



**REPORT**  
**ON**  
**AUDIT & ASSESSMENT OF QUALITY OF SERVICE**  
**OF**  
**CELLULAR MOBILE TELEPHONE SERVICE**  
**FOR**  
**TELECOM REGULATORY AUTHORITY OF INDIA**  
**WEST ZONE – MAHARASHTRA & GOA SERVICE AREA**  
**(JANUARY 2014 – MARCH 2014)**

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## PREFACE

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

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

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



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## 1. BACKGROUND





## 1. BACKGROUND

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

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

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

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

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

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



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

## **2. OBJECTIVES AND METHODOLOGY**





## 2. OBJECTIVES AND METHODOLOGY

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

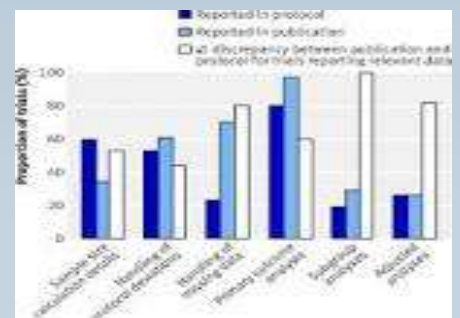
The audit and assessment of Quality of Service is carried out by **TUV SUD South Asia across all the Circles/Service areas of North and West Zones for Cellular Mobile Service. Apart from this, QoS audit for Basic (Wire line) is undertaken for J&K , Himachal Pradesh & Mumbai circles and for Broadband service, the audit is done for J&K , Himachal Pradesh, Haryana, Delhi & Mumbai Circles during the quarter January – March 2014.**

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

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



### 3. SAMPLE SIZE





### 3. SAMPLE SIZE

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

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

Sl. No.	Name of Service Provider	Dates of live measurement Audit			Audit Location
		January-14	February-14	March-14	
<b>GSM Operators</b>					
1	AIRCEL	21 to 23 Jan-14	12 to 14 Feb-14	5 to 7 Mar-14	Aircel Ltd. , Commer Zone, Building no-2,6 Floor,Yerwada Jail Road,Yerwada,Pune-1
2	AIRTEL	15 to 17 Jan-14	17 to 19 Feb-14	5 to 7 Mar-14	7th Floor, Interface 7, Near IJMIMA Tower, Behind Infinity Mall, Malad (West), Mumbai-400064
3	BSNL	20 to 22 Jan-14	12 to 14 Feb-14	6 to 8 Mar-14	BSNL, O/O G.M. (Mobile) NWO-CM 2nd floor, Telephine Bhavan, Bajirao Road, Pune 411002
4	UNINOR	20 to 22 Jan-14	19 to 21 Feb-14	20 to 24 Mar-14	Telewings Communications Services Pvt Ltd. (Uninor) Welldone Technology Park Sec-48 Sohana Road Gurgaon
5	TATA GSM	21 to 23 Jan-14	17 to 19 Feb-14	6 to 8 Mar-14	TATA Tel. Ltd., A1-Aqmar Building,5,Ganesh Kindh Road, Shivaji Nagar , Pune-5
6	IDEA	6 to 8 Jan-14	1 to 3 Feb-14	1 to 3 Mar-14	IDEA Cellulsr Ltd., 11-Sharda Center,Off Carve Road, Erandawane, Pune-4
7	RCOM GSM	21 to 23 Jan-14	14 to 16 Feb-14	5 to 7 Mar-14	Reliance Communications, 7th floor,Kumar cerebrum IT Park, B bldg, above standard chartered bank ,near d-mart,kalyani nagar, Pune.
8	VODAFONE	21 to 23 Jan-14	12 to 14 Feb-14	6 to 8 Mar-14	Vodafone Cellular Limited, Metropolitan, Old Mumbai -Pune Highway, Wakdewadi, Shivajinagar, Pune 411003
<b>CDMA Operators</b>					
9	RCOM CDMA	21 to 23 Jan-14	14 to 16 Feb-14	5 to 7 Mar-14	Reliance Communication Limited, NH-1, VPO-Mohari, Kuruskhetra, Near Hasari Pouthry Farm, Milestone 188.
10	TATA CDMA	21 to 23 Jan-14	17 to 19 Feb-14	6 to 8 Mar-14	TATA Tel. Ltd., A1-Aqmar Building,5,Ganesh Kindh Road, Shivaji Nagar , Pune-5

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

**The data generated by monthly PMR and 3-days live measurements audit for the period January 2014 to March 2014 has been successfully uploaded on 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. **However, QoS audit for basic (wire line) service was not required to be done for MH&G Circle in the quarter ended March 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. **However, the QoS audit for Broadband service was not required to be done for MH&G Circle in the quarter ended March 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.

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





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

**BUSY HOUR OF VARIOUS SERVICE PROVIDERS:**

SI. No.	Name of Service Provider	Month of Audit	Network TCBH Hour
<b>GSM Operators</b>			
1	AIRCEL	March-14	19:00 -20:00
2	AIRTEL	March-14	20:00 -21:00
3	BSNL	March-14	19:00 -20:00
4	IDEA	March-14	19:00 -20:00
5	TATA GSM	March-14	19:00 -20:00
6	RCOM GSM	March-14	19:00 -20:00
7	UNINOR	March-14	20:00 -21:00
8	VODAFONE	March-14	20:00 -21:00
<b>CDMA Operators</b>			
9	RCOM CDMA	March-14	19:00 -20:00
10	TATA CDMA	March-14	19:00 -20:00

The TCBH reported by all the service providers matched the network busy hour calculated by TUV auditors for the Maharashtra & Goa circle.

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

SI. No.	Name of Service Provider	No. of MSC + GMSC	No. of BSC	No. of BTS	NSS make	BSS make
<b>GSM Operators</b>						
1	AIRCEL	3	13	1831	Huawei	Huawei
2	AIRTEL	23	158	10714	NSN	NSN
3	BSNL	18	141	6880	Alcatel	Alcatel
4	IDEA	42	92	10267	Ericsson	Ericsson
5	TATA GSM	4	31	4206	Huawei	Huawei
6	RCOM GSM	5	23	3667	Huawei	Huawei
7	UNINOR	7	26	3600	NSN	NSN, Huawei
8	VODAFONE	16	115	9438	NSN	NSN
<b>CDMA Operators</b>						
9	RCOM CDMA	10	8	2280	ZTE, Lucent	ZTE, Lucent
10	TATA CDMA	12	19	2276	Huawei, ZTE, Ericsson	Huawei, ZTE, Ericsson

# AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MAHARASHTRA & GOA CIRCLE



## TABLES OF MONTHLY QOS PERFORMANCE:

TABLE: 1

CELLULAR MOBILE TELEPHONE SERVICES MAHARASHTRA & GOA CIRCLE- JAN-14 MONTH													
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	BSNL	IDEA	TATA GSM	RCOM GSM	UNINOR	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators							CDMA Operators		
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	Jan-14	0.11%	0.01%	1.96%	0.23%	0.02%	0.26%	0.11%	0.15%	0.15%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	Jan-14	0.60%	0.00%	1.86%	1.65%	0.00%	0.79%	0.29%	0.90%	0.18%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Jan-14	99.51%	99.89%	95.53%	98.73%	99.35%	99.59%	97.44%	99.27%	98.36%	98.02%
	b) SDCCH/PAGING Channel congestion	<=1%	Jan-14	0.05%	0.03%	0.71%	0.75%	0.10%	0.05%	0.41%	0.29%	0.00%	0.00%
	c) TCH congestion	<=2%	Jan-14	0.05%	0.05%	1.87%	0.76%	0.16%	0.04%	1.56%	0.73%	0.02%	0.71%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Jan-14	0.69%	0.44%	1.79%	1.01%	0.69%	0.33%	0.41%	0.71%	0.15%	1.01%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Jan-14	4.98%	0.27%	2.81%	1.80%	2.85%	0.01%	1.22%	2.76%	0.72%	5.32%
	c) Connections with good voice quality	>=95%	Jan-14	97.35%	98.95%	95.58%	97.57%	98.14%	98.86%	97.48%	97.42%	99.80%	NP
4	No. of POI's having >=0.5% POI congestion	<=0.5%	Jan-14	0	0	0	0	0	0	0	0	0	0

NP-Data not provided: Tata CDMA has not provided data for the parameter "Connections with good voice quality "because OMCR does not support this parameter.



**AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MAHARASHTRA & GOA CIRCLE**



**TABLE: 2**

<b>CELLULAR MOBILE TELEPHONE SERVICES MAHARASHTRA &amp; GOA CIRCLE- FEB-14 MONTH</b>													
<b>PMR Generation Data</b>		<b>Bench- mark</b>	<b>Audit Period</b>	<b>AIRCEL</b>	<b>AIRTEL</b>	<b>BSNL</b>	<b>IDEA</b>	<b>TATA GSM</b>	<b>RCOM GSM</b>	<b>UNINOR</b>	<b>VODAFONE</b>	<b>RCOM CDMA</b>	<b>TATA CDMA</b>
<b>S/N</b>	<b>Name of Parameter</b>			<b>GSM Operators</b>								<b>CDMA Operators</b>	
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	Feb-14	0.08%	0.01%	1.94%	0.23%	0.03%	0.27%	0.18%	0.23%	0.16%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	Feb-14	0.33%	0.00%	1.83%	1.80%	0.00%	0.65%	0.97%	1.29%	0.09%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Feb-14	99.50%	99.88%	95.22%	98.53%	99.36%	99.59%	97.24%	99.22%	98.71%	97.83%
	b) SDCCH/PAGING Channel congestion	<=1%	Feb-14	0.07%	0.03%	0.79%	0.75%	0.10%	0.06%	0.48%	0.29%	0.00%	0.00%
	c) TCH congestion	<=2%	Feb-14	0.13%	0.06%	1.89%	0.85%	0.14%	0.04%	1.99%	0.78%	0.01%	0.98%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Feb-14	0.69%	0.39%	1.75%	0.97%	0.65%	0.28%	0.44%	0.68%	0.16%	0.93%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Feb-14	1.42%	0.28%	2.84%	1.75%	<b>3.03%</b>	0.01%	1.62%	2.80%	0.70%	<b>4.96%</b>
	c) Connections with good voice quality	>=95%	Feb-14	97.31%	98.99%	95.83%	97.57%	98.12%	98.85%	97.59%	97.54%	99.80%	NP
4	No. of POI's having >=0.5% POI congestion	<=0.5%	Feb-14	0	0	0	0	0	0	0	0	0	0

NP-Data not provided: Tata CDMA has not provided data for the parameter "Connections with good voice quality "because OMCR does not support this parameter.



**TABLE: 3**

<b>CELLULAR MOBILE TELEPHONE SERVICES MAHARASHTRA &amp; GOA CIRCLE- MAR-14 MONTH</b>													
<b>PMR Generation Data</b>		<b>Bench- mark</b>	<b>Audit Period</b>	<b>AIRCEL</b>	<b>AIRTEL</b>	<b>BSNL</b>	<b>IDEA</b>	<b>TATA GSM</b>	<b>RCOM GSM</b>	<b>UNINOR</b>	<b>VODAFONE</b>	<b>RCOM CDMA</b>	<b>TATA CDMA</b>
<b>S/N</b>	<b>Name of Parameter</b>			<b>GSM Operators</b>								<b>CDMA Operators</b>	
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	Mar-14	0.04%	0.01%	1.83%	0.23%	0.02%	0.28%	0.18%	0.23%	0.17%	0.03%
	b) Worst affected BTSs due to downtime	<=2%	Mar-14	0.00%	0.00%	1.79%	1.63%	0.00%	0.79%	0.75%	1.67%	0.39%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Mar-14	99.47%	99.88%	95.32%	98.37%	99.60%	99.58%	97.15%	99.09%	98.50%	97.98%
	b) SDCCH/PAGING Channel congestion	<=1%	Mar-14	0.05%	0.03%	0.83%	0.76%	0.12%	0.02%	0.59%	0.35%	0.00%	0.00%
	c) TCH congestion	<=2%	Mar-14	0.17%	0.07%	1.82%	0.97%	0.18%	0.05%	1.98%	0.91%	0.02%	0.82%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Mar-14	0.72%	0.40%	1.78%	1.02%	0.67%	0.35%	0.63%	0.72%	0.16%	0.92%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Mar-14	1.56%	0.28%	2.78%	1.98%	2.95%	0.01%	2.27%	2.82%	0.56%	<b>5.40%</b>
	c) Connections with good voice quality	>=95%	Mar-14	97.18%	98.95%	95.64%	97.47%	98.05%	98.84%	97.44%	97.46%	99.80%	NP
4	No. of POI's having >=0.5% POI congestion	<=0.5%	Mar-14	0	0	0	0	0	0	0	0	0	0

NP-Data not provided: Tata CDMA has not provided data for the parameter "Connections with good voice quality" because OMCR does not support this parameter.

# AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MAHARASHTRA & GOA CIRCLE



## TABLE OF QUARTERLY QOS PERFORMANCE:

**TABLE: 4**

QUARTERLY QOS PERFORMANCE (AVERAGE OF QE-MARCH-14) OF MAHARASHTRA & GOA CIRCLE													
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	BSNL	IDEA	TATA GSM	RCOM GSM	UNINOR	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators							CDMA Operators		
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	Quarterly	0.08%	0.01%	1.91%	0.23%	0.02%	0.27%	0.16%	0.20%	0.16%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.31%	0.00%	1.83%	1.69%	0.00%	0.74%	0.67%	1.29%	0.22%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	99.49%	99.88%	95.36%	98.54%	99.44%	99.59%	97.28%	99.19%	98.52%	97.94%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.06%	0.03%	0.78%	0.75%	0.11%	0.04%	0.49%	0.31%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	0.12%	0.06%	1.86%	0.86%	0.16%	0.04%	1.84%	0.81%	0.02%	0.84%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	0.70%	0.41%	1.77%	1.00%	0.67%	0.32%	0.49%	0.70%	0.16%	0.95%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	2.65%	0.28%	2.81%	1.84%	2.94%	0.01%	1.70%	2.79%	0.66%	5.23%
	c) Connections with good voice quality	>=95%	Quarterly	97.28%	98.96%	95.68%	97.54%	98.10%	98.85%	97.50%	97.47%	99.80%	NP
4	No. of POI's having >=0.5% POI congestion	<=0.5%	Quarterly	0	0	0	0	0	0	0	0	0	0

NP-Data not provided: Tata CDMA has not provided data for the parameter "Connections with good voice quality "because OMCR does not support this parameter.



## KEY FINDINGS: CELLULAR MOBILE SERVICES

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

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

### Network Service Quality Parameters:

- **Network Availability**

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

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

In MH&G 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 of 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 (average 0.16 %) was for RCOM (CDMA) during the quarter.

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

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

The audit with respect to this parameter revealed that all the operators met the benchmark for this parameter except **Tata (CDMA) and Aircel. Tata (CDMA)** remained non-compliant in all the three months of the quarter with its average performance as **5.23%**, whereas **Aircel** could not perform well in the month of Jan-14 with its achievement as **4.98%**.

- iii. Connections with good voice quality:

The audit results for this parameter indicates that all operators have met the bench mark during the quarter.

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





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

<b>CSD Data for Cellular Mobile Telephone Services-QE March-14</b>													
<b>Quarterly CSD Audit Data</b>		<b>Bench- mark</b>	<b>Circle Name</b>	<b>AIRCEL</b>	<b>AIRTEL</b>	<b>BSNL</b>	<b>IDEA</b>	<b>RCOM GSM</b>	<b>TATA GSM</b>	<b>UNINOR</b>	<b>VODAFONE</b>	<b>RCOM CDMA</b>	<b>TATA CDMA</b>
<b>S/ N</b>	<b>Name of Parameter</b>			<b>GSM Operators</b>								<b>CDMA Operators</b>	
<b>Customer Service Quality Parameters</b>													
<b>1</b>	<b>Metering &amp; Billing Credibility -Post Paid</b>												
	A) No. of bills issued during the quarter		<b>MHG</b>	4591	488046	376638	1217955	61448	99421	Not App.	825480	264676	102868
	B) No. of bills disputed including billing complaints during the quarter		<b>MHG</b>	2	91	7	969	54	5	Not App.	508	258	0
	C) % of billing complaints during the quarter	<= 0.1%	<b>MHG</b>	0.04%	0.02%	0.00%	0.08%	0.09%	0.00%	Not App.	0.06%	0.10%	0.00%
<b>2</b>	<b>Metering &amp; Billing Credibility -Pre Paid</b>												
	A) Total No. of Pre-paid customers at the end of the quarter		<b>MHG</b>	1431725	10050985	6004402	17083772	5263336	4027893	5987931	14400531	1764225	1691036
	B) Total No. of complaints relating to charging, Credit and Validity during the quarter		<b>MHG</b>	0	1262	5655	270	5010	1	361	4585	1354	0
	C) % of Pre-paid Charging Complaints	<= 0.1%	<b>MHG</b>	0.00%	0.01%	0.09%	0.00%	0.10%	0.00%	0.01%	0.03%	0.08	0.00%
<b>3</b>	<b>Resolution of Billing/Charging Complaints and Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints</b>												
	A) No. of Billing/Charging/Credit/Validity Complaints received during the quarter		<b>MHG</b>	2	1353	5655	11891	5064	6	361	4978	1612	0
	B) No. of billing complaints for Post paid customers/Charging/Credit/Validity complaints for pre-paid customers resolved within 4 weeks during the quarter		<b>MHG</b>	2	1353	5655	11891	5064	6	361	4978	1612	0
	C) % of billing complaints (for post paid customer) / Charging/Credit/Validity (for Pre paid customer) resolved within 4 weeks	100 % within 4 week	<b>MHG</b>	100%	100%	100%	100%	100%	100%	100%	100%	100%	100.00%
	D) % of Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints	<=1 week	<b>MHG</b>	100%	100%	100%	100%	100%	100%	100%	100%	100%	100.00%

# AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MAHARASHTRA & GOA CIRCLE



4 Response time to customers for assistance													
A) Accessibility of call centre/Customer Care	>=95%	MHG	87.50%	100%	100%	100%	98.70%	98.88%	95.81	100%	99.31%	98.90%	
B) % call answered by operators(voice to voice) within 60 sec.	>=90%	MHG	71.87%	94.39%	72.64%	100%	79.85%	95.65%	91.40%	91.67%	75.70%	96.37%	
5 Termination/closure of service													
A) Total No. of requests for Termination / Closure of service received during the quarter		MHG	29	2008	27	7389	290	482	Not App.	5351	1378	132	
B) No. of requests for Termination /Closure of service complied within 7 days during the quarter		MHG	29	2,008	27	7389	290	482	Not App.	5351	1378	132	
C) % of Termination/ Closure of service within 7 days	<=7days	MHG	100%	100%	100%	100%	100%	100%	Not App.	100%	100%	100%	
6 Time taken for refunds of deposits after closures.													
A) No. of Payments/ Refunds due during the quarter		MHG	10	1076	129	625	453	158	Not App.	898	919	51	
B) No. of Payments/ Refunds Cleared during the quarter		MHG	10	1076	129	625	453	158	Not App.	898	919	51	
C)Time taken for refunds of deposits after closures.	100% within 60 days	MHG	100%	100%	100%	100%	100%	100%	Not App.	100%	100%	100%	

Not App.: Uninor have no post-paid customers, so data for parameters related to post-paid bills not applicable for them.





## KEY FINDINGS:

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

The performance of the service providers with respect to the parameter metering and billing credibility for both post-paid and pre-paid is well within the prescribed bench mark of  $\leq 0.1\%$ . UNINOR has no post-paid customers, so not provided the data for billing related parameters applicable for post-paid subscribers.

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

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

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

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

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

All service providers are in compliance with respect to the parameter accessibility of call center except **Aircel**. Performance of **Aircel (87.50%)** was way below the benchmark of  $\geq 95\%$ . Further, **Aircel, BSNL, RCOM (GSM) and RCOM (CDMA)** have not met the benchmark for the parameter “% calls answered by Operators (voice to voice) within 60 seconds”. They have achieved their performance as **71.87%, 72.64%, 79.85% and 75.70%** respectively, which is way below the benchmark of 90%.

### *4. Termination/Closure of Service*

In case of this parameter all service providers have settled 100% closure/termination within the benchmark of 7 days.

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

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

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





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

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

**TABLE: 1**

<b>CELLULAR MOBILE TELEPHONE SERVICES MAHARASHTRA &amp; GOA CIRCLE- JAN-14 MONTH</b>													
<u>Live measurement Data</u>		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	BSNL	IDEA	TATA GSM	RCOM GSM	UNINOR	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators								CDMA Operators	
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	<i>Live Data</i>	0.19%	0.00%	1.74%	0.34%	0.02%	0.31%	0.15%	0.16%	0.12%	0.03%
	b) Worst affected BTSs due to downtime	<=2%	<i>Live Data</i>	0.16%	0.00%	0.04%	0.03%	0.00%	0.00%	0.00%	0.09%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	<i>Live Data</i>	99.55%	99.99%	95.65%	98.89%	99.41%	99.60%	97.48%	99.32%	98.84%	98.07%
	b) SDCCH/PAGING Channel congestion	<=1%	<i>Live Data</i>	0.03%	0.00%	0.65%	0.46%	0.05%	0.03%	0.38%	0.22%	0.00%	0.00%
	c) TCH congestion	<=2%	<i>Live Data</i>	0.06%	0.00%	1.85%	0.64%	0.07%	0.04%	1.44%	0.68%	0.01%	0.50%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	<i>Live Data</i>	0.69%	0.30%	1.79%	1.01%	0.69%	0.34%	0.41%	0.70%	0.15%	1.04%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	<i>Live Data</i>	2.95%	0.00%	2.86%	1.85%	2.89%	0.01%	1.25%	2.83%	0.73%	<b>4.95%</b>
	c) Connections with good voice quality	>=95%	<i>Live Data</i>	97.27%	99.97%	95.66%	97.57%	98.15%	98.86%	97.49%	97.38%	99.80%	NP
4	No. of POI having >=0.5% congestion	<0.5%	<i>Live Data</i>	0	0	0	0	0	0	0	0	0	0

NP-Data not provided: Tata CDMA has not provided data for the parameter "Connections with good voice quality "because OMCR does not support this parameter.



**TABLE: 2**

<b>CELLULAR MOBILE TELEPHONE SERVICES MAHARASHTRA &amp; GOA CIRCLE- FEB-14 MONTH</b>													
<u>Live measurement Data</u>		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	BSNL	IDEA	TATA GSM	RCOM GSM	UNINOR	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators									CDMA Operators
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	Live data	0.07%	0.01%	1.36%	0.37%	0.03%	0.35%	0.19%	0.18%	0.15%	0.03%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.06%	0.05%	0.00%	0.00%	0.00%	0.12%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	99.67%	99.88%	95.18%	98.73%	99.33%	99.61%	96.86%	99.27%	98.93%	97.93%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.01%	0.03%	0.74%	0.75%	0.07%	0.10%	0.47%	0.21%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.09%	0.06%	1.92%	0.77%	0.11%	0.04%	2.36%	0.73%	0.00%	0.78%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.68%	0.42%	1.73%	0.96%	0.68%	0.20%	0.44%	0.66%	0.15%	0.94%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	<b>4.98%</b>	0.25%	2.83%	1.69%	<b>3.29%</b>	0.00%	1.62%	2.85%	0.64%	<b>4.71%</b>
	c) Connections with good voice quality	>=95%	Live data	97.33%	98.97%	95.89%	97.59%	98.10%	98.84%	97.59%	97.59%	99.80%	NP
4	No. of POI having >=0.5% congestion	<0.5%	Live data	0	0	0	0	0	0	0	0	0	0

• NP-Not Provided



**TABLE: 3**

<b>CELLULAR MOBILE TELEPHONE SERVICES MAHARASHTRA &amp; GOA CIRCLE- MAR-14 MONTH</b>													
<u>Live measurement Data</u>		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	BSNL	IDEA	TATA GSM	RCOM GSM	UNINOR	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators							CDMA Operators		
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	Live data	0.03%	0.01%	1.57%	0.44%	0.04%	0.22%	0.15%	0.38%	0.15%	0.05%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.09%	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	99.46%	99.89%	95.40%	98.54%	99.45%	99.60%	97.16%	99.19%	98.82%	96.93%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.02%	0.03%	0.72%	0.74%	0.09%	0.03%	0.60%	0.43%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.23%	0.06%	1.80%	0.92%	0.13%	0.05%	<b>2.05%</b>	0.81%	0.01%	1.83%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.73%	0.41%	1.81%	1.01%	0.70%	0.33%	0.70%	0.71%	0.13%	0.96%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	2.90%	0.26%	2.76%	1.88%	<b>3.33%</b>	0.00%	2.92%	2.84%	0.59%	<b>5.43%</b>
	c) Connections with good voice quality	>=95%	Live data	97.23%	99.00%	95.66%	97.51%	98.02%	98.83%	97.40%	97.49%	99.80%	NP
4	No. of POI having >=0.5% congestion	<0.5%	Live data	0	0	0	0	0	0	0	0	0	0

• NP-Not Provided



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

**TABLE: 4**

<b>QUARTERLY QOS PERFORMANCE OF 3-DAYS LIVE MEASUREMENT (AVERAGE OF QE-MARCH-14) – MH&amp;G CIRCLE</b>													
<u>Live measurement Data</u>		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	BSNL	IDEA	TATA GSM	RCOM GSM	UNINOR	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators									CDMA Operators
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	Quarterly	0.10%	0.01%	1.56%	0.38%	0.03%	0.29%	0.16%	0.24%	0.14%	0.04%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.05%	0.00%	0.06%	0.04%	0.00%	0.00%	0.00%	0.07%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	99.56%	99.92%	95.41%	98.72%	99.40%	99.60%	97.17%	99.26%	98.86%	97.64%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.02%	0.02%	0.70%	0.65%	0.07%	0.05%	0.48%	0.29%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	0.13%	0.04%	1.86%	0.78%	0.10%	0.04%	1.95%	0.74%	0.01%	1.04%
<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	0.70%	0.38%	1.78%	0.99%	0.69%	0.29%	0.52%	0.69%	0.14%	0.98%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	3.61%	0.17%	2.82%	1.81%	3.17%	0.00%	1.93%	2.84%	0.65%	5.03%
	c) Connections with good voice quality	>=95%	Quarterly	97.28%	99.31%	95.74%	97.56%	98.09%	98.84%	97.49%	97.49%	99.80%	NP
4	No. of POI having >=0.5% congestion	<0.5%	Quarterly	0	0	0	0	0	0	0	0	0	0

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

From three days live measurement assessment, it was revealed that the operators were largely meeting the benchmarks except for the parameter **“Worst affected cells> 3 % TCH drops”**. The benchmark for this parameter was not met by **Aircel, Tata (GSM) and Tata (CDMA)** with their average performance as 3.61%, 3.17% and 5.03% respectively.



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

CSD 3 days live data for Cellular Mobile Telephone Services-QE-March-14													
3 days live CSD Audit Data		Bench- mark	Circle Name	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	UNINOR	VODAFONE	RCOM CDMA	TATA CDMA
S/ N	Name of Parameter			GSM Operators							CDMA Operators		
Response time to customers for assistance													
1	A) Accessibility of call centre/Customer Care	>=95%	MHG	94.50%	100%	100%	100%	98.94%	98.75%	96.33%	98.47%	99.05%	98.09%
	B) % call answered by operators(voice to voice) within 60 sec.	>=90%	MHG	90.98%	99.24%	63.06%	100%	77.01%	98.45%	95.47%	95.40%	91.61%	99.13%

**CUSTOMER CARE / HELPLINE ASSESSMENT**

LIVE CALLING TO CALL CENTRE											
	Circle Name	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	UNINOR	VODAFONE	RCOM CDMA	TATA CDMA
<b>Total No. of calls Attempted</b>	MHG	100	100	100	100	100	100	100	100	100	100
<b>Total No. of calls connected to IVR</b>	MHG	100	100	100	100	100	100	100	100	100	100
<b>Calls got connected to agent within 60 Sec</b>	MHG	100	100	92	100	100	100	100	93	100	100
<b>%age of calls got answered</b>	MHG	100.00%	100.00%	92.00%	100.00%	100.00%	100.00%	100.00%	93.00%	100.00%	100.00%

**KEY FINDINGS:** The results for three days live measurements reveal that all operators have met the benchmarks for the parameters 'Accessibility to call center' except **Aircel**. The performance of **Aircel** for this parameter was **94.50%**.

With regard to the parameter 'Calls connection to operators (Voice to voice) within 60 seconds', performance of **RCOM (GSM)** and **BSNL** was **77.01 %** and **63.06%** respectively, way below the benchmark of >=90%.

In case of calls answered by operators (voice to voice) within 60 seconds when test calls were made to the call centers, **BSNL** and **Vodafone** could connect 92% and 93% of calls to the operator within 60 Seconds.

## **INTER OPERATOR CALLS ASSESSMENT**







**INTER OPERATOR CALLS ASSESSMENT**

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

<b>INTER OPERATOR CALL ASSESSMENT BASED ON LIVE MEASUREMENT</b>											
<b>Calling Operators</b>	<b>Circle Name</b>	<b>AIRCEL</b>	<b>AIRTEL</b>	<b>BSNL</b>	<b>IDEA</b>	<b>RCOM GSM</b>	<b>TATA GSM</b>	<b>VODAFONE</b>	<b>UNINOR</b>	<b>RCOM CDMA</b>	<b>TATA CDMA</b>
<b>AIRCEL</b>	<b>MHG</b>	--	100%	100%	100%	100%	100%	100%	100%	100%	100%
<b>AIRTEL</b>	<b>MHG</b>	100%	--	100%	100%	100%	100%	100%	100%	100%	100%
<b>BSNL</b>	<b>MHG</b>	100%	100%	--	100%	100%	100%	100%	100%	100%	100%
<b>IDEA</b>	<b>MHG</b>	100%	100%	100%	--	100%	100%	100%	100%	100%	100%
<b>RCOM GSM</b>	<b>MHG</b>	100%	100%	100%	100%	--	100%	100%	100%	100%	100%
<b>TATA GSM</b>	<b>MHG</b>	100%	100%	100%	100%	100%	--	100%	100%	100%	100%
<b>VODAFONE</b>	<b>MHG</b>	100%	100%	100%	100%	100%	100%	--	100%	100%	100%
<b>UNINOR</b>	<b>MHG</b>	100%	100%	100%	100%	100%	100%	100%	--	100%	100%
<b>RCOM CDMA</b>	<b>MHG</b>	100%	100%	100%	100%	100%	100%	100%	100%	--	100%
<b>TATA CDMA</b>	<b>MHG</b>	100%	100%	100%	100%	100%	100%	100%	100%	100%	--

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

**LEVEL-1 LIVE CALLING**





**LEVEL-1 LIVE CALLING**

LEVEL 1 LIVE CALLING												
Emergency no.	Circle Name	SDCA Name	No. of calls made	AIRCEL	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	VODAFONE	RCOM (CDMA)	TATA (CDMA)
100, 101, 102, 1091	MH & G	RATNAGIRI, Murugwada, Lanja, Chiplun, Khed, Guhagar, Dapoli	50	NS	50	50	50	50	50	50	50	50
100, 101, 102, 1091	MH & G	SANGLI, Miraj, Tasgaon, Kawathe Mahakal, Jath, Atpadi, Vita, Khanapur, Islampur, Shirala	50	50	50	50	50	50	50	50	50	50
100, 101, 102, 1091	MH & G	KOLHAPUR, Hatkangle, Jaisingpur, Radhanagari, Panhala, Murgud, Gargoti, Ajra, Chandgad	50	50	50	50	50	50	50	50	50	50

To assess the availability and efficiency of level 1 services such as police, fire, ambulance (emergency services) offered by various mobile service providers, the calls were made from mobile phones provided by the service providers. In these SDCAs of MH&G service areas, the emergency services as mentioned in the above table were found functional in the networks of all the service providers.

## 5. DRIVE TEST





## 5. DRIVE TEST

In terms of TRAI's letter dated 21<sup>st</sup> January, 2014, the drive tests were conducted for three consecutive days in one select SSA each month in each service area. Thus, the drive tests were carried out in three SSA's namely **Ratnagiri, Sangli and Kolhapur** in the months of January, February and March 2014 respectively, covering minimum 300 Km distance in each SSA . The performance of the operators has been highlighted below in the tables. The drive test was conducted simultaneously for all the operators following the same route of drive tests. The holding period for all test calls was 120 seconds. The drive test vehicle across all routes plied at a speed of about 30-50 km per hour.

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

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### DRIVE TEST TABLE: 1

#### OPERATOR-ASSISTED DRIVE TEST AT RATNAGIRI SSA IN JAN-14 MONTH- MH&G CIRCLE

S/N	Parameter	SSA Name: Ratnagiri	Drive Test Period	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	UNINOR	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
1	Call Attempts	Day-1	Jan-14	NS	156	148	153	74	145	110	155	75	145
		Day-2	Jan-14	NS	173	138	124	87	123	86	109	81	122
		Day-3	Jan-14	NS	98	110	94	60	103	74	83	69	96
		<b>Over all SSA Result</b>	<b>Total</b>	<b>NS</b>	<b>427</b>	<b>396</b>	<b>371</b>	<b>221</b>	<b>371</b>	<b>270</b>	<b>347</b>	<b>225</b>	<b>363</b>
2	Blocked Call Rate	Day-1	Jan-14	NS	0.00%	2.02%	0.00%	1.35%	2.07%	1.82%	0.00%	0.00%	0.00%
		Day-2	Jan-14	NS	0.00%	2.17%	0.00%	3.45%	1.63%	1.16%	0.00%	1.23%	0.00%
		Day-3	Jan-14	NS	0.00%	1.81%	0.00%	0.00%	0.00%	0.00%	1.20%	0.00%	0.00%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>NS</b>	<b>0.00%</b>	<b>2.02%</b>	<b>0.00%</b>	<b>1.81%</b>	<b>1.08%</b>	<b>1.11%</b>	<b>0.29%</b>	<b>0.44%</b>	<b>0.00%</b>
3	Dropped Call Rate (<=2%)	Day-1	Jan-14	NS	0.00%	2.06%	0.00%	2.74%	1.38%	0.00%	0.00%	0.00%	0.00%
		Day-2	Jan-14	NS	0.00%	1.48%	0.81%	2.47%	0.83%	0.00%	0.00%	0.00%	0.00%
		Day-3	Jan-14	NS	0.00%	0.92%	0.00%	1.67%	0.00%	1.35%	0.00%	0.00%	0.00%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>NS</b>	<b>0.00%</b>	<b>1.55%</b>	<b>0.27%</b>	<b>2.34%</b>	<b>1.09%</b>	<b>0.38%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>
<b>PERCENTAGE CONNECTIONS WITH GOOD VOICE QUALITY (=&gt;95%)</b>													
4	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Day-1	Jan-14	NS	NA	NA	NA	NA	NA	NA	NA	99.90%	95.06%
		Day-2	Jan-14	NS	NA	NA	NA	NA	NA	NA	NA	100.00%	95.37%
		Day-3	Jan-14	NS	NA	NA	NA	NA	NA	NA	NA	99.77%	95.17%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>NS</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>99.94%</b>	<b>95.18%</b>
	(b) 0-5 ( with frequency hopping for GSM Operators)	Day-1	Jan-14	NS	98.18%	95.90%	97.46%	97.77%	95.57%	94.03%	95.27%	NA	NA
		Day-2	Jan-14	NS	98.10%	95.41%	97.55%	98.55%	95.66%	97.20%	95.62%	NA	NA
		Day-3	Jan-14	NS	99.14%	94.93%	99.30%	98.59%	98.04%	96.82%	95.59%	NA	NA
		<b>Over all SSA Result</b>	<b>Total</b>	<b>NS</b>	<b>98.44%</b>	<b>95.90%</b>	<b>97.96%</b>	<b>98.26%</b>	<b>96.20%</b>	<b>95.84%</b>	<b>95.47%</b>	<b>NA</b>	<b>NA</b>
<b>SERVICE COVERAGE</b>													
5	In door (>= -75dBm)	Day-1	Jan-14	NS	96.29%	75.10%	79.40%	77.09%	97.12%	25.53%	72.40%	99.79%	96.77%
		Day-2	Jan-14	NS	99.13%	63.10%	66.71%	70.71%	95.63%	23.83%	63.27%	91.20%	94.83%
		Day-3	Jan-14	NS	88.00%	57.39%	59.94%	70.70%	84.51%	28.14%	73.71%	90.27%	90.98%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>NS</b>	<b>94.84%</b>	<b>65.98%</b>	<b>70.21%</b>	<b>73.18%</b>	<b>93.37%</b>	<b>25.73%</b>	<b>69.35%</b>	<b>98.38%</b>	<b>94.61%</b>
	In-vehicle (>= -85dBm)	Day-1	Jan-14	NS	99.52%	97.76%	96.54%	88.09%	99.93%	83.46%	92.57%	99.96%	99.98%
		Day-2	Jan-14	NS	99.98%	98.29%	92.66%	86.11%	99.96%	89.16%	90.27%	96.97%	99.49%
		Day-3	Jan-14	NS	100.00%	95.72%	88.01%	86.65%	94.06%	87.86%	93.56%	96.14%	97.95%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>NS</b>	<b>98.88%</b>	<b>97.36%</b>	<b>93.07%</b>	<b>87.01%</b>	<b>98.43%</b>	<b>85.96%</b>	<b>91.95%</b>	<b>99.44%</b>	<b>99.29%</b>
	Outdoor- in city (>= -95dBm)	Day-1	Jan-14	NS	99.97%	100.00%	99.62%	96.35%	100.00%	99.26%	99.57%	99.99%	100.00%
		Day-2	Jan-14	NS	100.00%	100.00%	99.61%	96.49%	100.00%	98.81%	99.22%	99.61%	100.00%

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		Day-3	Jan-14	NS	99.89%	100.00%	99.24%	96.24%	99.41%	97.65%	99.70%	99.75%	100.00%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>NS</b>	<b>99.95%</b>	<b>100.00%</b>	<b>99.51%</b>	<b>96.38%</b>	<b>99.85%</b>	<b>98.75%</b>	<b>99.47%</b>	<b>99.94%</b>	<b>100.00%</b>
6	Call Setup Success Rate (>=95%)	Day-1	Jan-14	NS	100.00%	97.97%	100.00%	98.65%	98.62%	98.18%	100.00%	100.00%	100.00%
		Day-2	Jan-14	NS	100.00%	97.82%	100.00%	93.10%	98.37%	98.83%	100.00%	98.77%	100.00%
		Day-3	Jan-14	NS	98.97%	98.18%	98.93%	100.00%	100.00%	98.64%	98.80%	100.00%	100.00%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>NS</b>	<b>99.77%</b>	<b>97.97%</b>	<b>99.73%</b>	<b>96.83%</b>	<b>98.92%</b>	<b>98.52%</b>	<b>99.71%</b>	<b>99.55%</b>	<b>100.00%</b>
7	Hand Over Success Rate (HOSR)	Day-1	Jan-14	NS	100.00%	98.86%	100.00%	99.38%	97.44%	98.68%	100.00%	NP	100.00%
		Day-2	Jan-14	NS	100.00%	96.79%	100.00%	97.20%	97.85%	100.00%	97.01%	NP	100.00%
		Day-3	Jan-14	NS	97.56%	96.31%	100.00%	100.00%	100.00%	96.15%	100.00%	NP	100.00%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>NS</b>	<b>99.74%</b>	<b>97.47%</b>	<b>100.00%</b>	<b>98.55%</b>	<b>98.26%</b>	<b>98.58%</b>	<b>99.06%</b>	<b>NP</b>	<b>100.00%</b>

- NS-No Service
- NA-Not Applicable

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**DRIVE TEST TABLE: 2**

**OPERATOR-ASSISTED DRIVE TEST AT RATNAGIRI SSA IN JAN-14 MONTH- MH&G CIRCLE - INDOOR**

S/N	Parameter	Ratnagiri SSA	Drive Test Period	Indoor Location	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	UNINOR	VODAFONE	RCOM CDMA	TATA CDMA	
					GSM Operators							CDMA Operators			
1	Call Attempts	Day-1	Jan-14	Maruti Mandir Chowk, Ratnagiri	NS	24	25	25	15	26	25	26	15	26	
		Day-2	Jan-14	BSNL Exchange, Chiplun	NS	26	25	25	21	26	25	25	25	26	
		Day-3	Jan-14	Near BSNL Exchange, Dapoli	NS	26	25	25	25	31	25	25	27	32	
		<b>Over all SSA</b>	<b>Total</b>		<b>NS</b>	<b>76</b>	<b>75</b>	<b>75</b>	<b>61</b>	<b>83</b>	<b>75</b>	<b>76</b>	<b>67</b>	<b>84</b>	
2	Blocked Call Rate	Day-1	Jan-14	Maruti Mandir Chowk, Ratnagiri	NS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Day-2	Jan-14	BSNL Exchange, Chiplun	NS	0.00%	0.00%	0.00%	0.00%	<b>3.85%</b>	0.00%	0.00%	<b>4.00%</b>	0.00%	
		Day-3	Jan-14	Near BSNL Exchange, Dapoli	NS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		<b>Over all SSA</b>	<b>Total</b>		<b>NS</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>1.20%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>1.49%</b>	<b>0.00%</b>	
3	Dropped Call Rate (<=2%)	Day-1	Jan-14	Maruti Mandir Chowk, Ratnagiri	NS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Day-2	Jan-14	BSNL Exchange, Chiplun	NS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Day-3	Jan-14	Near BSNL Exchange, Dapoli	NS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		<b>Over all SSA</b>	<b>Total</b>		<b>NS</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	
4	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Percentage connections with good voice quality (=>95%)													
		Day-1	Jan-14	Maruti Mandir Chowk, Ratnagiri	NS	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	100.00%	100.00%
		Day-2	Jan-14	BSNL Exchange, Chiplun	NS	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	100.00%	100.00%
		Day-3	Jan-14	Near BSNL Exchange, Dapoli	NS	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	100.00%	100.00%



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	Over all SSA	Total		NS	N/A	N/A	N/A	N/A	N/A	N/A	N/A	100.00%	100.00%	
<b>(b) 0-5 ( with frequency hopping for GSM Operators)</b>	Day-1	Jan-14	Maruti Mandir Chowk, Ratnagiri	NS	95.39%	96.45%	97.89%	98.97%	97.30%	97.18%	95.82%	N/A	N/A	
	Day-2	Jan-14	BSNL Exchange, Chiplun	NS	99.27%	96.38%	99.72%	99.52%	97.26%	98.31%	99.43%	N/A	N/A	
	Day-3	Jan-14	Near BSNL Exchange, Dapoli	NS	97.67%	<b>94.38%</b>	99.30%	99.61%	99.68%	99.37%	95.90%	N/A	N/A	
	<b>Over all SSA</b>	<b>Total</b>		<b>NS</b>	<b>97.45%</b>	<b>95.42%</b>	<b>98.98%</b>	<b>99.43%</b>	<b>98.20%</b>	<b>98.29%</b>	<b>95.63%</b>	<b>N/A</b>	<b>N/A</b>	
<b>5</b>	<b>In door (&gt;= - 75dBm)</b>	Day-1	Jan-14	Maruti Mandir Chowk, Ratnagiri	NS	99.86%	96.78%	99.50%	96.27%	100.00%	3.58%	97.85%	100.00%	100.00%
		Day-2	Jan-14	BSNL Exchange, Chiplun	NS	100.00%	45.15%	100.00%	86.32%	90.24%	3.58%	69.30%	100.00%	100.00%
		Day-3	Jan-14	Near BSNL Exchange, Dapoli	NS	99.74%	65.46%	98.81%	92.66%	100.00%	12.60%	94.77%	100.00%	100.00%
		<b>Over all SSA</b>	<b>Total</b>		<b>NS</b>	<b>99.86%</b>	<b>69.13%</b>	<b>99.44%</b>	<b>91.75%</b>	<b>96.75%</b>	<b>6.59%</b>	<b>87.31%</b>	<b>100.00%</b>	<b>100.00%</b>
	<b>In-vehicle (&gt;= - 85dBm)</b>	Day-1	Jan-14	Maruti Mandir Chowk, Ratnagiri	NS	100.00%	99.89%	100.00%	99.96%	100.00%	83.97%	99.94%	100.00%	100.00%
		Day-2	Jan-14	BSNL Exchange, Chiplun	NS	100.00%	99.80%	100.00%	99.81%	100.00%	89.72%	94.81%	100.00%	100.00%
		Day-3	Jan-14	Near BSNL Exchange, Dapoli	NS	100.00%	99.88%	100.00%	99.74%	100.00%	90.09%	99.50%	100.00%	100.00%
		<b>Over all SSA</b>	<b>Total</b>		<b>NS</b>	<b>100.00%</b>	<b>99.58%</b>	<b>100.00%</b>	<b>99.84%</b>	<b>100.00%</b>	<b>87.93%</b>	<b>98.08%</b>	<b>100.00%</b>	<b>100.00%</b>
	<b>Outdoor-in city (&gt;= - 95dBm)</b>	Day-1	Jan-14	Maruti Mandir Chowk, Ratnagiri	NS	100.00%	100.00%	100.00%	100.00%	100.00%	99.89%	100.00%	100.00%	100.00%
		Day-2	Jan-14	BSNL Exchange, Chiplun	NS	100.00%	100.00%	100.00%	100.00%	100.00%	99.50%	99.91%	100.00%	100.00%
		Day-3	Jan-14	Near BSNL Exchange, Dapoli	NS	100.00%	100.00%	100.00%	99.95%	100.00%	99.81%	100.00%	100.00%	100.00%
		<b>Over all SSA</b>	<b>Total</b>		<b>NS</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>99.98%</b>	<b>100.00%</b>	<b>99.73%</b>	<b>99.97%</b>	<b>100.00%</b>	<b>100.00%</b>
<b>6</b>	<b>Call Setup Success Rate (&gt;=95%)</b>	Day-1	Jan-14	Maruti Mandir Chowk, Ratnagiri	NS	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	
		Day-2	Jan-14	BSNL Exchange, Chiplun	NS	100.00%	100.00%	100.00%	100.00%	96.15%	100.00%	100.00%	96.00%	100.00%
		Day-3	Jan-14	Near BSNL Exchange, Dapoli	NS	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

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		Over all SSA	Total		NS	100.00%	100.00%	99.73%	100.00%	98.80%	100.00%	100.00%	98.50%	100.00%
7	Hand Over Success Rate (HOSR)	Day-1	Jan-14	Maruti Mandir Chowk, Ratnagiri	NS	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
		Day-2	Jan-14	BSNL Exchange, Chiplun	NS	100.00%	97.62%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
		Day-3	Jan-14	Near BSNL Exchange, Dapoli	NS	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
		Over all SSA	Total		NS	100.00%	98.65%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

# AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MAHARASHTRA & GOA CIRCLE



## DRIVE TEST TABLE: 3

OPERATOR-ASSISTED DRIVE TEST AT SANGLI SSA IN FEB-14 MONTH- MH&G CIRCLE													
S/N	Parameter	SSA Name: Sangali	Drive Test Period	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	UNINOR	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
1	Call Attempts	Day-1	Feb-14	123	135	130	127	132	151	105	173	130	137
		Day-2	Feb-14	122	156	147	139	143	135	127	151	147	149
		Day-3	Feb-14	271	276	250	262	292	409	228	303	294	266
		<b>Over all SSA Result</b>	<b>Total</b>	<b>516</b>	<b>567</b>	<b>527</b>	<b>528</b>	<b>567</b>	<b>695</b>	<b>460</b>	<b>627</b>	<b>571</b>	<b>552</b>
2	Blocked Call Rate	Day-1	Feb-14	0.00%	0.00%	4.62%	0.00%	1.52%	1.99%	0.95%	1.16%	0.00%	0.00%
		Day-2	Feb-14	0.00%	0.00%	3.40%	0.00%	1.40%	0.74%	0.00%	0.66%	0.00%	0.00%
		Day-3	Feb-14	0.00%	0.00%	4.00%	0.00%	6.16%	1.96%	0.88%	0.00%	4.76%	0.00%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>0.00%</b>	<b>0.00%</b>	<b>3.98%</b>	<b>0.00%</b>	<b>3.88%</b>	<b>1.73%</b>	<b>0.65%</b>	<b>0.48%</b>	<b>2.45%</b>	<b>0.00%</b>
3	Dropped Call Rate (<=2%)	Day-1	Feb-14	0.81%	0.00%	4.84%	0.79%	0.00%	1.40%	0.00%	0.00%	0.00%	0.00%
		Day-2	Feb-14	1.64%	0.00%	0.70%	0.00%	0.00%	0.00%	0.00%	0.00%	1.36%	0.00%
		Day-3	Feb-14	0.00%	0.00%	0.00%	0.76%	0.00%	1.75%	0.89%	0.33%	1.07%	0.00%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>0.58%</b>	<b>0.00%</b>	<b>1.38%</b>	<b>0.57%</b>	<b>0.00%</b>	<b>1.33%</b>	<b>0.44%</b>	<b>0.16%</b>	<b>0.90%</b>	<b>0.00%</b>
<b>PERCENTAGE CONNECTIONS WITH GOOD VOICE QUALITY (=&gt;95%)</b>													
4	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Day-1	Feb-14	NA	NA	NA	NA	NA	NA	NA	NA	99.35%	98.49%
		Day-2	Feb-14	NA	NA	NA	NA	NA	NA	NA	NA	99.14%	97.69%
		Day-3	Feb-14	NA	NA	NA	NA	NA	NA	NA	NA	97.33%	95.05%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>98.33%</b>	<b>96.61%</b>
	(b) 0-5 ( with frequency hopping for GSM Operators)	Day-1	Feb-14	97.64%	98.42%	92.77%	96.96%	96.03%	99.98%	95.42%	96.87%	NA	NA
		Day-2	Feb-14	96.50%	98.53%	93.30%	98.97%	98.05%	100.00%	95.43%	98.48%	NA	NA
		Day-3	Feb-14	95.42%	96.43%	86.98%	97.59%	90.19%	100.00%	89.02%	96.87%	NA	NA
		<b>Over all SSA Result</b>	<b>Total</b>	<b>96.27%</b>	<b>97.47%</b>	<b>90.37%</b>	<b>97.80%</b>	<b>93.53%</b>	<b>99.99%</b>	<b>92.33%</b>	<b>97.24%</b>	<b>NA</b>	<b>NA</b>
<b>SERVICE COVERAGE</b>													
5	In door (>= -75dBm)	Day-1	Feb-14	39.96%	60.18%	78.18%	77.97%	34.47%	69.24%	86.83%	81.72%	80.47%	100.00%
		Day-2	Feb-14	59.95%	66.03%	74.74%	69.24%	39.64%	63.76%	79.23%	83.81%	73.78%	100.00%
		Day-3	Feb-14	43.68%	70.61%	76.20%	91.00%	38.87%	72.90%	87.05%	93.25%	84.93%	100.00%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>46.50%</b>	<b>66.91%</b>	<b>76.31%</b>	<b>82.28%</b>	<b>38.13%</b>	<b>70.44%</b>	<b>84.90%</b>	<b>87.88%</b>	<b>81.14%</b>	<b>100.00%</b>
	In-vehicle (>= -85dBm)	Day-1	Feb-14	63.47%	91.07%	98.96%	95.66%	70.22%	93.85%	97.79%	98.60%	89.87%	100.00%
		Day-2	Feb-14	79.20%	87.46%	98.36%	92.32%	69.26%	86.52%	96.27%	97.45%	85.18%	100.00%
		Day-3	Feb-14	79.82%	95.73%	99.34%	99.75%	75.78%	93.50%	99.65%	99.09%	86.80%	100.00%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>76.30%</b>	<b>92.38%</b>	<b>98.98%</b>	<b>96.85%</b>	<b>72.83%</b>	<b>92.26%</b>	<b>98.31%</b>	<b>98.57%</b>	<b>87.00%</b>	<b>100.00%</b>
Outdoor- in city (>= -95dBm)	Day-1	Feb-14	82.64%	99.32%	100.00%	99.74%	93.83%	98.93%	99.74%	99.61%	95.38%	100.00%	
	Day-2	Feb-14	95.71%	98.49%	100.00%	99.06%	90.91%	97.41%	99.81%	99.52%	91.70%	100.00%	

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		Day-3	Feb-14	99.30%	99.76%	100.00%	99.97%	96.14%	98.43%	100.00%	99.73%	89.29%	100.00%	
		<b>Over all SSA Result</b>	<b>Total</b>	<b>94.97%</b>	<b>99.31%</b>	<b>100.00%</b>	<b>99.68%</b>	<b>94.24%</b>	<b>98.33%</b>	<b>99.89%</b>	<b>99.64%</b>	<b>91.13%</b>	<b>100.00%</b>	
6	Call Setup Success Rate (>=95%)	Day-1	Feb-14	100.00%	100.00%	95.38%	100.00%	98.48%	95.36%	98.09%	98.84%	100.00%	100.00%	
		Day-2	Feb-14	100.00%	100.00%	96.60%	100.00%	98.60%	99.25%	97.63%	99.34%	100.00%	100.00%	
		Day-3	Feb-14	100.00%	100.00%	96.00%	100.00%	93.84%	98.04%	97.80%	100.00%	95.23%	100.00%	
		<b>Over all SSA Result</b>	<b>Total</b>	<b>100.00%</b>	<b>100.00%</b>	<b>96.01%</b>	<b>100.00%</b>	<b>96.11%</b>	<b>97.70%</b>	<b>97.83%</b>	<b>99.52%</b>	<b>97.54%</b>	<b>100.00%</b>	
7	Hand Over Success Rate (HOSR)	Day-1	Feb-14	97.81%	100.00%	94.41%	98.60%	100.00%	100.00%	100.00%	100.00%	NP	100.00%	
		Day-2	Feb-14	99.40%	100.00%	99.37%	100.00%	98.70%	100.00%	100.00%	100.00%	100.00%	NP	100.00%
		Day-3	Feb-14	100.00%	100.00%	99.25%	100.00%	99.47%	99.80%	97.39%	100.00%	100.00%	NP	100.00%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>99.21%</b>	<b>100.00%</b>	<b>96.46%</b>	<b>99.70%</b>	<b>99.40%</b>	<b>99.86%</b>	<b>99.98%</b>	<b>100.00%</b>	<b>NP</b>	<b>100.00%</b>	

- NS-No Service
- NP-Data Not Provided

**AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MAHARASHTRA & GOA CIRCLE**



**DRIVE TEST TABLE: 4**

**OPERATOR-ASSISTED DRIVE TEST AT SANGLI SSA IN FEB-14 MONTH- MH&G CIRCLE - INDOOR**

S/N	Parameter	Sangli SSA	Drive Test Period	Indoor Location	AIRCEL	AIRTEL	BSNL	IDEA	RCOM SSM	TATA GSM	UNINOR	VODAFONE	RCOM CDMA	TATA CDMA	
					GSM Operators								CDMA Operators		
1	Call Attempts	Day-1	Feb-14	Hotel Sanskruti	25	25	29	26	15	25	25	31	24	25	
		Day-2	Feb-14	Parvati Complex	25	26	25	26	28	25	25	28	28	25	
		Day-3	Feb-14	Sai Hospital Complex	25	28	27	25	25	25	25	25	25	25	
		<b>Over all SSA</b>	<b>Total</b>		<b>75</b>	<b>79</b>	<b>81</b>	<b>77</b>	<b>68</b>	<b>75</b>	<b>75</b>	<b>84</b>	<b>77</b>	<b>75</b>	
2	Blocked Call Rate	Day-1	Feb-14	Hotel Sanskruti	0.00%	0.00%	6.90%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Day-2	Feb-14	Parvati Complex	0.00%	0.00%	4.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Day-3	Feb-14	Sai Hospital Complex	0.00%	0.00%	3.70%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		<b>Over all SSA</b>	<b>Total</b>		<b>0.00%</b>	<b>0.00%</b>	<b>6.17%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	
3	Dropped Call Rate (<=2%)	Day-1	Feb-14	Hotel Sanskruti	0.00%	0.00%	11.11%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Day-2	Feb-14	Parvati Complex	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Day-3	Feb-14	Sai Hospital Complex	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		<b>Over all SSA</b>	<b>Total</b>		<b>0.00%</b>	<b>0.00%</b>	<b>3.95%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	
4	<b>Percentage connections with good voice quality (=&gt;95%)</b>														
	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Day-1	Feb-14	Hotel Sanskruti	NA	NA	NA	NA	NA	NA	NA	NA	NA	100.00%	99.74%
		Day-2	Feb-14	Parvati Complex	NA	NA	NA	NA	NA	NA	NA	NA	NA	100.00%	98.36%
		Day-3	Feb-14	Sai Hospital Complex	NA	NA	NA	NA	NA	NA	NA	NA	NA	100.00%	98.75%
		<b>Over all SSA</b>	<b>Total</b>		<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>100.00%</b>	<b>98.75%</b>
	(b) 0-5 (with frequency hopping for GSM Operators)	Day-1	Feb-14	Hotel Sanskruti	99.19%	99.61%	97.11%	94.14%	100.00%	97.30%	99.30%	96.10%	NA	NA	
		Day-2	Feb-14	Parvati Complex	96.46%	99.19%	93.70%	99.55%	100.00%	100.00%	98.74%	99.53%	NA	NA	
		Day-3	Feb-14	Sai Hospital Complex	97.87%	99.70%	85.08%	99.44%	100.00%	100.00%	99.42%	98.53%	NA	NA	
<b>Over all SSA</b>				<b>97.90%</b>	<b>99.50%</b>	<b>91.89%</b>	<b>97.80%</b>	<b>100.00%</b>	<b>99.58%</b>	<b>99.16%</b>	<b>97.99%</b>	<b>NA</b>	<b>NA</b>		
5	<b>Service Coverage</b>														
	In door (>= -	Day-1	Feb-14	Hotel Sanskruti	49.07%	93.00%	97.92%	100.00%	33.21%	86.44%	100.00%	98.78%	100.00%	100.00%	

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	75dBm)	Day-2	Feb-14	Parvati Complex	89.90%	100.00%	90.63%	98.43%	85.26%	74.10%	100.00%	94.38%	100.00%	100.00%
		Day-3	Feb-14	Sai Hospital Complex	47.41%	100.00%	73.93%	100.00%	62.64%	16.90%	52.07%	98.71%	100.00%	100.00%
		<b>Over all SSA</b>	<b>Total</b>		<b>65.60%</b>	<b>97.67%</b>	<b>87.49%</b>	<b>99.48%</b>	<b>60.37%</b>	<b>59.15%</b>	<b>84.02%</b>	<b>97.29%</b>	<b>100.00%</b>	<b>100.00%</b>
	In-vehicle (>= - 85dBm)	Day-1	Feb-14	Hotel Sanskruti	69.30%	100.00%	100.00%	100.00%	96.91%	99.47%	100.00%	99.93%	100.00%	100.00%
		Day-2	Feb-14	Parvati Complex	98.76%	100.00%	99.87%	98.80%	99.90%	96.54%	100.00%	99.95%	100.00%	100.00%
		Day-3	Feb-14	Sai Hospital Complex	52.59%	100.00%	99.91%	100.00%	97.62%	90.44%	99.04%	100.00%	100.00%	100.00%
		<b>Over all SSA</b>	<b>Total</b>		<b>91.42%</b>	<b>100.00%</b>	<b>99.93%</b>	<b>99.60%</b>	<b>98.14%</b>	<b>95.48%</b>	<b>99.68%</b>	<b>99.96%</b>	<b>100.00%</b>	<b>100.00%</b>
	Outdoor-in city (>= - 95dBm)	Day-1	Feb-14	Hotel Sanskruti	95.12%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
		Day-2	Feb-14	Parvati Complex	100.00%	100.00%	100.00%	99.08%	100.00%	100.00%	100.00%	100.00%	99.97%	100.00%
		Day-3	Feb-14	Sai Hospital Complex	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
		<b>Over all SSA</b>	<b>Total</b>		<b>99.19%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>99.69%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>99.99%</b>	<b>100.00%</b>
	6	Call Setup Success Rate (>=95%)	Day-1	Feb-14	Hotel Sanskruti	100.00%	100.00%	93.10%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Day-2			Feb-14	Parvati Complex	100.00%	100.00%	96.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	
Day-3			Feb-14	Sai Hospital Complex	100.00%	100.00%	96.30%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	
<b>Over all SSA</b>			<b>Total</b>		<b>100.00%</b>	<b>100.00%</b>	<b>95.38%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	
7	Hand Over Success Rate (HOSR)	Day-1	Feb-14	Hotel Sanskruti	100.00%	100.00%	89.74%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	
		Day-2	Feb-14	Parvati Complex	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	
		Day-3	Feb-14	Sai Hospital Complex	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	
		<b>Over all SSA</b>	<b>Total</b>		<b>100.00%</b>	<b>100.00%</b>	<b>96.58%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	

# AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MAHARASHTRA & GOA CIRCLE



## DRIVE TEST TABLE: 5

OPERATOR-ASSISTED DRIVE TEST AT KOLHAPUR SSA IN MARCH-14 MONTH- MH&G CIRCLE													
S/N	Parameter	SSA Name: Kolhapur	Drive Test Period	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	UNINOR	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
1	Call Attempts	Day-1	Mar-14	178	179	204	190	200	215	184	140	203	202
		Day-2	Mar-14	33	72	108	67	45	30	24	79	42	54
		Day-3	Mar-14	58	99	112	89	62	89	76	103	62	110
		<b>Over all SSA Result</b>	<b>Total</b>	<b>269</b>	<b>350</b>	<b>424</b>	<b>346</b>	<b>307</b>	<b>334</b>	<b>284</b>	<b>322</b>	<b>307</b>	<b>366</b>
2	Blocked Call Rate	Day-1	Mar-14	0.00%	0.00%	14.71%	1.58%	1.50%	2.33%	1.63%	1.43%	1.97%	0.00%
		Day-2	Mar-14	0.00%	0.00%	39.81%	0.00%	4.44%	0.00%	0.00%	1.27%	0.00%	0.00%
		Day-3	Mar-14	0.00%	0.00%	10.71%	0.00%	0.00%	1.12%	0.00%	0.97%	0.00%	0.00%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>0.00%</b>	<b>0.00%</b>	<b>20.05%</b>	<b>0.87%</b>	<b>1.63%</b>	<b>1.80%</b>	<b>1.06%</b>	<b>1.24%</b>	<b>1.30%</b>	<b>0.00%</b>
3	Dropped Call Rate (<=2%)	Day-1	Mar-14	1.69%	0.00%	1.79%	0.53%	1.62%	0.95%	0.56%	0.00%	1.01%	0.50%
		Day-2	Mar-14	18.18%	0.00%	9.23%	1.49%	0.00%	0.00%	0.00%	1.28%	0.00%	0.00%
		Day-3	Mar-14	1.72%	0.00%	1.00%	0.00%	0.00%	1.14%	0.00%	0.97%	0.00%	0.00%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>3.72%</b>	<b>0.00%</b>	<b>3.00%</b>	<b>0.58%</b>	<b>0.99%</b>	<b>0.91%</b>	<b>0.36%</b>	<b>0.63%</b>	<b>0.66%</b>	<b>0.27%</b>
<b>PERCENTAGE CONNECTIONS WITH GOOD VOICE QUALITY (=&gt;95%)</b>													
4	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Day-1	Mar-14	NA	NA	NA	NA	NA	NA	NA	NA	98.99%	95.01%
		Day-2	Mar-14	NA	NA	NA	NA	NA	NA	NA	NA	98.85%	95.73%
		Day-3	Mar-14	NA	NA	NA	NA	NA	NA	NA	NA	100.00%	95.21%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>99.17%</b>	<b>95.08%</b>
	(b) 0-5 ( with frequency hopping for GSM Operators)	Day-1	Mar-14	95.27%	96.06%	89.80%	96.15%	88.78%	96.83%	86.88%	95.83%	NA	NA
		Day-2	Mar-14	95.77%	98.14%	85.39%	97.32%	85.16%	99.16%	98.00%	96.85%	NA	NA
		Day-3	Mar-14	95.88%	99.45%	95.79%	98.67%	97.17%	99.07%	95.98%	95.89%	NA	NA
		<b>Over all SSA Result</b>	<b>Total</b>	<b>95.45%</b>	<b>97.42%</b>	<b>91.03%</b>	<b>97.02%</b>	<b>89.95%</b>	<b>97.59%</b>	<b>90.22%</b>	<b>96.04%</b>	<b>NA</b>	<b>NA</b>
<b>SERVICE COVERAGE</b>													
5	In door (>= -75dBm)	Day-1	Mar-14	64.00%	81.22%	38.17%	85.63%	81.16%	66.97%	92.45%	97.84%	94.29%	97.21%
		Day-2	Mar-14	24.60%	54.58%	25.84%	60.65%	40.12%	77.85%	79.47%	79.68%	59.00%	95.01%
		Day-3	Mar-14	75.78%	65.63%	31.47%	52.60%	70.02%	43.63%	74.96%	83.34%	73.49%	98.07%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>62.91%</b>	<b>71.07%</b>	<b>33.98%</b>	<b>72.37%</b>	<b>74.20%</b>	<b>57.89%</b>	<b>86.79%</b>	<b>89.68%</b>	<b>86.04%</b>	<b>97.14%</b>
	In-vehicle (>= -85dBm)	Day-1	Mar-14	91.84%	97.58%	92.27%	98.89%	97.10%	91.58%	98.05%	99.76%	98.03%	99.92%
		Day-2	Mar-14	65.72%	85.52%	72.32%	89.53%	65.25%	82.86%	93.32%	96.26%	78.54%	99.81%
		Day-3	Mar-14	76.14%	91.57%	89.72%	86.75%	79.26%	79.44%	91.80%	94.69%	94.96%	99.85%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>89.14%</b>	<b>93.27%</b>	<b>87.92%</b>	<b>93.98%</b>	<b>89.94%</b>	<b>86.12%</b>	<b>96.02%</b>	<b>97.53%</b>	<b>95.08%</b>	<b>99.88%</b>
Outdoor- in city (>= -95dBm)	Day-1	Mar-14	99.22%	99.90%	100.00%	99.87%	98.05%	98.21%	99.85%	99.88%	98.09%	100.00%	
	Day-2	Mar-14	82.06%	96.70%	100.00%	98.36%	84.18%	91.11%	99.65%	99.57%	95.55%	100.00%	

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		Day-3	Mar-14	90.75%	99.34%	100.00%	99.08%	92.36%	95.22%	99.77%	99.80%	99.96%	100.00%	
		<b>Over all SSA Result</b>	<b>Total</b>	<b>96.94%</b>	<b>99.05%</b>	<b>100.00%</b>	<b>99.37%</b>	<b>95.33%</b>	<b>96.59%</b>	<b>99.81%</b>	<b>99.79%</b>	<b>98.14%</b>	<b>100.00%</b>	
6	Call Setup Success Rate (>=95%)	Day-1	Mar-14	100.00%	100.00%	82.35%	98.95%	98.40%	95.35%	97.83%	98.57%	98.03%	99.50%	
		Day-2	Mar-14	100.00%	100.00%	60.19%	100.00%	93.94%	100.00%	100.00%	98.73%	100.00%	100.00%	
		Day-3	Mar-14	100.00%	100.00%	89.29%	100.00%	100.00%	98.88%	98.68%	99.03%	100.00%	100.00%	
		<b>Over all SSA Result</b>	<b>Total</b>	<b>100.00%</b>	<b>100.00%</b>	<b>78.54%</b>	<b>99.42%</b>	<b>98.37%</b>	<b>96.71%</b>	<b>98.42%</b>	<b>98.76%</b>	<b>98.70%</b>	<b>99.73%</b>	
7	Hand Over Success Rate (HOSR)	Day-1	Mar-14	99.56%	100.00%	99.61%	99.77%	98.60%	98.08%	97.73%	99.45%	NP	100.00%	
		Day-2	Mar-14	97.80%	100.00%	99.05%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NP	100.00%
		Day-3	Mar-14	100.00%	100.00%	99.86%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NP	100.00%
		<b>Over all SSA Result</b>	<b>Total</b>	<b>99.19%</b>	<b>100.00%</b>	<b>99.75%</b>	<b>99.82%</b>	<b>98.88%</b>	<b>98.45%</b>	<b>98.17%</b>	<b>99.57%</b>	<b>NP</b>	<b>100.00%</b>	

- NP-Data Not Provided
- NA-Not Applicable



**AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MAHARASHTRA & GOA CIRCLE**



**DRIVE TEST TABLE: 6**

**OPERATOR-ASSISTED DRIVE TEST AT KOLHAPUR SSA IN MARCH-14 MONTH- MH&G CIRCLE - INDOOR**

S/N	Parameter	Kolhapur SSA	Drive Test Period	Indoor Location	AIRCEL	AIRTEL	UNINOR	IDEA	RCOM GSM	TATA GSM	BSNL	VODAFONE	RCOM CDMA	TATA CDMA	
					GSM Operators								CDMA Operators		
1	Call Attempts	Day-1	Mar-14	D-Mart Building Kolhapur	10	10	10	10	12	10	11	11	12	6	
		Day-2	Mar-14	Pandurang Plaza ( Shahuwadi )	9	10	10	10	12	10	12	11	12	11	
		Day-3	Mar-14	J.D.sidheshwar math(Gadhinglaj)	10	11	10	10	11	10	17	10	11	11	
		Over All SSA	Total		29	31	30	30	35	30	40	32	35	28	
2	Blocked Call Rate (<=3%)	Day-1	Mar-14	D-Mart Building Kolhapur	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Day-2	Mar-14	Pandurang Plaza ( Shahuwadi )	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Day-3	Mar-14	J.D.sidheshwar math(Gadhinglaj)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	5.88%	0.00%	0.00%	0.00%	
		Over All SSA	Total		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.50%	0.00%	0.00%	0.00%	
3	Dropped Call Rate (<=2%)	Day-1	Mar-14	D-Mart Building Kolhapur	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Day-2	Mar-14	Pandurang Plaza ( Shahuwadi )	11.11%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Day-3	Mar-14	J.D.sidheshwar math(Gadhinglaj)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Over All SSA	Total		3.45%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
4	<b>Percentage connections with good voice quality (=&gt;95%)</b>														
	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Day-1	Mar-14	D-Mart Building Kolhapur	NA	NA	NA	NA	NA	NA	NA	NA	NA	100.00%	100.00%
		Day-2	Mar-14	Pandurang Plaza ( Shahuwadi )	NA	NA	NA	NA	NA	NA	NA	NA	NA	100.00%	100.00%
		Day-3	Mar-14	J.D.sidheshwar math(Gadhinglaj)	NA	NA	NA	NA	NA	NA	NA	NA	NA	100.00%	100.00%
		Over All SSA	Total		NA	NA	NA	NA	NA	NA	NA	NA	NA	100.00%	100.00%
	(b) 0-5 ( with frequency hopping for GSM Operators)	Day-1	Mar-14	D-Mart Building Kolhapur	95.57%	98.29%	90.29%	98.18%	97.21%	100.00%	97.01%	97.22%	NA	NA	
		Day-2	Mar-14	Pandurang Plaza ( Shahuwadi )	96.59%	99.80%	99.60%	99.50%	100.00%	100.00%	100.00%	98.93%	NA	NA	
		Day-3	Mar-14	J.D.sidheshwar math(Gadhinglaj)	97.43%	99.77%	97.23%	99.65%	100.00%	100.00%	99.29%	97.53%	NA	NA	
Over All SSA		Total		96.46%	99.28%	95.78%	99.11%	98.33%	100.00%	99.10%	97.89%	NA	NA		
5	<b>Service Coverage</b>														

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In door (>= - 75dBm)	Day-1	Mar-14	D-Mart Building Kolhapur	46.59%	60.26%	94.17%	100.00%	99.89%	67.55%	23.53%	96.19%	100.00%	100.00%
	Day-2	Mar-14	Pandurang Plaza ( Shahuwadi )	43.97%	99.89%	100.00%	100.00%	20.17%	100.00%	7.69%	99.20%	100.00%	100.00%
	Day-3	Mar-14	J.D.sidheshwar math(Gadhinglaj)	99.86%	49.10%	87.44%	100.00%	90.58%	95.52%	10.00%	100.00%	100.00%	100.00%
	<b>Over All SSA</b>	<b>Total</b>		<b>63.47%</b>	<b>69.75%</b>	<b>93.87%</b>	<b>100.00%</b>	<b>70.21%</b>	<b>87.69%</b>	<b>13.74%</b>	<b>98.46%</b>	<b>100.00%</b>	<b>100.00%</b>
In-vehicle (>= - 85dBm)	Day-1	Mar-14	D-Mart Building Kolhapur	99.85%	91.46%	100.00%	100.00%	100.00%	100.00%	86.77%	100.00%	100.00%	100.00%
	Day-2	Mar-14	Pandurang Plaza ( Shahuwadi )	75.18%	100.00%	100.00%	100.00%	97.48%	100.00%	80.77%	99.80%	100.00%	100.00%
	Day-3	Mar-14	J.D.sidheshwar math(Gadhinglaj)	100.00%	88.66%	98.88%	100.00%	100.00%	100.00%	99.46%	100.00%	100.00%	100.00%
	<b>Over All SSA</b>	<b>Total</b>		<b>91.68%</b>	<b>93.37%</b>	<b>99.63%</b>	<b>100.00%</b>	<b>99.16%</b>	<b>100.00%</b>	<b>75.26%</b>	<b>99.93%</b>	<b>100.00%</b>	<b>100.00%</b>
Outdoor-in city (>= - 95dBm)	Day-1	Mar-14	D-Mart Building Kolhapur	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	Day-2	Mar-14	Pandurang Plaza ( Shahuwadi )	84.08%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	Day-3	Mar-14	J.D.sidheshwar math(Gadhinglaj)	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	<b>Over All SSA</b>	<b>Total</b>		<b>95.69%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>
6	Call Setup Success Rate (>=95%)	Day-1	Mar-14	D-Mart Building Kolhapur	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
		Day-2	Mar-14	Pandurang Plaza ( Shahuwadi )	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
		Day-3	Mar-14	J.D.sidheshwar math(Gadhinglaj)	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	94.12%	100.00%	100.00%
		<b>Over All SSA</b>	<b>Total</b>		<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>97.50%</b>	<b>100.00%</b>	<b>100.00%</b>
7	Hand Over Success Rate (HOSR)	Day-1	Mar-14	D-Mart Building Kolhapur	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
		Day-2	Mar-14	Pandurang Plaza ( Shahuwadi )	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
		Day-3	Mar-14	J.D.sidheshwar math(Gadhinglaj)	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
		<b>Over All SSA</b>	<b>Total</b>		<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>



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

**DRIVE TEST TABLE: 7**

<b>DRIVE TEST ROUTE OF JAN TO MAR - 14 – MH&amp;G CIRCLE</b>							
Name of SSA	Drive test Period	Day 1		Day 2		Day 3	
		Name of SDCA Covered	Route Covered	Name of SDCA Covered	Route Covered	Name of SDCA Covered	Route Covered
<b>RATNAGARI</b>	<b>Jan-14</b>	Ratnagiri, Lanja <b>(100 KM)</b>	SDCA urban - Ratnagiri (Athwada Bazaar, Ram Mandir, Nisarg Vihar, Mirkanwada, Ratnagiri Fort, Mirya Bandar, Salvi Stop, Shivaji Nagar) & Ratnagiri MIDC area & Ratnagiri Kolhapur Road SDCA - Lanja rural	Karla, Chiplun, Khed <b>(105 KM)</b>	SDCA urban - Karla (Ratnagiri) & Chiplun (Main Bazaar, Machi Market, Guhagar Road, DBJ College area, Bus Stand, Sheikh Bahadur Chowk, Kherdi MIDC, chiplun kapsal road SDCA - Khed rural	Dapoli, Guhagar <b>(102 KM)</b>	SDCA - Dapoli urban (bus stand, dapoli agriculture uni, bazaar area, khed road, Jalgaon road) SDCA - Guhagar rural
<b>SANGLI</b>	<b>Feb-14</b>	Mahakal, Jath <b>(104 KM)</b>	Tasgaon, Kawte mahankal, Jath, Malgaon	Atapadi, Khanpur & Vita <b>(103 KM)</b>	Atpadi, Vita, Khanapur	Sangli, Miraj, Islampur & Shirala <b>(102 KM)</b>	Sangali, Miraj, Islampur, Sirala
<b>KOLHAPUR</b>	<b>Mar-14</b>	Kolhapur, hatkangale (ichalkaranji), shirol (jaisingpur), kagal <b>(95 KM)</b>	KOLHAPUR---> Tarabai Park - Shahupuri - Laxmipuri - Gururwar Peth - Khasbag - Shahu Stadium - Rajarampuri - Sambhaji Nagar - Devkar Panand - Paachgaon - Morewadi - Jawahar Nagar - Bus Stand - Rlwy Station  HATKANGALE (ICHALKARANJI)---> Sangli Road - Hatkangle - Kabnoor - Ichalkaranji - Narayan Peth - Panchwati Theatre - Shanti Nagar - Fortune Cineplex - Shahapur - Station Road JAISINGPUR (SHIROL)---> Jaisingpur Rd - Jaisingpur - M.G. Road - Nehru Road - Udgaon - Jaamiya Nagar - Shirol Rd - Shirol - Sambhaji Chowk  KAGAL---> Gaikwad College - Kagal - Bus Stand - Bajar Peth - Main Rd - Kolhapur Road, Indoor D-Mart Building	Radhanagari, gaganbawda, shahuwadi (malakapur), panhala <b>(108 KM)</b>	RADHANAGARI---> Gaibi - Radhanagari - Bus Stand - Tahseel Office - Sodankur - Sodambi - Naratwade GAGANBAWDA---> Gaganbawda - Karud Ghat - Bajar Peth - Bus Stand  PANHALA---> Panhala Road - Jagdadewadi - Panhala - Budhwar Peth. MALAKAPUR (SHAHUWADI)---> Malakapur Road - Malakapur - Shahuwadi	Murgud, bhudargad (gargoti), ajara, chandgad, gadhinglaj <b>(107 KM)</b>	MURGUD---> Murgud - Bajar Peth - Ambedkar Nagar - Bus stand - Murgud Road. GARGOTI---> Gargoti Road - Kalnakwadi - Khanapur - Gargoti Bus Stand - Sudarshan Nagar - Bhudargad - Paatgaon Road - Pushp Nagar AJARA---> Ajara - Bus Stand - Amboli Road - Main Road - Mahajan Galli - Somwar Peth.  CHANDGAD---> Bus Stand - Market - Chandgad  GADHINGLAJ---> Bhadgaon - Gadhinglaj - Kadgaon Road - Shendri Rd - Ajara Rd - Gandhi Nagar - Patode Hospital - Shivaji Road



**SSA WISE DRIVE TEST OBSERVATION:**

**DRIVE TEST TABLE: 8**

**DRIVE TEST OBSERVATION OF RATNAGARI SSA (JAN-14)**

S NO	Name of SP	Month	SSA Covered	SDCA Covered in Day 1	Day 1 Observation	SDCA Covered in Day 2	Day 2 Observation	SDCA Covered in Day 3	Day 3 Observation
1	AIRTEL	Jan-14	Ratnagari	Ratnagiri, Lanja	---	Karla, Chiplun, Khed	---	Dapoli, Guhagar	---
2	BSNL				Ratnagiri:- Poor Level & Quality near DTO, Bus stand, miry bander & BSNL Exchange Lanja :- Poor Quality nearby Lanja exchange		Chiplun :- Poor Quality observed in whole SDCA		Dapoli :- Poor Quality observed in whole SDCA
3	TATA GSM				Ratnagiri :- Poor Voice quality near Mirya bandar & congress bhawan ,stated due to water reflecting		Chiplun: - Poor voice quality in chiplun SDCA over a small spot due to water reflecting body. Khed:- poor quality near terrain or hilly area		Dapoli :- Poor quality near Arwarta holidays village. Guhagar :- Poor voice quality & level due to site far from spot.
4	TATA CDMA				Ratnagiri :- Poor Voice quality near Mirya bandar & ,stated due to water reflecting		Chiplun:- Poor level & Quality in Hilly area and fish market		Dapoli:- Poor level & Quality, Poor coverage due to thick vegetation and No dedicated site in this area.
5	IDEA				Rtnagiri:Poor Level found nearby site id 453 hilly area		---		Dapoli :- Poor Quality observed in whole SDCA
6	RCOM GSM				Ratnagiri :- Poor Voice quality near Mirya Bandar due to Hilly Terrain & AMSL Variation & week C/I		Chiplun:- Hilly Terrain & AMSL Variation & week C/I		Dapoli:- Weak coverage as distance from site is high in outskirt area & week C/I
7	RCOM CDMA				---		---		---
8	UNINOR				Ratnagiri :- poor level & quality all over SDCA, stated due to handset issue Lanja :- Poor Rx level found in overall SDCA.		Chiplun :- Poor Quality surrounded site id 1212. Khed :- very poor Rx level nearby site 45521		Dapoli :- Poor Quality observed surrounding site ID 45632
9	VODAFONE				Ratnagiri :- Poor level & Quality observed at Hilly area near site id 19741. Lanja : Poor level & Quality observed nearby site ID 35822		---		Poor level & Quality observed at Hilly terrain site id: 42549
10	AIRCEL				No Service		No Service		No Service



**DRIVE TEST TABLE: 9**

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

S NO	Name of SP	Month	SSA Covered	SDCA Covered in Day 1	Day 1 Observation	SDCA Covered in Day 2	Day 2 Observation	SDCA Covered in Day 3	Day 3 Observation
1	AIRTEL	Feb-14	Sangli	kawthe mahakal, Jath	Poor Rx-Level & Quality found over two spot due to more distance from site.	Atapadi, Khanpur & Vita	Atapadi & Vita:- Poor Rx level due to site distance. Vita :- Poor level observed in outer side from this SDCA	Sangli, Miraj, Ishlampur & Shirala	Sangli:- Poor Rx Level all over the city. Miraj:- Poor performance over a area due to site issue. Tasgaon:- Poor level and quality over this village.
2	BSNL				Observed poor quality all over SDCA and result also not as per benchmark		Observed poor quality all over SDCA and result also not as per benchmark		Observed poor quality all over SDCA and result also not as per benchmark
3	TATA GSM				Poor Quality on Tasgaon sangli road. Mahakal :- Poor Rx level & Quality in this SDCA due to site distance around five KM.		They have coverage only in Atapadi & Vita SDCA. Atapadi: Poor level at nimbavadi road & Pujara wadi		Shirala :- Poor Rx Level at Outskirts of Shirala
4	TATA CDMA				---		---		---
5	IDEA				Mahakal :- poor quality observed in this SDCA due to higher interference		---		---
6	RCOM GSM				Mahakal :- Weak coverage as distance from site is high in outskirt area & weak C/I		Vita & Atapadi:- Weak coverage as distance from site is high in outskirt area		Sangli :- Week Quality & Coverage as dance Clutter and market area all over SDCA
7	RCOM CDMA				Kawathe :- Poor Rx level due to higher distance		Atapadi :- Weak coverage observed as distance from site is high		Sangli :- Poor level & Quality observed in outer road area.
8	UNINOR				Jath:- Poor Rx level nearby site is 32553		Vita:- Poor quality patch found all over Vita SDCA		Sangli, Miraj & Islampur :- Poor quality patches nearby market as well as all over SDCA
9	VODAFONE				kawthe mahaka :- Poor level and quality observed over a spot. distance from serving cell is around 4km from Serving cell id-45293 & 45293		Khanpur :- Poor level observed over a spot, distance from serving cell around 1.7km from Serving cell id-46173, Hilly Terrain		---
10	AIRCEL				Poor Rx-Level found due to higher AMSL variation.		Coverage only in Atapadi & Vita SDCA. Vita & Atapadi:- Poor level and quality observed in whole SDCA		Poor Rx Level over sangli and Miraj, In islampur poor level over the highway



**DRIVE TEST TABLE: 10**

**DRIVE TEST OBSERVATION OF KOLHAPUR SSA (MAR-14)**

S NO	Name of SP	Month	SSA Covered	SDCA Covered in Day 1	Day 1 Observation	SDCA Covered in Day 2	Day 2 Observation	SDCA Covered in Day 3	Day 3 Observation
1	AIRTEL	Mar-14	Kolhapur	KOLHAPUR , HATKANGALE (ICHALKARANJI) , SHIROL (JAISINGPUR),KAGAL		RADHANAGARI , GAGANBAWDA , SHAHUWADI (MALAKAPUR) , PANCHALA	They have coverage in Radhanagari ,Shahuwadi (Malakapur), Panhala SDCA only Panhala :- Poor level and Quality due to hilly area	MURGUD, BHUDARGAD (GARGOTI) , AJARA , CHANDGAD, GADHINGLAJ	Ajara : Poor Rx Level outer SDCA and Vegetation area
2	BSNL				Poor quality all over the SDCA, poor quality observed in Sulakha nagar, Bank colony, Rajendra nagar, RK nagar.		Very poor quality in all over SDCA but higher troublesome area is Sahubadi & Panhala		Gadhinglaj: Poor quality spot over road and dense area
3	TATA GSM				Kolhapur: - Poor coverage & Quality near Rajendra Nagar. Sirol: - poor coverage near Shirol-Jaisingpur road.		They have coverage in Shahuwadi , Panhala SDCA only. Radhanagari :- Poor level and quality on Fejwade road		Ajara :- sombarpeth to chafe gali
4	TATA CDMA				---		No Service in Panhala SDCA only. Radhanagari: Poor coverage because of AMSL variation and thick vegetation.		---
5	IDEA				---		Radhanagari & Gaganbawda :- Poor level and quality due to hilly area. Panhala:- Poor level and quality nearby site id : 8271 & 8272		---
6	RCOM GSM				Poor Quality, Level & C/I in all over SDCA covering in day-1		They have coverage in Shahuwadi ,Panhala SDCA only. Poor Quality, Level & C/I in all over SDCA covering in day-2		No Service in Ajara SDCA only. Murgud & Bhudargad Poor level and quality observed.
7	RCOM CDMA				---		They have coverage in Shahuwadi , Panhala SDCA only. Shahuwadi: - Weak coverage as distance from site is high also Hilly Terrain & strong AMSL Variation.		No Service in Ajara SDCA only. Murgud:- Poor Rx level found all over SDCA
8	UNINOR				Kolhapur, Hathkangale & Jaisinghpur:- Found poor Voice quality all over SDCA		They have coverage in Radhanagari & Shahuwadi SDCA only		---
9	VODAFONE				Kagal : Poor Rx quality observed on two spots, distance from serving Cell is around 1.8m, serving cell id-45391		---		---



10	AIRCEL			Kolhapur :- Poor Rx level nearby Stadium, Townhall, Rajendra Nagar Hatkangale:- poor Voice Quality observed in whole SDCA. Kagal :- Poor level and quality due to site was 6km away from each other. Jaisinghpur:- Quality poor near Naka and Singpura	They have coverage in Sahubadi & Panhala SDCA only. Panhala:- Poor level and Quality found due to hilly area. Sahubadi :- Poor service there is no site nearby.	They have coverage in Murgud , Chandgad, Gadhinglaj SDCA only. Murgud: very poor Rx Level in whole SDCA whereas in Gadhinglaj poor quality was observed.
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**KEY FINDINGS:** The key observations that could be derived from the results of the drive tests were as under –

- (i) Aircel was found having no coverage in Ratnagiri SSA.
- (ii) **In the Month of Jan-14**, drive tests were conducted across Ratnagiri SSA covering Ratnagiri, Lanja, Karla, Chiplun, Khed Dapoli and Guhaghar SDCAs. **RCOM (GSM)** failed to meet the benchmark of Call Drop rate on SSA level with its performance as **2.34%**. **BSNL** and **Uninor** also could not do well for the parameter Voice Quality on one or the other day of drive test in the SSA. Their performance was **94.93% and 94.03%** in some of the SDCAs of Ratanagiri SSA. For rest of the parameters, the performance of the service providers was satisfactory from bench mark compliance point of view.
- (iii) **In the Month of Feb-14**, drive test was conducted across Sangali covering Mahakal, Jath, Atapadi, Khanpur Vita Sangli, Miraj, Ishlampur & Shirala SDCAs. **BSNL and RCOM (GSM)** lagged behind in meeting the benchmark of Blocked Call Rate with their performance as **3.98 % and 3.88%** respectively. Apart from this, **BSNL , RCOM(GSM) and Uninor** were also found under performed for parameter Voice Quality with their achievement as **90.37%, 93.53% and 92.23%** respectively. BSNL was also having poor performance with respect to the parameter Call Drop rate (4.84%) on Day 1 drive test in Mahakal/jath SDCAs. In case of indoor drive test, BSNL could not meet the benchmark of all the prime parameters i.e. Block call rate (6.17%), Call drop rate (3.95%) and Voice Quality (91.89%)
- (iv) **In the month of March-14**, drive test was conducted across Kolhapur SSA covering Kolhapur, Hatkangale (ichalkaranji), Shirol (jaisingpur), kagal, Radhanagari, Gaganbawda, Shahuwadi(malakapur), Panhala, Murgud, Bhudargad (gargoti) , Ajara , Chandgad and Gadhinglaj SDCAs. The performance of **BSNL** was very poor in this SSA as it could not meet the benchmark of all the prime network parameters namely Blocked call rate, Call drop rate (CDR), Good Voice Quality and Call setup success rate with its achievement on SSA level as **20.05 %** ( way beyond the benchmark) , **3.00% , 91.03 % and 78.54%** (way below the benchmark) respectively. The performance of **Aircel** with respect to the parameter Call drop rate was also found poor with its performance on SSA level as **3.72%**. In the SDCAs covered on Day 2 of drive test, Aircel suffered with excessive Call Drop rate of **18.18 %**. **RCOM (GSM) and Uninor** have not met the benchmark for parameter 'Voice quality' with their performance as **89.95% and 90.22%** respectively. In case of indoor drive test, Only Aircel could not meet the benchmark of the parameter Call drop rate (3.45%).

The deficiencies with respect to inadequate coverage and poor voice quality, encountered by different Service providers at the various places as shown in the drive tests plots, are detailed in the above table.-8, table-9 and table-10 for Ratnagiri, Sangali and Kolhapur SSAs respectively.

*Thus, BSNL needs improvement in its network as the vital parameters Voice Quality, CDR, Blocked Call Rate and CSSR remained non-compliant repeatedly in different parts of SSA where drive tests were conducted during the quarter ended March 2014. The service providers such as RCOM (GSM) & Uninor also need to improve their network quality with respect to the parameter Voice Quality in most of the parts of SSAs..*

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







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

From month audit & 3 days live findings, it was concluded that on an average, performance of the operators in the Maharashtra & Goa service area was satisfactory as most of the operators were found to have largely met the benchmarks of **Network Parameters** except for one parameter namely '**Worst affected cells having > 3% TCH drop**' which could not be met by **Tata (CDMA) and Aircel**. **Tata (CDMA)** remained non-compliant in all the three months of the quarter with its average performance of 5.23%, whereas **Aircel** could not perform well in the month of Jan-14 with its achievement as 4.98%.

During 3 days live measurements also, **Aircel, Tata (GSM) and Tata (CDMA)** failed to meet the benchmark of '**Worst affected cells having > 3% TCH drop**' with their average performance of 3.61%, 3.17% and 5.03% respectively.

With regard to the **Customer Service Quality Parameters**, it is revealed that most of the operators are in well compliance of the parameters on Metering and Billing Credibility, Response Time to Customers, Termination of Service and Time taken for refunds. However, with respect to the parameter accessibility of call center only **Aircel** was under performed with its performance as (87.50%), way below the benchmark of  $\geq 95\%$ . Further, **Aircel, BSNL, RCOM (GSM) and RCOM (CDMA)** have not met the benchmark for the parameter "% calls answered by Operators (voice to voice) within 60 seconds". They have achieved their performance as 71.87%, 72.64%, 79.85% and 75.70% respectively which is way below the benchmark of 90%..

With regards to the outcome of drive tests, BSNL needs improvement in its network as the vital parameters Voice Quality, CDR, Blocked Call Rate and CSSR remained non-compliant repeatedly in different parts of SSA where drive tests were conducted during the quarter ended March 2014. The service providers such as RCOM (GSM) & Uninor also need to improve their network quality with respect to the parameter Voice Quality in most of the parts of SSAs..

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





## 7. DETAILED NETWORK DATA ASSESSMENT OF CELLULAR MOBILE TELEPHONE SERVICES MAHARASHTRA & GOA CIRCLE:

TABLE: 1

Detailed Network Data Assessment of Cellular Mobile Telephone Services- MH&G Circle- Jan 14 month													
S/N	Name of Parameter	Bench- mark	Audit Period	AIRCEL	AIRTEL	BSNL	IDEA	TATA GSM	RCOM GSM	UNINOR	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
<b>Network Service Quality Parameter</b>													
1	<b>Network Availability</b>												
	a) Total no. of BTSs in the licensed service area		Jan-14	1831	10616	6880	10168	4144	3665	3490	9342	2277	2271
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Jan-14	1441.56	939	100567	17163.3	551.23	7062	2838.69	10261.7	2484	326.53
	c) BTS Accumulated Downtime	<=2%	Jan-14	0.11%	0.01%	1.96%	0.23%	0.02%	0.26%	0.11%	0.15%	0.15%	0.02%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Jan-14	11	0	128	168	0	29	10	84	4	0
e) Worst affected BTSs due to downtime	<=2%	Jan-14	0.60%	0.00%	1.86%	1.65%	0.00%	0.79%	0.29%	0.90%	0.18%	0.00%	
2	<b>Connection Establishment (Accessibility)</b>												
	a) CSSR (Call Setup Success Rate)	>=95%	Jan-14	99.51%	99.89%	95.53%	98.73%	99.35%	99.59%	97.44%	99.27%	98.36%	98.02%
	b) SDCCH/PAGING Congestion	<=1%	Jan-14	0.05%	0.03%	0.71%	0.75%	0.10%	0.05%	0.41%	0.29%	0.00%	0.00%
c) TCH congestion	<=2%	Jan-14	0.05%	0.05%	1.87%	0.76%	0.16%	0.04%	1.56%	0.73%	0.02%	0.71%	
3	<b>Connection Maintenance (Retainability)</b>												
	a) Call Drop Rate (CDR)	<=2%	Jan-14	0.69%	0.44%	1.79%	1.01%	0.69%	0.33%	0.41%	0.71%	0.15%	1.01%
	b) Worst affected cells>3% TCH drop	<=3%	Jan-14	<b>4.98%</b>	0.27%	2.81%	1.80%	2.85%	0.01%	1.22%	2.76%	0.72%	<b>5.32%</b>
	c) % of connections with good voice quality	>=95%	Jan-14	97.35%	98.95%	95.58%	97.57%	98.14%	98.86%	97.48%	97.42%	99.80%	NP
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Jan-14	274	85	568	545	354	1	129	777	49	349
e) Total no. of cells (Sector) in the licensed service area		Jan-14	5501	31132	20217	30229	12429	10945	10604	28152	6831	6558	
4	<b>No. of POI's having &gt;=0.5% POI congestion</b>												
	No. of POI's having >=0.5% POI congestion		Jan-14	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Jan-14	0	0	0	0	0	0	0	0	0	0

# AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MAHARASHTRA & GOA CIRCLE



Network Data													
5	a) Equipped Capacity of Network in Erlang		Jan-14	51643	382900	259355	508402	184877	144000	136148	359812.8	230000	389336
	b) Total traffic in TCBH in erlang (Avg.)		Jan-14	21708	275647	119880	449743	68520	128309	163631	349513	76486	101381
	c) Total no. of customers served (as per VLR) on last day of the month		Jan-14	915475	10391835	4642510	18675049	2798835	5139222	4330777	14672168	1878286	1542565

**AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MAHARASHTRA & GOA CIRCLE**



**TABLE: 2**

<b>Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live- MH&amp;G Circle- Jan-14 month</b>													
S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	BSNL	IDEA	TATA GSM	RCOM GSM	UNINOR	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
<b>Network Service Quality Parameter</b>													
<b>Network Availability</b>													
1	a) Total no. of BTSs in the licensed service area		Live data	1832	3857	6880	10068	4130	3665	3490	9288	2276	2259
	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	248.2	4	8636	2481	70.95	831	375	1042.84	204	50.26
	c) BTS Accumulated Downtime	<=2%	Live data	0.19%	0.00%	1.74%	0.34%	0.02%	0.31%	0.15%	0.16%	0.12%	0.03%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	3	0	3	3	0	0	0	8	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.16%	0.00%	0.04%	0.03%	0.00%	0.00%	0.00%	0.09%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	99.55%	99.99%	95.65%	98.89%	99.41%	99.60%	97.48%	99.32%	98.84%	98.07%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.03%	0.00%	0.65%	0.46%	0.05%	0.03%	0.38%	0.22%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.06%	0.00%	1.85%	0.64%	0.07%	0.04%	1.44%	0.68%	0.01%	0.50%
<b>Connection Maintenance (Retainability)</b>													
3	a) Call Drop Rate (CDR)	<=2%	Live data	0.69%	0.30%	1.79%	1.01%	0.69%	0.34%	0.41%	0.70%	0.15%	1.04%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	2.95%	0.00%	2.86%	1.85%	2.89%	0.01%	1.25%	2.83%	0.73%	4.95%
	c) % of connections with good voice quality	>=95%	Live data	97.27%	99.97%	95.66%	97.57%	98.15%	98.86%	97.49%	97.38%	99.80%	NP
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	162	0	579	557	353	1	133	793	50	323
	e) Total no. of cells (Sector) in the licensed service area		Live data	5498	9834	20217	30174	12212	10945	10604	27992	6828	6520
<b>No. of POI's having &gt;=0.5% POI congestion</b>													
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0	0

**AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MAHARASHTRA & GOA CIRCLE**



**TABLE: 3**

<b>Detailed Network Data Assessment of Cellular Mobile Telephone Services- MH&amp;G Circle - Feb-14 month</b>													
S/N	Name of Parameter	Bench- mark	Audit Period	AIRCEL	AIRTEL	BSNL	IDEA	TATA GSM	RCOM GSM	UNINOR	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
<b>Network Service Quality Parameter</b>													
1	<b>Network Availability</b>												
	a) Total no. of BTSs in the licensed service area		Feb-14	1827	10653	6880	10268	4154	3665	3600	9392	2278	2265
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Feb-14	925.49	778.45	89547	15950	823.23	6556	4340	14326.5	2491	307.13
	c) BTS Accumulated Downtime	<=2%	Feb-14	0.08%	0.01%	1.94%	0.23%	0.03%	0.27%	0.18%	0.23%	0.16%	0.02%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Feb-14	6	0	126	185	0	24	35	121	2	0
e) Worst affected BTSs due to downtime	<=2%	Feb-14	0.33%	0.00%	1.83%	1.80%	0.00%	0.65%	0.97%	1.29%	0.09%	0.00%	
2	<b>Connection Establishment (Accessibility)</b>												
	a) CSSR (Call Setup Success Rate)	>=95%	Feb-14	99.50%	99.88%	95.22%	98.53%	99.36%	99.59%	97.24%	99.22%	98.71%	97.83%
	b) SDCCH/PAGING Congestion	<=1%	Feb-14	0.07%	0.03%	0.79%	0.75%	0.10%	0.06%	0.48%	0.29%	0.00%	0.00%
c) TCH congestion	<=2%	Feb-14	0.13%	0.06%	1.89%	0.85%	0.14%	0.04%	1.99%	0.78%	0.01%	0.98%	
3	<b>Connection Maintenance (Retainability)</b>												
	a) Call Drop Rate (CDR)	<=2%	Feb-14	0.69%	0.39%	1.75%	0.97%	0.65%	0.28%	0.44%	0.68%	0.16%	0.93%
	b) Worst affected cells>3% TCH drop	<=3%	Feb-14	1.42%	0.28%	2.84%	1.75%	3.03%	0.01%	1.62%	2.80%	0.70%	4.96%
	c) % of connections with good voice quality	>=95%	Feb-14	97.31%	98.99%	95.83%	97.57%	98.12%	98.85%	97.59%	97.54%	99.80%	NP
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Feb-14	78	88	574	534	284	1	175	787	48	324
e) Total no. of cells (Sector) in the licensed service area		Feb-14	5498	31403	20217	30506	9363	10945	10827	28152	6833	6538	
4	<b>No. of POI's having &gt;=0.5% POI congestion</b>												
	No. of POI's having >=0.5% POI congestion		Feb-14	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Feb-14	0	0	0	0	0	0	0	0	0	0

# AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MAHARASHTRA & GOA CIRCLE



Network Data													
5	a) Equipped Capacity of Network in Erlang		Feb-14	51798	370600	259355	513847	185652	144000	138680	355514	230000	389131
	b) Total traffic in TCBH in erlang (Avg.)		Feb-14	23008	268462	119700	459205	64930	127457	166839	354540	78110	90301
	c) Total no. of customers served (as per VLR) on last day of the month		Feb-14	955522	10462864	4652736	19012395	2828489	5136642	4395221	14863932	1849475	1620651



**TABLE: 4**

<b>Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live- MH&amp;G Circle- Feb-14 month</b>													
S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	BSNL	IDEA	TATA GSM	RCOM GSM	UNINOR	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
<b>Network Service Quality Parameter</b>													
1	<b>Network Availability</b>												
	a) Total no. of BTSs in the licensed service area		Live data	1828	10672	6880	10168	4130	3666	3590	9342	2278	2271
	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	97.15	75.76	6734	2721	102.53	917	493	1231	253	52.55
	c) BTS Accumulated Downtime	<=2%	Live data	0.07%	0.01%	1.36%	0.37%	0.03%	0.35%	0.19%	0.18%	0.15%	0.03%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	4	5	0	0	0	11	0	0
e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.06%	0.05%	0.00%	0.00%	0.00%	0.12%	0.00%	0.00%	
2	<b>Connection Establishment (Accessibility)</b>												
	a) CSSR (Call Setup Success Rate)	>=95%	Live data	99.67%	99.88%	95.18%	98.73%	99.33%	99.61%	96.86%	99.27%	98.93%	97.93%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.01%	0.03%	0.74%	0.75%	0.07%	0.10%	0.47%	0.21%	0.00%	0.00%
c) TCH congestion	<=2%	Live data	0.09%	0.06%	1.92%	0.77%	0.11%	0.04%	<b>2.36%</b>	0.73%	0.00%	0.78%	
3	<b>Connection Maintenance (Retainability)</b>												
	a) Call Drop Rate (CDR)	<=2%	Live data	0.68%	0.42%	1.73%	0.96%	0.68%	0.20%	0.44%	0.66%	0.15%	0.94%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	<b>4.98%</b>	0.25%	2.83%	1.69%	<b>3.29%</b>	0.00%	1.62%	2.85%	0.64%	<b>4.71%</b>
	c) % of connections with good voice quality	>=95%	Live data	97.33%	98.97%	95.89%	97.59%	98.10%	98.84%	97.59%	97.59%	99.80%	NP
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	274	79	573	514	403	0	177	802	44	309
e) Total no. of cells (Sector) in the licensed service area		Live data	5498	31435	20217	30385	12260	10948	10907	28152	6833	6558	
4	<b>No. of POI's having &gt;=0.5% POI congestion</b>												
	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0	0



**AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MAHARASHTRA & GOA CIRCLE**



**TABLE: 5**

<b>Detailed Network Data Assessment of Cellular Mobile Telephone Services- MH&amp;G Circle- Mar-14 month</b>													
S/N	Name of Parameter	Bench- mark	Audit Period	AIRCEL	AIRTEL	BSNL	IDEA Cellular	TATA GSM	RCOM GSM	UNINOR	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
<b>Network Service Quality Parameter</b>													
1	<b>Network Availability</b>												
	a) Total no. of BTSs in the licensed service area		Mar-14	1801	10714	6880	10267	4206	3667	3600	9438	2280	2276
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Mar-14	471.98	948.81	93678	17376.2	729.56	7539	4877.38	16113	2850	443.43
	c) BTS Accumulated Downtime	<=2%	Mar-14	0.04%	0.01%	1.83%	0.23%	0.02%	0.28%	0.18%	0.23%	0.17%	0.03%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Mar-14	0	0	123	167	0	29	27	158	9	0
	e) Worst affected BTSs due to downtime	<=2%	Mar-14	0.00%	0.00%	1.79%	1.63%	0.00%	0.79%	0.75%	1.67%	0.39%	0.00%
2	<b>Connection Establishment (Accessibility)</b>												
	a) CSSR (Call Setup Success Rate)	>=95%	Mar-14	99.47%	99.88%	95.32%	98.37%	99.60%	99.58%	97.15%	99.09%	98.50%	97.98%
	b) SDCCH/PAGING Congestion	<=1%	Mar-14	0.05%	0.03%	0.83%	0.76%	0.12%	0.02%	0.59%	0.35%	0.00%	0.00%
	c) TCH congestion	<=2%	Mar-14	0.17%	0.07%	1.82%	0.97%	0.18%	0.05%	1.98%	0.91%	0.02%	0.82%
3	<b>Connection Maintenance (Retainability)</b>												
	a) Call Drop Rate (CDR)	<=2%	Mar-14	0.72%	0.40%	1.78%	1.02%	0.67%	0.35%	0.63%	0.72%	0.16%	0.92%
	b) Worst affected cells>3% TCH drop	<=3%	Mar-14	1.56%	0.28%	2.78%	1.98%	2.95%	0.01%	2.27%	2.82%	0.56%	5.40%
	c) % of connections with good voice quality	>=95%	Mar-14	97.18%	98.95%	95.64%	97.47%	98.05%	98.84%	97.44%	97.46%	99.80%	NP
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Mar-14	86	88	562	606	369	1	248	801	38	355
	e) Total no. of cells (Sector) in the licensed service area		Mar-14	5517	31753	20217	30629	12525	10951	10937	28449	6840	6571
4	<b>No. of POI's having &gt;=0.5% POI congestion</b>												
	No. of POI's having >=0.5% POI congestion		Mar-14	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Mar-14	0	0	0	0	0	0	0	0	0	0

# AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MAHARASHTRA & GOA CIRCLE



Network Data												
5	a) Equipped Capacity of Network in Erlang	Mar-14	50317	378205	259355	514317	187778	144000	139981	359069	230000	390730
	b) Total traffic in TCBH in erlang (Avg.)	Mar-14	24024	270193	120975	456852	67318	131246	172763	355783	75425	95150
	c) Total no. of customers served (as per VLR) on last day of the month	Mar-14	967556	10520692	4696903	19333510	2834984	5189858	4436614	15102531	1835417	1585078

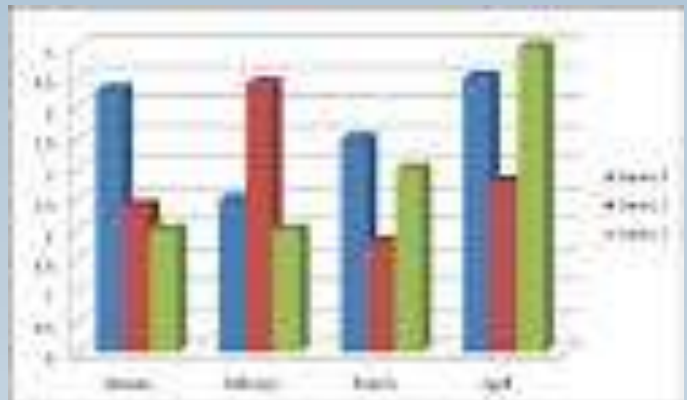
**AUDIT & ASSESSMENT OF QOS FOR QE-MARCH-2014-MAHARASHTRA & GOA CIRCLE**



**TABLE: 6**

<b>Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live- MH&amp;G Circle- Mar-14 month</b>													
S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	BSNL	IDEA	TATA GSM	RCOM GSM	UNINOR	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators								CDMA Operators	
<b>Network Service Quality Parameter</b>													
1	<b>Network Availability</b>												
	a) Total no. of BTSs in the licensed service area		Live data	1829	10664	6880	10268	4154	3666	3600	9392	2279	2265
	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	43.85	74.2	7766	3223.8	117.52	590	383	2568.9	244	78.13
	c) BTS Accumulated Downtime	<=2%	Live data	0.03%	0.01%	1.57%	0.44%	0.04%	0.22%	0.15%	0.38%	0.15%	0.05%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	6	3	0	0	0	0	0	0
e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.09%	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
2	<b>Connection Establishment (Accessibility)</b>												
	a) CSSR (Call Setup Success Rate)	>=95%	Live data	99.46%	99.89%	95.40%	98.54%	99.45%	99.60%	97.16%	99.19%	98.82%	96.93%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.02%	0.03%	0.72%	0.74%	0.09%	0.03%	0.60%	0.43%	0.00%	0.00%
c) TCH congestion	<=2%	Live data	0.23%	0.06%	1.80%	0.92%	0.13%	0.05%	2.05%	0.81%	0.01%	1.83%	
3	<b>Connection Maintenance (Retainability)</b>												
	a) Call Drop Rate (CDR)	<=2%	Live data	0.73%	0.41%	1.81%	1.01%	0.70%	0.33%	0.70%	0.71%	0.13%	0.96%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	2.90%	0.26%	2.76%	1.88%	3.33%	0.00%	2.92%	2.84%	0.59%	5.43%
	c) % of connections with good voice quality	>=95%	Live data	97.23%	99.00%	95.66%	97.51%	98.02%	98.83%	97.40%	97.49%	99.80%	NP
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	159	82	557	576	411	0	319	805	40	355
e) Total no. of cells (Sector) in the licensed service area		Live data	5481	31532	20217	30619	12354	10948	10937	28304	6836	6538	
4	<b>No. of POI's having &gt;=0.5% POI congestion</b>												
	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0	0

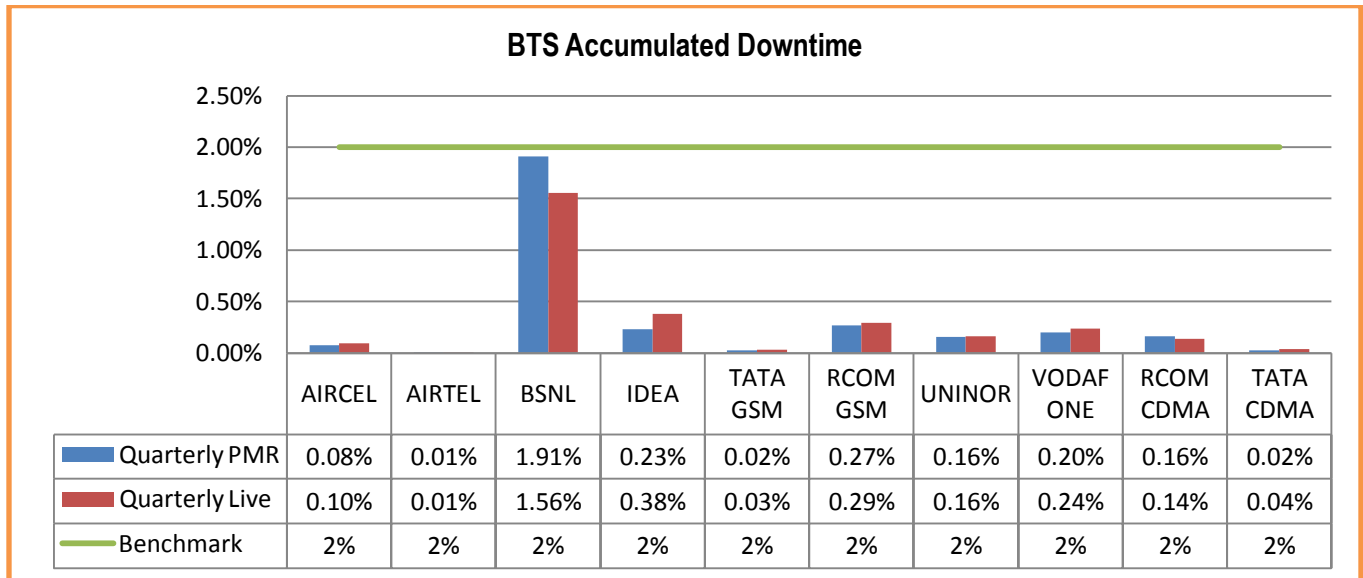
## 8. GRAPHICAL REPRESENTATION





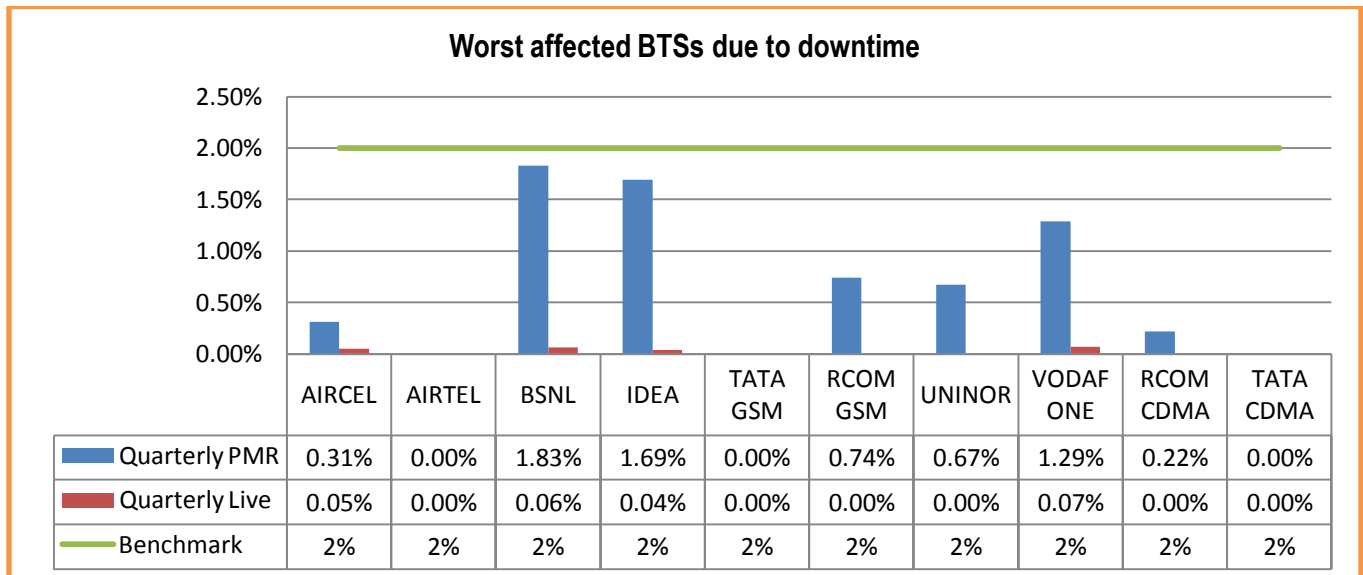
**8. GRAPHICAL REPRESENTATION OF PERFORMANCE OF THE CELLULAR MOBILE SERVICE PROVIDERS-QUARTERLY V/S 3-DAYS LIVE MEASUREMENT QUARTERLY:**

**1) BTS ACCUMULATED DOWNTIME:**



All operators are meeting the benchmarks.

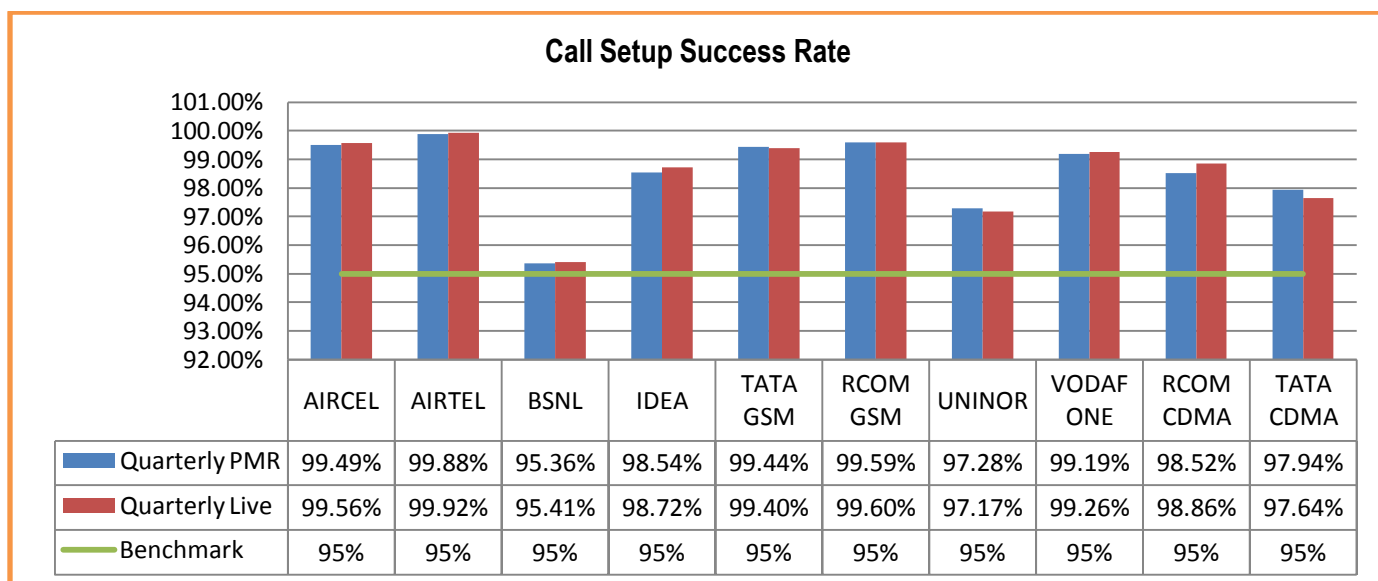
**2) WORST AFFECTED BTSS DUE TO DOWNTIME:**



All operators are meeting the benchmarks.

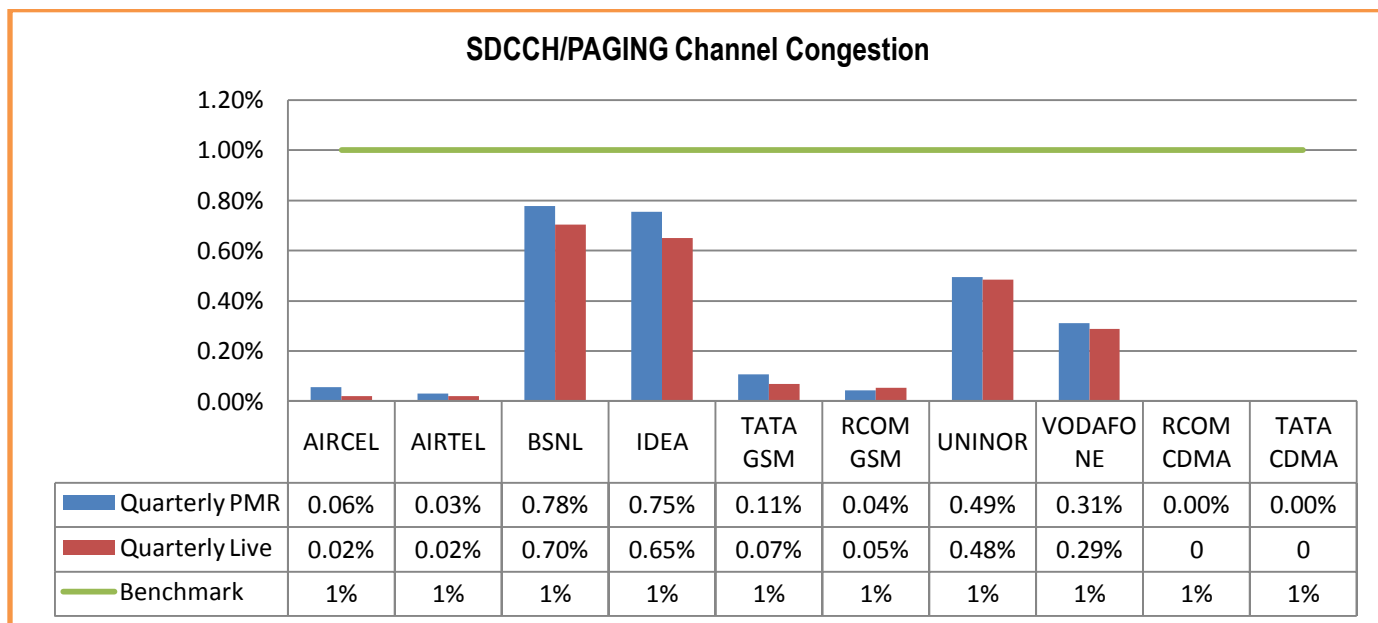


3) CALL SETUP SUCCESS RATE :



All operators are meeting the benchmarks.

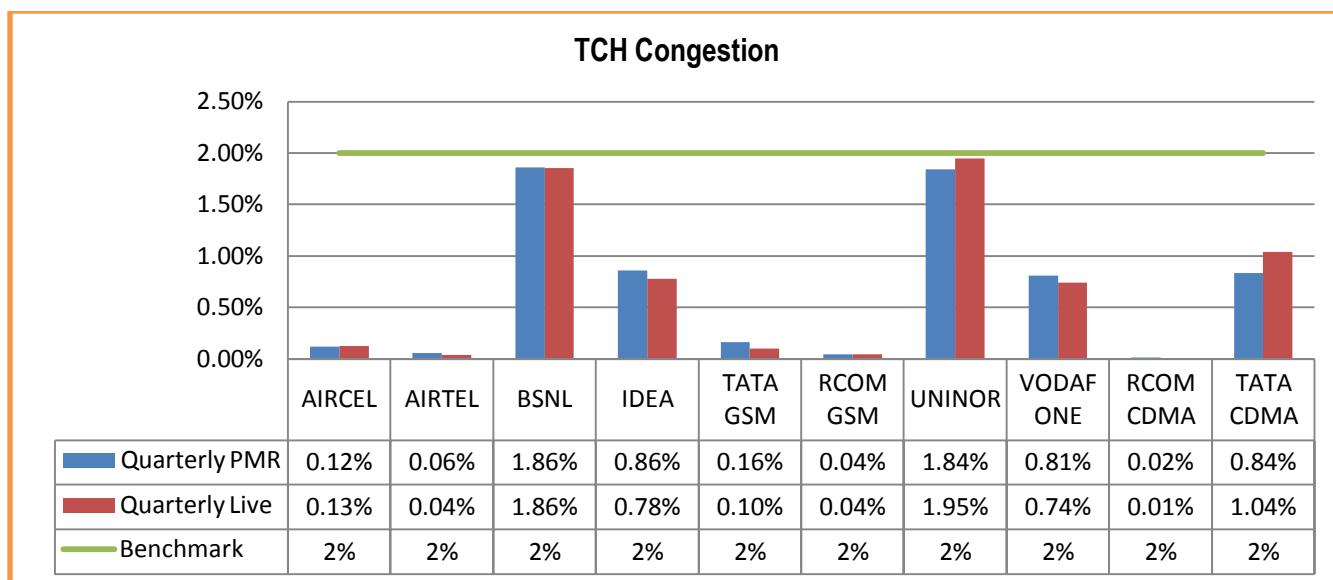
4) SDCCH/PAGING CHANNEL CONGESTION :



All operators are meeting the benchmarks.

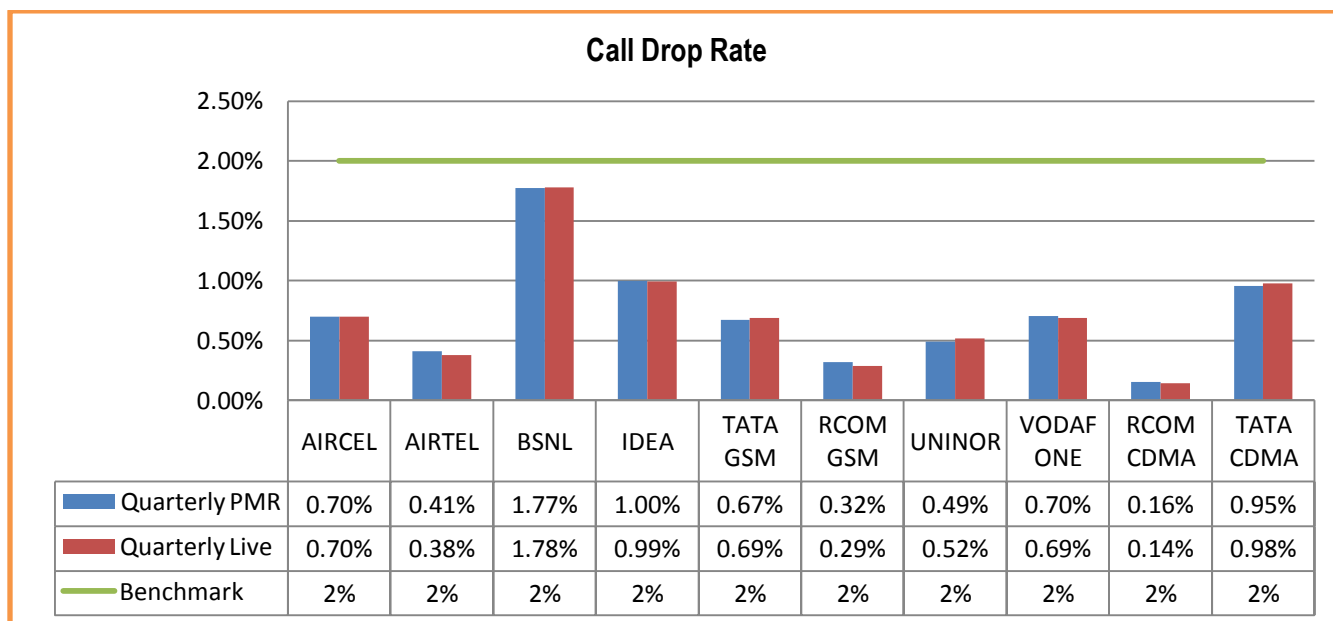


5) TCH CONGESTION:



All operators are meeting the benchmarks.

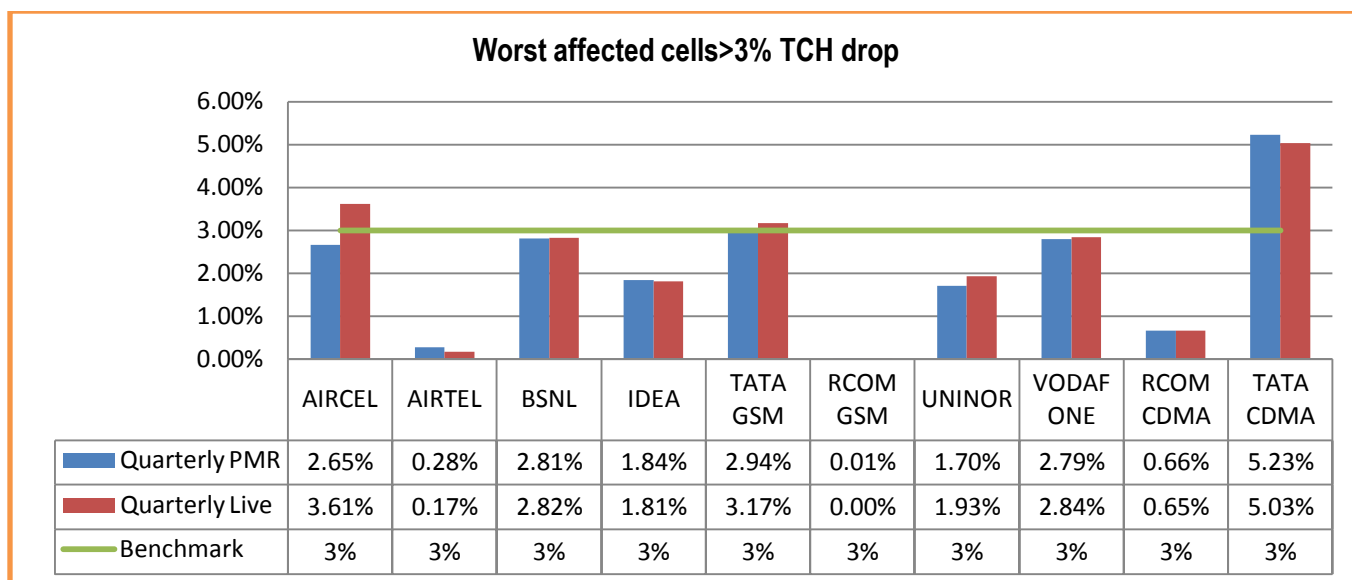
6) CALL DROP RATE:



All operators are meeting the benchmarks.

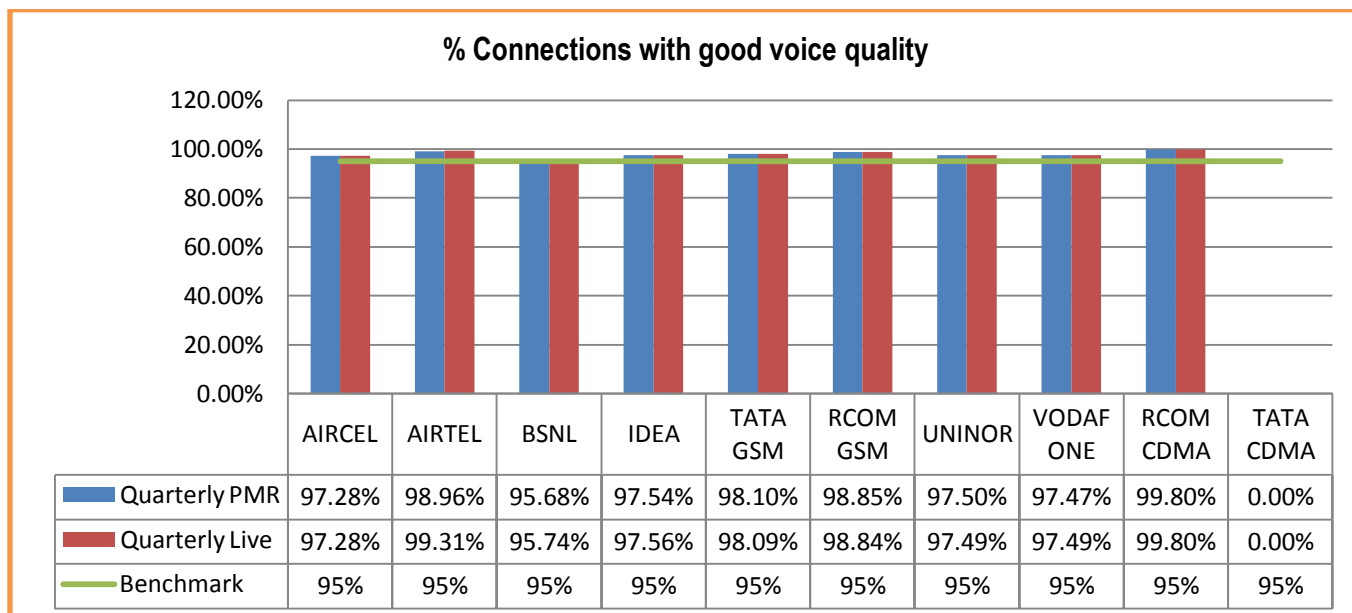


7) WORST AFFECTED CELLS>3% TCH DROP:



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

8) PERCENTAGE OF CONNECTIONS WITH GOOD VOICE QUALITY:



All operators are meeting the benchmarks.