		Within City	97.57%	87.10%	90.18%	80.61%	32.30%	24.15%	97.93%	96.98%	98.83%	94.38%	69.73%	100%	76.26%	99.97%	71.02%	100%	99.84%	100%	87.93%	100%
		Overall SSA	97.72%	93.30%	91.15%	100%	31.12%	15.18%	98.02%	98.89%	97.99%	89.31%	70.79%	100%	78.75%	97.24%	73.17%	95.82%	99.20%	100%	85.83%	100%
	In-vehicle (>= - 85dBm)	Highways	99.90%	100%	97.47%	98.93%	77.16%	27.37%	99.93%	100%	99.92%	99.99%	97.91%	100%	94.20%	100%	98.44%	99.99%	100%	100%	100%	100%
		Major Roads	99.45%	100%	98.01%	97.01%	67.40%	70.61%	99.80%	100%	98.93%	99.71%	87.07%	100%	98.83%	99.79%	95.00%	99.69%	99.87%	100%	89.54%	100%
		Within City	99.52%	100%	98.00%	99.80%	72.82%	82.98%	99.83%	99.99%	99.90%	99.54%	92.98%	100%	95.84%	100%	95.08%	100%	100%	100%	99.41%	100%
		Overall SSA	99.53%	100%	97.83%	100%	72.46%	60.32%	99.83%	100%	99.66%	99.74%	92.22%	100%	95.85%	100%	96.09%	99.89%	99.96%	100%	97.41%	100%
	Outdoor-in city (>= - 95dBm)	Highways	99.96%	100%	100%	100%	98.28%	99.02%	100%	100%	99.99%	100%	99.94%	100%	99.66%	100%	99.91%	100%	100%	100%	100%	100%
		Major Roads	99.93%	100%	100%	100%	96.48%	99.87%	100%	100%	99.91%	100%	96.65%	100%	99.95%	100%	99.20%	100%	100%	100%	100%	100%
		Within City	99.92%	100%	100%	100%	97.50%	100%	100%	100%	99.95%	99.99%	99.08%	100%	99.83%	100%	99.89%	100%	100%	100%	100%	100%
		Overall SSA	99.93%	100%	100%	100%	97.42%	99.63%	100%	100%	99.94%	100%	98.67%	100%	99.80%	100%	99.78%	100%	100%	100%	100%	100%

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



S/N	Parameter	Classification of routes covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		LOOP MOBILE		VODAFONE		TATA CDMA		RCOM CDMA		
			OUTDOOR	INDOOR	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	98.36%	100%	100%	100%	96.83%	100%	88.64%	96.67%	98.51%	100%	100%	100%	97.78%	100%	100%	100%	100%	100%	100%	96.23%	100%
		Major Roads	100%	100%	100%	100%	98.13%	100%	91.53%	100%	98.63%	100%	98.53%	100%	97.67%	100%	100%	100%	99.01%	100%	93.71%	100%	
		Within City	97.54%	100%	100%	100%	98.61%	100%	97.22%	100%	99.20%	100%	99.50%	100%	98.18%	100%	100%	100%	100%	100%	99.52%	100%	
		Overall SSA	98.25%	100%	100%	100%	98.31%	100%	95.06%	98.89%	98.98%	100%	99.32%	100%	98.05%	100%	100%	100%	99.81%	100%	97.87%	100%	
7	Hand Over Success Rate (HOSR)	Highways	98.18%	100%	99.39%	100%	98.77%	100%	93.90%	91.16%	95.11%	100%	100%	100%	98.81%	100%	99.13%	100%	100%	100%	100%	100%	100%
		Major Roads	96.28%	100%	98.28%	100%	99.22%	100%	97.52%	100%	98.06%	100%	98.56%	100%	99.56%	100%	99.10%	100%	100%	100%	100%	100%	100%
		Within City	99.59%	100%	98.85%	100%	99.43%	100%	95.72%	100%	96.71%	100%	98.78%	100%	99.12%	100%	99.40%	100%	100%	100%	100%	100%	100%
		Overall SSA	99.07%	100%	98.81%	100%	99.29%	100%	95.83%	97.10%	96.74%	100%	98.91%	100%	99.10%	100%	99.31%	100%	100%	100%	100%	100%	100%

\*NA: Not Applicable

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

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

**DRIVE TEST TABLE: 4**

DRIVE TEST ROUTE OF JULY TO SEPTEMBER - 14 – MUMBAI METRO CIRCLE							
Name of SSA	Drive test Period	Day 1		Day 2		Day 3	
		Name of SDCA Covered	Route Covered	Name of SDCA Covered	Route Covered	Name of SDCA Covered	Route Covered
<b>SOUTH MUMBAI</b>	<b>July-14</b>	South Mumbai / 105 KM	Shivajipark,Mahim,Bandra,Worli,Pedder Rd,Gamdevi,Grant Rd,Lamington Rd,Mumbai Central,Byculla,Sat Rasta Circle,Mazgaon,Parel,Curry Rd,Lalbaugh,Lower Parel,Elphinstone,Dadar,Prabhadevi,Adarsh Nagar.  <b>INDOOR: PHOENIX MALL</b>	South Mumbai / 103 KM	Shivajipark,Mahim, Bandra, Worli, Pedder Rd,Bhulabhai Desai Rd,Malabar Hill,Tin Batti,Walkeshwar Rd,Girgaon Chowpaty,Marine Drive,Nariman Point,Cooperage,Cuffparade,Colaba,Navy Nagar,Gate Way Of India,Ballard Estate,GPR,P D'Mello Rd,Eastern free Way,Wadala,Matunga,Dadar,Prabhadevi.  <b>INDOOR: I-MAX MALL</b>	South Mumbai / 100 KM	Shivajipark,Mahim,Tulsi Pipe road,Bandra,Worli,Pedder Rd,Bhulabhai Desai Rd,Malabar Hill,Tin Batti,Walkeshwar Rd,Girgaon Chowpaty,Marine Drive,Nariman Point,Cooperage,Cuffparade,Colaba,Navy Nagar,Gate Way of India,Ballard Estate,GPO,Eastern Free Way Wadala,Sewree,Cotton Green,Parel,Lalbaugh,Dadar,Prabhadevi.  <b>INDOOR: ATRIA MALL</b>
<b>KALYAN</b>	<b>Aug-14</b>	Kalyan / 101 KM	Kalyan Shil Road,Pune Link Rd,Kalyan-Badlapur Rd,Murbad Rd,Birla College Rd,Barve Gaon Rd,Nashik Rd,Bhiwandi Rd,Kalyan Dombivli Rd  <b>INDOOR: GOPI CINEMA</b>	Kalyan / 105KM	Kalyan Shil Road,Kalyan(West),Haji Malang Rd,Badlapur-Kalyan Rd,Vadveli Rd,Murbad Rd.  <b>INDOOR: METRO MALL</b>	Kalyan / 104 KM	Kalyan Shil Road, Bhiwandi Rd, Gandhari Gaon Rd ,Birla College Rd ,Mohana Rd ,Ulhas Ngr Rd ,Kalyan-Badlapur Rd ,Murbad Rd ,Ram Nagar, MIDC & Old Dombivli  <b>INDOOR: SUNDRAM MALL</b>
<b>NORTH MUMBAI</b>	<b>Sep-14</b>	North Mumbai / 105 KM	Linking Road-Malad,Kandivali,Charkop,SV Road,Kandivali,Borivali,Western Expr HW Kandivali,Malad,Malad Marve Rd,Malvani,Aksa Beach.  <b>INDOOR: INFINITY Mall, Malad</b>	North Mumbai / 108 KM	Linking Road-Malad,Kandivali,Charkop,SV Rd-Malad,Kandivali,Western Expr HW-Thakur Village,Malad-East,Western Expr HW Bhayander,Marve,INS Hamla,Malad-Marve Road.  <b>INDOOR: INORBIT Mall,Malad</b>	North Mumbai / 112 KM	Linkinh Rd-Malad,Kandivali,Borivali,Dahisar,Western Expr HW-Dahisar,Mira Rd,Bhayander,Kashimira,Uttan-Bhayander Rd,Essel World.Western Expr HW-Borivali,Kandivali,Malad  <b>INDOOR: Thakur Mall, Bhayander</b>

**7.5 SSA WISE DRIVE TEST OBSERVATION:**

**DRIVE TEST TABLE: 5**

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

S NO	Name of SP	Day 1 Observation	Day 2 Observation	Day 3 Observation
1	AIRTEL	Poor voice quality observed at :S.T Dnyaneshwar Marg Landmark: Audio Elite, and Easter Flyover Landmark: Mosque Masjid	Poor voice quality observed at : Eastern Free way Landmark: Bombay Port Trust Road	Poor voice quality observed at :Road: Easter Flyover Landmark: TJ road
2	AIRCEL	Poor voice quality & Call drop,Near MTNL worli, Paragaon centre worli	Poor voice quality Near Love Grove Flyover ,Marine drive & Churche gete station	Poor voice quality Near Mahim Church, Cuff pared road
3	MTNL	Poor level and quality at Rajrani,Bndra-Warli Sea Link,Gurukrupa and Atherva,Retiwala	Poor level and quality atWadala and Bhakti Park,SunVilla Hotel,Shanti Sadan	Poor level and quality at Point,Cooperage,Cuffparade,Colaba,Navy Nagar,Gate Way of India,Ballard
4	IDEA CELLULAR	Poor level and quality at Bandra Worli SeaLink,worli seaface,Elphiston Flyover ,Lower Parel Bridge ,Mumbai Central Bridge.	Poor level and quality at Bandra Worli SeaLink,worli seaface,Near Navy Nagar defence area,Five garden,Eastern Free Way	Poor level and quality at Matunga,Antop Hill .
5	LOOP MOBILE	Poor level and quality at Bandra Worli SeaLink,worli seaface.	Poor level and quality at Bandra Worli SeaLink,worli seaface .	Poor level and quality at Bandra Worli SeaLink,worli seaface .
6	VODAFONE	Poor voice quality observed at Site Wadia Hospital (Mahim),Nav Bharat potteries (VT Parel)	Poor voice quality observed at Mahim BWSL,Pedder road,Navy nagar colaba	Poor voice quality observed at Dadar-Marine line road,PD Mello road,
7	TATA GSM	Poor voice quality observed at :Parel, King Edward Road	--	--
8	TATA CDMA	Poor voice quality observed at :Bellasis Road	Poor voice quality observed at :Muraj road	--
9	RCOM GSM	Poor level and quality at Worli Bandra Sea Link road,MTNL office Dadar.	Poor level and quality at Poor level and quality at Old Custom House Area,Wode House road	Poor level and quality at Malabar hill area,Us Embassy,Nana Phadwanis bridge
10	RCOM CDMA	Poor level and quality at Neelkanth Apt	Poor voice quality observed at Neelkanth Apt,Malabar Hill,Sonas Building	Poor voice quality observed at Neelkanth Apt,Sonas Building,Malbar Hill



**DRIVE TEST TABLE: 6**

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

S.No	Name of SP	Day 1 Observation	Day 2 Observation	Day 3 Observation
1	AIRTEL	--	--	--
2	AIRCEL	--	Poor Rx Quality observed at Nilaje-Shilphata Road	Poor Rx Quality observed at Thakurli Station Road ,Nandivali Village ,Nilaje- Shilphata Road
3	MTNL	Poor Rx Quality observed at VAIBHAV NAGRI	Poor Rx Quality observed at BOHARI colony ,Nilaje- Shilphata Road	Poor Rx Quality observed at Laxmi Park, Thakrli Kalyan road,Thakurli Station Road ,Nandivali Village
4	IDEA CELLULAR	--	Poor Rx Quality observed at Thakurli kalyan Rd	Poor Rx Quality Observed at Thakurli Station rd, and Laxmi Park, Nalaje -Shilphata Rd
5	LOOP MOBILE	Poor Rx Level Observed at Khadkpada Area,Hanuman nagar,Thakurli Station rd.	Poor Rx Quality observed at Khadkpada Rd.	Poor Rx Quality observed at Waldhuni Area,Birla college rd.
6	VODAFONE	Poor Rx level Observed near Rukmini Apt, Indraprastha apt.,Uma darshan apt.	Poor Rx Quality Observed near Clefton Tower, Rukimini Apt,	Poor Rx Quality Observed near Shahad – Ambivali ,Kalyan – Ulhas nagar road
7	TATA GSM	--	--	Kalyan Badlapur Road, Mohane rd shahad
8	TATA CDMA	Poor Rx Quality Observed at Shastri nagar , Sarawati colony , Dombivali	Poor Rx Quality Observed at Shilphata Rd.	Poor Rx Quality Observed at Shilphata Rd.
9	RCOM GSM	Poor Rx Level Observed at Gagangiri-Kalyan, Thakurli Station Rd,Kopar Rd,navapada.	Poor Rx Quality observed at Ambavili, Gagangiri apt,regency apt.	Poor Rx Quality observed at MIDC area,Ambivali,
10	RCOM CDMA	Poor Rx Level Observed at Thakurli Station Rd,Kopar Rd,navapada, Anusuya Nivas, Nielkanth towers,	Poor Rx Quality observed at Ambavili, Gagangiri apt,regency apt, Shivmangal Apt, Kolsewadi.	Poor Rx Quality observed at MIDC area,Ambivali, Panduranga Niwas, thakurli rd.

**DRIVE TEST TABLE: 7**

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

S. NO	Name of SP	Day 1 Observation	Day 2 Observation	Day 3 Observation
1	AIRTEL	Observed worst voice qualities patches Mahaka Road Landmark: Malvani	Observed worst voice qualities patches Road: Link Road Landmark: Borivali Biryani Centre	Observed worst voice qualities patches Road: Sant Namdev Marg Landmark: Kokani Pada
2	AIRCEL	Observed worst voice qualities patches near Ekta nagar	--	--
3	MTNL	Observed worst voice qualities patches Daftary Road, Malad/malvani area	Observed worst voice qualities patches Jankalyan nagar	Observed worst voice qualities patches Mira-Bhayander Rd, Kashmirira/ Nilam Park/Sony Apt
4	IDEA CELLULAR	Observed poor voice qualities all over covered area but found worst quality at Malwe road, neelam park, MDP Road, Madh marwe road.	Observed poor voice qualities all over covered area but found worst quality Near Borivali Station road, Akurli village, Western exp highway.	Observed poor voice qualities all over covered area but found worst voice qualities patches Vaishali nagar
5	LOOP MOBILE	Observed worst voice qualities patches at Observed worst voice qualities patches in Malvani area/azad nagar/goregaon east/WE Highway	Observed worst voice qualities patches at Observed worst voice qualities patches at Eksar Rd & L T Rd down	Observed worst voice qualities patches at Chandanpark, Kashmirira Junction, Kandarpada, Rawal pada, Kokani pada & chintamani Ngr.
6	VODAFONE	Observed worst voice qualities patches at Madh Marve road, Evershine nagar Link road, Malad-w. Goregaon-w, Haji Babu road, Malad-E, Boraspada road, Poisar/Near kankia country Park, Western Express highway, Kandivali.	Observed worst voice qualities patches at Ram mandir chowk, Link road, Borivali-W, Link Road, Charkop. Refer, Near thakur Stadium, Kandivali-E, Near Shriram school, Kurar village, Malad-E	Observed worst voice qualities patches at Near gorai gaon, Gorai Uttan road, Bhyander-w/Near Ideal park, Mira Bhaynader road/Near National park, Western express highway, Borivali-E/Dahisar West
7	TATA GSM	Devipada, Borivali east./Link Cross Rd, Kandivali(W)/Abdul Hamid Street, Malwani/Goregaon Mulund Link Road./Madh Marve Road.	Observed worst voice qualities patches at Mira Gaon, Kashmirira, Mira Road/Chechnaka, Dahisar/Akurli Cross Road/Haridas Nagar Road/Akurli Cross Road	East-West Bridge, Bhyander/Mithagar road, Kandarpada, Dahisar west
8	TATA CDMA	Observed worst voice qualities patches at Dattapada Road, Borivali(E)/Charkop, Kandivali(W)/	--	--
9	RCOM GSM	Observed worst voice qualities patches at Dharavali, WE Highway, Ambedkar nagar, Kailash Nagar, Malvani	Observed worst voice qualities patches at Azad nagar, goregaon east	Observed worst voice qualities patches at Manori-Gorai Road/IC Colony
10	RCOM CDMA	Observed worst voice qualities patches at Ram Nagar area / Gautam Nagar area /Shant sadan area/Marve road/Gayatri Nagar area	Observed worst voice qualities patches at /Marve road/Gayatri Nagar area	Observed worst voice qualities patches at Queens Park Mira Bhyander, Kandarpada, Kandarpada and IC colony, Morva village, Dongri village Mira Bhayander

## 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 July-14**, drive tests were conducted across **South Mumbai** SSA (Total Drive Test 308Kms). The analysis of the drive test results conducted during the three consecutive days in South Mumbai SSA revealed that **MTNL, Idea, RCOM (GSM), RCOM (CDMA) and Loop Mobile** remained under performed with respect to parameter **Voice Quality** with their performance as **92.76%, 90.86%, 93.31%, 93.94% and 94.95%** respectively. Further, **MTNL** and **Loop Mobile** also failed to meet the benchmark of **Call drop rate** with their performance as **2.45% and 2.72%** respectively on overall SSA basis.
- (ii) **In the Month of August-14**, drive tests were conducted across **Kalyan** SSA for three consecutive days (Total drive test 310 Kms). The performance of **Idea, RCOM (CDMA) and MTNL** on over all SSA basis, was not in compliance for parameter '**Voice Quality**' with their achieved level as **89.79%, 89.26% and 88.30%** respectively. Further, performance of **MTNL** and **RCOM (CDMA)** for parameters **CSSR** and **Blocked Call rate** remained under performed with their performance as **94.63% and 3.77%** respectively on overall SSA level.
- (iii) **In the month of September-14**, drive tests were conducted across **North Mumbai** SSA (Total 323 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 **91.18% (Indoor), 87.69%, 90.24%, 94.14% and 92.86%** respectively. Apart from this, **Tata (CDMA)** and **Tata (GSM)** also remained non-complied for parameters **Call Drop rate and Blocked Call rate** having achieved level as **2.81% and 4.94%** respectively.

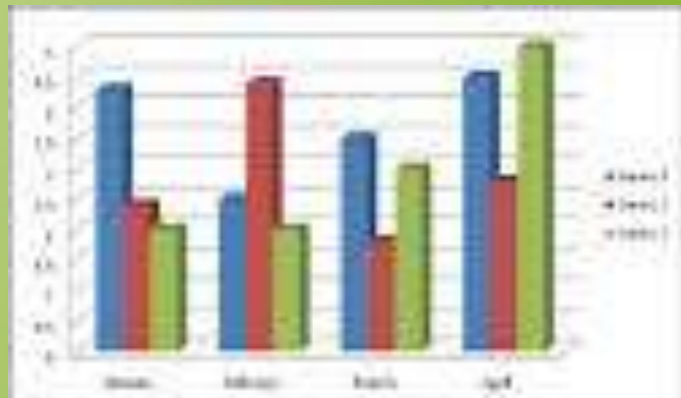
*Thus, Aircel, MTNL, Idea, RCOM (GSM), RCOM (CDMA), Tata (CDMA) and Loop Mobile were having non-complied performance for the parameters Call drop rate and Voice quality across the above SSAs where the drive tests were conducted during the quarter. Some operators also could not perform well in respect of the parameters CSSR and Blocked Call rate. 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

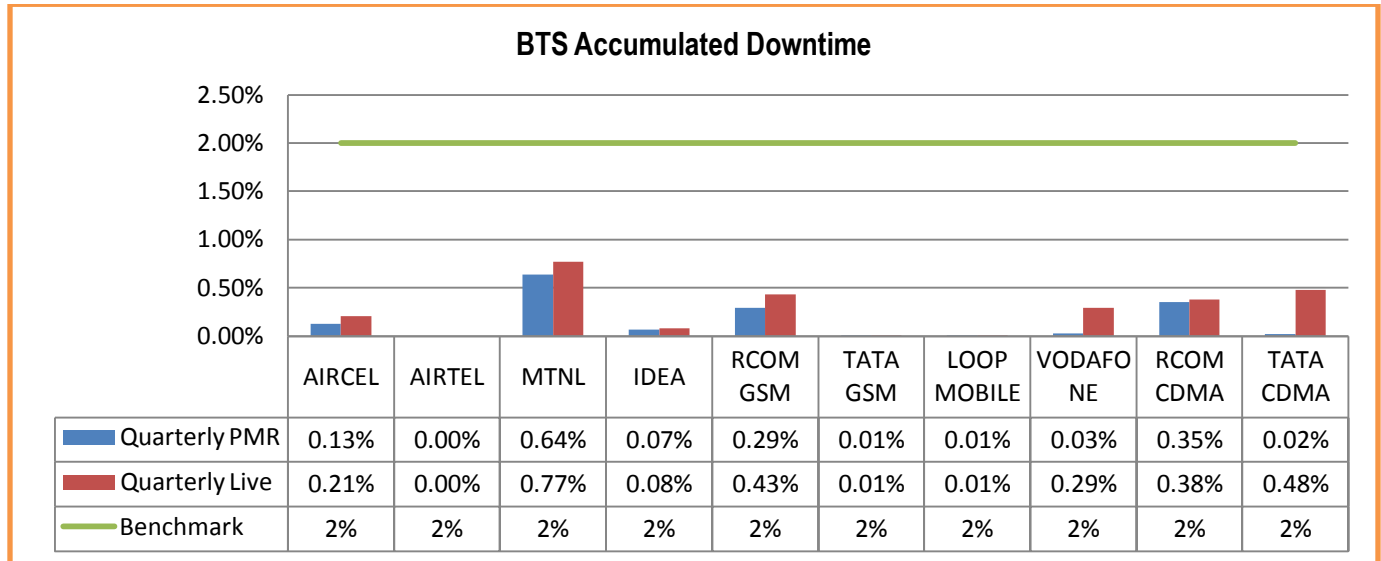
AVERAGED QUARTERLY 3-DAYs LIVE MEASURMENT



## 8. GRAPHICAL REPRESENTATION:

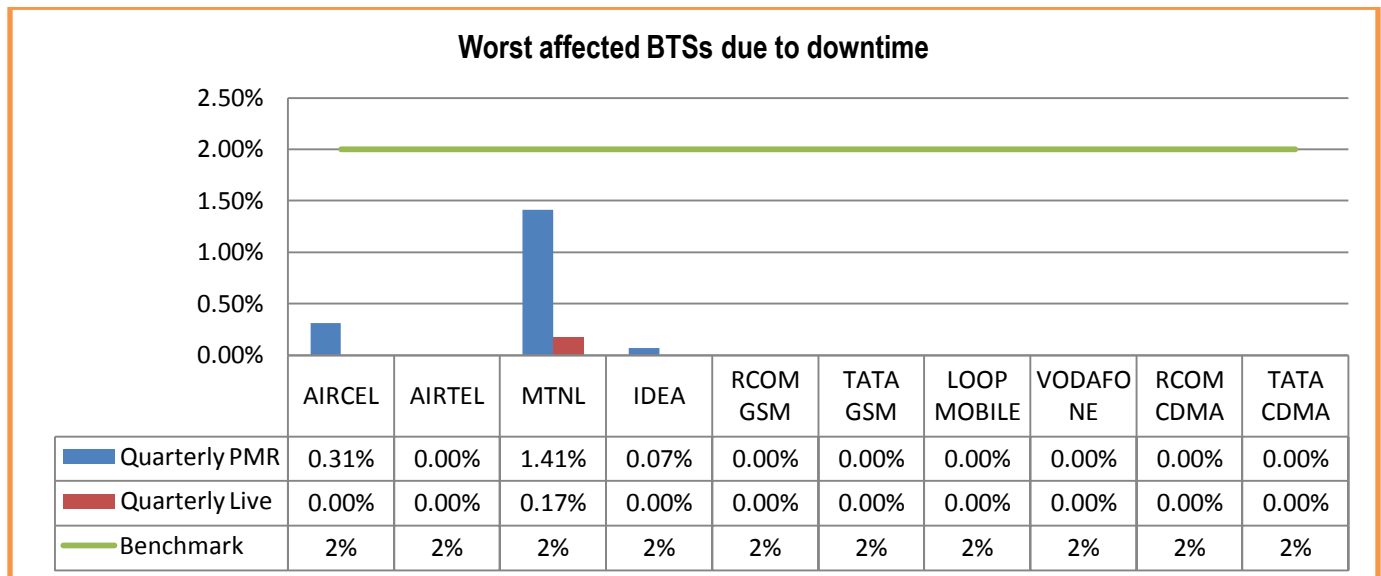
Graphical Representation of Performance of the Cellular Mobile Service Providers (PMR) V/S 3-Days Live Measurement (Quarterly Average Data):

### 1) **BTS ACCUMULATED DOWNTIME:**



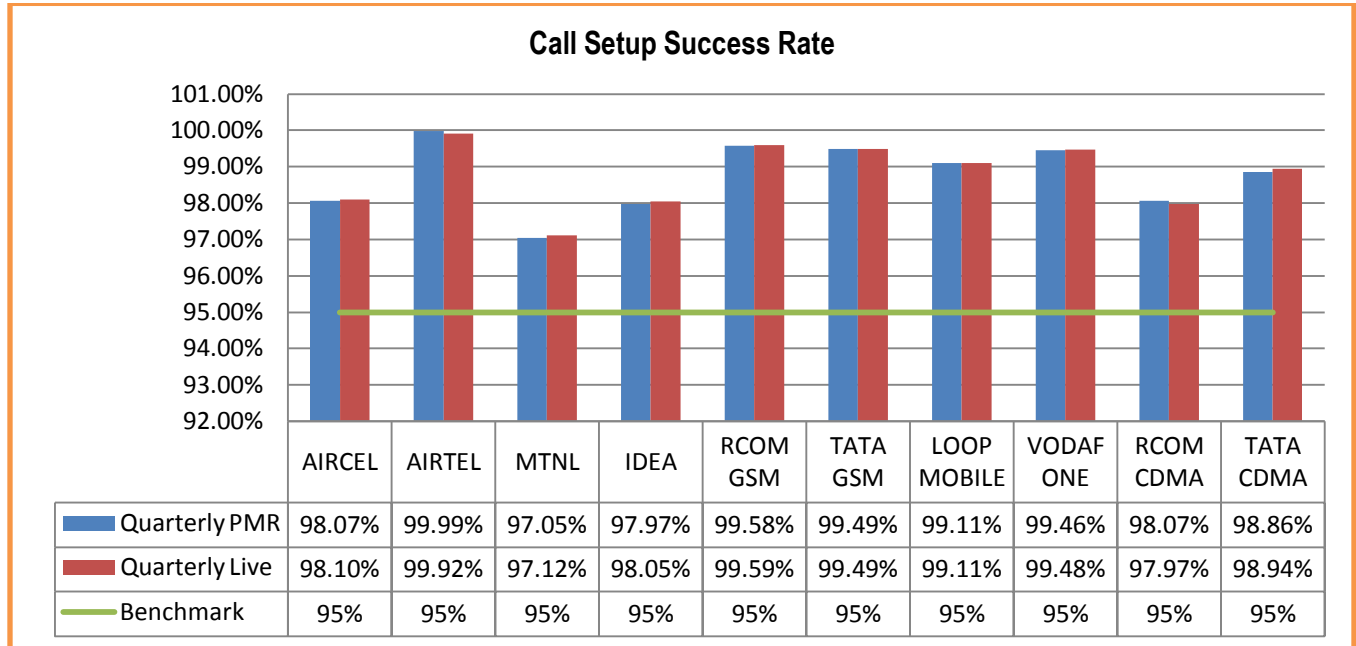
All operators are meeting the benchmarks.

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



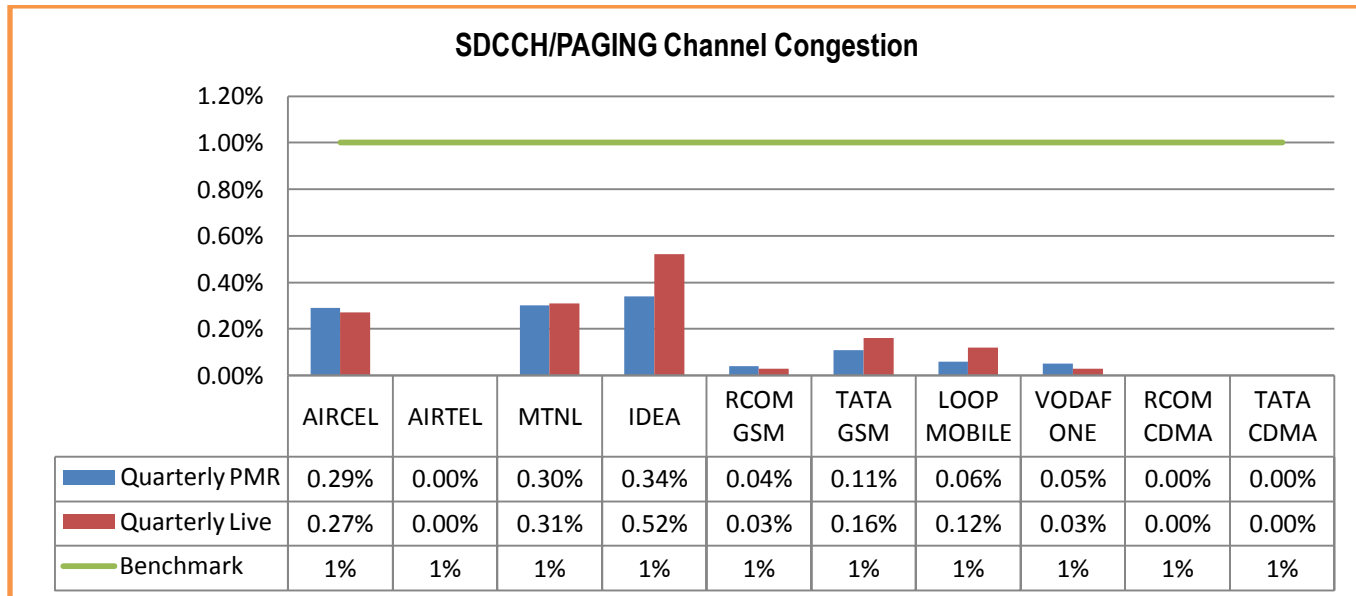
All operators are meeting the benchmarks.

**3) CALL SETUP SUCCESS RATE:**



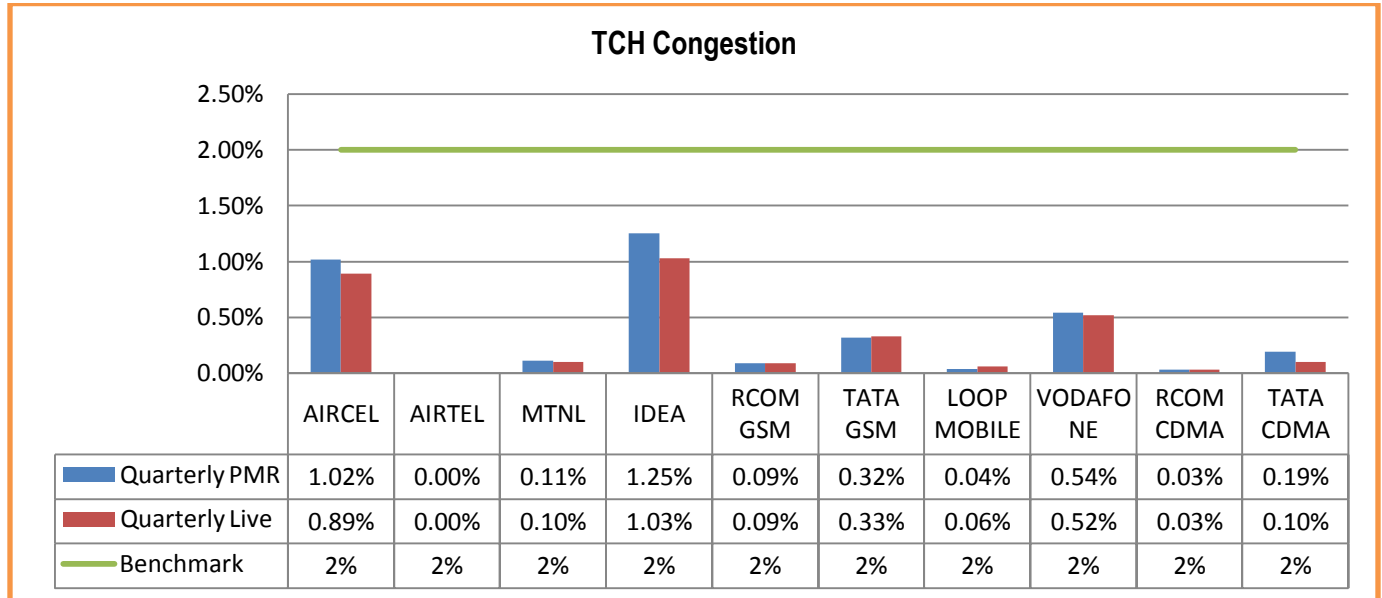
All operators are meeting the benchmarks.

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



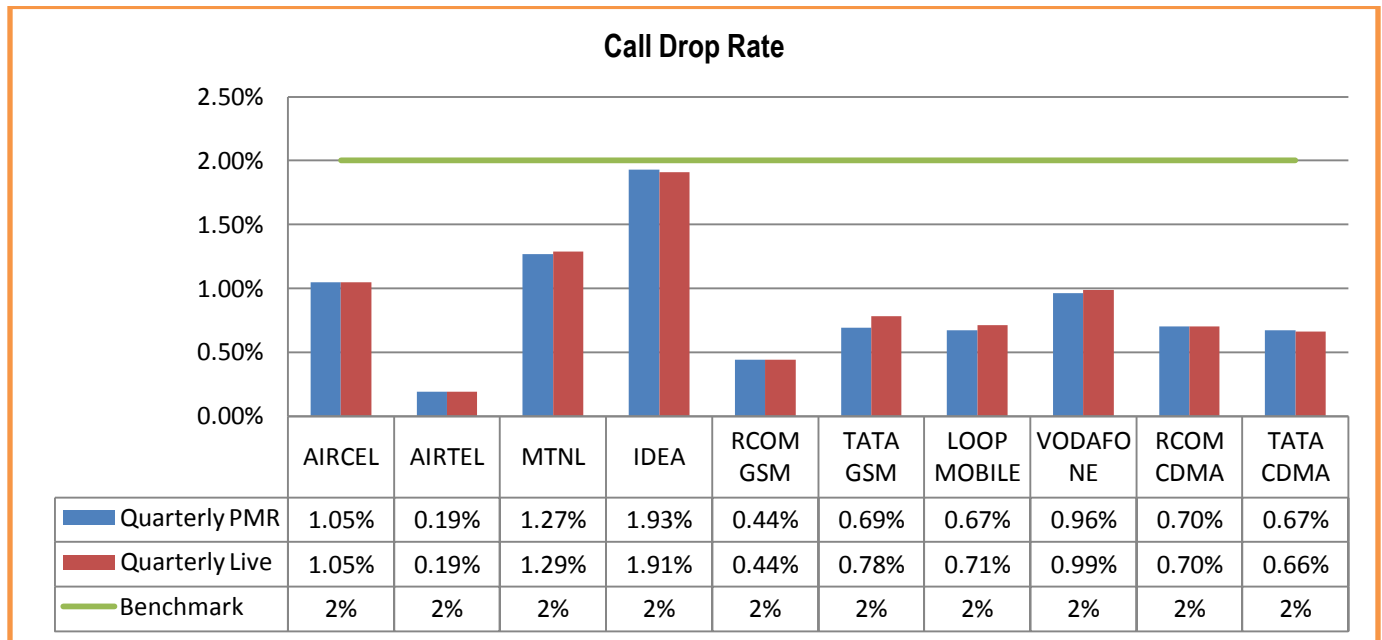
All operators are meeting the benchmarks.

**5) TCH CONGESTION:**



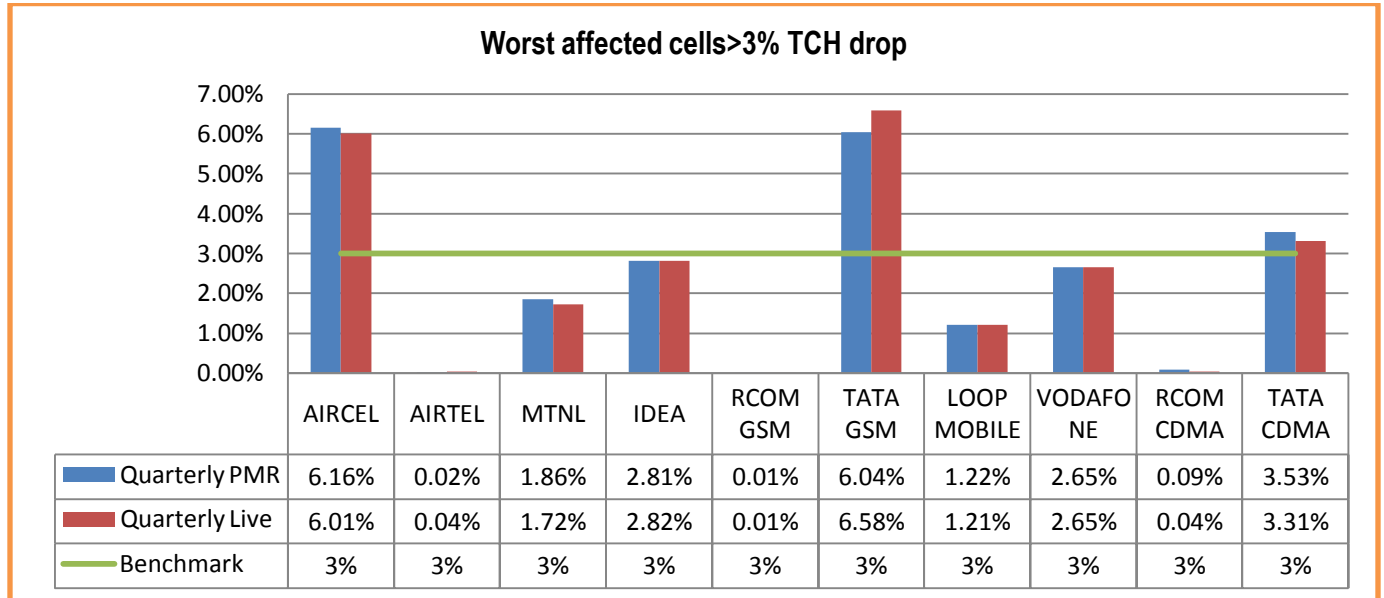
All operators are meeting the benchmarks.

**6) CALL DROP RATE:**



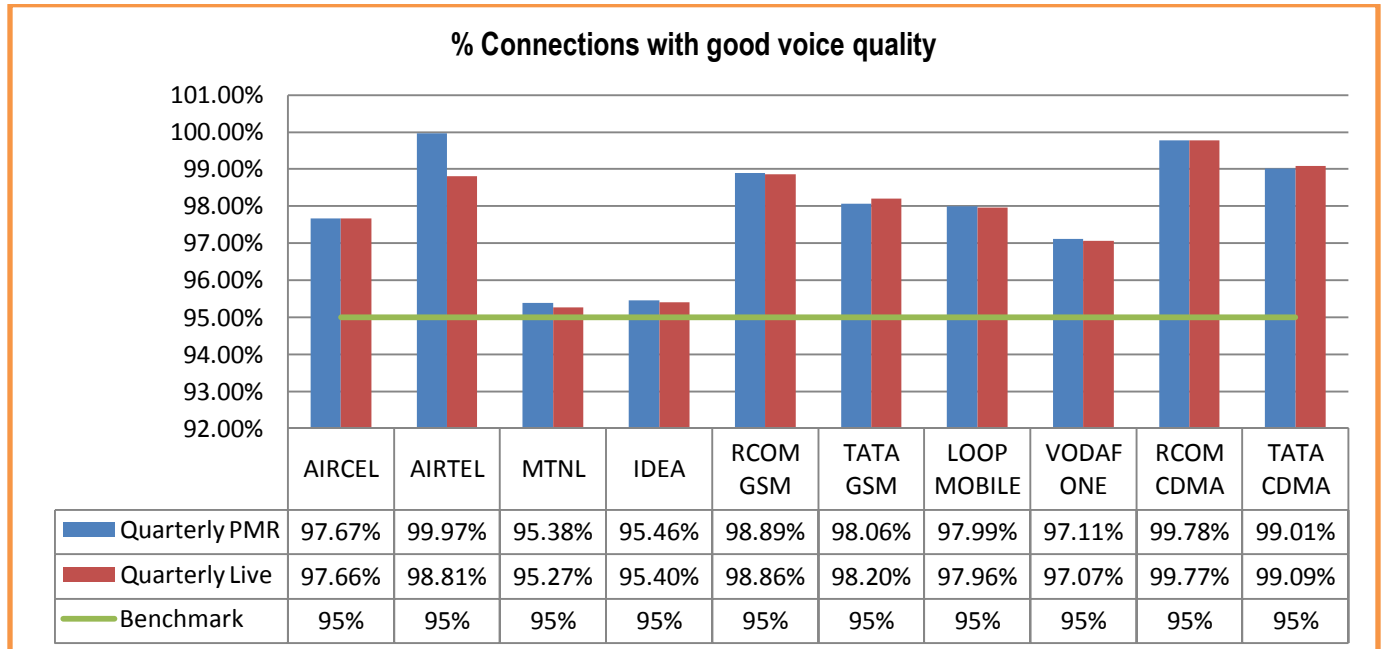
All operators are meeting the benchmarks.

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.