



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

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PREFACE

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

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

TUV-SUD South Asia carried out QoS audit as per the norms of TRAI in all the eight circles / services areas of the North Zone and four circles of the West Zone. This report details the performance of the various service providers in **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.

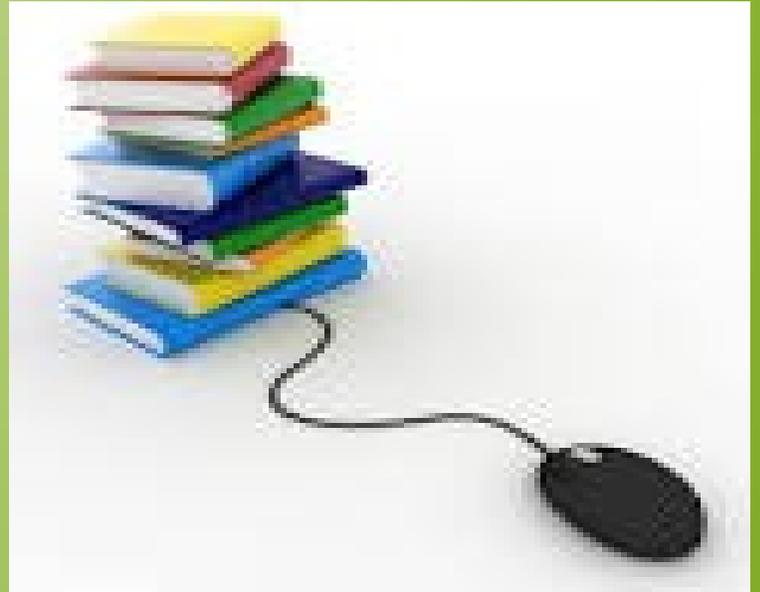
TRAI, the regulatory watch dog for the Quality of Service for the telecom services – Basic (Wire line), Cellular Mobile (Wireless) and Broadband has commissioned **M/s TUV-SUD South Asia Pvt. Ltd.** for conducting audit and assessment of quality of service of service providers, in terms of the benchmarks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

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

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

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

2. OBJECTIVES AND METHODOLOGY



2) **OBJECTIVES AND METHODOLOGY**

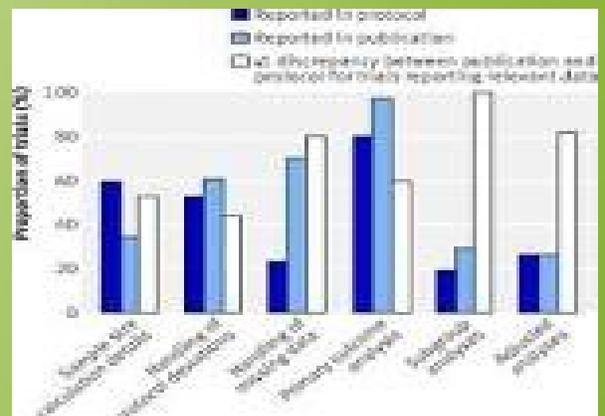
The primary objective is to audit and assess the Quality of Service being rendered by Basic, Cellular Mobile & Broadband service providers against the parameters notified by TRAI.

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

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

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

3. SAMPLE SIZE



3) SAMPLE SIZE

3.1 SAMPLING FOR CELLULAR MOBILE (WIRELESS) SERVICE PROVIDERS.

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

Sl. No.	Name of Service Provider	Dates of live measurement Audit			Audit Location
GSM Operators		April-15	May -15	June-15	
1	AIRCEL	12,13,14th April-2015	10,11,12th May-2015	4,5,6th June-15	Aircel Ltd. , Commer Zone, Building no-2,6 Floor,Yerwada Jail Road,Yerwada,Pune-1
2	AIRTEL	6,7,8th April-2015	4,5,6th May-2015	1,2,3rd June-2015	D Building, Vega Center, Near Swargate Bus Stand, Pune
3	BSNL	6,7,8th April-2015	4,5,6th May-2015	1,2,3rd June-2015	2nd Floor, Telephone Bhawan, Near C'lai Shop, Bajirao Road, Pune 411002
4	UNINOR	20,21,22th April-2015	13,14,15th May-2015	17,18,19th June-2015	Telewings Communications Services Pvt Ltd. (Uninor) Welldone Technology Park Sec-48 Sohana Road Gurgaon
5	TATA GSM	12,13,14th April-2015	10,11,12th May-2015	4,5,6th June-15	TATA Tel. Ltd., A1-Aqmar Building,5,Ganesh Kindh Road, Shivaji Nagar , Pune-5
6	IDEA	12,13,14th April-2015	10,11,12th May-2015	4,5,6th June-15	IDEA Cellular Ltd. Sharada Centre, 11/1, Erandwane,Pune - 411 004.
7	RCOM GSM	6,7,8th April-2015	4,5,6th May-2015	--	Reliance Communications, 7th floor,Kumar cerebrum IT Park, B bldg, above standard chartered bank,near d-mart,kalyani nagar, Pune.
8	VODAFONE	6,7,8th April-2015	4,5,6th May-2015	1,2,3rd June-2015	Vodafone Cellular Limited, Metropolitan, Old Mumbai -Pune Highway, Wakdewadi, Shivajinagar, Pune 411003
CDMA Operators					
9	RCOM CDMA	6,7,8th April-2015	4,5,6th May-2015	--	Reliance Communications, 7th floor,Kumar cerebrum IT Park, B bldg, above standard chartered bank,near d-mart,kalyani nagar, Pune.
10	TATA CDMA	12,13,14th April-2015	10,11,12th May-2015	4,5,6th June-15	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 June 2015.

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

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

3.2 SAMPLING FOR BASIC (WIRE LINE) SERVICES

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

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 **only once in a year**. **Based on this criterion, the QoS audit for Broadband service was not required to be done for Maharashtra & Goa Circle in the quarter ended June- 2015, as the same has already been done during QE March 2015.**

EXECUTIVE SUMMARY



4) EXECUTIVE SUMMARY

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

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

Cellular Mobile

(i) From monthly audit , 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 **Aircel, Tata (GSM) and Tata(CDMA)** as they remained non-complied in all the three months of the quarter with their average performance of **4.23%, 5.84% and 6.32%** respectively.

(ii) 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 **4.11%, 5.72% and 5.47%** respectively.

Similar non-compliance in respect of this parameter was also observed for these service providers during monthly audit.

(iii) 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. All service providers are in compliance with respect to the parameter ‘Accessibility of call center’. However, **Airtel, RCOM (GSM), and RCOM (CDMA)** have not met the benchmark for the parameter **“% calls answered by Operators (voice**

to voice) within 90 seconds. They have achieved their performance as 72.85%, 43.48%, 52.67% respectively. Their performance has been way below the benchmark of >95%.

Vodafone failed to meet the benchmark for the parameter "Time taken for refund of deposits after closures "as its achievement level was 89.67% against the benchmark of 100% within 60 days.

The results for **three days live measurements** reveal that all operators have met the benchmarks for the parameters 'Accessibility to call center'. However, with regard to the parameter '**Calls connection to operators (Voice to voice) within 90 seconds**', performance of **Airtel, RCOM GSM** and **RCOM CDMA** was 26.50%, 77.84% and 81.53% respectively. The performance of Airtel was way below the benchmark.

(iv) The analysis of Drive tests revealed that Service providers namely **BSNL, RCOM (GSM) / RCOM (CDMA), Airtel and Uninor** remained non-complied and need to improve their network performance with respect to the parameters **Voice Quality, Call Drop rate and Call setup success rate / Blocked Call Rate** at different locations of Panaji, Parbhani and Yeotmal SSAs, where the drive tests were conducted

5. PMR AUDIT REPORT



5) PMR AUDIT REPORTS:

5.1 MONTHLY PMR:

5.1.1 BUSY HOUR OF VARIOUS SERVICE PROVIDERS:

Sl. No.	Name of Service Provider	Month of Audit	Network TCBH Hour
GSM OPERATORS			
1	AIRCEL	June-15	20 Hrs-21 Hrs
2	AIRTEL	June-15	20 Hrs-21 Hrs
3	BSNL	June-15	19 Hrs-20 Hrs
4	IDEA	June-15	20 Hrs-21 Hrs
5	TATA GSM	June-15	19 Hrs-20 Hrs
6	RCOM GSM	June-15	19 Hrs-20 Hrs
7	UNINOR	June-15	20 Hrs-21 Hrs
8	VODAFONE	June-15	20 Hrs-21 Hrs
CDMA OPERATORS			
9	RCOM CDMA	June-15	19 Hrs-20 Hrs
10	TATA CDMA	June-15	20 Hrs-21 Hrs

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

5.1.2 SWITCHES/BSC/BTS DETAILS OF SERVICE PROVIDERS:

Sl. No.	Name of Service Provider	No. of MSC + GMSC	No. of BSC	No. of BTS	NSS make	BSS make
GSM OPERATORS						
1	AIRCEL	3	15	1957	Huawei	Huawei
2	AIRTEL	25	167	10726	NSN	NSN
3	BSNL	18	144	6900	Alcatel	Alcatel
4	IDEA	42	94	10942	Ericsson	Ericsson
5	TATA GSM	4	30	4517	Huawei	Huawei
6	RCOM GSM	5	23	2745	Huawei	Huawei
7	UNINOR	10	25	4502	NSN+Huawei	NSN+Huawei
8	VODAFONE	19	122	10688	NSN	NSN
CDMA OPERATORS						
9	RCOM CDMA	10	8	1749	ZTE,Lucent	ZTE,Lucent
10	TATA CDMA	12	18	2116	Huawei, ZTE, Ericsson	Huawei, ZTE, Ericsson

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

CELLULAR MOBILE TELEPHONE SERVICES MAHARASHTRA & GOA CIRCLE - APRIL 15 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	
Network Service Quality Parameter													
Network Availability													
1	a) BTS Accumulated Downtime	<=2%	Apr-15	0.11%	0.01%	1.94%	0.09%	0.04%	0.34%	0.27%	0.12%	0.43%	0.06%
	b) Worst affected BTSs due to downtime	<=2%	Apr-15	0.05%	0.00%	1.89%	0.24%	0.00%	1.09%	1.09%	0.52%	1.37%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Apr-15	99.37%	99.87%	98.15%	98.15%	99.58%	99.55%	97.98%	99.35%	97.55%	97.92%
	b) SDCCCH/PAGING Channel congestion	<=1%	Apr-15	0.21%	0.04%	0.67%	0.82%	0.12%	0.03%	0.52%	0.38%	0.00%	0.00%
	c) TCH congestion	<=2%	Apr-15	0.09%	0.08%	1.92%	1.27%	0.21%	0.06%	0.99%	0.65%	0.05%	0.71%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Apr-15	0.83%	0.45%	1.48%	0.89%	0.63%	0.25%	0.53%	0.65%	0.28%	0.91%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Apr-15	4.38%	0.11%	2.37%	0.94%	5.66%	0.05%	1.28%	2.67%	1.03%	6.58%
	c) Connections with good voice quality	>=95%	Apr-15	96.94%	98.86%	95.64%	97.53%	97.31%	98.78%	98.03%	97.34%	99.80%	99.99%
4	No. of POI's having >=0.5% POI congestion	<=0.5%	Apr-15	0	0	0	0	0	0	0	0	0	0

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

CELLULAR MOBILE TELEPHONE SERVICES MAHARASHTRA & GOA CIRCLE - MAY 15 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		
Network Service Quality Parameter													
Network Availability													
1	a) BTS Accumulated Downtime	<=2%	May-15	0.12%	0.01%	1.89%	0.09%	0.03%	0.40%	0.26%	0.16%	0.53%	0.07%
	b) Worst affected BTSs due to downtime	<=2%	May-15	0.15%	0.00%	1.96%	0.26%	0.00%	0.98%	1.11%	0.71%	1.83%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	May-15	99.53%	99.87%	95.19%	97.91%	99.65%	99.58%	98.21%	99.31%	97.78%	97.96%
	b) SDCCH/PAGING Channel congestion	<=1%	May-15	0.09%	0.04%	0.89%	0.78%	0.10%	0.03%	0.52%	0.33%	0.00%	0.00%
	c) TCH congestion	<=2%	May-15	0.08%	0.08%	1.87%	1.39%	0.13%	0.06%	0.69%	0.69%	0.04%	0.51%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	May-15	0.80%	0.45%	1.50%	0.97%	0.62%	0.25%	0.58%	0.64%	0.28%	0.96%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	May-15	4.15%	0.11%	2.28%	0.92%	5.57%	0.07%	1.07%	2.50%	0.99%	5.21%
	c) Connections with good voice quality	>=95%	May-15	96.73%	99.84%	95.63%	97.50%	97.40%	98.81%	98.01%	97.51%	99.79%	99.09%
4	No. of POI's having >=0.5% POI congestion	<=0.5%	May-15	0	0	0	0	0	0	0	0	0	0

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

CELLULAR MOBILE TELEPHONE SERVICES MAHARASHTRA & GOA CIRCLE- JUNE 15 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
Network Service Quality Parameter													
Network Availability													
1	a) BTS Accumulated Downtime	<=2%	Jun-15	0.17%	0.01%	1.94%	0.13%	0.04%	NP	0.29%	0.27%	NP	0.09%
	b) Worst affected BTSs due to downtime	<=2%	Jun-15	0.26%	0.00%	1.90%	0.32%	0.00%	NP	1.27%	1.24%	NP	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Jun-15	98.92%	99.87%	95.38%	97.72%	99.66%	NP	97.95%	99.46%	NP	97.73%
	b) SDCCH/PAGING Channel congestion	<=1%	Jun-15	0.16%	0.04%	0.91%	0.72%	0.09%	NP	0.29%	0.37%	NP	0.00%
	c) TCH congestion	<=2%	Jun-15	0.07%	0.08%	1.83%	1.36%	0.12%	NP	0.71%	0.54%	NP	0.75%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Jun-15	0.82%	0.54%	1.58%	1.09%	0.69%	NP	0.52%	0.68%	NP	1.10%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Jun-15	4.17%	0.14%	2.45%	1.28%	6.30%	NP	1.11%	2.80%	NP	7.18%
	c) Connections with good voice quality	>=95%	Jun-15	96.42%	98.79%	95.45%	97.31%	97.31%	NP	97.62%	97.44%	NP	99.95%
4	No. of POI's having >=0.5% POI congestion	<=0.5%	Jun-15	0	0	0	0	0	NP	0	0	NP	0

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

5.1.6 QOS PERFORMANCE OF QUARTERLY PMR –AVERAGE OF QE- JUNE-15 (APRIL TO JUNE 2015 MONTHS AUDITED DATA)

QUARTERLY QOS PERFORMANCE (AVERAGE OF THREE MONTHS) - 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			
Network Service Quality Parameter													
Network Availability													
1	a) BTS Accumulated Downtime	<=2%	Quarterly	0.13%	0.01%	1.92%	0.10%	0.04%	0.37%	0.27%	0.18%	0.48%	0.07%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.15%	0.00%	1.92%	0.27%	0.00%	1.04%	1.16%	0.82%	1.60%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	99.27%	99.87%	96.24%	97.93%	99.63%	99.57%	98.05%	99.37%	97.67%	97.87%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.15%	0.04%	0.82%	0.77%	0.10%	0.03%	0.44%	0.36%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	0.08%	0.08%	1.87%	1.34%	0.15%	0.06%	0.80%	0.63%	0.05%	0.66%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	0.82%	0.48%	1.52%	0.98%	0.65%	0.25%	0.54%	0.66%	0.28%	0.99%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	4.23%	0.12%	2.37%	1.05%	5.84%	0.06%	1.15%	2.66%	1.01%	6.32%
	c) Connections with good voice quality	>=95%	Quarterly	96.70%	99.16%	95.57%	97.45%	97.34%	98.80%	97.89%	97.43%	99.80%	99.68%
4	No. of POI's having >=0.5% POI congestion	<=0.5%	Quarterly	0	0	0	0	0	0	0	0	0	0

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

5.1.7 KEY FINDINGS ON MONTHLY PMR AUDIT REPORTS:

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

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

Network Service Quality Parameters:

- **Network Availability**

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

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

In 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 0.25 %) was for RCOM (GSM) during the quarter.

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

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

The audit with respect to this parameter revealed that all the operators met the benchmark for this parameter except **Aircel, Tata (GSM) and Tata (CDMA)**. **Aircel, Tata GSM & CDMA** remained non-complied in all the three months of the quarter with their average performance as **4.23%, 5.84% and 6.32% respectively**.

- iii. Connections with good voice quality:

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

- iv. POI congestion

There was no congestion on individual POI links between a service provider vis-à-vis other service providers.

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



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

5.2.1 LIVE MEASUREMENT DATA (3-DAYS) – APRIL15 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES MAHARASHTRA & GOA CIRCLE- APRIL 15 MONTH													
Live measurement Data		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			
Network Service Quality Parameter													
Network Availability													
1	a) BTS Accumulated Downtime	<=2%	Live Data	0.14%	0.01%	1.95%	0.11%	0.03%	0.22%	0.30%	0.10%	0.34%	0.05%
	b) Worst affected BTSS due to downtime	<=2%	Live Data	0.00%	0.00%	0.04%	0.01%	0.00%	0.00%	0.02%	0.01%	0.00%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live Data	99.38%	99.87%	95.38%	98.14%	99.60%	99.61%	98.10%	99.55%	98.39%	97.83%
	b) SDCCH/PAGING Channel congestion	<=1%	Live Data	0.06%	0.03%	0.72%	0.68%	0.12%	0.03%	0.32%	0.36%	0.00%	0.00%
	c) TCH congestion	<=2%	Live Data	0.12%	0.08%	1.88%	1.33%	0.18%	0.05%	0.86%	0.45%	0.02%	0.81%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Live Data	0.85%	0.44%	1.51%	0.95%	0.64%	0.25%	0.50%	0.65%	0.18%	0.96%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live Data	4.51%	0.10%	2.43%	1.07%	5.73%	0.01%	1.17%	2.60%	0.86%	7.38%
	c) Connections with good voice quality	>=95%	Live Data	96.93%	98.95%	95.77%	97.44%	97.30%	98.81%	98.02%	97.39%	99.80%	99.95%
4	No. of POI having >=0.5% congestion	<0.5%	Live Data	0	0	0	0	0	0	0	0	0	0

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

CELLULAR MOBILE TELEPHONE SERVICES MAHARASHTRA & GOA CIRCLE- MAY 15 MONTH													
Live measurement Data		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			
Network Service Quality Parameter													
Network Availability													
1	a) BTS Accumulated Downtime	<=2%	Live data	0.13%	0.01%	1.94%	0.07%	0.02%	0.46%	0.37%	0.22%	0.55%	0.09%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.06%	0.00%	0.00%	0.00%	0.02%	0.04%	0.11%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	99.59%	99.87%	95.18%	97.93%	99.64%	99.54%	98.00%	99.33%	98.02%	98.10%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.12%	0.04%	0.91%	0.64%	0.10%	0.03%	0.36%	0.37%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.07%	0.08%	1.83%	1.37%	0.07%	0.05%	0.67%	0.67%	0.03%	0.36%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.82%	0.45%	1.43%	1.00%	0.61%	0.25%	0.63%	0.63%	0.23%	0.97%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	3.98%	0.10%	2.54%	0.92%	5.38%	0.00%	1.06%	2.56%	1.12%	4.64%
	c) Connections with good voice quality	>=95%	Live data	96.78%	98.96%	95.47%	97.48%	97.39%	98.80%	98.00%	97.47%	99.79%	99.95%
4	No. of POI having >=0.5% congestion	<0.5%	Live data	0	0	0	0	0	0	0	0	0	0

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

CELLULAR MOBILE TELEPHONE SERVICES MAHARASHTRA & GOA CIRCLE- JUNE 15 MONTH													
Live measurement Data		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		
Network Service Quality Parameter													
Network Availability													
1	a) BTS Accumulated Downtime	<=2%	Live data	0.22%	0.01%	1.88%	0.13%	0.02%	NP	0.25%	0.21%	NP	0.05%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.09%	0.00%	0.00%	NP	0.00%	0.01%	NP	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.94%	98.86%	95.22%	97.73%	99.65%	NP	97.89%	99.44%	NP	98.12%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.14%	0.04%	0.90%	0.55%	0.10%	NP	0.23%	0.33%	NP	0.00%
	c) TCH congestion	<=2%	Live data	0.15%	0.08%	1.93%	1.44%	0.07%	NP	0.78%	0.56%	NP	0.31%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.79%	0.45%	1.43%	1.03%	0.69%	NP	0.55%	0.64%	NP	0.97%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	3.85%	0.10%	2.30%	1.02%	6.06%	NP	1.13%	2.65%	NP	4.40%
	c) Connections with good voice quality	>=95%	Live data	96.56%	98.82%	95.40%	97.45%	97.39%	NP	97.56%	97.57%	NP	99.96%
4	No. of POI having >=0.5% congestion	<0.5%	Live data	0	0	0	0	0	NP	0	0	NP	0

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

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

QUARTERLY QOS PERFORMANCE OF 3-DAYS LIVE MEASUREMENT (AVERAGE OF THREE MONTHS) – MH&G CIRCLE													
Live measurement Data		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
Network Service Quality Parameter													
Network Availability													
1	a) BTS Accumulated Downtime	<=2%	Quarterly	0.16%	0.01%	1.92%	0.10%	0.02%	0.34%	0.31%	0.18%	0.45%	0.06%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.00%	0.00%	0.06%	0.00%	0.00%	0.00%	0.01%	0.02%	0.06%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	99.30%	99.53%	95.26%	97.93%	99.63%	99.58%	98.00%	99.44%	98.21%	98.02%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.11%	0.04%	0.84%	0.62%	0.11%	0.03%	0.30%	0.35%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	0.11%	0.08%	1.88%	1.38%	0.11%	0.05%	0.77%	0.56%	0.03%	0.49%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	0.82%	0.45%	1.46%	0.99%	0.65%	0.25%	0.56%	0.64%	0.21%	0.97%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	4.11%	0.10%	2.42%	1.00%	5.72%	0.01%	1.12%	2.60%	0.99%	5.47%
	c) Connections with good voice quality	>=95%	Quarterly	96.76%	98.91%	95.55%	97.46%	97.36%	98.81%	97.86%	97.48%	99.80%	99.95%
4	No. of POI having >=0.5% congestion	<0.5%	Quarterly	0	0	0	0	0	0	0	0	0	0

Note: Calculation for RCOM (GSM & CDMA) is made on the basis of two months (April & May 15) audited data.

5.2.5 KEY FINDING 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 **4.11%, 5.72% and 5.47%** respectively.

Similar non-compliance in respect of this parameter was also observed for these service providers during monthly audit.

5.2.6 DETAILED NETWORK DATA ASSESSMENT OF CELLULAR MOBILE TELEPHONE SERVICES:

TABLE: 1

Detailed Network Data Assessment of Cellular Mobile Telephone Services- MH&G Circle - April 15 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	
Network Service Quality Parameter													
Network Availability													
1	a) Total no. of BTSs in the licensed service area		Apr-15	1936	10713	6880	10759	4475	2760	4502	10658	1753	2263
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Apr-15	1553	504	96015	6643	1320	6700	8591	9500	5431	932
	c) BTS Accumulated Downtime	<=2%	Apr-15	0.11%	0.01%	1.94%	0.09%	0.04%	0.34%	0.27%	0.12%	0.43%	0.06%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Apr-15	1	0	130	26	0	30	49	55	24	0
	e) Worst affected BTSs due to downtime	<=2%	Apr-15	0.05%	0.00%	1.89%	0.24%	0.00%	1.09%	1.09%	0.52%	1.37%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Apr-15	99.37%	99.87%	98.15%	98.15%	99.58%	99.55%	97.98%	99.35%	97.55%	97.92%
	b) SDCCH/PAGING Congestion	<=1%	Apr-15	0.21%	0.04%	0.67%	0.82%	0.12%	0.03%	0.52%	0.38%	0.00%	0.00%
	c) TCH congestion	<=2%	Apr-15	0.09%	0.08%	1.92%	1.27%	0.21%	0.06%	0.99%	0.65%	0.05%	0.71%
Connection Maintenance (Retainability)													
3	a) Call Drop Rate (CDR)	<=2%	Apr-15	0.83%	0.45%	1.48%	0.89%	0.63%	0.25%	0.53%	0.65%	0.28%	0.91%
	b) Worst affected cells>3% TCH drop	<=3%	Apr-15	4.38%	0.11%	2.37%	0.94%	5.66%	0.05%	1.28%	2.67%	1.03%	6.58%
	c) % of connections with good voice quality	>=95%	Apr-15	96.94%	98.86%	95.64%	97.53%	97.31%	98.78%	98.03%	97.34%	99.80%	99.99%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Apr-15	253	35	480	305	739	4	174	855	54	431
	e) Total no. of cells (Sector) in the licensed service area		Apr-15	5776	32730	20217	32380	13050	8235	13625	32056	5253	6547
No. of POI's having >=0.5% POI congestion													
4	No. of POI's having >=0.5% POI congestion		Apr-15	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Apr-15	0	0	0	0	0	0	0	0	0	0
Network Data													
5	a) Equipped Capacity of Network in Erlang		Apr-15	58338	367361	259355	535241	206438	144000	180527	401059	230000	402807
	b) Total traffic in TCBH in erlang (Avg.)		Apr-15	33395	290138	97050	470967	67293	117853	192636	352565	54833	78305
	c) Total no. of customers served (as per VLR) on last day of the month		Apr-15	1189591	11128245	4320179	22662672	3625890	3158688	5302871	17061590	1592265	1309420

TABLE: 2

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live- MH&G Circle - Apr 15 month													
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	
Network Service Quality Parameter													
Network Availability													
1	a) Total no. of BTSs in the licensed service area		Live data	1910	10715	6880	10729	4440	2761	4502	10658	1754	2263
	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	194	51	9646	852	95	432	962	788	428	88
	c) BTS Accumulated Downtime	<=2%	Live data	0.14%	0.01%	1.95%	0.11%	0.03%	0.22%	0.30%	0.10%	0.34%	0.05%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	3	1	0	0	1	1	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.04%	0.01%	0.00%	0.00%	0.02%	0.01%	0.00%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	99.38%	99.87%	95.38%	98.14%	99.60%	99.61%	98.10%	99.55%	98.39%	97.83%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.06%	0.03%	0.72%	0.68%	0.12%	0.03%	0.32%	0.36%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.12%	0.08%	1.88%	1.33%	0.18%	0.05%	0.86%	0.45%	0.02%	0.81%
Connection Maintenance (Retainability)													
3	a) Call Drop Rate (CDR)	<=2%	Live data	0.85%	0.44%	1.51%	0.95%	0.64%	0.25%	0.50%	0.65%	0.18%	0.96%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	4.51%	0.10%	2.43%	1.07%	5.73%	0.01%	1.17%	2.60%	0.86%	7.38%
	c) % of connections with good voice quality	>=95%	Live data	96.93%	98.95%	95.77%	97.44%	97.30%	98.81%	98.02%	97.39%	99.80%	99.95%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	260	33	492	346	748	1	160	833	45	483
	e) Total no. of cells (Sector) in the licensed service area		Live data	5766	32744	20217	32380	13043	8238	13623	32056	5256	6547
No. of POI's having >=0.5% POI congestion													
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0	0

TABLE: 3

Detailed Network Data Assessment of Cellular Mobile Telephone Services- MH&G Circle – May 15 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	
Network Service Quality Parameter													
1	Network Availability												
	a) Total no. of BTSs in the licensed service area		May-15	1940	10722	6900	10859	4490	2745	4505	10658	1749	2262
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		May-15	1790	542	97123	7427	1102	8112	8635	12786	6910	1248
	c) BTS Accumulated Downtime	<=2%	May-15	0.12%	0.01%	1.89%	0.09%	0.03%	0.40%	0.26%	0.16%	0.53%	0.07%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		May-15	3	0	135	28	0	27	50	76	32	0
e) Worst affected BTSs due to downtime	<=2%	May-15	0.15%	0.00%	1.96%	0.26%	0.00%	0.98%	1.11%	0.71%	1.83%	0.00%	
2	Connection Establishment (Accessibility)												
	a) CSSR (Call Setup Success Rate)	>=95%	May-15	99.53%	99.87%	95.19%	97.91%	99.65%	99.58%	98.21%	99.31%	97.78%	97.96%
	b) SDCCH/PAGING Congestion	<=1%	May-15	0.09%	0.04%	0.89%	0.78%	0.10%	0.03%	0.52%	0.33%	0.00%	0.00%
c) TCH congestion	<=2%	May-15	0.08%	0.08%	1.87%	1.39%	0.13%	0.06%	0.69%	0.69%	0.04%	0.51%	
3	Connection Maintenance (Retainability)												
	a) Call Drop Rate (CDR)	<=2%	May-15	0.80%	0.45%	1.50%	0.97%	0.62%	0.25%	0.58%	0.64%	0.28%	0.96%
	b) Worst affected cells>3% TCH drop	<=3%	May-15	4.15%	0.11%	2.28%	0.92%	5.57%	0.07%	1.07%	2.50%	0.99%	5.21%
	c) % of connections with good voice quality	>=95%	May-15	96.73%	99.84%	95.63%	97.50%	97.40%	98.81%	98.01%	97.51%	99.79%	99.09%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		May-15	242	36	462	297	733	6	146	803	52	341
e) Total no. of cells (Sector) in the licensed service area		May-15	5837	32752	20277	32423	13153	8229	13643	32056	5251	6545	
4	No. of POI's having >=0.5% POI congestion												
	No. of POI's having >=0.5% POI congestion		May-15	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		May-15	0	0	0	0	0	0	0	0	0	0
5	Network Data												
	a) Equipped Capacity of Network in Erlang		May-15	62095	370601	260555	535113	206854	144000	182200	404049	230000	402561
	b) Total traffic in TCBH in erlang (Avg.)		May-15	31552	286993	95060	485793	62489	104867	176922	349581	53994	65305
c) Total no. of customers served (as per VLR) on last day of the month		May-15	1144385	11244049	4031591	22599543	2822170	3114065	5232765	17009512	1544018	1162848	

TABLE: 4

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live- MH&G Circle- May-15 month													
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	
Network Service Quality Parameter													
Network Availability													
1	a) Total no. of BTSs in the licensed service area		Live data	1930	10706	6880	10759	4475	2760	4503	10658	1753	2263
	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	181	52	9597	564	58	919	1198	1678	690	140
	c) BTS Accumulated Downtime	<=2%	Live data	0.13%	0.01%	1.94%	0.07%	0.02%	0.46%	0.37%	0.22%	0.55%	0.09%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	4	0	0	0	1	4	2	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.06%	0.00%	0.00%	0.00%	0.02%	0.04%	0.11%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	99.59%	99.87%	95.18%	97.93%	99.64%	99.54%	98.00%	99.33%	98.02%	98.10%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.12%	0.04%	0.91%	0.64%	0.10%	0.03%	0.36%	0.37%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.07%	0.08%	1.83%	1.37%	0.07%	0.05%	0.67%	0.67%	0.03%	0.36%
Connection Maintenance (Retainability)													
3	a) Call Drop Rate (CDR)	<=2%	Live data	0.82%	0.45%	1.43%	1.00%	0.61%	0.25%	0.63%	0.63%	0.23%	0.97%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	3.98%	0.10%	2.54%	0.92%	5.38%	0.00%	1.06%	2.56%	1.12%	4.64%
	c) % of connections with good voice quality	>=95%	Live data	96.78%	98.96%	95.47%	97.48%	97.39%	98.80%	98.00%	97.47%	99.79%	99.95%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	232	33	513	297	708	0	145	820	59	304
	e) Total no. of cells (Sector) in the licensed service area		Live data	5823	32744	20217	32408	13149	8235	13641	32056	5253	6547
No. of POI's having >=0.5% POI congestion													
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0	0

TABLE: 5

Detailed Network Data Assessment of Cellular Mobile Telephone Services- MH&G Circle – June 15 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	
Network Service Quality Parameter													
1	Network Availability												
	a) Total no. of BTSs in the licensed service area		Jun-15	1947	10726	6900	10942	4540	NP	4502	10688	NP	2081
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Jun-15	2446	616	96313	9964	1263	NP	9501	20492	NP	1285
	c) BTS Accumulated Downtime	<=2%	Jun-15	0.17%	0.01%	1.94%	0.13%	0.04%	NP	0.29%	0.27%	NP	0.09%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Jun-15	5	0	131	35	0	NP	57	133	NP	0
e) Worst affected BTSs due to downtime	<=2%	Jun-15	0.26%	0.00%	1.90%	0.32%	0.00%	NP	1.27%	1.24%	NP	0.00%	
2	Connection Establishment (Accessibility)												
	a) CSSR (Call Setup Success Rate)	>=95%	Jun-15	98.92%	99.87%	95.38%	97.72%	99.66%	NP	97.95%	99.46%	NP	97.73%
	b) SDCCH/PAGING Congestion	<=1%	Jun-15	0.16%	0.04%	0.91%	0.72%	0.09%	NP	0.29%	0.37%	NP	0.00%
c) TCH congestion	<=2%	Jun-15	0.07%	0.08%	1.83%	1.36%	0.12%	NP	0.71%	0.54%	NP	0.75%	
3	Connection Maintenance (Retainability)												
	a) Call Drop Rate (CDR)	<=2%	Jun-15	0.82%	0.54%	1.58%	1.09%	0.69%	NP	0.52%	0.68%	NP	1.10%
	b) Worst affected cells>3% TCH drop	<=3%	Jun-15	4.17%	0.14%	2.45%	1.28%	6.30%	NP	1.11%	2.80%	NP	7.18%
	c) % of connections with good voice quality	>=95%	Jun-15	96.42%	98.79%	95.45%	97.31%	97.31%	NP	97.62%	97.44%	NP	99.95%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Jun-15	245	45	496	419	837	NP	151	902	NP	443
e) Total no. of cells (Sector) in the licensed service area		Jun-15	5882	32751	20277	32659	13293	NP	13647	32197	NP	6169	
4	No. of POI's having >=0.5% POI congestion												
	No. of POI's having >=0.5% POI congestion		Jun-15	0	0	0	0	0	NP	0	0	NP	0
	Name of POI not meeting the benchmark		Jun-15	0	0	0	0	0	NP	0	0	NP	0
5	Network Data												
	a) Equipped Capacity of Network in Erlang		Jun-15	62307	370135	260555	536759	208369	NP	182806	398254	NP	373067
	b) Total traffic in TCBH in erlang (Avg.)		Jun-15	32617	283754	90344	467693	59172	NP	177709	335506	NP	69584
c) Total no. of customers served (as per VLR) on last day of the month		Jun-15	1214900	11315853	4264630	22576801	2869595	NP	5408724	17009512	NP	1122153	

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

TABLE: 6

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live- MH&G Circle - June 15 month													
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	
Network Service Quality Parameter													
1	Network Availability												
	a) Total no. of BTSs in the licensed service area		Live data	1941	10723	6900	10859	4495	NP	4500	10658	NP	2262
	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	314	53	9320	1051	52	NP	804	1599	NP	78
	c) BTS Accumulated Downtime	<=2%	Live data	0.22%	0.01%	1.88%	0.13%	0.02%	NP	0.25%	0.21%	NP	0.05%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	6	0	0	NP	0	1	NP	0
e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.09%	0.00%	0.00%	NP	0.00%	0.01%	NP	0.00%	
2	Connection Establishment (Accessibility)												
	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.94%	98.86%	95.22%	97.73%	99.65%	NP	97.89%	99.44%	NP	98.12%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.14%	0.04%	0.90%	0.55%	0.10%	NP	0.23%	0.33%	NP	0.00%
c) TCH congestion	<=2%	Live data	0.15%	0.08%	1.93%	1.44%	0.07%	NP	0.78%	0.56%	NP	0.31%	
3	Connection Maintenance (Retainability)												
	a) Call Drop Rate (CDR)	<=2%	Live data	0.79%	0.45%	1.43%	1.03%	0.69%	NP	0.55%	0.64%	NP	0.97%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	3.85%	0.10%	2.30%	1.02%	6.06%	NP	1.13%	2.65%	NP	4.40%
	c) % of connections with good voice quality	>=95%	Live data	96.56%	98.82%	95.40%	97.45%	97.39%	NP	97.56%	97.57%	NP	99.96%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	678	32	467	334	806	NP	154	849	NP	288
e) Total no. of cells (Sector) in the licensed service area		Live data	17601	32760	20277	32626	13296	NP	13644	32056	NP	6544	
4	No. of POI's having >=0.5% POI congestion												
	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	NP	0	0	NP	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	NP	0	0	NP	0

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

CUSTOMER SERVICE QUALITY (CSD) PARAMETERS



5.3 CUSTOMER SERVICE QUALITY PARAMETERS MEASUREMENT FOR CMTS:

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

QUARTERLY CSD AUDITED DATA FOR CELLULAR MOBILE TELEPHONE SERVICES													
Quarterly CSD Audit Data		Bench- mark	Circle Name	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	UNINOR	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators									CDMA Operators
Customer Service Quality Parameters													
Metering & Billing Credibility -Post Paid													
1	A) No. of bills issued during the quarter		MHG	5850	1652210	1034969	4637496	148073	361858	3217063	NA	586911	79092
	B) No. of bills disputed including billing complaints during the quarter		MHG	3	258	12	2955	139	1	2089	NA	527	1
	C) % of billing complaints during the quarter	<= 0.1%	MHG	0.051%	0.016%	0.001%	0.064%	0.094%	0.00%	0.065%	NA	0.090%	0.001%
Metering & Billing Credibility -Pre Paid													
2	A) Total No. of Pre-paid customers at the end of the quarter		MHG	2067342	11200014	4459835	20341993	3145114	5016629	16254191	7552691	1555190	1624588
	B) Total No. of complaints relating to charging, Credit and Validity during the quarter		MHG	122	62	3000	4702	2842	0	7583	328	1244	0
	C) % of Pre-paid Charging Complaints	<= 0.1%	MHG	0.006%	0.001%	0.067%	0.023%	0.090%	0.00%	0.047%	0.004%	0.080%	0.00%
Resolution of Billing/Charging Complaints and Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints													
3	A) No. of Billing/Charging/Credit/Validity Complaints received during the quarter		MHG	125	320	3012	33692	2981	1	9672	328	1771	1
	B) No. of billing complaints for Post paid customers/Charging/Credit/Validity complaints for pre-paid customers resolved within 4 weeks during the quarter		MHG	125	320	3012	33692	2981	1	9672	328	1771	1
	C) No. of billing complaints for Post paid customers/Charging/Credit/Validity complaints for pre-paid customers resolved within 6 weeks during the quarter		MHG	125	320	3012	33692	2981	1	9672	328	1771	1
	D) % of billing complaints (for post paid customer) / Charging/Credit/Validity (for Pre paid customer) resolved within 4 weeks	>=98% within 4 weeks	MHG	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	E) % of billing complaints (for post paid customer) / Charging/Credit/Validity (for Pre paid customer) resolved within 6 weeks	100% within 6 weeks	MHG	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

QUARTERLY CSD AUDITED DATA FOR CELLULAR MOBILE TELEPHONE SERVICES

Quarterly CSD Audit Data		Bench- mark	Circle Name	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	UNINOR	RCOM CDMA	TATA CDMA
S/ N	Name of Parameter			GSM Operators								CDMA Operators	
	F) % of Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints	<=1 week	MHG	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Response time to customers for assistance													
	A) Total no of calls attempted to customer care/Call center		MHG	6379521	2462860	334841	63686085	3602204	828902	35732477	14892495	1275868	99284
	B) Total no. of calls successfully established to customer care/Call center		MHG	6273064	2462860	334841	63089970	3580735	806687	35723715	14822868	1269402	98409
4	C) % Accessibility of Call centre /customer Care (Total call successfully established*100/ Total call attempt)	>=95%	MHG	98.33%	100.00%	100.00%	99.06%	99.40%	97.32%	99.98%	99.53%	99.49%	99.12%
	D) Total Calls reached to operator for Voice to Voice (Total call attempts)		MHG	1168899	5821450	1577418	13094201	768254	1480917	9050648	4054965	224510	120289
	E) Total number of calls answered by the operator (Voice to voice) within 90 seconds		MHG	1133497	4240658	1577418	13028117	334075	1464278	8947024	4039581	118255	119705
	F) % age of calls answered by operator(voice to voice) (Total call successfully established within 90 Sec.*100 / Total call attempts)	>=95%	MHG	96.97%	72.85%	100.00%	99.50%	43.48%	98.88%	98.86%	99.62%	52.67%	99.51%
Termination/closure of service													
5	A) Total No. of requests for Termination / Closure of service received during the quarter		MHG	14	6683	6623	27448	619	3074	17303	NA	4686	1513
	B) No. of requests for Termination /Closure of service complied within 7 days during the quarter		MHG	14	6683	6623	27448	619	3074	17303	NA	4686	1513
	C) % of Termination/ Closure of service within 7 days	<=7days	MHG	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%
Time taken for refunds of deposits after closures.													
6	A) No. of Payments/ Refunds due during the quarter		MHG	9	1827	844	5443	700	682	13048	NA	1088	407
	B) No. of Payments/ Refunds Cleared during the quarter		MHG	9	1827	844	5443	700	682	11700	NA	1088	407
	C) Time taken for refunds of deposits after closures.	100% within 60 days	MHG	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	89.67%	NA	100.00%	100.00%

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

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

5.3.2 3 DAYS LIVE CSD AUDITED DATA FOR CELLULAR MOBILE SERVICES (QE - JUNE 2015):

CSD 3 DAYS LIVE DATA FOR CELLULAR MOBILE TELEPHONE SERVICES – QE – JUNE 15													
3 days live CSD Audit Data		Bench- mark	Circle Name	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	TATA GSM	VODAFONE	UNINOR	RCOM CDMA	TATA CDMA
S/ N	Name of Parameter			GSM Operators									CDMA Operators
Response time to customers for assistance													
1	Total no of calls attempted to customer care/Call center		MHG	234634	38948	13604	2138074	NP	330576	1228222	459885	NP	58279
	Total no. of calls successfully established to customer care/Call center		MHG	230728	38948	13604	2119517	NP	324471	1227398	457617	NP	57954
	% Accessibility of Call centre /customer Care (Total call successfully established *100 / Total call attempts)	>=95%	MHG	98.34%	100.00%	100.00%	99.13%	NP	98.15%	99.93%	99.51%	NP	99.44%
2	Total Calls reached to operator for Voice to Voice (Total call attempt)		MHG	43829	211443	56441	439243	28595	53390	287818	127023	9528	3396
	Total number of calls answered by the operator (Voice to voice) within 90 seconds.		MHG	42094	56025	56441	437508	22258	52779	277458	126664	7768	3380
	% age of calls answered by operator (voice to voice) (Total call successfully established within 90 Sec. *100/ Total call attempts)	>=95%	MHG	96.04%	26.50%	100.00%	99.61%	77.84%	98.86%	96.40%	99.72%	81.53%	99.53%

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

5.3.3 KEY FINDINGS ON CUSTOMER SERVICE DELIVERY (CSD) PARAMETERS

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

The performance of the service providers with respect to the parameter metering and billing credibility for both post-paid and pre-paid 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 4/6 weeks. Apart from this, all service providers also have met the benchmark of 100 % cases of credit 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'. However, **Airtel, RCOM (GSM), and RCOM (CDMA)** have not met the benchmark for the parameter "**% calls answered by Operators (voice to voice) within 90 seconds**". They have achieved their performance as **72.85%, 43.48%, 52.67%** respectively. Their performance has been way below the benchmark of $>95\%$.

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 except **Vodafone**. Vodafone failed to meet the benchmark as its achievement level was **89.67%** against the benchmark of 100% within 60 days.

Live measurements:

The results for **three days live measurements** reveal that all operators have met the benchmarks for the parameters 'Accessibility to call center'. However, with regard to the parameter '**Calls connection to operators (Voice to voice) within 90 seconds**', performance of **Airtel, RCOM GSM and RCOM CDMA** was **26.50%, 77.84% and 81.53%** respectively. The performance of Airtel was way below the benchmark.

6. LIVE CALLING ASSESSMENT



6) LIVE CALLING ASSESSMENT:

6.1 INTER OPERATOR CALLS ASSESSMENT:

Inter operator call assessment with a sample of 2x50 test calls for each Service provider operating in 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.

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

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

6.2 CUSTOMER CARE / HELPLINE ASSESSMENT:

LIVE CALLING TO CALL CENTRE											
Parameter	Circle Name	AIRCEL	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	VODAFONE	UNINOR	RCOM (CDMA)	TATA (CDMA)
Total no of calls attempted to customer care/Call center	MHG	100	100	100	100	100	100	100	100	100	100
Total no. of calls successfully established to customer care/Call center	MHG	100	100	100	100	100	100	100	100	100	100
% Accessibility of Call centre /customer Care (Total calls successfully established*100 / Total call attempts)	MHG	100	100	100	100	100	100	100	100	100	100
Total Calls reached to agent desk for Voice to Voice (Total call attempts)	MHG	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Total number of calls answered by the operator (Voice to voice) within 90 seconds	MHG	100	100	100	100	100	100	100	100	100	100
% age of calls answered by operator(voice to voice) (Total calls successfully established within 90 Sec.*100 / Total call attempts)	MHG	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

In case of calls answered by operators (voice to voice) within 90 seconds when test calls were made to the call centers, all service providers were found to have 100% of call access and answered from the call center operators within 90 Seconds.

6.3 LIVE CALLING ASSESSMENT FOR BILLING COMPLIANTS:

TELEPHONIC INTERVIEW FOR BILLING COMPLAINTS											
Parameter	Circle Name	AIRCEL	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	VODAFONE	UNINOR	RCOM (CDMA)	TATA (CDMA)
Total No. of calls Attempted	MHG	100	100	100	100	100	1	100	100	100	1
Total No. of calls Answered	MHG	100	100	100	100	100	1	100	100	100	1
Cases resolved within 4 weeks	MHG	100	100	100	100	100	1	100	100	100	1
%age of cases resolved	MHG	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

To test the Service Providers performance on billing related complaints and their resolutions, TUV-SUD auditors conducted a customer feedback calling for about random 100 nos. of customers. However, in some cases, the number of customers contacted for verification was very less due to less number of billing complaints. During live calling, some of the customers did not attend the calls, so shortfall was made good by taking other complaints to make verification of 100 Complaints.

Some of the complainants reported that they didn't exactly remember about the resolution of complaints. However, majority of the customers reported that the billing complaints were resolved to their satisfaction.

6.4 LEVEL -1 CALLING ASSESSMENT:

LEVEL 1 LIVE CALLING																
Emergency no.	Circle Name	Month	SSA Name	SDCA Name	No. of calls made	AIRCEL	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	UNINOR	VODAFONE	RCOM (CDMA)	TATA (CDMA)	
100, 101, 102,1098	MHG	Apr-15	Panjim (Goa)	Panjim	10	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
100, 101, 102,1098	MHG			Ponda, Senguem	20	✓	✓	✓	✓	✓	✓	✓	✓ (NC in Senguem)	✓	✓	✓
100, 101, 102,1098	MHG			Margaon, Canacona	20	✓	✓	✓	✓	✓	✓	✓	✓ (NC in Canacona)	✓	✓	✓
100, 101, 102,1098	MHG	May-15	Parbhani	Pathari , Jintur	20	NC	✓	✓	✓	✓ (NC in Pathari)	✓	✓	✓	✓	✓	
100, 101, 102,1098	MHG			Hingoli , Kalamnuri	20	NC	✓	✓	✓	NC	✓	✓	✓	✓	✓	✓
100, 101, 102,1098	MHG			Parbhani , Vasmat	10	NC	✓	✓	✓	NC	✓	✓	✓	✓	✓	✓
100, 101, 102,1098	MHG	Jun-15	Yeotmal	Dharwah , Digras , Pusad	20	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
100, 101, 102,1098	MHG			Babhulgaon, Kalamb, Ralegaon	20	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ (NC Ralegaon)	✓
100, 101, 102,1098	MHG			Yeotmal	10	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

NC: No Coverage

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 during the drive tests. 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'. The level one service of some of the operators was also not available in SDCAs where they were not having their coverage. Such SDCA have marked as 'NC'.

7. DRIVE TEST



7) OPERATOR ASSISTED DRIVE TEST

In terms of TRAI's letter dated 21st January, 2014, the drive tests were conducted for three consecutive days in one select SSA each month in each service area. Thus, the drive tests were carried out in three SSA's namely **Panaji, Parbhani and Yeotmal** in the months of April, May and June 2015 respectively. The total route Kms covered during drive tests in respective SSAs was **309 Kms, 332 Kms and 322 Kms**. The performance of the operators has been highlighted below in the tables. The drive test was conducted simultaneously for all the operators following the same route of drive tests. The holding period for all test calls was 120 seconds. The drive test vehicle across all routes plied at a speed of about 30-50 km per hour.

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

DRIVE TEST TABLE-1

OPERATOR ASSISTED DRIVE TEST AT PANAJI SSA IN APRIL 15 MONTH- MAHARSTRA & GOA CIRCLE

S/N	Parameter	Days of drive test	AIRCEL		AIRTEL		BSNL		TATA GSM		IDEA		RCOM GSM		UNINOR		VODAFONE		TATA CDMA		RCOM CDMA			
			OUTDOOR	INDOOR																				
1	Call Attempts	Highways	81	20	80	25	82	31	76	20	90	20	94	20	74	20	80	20	92	20	107	20		
		Major Roads	111	20	107	20	119	35	105	20	146	20	117	20	96	20	121	21	122	20	131	20		
		Within City	185	20	199	21	175	18	189	20	189	20	170	20	183	20	184	20	219	20	172	20		
		Overall SSA	377	60	386	66	376	84	370	60	425	60	381	60	353	60	385	61	433	60	410	60		
2	Blocked Call Rate	Highways	0.00%	0.00%	0.00%	0.00%	4.88%	3.23%	1.32%	0.00%	0.00%	0.00%	11.70%	0.00%	2.70%	0.00%	0.00%	0.00%	0.00%	0.00%	7.48%	0.00%		
		Major Roads	0.90%	0.00%	0.00%	0.00%	4.20%	5.71%	2.86%	0.00%	0.00%	0.00%	6.84%	0.00%	2.08%	0.00%	1.65%	0.00%	0.00%	0.00%	8.40%	0.00%		
		Within City	1.62%	0.00%	0.00%	0.00%	4.00%	5.56%	2.12%	0.00%	0.53%	0.00%	9.41%	0.00%	3.83%	0.00%	0.00%	0.00%	0.00%	0.00%	3.49%	0.00%		
		Overall SSA	1.06%	0.00%	0.00%	0.00%	4.26%	4.76%	2.16%	0.00%	0.24%	0.00%	9.19%	0.00%	3.12%	0.00%	0.52%	0.00%	0.00%	0.00%	6.10%	0.00%		
3	Dropped Call Rate (<=2%)	Highways	0.00%	0.00%	0.00%	0.00%	3.85%	3.33%	0.00%	0.00%	0.00%	0.00%	1.20%	0.00%	0.00%	0.00%	2.50%	0.00%	0.00%	0.00%	10.20%	0.00%		
		Major Roads	0.00%	0.00%	0.00%	0.00%	3.51%	4.35%	0.00%	0.00%	0.00%	0.00%	0.92%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.48%	0.00%		
		Within City	0.55%	0.00%	0.00%	0.00%	2.98%	0.00%	1.08%	0.00%	0.00%	0.00%	8.44%	0.00%	0.57%	0.00%	0.00%	0.00%	0.46%	0.00%	1.75%	0.00%		
		Overall SSA	0.27%	0.00%	0.00%	0.00%	3.33%	2.86%	0.55%	0.00%	0.00%	0.00%	4.34%	0.00%	0.29%	0.00%	0.52%	0.00%	0.23%	0.00%	4.10%	0.00%		
4	(a) 0-4 (w/o frequency hopping for CDMA)	Percentage connections with good voice quality (=>95%)																						
		Highways	NA	96.72%	99.76%	90.75%	100%																	
		Major Roads	NA	97.49%	98.69%	98.00%	100%																	
		Within City	NA	97.45%	98.93%	95.07%	100%																	

AUDIT & ASSESSMENT OF QOS FOR QE-JUNE-2015-MAHARASHTRA & GOA CIRCLE



OPERATOR ASSISTED DRIVE TEST AT PANAJI SSA IN APRIL 15 MONTH- MAHARSTRA & GOA CIRCLE

S/N	Parameter	Days of drive test	AIRCEL		AIRTEL		BSNL		TATA GSM		IDEA		RCOM GSM		UNINOR		VODAFONE		TATA CDMA		RCOM CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
			Overall SSA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.31%	99.14%	95.28%
5	Operators)	Overall SSA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.31%	99.14%	95.28%	100%	
		(b) 0-5 (with frequency hopping for GSM Operators)	Highways	94.18%	98.97%	97.87%	98.93%	92.49%	97.75%	98.34%	99.79%	95.76%	97.17%	91.02%	98.89%	94.45%	98.92%	95.23%	97.60%	NA	NA	NA	NA
			Major Roads	96.12%	99.52%	98.01%	96.72%	90.24%	81.60%	96.79%	100%	95.69%	99.11%	91.11%	99.87%	95.69%	99.09%	95.48%	95.58%	NA	NA	NA	NA
			Within City	94.40%	99.22%	97.95%	98.80%	89.05%	99.72%	98.00%	100%	96.40%	96.57%	89.33%	99.53%	94.07%	98.70%	95.90%	95.84%	NA	NA	NA	NA
5	Service Coverage	Overall SSA	94.87%	99.23%	97.95%	98.24%	90.10%	92.38%	97.72%	99.92%	96.16%	97.59%	90.30%	99.48%	94.62%	98.90%	95.56%	96.30%	NA	NA	NA	NA	
		In door (>= - 75dBm)	Highways	48.44%	49.83%	37.93%	100%	66.85%	73.95%	91.55%	92.42%	87.77%	99.96%	39.83%	99.09%	65.21%	100%	87.82%	100%	99.72%	100%	35.03%	93.84%
			Major Roads	41.79%	97.96%	54.19%	99.45%	59.25%	85.25%	90.41%	100%	85.73%	100%	37.04%	98.86%	50.40%	100%	92.12%	100%	99.95%	100%	39.44%	100%
			Within City	49.74%	90.90%	59.33%	72.63%	76.37%	99.66%	91.48%	100%	94.23%	100%	39.13%	99.54%	50.76%	100%	89.50%	100%	99.99%	100%	42.95%	100%
	Overall SSA		47.04%	80.07%	53.20%	91.06%	67.49%	86.29%	91.19%	96.89%	89.24%	99.99%	41.29%	99.16%	55.46%	100%	89.95%	100%	99.92%	100%	42.29%	97.95%	
	In-vehicle (>= - 85dBm)	Highways	71.51%	99.47%	76.06%	100%	93.81%	99.63%	99.09%	99.87%	97.63%	100%	71.53%	100%	92.27%	100%	96.38%	100%	99.92%	100%	60.06%	100%	
		Major Roads	73.08%	100%	82.63%	100%	92.63%	100%	98.90%	100%	97.63%	100%	64.31%	100%	77.98%	100%	98.92%	100%	99.99%	100%	70.23%	100%	
		Within City	78.33%	94.29%	88.15%	99.41%	96.69%	100%	98.43%	100%	99.17%	100%	66.77%	100%	82.84%	100%	98.26%	100%	100%	100%	71.24%	100%	
		Overall SSA	75.28%	97.58%	84.00%	99.81%	94.37%	99.88%	98.70%	99.95%	98.14%	100%	68.66%	100%	84.36%	100%	98.07%	100%	99.98%	100%	69.39%	100%	
	Outdoor-in city (>= - 95dBm)	Highways	92.41%	99.93%	93.29%	100%	98.76%	100%	100%	100%	99.70%	100%	89.49%	100%	98.57%	100%	99.15%	100%	100%	100%	87.11%	100%	
		Major Roads	96.23%	100%	96.09%	100%	99.35%	100%	100%	100%	99.73%	100%	88.79%	100%	96.82%	100%	99.62%	100%	100%	100%	94.13%	100%	
		Within City	97.25%	99.79%	98.89%	99.59%	99.82%	100%	100%	100%	99.83%	100%	89.26%	100%	97.54%	100%	99.52%	100%	100%	100%	89.38%	100%	
		Overall SSA	95.91%	99.90%	96.90%	99.98%	99.31%	100%	100%	100%	99.76%	100%	89.65%	100%	97.64%	100%	99.48%	100%	100%	100%	90.63%	100%	

AUDIT & ASSESSMENT OF QOS FOR QE-JUNE-2015-MAHARASHTRA & GOA CIRCLE



OPERATOR ASSISTED DRIVE TEST AT PANAJI SSA IN APRIL 15 MONTH- MAHARSTR & GOA CIRCLE

S/N	Parameter	Days of drive test	AIRCEL		AIRTEL		BSNL		TATA GSM		IDEA		RCOM GSM		UNINOR		VODAFONE		TATA CDMA		RCOM CDMA			
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR		
			6	Call Setup Success Rate (>=95%)	Highways	98.77%	100%	100%	100%	95.12%	96.77%	98.68%	100%	100%	100%	88.30%	100%	97.30%	100%	100%	100%	100%	100%	100%
Major Roads	99.10%	100%			100%	100%	95.80%	94.29%	97.14%	100%	100%	100%	93.16%	100%	96.88%	100%	98.35%	100%	100%	100%	100%	100%	92.37%	100%
Within City	98.38%	100%			100%	100%	96.00%	94.44%	97.88%	100%	98.94%	100%	90.59%	100%	96.17%	100%	100%	100%	100%	100%	100%	100%	99.42%	100%
Overall SSA	98.67%	100%			100%	100%	95.74%	95.24%	97.84%	100%	99.53%	100%	90.81%	100%	96.60%	100%	99.48%	100%	100%	100%	100%	100%	95.12%	100%
7	Hand Over Success Rate (HOSR)	Highways	100%	100%	100%	100%	94.12%	100%	100%	100%	100%	100%	100%	100%	100%	100%	96.99%	100%	100%	100%	100%	100%	100%	100%
		Major Roads	98.63%	100%	100%	100%	97.39%	100%	100%	100%	99.63%	100%	99.29%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Within City	100%	100%	100%	100%	94.50%	100%	100%	100%	99.42%	100%	99.51%	100%	99.37%	100%	98.34%	100%	100%	100%	100%	100%	100%	100%
		Overall SSA	99.66%	100%	100%	100%	95.39%	100%	100%	100%	99.62%	100%	99.74%	100%	99.64%	100%	98.42%	100%	100%	100%	100%	100%	100%	100%

NA: Not Applicable

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

DRIVE TEST TABLE-2

OPERATOR ASSISTED DRIVE TEST AT PARBHANI SSA IN MAY 15 MONTH - MAHARSTRRA & GOA CIRCLE

S/N	Parameter	Days of drive test	AIRCEL		AIRTEL		BSNL		TATA GSM		IDEA		RCOM GSM		UNINOR		VODAFONE		TATA CDMA		RCOM CDMA			
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR		
1	Call Attempts	Highways	NC	NC	169	25	150	25	140	25	170	28	23	25	131	25	140	27	166	25	127	25		
		Major Roads	NC	NC	103	25	90	25	98	25	78	25	NA	NC	87	25	108	26	91	25	92	25		
		Within City	NC	NC	252	10	219	11	229	10	217	10	26	NC	249	10	247	10	246	10	219	10		
		Overall SSA	NC	NC	524	60	459	61	467	60	465	63	49	25	467	60	495	63	503	60	438	60		
2	Blocked Call Rate	Highways	NC	NC	0.00%	0.00%	6.67%	4.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	3.94%	0.00%	
		Major Roads	NC	NC	0.00%	0.00%	8.89%	8.00%	1.02%	0.00%	0.00%	0.00%	NA	NC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.09%	0.00%	
		Within City	NC	NC	0.00%	0.00%	5.02%	9.09%	0.87%	0.00%	0.00%	0.00%	0.00%	NC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.85%	0.00%	0.91%	0.00%
		Overall SSA	NC	NC	0.00%	0.00%	6.32%	6.56%	0.64%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.39%	0.00%	1.83%	0.00%
3	Dropped Call Rate (<=2%)	Highways	NC	NC	0.00%	0.00%	4.44%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Major Roads	NC	NC	0.00%	0.00%	1.23%	0.00%	0.00%	0.00%	0.00%	0.00%	NA	NC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Within City	NC	NC	0.00%	0.00%	8.29%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.26%	0.00%	0.92%	0.00%
		Overall SSA	NC	NC	0.00%	0.00%	5.70%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.60%	0.00%	0.47%	0.00%
4	(a) 0-4 (w/o frequency hopping for CDMA)	Percentage connections with good voice quality (=>95%)																						
		Highways	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.44%	98.36%	98.32%	100%	
		Major Roads	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.98%	100%	98.85%	100%	
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.74%	99.84%	97.67%	100%	

AUDIT & ASSESSMENT OF QOS FOR QE-JUNE-2015-MAHARASHTRA & GOA CIRCLE



OPERATOR ASSISTED DRIVE TEST AT PARBHANI SSA IN MAY 15 MONTH - MAHARSTR & GOA CIRCLE

S/N	Parameter	Days of drive test	AIRCEL		AIRTEL		BSNL		TATA GSM		IDEA		RCOM GSM		UNINOR		VODAFONE		TATA CDMA		RCOM CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
			Operators																			
		Overall SSA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.56%	99.29%	98.12%	100%
(b) 0-5 (with frequency hopping for GSM Operators)	Highways	NC	NC	97.13%	99.20%	94.71%	99.00%	98.78%	100%	96.89%	99.28%	96.44%	99.10%	97.14%	97.76%	98.09%	96.32%	NA	NA	NA	NA	
	Major Roads	NC	NC	97.38%	99.35%	92.61%	98.11%	98.19%	99.95%	96.10%	99.59%	NA	NC	96.34%	99.58%	97.45%	98.54%	NA	NA	NA	NA	
	Within City	NC	NC	97.46%	99.32%	95.58%	100%	98.64%	99.90%	97.17%	95.68%	98.90%	NC	96.55%	99.16%	97.63%	99.32%	NA	NA	NA	NA	
	Overall SSA	NC	NC	97.34%	99.28%	94.71%	98.84%	98.59%	99.96%	96.91%	98.72%	97.70%	99.10%	96.68%	98.76%	97.75%	97.56%	NA	NA	NA	NA	
Service Coverage																						
5	In door (>= - 75dBm)	Highways	NC	NC	37.35%	97.38%	6.59%	9.08%	92.98%	95.81%	55.43%	16.20%	24.83%	40.94%	70.97%	99.90%	89.36%	95.01%	99.95%	100%	51.00%	63.30%
		Major Roads	NC	NC	46.21%	100%	11.30%	10.97%	92.34%	99.10%	65.80%	99.90%	NA	NC	75.37%	100%	95.42%	100%	99.94%	100%	50.66%	96.12%
		Within City	NC	NC	46.62%	100%	7.79%	15.13%	93.21%	91.86%	65.63%	80.10%	32.46%	NC	88.23%	99.97%	94.46%	100%	99.99%	100%	69.87%	90.93%
		Overall SSA	NC	NC	43.61%	98.90%	8.11%	11.73%	92.94%	96.40%	62.29%	65.40%	29.96%	40.94%	78.19%	99.97%	93.07%	9788.00%	99.97%	100%	58.25%	77.15%
5	In-vehicle (>= - 85dBm)	Highways	NC	NC	71.43%	97.57%	38.82%	57.91%	98.89%	99.97%	85.37%	97.00%	67.70%	93.79%	91.30%	100%	98.85%	99.05%	100%	100%	76.48%	99.51%
		Major Roads	NC	NC	86.33%	100%	44.84%	95.85%	99.21%	100%	87.13%	100%	NA	NC	88.13%	100%	99.11%	100%	100%	100%	85.36%	99.74%
		Within City	NC	NC	79.46%	100%	45.06%	100%	99.36%	100%	87.67%	99.50%	70.69%	NC	98.03%	100%	99.38%	100%	100%	100%	92.44%	100%
		Overall SSA	NC	NC	78.64%	98.98%	43.05%	84.59%	99.17%	99.99%	86.72%	98.83%	71.73%	93.79%	92.49%	100%	99.16%	9960.00%	100%	100%	85.90%	96.29%
5	Outdoor-in city (>= - 95dBm)	Highways	NC	NC	95.85%	98.90%	72.93%	91.11%	100%	100%	98.40%	100%	89.23%	100%	99.03%	100%	99.87%	99.83%	100%	100%	93.10%	100%
		Major Roads	NC	NC	98.39%	100%	78.43%	98.00%	100%	100%	99.00%	100%	NA	NC	98.80%	100%	99.70%	100%	100%	100%	98.82%	100%
		Within City	NC	NC	96.13%	100%	80.11%	100%	100%	100%	99.73%	99.90%	98.01%	NC	99.80%	100%	99.94%	100%	100%	100%	99.98%	100%
		Overall SSA	NC	NC	96.60%	99.54%	77.52%	96.37%	100%	100%	99.04%	99.97%	94.34%	100%	99.21%	100%	99.87%	9993.00%	100%	100%	97.67%	99.42%

OPERATOR ASSISTED DRIVE TEST AT PARBHANI SSA IN MAY 15 MONTH - MAHARSTR & GOA CIRCLE

S/N	Parameter	Days of drive test	AIRCEL		AIRTEL		BSNL		TATA GSM		IDEA		RCOM GSM		UNINOR		VODAFONE		TATA CDMA		RCOM CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
			6	Call Setup Success Rate (>=95%)	Highways	NC	NC	100%	100%	93.33%	96.00%	100%	100%	100%	96.43%	100%	100%	96.18%	100%	100%	100%	100%	100%
Major Roads	NC	NC			100%	100%	91.11%	92.00%	98.98%	100%	98.72%	100%	NA	NC	96.55%	100%	100%	100%	100%	100%	100%	98.91%	100%
Within City	NC	NC			100%	100%	94.98%	90.91%	99.13%	100%	99.54%	100%	100%	NC	97.19%	100%	100%	100%	97.15%	100%	99.09%	100%	
Overall SSA	NC	NC			100%	100%	93.68%	93.44%	99.36%	100%	99.57%	98.41%	100%	100%	96.79%	100%	100%	100%	98.61%	100%	98.17%	100%	
7	Hand Over Success Rate (HOSR)	Highways	NC	NC	100%	100%	92.27%	NA	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Major Roads	NC	NC	100%	NA	95.92%	100%	100%	100%	100%	100%	NA	NC	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Within City	NC	NC	100%	NA	94.88%	NA	99.68%	100%	99.59%	100%	100%	NC	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Overall SSA	NC	NC	100%	100%	94.42%	100%	99.85%	100%	99.79%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

NA: Not Applicable, NC: No Coverage

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

DRIVE TEST TABLE-3

OPERATOR ASSISTED DRIVE TEST AT YEOTMAL SSA IN JUNE 15 MONTH- MAHARSTRA & GOA CIRCLE																							
S/N	Parameter	Days of drive test	AIRCEL		AIRTEL		BSNL		TATA GSM		IDEA		RCOM GSM		UNINOR		VODAFONE		TATA CDMA		RCOM CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
1	Call Attempts	Highways	175	11	170	10	192	13	132	10	177	10	70	417	146	10	190	10	183	10	128	10	
		Major Roads	161	10	156	10	163	12	139	10	153	10	144	10	154	10	173	10	151	10	92	10	
		Within City	202	11	144	10	160	18	126	10	151	10	97	10	144	10	162	11	139	10	150	10	
		Overall SSA	538	32	470	30	515	43	397	30	481	30	176	10	444	30	525	31	473	30	370	30	
2	Blocked Call Rate	Highways	1.72%	0.00%	0.00%	0.00%	7.29%	7.69%	1.52%	0.00%	0.56%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.55%	0.00%	0.00%	0.00%
		Major Roads	1.24%	0.00%	0.00%	0.00%	6.13%	8.33%	1.44%	0.00%	0.00%	0.00%	0.00%	0.00%	0.65%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		Within City	0.00%	0.00%	0.00%	0.00%	8.13%	5.56%	0.79%	0.00%	0.00%	0.00%	0.00%	0.00%	0.69%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		Overall SSA	0.93%	0.00%	0.00%	0.00%	7.18%	6.98%	1.26%	0.00%	0.21%	0.00%	0.00%	0.00%	0.45%	0.00%	0.00%	0.00%	0.21%	0.00%	0.00%	0.00%	0.00%
3	Dropped Call Rate (<=2%)	Highways	1.16%	0.00%	0.00%	0.00%	1.12%	0.00%	0.77%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.55%	0.00%	1.56%	0.00%
		Major Roads	0.00%	0.00%	0.00%	0.00%	1.96%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		Within City	0.51%	0.00%	0.00%	0.00%	2.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		Overall SSA	0.57%	0.00%	0.00%	0.00%	1.67%	0.00%	0.26%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.21%	0.00%	0.54%	0.00%	0.00%
4	Percentage connections with good voice quality (=>95%)																						
	(a) 0-4 (w/o frequency)	Highways	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.55%	99.51%	99.47%	100%	
		Major Roads	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.75%	99.34%	99.78%	100%	

AUDIT & ASSESSMENT OF QOS FOR QE-JUNE-2015-MAHARASHTRA & GOA CIRCLE



OPERATOR ASSISTED DRIVE TEST AT YEOTMAL SSA IN JUNE 15 MONTH- MAHARSTRA & GOA CIRCLE

S/N	Parameter	Days of drive test	AIRCEL		AIRTEL		BSNL		TATA GSM		IDEA		RCOM GSM		UNINOR		VODAFONE		TATA CDMA		RCOM CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
			hopping for CDMA Operators)	Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.70%	97.05%
	Overall SSA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.66%	98.63%	99.73%	99.72%	
(b) 0-5 (with frequency hopping for GSM Operators)	Highways	96.00%	99.91%	98.43%	99.90%	90.44%	92.37%	96.90%	99.93%	95.35%	98.48%	97.74%	97.59%	95.85%	99.54%	97.51%	99.40%	NA	NA	NA	NA	
	Major Roads	98.35%	99.08%	98.25%	99.65%	92.24%	94.77%	96.77%	99.90%	95.34%	99.49%	96.37%	100%	96.02%	99.66%	97.64%	99.26%	NA	NA	NA	NA	
	Within City	97.89%	96.55%	98.56%	99.50%	91.61%	93.92%	97.27%	97.34%	96.05%	98.92%	98.54%	99.31%	95.99%	99.77%	97.42%	93.86%	NA	NA	NA	NA	
	Overall SSA	97.42%	98.50%	98.41%	99.68%	91.40%	93.71%	96.97%	98.99%	95.57%	98.96%	98.04%	99.09%	95.95%	99.66%	97.53%	97.26%	NA	NA	NA	NA	
Service Coverage																						
5	In door (>= - 75dBm)	Highways	58.49%	100%	61.03%	99.89%	38.66%	98.47%	91.07%	100%	70.33%	100%	19.99%	29.66%	54.50%	100%	64.81%	100%	99.86%	100%	58.64%	100%
		Major Roads	63.99%	54.39%	68.47%	100%	54.56%	19.28%	92.13%	100%	81.57%	100%	28.02%	99.28%	57.80%	100%	66.13%	99.81%	99.98%	100%	66.89%	100%
		Within City	73.04%	22.07%	73.95%	100%	39.30%	93.97%	92.55%	100%	81.09%	99.91%	26.39%	100%	65.10%	100%	79.31%	97.99%	99.99%	100%	61.25%	90.89%
		Overall SSA	66.56%	55.70%	67.32%	99.96%	44.08%	71.05%	91.90%	100%	77.66%	99.97%	27.18%	72.01%	58.92%	100%	69.53%	99.24%	99.94%	100%	64.39%	96.96%
5	In-vehicle (>= - 85dBm)	Highways	86.36%	100%	89.35%	100%	83.88%	100%	98.99%	100%	95.60%	0.00%	50.20%	66.80%	82.90%	100%	87.42%	100%	99.97%	100%	89.55%	100%
		Major Roads	79.85%	99.44%	93.11%	100%	94.54%	99.93%	99.56%	100%	97.66%	0.00%	72.35%	100%	84.90%	100%	92.14%	100%	100%	100%	96.54%	100%
		Within City	92.23%	99.83%	91.54%	100%	92.59%	100%	99.45%	100%	98.04%	0.00%	69.23%	100%	91.80%	100%	97.16%	99.63%	100%	100%	91.92%	100%
		Overall SSA	87.01%	99.69%	91.17%	100%	90.34%	99.98%	99.33%	100%	97.10%	0.00%	56.73%	100%	86.00%	100%	91.85%	99.87%	99.99%	100%	92.80%	100%
5	Outdoor-in city (>= - 95dBm)	Highways	97.65%	100%	98.18%	100%	94.74%	100%	100%	100%	99.29%	0.00%	85.40%	92.03%	97.50%	100%	97.26%	100%	100%	100%	99.73%	100%
		Major Roads	84.91%	100%	99.24%	100%	99.89%	100%	100%	100%	99.93%	0.00%	94.15%	100%	97.40%	100%	99.46%	100%	100%	100%	100%	100%
		Within City	99.30%	100%	98.13%	100%	99.60%	100%	100%	100%	99.92%	0.09%	94.88%	100%	99.40%	100%	99.70%	100%	100%	100%	99.99%	100%

AUDIT & ASSESSMENT OF QOS FOR QE-JUNE-2015-MAHARASHTRA & GOA CIRCLE

OPERATOR ASSISTED DRIVE TEST AT YEOTMAL SSA IN JUNE 15 MONTH- MAHARSTR & GOA CIRCLE																							
S/N	Parameter	Days of drive test	AIRCEL		AIRTEL		BSNL		TATA GSM		IDEA		RCOM GSM		UNINOR		VODAFONE		TATA CDMA		RCOM CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
					Overall SSA	94.58%	100%	98.48%	100%	98.07%	100%	100%	100%	99.72%	0.03%	87.60%	100%	98.00%	100%	98.70%	100%	100%	100%
6	Call Setup Success Rate (>=95%)	Highways	98.29%	100%	100%	100%	92.71%	92.31%	98.48%	100%	99.44%	100%	100%	100%	99.32%	100%	100%	100%	99.45%	100%	100%	100%	
		Major Roads	98.76%	90.00%	100%	100%	93.87%	91.67%	98.56%	100%	100%	100%	100%	100%	99.35%	100%	100%	100%	100%	100%	100%	100%	
		Within City	97.52%	90.91%	100%	100%	91.88%	94.44%	99.21%	100%	100%	100%	100%	100%	97.92%	100%	100%	100%	100%	100%	100%	100%	
		Overall SSA	98.14%	93.75%	100%	100%	92.82%	93.02%	98.74%	100%	99.79%	100%	100%	100%	98.87%	100%	100%	100%	99.79%	100%	100%	100%	
7	Hand Over Success Rate (HOSR)	Highways	100%	100%	100%	100%	94.92%	100%	100%	100%	99.69%	100%	100%	100%	97.45%	100%	100%	100%	100%	100%	100%	100%	
		Major Roads	100%	100%	100%	100%	97.64%	100%	100%	100%	99.64%	100%	100%	100%	99.53%	100%	100%	100%	100%	100%	100%	100%	
		Within City	100%	100%	100%	100%	97.87%	90.45%	100%	100%	100%	100%	100%	100%	97.85%	100%	100%	100%	100%	100%	100%	100%	
		Overall SSA	100%	100%	100%	100%	96.70%	92.86%	100%	100%	99.77%	100%	100%	100%	98.34%	100%	100%	100%	100%	100%	100%	100%	

NA: Not Applicable

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

7.1 DETAIL OF THE ROUTES COVERED DURING THE DRIVE TESTS:

DRIVE TEST TABLE: 4

DRIVE TEST ROUTE OF APRIL TO JUNE 15 – MH&G CIRCLE							
Name of SSA	Drive test Period	Day 1		Day 2		Day 3	
		Name of SDCA & KM Covered	Route Covered	Name of SDCA & KM Covered	Route Covered	Name of SDCA & KM Covered	Route Covered
PANAJI	Apr-15	Panjim / 101 KMs	Goa University , Health care Centre road , Nagali- Talegaon , Keranjalem , Miramar Beach , Campel- sports head office , BOI miramar branch , St INEZ , Dhanlaxmi Bank , M.G Road , Altinho Rd , Chinchode , New Talegaon Rd ,Betim Road , Verem , Bardez Road , Verem- Candolim Road. ,Mapusa Highway , Panjim to Margaon Highway , Old Goa Road. INDOOR: BSNL EXCHANGE , Altinho , Panjim	Ponda & Senguem SDCA / 105 KMs	PONDA SDCA:- Panchayat Office , Haveli-Kurti , Naga Masjid Road , Behind Hotel Sunn inn , Warkhandem , Fire Station Rd , A.J de almeida High school , Heritage Princess , Khadapaband , Freinds colony , Civil Court Rd , Kapiteshwaram , Kavlem , Sanatam Ashram d , Davadi-Fonda , St Cruz ,Panaji Highway NH-4 , Pharmacy College Road , Margao Highway ,Ponda- Belgaum Road , Borim- Shiroda. SANGEUM SDCA:- Behind Buss stand Sangeum , Market Road , Near lake area , HDFC Bank road , Khutivada , Kalay Costi , Pueena mal , Donda , Ponda highway , Bendwada , Uguem Road , Police station Road. INDOOR: BSNL Exchange , Ponda City	Madgaon & Canacona / 103 KMs	MARGAON SDCA:- HP Petrol pump road , State bank of travancore , Pajifond , Cine vishant Road , Malbhat , Babu naik Road , Aquem , HDFC Bank rd , PWD Colony , Old Market road , Comba , Custodio Pinto rd , Dirctorate of agriculture office rd , Baptista Road , Main Market behind MMC Garden , Old railway station road , Jamia Masjid Road , Station Road , Station rd bridge , Kharaband Road , Neugi Road , MMC Garden Rd , Colve Circle , KTC Bus stand Road , South Goa district H.Q , Nuvem Road , Fatorda , Nehru Stadium Road , Borda Toleband Road , Panaji to Margaon Highway , Indian Oil Petr Pump , Bypass Road , Quepem Road. CANACONA SDCA:- Near Bagayat Bazaar , Chowdi Market area , Rajbag , Beach Road , Near Lalit Hotel ,Canacona Police station , Mallikarjun temple road , Community health

DRIVE TEST ROUTE OF APRIL TO JUNE 15 – MH&G CIRCLE

Name of SSA	Drive test Period	Day 1		Day 2		Day 3	
		Name of SDCA & KM Covered	Route Covered	Name of SDCA & KM Covered	Route Covered	Name of SDCA & KM Covered	Route Covered
							crntre road , IPO , Chowdi ,Karwar Highway , Margaon Highway , Bus stand road. INDOOR: INOX Mall , Near Colva Circle , Margaon
PARBHANI	May-15	Pathari & Jintur / 92 KMs	Pathari : High-Ways - 1) Majalgaon-Manwat NH-222. 2) Selu-sonpeth HW. Major Road - Kranti Chouk ,I.T.I. Govt. College ,Maliwada Road ,Maulana Abdul Kalam Chouk ,bus Stand ,Shivaji chouk ,Rampuri Road ,Mana Masjid ,Rampuri By-Pass Road ,Ekbal Chouk ,Rajmata Jijau Chouk ,Amera Chouk ,BSNL Exchange ,Lahuji Chouk ,Hadgaon Road. WithIn City - Fule Nagar ,Pathari BSNL exchange ,Krishi Uttpana Bazar Samiti ,Bhim Nagar ,Netaji Nagar ,Sathe Nagar ,Netaji School ,Athwade Bazar ,Mali Galli ,Main Road ,Bazar Peth ,Nagarparishad ,police Station ,Karanja Chouk ,Sai Chouk ,madina Chouk ,Sai Road ,Bus Stand ,Shivaji Chouk ,Ravidas Colony ,Jawahar Nagar. Jintur : High Ways - 1) Aurangabad-Nanded HW 2) Parbhani-Shengaon HW. WithIn City - Govt. College of Engg. ,Jalna Road ,Yeldari Road ,Krishi Uttpana Bazar Samiti Area ,Nava Mondha ,Main Road ,Sarafa Lane	Hingoli & Kalamnuri / 102 KMs	Hingoli : High Ways - 1) Parbhani-Kalamnuri HW 2) Akola bypass road 3) Parbhani - Akola HW Major Road : Bus Stand ,Vasmat Road ,Sengaon road ,Narsi Fata ,Agrasen chouk ,I.T.I college ,Bangar Nagar , ,SRPF office ,Ydut Road ,Z.P.M.P. School ,Govt.Guest house ,Station Road ,old BSNL exchange ,Gandhi Chouk ,Palsi Road. Within City : Gayatri Nagar ,Dube Marg ,Adasha College ,Savarkar Nagar ,Station Road ,Tahacil Karyalay ,Civil Court ,Biyani Nagar ,Main Road ,Jawahar Road ,Naw Monda ,APMC ,Staion ,Pention Pura ,Gawli Pura ,Naik Nagar ,Ajam Colony ,Police Head Quater ,Bus Stand. Kalamnuri : High Ways - 1) Hingoli-Ardhapur HW With In City - Govt. Guest House ,Sai Nagar ,Shastr Nagar , ganesh nagar	Parbhani & Vasmat / 138 KMs	Parbhani : With in City - Vakil Colony ,Bus stand ,Gandhi Park ,Saraf Lane ,Subhash Road ,Jamkar college Area ,Jail Road ,Police Head Quarter ,Post Office ,Kachhi lane ,Station Road ,Shivaji Chouk ,Shahi Masjid ,Janta Market ,Nanal Peth ,Vidya Nagar ,Sane chouk ,Khndoba Road ,Gulshan Nagar ,Vangi road ,Hudco ,Anand Nagar ,Shi-Ram Nagar ,Vasmat Road ,MIDC Area ,Krishi University ,Ram-Krishna Nagar ,AIR ,Vishnu Nagar ,Railway Station ,Mondha ,Ambedkar Nagar ,Prasad Nagar ,Darga Road ,Pedgaon Road ,Ganpati Nagar ,Trimurti Nagar ,Kwaja Colony ,Sahakar Nagar ,Eknath Nagar. High Ways - 1) Parbhani-Jintur HW 2) Parbhani-Pathari HW 3) Parbhani-Gangakhed HW 4) Parbhani-Vasmat HW Major Road - Vasant Dada Maratwada Krishi Vidyapith ,Khana pur ,Pingali Road

DRIVE TEST ROUTE OF APRIL TO JUNE 15 – MH&G CIRCLE

Name of SSA	Drive test Period	Day 1		Day 2		Day 3	
		Name of SDCA & KM Covered	Route Covered	Name of SDCA & KM Covered	Route Covered	Name of SDCA & KM Covered	Route Covered
			,Police Station ,Shivaji chouk ,Balsa Road ,Chaparasi Colony ,Ambedkar Nagar ,Jintur BSNL Tele.Exe ,Shivaji Nagar ,Tirupati Nagar ,Gulshan colony ,Buddha Nagar ,Mangalwar Bazar ,MSEB Sub-Station ,Mondha Road. Indoor: Market Yard , Jintur		,Asol wadi ,Bus stand ,Main Road ,Nalanda Nagar ,Indira Nagar ,Shri ram Nagar ,Darga Road ,Maruti Mandir Road ,Mali Galli ,Bazar Peth ,Police station ,Bus stand. Indoor: City Bus Stand Complex , Kalamnuri		,Kalyan Nagar ,AIR ,Lahuji Nagar ,Super Market Road ,Dhar Naka ,Khndoba Nagar ,Dhar Road ,Deshmukh Galli ,Sai Road ,Vasmat Road. Vasmat : High Ways - 1) Parbhani-Vasmat HW 2) Vasmat-Nanded HW Within City - Bus Stand ,Mama Chouk ,Kurunja road ,Kautha Road ,Asegaon road ,Fule Nagar ,Vasmat Nagar ,Sai Nagar ,Patil Nagar ,old bus stand ,Karkhana Road ,Swami Chouk ,Police Station ,Nagar Parishd. Indoor: Mundala Complex , Vasmat
YEOTMAL	Jun-15	Dharwah , Digras , Pusad / 110 KMs	Pathari : High-Ways - 1) Yeotmal-Dharwah HW 2) Dharwah-Digras HW. 3) Yeotmal-Nanded HW Major Road - Warur Road ,Ner Road ,Urdu School ,Motibag Railway Station ,Karanja Road ,Bus Stand ,Pusad Road. Within City - MSEB Sub station ,Asim Colony ,Krishi Vidyalay ,Arni Road ,Shivaji Nagar ,Ambika Nagar ,Main Road ,Bus stans area ,Civil court ,BSNL Dharwah ,Golibar Chouk ,Tamdut Chouk.	Babhulgaon , Kalamb , Ralegaon / 104 KMs	Babhulgaon : High Ways - 1) Yeotmal - Dhamangaon HW Major Road : Bus Stand , BSNL exchange ,Gandhi Chouk ,Kalamb Road ,BOI ,Bus stand. Within City : Bus Stand ,Civil court ,Main Road ,Alhabad Bank ,New Bus Stand ,MSEB office ,Koli Galli ,Manawata Mandir ,Police Station ,Govt guest house ,Kalamb Road. Kalamb : High Ways - 1) Babhulgaon-Kalab HW 2) Kalamb - Yeotmal	Yeotmal / 108 KMs	Yeotmal : With in City - Lathi wala Chouk ,Bus Stand ,Nagar Parishd , Main Road ,Sarafa Lane ,Gandhi Chouk , Shatri Nagar ,Jai Hind ,Saroj Talkies ,Neharu Chouk ,Tanga Chouk ,Choti Gujari ,Chandani Chouk ,Post Office ,Govt. Medical college ,SBI , Datta Chouk ,Samartha Wadi ,Shivaji Nagar ,Date College area ,Umarsara ,Arni Road ,Darda Nagar , Arni Road. High Ways - 1) Yeotmal - Dhamangaon 2) Yeotmal -

DRIVE TEST ROUTE OF APRIL TO JUNE 15 – MH&G CIRCLE

Name of SSA	Drive test Period	Day 1		Day 2		Day 3	
		Name of SDCA & KM Covered	Route Covered	Name of SDCA & KM Covered	Route Covered	Name of SDCA & KM Covered	Route Covered
			<p>Digras : High Ways - 1) Dharwah-Digras HW 2) Digras-Manora HW. 3) Digras-Pusad HW WithIn City - BSNL Digras ,Police Station ,Ambedkar Chouk ,Ghanti Baba Temple ,Arni Naka ,Subhash Nagar ,Arni Road ,Civil Hospital Area ,Tahasil Chouk ,Viraj nagar ,Gandhi Chouk ,Main Road ,Pusad Road ,Tirupati Park.</p> <p>Pusad : High-Ways - 1) Digras-Pusd HW 2) Pusad-Jambazar HW Major Road- Halkar Chouk ,Govt Guest house ,Wasim Road ,Shivaji Chouk ,Main Road ,Police quartes ,Civil Court ,BSNL Pusd ,Bus Stand ,Moti Nagar ,Karla Road ,Gandhi Nagar ,Shrirampur ,Hirani College ,Umerkhed Road. Indoor: BSNL Pusad Campus</p>		<p>HW. Major Road - Panchayat Samiti ,Nagpur Road ,Ralegaon Road ,Indira College. With In City - Bus stand , Shivaji Chouk ,Jodmona Road ,Ganesh Nagar ,Datta Road ,Saheb Nagar ,Rasa Road ,APMC ,Vyas Lay out ,main road ,Post Office ,Neharu Nagar ,Panchayat Samiti ,Ralegaon Road.</p> <p>Ralegaon : High_ways - 1) Kalamb-Ralegaon HW 2) Ralegaon _ Wani HW Major Road - Bus Stand , Vadki Road ,Savangi Gaon , Radha Krishna Nagari ,Sai Nagar ,Raveri Road ,Raveri Gaon , BSNL , Main Road , Mata Nagar ,Kranti Chouk , Police Station , Ambedkar Chouk ,APMC. Indoor: Kolhe Comercial Complex, Ralegaon.</p>		<p>Nagapur 3) Yeotmal - Wani 4) Yeotmal - Ghatangi 5) Yeotmal - Dharwah 6) Yeotmal - Amrawati HW Major Road - Arni Road ,Vamanrao Chouk , Anad Nagar Road ,Godhani Road , AIR , Panchayat Samiti , Vadgaon Road , Bus Stand , Jam road , Gonda Pura , Shiv Neri Society , Dharwah Road. Indoor: BSNL Yeotmal , Campus</p>

7.2 SSA WISE DRIVE TEST OBSERVATION:

DRIVE TEST TABLE: 5

DRIVE TEST OBSERVATION OF PANAJI SSA (APRIL-15)

S. NO	Name of SP	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	AIRCEL	Panjim	Poor voice quality observed at Santa Cruz, Goa University, Near by Bambolim	Ponda & Senguem	Ponda SDCA :Poor Receiving level observed at Ponda Education society and Shri durga temple Sengeum SDCA: Poor Rx Level & voice quality observed at Sengeum-Umeg road	Madgaon & Canacona	---
2	AIRTEL		---		Ponda SDCA :Poor Receiving level observed at NH17B & NH4A and Sengeum SDCA: Sengeum-Umeg road		---
3	BSNL		Poor voice quality observed at Santa Cruz, Goa University, Near by Bambolim, And Dauna Paula area.		Ponda SDCA :Poor Voice quality observed at Prabhu nagar & Ponda Durbhat road		Madgaon SDCA : Poor Voice quality observed at Ambaji, Arlim by pass and Pajifond area
4	IDEA		---		Sengeum SDCA:Poor Voice quality observed at Sengeum-Umeg road		---
5	UNINOR		Poor Voice quality observed at Aguada road , Taligaon road , Braga road ,Goa University area ,Santa-Cruz area		Ponda SDCA :Poor Voice quality observed at NH-4A		---
6	VODAFONE		Poor Voice quality observed at Betim area, Old Goa Road ,GOA University area.		---		Madgaon SDCA : Poor Voice quality observed at St. Joaquim Rd, Arlem Bypass area
7	TATA GSM		Poor Voice quality observed at Near Zosali gaon, near Magnum Resort ,Raybander area		Ponda SDCA :Poor Voice quality observed at Ponda market area. Senguem SDCA : Sanguem-Calem Rd. & Sengeum-Umeg road		---
8	TATA CDMA		---		---		Canacona SDCA : Industrial Area
9	RCOM GSM		Poor Receiving level & Voice quality observed at Near Magnum Resort ,Raybander area , Hotal Swimsee, Hotal London		Ponda SDCA :Poor Receiving level and Voice quality observed at Ponda Market , Upper market , Narayanji temple . Senguem SDCA :Sengeum-Umeg road		Madgaon SDCA : Poor Receiving level and Voice quality observed at Lotus city center, Mount hill, Lotus classic area
10	RCOM CDMA		---		---		---

Common Troublesome Areas: Panjim: Goa University, Santa-Cruz area, Raybander area and Senguem SDCA: Sengeum-Umeg road

DRIVE TEST TABLE: 6

DRIVE TEST OBSERVATION OF PARBHANI SSA (MAY-15)

S NO	Name of SP	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	AIRCEL	Jintur, Pathari	No Coverage	kalamnuri, Hingoli	No Coverage	Vasmat, Parbhani	No Coverage
2	AIRTEL		Jintur SDCA: Poor Rx Quality observed at Parbhani -Jintur Road and Nemgiri Road.		Poor Rx Level at Khwaja colony and Shiwani Kh Road		Vasmat SDCA : Poor Rx Level at Vasmat - Ardhapur Road and some part of Parbhani State HW
3	BSNL		Jintur SDCA: Poor Voice quality at Pathari HW and Jintur HW		Kalamnuri SDCA : Poor Rx Level and quality at Kalamnuri HW and Hingoli HW		Parbhani SDCA : Poor Rx Quality observed at Parbhani HW,poor voice quality observed at MIDC & sub areas and Jintur road
4	IDEA		-		-		-
5	UNINOR		Pathari SDCA: Poor coverage observed on Majalgaon Manwat HW		Hingoli SDCA : Poor Voice quality at Akola By-Pass		-
6	VODAFONE		-		-		-
7	TATA GSM		-		-		Parbhani SDCA : Poor voice quality at Vangi Road & Anand Nagar area.
8	TATA CDMA		Pathari SDCA : Poor Voice quality observed at Pathari HW.		-		-
9	RCOM GSM		Jintur SDCA: Poor voice quality observed at Jintur Road.		No Coverage		No Coverage
10	RCOM CDMA		Jintur SDCA: Poor Rx Quality observed at Pathari HW.		Hingoli SDCA : Poor Rx quality observed near Hingoli Railway Track		Parbhani : Poor Rx Level observed at Vidyanagar ,Parbhani and Basmat HW.

Common Troublesome Areas: Jintur SDCA: Jintur HW, Ardhapur Highway, Hingoli Highway.

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DRIVE TEST TABLE: 7

DRIVE TEST OBSERVATION OF YEOTMAL SSA (JUNE-15)

S. No	Name of SP	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	AIRCEL	Darwah ,Digras, Pusad	Dharwah SDCA : Poor Rx Quality at Darwah HW & ICR with RCOM GSM for whole SSA	Babhulgaon, Kalamb, Ralegaon	Babhulgaon SDCA : Poor Rx Level at Bhabhulgaon HW & ICR with RCOM GSM for whole SSA	Yeotmal	Poor Voice quality observed at Wadgoan Raod, Darwah MIDC, Civil Lines & ICR with RCOM GSM for whole SSA
2	AIRTEL		Dharwah SDCA : Poor voice quality observed at Dharwah Yeotmal High Way.		-		-
3	BSNL		Dharwah SDCA : Poor Rx Level at Darwah HW		Babhulgaon SDCA : Poor Rx Level at Bhabhulgaon HW		Poor voice quality observed at SBI office and near area.
4	IDEA		Dharwah SDCA : Poor Rx Level at Darwah HW		Kalamb SDCA : Poor Rx Level at Yeotmal HW		-
5	UNINOR		Poor Rx Level at Darwah & Ganeshpur road at Dharwah Also at Manora road		Ralegaon SDCA : Poor voice quality observed at Kalam and Ralegaon HW		-
6	VODAFONE		-		Kalamb SDCA : Poor Rx Quality observed at NH-236		-
7	TATA GSM		-		Poor Rx Level at Bhabhulgaon HW		-
8	TATA CDMA		Dharwah SDCA : Poor voice quality observed at Dharwah HW		-		-
9	RCOM GSM		Dharwah SDCA : Poor Rx Quality at Darwah HW		Babhulgaon SDCA : Poor Rx Level at Bhabhulgaon HW		Poor Rx Level at Wadgoan Raod, Darwah MIDC and sub areas.
10	RCOM CDMA		Dharwah SDCA : Poor voice quality observed at Dharwah HW		Ralegaon SDCA : No Coverage. Babhulgaon SDCA : Poor Rx quality at Bhabhulgaon HW		-

Common Troublesome Areas: Dharwah SDCA: Poor voice quality observed at Darwah & Babhulgaon highway.

DRIVE TEST TABLE: 8

NO NETWORK COVERAGE STATUS OF DRIVE TEST – APRIL TO JUNE 15

S No	Month of Drive Test	Operator	SSA	Total SDCA Covered	Status of no network coverage area (SDCA Name)	ICR Status (SDCA Name)
1	April-15	Aircel	Goa	Panjim , Ponda , Senguem , Madgaon & Canacona	No Coverage Issue	NO
		Airtel			No Coverage Issue	NO
		BSNL			No Coverage Issue	NO
		Idea			No Coverage Issue	NO
		Uninor			Canacona SDCA	NO
		Vodafone			No Coverage Issue	NO
		Tata GSM			No Coverage Issue	NO
		Tata CDMA			No Coverage Issue	NO
		RCOM GSM			No Coverage Issue	NO
		RCOM CDMA			No Coverage Issue	NO
2	May-15	Aircel	Parbhani	Parbhani ,Pathari , Jintur ,Hingoli , Kalamnuri & Vasmat	Parbhani ,Pathari , Jintur ,Hingoli , Kalamnuri & Vasmat SDCA (All SSA)	NO
		Airtel			No Coverage Issue	NO
		BSNL			No Coverage Issue	NO
		Idea			No Coverage Issue	NO
		Uninor			No Coverage Issue	NO
		Vodafone			No Coverage Issue	NO
		Tata GSM			No Coverage Issue	NO
		Tata CDMA			No Coverage Issue	NO
		RCOM GSM			Parbhani ,Pathari , Hingoli , Kalamnuri & Vasmat SDCA	NO
		RCOM CDMA			No Coverage Issue	NO
3	June-15	Aircel	YEOTMAL	Dharwah , Digras , Pused ,Babhulgaon , Kalamb , Ralegaon & YEOTMAL	No Coverage Issue	Aircel is on ICR with RCOM GSM all over SDCA
		Airtel			No Coverage Issue	No
		BSNL			No Coverage Issue	No
		Idea			No Coverage Issue	No
		Uninor			No Coverage Issue	No
		Vodafone			No Coverage Issue	No
		Tata GSM			No Coverage Issue	TATA GSM is on ICR with RCOM GSM at Babhulgaon and Kalamb SDCA
		Tata CDMA			No Coverage Issue	No
		RCOM GSM			No Coverage Issue	No
		RCOM CDMA			Ralegaon SDCA	No

7.3 KEY FINDINGS ON DRIVE TEST:

The key observations derived from the results of the drive tests were as under –

- (i) **In the Month of April -15**, drive test was conducted across **Panaji** SSA, covering Panjim, Ponda, Senguem, Madgaon & Canacona SDCAs (Total 309 Kms). The non-compliance of the service providers in respect of some of the parameters on overall SSA basis is summarized below:

BSNL lagged behind in achieving the benchmarks for parameter **Call Drop Rate , Voice Quality , and Blocked Call Rate** with its performance as **3.33% (outdoor) / 2.86% (indoor) , 90.10% (outdoor) / 92.38% (indoor)** and **4.26% (outdoor) / 4.76% (indoor)** respectively on overall SSA basis.

RCOM GSM remained under performed for parameters **Call Drop rate (4.34% - outdoor) , Voice Quality (90.30% - outdoor) , CSSR (90.81%- outdoor) and Blocked Call Rate (9.19%-outdoor)** respectively.

RCOM CDMA failed to meet the benchmark of parameters **Call Drop Rate (4.10% - outdoor) and Blocked call rate (6.10%- outdoor)**.

Uninor could not achieve the benchmark of parameters **Voice Quality (94.62%- outdoor) and Blocked Call rate (3.12% - outdoor)**

Aircel failed to meet the benchmark of parameter **Voice Quality (94.87% - outdoor)**.

- (ii) **In the Month of May -15**, drive test was conducted across **Parbhani** SSA covering Parbhani, Pathari, Jintur ,Hingoli , Kalamnuri & Vasmat SDCAs (Total 332Kms). **Aircel has no coverage in this SSA**. The results of the drive test exposed that only **BSNL** could not comply with the benchmark of the parameters **Call Drop Rate , Voice Quality and CSSR / Blocked Call Rate** with its achievement as **5.70% (outdoor) , 94.71% (Outdoor) and 93.68% (outdoor)/ 93.44% (indoor) and 6.32% (Outdoor) / 6.56% (Indoor)** respectively on overall SSA level.

- (iii) **In the month of June -15**, drive test was conducted across **Yeotmal** SSA covering Dharwah , Digras , Pusad ,Babhulgaon , Kalamb , Ralegaon & YEOTMAL SDCAs (Total 322 Kms). The performance of **BSNL** with respect to the parameters **Voice quality , CSSR and Blocked Call rate remained** under performed with their achieved level as **91.40% (outdoor) / 93 ,71% (indoor) , 92.82% (outdoor) / 93.02% (indoor) and 7.18% (outdoor) / 6.98% (indoor)** respectively. Whereas, **Aircel failed** to meet the benchmark of **CSSR (93.75%)** during indoor drive test.

The deficiencies with respect to adequate coverage and poor voice quality, encountered by different Service providers at the various places, shown in the drive tests plots, are detailed in the above table.-5, table-6 and table-7 respectively for respective SSA.

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

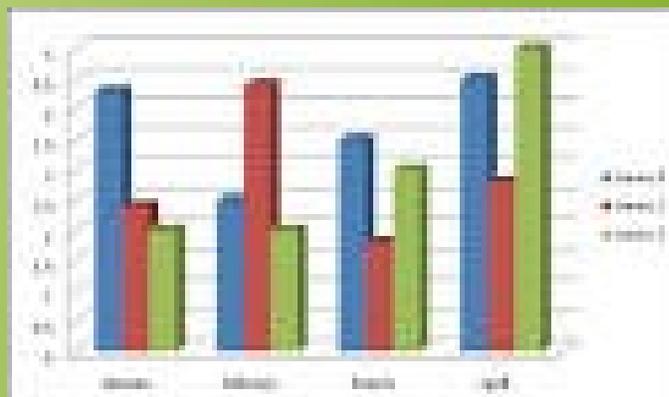
*Thus the analysis of Drive tests revealed that Service providers namely **BSNL, RCOM (GSM) / RCOM (CDMA) , Aircel and Uninor** remained non-complied and need to improve their network performance with respect to the parameters **Voice Quality, Call Drop rate and Call setup success rate / Blocked Call Rate** at different locations of **Panaji , Parbhani and Yeotmal** SSAs , where the drive tests were conducted.*

8. GRAPHICAL REPRESENTATION (CELLULAR MOBILE SERVICE PROVIDERS)

AVERAGED QUARTERLY PMR

V/S

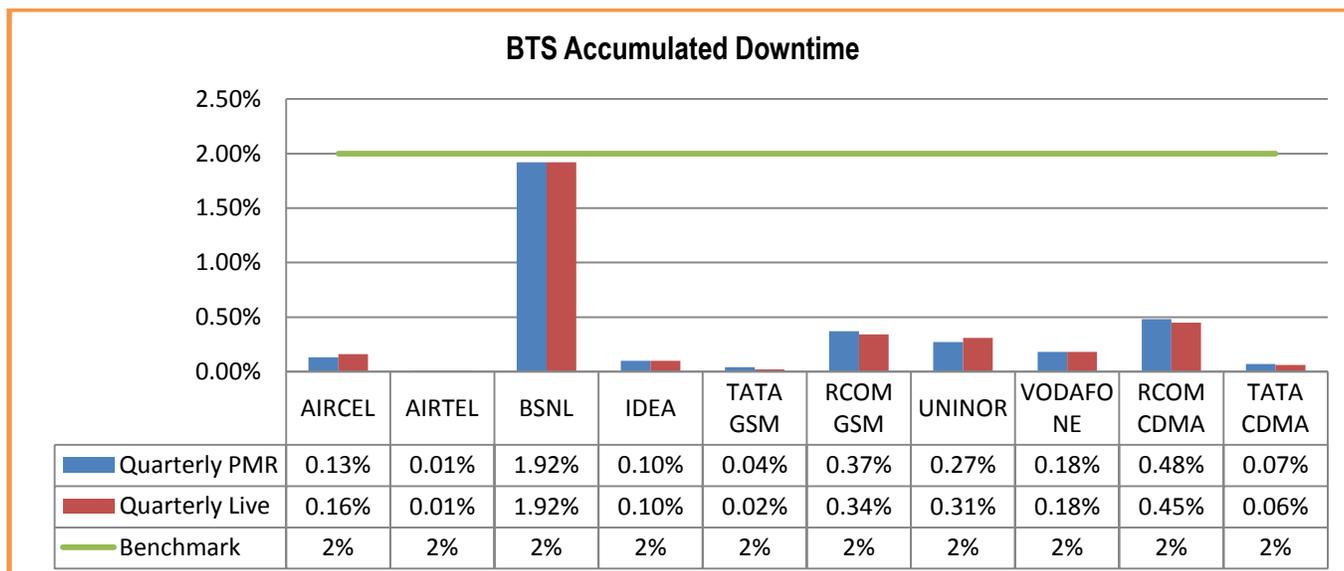
AVERAGED QUARTERLY 3-DAYs LIVE MEASURMENT



8) GRAPHICAL REPRESENTATION (CMTS):

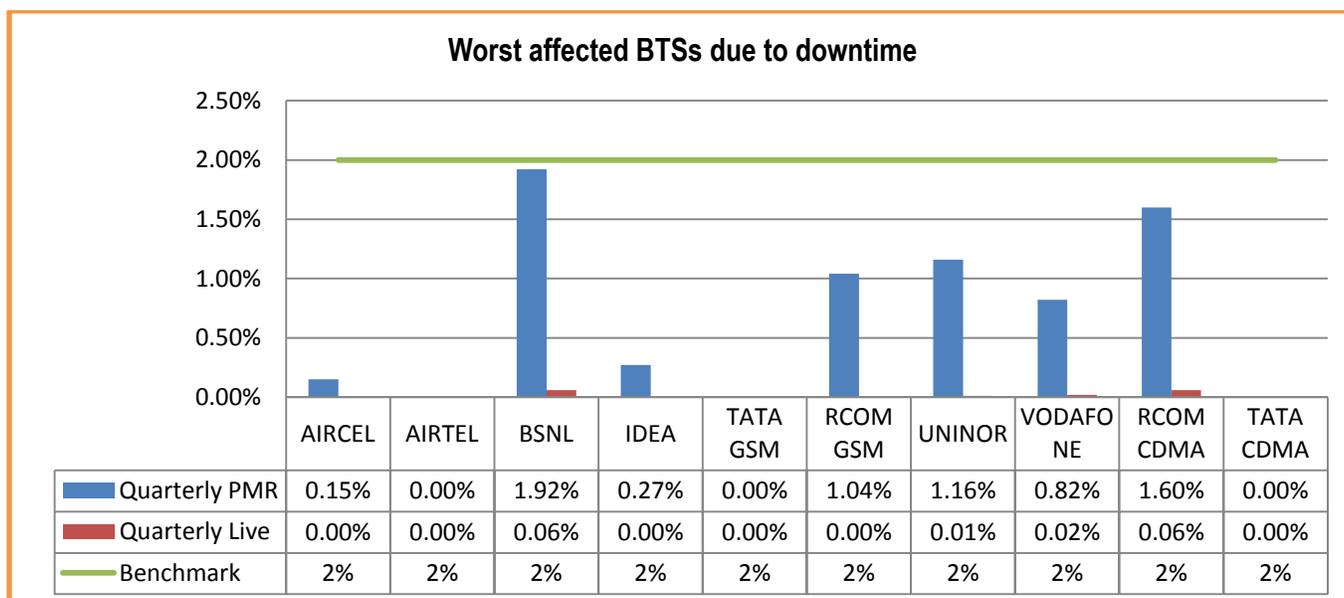
Graphical Representation of Performance of the Cellular Mobile Service Providers (PMR) V/S 3-Days Live Measurement (Quarterly Average Data):

1) BTS ACCUMULATED DOWNTIME:



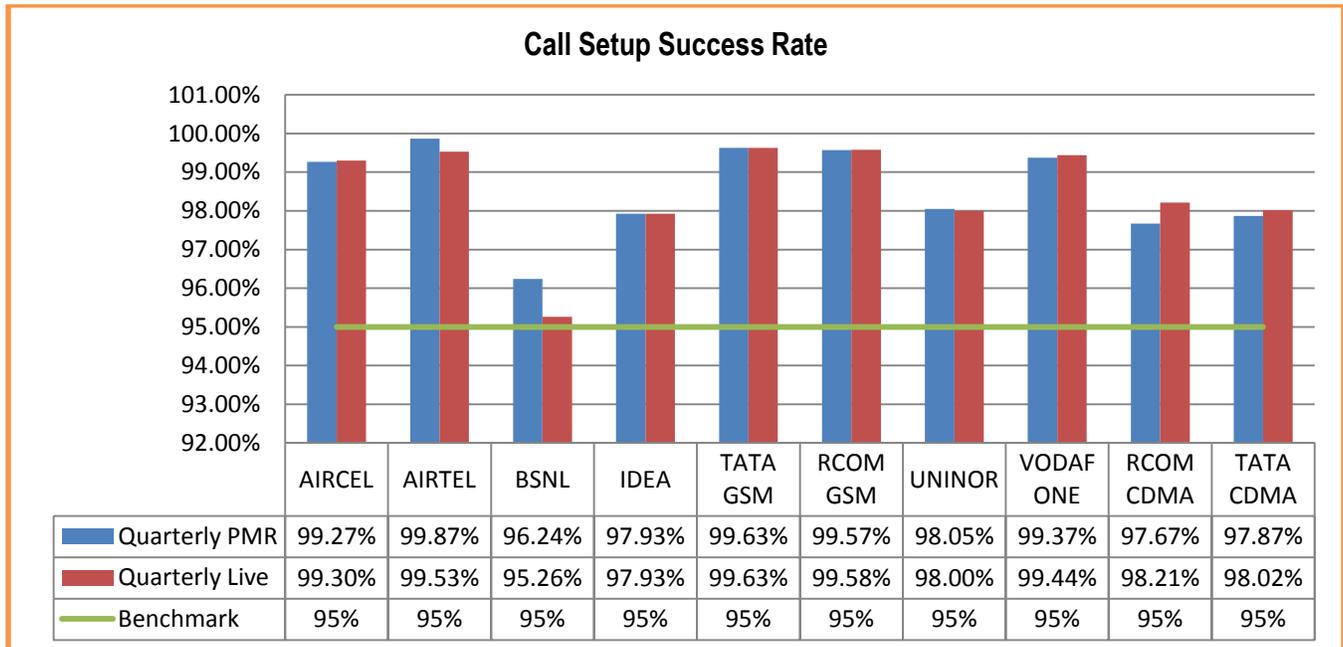
All operators are meeting the benchmarks.

2) WORST AFFECTED BTSS DUE TO DOWNTIME:



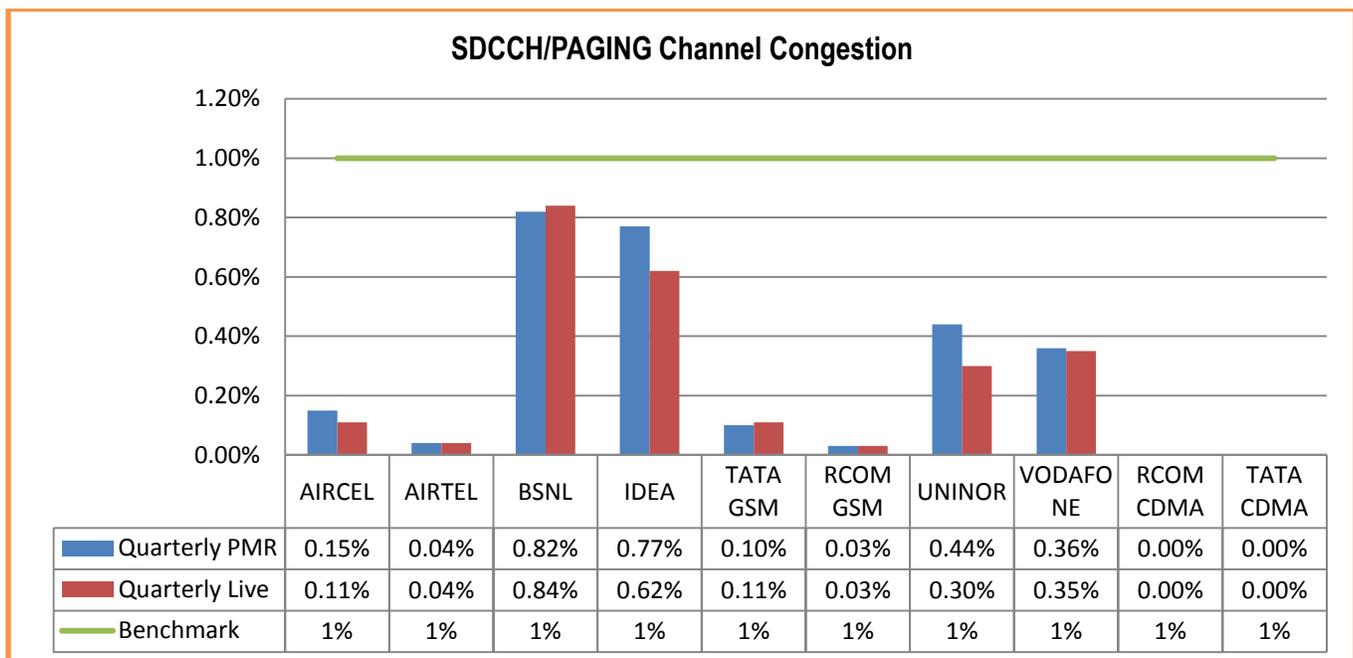
All operators are meeting the benchmarks.

3) CALL SETUP SUCCESS RATE :



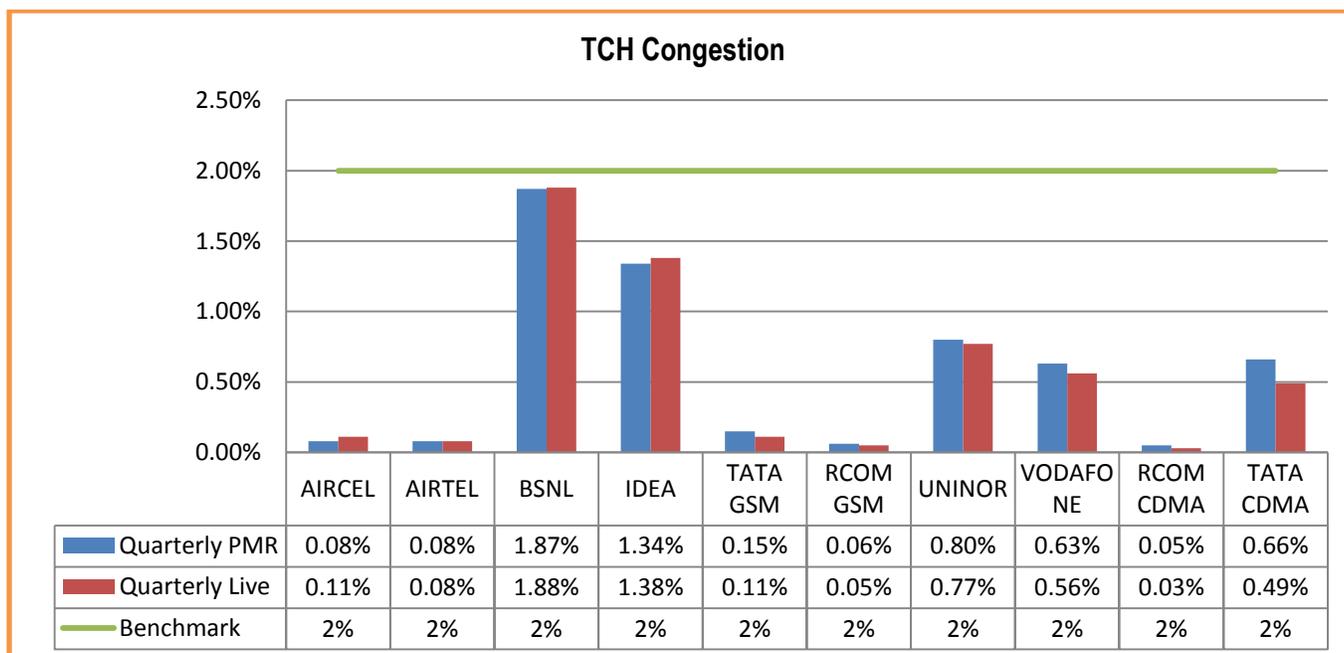
All operators are meeting the benchmarks.

4) SDCCH/PAGING CHANNEL CONGESTION :



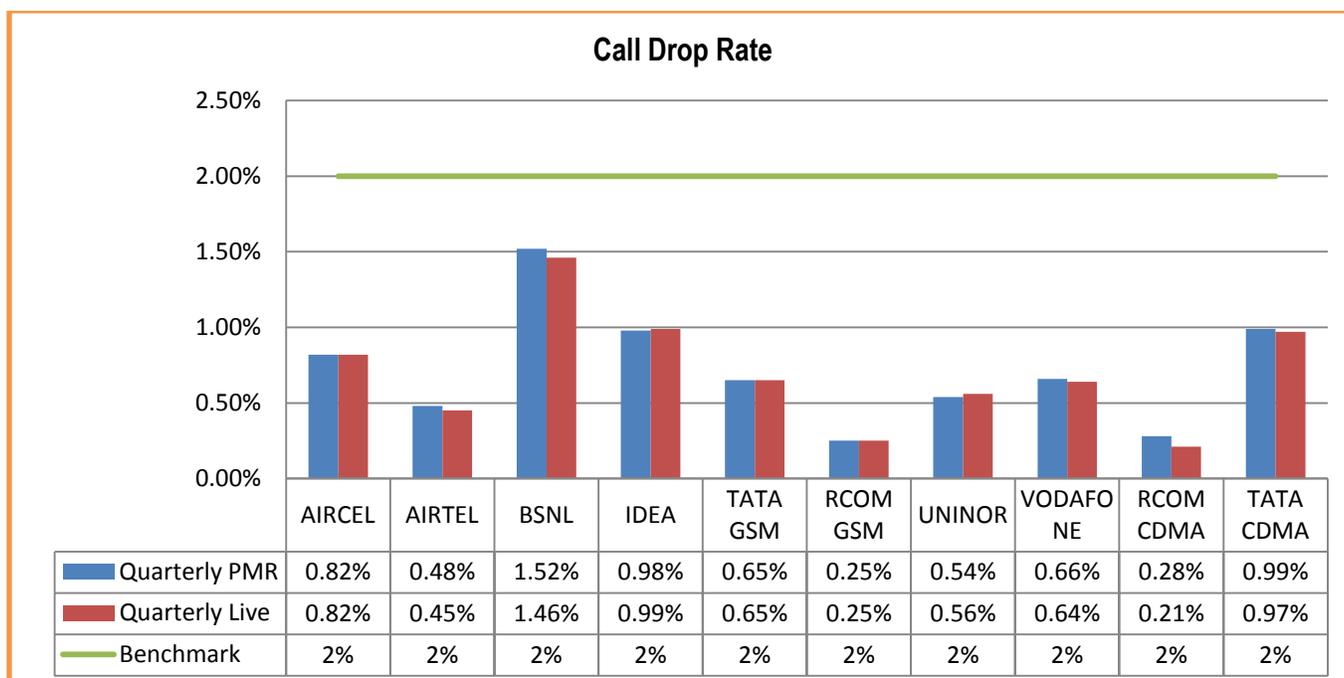
All operators are meeting the benchmarks.

5) TCH CONGESTION:



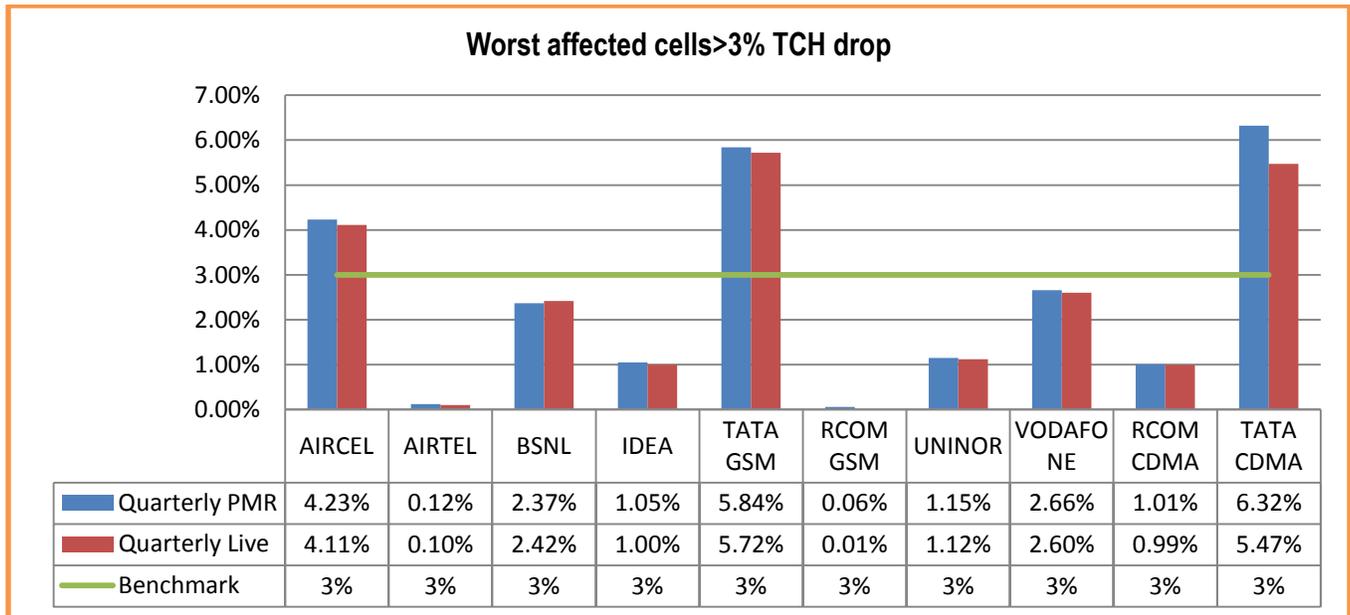
All operators are meeting the benchmarks.

6) CALL DROP RATE:



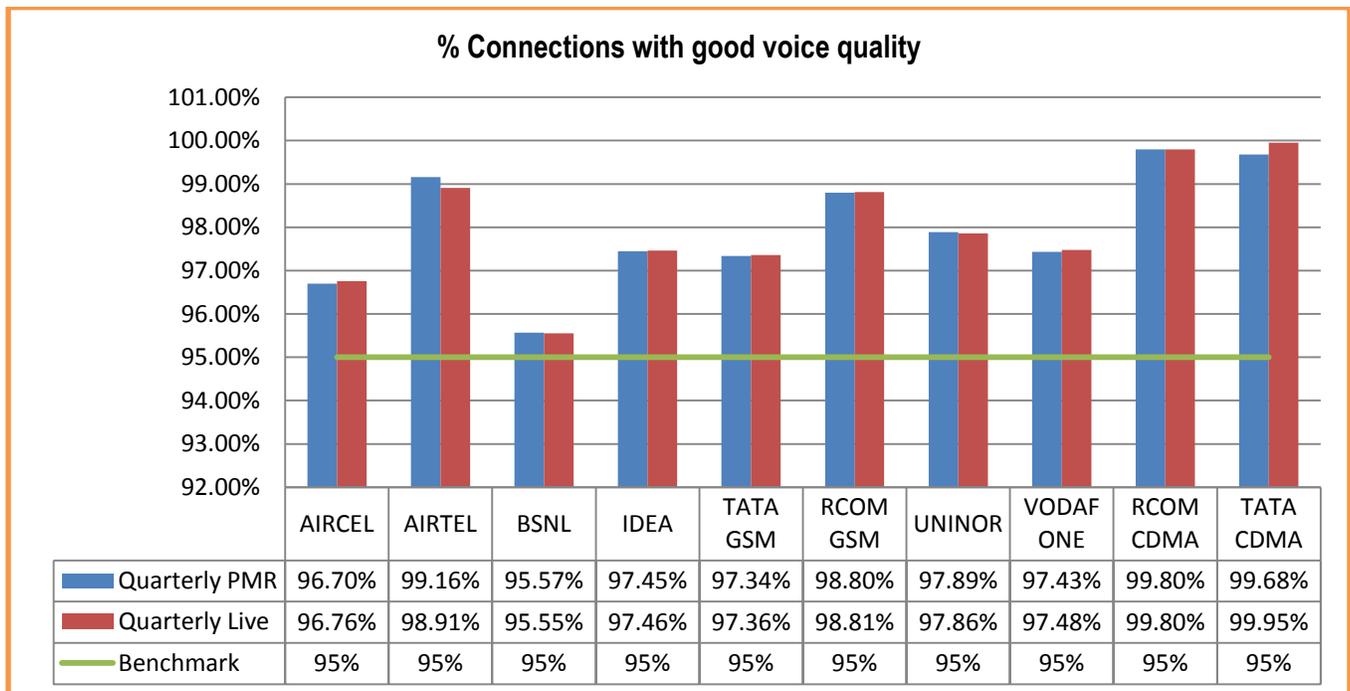
All operators are meeting the benchmarks.

7) WORST AFFECTED CELLS>3% TCH DROP:



All operators 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.