



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

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PREFACE

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

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

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

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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 20th March, 2009 and the Quality of Service of Broadband Service Regulations, 2006 (11 of 2006) dated 6th October, 2006 on zonal basis for **North Zone and West Zone** comprising of the following Telecom Circles/Metro Service Areas:

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

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

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

2. OBJECTIVES AND METHODOLOGY



2. OBJECTIVES AND METHODOLOGY

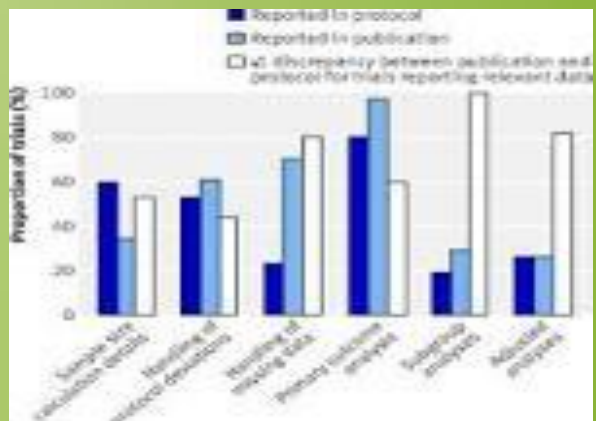
The primary objective is to audit and assess the Quality of Service being rendered by Basic, Cellular Mobile & Broadband service providers against the parameters notified by TRAI.

The audit and assessment of Quality of Service was carried out by **TUV SUD South Asia across all the Circles/Service areas of North and West Zones for Cellular Mobile Service. Apart from this, QoS audit for Basic (Wire line) and Broadband Services was also undertaken for Himanchal Pradesh, J&K and Maharashtra & Goa circles during the quarter January 2015 – March 2015.**

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

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

3. SAMPLE SIZE



3. SAMPLE SIZE

3.1 SAMPLING FOR CELLULAR MOBILE (WIRELESS) SERVICE PROVIDERS

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

Sl. No.	Name of Service Provider	Dates of live measurement Audit			Audit Location
		January-15	February-15	March-15	
GSM Operators					
1	AIRCEL	5th to 7th Jan'15	2nd to 4th Feb'15	9th to 11th March'15	Aircel Limited, Opus Center, Opp. Hotel Tunga Paradise, Near Speez, Andheri(E)
2	AIRTEL	5th to 7th Jan'15	4th to 6th Feb'15	2nd to 4th March'15	7th Floor, Interface 7, Near IJMIMA Tower, Behind Infinity Mall, Malad (West), Mumbai-400064
3	MTNL	5th to 7th Jan'15	4th to 6th Feb'15	4th to 6th March'15	OMC-R unit, 10th Floor, Prabhadevi Telecom Bldg., V.S. Marg, Dadar(W), Mumbai-400028
4	TATA GSM	5th to 7th Jan'15	2nd to 4th Feb'15	9th to 11th March'15	2nd Floor, TTML, Technopolis Park, Andheri(E), Mumbai
5	IDEA	5th to 7th Jan'15	2nd to 4th Feb'15	2nd to 4th March'15	3rd Floor Windsor, Kalina CST Road, Santacruz East, Mumbai
6	RCOM GSM	5th to 7th Jan'15	4th to 6th Feb'15	4th to 6th March'15	Ai8, Reliance Infrastructure bldg, A-wing, MBP, mahape, Navi Mumbai.
7	VODAFONE	5th to 7th Jan'15	2nd to 4th Feb'15	2nd to 4th March'15	Skyline ikon, Near Mittal Industrial Estate, Andheri Kurla Road, Marol Naka, Andheri (E), Mumbai-59
CDMA Operators					
8	RCOM CDMA	5th to 7th Jan'15	4th to 6th Feb'15	4th to 6th March'15	Ai8, Reliance Infrastructure bldg, A-wing, MBP, mahape, Navi Mumbai.
9	TATA CDMA	5th to 7th Jan'15	2nd to 4th Feb'15	9th to 11th March'15	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 March 2015.

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

3.2 SAMPLING FOR BASIC (WIRE LINE) SERVICES

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

3.3 SAMPLING FOR BROADBAND SERVICE PROVIDERS

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

4. EXECUTIVE SUMMARY



4. EXECUTIVE SUMMARY

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

- “Service provider performance report” for Cellular mobile, Basic (wire line) and Broadband services , which gives a foretaste of the performance of various operators against the benchmark specified by TRAI, during the months in which the Audit was carried out by TUV-SUD Auditors.
- “Parameter wise critical findings” for Cellular mobile, Basic (wire line) and Broadband services: This indicates key observations and findings from different activities carried out during the Audit process.
- TUV-SUD conducted audit involved a 3 stage verification process which consisted of auditing the records of the service providers and verifying the data submitted to TRAI. The second step involved a three day live measurement of all the network parameters. On the basis of the three days live measurement, the auditors checked the busy hour of the day for the service provider and collected the data for this busy hour for the month in which the audit was conducted Finally, the performance of the service providers was also gauged by conducting drive tests in three select SSAs per service provider per quarter.
- The three stage audit / verification viz audit of the records, live measurements and drive tests of all the cellular mobile operators was repeated every month. In case of Basic (Wire line) and Broadband, this exercise is required to be carried out on quarterly basis.
- **Essence of compliance report of service providers with respect to the QoS:**
 - (i) From **monthly audit** it was concluded that on an average, performance of the operators in the Mumbai Metro Service area was satisfactory for **Network Parameters** except for one parameter namely **‘Worst affected cells > 3% TCH drop’** which could not be met by **Aircel, Tata(GSM) and Tata(CDMA)** with their quarterly average performance as **6.74%, 4.90% and 3.75%** 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 **6.45%, 5.24% and 3.79%** respectively.
 - (iii) With regard to the **Customer Service Quality Parameters**, it was revealed that the parameters namely ‘Metering and Billing Credibility, Response Time to Customers, Termination of Service and Time taken for refunds’ have been largely met by the operators. However, **Idea** failed to meet the benchmark of **Billing Creditability for Post-paid** with its performance as **0.12%**.

Regarding the parameters **Response time to customers for assistance**, all service providers are in compliance of the parameter **Accessibility of call center**. However, **Aircel, Airtel, RCOM (GSM), Tata (GSM), RCOM (CDMA) and Tata**

(CDMA) have not met the benchmark of '**Calls answered by Operators (voice to voice) within 90 seconds**' with their performance as **93.02%, 94.51%, 91.37%, 94.26%, 91.66% and 94.05%** respectively.

The parameter **Time taken for refunds after closure** was marginally underperformed by **Aircel (99.46%)** and **Tata CDMA (99.73%)**.

The results for **three days live measurements** reveal that only **RCOM GSM/RCOM CDMA** have not met the parameter **calls connection to operators (Voice to voice)**, with their performed value as **93.04% and 93.08%** respectively.

(iv) Based on the analysis of the **drive test results**, it was revealed that **MTNL, Idea, RCOM (GSM) and RCOM (CDMA)** were having non-complied performance for the parameters **Voice quality and Call drop rate** across the South Mumbai, Kalyan and North Mumbai SSAs. **RCOM (CDMA) /Tata (GSM)** also remained under performed for parameters **CSSR/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
GSM Operators			
1	AIRTEL	March-15	19 Hrs-20 Hrs
2	AIRCEL	March-15	20 Hrs-21 Hrs
3	MTNL	March-15	19 Hrs-20 Hrs
4	IDEA	March-15	20 Hrs-21 Hrs
5	RCOM GSM	March-15	19 Hrs-20 Hrs
6	TATA GSM	March-15	19 Hrs-20 Hrs
7	VODAFONE	March-15	20 Hrs-21 Hrs
CDMA Operators			
8	RCOM CDMA	March-15	19 Hrs-20 Hrs
9	TATA CDMA	March-15	11 Hrs-12 Hrs

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

5.1.2 SWITCHES/BSC/BTS DETAILS OF SERVICE PROVIDERS:

Sl. No.	Name of Service Provider	No. of MSC + GMSC	No. of BSC	No. of BTS	NSS make	BSS make
GSM Operators						
1	AIRTEL	15	70	3999	NSN	NSN
2	AIRCEL	3	19	1804	NSN	NSN
3	MTNL	5	46	995	Alcatel	Motorola, Alcatel
4	IDEA	8	32	3448	Ericsson	Ericsson
5	RCOM GSM	3	11	2245	Huawei	Huawei
6	TATA GSM	4	16	2871	Huawei	Huawei
7	VODAFONE	21	63	4498	Ericsson	Ericsson
CDMA Operators						
8	RCOM CDMA	8	NA	873	Lucent, ZTE, Ericsson	Lucent.
9	TATA CDMA	5	6	944	Huawei	Huawei

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

CELLULAR MOBILE TELEPHONE SERVICES MUMBAI METRO CIRCLE - JANUARY 15 MONTH												
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators							CDMA Operators	
Network Service Quality Parameter												
Network Availability												
1	a) BTS Accumulated Downtime	<=2%	Jan-15	0.05%	0.00%	0.56%	0.06%	0.25%	0.01%	0.02%	0.30%	0.03%
	b) Worst affected BTSs due to downtime	<=2%	Jan-15	0.00%	0.00%	1.11%	0.03%	0.49%	0.00%	0.00%	0.46%	0.00%
Connection Establishment (Accessibility)												
2	a) CSSR (Call Setup Success Rate)	>=95%	Jan-15	97.89%	99.99%	98.28%	98.51%	99.60%	99.31%	99.02%	97.82%	98.89%
	b) SDCCH/PAGING Channel congestion	<=1%	Jan-15	0.35%	0.00%	0.30%	0.60%	0.04%	0.16%	0.06%	0.00%	0.00%
	c) TCH congestion	<=2%	Jan-15	1.00%	0.00%	0.12%	1.18%	0.07%	0.45%	0.98%	0.02%	0.07%
Connection maintenance (Retainability)												
3	a) CDR (Call Drop Rate)	<=2%	Jan-15	1.10%	0.27%	1.24%	1.22%	0.41%	0.04%	0.92%	0.73%	0.58%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Jan-15	6.55%	0.02%	1.40%	2.46%	0.05%	5.24%	2.47%	0.08%	3.90%
	c) Connections with good voice quality	>=95%	Jan-15	97.43%	99.97%	95.53%	96.25%	98.87%	97.53%	97.49%	99.78%	99.10%
4	No. of POI's having >=0.5% POI congestion		Jan-15	0	0	0	0	0	0	0	0	0

5.1.4 QOS PERFORMANCE OF MONTHLY PMR – FEBRUARY-15 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES MUMBAI METRO CIRCLE - FEBRUARY 15 MONTH												
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators		
Network Service Quality Parameter												
Network Availability												
1	a) BTS Accumulated Downtime	<=2%	Feb-15	0.04%	0.00%	0.60%	0.07%	0.30%	0.04%	0.02%	0.42%	0.06%
	b) Worst affected BTSs due to downtime	<=2%	Feb-15	0.00%	0.00%	1.31%	0.03%	0.49%	0.00%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)												
2	a) CSSR (Call Setup Success Rate)	>=95%	Feb-15	97.87%	99.99%	98.15%	98.23%	99.58%	99.29%	98.98%	98.00%	98.93%
	b) SDCCH/PAGING Channel congestion	<=1%	Feb-15	0.24%	0.00%	0.44%	0.42%	0.04%	0.12%	0.04%	0.00%	0.00%
	c) TCH congestion	<=2%	Feb-15	1.11%	0.00%	0.09%	1.44%	0.08%	0.35%	1.02%	0.02%	0.06%
Connection maintenance (Retainability)												
3	a) CDR (Call Drop Rate)	<=2%	Feb-15	1.11%	0.27%	1.29%	1.24%	0.42%	0.04%	1.06%	0.85%	0.57%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Feb-15	6.75%	0.02%	2.37%	2.36%	0.07%	5.17%	2.57%	0.08%	3.77%
	c) Connections with good voice quality	>=95%	Feb-15	97.17%	99.96%	95.49%	96.31%	98.87%	97.36%	97.25%	99.77%	99.10%
4	No. of POI's having >=0.5% POI congestion		Feb-15	0	0	0	0	0	0	0	0	0

5.1.5 QOS PERFORMANCE OF MONTHLY PMR – MARCH-15 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES MUMBAI METRO CIRCLE - MARCH 15 MONTH												
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators		
Network Service Quality Parameter												
Network Availability												
1	a) BTS Accumulated Downtime	<=2%	Mar-15	0.03%	0.00%	0.60%	0.07%	0.19%	0.03%	0.02%	0.23%	0.04%
	b) Worst affected BTSs due to downtime	<=2%	Mar-15	0.00%	0.00%	1.21%	0.03%	0.13%	0.00%	0.00%	0.46%	0.00%
Connection Establishment (Accessibility)												
2	a) CSSR (Call Setup Success Rate)	>=95%	Mar-15	97.84%	99.99%	98.39%	98.24%	99.58%	99.33%	99.13%	98.10%	98.98%
	b) SDCCH/PAGING Channel congestion	<=1%	Mar-15	0.13%	0.00%	0.42%	0.48%	0.04%	0.13%	0.04%	0.00%	0.00%
	c) TCH congestion	<=2%	Mar-15	1.09%	0.00%	0.07%	1.40%	0.07%	0.32%	0.87%	0.02%	0.04%
Connection maintenance (Retainability)												
3	a) CDR (Call Drop Rate)	<=2%	Mar-15	1.13%	0.28%	1.29%	1.26%	0.40%	0.04%	1.16%	0.88%	0.57%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Mar-15	6.91%	0.03%	2.41%	2.34%	0.03%	4.30%	2.05%	0.08%	3.57%
	c) Connections with good voice quality	>=95%	Mar-15	97.14%	99.93%	95.47%	96.53%	98.93%	97.75%	97.02%	99.77%	99.09%
4	No. of POI's having >=0.5% POI congestion		Mar-15	0	0	0	0	0	0	0	0	0

5.1.6 QOS PERFORMANCE OF QUARTERLY PMR –AVERAGE OF QE- MARCH- 15 (JANUARY TO MARCH MONTHS AUDITED DATA)

QUARTERLY QOS PERFORMANCE (AVERAGE OF THREE MONTHS) OF MUMBAI METRO CIRCLE												
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators		
Network Service Quality Parameter												
Network Availability												
1	a) BTS Accumulated Downtime	<=2%	Quarterly	0.04%	0.00%	0.59%	0.07%	0.25%	0.03%	0.02%	0.32%	0.04%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.00%	0.00%	1.21%	0.03%	0.37%	0.00%	0.00%	0.31%	0.00%
Connection Establishment (Accessibility)												
2	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	97.87%	99.99%	98.27%	98.33%	99.59%	99.31%	99.04%	97.97%	98.93%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.24%	0.00%	0.39%	0.50%	0.04%	0.14%	0.05%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	1.07%	0.00%	0.09%	1.34%	0.07%	0.37%	0.96%	0.02%	0.06%
Connection maintenance (Retainability)												
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	1.11%	0.27%	1.27%	1.24%	0.41%	0.04%	1.05%	0.82%	0.57%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	6.74%	0.02%	2.06%	2.39%	0.05%	4.90%	2.36%	0.08%	3.75%
	c) Connections with good voice quality	>=95%	Quarterly	97.25%	99.95%	95.50%	96.36%	98.89%	97.55%	97.25%	99.77%	99.10%
4	No. of POI's having >=0.5% POI congestion		Quarterly	0	0	0	0	0	0	0	0	0

5.1.7 KEY FINDINGS ON MONTHLY PMR AUDIT REPORTS:

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

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

Network Service Quality Parameters:

- **Network Availability**

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

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

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

- **Connection Establishment (Accessibility)**

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

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

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

- **Parameters related to Network Congestion:**

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

In CDMA system, there is no direct counter defined for reporting Paging Channel Congestion as reported by Tata Teleservices. However, they have a defined counter for 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 (0.04%) was for Tata (GSM) 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 **6.74%, 4.90% and 3.75%** 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) - JANUARY -15 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES - MUMBAI METRO CIRCLE- JANUARY 15 MONTH												
Live measurement Data		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators							CDMA Operators	
Network Service Quality Parameter												
1	Network Availability											
	a) BTS Accumulated Downtime	<=2%	Live data	0.04%	0.00%	0.50%	0.08%	0.21%	0.01%	0.01%	0.32%	0.06%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.20%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2	Connection Establishment (Accessibility)											
	a) CSSR (Call Setup Success Rate)	>=95%	Live data	97.95%	99.99%	98.32%	98.73%	98.58%	99.33%	99.28%	97.71%	98.86%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.36%	0.00%	0.54%	0.86%	0.03%	0.14%	0.05%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.83%	0.00%	0.05%	0.96%	0.08%	0.44%	0.72%	0.02%	0.13%
3	Connection maintenance (Retainability)											
	a) CDR (Call Drop Rate)	<=2%	Live data	1.09%	0.27%	1.31%	1.25%	0.42%	0.04%	0.90%	0.62%	0.57%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	6.08%	0.03%	1.81%	2.57%	0.03%	5.02%	2.20%	0.04%	3.94%
	c) Connections with good voice quality	>=95%	Live data	97.47%	99.96%	95.40%	96.32%	98.85%	97.56%	97.67%	99.77%	99.10%
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0

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

CELLULAR MOBILE TELEPHONE SERVICES - MUMBAI METRO CIRCLE- FEBRUARY 15 MONTH												
Live measurement Data		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators							CDMA Operators	
Network Service Quality Parameter												
Network Availability												
1	a) BTS Accumulated Downtime	<=2%	Live data	0.02%	0.00%	0.66%	0.08%	0.67%	0.03%	0.01%	1.12%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.10%	0.00%	0.00%	0.07%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)												
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	97.82%	99.99%	98.06%	98.33%	99.59%	99.35%	98.73%	97.99%	98.72%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.29%	0.00%	0.27%	0.45%	0.04%	0.11%	0.05%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	1.07%	0.00%	0.08%	1.34%	0.07%	0.29%	1.27%	0.02%	0.17%
Connection maintenance (Retainability)												
3	a) CDR (Call Drop Rate)	<=2%	Live data	1.12%	0.27%	1.41%	1.27%	0.42%	0.04%	1.04%	0.76%	0.59%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	6.80%	0.02%	1.97%	2.33%	0.03%	6.21%	2.69%	0.08%	4.20%
	c) Connections with good voice quality	>=95%	Live data	97.39%	99.96%	95.44%	96.24%	98.85%	97.46%	97.40%	99.76%	99.10%
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0

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

CELLULAR MOBILE TELEPHONE SERVICES - MUMBAI METRO CIRCLE – MARCH 15 MONTH												
Live measurement Data		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators		
Network Service Quality Parameter												
Network Availability												
1	a) BTS Accumulated Downtime	<=2%	Live data	0.01%	0.00%	0.70%	0.08%	0.16%	0.02%	0.02%	0.22%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)												
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.01%	99.99%	98.63%	98.45%	99.60%	99.36%	99.25%	98.23%	98.99%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.16%	0.00%	0.54%	0.63%	0.03%	0.13%	0.03%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.67%	0.00%	0.04%	1.19%	0.07%	0.27%	0.75%	0.02%	0.03%
Connection maintenance (Retainability)												
3	a) CDR (Call Drop Rate)	<=2%	Live data	1.08%	0.28%	1.20%	1.31%	0.39%	0.04%	1.16%	0.67%	0.52%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	6.47%	0.05%	2.26%	2.45%	0.05%	4.49%	2.11%	0.09%	3.23%
	c) Connections with good voice quality	>=95%	Live data	97.22%	99.95%	95.59%	96.61%	98.95%	97.80%	97.13%	99.77%	99.10%
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0

5.2.4 QUARTERLY QOS PERFORMANCE OF 3-DAYS LIVE MEASUREMENT AUDITED DATA (AVERAGE OF JANUARY TO MARCH 2015)

QUARTERLY QOS PERFORMANCE OF 3-DAYS LIVE MEASUREMENT (AVERAGE OF THREE MONTHS) – MUMBAI CIRCLE												
Live measurement Data		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators							CDMA Operators	
Network Service Quality Parameter												
1	Network Availability											
	a) BTS Accumulated Downtime	<=2%	Quarterly	0.02%	0.00%	0.62%	0.08%	0.35%	0.02%	0.01%	0.55%	0.03%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.00%	0.00%	0.10%	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%
2	Connection Establishment (Accessibility)											
	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	97.93%	99.99%	98.34%	98.50%	99.26%	99.35%	99.09%	97.98%	98.86%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.27%	0.00%	0.45%	0.65%	0.03%	0.13%	0.04%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	0.86%	0.00%	0.06%	1.16%	0.07%	0.33%	0.91%	0.02%	0.11%
3	Connection maintenance (Retainability)											
	a) CDR (Call Drop Rate)	<=2%	Quarterly	1.10%	0.27%	1.31%	1.28%	0.41%	0.04%	1.03%	0.68%	0.56%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	6.45%	0.03%	2.01%	2.45%	0.04%	5.24%	2.33%	0.07%	3.79%
	c) Connections with good voice quality	>=95%	Quarterly	97.36%	99.96%	95.48%	96.39%	98.88%	97.61%	97.40%	99.77%	99.10%
4	No. of POI's having >=0.5% POI congestion		Quarterly	0	0	0	0	0	0	0	0	0

5.2.5 KEY FINDING ON 3 DAYS LIVE MEASUREMENTS:

From three days live assessment, it was found that the performance of all operators was satisfactory as they were largely meeting the benchmarks except for the parameter **‘Worst affected cells> 3 % TCH drops’**. This parameter was not complied with by **Aircel, Tata (GSM) and Tata (CDMA)** in all the three months of the quarter with their quarterly average performance as **6.45%, 5.24% and 3.79%** 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- January 15 month												
S/N	Name of Parameter	Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators							CDMA Operators	
Network Service Quality Parameter												
Network Availability												
1	a) Total no. of BTSs in the licensed service area		Jan-15	1790	3882	991	3349	2245	2892	4491	873	951
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Jan-15	607	29	4129	1454	4210	162	548	1933	180
	c) BTS Accumulated Downtime	<=2%	Jan-15	0.05%	0.00%	0.56%	0.06%	0.25%	0.01%	0.02%	0.30%	0.03%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Jan-15	0	0	11	1	11	0	0	4	0
	e) Worst affected BTSs due to downtime	<=2%	Jan-15	0.00%	0.00%	1.11%	0.03%	0.49%	0.00%	0.00%	0.46%	0.00%
Connection Establishment (Accessibility)												
2	a) CSSR (Call Setup Success Rate)	>=95%	Jan-15	97.89%	99.99%	98.28%	98.51%	99.60%	99.31%	99.02%	97.82%	98.89%
	b) SDCCH/PAGING Congestion	<=1%	Jan-15	0.35%	0.00%	0.30%	0.60%	0.04%	0.16%	0.06%	0.00%	0.00%
	c) TCH congestion	<=2%	Jan-15	1.00%	0.00%	0.12%	1.18%	0.07%	0.45%	0.98%	0.02%	0.07%
Connection Maintenance (Retainability)												
3	a) Call Drop Rate (CDR)	<=2%	Jan-15	1.10%	0.27%	1.24%	1.22%	0.41%	0.04%	0.92%	0.73%	0.58%
	b) Worst affected cells>3% TCH drop	<=3%	Jan-15	6.55%	0.02%	1.40%	2.46%	0.05%	5.24%	2.47%	0.08%	3.90%
	c) % of connections with good voice quality	>=95%	Jan-15	97.43%	99.97%	95.53%	96.25%	98.87%	97.53%	97.49%	99.78%	99.10%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Jan-15	343	2	37	239	3	415	271	2	102
	e) Total no. of cells (Sector) in the licensed service area		Jan-15	5238	10509	2646	9706	6096	7913	10974	2557	2616
No. of POI's having >=0.5% POI congestion												
4	No. of POI's having >=0.5% POI congestion		Jan-15	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Jan-15	0	0	0	0	0	0	0	0	0
Network Data												
5	a) Equipped Capacity of Network in Erlang		Jan-15	62201	157297	37627	120818	NP	112784	293206	NP	106067
	b) Total traffic in TCBH in erlang (Avg.)		Jan-15	40560	106303	16659	108644	NP	57056	180194	NP	46955
	c) Total no. of customers served (as per VLR) on last day of the month		Jan-15	1526635	4840259	849582	3678247	NP	1942301	7251752	NP	527422

TABLE: 2

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live - Mumbai Metro Circle - January 15 month												
S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators						CDMA Operators		
Network Service Quality Parameter												
Network Availability												
1	a) Total no. of BTSs in the licensed service area		Live data	1811	3863	991	3348	2245	2886	4463	873	952
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Live data	58	5	358	183	337	25	19	198	38
	c) BTS Accumulated Downtime	<=2%	Live data	0.04%	0.00%	0.50%	0.08%	0.21%	0.01%	0.01%	0.32%	0.06%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	2	0	0	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.20%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)												
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	97.95%	99.99%	98.32%	98.73%	98.58%	99.33%	99.28%	97.71%	98.86%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.36%	0.00%	0.54%	0.86%	0.03%	0.14%	0.05%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.83%	0.00%	0.05%	0.96%	0.08%	0.44%	0.72%	0.02%	0.13%
Connection Maintenance (Retainability)												
3	a) Call Drop Rate (CDR)	<=2%	Live data	1.09%	0.27%	1.31%	1.25%	0.42%	0.04%	0.90%	0.62%	0.57%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	6.08%	0.03%	1.81%	2.57%	0.03%	5.02%	2.20%	0.04%	3.94%
	c) % of connections with good voice quality	>=95%	Live data	97.47%	99.96%	95.40%	96.32%	98.85%	97.56%	97.67%	99.77%	99.10%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	322	3	48	249	2	396	241	1	103
	e) Total no. of cells (Sector) in the licensed service area		Live data	5297	10432	2646	9704	6096	7892	10972	2557	2617
No. of POI's having >=0.5% POI congestion												
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0

TABLE: 3

Detailed Network Data Assessment of Cellular Mobile Telephone Services - Mumbai Metro Circle- February 15 month												
S/N	Name of Parameter	Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators						CDMA Operators		
Network Service Quality Parameter												
Network Availability												
1	a) Total no. of BTSs in the licensed service area		Feb-15	1801	3928	995	3406	2245	2839	4498	873	943
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Feb-15	478	32	4032	1680	4550	841	673	2491	401
	c) BTS Accumulated Downtime	<=2%	Feb-15	0.04%	0.00%	0.60%	0.07%	0.30%	0.04%	0.02%	0.42%	0.06%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Feb-15	0	0	13	1	11	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Feb-15	0.00%	0.00%	1.31%	0.03%	0.49%	0.00%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)												
2	a) CSSR (Call Setup Success Rate)	>=95%	Feb-15	97.87%	99.99%	98.15%	98.23%	99.58%	99.29%	98.98%	98.00%	98.93%
	b) SDCCCH/PAGING Congestion	<=1%	Feb-15	0.24%	0.00%	0.44%	0.42%	0.04%	0.12%	0.04%	0.00%	0.00%
	c) TCH congestion	<=2%	Feb-15	1.11%	0.00%	0.09%	1.44%	0.08%	0.35%	1.02%	0.02%	0.06%
Connection Maintenance (Retainability)												
3	a) Call Drop Rate (CDR)	<=2%	Feb-15	1.11%	0.27%	1.29%	1.24%	0.42%	0.04%	1.06%	0.85%	0.57%
	b) Worst affected cells>3% TCH drop	<=3%	Feb-15	6.75%	0.02%	2.37%	2.36%	0.07%	5.17%	2.57%	0.08%	3.77%
	c) % of connections with good voice quality	>=95%	Feb-15	97.17%	99.96%	95.49%	96.31%	98.87%	97.36%	97.25%	99.77%	99.10%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Feb-15	356	2	63	231	4	411	286	2	98
	e) Total no. of cells (Sector) in the licensed service area		Feb-15	5273	10716	2655	9773	6096	7950	11108	2557	2601
No. of POI's having >=0.5% POI congestion												
4	No. of POI's having >=0.5% POI congestion		Feb-15	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Feb-15	0	0	0	0	0	0	0	0	0
Network Data												
5	a) Equipped Capacity of Network in Erlang		Feb-15	63040	159289	37627	122220	72000	114228	296856	168000	106067
	b) Total traffic in TCBH in erlang (Avg.)		Feb-15	42951	106303	16365	110999	67838	59551	175815	88716	46284
	c) Total no. of customers served (as per VLR) on last day of the month		Feb-15	1507386	4840259	852018	3684775	2779046	1999064	7265770	2724200	521882

TABLE: 4

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live - Mumbai Metro Circle – February 15 month												
S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators						CDMA Operators		
Network Service Quality Parameter												
Network Availability												
1	a) Total no. of BTSs in the licensed service area		Live data	1790	3899	991	3357	2245	2898	4491	873	943
	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	23	4	471	205	1079	57	35	701	0
	c) BTS Accumulated Downtime	<=2%	Live data	0.02%	0.00%	0.66%	0.08%	0.67%	0.03%	0.01%	1.12%	0.00%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	1	0	0	2	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.10%	0.00%	0.00%	0.07%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)												
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	97.82%	99.99%	98.06%	98.33%	99.59%	99.35%	98.73%	97.99%	98.72%
	b) SDCCCH/PAGING Congestion	<=1%	Live data	0.29%	0.00%	0.27%	0.45%	0.04%	0.11%	0.05%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	1.07%	0.00%	0.08%	1.34%	0.07%	0.29%	1.27%	0.02%	0.17%
Connection Maintenance (Retainability)												
3	a) Call Drop Rate (CDR)	<=2%	Live data	1.12%	0.27%	1.41%	1.27%	0.42%	0.04%	1.04%	0.76%	0.59%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	6.80%	0.02%	1.97%	2.33%	0.03%	6.21%	2.69%	0.08%	4.20%
	c) % of connections with good voice quality	>=95%	Live data	97.39%	99.96%	95.44%	96.24%	98.85%	97.46%	97.40%	99.76%	99.10%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	356	2	52	227	2	494	297	2	109
	e) Total no. of cells (Sector) in the licensed service area		Live data	5238	10554	2646	9742	6096	7959	11058	2555	2598
No. of POI's having >=0.5% POI congestion												
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0

TABLE: 5

Detailed Network Data Assessment of Cellular Mobile Telephone Services - Mumbai Metro Circle- March 15 month												
S/N	Name of Parameter	Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators						CDMA Operators		
Network Service Quality Parameter												
Network Availability												
1	a) Total no. of BTSs in the licensed service area		Mar-15	1804	3999	995	3448	2245	2871	4498	873	944
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Mar-15	436	53	4445	1882	3224	623	595	1497	281
	c) BTS Accumulated Downtime	<=2%	Mar-15	0.03%	0.00%	0.60%	0.07%	0.19%	0.03%	0.02%	0.23%	0.04%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Mar-15	0	0	12	1	3	0	0	4	0
	e) Worst affected BTSs due to downtime	<=2%	Mar-15	0.00%	0.00%	1.21%	0.03%	0.13%	0.00%	0.00%	0.46%	0.00%
Connection Establishment (Accessibility)												
2	a) CSSR (Call Setup Success Rate)	>=95%	Mar-15	97.84%	99.99%	98.39%	98.24%	99.58%	99.33%	99.13%	98.10%	98.98%
	b) SDCCH/PAGING Congestion	<=1%	Mar-15	0.13%	0.00%	0.42%	0.48%	0.04%	0.13%	0.04%	0.00%	0.00%
	c) TCH congestion	<=2%	Mar-15	1.09%	0.00%	0.07%	1.40%	0.07%	0.32%	0.87%	0.02%	0.04%
Connection Maintenance (Retainability)												
3	a) Call Drop Rate (CDR)	<=2%	Mar-15	1.13%	0.28%	1.29%	1.26%	0.40%	0.04%	1.16%	0.88%	0.57%
	b) Worst affected cells>3% TCH drop	<=3%	Mar-15	6.91%	0.03%	2.41%	2.34%	0.03%	4.30%	2.05%	0.08%	3.57%
	c) % of connections with good voice quality	>=95%	Mar-15	97.14%	99.93%	95.47%	96.53%	98.93%	97.75%	97.02%	99.77%	99.09%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Mar-15	365	3	64	232	2	343	229	2	93
	e) Total no. of cells (Sector) in the licensed service area		Mar-15	5280	10694	2658	9916	6096	7970	11155	2557	2605
No. of POI's having >=0.5% POI congestion												
4	No. of POI's having >=0.5% POI congestion		Mar-15	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Mar-15	0	0	0	0	0	0	0	0	0
Network Data												
5	a) Equipped Capacity of Network in Erlang		Mar-15	62190	161425	37627	123608	72000	115251	291116	168000	106067
	b) Total traffic in TCBH in erlang (Avg.)		Mar-15	43124	100951	15743	111128	67778	60935	170975	88954	45562
	c) Total no. of customers served (as per VLR) on last day of the month		Mar-15	1532490	4883356	859187	3669655	2866767	1997616	7299694	2711577	513994

TABLE: 6

Detailed Network Data Assessment of Cellular Mobile Telephone Services -3 days live - Mumbai Metro Circle - March 15 month												
S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators						CDMA Operators		
Network Service Quality Parameter												
Network Availability												
1	a) Total no. of BTSs in the licensed service area		Live data	1800	3940	995	3403	2244	2863	4498	873	944
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Live data	16.66	6.60	498.51	195.80	265.00	46.25	53.60	139.00	11.60
	c) BTS Accumulated Downtime	<=2%	Live data	0.01%	0.00%	0.70%	0.08%	0.16%	0.02%	0.02%	0.22%	0.02%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	0	0	0	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)												
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.01%	99.99%	98.63%	98.45%	99.60%	99.36%	99.25%	98.23%	98.99%
	b) SDCCCH/PAGING Congestion	<=1%	Live data	0.16%	0.00%	0.54%	0.63%	0.03%	0.13%	0.03%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.67%	0.00%	0.04%	1.19%	0.07%	0.27%	0.75%	0.02%	0.03%
Connection Maintenance (Retainability)												
3	a) Call Drop Rate (CDR)	<=2%	Live data	1.08%	0.28%	1.20%	1.31%	0.39%	0.04%	1.16%	0.67%	0.52%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	6.47%	0.05%	2.26%	2.45%	0.05%	4.49%	2.11%	0.09%	3.23%
	c) % of connections with good voice quality	>=95%	Live data	97.22%	99.95%	95.59%	96.61%	98.95%	97.80%	97.13%	99.77%	99.10%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	341	5	60	242	3	358	235	2	84
	e) Total no. of cells (Sector) in the licensed service area		Live data	5270	10664	2658	9886	6093	7973	11152	2184	2602
No. of POI's having >=0.5% POI congestion												
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0

CUSTOMER SERVICE QUALITY (CSD) PARAMETERS



5.3 CUSTOMER SERVICE QUALITY PARAMETERS MEASUREMENT FOR CMTS:

5.3.1 QUARTERLY CUSTOMER SERVICE DELIVERY (CSD) AUDITED DATA FOR CELLULAR MOBILE SERVICES (JANUARY to MARCH 2015 MONTHS AUDITED DATA):

QUARTERLY CSD AUDITED DATA FOR CELLULAR MOBILE TELEPHONE SERVICES												
Quarterly CSD Audit Data		Bench- mark	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA	
S/ N	Name of Parameter		GSM Operators						CDMA Operators			
Metering & Billing Credibility -Post Paid												
1	A) No. of bills issued during the quarter		117880	2328730	405817	1775396	535892	320075	7057669	1230886	142176	
	B) No. of bills disputed including billing complaints during the quarter		1	264	132	2166	478	2	4388	1152	0	
	C)% of billing complaints during the quarter	<= 0.1%	0.00%	0.01%	0.03%	0.12%	0.09%	0.00%	0.06%	0.09%	0.00%	
Metering & Billing Credibility -Pre Paid												
2	A) Total No. of Pre-paid customers at the end of the quarter		2388416	3981539	985876	3395971	2632803	2723894	6257324	2519372	712213	
	B) Total No. of complaints relating to charging, Credit and Validity during the quarter		4	32	113	3083	2314	1	713	752	1	
	C) % of Pre-paid Charging Complaints	<= 0.1%	0.00%	0.00%	0.01%	0.09%	0.09%	0.00%	0.01%	0.03%	0.00%	
Resolution of Billing/Charging Complaints and Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints												
3	A) No. of Billing/Charging/Credit/Validity Complaints received during the quarter		5	296	132	18940	2792	3314	5101	1904	373	
	B) No. of billing complaints for Post paid customers/Charging/Credit/Validity complaints for pre-paid customers resolved within 4 weeks during the quarter		5	296	132	18940	2792	3314	5101	1903	373	
	C) No. of billing complaints for Post paid customers/Charging/Credit/Validity complaints for pre-paid customers resolved within 6 weeks during the quarter		5	296	132	18940	2792	3314	5101	1904	373	
	D) % of billing complaints (for post paid customer) / Charging/Credit/Validity (for Pre paid customer) resolved within 4 weeks	>=98% within 4 weeks	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.95%	100.00%
	E) % of billing complaints (for post paid customer) / Charging/Credit/Validity (for Pre paid customer) resolved within 6 weeks	100% within 6 weeks	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

QUARTERLY CSD AUDITED DATA FOR CELLULAR MOBILE TELEPHONE SERVICES											
Quarterly CSD Audit Data		Bench- mark	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
S/ N	Name of Parameter		GSM Operators						CDMA Operators		
	F) % of Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints	<=1 week	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Response time to customers for assistance											
4	A) Total no of calls attempted to customer care/Call center		10541354	1016247		8915060	6285245	648886	14364839	1220000	132162
	B) Total no. of calls successfully established to customer care/Call center.		10438525	1015977	IVR Not Functional	8889353	6221266	644954	14352016	1205597	131549
	C) % Accessibility of Call centre /customer Care (Total calls successfully established *100/ Total call attempts)	>=95%	99.02%	99.97%		99.71%	98.98%	99.39%	99.91%	98.82%	99.54%
	D) Total Calls reached to operator for Voice to Voice (Total call attempts)		1997249	3033328	1126045	3192123	1241515	910634	4689262	252313	130505
	E) Total number of calls answered by the operator (Voice to voice) within 90 seconds		1857921	2866784	1070986	3147878	1134400	858340	4619318	231267	122745
	F) % age of calls answered by operator (voice to voice) (Total calls successfully established within 90 Sec.*100 / Total call attempts)	>=95%	93.02%	94.51%	95.11%	98.61%	91.37%	94.26%	98.51%	91.66%	94.05%
Termination/closure of service											
5	A) Total No. of requests for Termination / Closure of service received during the quarter		994	6972	12069	9360	3045	3941	19898	5854	2527
	B) No. of requests for Termination /Closure of service complied within 7 days during the quarter		994	6972	12069	9360	3045	3941	19898	5854	2527
	C) % of Termination/ Closure of service within 7 days	<=7days	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Time taken for refunds of deposits after closures.											
6	A) No. of Payments/ Refunds due during the quarter		184	3085	819	2072	1854	611	3721	2833	366
	B) No. of Payments/ Refunds Cleared during the quarter		183	3085	819	2072	1854	611	3721	2833	365
	C) Time taken for refunds of deposits after closures.	100% within 60 days	99.46%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.73%

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

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

CSD 3 DAYS LIVE DATA FOR CELLULAR MOBILE TELEPHONE SERVICES – QE MARCH 2015											
3 days live CSD Audit Data		Bench- mark	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	RCOM CDMA	TATA CDMA
S/ N	Name of Parameter		GSM Operators						CDMA Operators		
1	Response time to customers for assistance										
	Total no of calls attempted to customer care/Call center		334054	40487		279866	220380	241555	465483	39412	48099
	Total no. of calls successfully established to customer care/Call center		331089	40487	IVR Not Functional	279856	218135	240110	465378	38521	47858
% Accessibility of Call centre /customer Care (Total call successfully established *100 / Total call attempts)	>=95%	99.11%	100.00%	100.00%		98.98%	99.40%	99.98%	97.74%	99.50%	
2	Total Calls reached to operator for Voice to Voice (Total call attempts)		59131	98473	31944	97611	39829	25772	155224	8487	3677
	Total number of calls answered by the operator (Voice to voice) within 90 seconds.		57309	95839	30865	97330	37055	25640	153819	7900	3581
	% age of calls answered by operator(voice to voice) (Total calls successfully established within 90 sec. *100 / Total call attempts)	>=95%	96.92%	97.33%	96.62%	99.71%	93.04%	99.49%	99.09%	93.08%	97.39%

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

5.3.3 KEY FINDINGS ON CUSTOMER SERVICE DELIVERY (CSD) PARAMETERS

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

The performance of the service providers with respect to the parameter metering and billing credibility for both post-paid and pre-paid was within the prescribed bench mark of $\leq 0.1\%$. However, **Idea** failed to meet the benchmark of Billing Creditability for Post-paid with its performance as **0.12%**.

2. Resolution of Billing complaints and applying credits -

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

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

3. Response Time to the Customer for assistance

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

All service providers are in compliance of the parameter Accessibility of call center. However, **Aircel, Airtel, RCOM (GSM), Tata (GSM), RCOM (CDMA) and Tata (CDMA)** have not met the benchmark of **Calls answered by Operators (voice to voice) within 90 seconds**. They have achieved their performance as **93.02%, 94.51%, 91.37%, 94.26%, 91.66% and 94.05%** respectively.

4. Termination/Closure of Service

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

5. Time Taken for Refund of deposits after closures

All operators (except **Aircel and Tata CDMA**) were found to have complied with the benchmark of 100% refund of deposits within 60 days of closure. The performance of **Aircel and Tata CDMA** was **99.46% and 99.73%** respectively, marginally below the benchmark of 100%.

Live Measurements:

The results for **three days live measurements** reveal that only **RCOM GSM and RCOM CDMA** have not met the benchmarks of parameter **calls connection to operators (Voice to voice)**, with their performance as **93.04% and 93.08%** respectively, against the benchmark of $\geq 95\%$.

6. LIVE CALLING ASSESSMENT



6. LIVE CALLING ASSESSMENT:

6.1 INTER OPERATOR CALLS ASSESSMENT:

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

INTER OPERATOR CALL ASSESSMENT										
CALLING OPERATORS	CIRCLE NAME	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	RCOM CDMA	TATA GSM	TATA CDMA	VODAFONE
AIRTEL	Mumbai Metro	---	100%	99%	100%	100%	100%	100%	100%	100%
AIRCEL	Mumbai Metro	100%	---	100%	99%	100%	100%	99%	100%	100%
MTNL	Mumbai Metro	99%	98%	---	100%	99%	98%	100%	98%	99%
IDEA	Mumbai Metro	100%	100%	100%	---	100%	100%	100%	100%	100%
RCOM GSM	Mumbai Metro	100%	100%	100%	100%	---	100%	100%	100%	100%
RCOM CDMA	Mumbai Metro	100%	100%	100%	99%	100%	---	99%	100%	99%
TATA GSM	Mumbai Metro	99%	98%	100%	100%	99%	100%	---	100%	100%
TATA CDMA	Mumbai Metro	100%	100%	99%	100%	100%	99%	100%	---	100%
VODAFONE	Mumbai Metro	100%	100%	100%	100%	100%	100%	100%	99%	---

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

6.2 CUSTOMER CARE / HELPLINE ASSESSMENT:

LIVE CALLING TO CALL CENTRE										
Parameter	Circle Name	AIRCEL	AIRTEL	MTNL	IDEA	RCOM (GSM)	TATA (GSM)	VODAFONE	RCOM (CDMA)	TATA (CDMA)
Total No. of calls Attempted	Mumbai Metro	100	100	IVR Not Function	100	100	100	100	100	100
Total no. of calls successfully established to customer care/Call center	Mumbai Metro	100	100		100	100	100	100	100	100
% Accessibility of Call centre /customer Care (Total call successfully established *100/ Total call attempt)	Mumbai Metro	100.00%	100.00%		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Total Calls reached to agent desk for Voice to Voice (Total call attempt)	Mumbai Metro	100	100	100	100	100	100	100	100	100
Total number of calls answered by the operator (Voice to voice) within 90 seconds.	Mumbai Metro	100	100	100	100	99	100	100	100	100
% age of calls answered by operator (voice to voice) (Total call successfully established within 90 Sec.*100 /Total call attempt)	Mumbai Metro	100.00%	100.00%	100.00%	100.00%	99.00%	100.00%	100.00%	100.00%	100.00%

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

6.3 LIVE CALLING ASSESSMENT FOR BILLING COMPLAINTS:

TELEPHONIC INTERVIEW FOR BILLING COMPLAINTS										
Parameter	Circle Name	AIRCEL	AIRTEL	MTNL	IDEA	RCOM (GSM)	TATA (GSM)	VODAFONE	RCOM (CDMA)	TATA (CDMA)
Total No. of calls Attempted	Mumbai	5	100	100	100	100	100	100	100	100
Total No. of calls Answered	Mumbai	5	90	85	95	85	85	96	89	90
Resolution of Billing Complaints	Mumbai	5	89	83	93	84	84	95	88	88
%age of cases resolved	Mumbai	100.00%	98.89%	97.65%	97.89%	98.82%	98.82%	98.96%	98.88%	97.78%

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. During live calling, some of the customers did not attend the calls while some others reported that there complaints have been resolved but not sure of duration of their resolution. %age of resolution of billing complaints was 97.65% to 100%. During telephonic verification, most of the customers were satisfied with the resolution of Billing Complaints.

6.4 LEVEL -1 CALLING ASSESSMENT:

LEVEL 1 LIVE CALLING											
Emergency no.	Name of SDCA	No. of calls made	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	RCOM CDMA	TATA GSM	TATA CDMA	VODAFONE
100, 101, 102, 103, 1098	SOUTH MUMBAI	10	√	√	√	√	√	√	√	√	√
		10	√	√	√	√	√	√	√	√	√
		10	√	√	√	√	√	√	√	√	√
		10	√	√	√	√	√	√	√	√	√
		10	√	√	√	√	√	√	√	√	√
100, 101, 102, 103, 1098	KALYAN	10	√	√	√	√	√	√	√	√	√
		10	√	√	√	√	√	√	√	√	√
		10	√	√	√	√	√	√	√	√	√
		10	√	√	√	√	√	√	√	√	√
		10	√	√	√	√	√	√	√	√	√
100, 101, 102, 103, 1098	NORTH MUMBAI	10	√	√	√	√	√	√	√	√	√
		10	√	√	√	√	√	√	√	√	√
		10	√	√	√	√	√	√	√	√	√
		10	√	√	√	√	√	√	√	√	√
		10	√	√	√	√	√	√	√	√	√

To assess the availability and efficiency of level 1 services such as police, fire, ambulance, women help line and child help line (emergency services) offered by various mobile service providers, the calls were made during the drive test (Jan15 – Mar15) in different SDCAs. In Mumbai Metro service area, these services were found functional in the networks of all the service providers.

7. DRIVE TEST



7. OPERATOR ASSISTED DRIVE TEST

In terms of TRAI's letter dated 21st January, 2014, the drive tests were conducted for three consecutive days in one select SSA each month in each service area. Thus, the drive tests were carried out in three SSA's namely **South Mumbai, Kalyan and North Mumbai** in the months of January, February and March 2015 respectively. The total route Kms covered during drive tests in respective SSAs was **324 Kms, 315 Kms and 321 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 ≥ -75 dBm for in-door coverage and ≥ -85 dBm for in-vehicle.

7.1 OPERATOR ASSISTED DRIVE TEST: SOUTH MUMBAI (JANUARY-15)

DRIVE TEST TABLE – 1

S/N	Parameter	Classification of Route covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		VODAFONE		TATA CDMA		RCOM CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
1	Call Attempts	Highways	109	31	102	30	119	32	119	30	112	31	101	23	90	30	93	30	100	23
		Major Roads	129	30	101	30	115	31	180	30	106	30	119	25	102	30	113	30	136	25
		Within City	434	31	398	30	441	32	467	30	400	30	401	25	360	30	398	30	422	25
		Overall SSA	672	92	601	90	675	95	766	90	618	91	621	90	552	90	604	90	658	73
2	Blocked Call Rate	Highways	4.59%	0.00%	0.00%	0.00%	1.68%	0.00%	5.88%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		Major Roads	2.33%	0.00%	0.00%	0.00%	3.48%	0.00%	2.22%	0.00%	1.89%	0.00%	1.68%	0.00%	0.98%	0.00%	0.00%	0.00%	2.21%	0.00%
		Within City	2.53%	0.00%	0.00%	0.00%	1.36%	0.00%	3.64%	0.00%	1.00%	0.00%	1.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.61%	0.00%
		Overall SSA	2.83%	0.00%	0.00%	0.00%	1.78%	0.00%	3.66%	0.00%	0.97%	0.00%	0.97%	0.00%	0.18%	0.00%	0.00%	0.00%	2.13%	0.00%
3	Dropped Call Rate (<=2%)	Highways	0.96%	0.00%	0.00%	0.00%	5.17%	0.00%	1.79%	0.00%	0.89%	0.00%	1.98%	0.00%	0.00%	0.00%	0.00%	0.00%	3.00%	0.00%
		Major Roads	0.78%	0.00%	0.00%	0.00%	1.92%	0.00%	1.14%	0.00%	2.91%	0.00%	1.71%	0.00%	0.00%	0.00%	0.00%	0.00%	3.76%	0.00%
		Within City	0.47%	0.00%	0.00%	0.00%	2.59%	0.00%	0.89%	0.00%	0.76%	0.00%	0.50%	0.00%	0.00%	0.00%	0.25%	0.00%	0.24%	0.00%
		Overall SSA	0.61%	0.00%	0.00%	0.00%	2.95%	0.00%	1.08%	0.00%	1.15%	0.00%	0.98%	0.00%	0.00%	0.00%	0.17%	0.00%	1.40%	0.00%

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



S/N	Parameter	Classification of Route covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		VODAFONE		TATA CDMA		RCOM CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
			Percentage connections with good voice quality (=>95%)																	
4	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Highways	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.05%	98.07%	94.16%	98.89%
		Major Roads	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.79%	98.19%	91.73%	98.03%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.36%	99.32%	94.26%	98.10%
		Overall SSA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.55%	98.52%	93.78%	98.41%
	(b) 0-5 (with frequency hopping for GSM Operators)	Highways	96.31%	99.91%	96.84%	97.55%	89.25%	99.80%	98.61%	99.80%	94.30%	99.79%	89.03%	92.11%	95.97%	99.47%	NA	NA	NA	NA
		Major Roads	95.26%	99.80%	96.19%	99.48%	90.80%	99.58%	98.63%	99.00%	91.47%	96.94%	84.66%	99.54%	95.10%	99.62%	NA	NA	NA	NA
		Within City	95.83%	99.73%	96.72%	99.58%	90.99%	99.76%	98.45%	99.63%	94.32%	95.16%	90.40%	97.49%	95.08%	99.15%	NA	NA	NA	NA
		Overall SSA	95.85%	99.81%	96.65%	98.86%	90.65%	99.71%	98.51%	99.47%	93.86%	97.32%	89.20%	96.65%	95.26%	99.41%	NA	NA	NA	NA
Service Coverage																				
5	In door (>= - 75dBm)	Highways	73.03%	100%	78.28%	72.63%	51.94%	30.44%	97.65%	98.09%	97.46%	99.82%	70.59%	44.05%	73.92%	99.84%	96.47%	99.02%	90.21%	57.39%
		Major Roads	82.95%	99.60%	77.43%	57.51%	46.08%	22.30%	97.20%	99.66%	94.21%	99.96%	60.03%	99.59%	71.52%	91.55%	97.78%	100%	81.01%	100%
		Within City	80.76%	73.54%	76.50%	77.96%	32.81%	21.10%	97.09%	97.64%	98.18%	99.85%	72.91%	98.42%	72.23%	93.77%	99.90%	100%	89.24%	96.95%
		Overall SSA	80.78%	99.99%	77.40%	69.37%	38.35%	24.65%	97.21%	98.47%	97.39%	99.88%	70.28%	81.26%	72.41%	95.04%	98.97%	99.67%	87.85%	100%
	In-vehicle (>= - 85dBm)	Highways	95.39%	100%	95.38%	99.69%	88.26%	69.20%	99.62%	100%	99.98%	100%	92.93%	98.93%	94.00%	100%	100%	100%	98.67%	100%
		Major Roads	95.94%	99.97%	95.24%	98.81%	85.59%	67.82%	99.79%	100%	99.53%	100%	82.03%	100%	95.61%	99.92%	100%	100%	98.00%	100%
		Within City	96.70%	99.99%	95.23%	99.80%	78.43%	70.20%	99.87%	100%	99.95%	100%	94.20%	100%	94.43%	100%	100%	100%	99.75%	100%
		Overall SSA	96.27%	100%	95.29%	99.43%	81.33%	69.07%	99.81%	100%	99.89%	100%	91.86%	99.65%	94.61%	99.97%	100%	100%	99.27%	100%
	Outdoor- in city (>= - 95dBm)	Highways	98.94%	100%	100%	100%	99.41%	99.80%	100%	100%	99.99%	100%	98.02%	100%	99.71%	100%	100%	100%	100%	100%
		Major Roads	99.09%	100%	100%	100%	99.38%	99.96%	100%	100%	99.92%	100%	95.05%	100%	99.79%	100%	100%	100%	100%	100%
		Within City	99.57%	100%	100%	100%	98.44%	99.94%	100%	100%	99.98%	100%	99.56%	100%	99.81%	100%	100%	100%	100%	100%
		Overall SSA	99.35%	100%	100%	100%	98.76%	99.90%	100%	100%	99.97%	100%	98.52%	100%	99.78%	100%	100%	100%	100%	100%

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



S/N	Parameter	Classification of Route covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		VODAFONE		TATA CDMA		RCOM CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
6	Call Setup Success Rate (>=95%)	Highways	95.41%	100%	100%	100%	97.48%	100%	94.12%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Major Roads	97.67%	100%	100%	100%	90.43%	100%	97.78%	100%	97.17%	100%	98.32%	100%	99.02%	100%	100%	100%	100%	97.79%	100%
		Within City	97.47%	100%	99.75%	100%	96.37%	100%	96.36%	100%	99.00%	100%	99.00%	100%	100%	100%	100%	100%	100%	97.39%	100%
		Overall SSA	97.17%	100%	99.83%	100%	95.56%	100%	96.34%	100%	98.87%	100%	99.03%	100%	99.82%	100%	100%	100%	100%	97.87%	100%
7	Hand Over Success Rate (HOSR)	Highways	95.90%	100%	99.16%	100%	93.04%	100%	98.87%	100%	99.55%	100%	98.58%	100%	99.13%	100%	100%	100%	100%	100%	100%
		Major Roads	97.74%	100%	97.99%	100%	94.98%	100%	98.71%	100%	98.31%	100%	97.96%	100%	99.35%	100%	100%	100%	100%	100%	100%
		Within City	97.29%	100%	98.14%	100%	98.48%	100%	99.03%	100%	99.37%	100%	98.71%	100%	99.12%	100%	99.88%	100%	100%	100%	100%
		Overall SSA	97.20%	100%	98.25%	100%	96.79%	100%	98.95%	100%	99.22%	100%	98.55%	100%	99.17%	100%	99.92%	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 (FEBRUARY-15)

DRIVE TEST TABLE – 2

S/N	Parameter	Classification of Route covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		VODAFONE		TATA CDMA		RCOM CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
1	Call Attempts	Highways	70	30	70	30	80	30	89	30	78	30	71	30	72	30	62	30	77	30	
		Major Roads	119	30	117	30	113	31	157	30	118	30	117	30	118	30	130	30	123	30	
		Within City	244	30	216	30	241	30	323	30	235	30	258	30	255	30	208	30	278	30	
		Overall SSA	433	90	403	90	434	91	569	90	431	90	446	90	445	90	400	90	478	90	
2	Blocked Call Rate	Highways	0.00%	0.00%	0.00%	0.00%	2.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	3.90%	0.00%	
		Major Roads	0.00%	0.00%	0.00%	0.00%	2.65%	0.00%	8.92%	0.00%	0.00%	0.00%	1.71%	0.00%	0.00%	0.00%	0.00%	0.00%	0.81%	0.00%	
		Within City	1.64%	0.00%	0.00%	0.00%	1.66%	0.00%	1.86%	0.00%	0.00%	0.00%	0.78%	0.00%	0.00%	0.00%	0.48%	0.00%	2.52%	0.00%	
		Overall SSA	0.92%	0.00%	0.00%	0.00%	2.07%	0.00%	3.51%	0.00%	0.00%	0.00%	0.90%	0.00%	0.00%	0.00%	0.25%	0.00%	2.30%	0.00%	
3	Dropped Call Rate (<=2%)	Highways	1.43%	0.00%	0.00%	0.00%	1.43%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Major Roads	2.52%	0.00%	0.00%	0.00%	1.83%	0.00%	0.70%	0.00%	0.00%	0.00%	2.61%	0.00%	0.00%	0.00%	0.00%	0.00%	4.10%	0.00%	
		Within City	0.42%	0.00%	0.00%	0.00%	1.71%	0.00%	0.95%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.21%	0.00%	
		Overall SSA	1.17%	0.00%	0.00%	0.00%	1.69%	0.00%	0.73%	0.00%	0.00%	0.00%	0.68%	0.00%	0.00%	0.00%	0.00%	0.00%	2.36%	0.00%	
4	Percentage connections with good voice quality (=>95%)																				

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S/N	Parameter	Classification of Route covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		VODAFONE		TATA CDMA		RCOM CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
			(a) 0-4 (w/o frequency hopping for CDMA Operators)	Highways	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.10%
Major Roads	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.79%	98.00%	90.70%	99.25%
Within City	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.45%	98.06%	93.02%	99.49%
Overall SSA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.64%	98.19%	92.87%	99.14%
(b) 0-5 (with frequency hopping for GSM Operators)	Highways	95.49%	99.76%	97.61%	99.48%	93.93%	97.80%	97.14%	95.36%	95.55%	99.48%	97.98%	96.10%	97.84%	99.00%	NA	NA	NA	NA	
	Major Roads	94.48%	99.78%	96.72%	99.57%	84.36%	97.33%	95.50%	100%	94.25%	99.64%	87.37%	99.39%	95.18%	98.98%	NA	NA	NA	NA	
	Within City	96.91%	91.48%	97.48%	99.16%	89.36%	90.40%	95.73%	99.27%	95.84%	99.17%	93.02%	96.04%	95.32%	99.21%	NA	NA	NA	NA	
	Overall SSA	96.33%	96.98%	97.29%	99.40%	88.82%	95.07%	95.91%	96.28%	95.35%	99.43%	92.33%	97.28%	95.70%	99.06%	NA	NA	NA	NA	
Service Coverage																				
5	In door (>= -75dBm)	Highways	79.36%	97.03%	79.49%	87.58%	24.97%	31.58%	99.56%	97.83%	94.44%	99.98%	67.12%	100%	67.04%	91.38%	97.24%	99.32%	75.05%	100%
		Major Roads	71.73%	96.65%	69.65%	92.86%	31.23%	10.54%	95.97%	98.95%	87.50%	99.98%	51.12%	100%	58.21%	56.70%	96.94%	99.66%	63.32%	100%
		Within City	73.64%	87.08%	68.08%	87.15%	18.06%	1.63%	95.37%	96.39%	87.25%	99.99%	55.48%	100%	56.06%	32.62%	98.93%	99.86%	55.00%	93.59%
		Overall SSA	74.07%	93.53%	72.41%	89.20%	22.59%	15.57%	96.27%	97.76%	88.62%	99.98%	56.20%	100%	72.41%	95.04%	98.14%	99.61%	60.72%	100%
5	In-vehicle (>= -85dBm)	Highways	93.50%	99.97%	95.58%	99.62%	79.24%	84.30%	100%	99.10%	99.91%	100%	93.81%	100%	93.63%	99.69%	100%	100%	97.14%	100%
		Major Roads	92.54%	99.97%	89.76%	99.70%	84.96%	80.17%	99.56%	100%	99.44%	100%	78.76%	100%	89.83%	99.79%	100%	100%	91.88%	100%
		Within City	95.99%	99.96%	92.40%	99.30%	76.59%	67.11%	99.42%	98.73%	99.64%	100%	82.28%	100%	87.38%	96.83%	100%	100%	81.04%	100%
		Overall SSA	94.98%	99.07%	92.58%	99.54%	79.18%	77.17%	99.56%	99.14%	99.63%	100%	83.21%	100%	94.61%	99.97%	100%	100%	86.79%	100%
5	Outdoor- in city (>= -95dBm)	Highways	99.46%	100%	100%	100%	98.90%	99.95%	100%	100%	100%	100%	99.63%	100%	99.88%	100%	100%	100%	100%	100%
		Major Roads	98.51%	100%	100%	100%	99.23%	100%	100%	100%	99.99%	100%	94.52%	100%	99.51%	100%	100%	100%	100%	100%
		Within City	99.63%	100%	100%	100%	98.40%	99.98%	100%	100%	99.99%	100%	95.78%	100%	99.61%	99.99%	100%	100%	100%	100%
		Overall SSA	99.39%	100%	100%	100%	98.70%	99.98%	100%	100%	99.99%	100%	96.07%	100%	99.78%	100%	100%	100%	100%	100%
6	Call Setup Success	Highways	100%	100%	100%	100%	87.50%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	96.10%	100%

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S/N	Parameter	Classification of Route covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		VODAFONE		TATA CDMA		RCOM CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
	Rate (>=95%)	Major Roads	100%	100%	100%	100%	96.46%	100%	91.08%	100%	100%	100%	98.29%	100%	100%	100%	100%	100%	100%	99.19%	100%
		Within City	98.36%	100%	100%	100%	97.10%	100%	98.14%	100%	100%	100%	99.22%	100%	100%	100%	99.52%	100%	97.48%	100%	
		Overall SSA	99.08%	100%	100%	100%	95.16%	100%	96.49%	100%	100%	100%	99.10%	100%	100%	100%	99.75%	100%	97.70%	100%	
		Highways	99.38%	100%	99.48%	100%	95.73%	100%	98.72%	100%	100%	100%	100%	100%	99.60%	100%	100%	100%	100%	100%	100%
7	Hand Over Success Rate (HOSR)	Major Roads	96.14%	100%	100%	100%	98.14%	100%	98.43%	100%	98.15%	100%	99.24%	100%	98.28%	100%	100%	100%	100%	100%	100%
		Within City	97.56%	100%	98.73%	100%	95.53%	100%	98.40%	100%	99.32%	100%	99.19%	100%	99.53%	100%	100%	100%	100%	100%	100%
		Overall SSA	97.44%	100%	99.21%	100%	96.26%	100%	98.47%	100%	99.12%	100%	99.35%	100%	99.20%	100%	100%	100%	100%	100%	100%
		Highways	99.38%	100%	99.48%	100%	95.73%	100%	98.72%	100%	100%	100%	100%	100%	99.60%	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.

7.3 OPERATOR ASSISTED DRIVE TEST: NORTH MUMBAI (MARCH-15)

DRIVE TEST TABLE – 3

S/N	Parameter	Classification of Route covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		VODAFONE		TATA CDMA		RCOM CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
1	Call Attempts	Highways	41	30	49	30	63	31	50	30	49	30	48	30	52	30	36	30	50	30
		Major Roads	114	30	111	30	114	32	100	30	123	30	104	30	104	30	117	30	127	30
		Within City	397	30	368	30	337	34	340	30	375	30	372	30	339	30	340	30	410	30
		Overall SSA	552	90	528	90	514	97	490	90	547	90	524	90	495	90	493	90	587	90
2	Blocked Call Rate	Highways	7.32%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	4.17%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	0.00%
		Major Roads	0.88%	0.00%	0.00%	0.00%	0.88%	0.00%	0.00%	0.00%	0.00%	0.00%	0.96%	0.00%	0.00%	0.00%	0.00%	0.00%	16.54%	0.00%
		Within City	1.01%	0.00%	0.00%	0.00%	0.59%	0.00%	1.18%	0.00%	0.00%	0.00%	1.88%	0.00%	0.00%	0.00%	0.29%	0.00%	4.15%	0.00%
		Overall SSA	1.45%	0.00%	0.00%	0.00%	0.58%	0.00%	0.82%	0.00%	0.00%	0.00%	1.91%	0.00%	0.00%	0.00%	0.20%	0.00%	6.64%	0.00%
3	Dropped Call Rate (<=2%)	Highways	0.00%	0.00%	0.00%	0.00%	3.17%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.92%	0.00%	0.00%	0.00%	2.04%	0.00%
		Major Roads	0.00%	0.00%	0.00%	0.00%	0.88%	0.00%	0.00%	0.00%	0.00%	0.00%	6.80%	0.00%	0.00%	0.00%	0.85%	0.00%	9.43%	0.00%
		Within City	0.76%	0.00%	0.00%	0.00%	2.69%	0.00%	0.30%	0.00%	0.80%	0.00%	0.82%	0.00%	0.00%	0.00%	0.00%	0.00%	4.33%	0.00%
		Overall SSA	0.55%	0.00%	0.00%	0.00%	2.35%	0.00%	0.21%	0.00%	0.55%	0.00%	1.95%	0.00%	0.20%	0.00%	0.20%	0.00%	5.11%	0.00%

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



S/N	Parameter	Classification of Route covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		VODAFONE		TATA CDMA		RCOM CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
			Percentage connections with good voice quality (=>95%)																	
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	100%	100%	95.09%	99.23%
		Major Roads	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	100%	100%	86.43%	98.74%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	100%	100%	88.25%	99.33%	
		Overall SSA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	100%	100%	88.58%	99.08%		
	(b) 0-5 (with frequency hopping for GSM Operators)	Highways	94.46%	99.12%	95.83%	95.21%	85.40%	99.30%	96.78%	97.36%	91.50%	99.66%	91.68%	99.62%	96.32%	99.84%	NA	NA	NA	NA
		Major Roads	96.32%	99.54%	96.55%	99.47%	89.36%	98.62%	98.02%	99.95%	94.58%	99.02%	83.75%	98.96%	95.93%	98.79%	NA	NA	NA	NA
		Within City	96.53%	99.42%	96.34%	99.71%	88.50%	78.45%	97.48%	99.95%	95.04%	94.20%	90.75%	100%	95.12%	99.55%	NA	NA	NA	NA
		Overall SSA	96.42%	99.36%	96.32%	98.15%	88.34%	91.28%	97.52%	99.10%	94.63%	97.63%	89.52%	99.50%	95.54%	99.39%	NA	NA	NA	NA
Service Coverage																				
5	In door (>= -75dBm)	Highways	96.19%	52.30%	92.40%	69.71%	47.29%	24.10%	99.44%	97.98%	85.15%	96.25%	67.12%	99.52%	85.20%	99.77%	97.13%	98.52%	98.33%	100%
		Major Roads	67.58%	99.16%	68.36%	99.05%	37.20%	30.99%	96.74%	97.42%	83.56%	100%	51.12%	99.89%	67.39%	96.93%	98.79%	100%	62.29%	100%
		Within City	62.69%	93.73%	74.32%	99.52%	34.64%	29.82%	96.66%	97.49%	86.87%	99.90%	55.48%	100%	76.89%	90.05%	99.90%	100%	71.64%	100%
		Overall SSA	65.92%	81.73%	78.36%	89.43%	36.64%	28.50%	96.96%	97.63%	85.96%	98.74%	56.20%	99.81%	75.17%	95.58%	98.61%	99.51%	72.38%	100%
	In-vehicle (>= -85dBm)	Highways	99.37%	98.53%	99.07%	99.38%	81.94%	74.78%	99.97%	100%	98.84%	99.99%	93.81%	100%	96.92%	100%	100%	100%	99.93%	100%
		Major Roads	97.18%	99.99%	86.56%	99.98%	80.83%	79.37%	99.93%	100%	96.78%	100%	78.76%	100%	89.79%	99.85%	100%	100%	83.11%	100%
		Within City	97.20%	99.90%	95.52%	99.98%	76.54%	79.77%	99.91%	100%	99.21%	99.99%	82.28%	100%	96.85%	97.95%	100%	100%	94.04%	100%
		Overall SSA	97.35%	99.47%	93.72%	99.78%	78.10%	78.15%	99.92%	100%	98.62%	99.99%	83.21%	100%	94.71%	99.27%	100%	100%	92.46%	100%
	Outdoor- in city (>= -95dBm)	Highways	99.87%	100%	100%	100%	98.52%	100%	100%	100%	99.98%	100%	99.63%	100%	99.67%	100%	100%	100%	100%	100%
		Major Roads	99.44%	100%	100%	100%	97.98%	99.89%	100%	100%	99.47%	100%	94.52%	100%	98.54%	100%	100%	100%	100%	100%
		Within City	99.69%	100%	100%	100%	98.36%	99.87%	100%	100%	99.97%	100%	95.78%	100%	99.94%	99.96%	100%	100%	100%	100%
		Overall SSA	99.66%	100%	100%	100%	98.29%	99.91%	100%	100%	99.86%	100%	96.07%	100%	99.47%	99.99%	100%	100%	100%	100%

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



S/N	Parameter	Classification of Route covered	AIRCEL		AIRTEL		MTNL		TATA GSM		IDEA		RCOM GSM		VODAFONE		TATA CDMA		RCOM CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
			6	Call Setup Success Rate (>=95%)	Highways	92.68%	100%	100%	100%	100%	100%	100%	100%	100%	100%	95.83%	100%	100%	100%	100%	100%
Major Roads	99.12%	100%			100%	100%	99.12%	100%	100%	100%	99.19%	100%	99.04%	100%	100%	100%	100%	100%	100%	83.46%	100%
Within City	98.99%	100%			100%	100%	99.41%	100%	98.82%	100%	99.73%	100%	98.12%	100%	100%	100%	99.71%	100%	100%	95.85%	100%
Overall SSA	98.55%	100%			100%	100%	99.42%	100%	99.18%	100%	99.63%	100%	98.09%	100%	100%	100%	99.80%	100%	100%	93.36%	100%
7	Hand Over Success Rate (HOSR)	Highways	100%	100%	99.56%	100%	97.81%	100%	97.48%	100%	96.97%	100%	100%	100%	97.23%	100%	100%	100%	100%	100%	100%
		Major Roads	99.10%	100%	96.96%	100%	99.08%	100%	99.09%	100%	98.85%	100%	94.70%	100%	97.90%	100%	100%	100%	100%	100%	100%
		Within City	97.67%	100%	98.57%	100%	98.67%	100%	99.42%	100%	98.23%	100%	98.26%	100%	98.90%	100%	100%	100%	100%	100%	100%
		Overall SSA	98.19%	100%	98.48%	100%	98.64%	100%	99.10%	100%	98.15%	100%	97.83%	100%	98.49%	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 OCTOBER TO DECEMBER 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
SOUTH MUMBAI	Jan-15	South Mumbai / 112 KM	Shivaji Park, Matunga, Mahim, Bandra, Prabhadevi, Worli-Sea Link, Haji Ali, Pedder Rd, Gamdevi, Grant Rd, Mumbai Central, Byculla, Sat Rasta, Curry Rd, Parel, Lower Parel, Dadar, Lalbaugh, Kalachowky and Mazgaon. Indoor: Nakshatra Mall	South Mumbai / 110 KM	Dadar, Lower Parel, Mahalaxmi, Haji Ali, Pedder Rd, Girgaum Chowpaty, Marine Lines, Marine Drive, Nariman Point, Cooperage, Cuff Parade, Colaba, Navy Nagar, Fountain, Fort, JJ Flyover, DR Ambedkar Rd from CST to Matunga, Wadala, P D'Mello Rd from Parel to CST, Shivajipark and Matunga. Indoor: Palladium Mall	South Mumbai / 102 KM	Shivajipark, Matunga, Mahim, Bandra, Worli-Sea Link, Haji Ali, Pedder Rd, Girgaum Chowpaty, Marine lines, Marine Drive, Nariman Point, Cooperage, Cuffparade, Colaba, Navy Nagar, Fort, P D'mello Rd , Eastern Free Way, Wadala ,matunga, Sewree ,Parel, Lower Parel and Prabhadevi. Indoor: Atria Mall
KALYAN	Feb-15	Kalyan / 101 KM	Ganpati Mandir road , New Kalyan Road , Shilphata Road , Ambivli titwala road ,Pandurang wada , Sunil nagar road , Nandivli Road , Malangad Road, Kalyan Badlapur Road, Ambiwali Titwala Road, Pune Link Road and Kalyan New Road. Indoor: METRO MALL Coloba Mumbai	Kalyan / 109 KM	Pandit Dindayal Rd,Thakur Wadi , Old dombivli RD , Kalyan Shilphata RD , Kopar Road , Retibunder road, Subhashchandra RD, Pandit Dindayal Rd,Thakur Wadi , Kopar Road, New Kalyan Rd , Shilphata Rd,badlapur road , Umbad Road ,Gokul Nagar and Kalyan Shilphata Rd. Indoor: GOPI MALL Dombili East Mumbai	Kalyan / 105 KM	GOPI Theater, Dombivili West, Dombivili East, MIDC Dombivli, SheelPhata Rd., Kalyan Dombivili Rd., Kalyan West, Santoshi Mata Rd., Khadak Pada, Kalyan East and Kalyan Metro Mall Indoor: SARVODAY MALL Kalyan West Mumbai

DRIVE TEST ROUTE OF OCTOBER TO DECEMBER 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
NORTH MUMBAI	Mar-15	North Mumbai / 108 KM	Malad, kandivali, Borivali, Dahisar Mira rd, bhayander, Kashimkira, Essel world, WEHW,Goregaon,Mira Road East , Dahisar East & west ,Western Express Highway Kandivali ,Western Express Highway Goregaon. Indoor: Infinity Mall Andheri Malad	North Mumbai / 104 KM	Malad east west, Goregaon, Kandivali, Malwani INS amla, WEHW, SV rd, dahisar toll,Western Express highway Dahisar ,Kandivali East & West ,Malad West ,Malad East. Indoor: Inorbit Mall Malad	North Mumbai / 109 KM	oregaon, Kandivali east west, Borivali chakop Gorai , Malwani INS amla, WEHW, SV rd, Marve rd .Bhayander,Western express Highway Mira Road & Dahisar ,Kandivali East Thakur Village ,Charkop & Gorai ,Malad Marve road & Malvani. Indoor: Thakur Mall Dahisar East

7.5 SSA WISE DRIVE TEST OBSERVATION:

DRIVE TEST TABLE: 5

DRIVE TEST OBSERVATION OF SOUTH MUMBAI SSA (JAN-15)

S NO	Name of SP	Day 1 Observation	Day 2 Observation	Day 3 Observation
1	AIRTEL	Rx Quality poor at Pandurang Budhkar Marg,	Rx Quality poor at Sheikh Masari Marg, Dr Ambedkar Road	Rx Level poor at Lakhamsi Nappu Road. Rx Quality poor at Lakhamsi Nappu Road, Sheikh Masari Marg
2	AIRCEL	Rx Level poor at Sewari Road, WSL Road	Rx Level poor at Tardeo road. Rx Quality poor at Dadar mahim road	Rx Level poor at WSL Road.
3	MTNL	Rx Quality poor at WADIA_HOSPITAL, near Parel HAFKIN, Near Minerva Theatre, Wadala Telephone exchange(Quality improved. Redrive done.)	Rx Quality poor at Five Garden VJTI, Sangam Apartments Wadala(Quality improved), Five Garden -Parsy Colony, Near Peninsula Business Park(Neighbor Optimization done), Near Marine lines station,	Rx Quality poor at Five Garden VJTI, Sangam Apartments Wadala(Quality improved), Five Garden -Parsy Colony, Near Peninsula Business Park(Neighbor Optimization done), Near Marine lines station,
4	IDEA CELLULAR	--	--	--
5	VODAFONE	Rx Quality poor at Wadia_Hospital, near Parel Hafkin.	Rx Quality poor at Five Garden VJTI, Sangam Apartments Wadala,Near Marine lines station,	Rx Quality poor at Kirti College, Five Garden-Parsy Colony, Worli Sea face, Between Hafkin & Shiwri station, Walkeshwar Road Nariman Point, Backbay Depot.
6	TATA GSM	Rx Quality poor at Gokhale Road (Prabhadevi),Sheth Motishah Lane, Mazgaon,	Rx Quality poor at Senapati Bapat Marg Lower Parel , Dr. Baba Saheb Ambedkar Road Ghodapdeo Parel,Chhatrapati Shivaji Terminus Area Fort,	Rx Quality poor at H. R. Mahajani Marg, Matunga Road
7	TATA CDMA	--	--	--
8	RCOM GSM	Rx Quality poor at Near Worli Police camp ,Lower Parel area,Wadala,Worli Sea Link	Rx Quality poor at Shahid Bhagat Singh Marg Colaba,Captain Prakash Pethe Marg Colaba,Dr E Moses Marg,Shahid Bhagat Singh Marg Colaba,Captain Prakash Pethe Marg Colaba	Rx Quality poor at Worli Sea Link ,Worli Sea Face ,Warden Road,Marine Drive,Antop Hill.
9	RCOM CDMA	Rx Quality poor at NM Joshi marg Chinchpokli ,Near Worli Police camp,near Dadar TT Flyover	Rx Quality poor at Walkeshwar Road , Shahid Bhagat Singh Marg Colaba,Captain Prakash Pethe Marg Colaba , Eastern Expressway near BPCL	Rx Quality poor at near Sayani Road, Prabhadevi , Dadar TT Flyover

Common observation Area: Worli Police camp,TT Flyover Dadar ,Marine lines station, WSL Road,Worli Sea face.

DRIVE TEST TABLE: 6

DRIVE TEST OBSERVATION OF KALYAN SSA (FEB-15)

S.No	Name of SP	Day 1 Observation	Day 2 Observation	Day 3 Observation
1	AIRTEL	Poor Rx Level at Pandurang Wadi Road. Poor Rx Quality at Kalyan Shilphata road.	--	Poor Rx Level at Titwala Ambivali Road.
2	AIRCEL	Poor Rx Level at Padgha Road, Shahad road.	--	Poor Rx Level at Padgha Road. Poor Rx Quality at Padgha Road.
3	MTNL	Poor Rx Level at Vaishnavi CHS.	Poor Rx Level on Shilphata Road, Nr Dombivali West.	Poor Rx Quality Near Lakshmi Park.
4	IDEA CELLULAR	--	Poor Rx Quality on Kalyan murabad road.	--
5	VODAFONE	Poor Rx Quality Near Vadavali Village-Ambivali.	Poor Rx Quality on Kalyan _Murbad Road(Antenna optimization done , Rx level & quality improved), Katemanivali _Kalyan, MIDC Phase 1, Shastri Nagar.	Poor Rx Quality at Vadavali Village - Ambivali, Roshan Petrol Pump on kalyan – Murbad road(cell optimization done , Rx level & quality improved)
6	TATA GSM	Poor Rx Quality at Koper Cross Road-Shashtri Nagar-Dombivali(W), adharwadi	Poor Rx Quality at city mall near pendharkar circle dombovali (E), Brla college Road,	Poor Rx Quality at Ashoka Building_Kalyan(E), Nirmal Angenia_Ambivali(E),
7	TATA CDMA	--	--	Poor Rx Level at Sairaj Park-Kachore Road.
8	RCOM GSM	Poor Rx Level & Rx Quality near Bhagirathi Nagar, near Ambivli, at Yash Tower, Anusuya Niwas, Vedant complex, Vidhata Darshan, Sameer Appt.	Poor Rx Level & Rx Quality at Faizen manzil, Anusuya Niwas , Seema Motors, Jage Niwas, Ratna Prabha, Sameer Appt.	Poor Rx Level & Rx Quality at Kantilal & Ajanta CHSL, Devidayal & Shiv Mangal. Poor Rx Quality at Laxmi Park
9	RCOM CDMA	Poor Rx Level and Rx Quality at Trimurti Nagar and Thakurli, near Mhatre Nagar, Navneet Nagar, Nandivali Panchanand and MIDC, Anand Nagar. Poor Rx Level & Rx Quality at Bhagirathi Nagar, near Ambivli , near Rambaug, near Koliwada. Poor Rx Level & Rx Quality at New Ganesh Nagar	Poor Rx Level & Rx Quality near Meghani Nagar, near Tilak Nagar, Gopal Nagar and Trimurti Nagar. Poor Rx Level near Koliwada, near Khadakpada, Rambaug, near New Ganesh Nagar	Poor Rx Level & Rx Quality near Milind Nagar, near Thakurwadi, near Ambivli , Kalyan East Shivaji Colony. Poor Rx Quality at New Ganesh Nagar.

Common observation Area: Shilphata Road, Padagha Road (Ambivali), Murbad Road, Shastri Nagar, Ambivali Road and Laxmi Park

DRIVE TEST TABLE: 7

DRIVE TEST OBSERVATION OF NORTH MUMBAI SSA (MARCH-15)

S. NO	Name of SP	Day 1 Observation	Day 2 Observation	Day 3 Observation
1	AIRTEL	Poor Rx Level at Uttan Road. Poor Rx Quality at 90 feet Road, Uttan Road (Near Koliwada).	Poor Rx Level at Marve Road (Near I. N.S Hamla). Poor Rx Quality at Western Express highway(Near Ban dongri bus stop), Link Road(Near Chinchpoli Fire station).	Poor Rx Level at Marve Road (Near I. N.S Hamla). Poor Rx Quality at Western Express highway(Near Ban dongri bus stop & Shantivan Hospital),Link Road.
2	AIRCEL	--	--	Poor Rx Level Near Gorai Road, Marve Road. Poor Rx Quality Near Charkop Village.
3	MTNL	Poor Rx Level & Rx Qual near Pathanwadi(Daftary Rd WEHW Malad(E)), Low Rx Level on Uttan Bhayander Rd. Low Rx Quality Nr Indralok-Mira Rd, Low Rx Quality Nr Poonam Sagar Complex. Low Rx Quality near IC Colony,Borivali West	Poor Rx Level on Malad Marve Rd & Madh Marve Rd. Low Rx Level & Rx Quality near Pathanwadi,Daftary Rd,WEHW Malad(E). Low Rx Level in Malvani Area, Liberty Garden Malad West, Chincholi Bunder Rd.	Poor Rx Level Nr Kharodi/Rathodi Village,Poisar Bus Depot,Charkop Industrial Est,Kandarpada Dahisar Wesr Link Rd,Nr Vazira Naka,Boriveli West Link Rd. Low Rx Quality Nr Akurli Rd,WEHW Kandivali East, Nr Vazira Naka,Boriveli West Link Rd
4	IDEA CELLULAR	Poor Rx Level observed on Gorai Road,Link road,Mera road East,Borowali East,Gorai Greek road,	Poor Coverage & Quality Near Orlem Church Road,Link road,Mudhar marve road	Poor Rx Quality Near Akurli Road,Borivali west,Western express highway.
5	VODAFONE	Poor Rx Quality at Bhayander E& W flyover, Shupkarna(Mira road-E), Nirav Park, Shantinagar Dahisar ,Western experss highway(Shree Dwarakesh & Sai saptarishi)	Poor Rx Quality on Western express highway (S.N Dubey & Shree Dwarakesh), Varun CHSL & Link House & Kamgar Panchganga,Krishna Heights-Malad	Poor Rx Quality on Western express highway(Nr. AG Nagar & Ekta Villa), Mahatma Gandhi road,Poor Rx Quality near Malvani(Bay View & Sea Bird).
6	TATA GSM	--	Poor Rx Quality on Mahakali Road(Malad-West).	--
7	TATA CDMA	--	--	--
8	RCOM GSM	Poor Rx Level near Maxus mall, Manori-Gorai Road, Mayur Pankh , Shubh Jivan Bldg, Nilesh Apt, Nilesh co housing . Poor Rx Quality near Hira Industrial,Manori-Gorai Road,Mayur Pankh, Pearl Diamond.	Poor Rx Level near blue dimond, Marve Road, Kailash Nagar. Poor Rx Quality near Western Exp Highway near Shantivan, Marve Road, Kailash Nagar, Yatri Hotel.	Poor Rx Level near Marve Road, Parshwanath Apts, Purva Plaza. Poor Rx Quality near Marve Road, Parshwanath Apts, Nandanvan & Sensational Accessories, Praneeta arcade, Samadhan arcade, Pushkar arcade.
9	RCOM CDMA	Poor Rx Level & Quality near Maxus Mall, Ramdev Aprk (Bhayander),Krishna Colony(Dahisar), Sector 3(Mira Road), Uttan Road.	Poor Rx Level & Quality near Bafhira Nagar(Malad), NSC Colony and Adarsh Nagar(Malad), Mahindra Nagar(Malad), Malvani, Madh-Marve road, Kharodi. Poor quality observed near Ganesh Nagar & Mahavir Nagar(Kandivali).	Poor Rx Level & Quality near Gorai area, Narsi Pada.Poor Rx Level on on Madh-Marve road & Kharodi area. Poor quality observed on West Exp way near Gayatri Nagar, Ganesh Nagar,Chikuwadi area, Parekh Nagar, on Western Expressway near Kurar Village.

Common observation Area: Uttan Road, Western Express Highway (Near Pathanwadi), Malad Marve Road, Akurli Road, Malvani..

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 January-15**, drive tests were conducted across **South Mumbai** SSA (Total Drive Test 324Kms). The analysis of the drive tests conducted during the three consecutive days in South Mumbai SSA revealed that **MTNL, Idea, RCOM (GSM) and RCOM (CDMA)** remained under performed in respect of the parameter **Good Voice Quality** with their performance as **90.65%, 93.86%, 89.20% and 93.78%** respectively. Further, **MTNL** and **Tata (GSM)** also failed to meet the benchmark of **Call drop rate** and **Blocked Call rate** with their performance as **2.95% and 3.66%** respectively on overall SSA basis.
- (ii) **In the Month of February-15**, drive tests were conducted across **Kalyan** SSA for three consecutive days (Total drive test 315 Kms). The performance of **MTNL, RCOM (GSM) and RCOM (CDMA)** on over all SSA basis, was not in compliance for parameter '**Voice Quality**' with their achieved level as **88.82%, 92.33%** and **92.87%** respectively. Further, **RCOM (CDMA)** and **Tata (GSM)** also could not perform to the benchmark for parameters **Call Drop Rate and Block Call rate** with their achieved value as **2.36% and 3.51%** respectively on overall SSA level.
- (iii) **In the month of March-15**, drive tests were conducted across **North Mumbai** SSA (Total 321 Kms). The analysis of the drive test results at SSA level revealed that **MTNL, Idea, RCOM (GSM) and RCOM (CDMA)** remained underperformed for the parameter **Good Voice Quality** with their performance as **88.34%, 94.63%, 89.52% and 88.58%** respectively. Apart from this, **RCOM (CDMA)** also remained non-complied for parameter **Call Drop rate** and **CSSR** having its achieved level as **5.11% and 88.58%** respectively. Further, **MTNL** could not meet the benchmark of **Call Drop rate (2.35%)**.

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

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

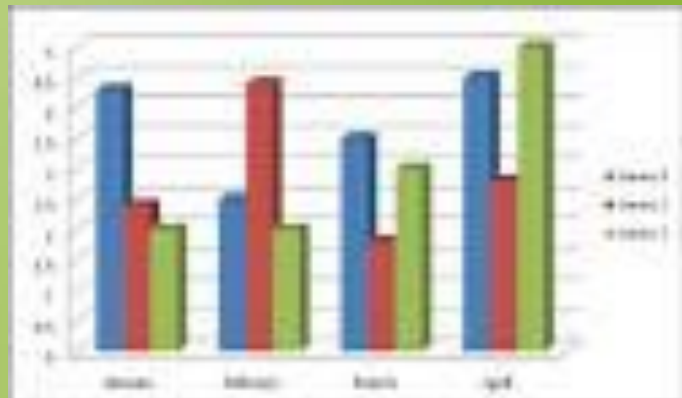
Thus, MTNL, Idea, RCOM (GSM) and RCOM (CDMA) were having non-complied performance for the parameters Voice quality and Call drop rate across the above SSAs where the drive tests were conducted during the quarter. RCOM (CDMA) /Tata (GSM) also remained under performed for parameters CSSR/Blocked Call rate. 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

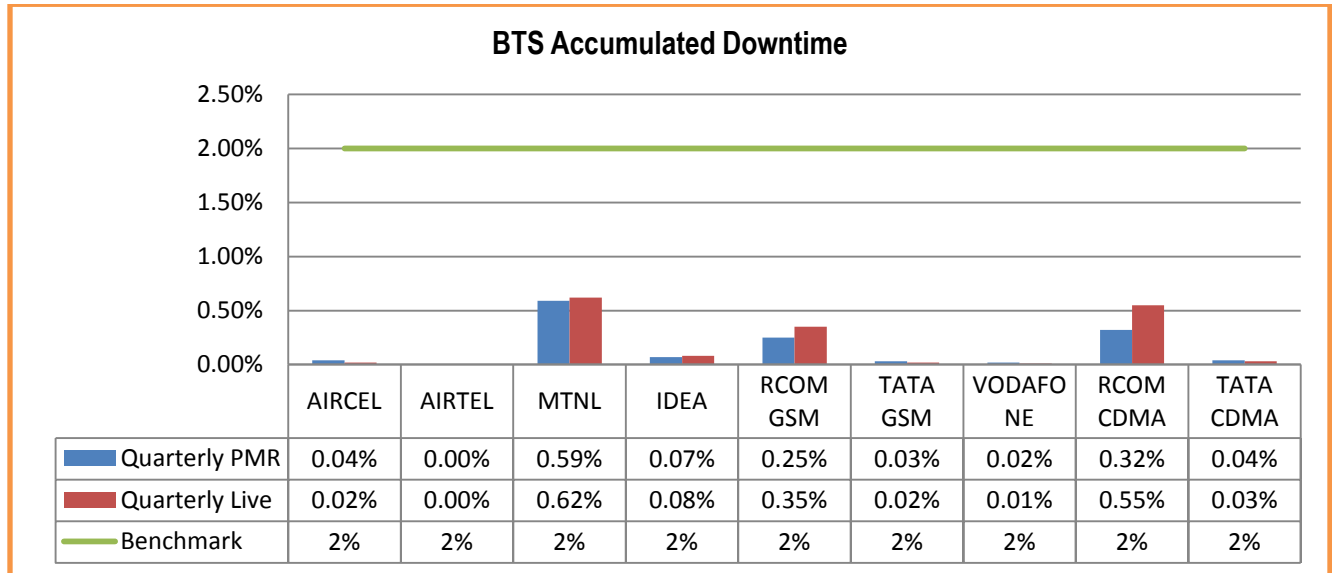
AVERAGED QUARTERLY 3-DAYs LIVE MEASURMENT



8. GRAPHICAL REPRESENTATION (CMTS):

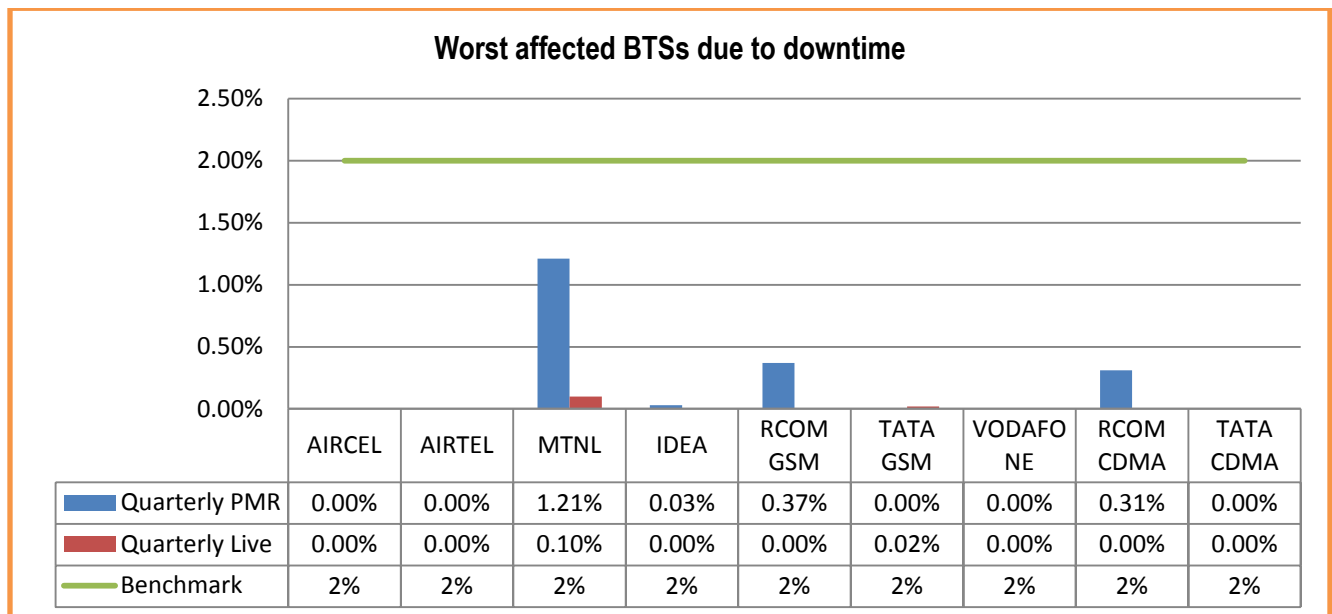
Graphical Representation of Performance of the Cellular Mobile Service Providers (PMR) V/S 3-Days Live Measurement (Quarterly Average Data):

1) BTS ACCUMULATED DOWNTIME:



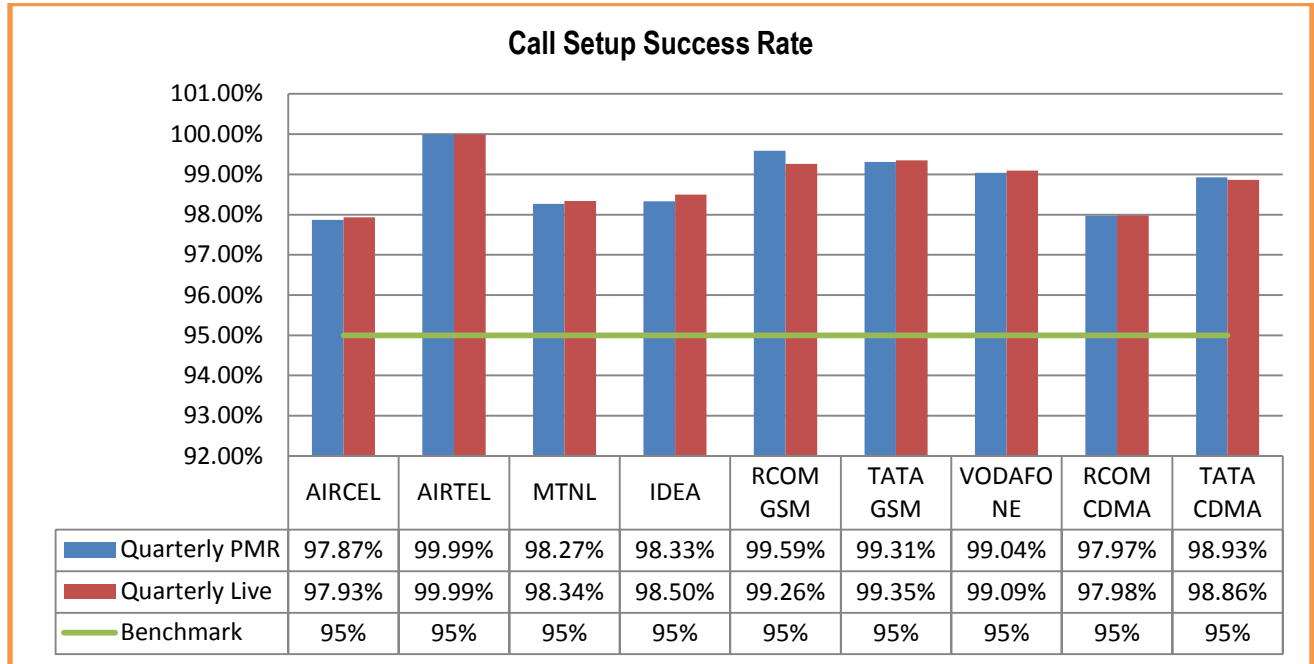
All operators are meeting the benchmarks.

2) WORST AFFECTED BTSs DUE TO DOWNTIME:



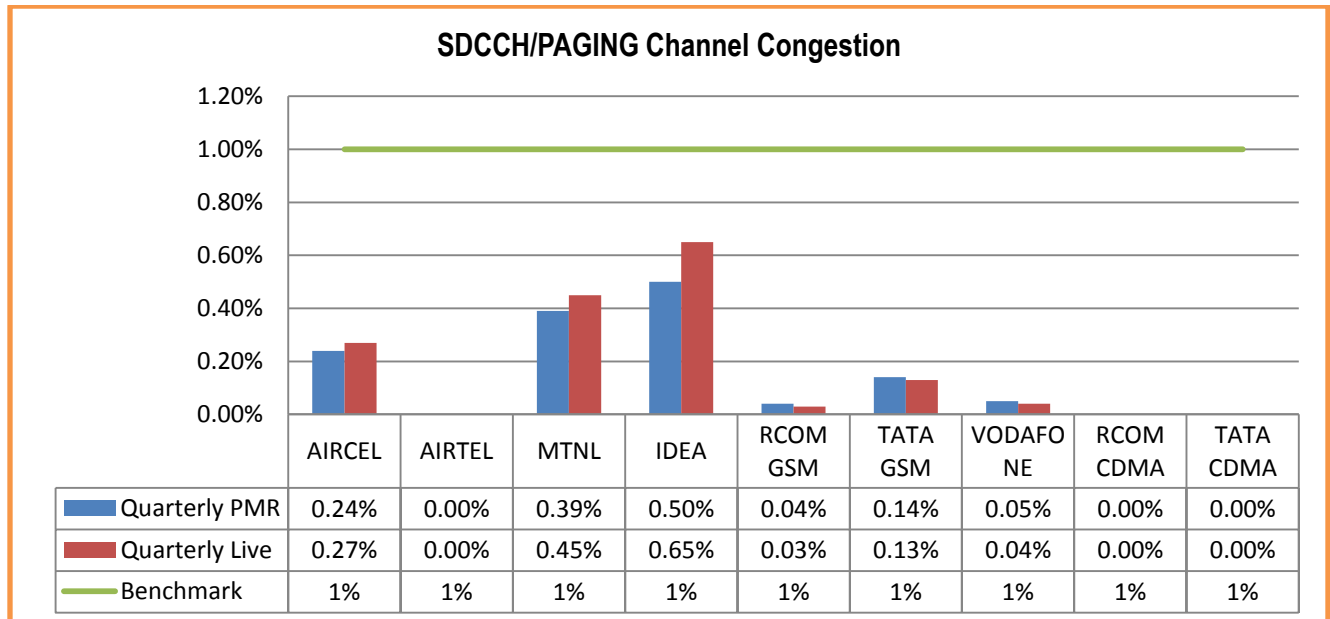
All operators are meeting the benchmarks.

3) CALL SETUP SUCCESS RATE:



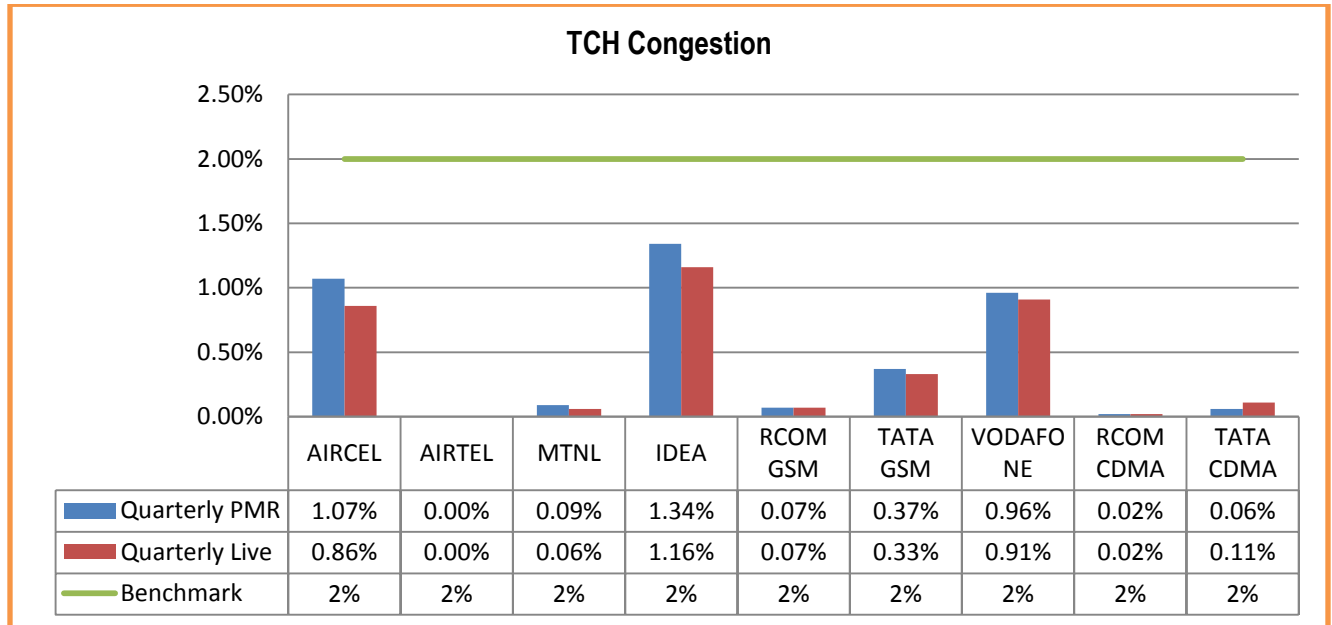
All operators are meeting the benchmarks.

4) SDCCH/PAGING CHANNEL CONGESTION:



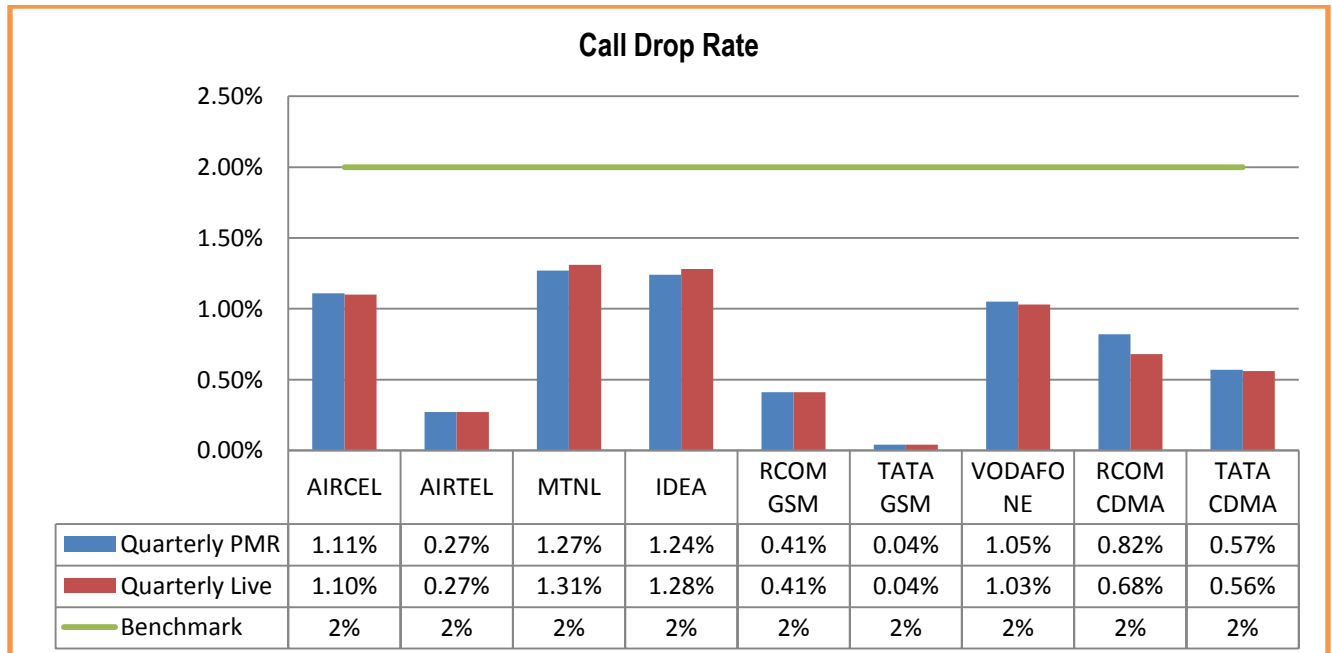
All operators are meeting the benchmarks.

5) TCH CONGESTION:



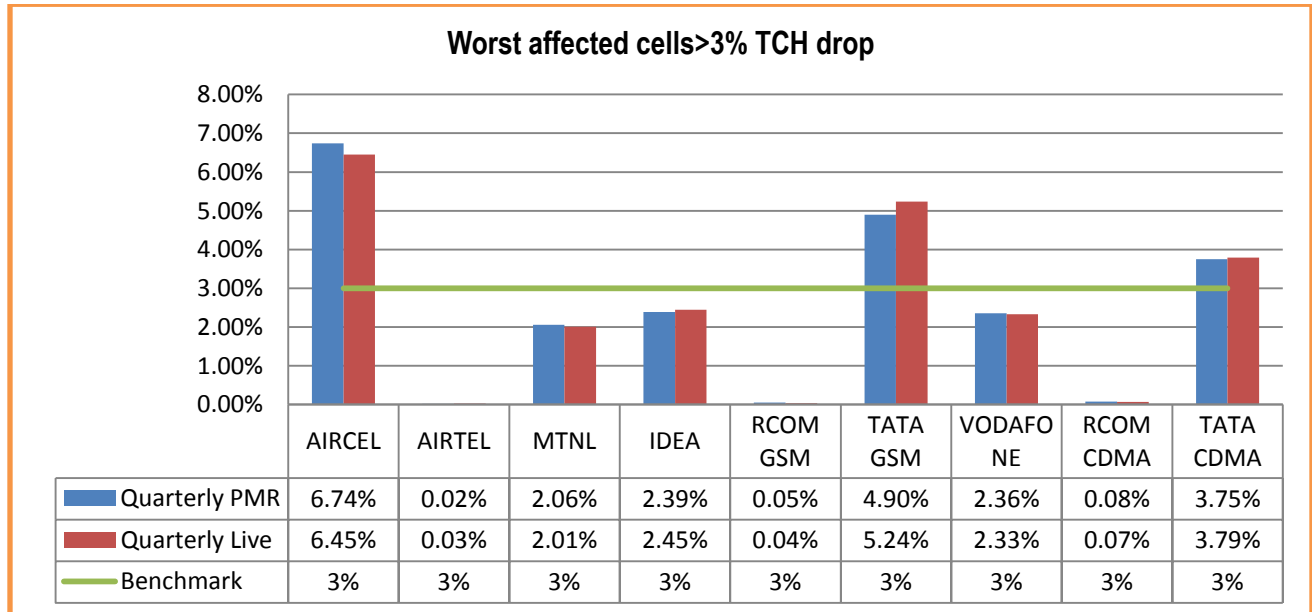
All operators are meeting the benchmarks.

6) CALL DROP RATE:



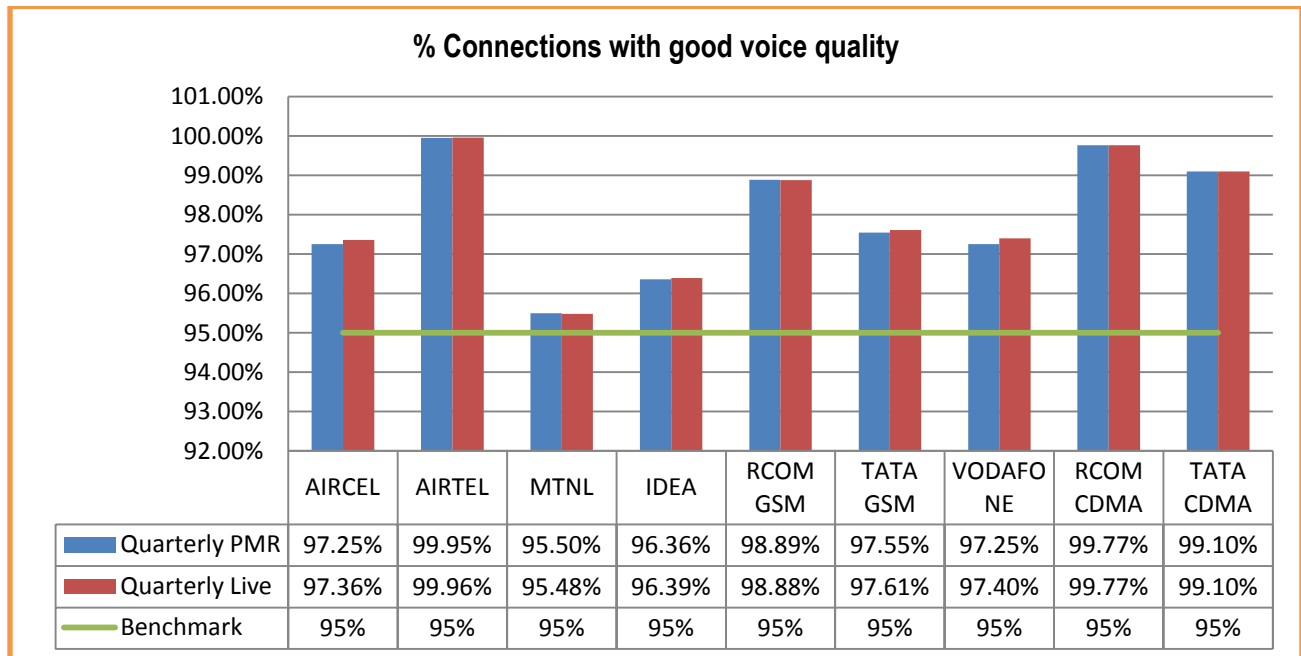
All operators are meeting the benchmarks.

7) WORST AFFECTED CELLS>3% TCH DROP :



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

8) PERCENTAGE OF CONNECTIONS WITH GOOD VOICE QUALITY:



All operators are meeting the benchmarks.