



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

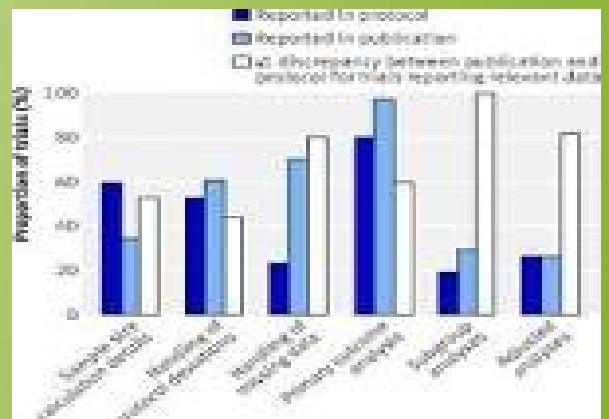
The primary objective is to audit and assess the Quality of Service being rendered by Basic, Cellular Mobile & Broadband service providers against the parameters notified by TRAI.

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 **UP (E), UP (W), and MP&CG circles during the quarter July 2015 – September 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
		July-15	August -15	September-15	
GSM Operators					
1	AIRCEL	8,9,10 th July-2015	2,3,4 th Aug-2015	1,2,3 rd Sep-2015	Aircel Ltd. , Commer Zone, Building no-2,6 Floor,Yerwada Jail Road,Yerwada,Pune-1
2	AIRTEL	7, 8,9 th July-2015	6,7,8 th Aug-2015	1,2,3 rd Sep-2015	D Building, Vega Center, Near Swargate Bus Stand, Pune
3	BSNL	7, 8,9 th July-2015	6,7,8 th Aug-2015	1,2,3 rd Sep-2015	2nd Floor, Telephone Bhawan, Near C'lai Shop, Bajirao Road, Pune 411002
4	UNINOR	21,22,23 th July-2015	20,21,24 th Aug-2015	20,21,24 th Sep-2015	Telewings Communications Services Pvt Ltd. (Uninor) Welldone Technology Park Sec-48 Sohana Road Gurgaon
5	TATA GSM	8,9,10 th July-2015	2,3,4 th Aug-2015	1,2,3 rd Sep-2015	TATA Tel. Ltd., A1-Aqmar Building,5,Ganesh Kindh Road, Shivaji Nagar , Pune-5
6	IDEA	8,9,10 th July-2015	2,3,4 th Aug-2015	1,2,3 rd Sep-2015	IDEA Cellular Ltd. Sharada Centre, 11/1, Erandwane,Pune - 411 004.
7	RCOM GSM	7, 8,9 th July-2015	6,7,8 th Aug-2015	1,2,3 rd Sep-2015	Reliance Communications, 7th floor,Kumar cerebrum IT Park, B bldg, above standard chartered bank,near d-mart,kalyani nagar, Pune.
8	VODAFONE	7, 8,9 th July-2015	6,7,8 th Aug-2015	1,2,3 rd Sep-2015	Vodafone Cellular Limited, Metropolitan, Old Mumbai -Pune Highway, Wakdewadi, Shivajinagar, Pune 411003
CDMA Operators					
9	RCOM CDMA	7, 8,9 th July-2015	6,7,8 th Aug-2015	1,2,3 rd Sep-2015	Reliance Communications, 7th floor,Kumar cerebrum IT Park, B bldg, above standard chartered bank,near d-mart,kalyani nagar, Pune.
10	TATA CDMA	8,9,10 th July-2015	2,3,4 th Aug-2015	1,2,3 rd Sep-2015	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 Sept. 2015.

The data generated by monthly PMR and 3-days live measurements audit for the period July 2015 to September 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 September- 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 September- 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:**

(1) 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 **4.51%, 5.92% and 8.70%** 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 **4.18%, 5.64% and 8.69%** 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. Only **Idea** failed to meet the benchmark of billing credibility for Pre-paid with its performance as **0.15%**. All service providers are in compliance with respect to the parameter **‘Accessibility of call center’**. However, **Airtel, RCOM (GSM), Tata**

(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 **86.83%, 18.26%, 92.58% and 32.60%** respectively. Their performance has been way below the benchmark of >95%.

In respect of parameter ‘Time taken for refunds of deposits’, **Vodafone and RCOM (CDMA)** failed to meet the benchmark with their performance as **92.25%** and **99.33%** respectively.

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 RCOM **GSM** and RCOM **CDMA** was **9.05%** and **27.76%** respectively. The performance of Airtel was way below the benchmark.

(iv) The analysis of Drive tests revealed that Service providers namely **BSNL and RCOM (GSM)** 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 Akola , Bhandra and Dhulia 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	September-15	20 Hrs-21 Hrs
2	AIRTEL	September-15	20 Hrs-21 Hrs
3	BSNL	September-15	19 Hrs-20 Hrs
4	IDEA	September-15	20 Hrs-21 Hrs
5	TATA GSM	September-15	19 Hrs-20 Hrs
6	RCOM GSM	September-15	19 Hrs-20 Hrs
7	UNINOR	September-15	20 Hrs-21 Hrs
8	VODAFONE	September-15	20 Hrs-21 Hrs
CDMA OPERATORS			
9	RCOM CDMA	September-15	19 Hrs-20 Hrs
10	TATA CDMA	September-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	16	1972	Huawei	Huawei
2	AIRTEL	25	167	10731	NSN	NSN
3	BSNL	18	144	6900	Alcatel	Alcatel
4	IDEA	42	95	11071	Ericsson	Ericsson
5	TATA GSM	4	30	4587	Huawei	Huawei
6	RCOM GSM	5	23	2737	Huawei	Huawei
7	UNINOR	10	25	4488	NSN+Huawei	NSN+Huawei
8	VODAFONE	19	121	10913	NSN	NSN
CDMA OPERATORS						
9	RCOM CDMA	10	8	1748	ZTE,Lucent	ZTE,Lucent
10	TATA CDMA	12	18	2093	Huawei, ZTE, Ericsson	Huawei, ZTE, Ericsson

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

CELLULAR MOBILE TELEPHONE SERVICES MAHARASHTRA & GOA CIRCLE - JULY 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%	July-15	0.11%	0.01%	1.89%	0.07%	0.03%	0.27%	0.21%	0.12%	0.20%	0.07%
	b) Worst affected BTSs due to downtime	<=2%	July-15	0.20%	0.00%	1.93%	0.20%	0.00%	0.15%	0.71%	0.63%	0.11%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	July-15	99.04%	99.87%	95.53%	97.80%	99.63%	99.54%	97.93%	99.38%	98.07%	97.87%
	b) SDCCH/PAGING Channel congestion	<=1%	July-15	0.10%	0.05%	0.91%	0.78%	0.10%	0.03%	0.35%	0.50%	0.00%	0.00%
	c) TCH congestion	<=2%	July-15	0.12%	0.08%	1.71%	1.40%	0.15%	0.06%	0.63%	0.62%	0.03%	0.59%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	July-15	0.79%	0.55%	1.63%	1.14%	0.72%	0.31%	0.52%	0.68%	0.27%	1.21%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	July-15	4.00%	0.18%	2.82%	1.45%	5.78%	0.01%	1.22%	2.86%	1.18%	8.77%
	c) Connections with good voice quality	>=95%	July-15	95.97%	98.70%	95.39%	97.27%	97.23%	98.76%	97.49%	97.42%	99.79%	99.95%
4	No. of POI's having >=0.5% POI congestion	<=0.5%	July-15	0	0	0	0	0	0	0	0	0	0

Note: Data not provided by RCOM (GSM) during 1st July to 23rd July-15 and 24th July-15 due to TTI server issue.

Data not provided by RCOM (CDMA) during 1st July to 20th July-15 due to TTI server issue.

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

CELLULAR MOBILE TELEPHONE SERVICES MAHARASHTRA & GOA CIRCLE - AUGUST 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%	Aug-15	0.08%	0.01%	1.90%	0.07%	0.03%	0.22%	0.16%	0.11%	0.29%	0.04%
	b) Worst affected BTSs due to downtime	<=2%	Aug-15	0.05%	0.00%	1.94%	0.18%	0.00%	0.37%	0.44%	0.43%	0.86%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Aug-15	99.48%	99.87%	96.12%	98.07%	99.53%	99.54%	97.99%	99.64%	98.50%	98.14%
	b) SDCCH/PAGING Channel congestion	<=1%	Aug-15	0.08%	0.05%	0.87%	0.60%	0.09%	0.03%	0.35%	0.27%	0.00%	0.00%
	c) TCH congestion	<=2%	Aug-15	0.12%	0.08%	1.56%	1.19%	0.20%	0.07%	0.43%	0.36%	0.01%	0.36%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Aug-15	0.82%	0.55%	1.53%	1.14%	0.74%	0.31%	0.50%	0.72%	0.24%	1.18%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Aug-15	4.42%	0.15%	2.67%	1.51%	5.98%	0.01%	1.30%	2.84%	0.91%	8.65%
	c) Connections with good voice quality	>=95%	Aug-15	95.64%	98.75%	95.71%	97.18%	97.07%	98.75%	97.39%	97.30%	99.78%	99.93%
4	No. of POI's having >=0.5% POI congestion	<=0.5%	Aug-15	0	0	0	0	0	0	0	0	0	0

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

CELLULAR MOBILE TELEPHONE SERVICES MAHARASHTRA & GOA CIRCLE- SEPTEMBER 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%	Sep-15	0.08%	0.01%	1.95%	0.08%	0.02%	0.24%	0.18%	0.12%	0.32%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	Sep-15	0.10%	0.00%	1.93%	0.13%	0.00%	0.62%	0.54%	0.44%	0.86%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Sep-15	99.56%	99.87%	96.21%	98.01%	99.58%	99.52%	98.05%	99.66%	98.68%	98.05%
	b) SDCCH/PAGING Channel congestion	<=1%	Sep-15	0.09%	0.05%	0.88%	0.68%	0.09%	0.03%	0.28%	0.30%	0.00%	0.00%
	c) TCH congestion	<=2%	Sep-15	0.10%	0.08%	1.42%	1.29%	0.14%	0.08%	0.45%	0.34%	0.01%	0.48%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Sep-15	0.92%	0.55%	1.33%	1.16%	0.76%	0.30%	0.49%	0.68%	0.22%	1.11%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Sep-15	5.10%	0.18%	2.62%	1.56%	5.99%	0.01%	1.11%	2.75%	0.84%	8.68%
	c) Connections with good voice quality	>=95%	Sep-15	95.31%	98.74%	95.66%	97.13%	96.99%	98.76%	97.36%	97.28%	99.78%	99.94%
4	No. of POI's having >=0.5% POI congestion	<=0.5%	Sep-15	0	0	0	0	0	0	0	0	0	0

5.1.6 QOS PERFORMANCE OF QUARTERLY PMR –AVERAGE OF QE- SEPTEMBER-15 (JULY TO SEPT 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	0.09%	0.01%	1.91%	0.07%	0.03%	0.24%	0.18%	0.12%	0.27%	0.04%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.12%	0.00%	1.93%	0.17%	0.00%	0.38%	0.56%	0.50%	0.61%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	99.36%	99.87%	95.95%	97.96%	99.58%	99.53%	97.99%	99.56%	98.42%	98.02%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.09%	0.05%	0.89%	0.69%	0.09%	0.03%	0.33%	0.36%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	0.11%	0.08%	1.56%	1.29%	0.16%	0.07%	0.50%	0.44%	0.02%	0.48%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	0.84%	0.55%	1.50%	1.15%	0.74%	0.31%	0.50%	0.69%	0.24%	1.17%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	4.51%	0.17%	2.70%	1.51%	5.92%	0.01%	1.21%	2.82%	0.98%	8.70%
	c) Connections with good voice quality	>=95%	Quarterly	95.64%	98.73%	95.59%	97.19%	97.10%	98.76%	97.41%	97.33%	99.78%	99.94%
4	No. of POI's having >=0.5% POI congestion	<=0.5%	Quarterly	0	0	0	0	0	0	0	0	0	0

5.1.7 KEY FINDINGS ON MONTHLY PMR AUDIT REPORTS:

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

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

Network Service Quality Parameters:

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

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

In 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 0.24 %) was for RCOM (CDMA) during the quarter.

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

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

The audit with respect to this parameter revealed that all the operators met the benchmark for this parameter except **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 **4.51%, 5.92% and 8.70% 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) – JULY15 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES MAHARASHTRA & GOA CIRCLE- JULY 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	0.09%	0.01%	1.95%	0.07%	0.03%	0.57%	0.35%	0.08%	0.19%	0.05%
	b) Worst affected BTSS due to downtime	<=2%	Live Data	0.00%	0.00%	0.07%	0.03%	0.00%	0.00%	0.00%	0.00%	0.11%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live Data	99.14%	99.85%	95.32%	98.06%	99.67%	99.60%	97.91%	99.49%	97.81%	98.16%
	b) SDCCH/PAGING Channel congestion	<=1%	Live Data	0.10%	0.05%	0.88%	0.74%	0.07%	0.03%	0.43%	0.25%	0.00%	0.00%
	c) TCH congestion	<=2%	Live Data	0.07%	0.08%	1.81%	1.30%	0.13%	0.05%	0.62%	0.51%	0.04%	0.37%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Live Data	0.80%	0.57%	1.56%	1.09%	0.69%	0.26%	0.53%	0.64%	0.27%	1.15%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live Data	3.68%	0.17%	2.84%	1.19%	5.42%	0.04%	1.42%	2.79%	1.39%	8.86%
	c) Connections with good voice quality	>=95%	Live Data	96.07%	98.74%	95.30%	97.32%	97.28%	98.90%	97.43%	97.54%	99.79%	99.96%
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) – AUGUST-15 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES MAHARASHTRA & GOA CIRCLE- AUGUST 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	0.08%	0.01%	1.77%	0.07%	0.02%	0.25%	0.12%	0.11%	0.32%	0.03%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.06%	0.02%	0.00%	0.04%	0.00%	0.01%	0.06%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	99.41%	99.87%	96.39%	98.45%	99.54%	99.58%	97.79%	99.64%	98.53%	97.49%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.06%	0.04%	0.96%	0.67%	0.10%	0.03%	0.21%	0.31%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.09%	0.08%	1.76%	0.90%	0.18%	0.05%	0.52%	0.36%	0.01%	0.93%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.72%	0.56%	1.64%	1.01%	0.70%	0.30%	0.53%	0.78%	0.29%	1.18%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	3.90%	0.15%	2.67%	1.44%	5.54%	0.01%	1.60%	2.81%	0.97%	8.90%
	c) Connections with good voice quality	>=95%	Live data	95.77%	98.71%	96.00%	97.29%	97.18%	98.77%	97.37%	97.26%	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) – SEPTEMBER 15 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES MAHARASHTRA & GOA CIRCLE- SEPTEMBER 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	0.08%	0.01%	1.42%	0.07%	0.04%	0.20%	0.26%	0.07%	0.32%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.07%	0.02%	0.00%	0.00%	0.02%	0.00%	0.06%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	99.56%	99.86%	96.21%	98.24%	99.63%	99.56%	98.16%	99.66%	98.48%	97.31%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.07%	0.05%	0.88%	0.54%	0.07%	0.03%	0.24%	0.23%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.08%	0.08%	1.39%	1.14%	0.09%	0.06%	0.31%	0.34%	0.02%	1.26%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.89%	0.49%	1.45%	1.06%	0.72%	0.29%	0.44%	0.71%	0.20%	1.13%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	4.95%	0.14%	2.34%	1.34%	5.95%	0.01%	0.84%	2.79%	0.86%	8.31%
	c) Connections with good voice quality	>=95%	Live data	95.22%	98.79%	95.86%	97.27%	97.07%	98.77%	97.42%	97.37%	99.78%	99.91%
4	No. of POI having >=0.5% congestion	<0.5%	Live data	0	0	0	0	0	0	0	0	0	0

5.2.4 QUARTERLY QOS PERFORMANCE OF 3-DAYS LIVE MEASUREMENT AUDITED DATA (AVERAGE OF JULY TO SEPTEMBER- 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	0.08%	0.01%	1.71%	0.07%	0.03%	0.34%	0.24%	0.09%	0.28%	0.03%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.00%	0.00%	0.07%	0.02%	0.00%	0.01%	0.01%	0.00%	0.08%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	99.37%	99.86%	95.97%	98.25%	99.61%	99.58%	97.95%	99.60%	98.27%	97.65%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.08%	0.05%	0.91%	0.65%	0.08%	0.03%	0.29%	0.26%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	0.08%	0.08%	1.65%	1.11%	0.13%	0.05%	0.48%	0.40%	0.02%	0.85%
Connection maintenance (Retainability)													
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	0.80%	0.54%	1.55%	1.05%	0.70%	0.28%	0.50%	0.71%	0.25%	1.15%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	4.18%	0.15%	2.62%	1.32%	5.64%	0.02%	1.29%	2.80%	1.07%	8.69%
	c) Connections with good voice quality	>=95%	Quarterly	95.69%	98.75%	95.72%	97.29%	97.18%	98.81%	97.41%	97.39%	99.79%	99.94%
4	No. of POI having >=0.5% congestion	<0.5%	Quarterly	0	0	0	0	0	0	0	0	0	0

5.2.5 KEY FINDING ON 3 DAYS LIVE MEASUREMENTS:

From three days live 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 **4.18%, 5.64%and 8.69%** 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 - July 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		Jul-15	1967	10743	6900	10992	4565	2740	4493	10758	1750	2093
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Jul-15	1550	771	97128	5520	977	1573	6911	9923	758	1103
	c) BTS Accumulated Downtime	<=2%	Jul-15	0.11%	0.01%	1.89%	0.07%	0.03%	0.27%	0.21%	0.12%	0.20%	0.07%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Jul-15	4	0	133	22	0	4	32	68	2	0
	e) Worst affected BTSs due to downtime	<=2%	Jul-15	0.20%	0.00%	1.93%	0.20%	0.00%	0.15%	0.71%	0.63%	0.11%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Jul-15	99.04%	99.87%	95.53%	97.80%	99.63%	99.54%	97.93%	99.38%	98.07%	97.87%
	b) SDCCH/PAGING Congestion	<=1%	Jul-15	0.10%	0.05%	0.91%	0.78%	0.10%	0.03%	0.35%	0.50%	0.00%	0.00%
	c) TCH congestion	<=2%	Jul-15	0.12%	0.08%	1.71%	1.40%	0.15%	0.06%	0.63%	0.62%	0.03%	0.59%
Connection Maintenance (Retainability)													
3	a) Call Drop Rate (CDR)	<=2%	Jul-15	0.79%	0.55%	1.63%	1.14%	0.72%	0.31%	0.52%	0.68%	0.27%	1.21%
	b) Worst affected cells>3% TCH drop	<=3%	Jul-15	4.00%	0.18%	2.82%	1.45%	5.78%	0.01%	1.22%	2.86%	1.18%	8.77%
	c) % of connections with good voice quality	>=95%	Jul-15	95.97%	98.70%	95.39%	97.27%	97.23%	98.76%	97.49%	97.42%	99.79%	99.95%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Jul-15	237	60	572	476	774	1	166	922	62	535
	e) Total no. of cells (Sector) in the licensed service area		Jul-15	5932	32802	20277	32909	13402	8175	13622	32205	5244	6099
No. of POI's having >=0.5% POI congestion													
4	No. of POI's having >=0.5% POI congestion		Jul-15	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Jul-15	0	0	0	0	0	0	0	0	0	0
Network Data													
5	a) Equipped Capacity of Network in Erlang		Jul-15	64591	371495	260555	542450	210632	144000	187292	405515	230000	366694
	b) Total traffic in TCBH in erlang (Avg.)		Jul-15	34844	280846	89725	460529	59235	110257	186620	328168	50152	68584
	c) Total no. of customers served (as per VLR) on last day of the month		Jul-15	1273752	11428745	4408909	22829406	2886681	3197394	5532559	17226523	1570370	1166631

TABLE: 2

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live- MH&G Circle – July 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	1963	10734	6900	10942	4565	2745	4491	10688	1750	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		Live data	131	75	9705	529	115	1123	1123	645	245	70
	c) BTS Accumulated Downtime	<=2%	Live data	0.09%	0.01%	1.95%	0.07%	0.03%	0.57%	0.35%	0.08%	0.19%	0.05%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	5	3	0	0	0	0	2	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.07%	0.03%	0.00%	0.00%	0.00%	0.00%	0.11%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	99.14%	99.85%	95.32%	98.06%	99.67%	99.60%	97.91%	99.49%	97.81%	98.16%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.10%	0.05%	0.88%	0.74%	0.07%	0.03%	0.43%	0.25%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.07%	0.08%	1.81%	1.30%	0.13%	0.05%	0.62%	0.51%	0.04%	0.37%
Connection Maintenance (Retainability)													
3	a) Call Drop Rate (CDR)	<=2%	Live data	0.80%	0.57%	1.56%	1.09%	0.69%	0.26%	0.53%	0.64%	0.27%	1.15%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	3.68%	0.17%	2.84%	1.19%	5.42%	0.04%	1.42%	2.79%	1.39%	8.86%
	c) % of connections with good voice quality	>=95%	Live data	96.07%	98.74%	95.30%	97.32%	97.28%	98.90%	97.43%	97.54%	99.79%	99.96%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	218	56	576	393	727	3	193	898	73	538
	e) Total no. of cells (Sector) in the licensed service area		Live data	5931	32795	20277	32904	13412	8206	13606	32197	5244	6075
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 – August 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		Aug-15	1972	10731	6900	11071	4604	2737	4495	10913	1748	2093
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Aug-15	1076	721	97562	5754	986	4454	5233	8529	3759	574
	c) BTS Accumulated Downtime	<=2%	Aug-15	0.08%	0.01%	1.90%	0.07%	0.03%	0.22%	0.16%	0.11%	0.29%	0.04%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Aug-15	1	0	134	20	0	10	20	47	15	0
e) Worst affected BTSs due to downtime	<=2%	Aug-15	0.05%	0.00%	1.94%	0.18%	0.00%	0.37%	0.44%	0.43%	0.86%	0.00%	
2	Connection Establishment (Accessibility)												
	a) CSSR (Call Setup Success Rate)	>=95%	Aug-15	99.48%	99.87%	96.12%	98.07%	99.53%	99.54%	97.99%	99.64%	98.50%	98.14%
	b) SDCCH/PAGING Congestion	<=1%	Aug-15	0.08%	0.05%	0.87%	0.60%	0.09%	0.03%	0.35%	0.27%	0.00%	0.00%
c) TCH congestion	<=2%	Aug-15	0.12%	0.08%	1.56%	1.19%	0.20%	0.07%	0.43%	0.36%	0.01%	0.36%	
3	Connection Maintenance (Retainability)												
	a) Call Drop Rate (CDR)	<=2%	Aug-15	0.82%	0.55%	1.53%	1.14%	0.74%	0.31%	0.50%	0.72%	0.24%	1.18%
	b) Worst affected cells>3% TCH drop	<=3%	Aug-15	4.42%	0.15%	2.67%	1.51%	5.98%	0.01%	1.30%	2.84%	0.91%	8.65%
	c) % of connections with good voice quality	>=95%	Aug-15	95.64%	98.75%	95.71%	97.18%	97.07%	98.75%	97.39%	97.30%	99.78%	99.93%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Aug-15	263	50	541	500	805	1	177	920	48	528
e) Total no. of cells (Sector) in the licensed service area		Aug-15	5950	32782	20277	33093	13472	8229	13586	32439	5251	6107	
4	No. of POI's having >=0.5% POI congestion												
	No. of POI's having >=0.5% POI congestion		Aug-15	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Aug-15	0	0	0	0	0	0	0	0	0	0
5	Network Data												
	a) Equipped Capacity of Network in Erlang		Aug-15	36806	383300	260555	548060	212782	144000	192417	413088	230000	367170
	b) Total traffic in TCBH in erlang (Avg.)		Aug-15	1313525	275489	87071	446265	63430	114516	185307	315424	49534	64144
c) Total no. of customers served (as per VLR) on last day of the month		Aug-15	6429	11531138	4278541	23103574	2864178	3162885	5577862	17316737	1557644	1146246	

TABLE: 4

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live- MH&G Circle- August-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	1969	10734	6900	10992	4565	2737	4494	10758	1746	2093
	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	107	67	8790	550	58	484	381	871	396	53
	c) BTS Accumulated Downtime	<=2%	Live data	0.08%	0.01%	1.77%	0.07%	0.02%	0.25%	0.12%	0.11%	0.32%	0.03%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	4	2	0	1	0	1	1	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.06%	0.02%	0.00%	0.04%	0.00%	0.01%	0.06%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	99.41%	99.87%	96.39%	98.45%	99.54%	99.58%	97.79%	99.64%	98.53%	97.49%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.06%	0.04%	0.96%	0.67%	0.10%	0.03%	0.21%	0.31%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.09%	0.08%	1.76%	0.90%	0.18%	0.05%	0.52%	0.36%	0.01%	0.93%
Connection Maintenance (Retainability)													
3	a) Call Drop Rate (CDR)	<=2%	Live data	0.72%	0.56%	1.64%	1.01%	0.70%	0.30%	0.53%	0.78%	0.29%	1.18%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	3.90%	0.15%	2.67%	1.44%	5.54%	0.01%	1.60%	2.81%	0.97%	8.90%
	c) % of connections with good voice quality	>=95%	Live data	95.77%	98.71%	96.00%	97.29%	97.18%	98.77%	97.37%	97.26%	99.79%	99.95%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	232	50	542	478	744	1	218	912	51	541
	e) Total no. of cells (Sector) in the licensed service area		Live data	5946	32782	20277	33111	13420	8166	13614	32435	5232	6081
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 – September 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		Sep-15	1972	10724	6900	11171	4604	2737	4448	11012	1749	1924
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Sep-15	1099	680	96788	6785	744	4700	5842	9407	3981	198
	c) BTS Accumulated Downtime	<=2%	Sep-15	0.08%	0.01%	1.95%	0.08%	0.02%	0.24%	0.18%	0.12%	0.32%	0.01%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Sep-15	2	0	133	15	0	17	24	49	15	0
	e) Worst affected BTSs due to downtime	<=2%	Sep-15	0.10%	0.00%	1.93%	0.13%	0.00%	0.62%	0.54%	0.44%	0.86%	0.00%
Connection Establishment (Accessibility)													
2	a) CSSR (Call Setup Success Rate)	>=95%	Sep-15	99.56%	99.87%	96.21%	98.01%	99.58%	99.52%	98.05%	99.66%	98.68%	98.05%
	b) SDCCH/PAGING Congestion	<=1%	Sep-15	0.09%	0.05%	0.88%	0.68%	0.09%	0.03%	0.28%	0.30%	0.00%	0.00%
	c) TCH congestion	<=2%	Sep-15	0.10%	0.08%	1.42%	1.29%	0.14%	0.08%	0.45%	0.34%	0.01%	0.48%
Connection Maintenance (Retainability)													
3	a) Call Drop Rate (CDR)	<=2%	Sep-15	0.92%	0.55%	1.33%	1.16%	0.76%	0.30%	0.49%	0.68%	0.22%	1.11%
	b) Worst affected cells>3% TCH drop	<=3%	Sep-15	5.10%	0.18%	2.62%	1.56%	5.99%	0.01%	1.11%	2.75%	0.84%	8.68%
	c) % of connections with good voice quality	>=95%	Sep-15	95.31%	98.74%	95.66%	97.13%	96.99%	98.76%	97.36%	97.28%	99.78%	99.94%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Sep-15	304	60	531	519	811	1	151	897	44	492
	e) Total no. of cells (Sector) in the licensed service area		Sep-15	5958	32734	20277	33324	13543	8166	13606	32586	5241	5667
No. of POI's having >=0.5% POI congestion													
4	No. of POI's having >=0.5% POI congestion		Sep-15	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Sep-15	0	0	0	0	0	0	0	0	0	0
Network Data													
5	a) Equipped Capacity of Network in Erlang		Sep-15	68325	373195	260555	548597	215140	144000	192626	427479	230000	336750
	b) Total traffic in TCBH in erlang (Avg.)		Sep-15	38000	261124	84577	436028	65020	117582	181280	312906	42681	55963
	c) Total no. of customers served (as per VLR) on last day of the month		Sep-15	1402139.00	11660885	4331072	23368009	2940544	3142003	5408724	17450701	1522870	1033479

TABLE: 6

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live- MH&G Circle – September 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	1972	10726	6900	11071	4604	2737	4489	10913	1748	2093
	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	107	63	7030	570	119	394	840	527	406	35
	c) BTS Accumulated Downtime	<=2%	Live data	0.08%	0.01%	1.42%	0.07%	0.04%	0.20%	0.26%	0.07%	0.32%	0.02%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	5	2	0	0	1	0	1	0
e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.07%	0.02%	0.00%	0.00%	0.02%	0.00%	0.06%	0.00%	
2	Connection Establishment (Accessibility)												
	a) CSSR (Call Setup Success Rate)	>=95%	Live data	99.56%	99.86%	96.21%	98.24%	99.63%	99.56%	98.16%	99.66%	98.48%	97.31%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.07%	0.05%	0.88%	0.54%	0.07%	0.03%	0.24%	0.23%	0.00%	0.00%
c) TCH congestion	<=2%	Live data	0.08%	0.08%	1.39%	1.14%	0.09%	0.06%	0.31%	0.34%	0.02%	1.26%	
3	Connection Maintenance (Retainability)												
	a) Call Drop Rate (CDR)	<=2%	Live data	0.89%	0.49%	1.45%	1.06%	0.72%	0.29%	0.44%	0.71%	0.20%	1.13%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	4.95%	0.14%	2.34%	1.34%	5.95%	0.01%	0.84%	2.79%	0.86%	8.31%
	c) % of connections with good voice quality	>=95%	Live data	95.22%	98.79%	95.86%	97.27%	97.07%	98.77%	97.42%	97.37%	99.78%	99.91%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	295	46	474	445	807	1	114	908	45	508
e) Total no. of cells (Sector) in the licensed service area		Live data	5958	32772	20277	33264	13552	8166	13607	32513	5238	6111	
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	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0	0

CUSTOMER SERVICE QUALITY (CSD) PARAMETERS



5.3 CUSTOMER SERVICE QUALITY PARAMETERS MEASUREMENT FOR CMTS:

5.3.1 QUARTERLY CUSTOMER SERVICE DELIVERY (CSD) AUDITED DATA FOR CELLULAR MOBILE SERVICES (JULY TO SEPTEMBER 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	5269	1678862	1039839	4912171	140957	388255	3599818	NA	562865	63946
	B) No. of bills disputed including billing complaints during the quarter		MHG	2	207	18	4771	127	6	2582	NA	518	1
	C) % of billing complaints during the quarter	<= 0.1%	MHG	0.04%	0.01%	0.00%	0.097%	0.09%	0.00%	0.07%	NA	0.09%	0.00%
Metering & Billing Credibility -Pre Paid													
2	A) Total No. of Pre-paid customers at the end of the quarter		MHG	2352607	11490840	4636485	20804199	3200672	5363994	16714659	7727851	1528038	1618757
	B) Total No. of complaints relating to charging, Credit and Validity during the quarter		MHG	82	79	2385	30257	2864	0	4543	169	1081	0
	C) % of Pre-paid Charging Complaints	<= 0.1%	MHG	0.00%	0.00%	0.05%	0.15%	0.09%	0.00%	0.03%	0.00%	0.07%	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	84	286	2403	24450	2991	14	7125	169	1599	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	84	286	2403	24450	2991	14	7125	169	1599	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	84	286	2403	24450	2991	14	7125	169	1599	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	7098114	1760173	349233	67935738	135113	868954	28122444	18383594	NP	142959
	B) Total no. of calls successfully established to customer care/Call center		MHG	6968378	1759923	349233	66766420	134565	847511	28107281	18304924	NP	142415
4	C) % Accessibility of Call centre /customer Care (Total call successfully established*100/ Total call attempt)	>=95%	MHG	98.17%	99.99%	100.00%	98.28%	99.59%	97.53%	99.95%	99.57%	NP	99.62%
	D) Total Calls reached to operator for Voice to Voice (Total call attempts)		MHG	1290142	6364209	1690786	13204274	1003140	1658672	9926219	4320868	283182	132985
	E) Total number of calls answered by the operator (Voice to voice) within 90 seconds		MHG	1236376	5526111	1690786	13156355	183139	1535624	9776404	4264427	92311	130212
	F) % age of calls answered by operator(voice to voice) (Total call successfully established within 90 Sec.*100 / Total call attempts)	>=95%	MHG	95.83%	86.83%	100.00%	99.64%	18.26%	92.58%	98.49%	98.69%	32.60%	97.91%
Termination/closure of service													
5	A) Total No. of requests for Termination / Closure of service received during the quarter		MHG	5	5631	12755	28866	460	3149	13645	NA	4840	1775
	B) No. of requests for Termination /Closure of service complied within 7 days during the quarter		MHG	5	5631	12755	28866	460	3149	13645	NA	4840	1775
	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	11	1128	1025	5127	531	334	41955	NA	751	342
	B) No. of Payments/ Refunds Cleared during the quarter		MHG	11	1128	1025	5127	531	334	38706	NA	746	342
	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%	92.25%	NA	99.33%	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. August & September 15 as July-15 month data was not provided by RCOM (GSM & CDMA) due to technical issue in their system.

5.3.2 3 DAYS LIVE CSD AUDITED DATA FOR CELLULAR MOBILE SERVICES (QE – SEPT. 2015):

CSD 3 DAYS LIVE DATA FOR CELLULAR MOBILE TELEPHONE SERVICES – QE – SEPTEMBER 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	195034	116174	10737	2219524	NP	334551	749884	595112	NP	40300
	Total no. of calls successfully established to customer care/Call center		MHG	192088	116174	10737	2198748	NP	329271	749652	592790	NP	40084
	% Accessibility of Call centre /customer Care (Total call successfully established *100 / Total call attempts)	>=95%	MHG	98.49%	100.00%	100.00%	99.06%	NP	98.42%	99.97%	99.61%	NP	99.46%
2	Total Calls reached to operator for Voice to Voice (Total call attempt)		MHG	37058	195681	55855	441771	40656	48950	296945	138693	9205	3237
	Total number of calls answered by the operator (Voice to voice) within 90 seconds.		MHG	36175	192197	55855	425662	3681	46501	295276	138530	2555	3229
	% age of calls answered by operator (voice to voice) (Total call successfully established within 90 Sec. *100/ Total call attempts)	>=95%	MHG	97.62%	98.22%	100.00%	96.35%	9.05%	95.00%	99.44%	99.88%	27.76%	99.75%

NP: RCOM (GSM & CDMA) has not provided data for the parameter “Accessibility of call center / Customer care” due to technical 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 (**except Idea**) is well within the prescribed bench mark of $\leq 0.1\%$. Only **Idea** failed to meet the benchmark of billing credibility for Pre-paid with its performance as **0.15%**. 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), Tata (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 **86.83%, 18.26%, 92.58% and 32.60%** respectively. The performance of **Airtel, RCOM (GSM) / (CDMA)** 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 except Vodafone and RCOM CDMA), were found to have complied with the benchmark of 100% refund of deposits within 60 days of closure. The performance of **Vodafone** and **RCOM (CDMA)** was **92.25%** and **99.33%** respectively.

Live measurements:

The results for **three days live measurements** reveal that all operators have met the benchmarks for the parameters 'Accessibility to call center'. However, with regard to the parameter '**Calls connection to operators (Voice to voice) within 90 seconds**', performance of **RCOM GSM** and **RCOM CDMA** was **9.05%** and **27.76%** respectively. Their performance of 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%	100%	100%	100%	100%	100%	100%	100%	100%	100%
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%	100%	100%	100%	100%	100%	100%	100%	100%	100%

In case of calls answered by operators (voice to voice) within 90 seconds when test calls were made to the call centers, 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	2	100	18	100	100	6	100	NA	100	1
Total No. of calls Answered	MHG	2	90	15	96	90	5	93	NA	98	1
Cases resolved within 4 weeks	MHG	2	90	15	96	90	5	93	NA	98	1
%age of cases resolved	MHG	100%	100%	100%	100%	100%	100%	100%	NA	100%	100%

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		No. of calls made	AIRCEL	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	UNINOR	VODAFONE	RCOM (CDMA)	TATA (CDMA)	
100, 101, 102,1098	MHG	Jul-15	Akola	Risod, Washim, Malegoan	20	NC at Risod, Washim, Malegoan	√	√	√	√	√	√	√	NC at Risod, Washim, Malegoan	NC at Malegoan	
100, 101, 102,1098				Akola	20	√	√	√	√	√	√	√	√	√	√	√
100, 101, 102,1098				Barshi Takli, Murtizapur, Akot	10	√	√	√	√	√	√	√	√	√	√	√
100, 101, 102,1098		Aug-15	Bhandara	Deori, Arjuni Moregoan, Sakoli	20	√	√	√	√	√	√	√	√	√	√	√
100, 101, 102,1098				Tumsar, Mohadi, Bhandara	20	√	√	√	√	√	√	√	√	√	√	NC at Mohadi
100, 101, 102,1098				Tirora, Gondia	10	√	√	√	√	√	√	√	NC at Tirora	√	√	√
100, 101, 102,1098		Sep-15	Dhule	Sakri, Pimpalner, Navapur	20	√	√	√	√	√	√	√	√	√	√	NC at Pimpalner
100, 101, 102,1098				Shahada, Shirpur, Sindkheda.	20	√	√	√	√	√	√	√	√	√	√	NC at Shahada, Shirpur, Shindkheda
100, 101, 102,1098				Dhule, Kusumba	10	NC at Kusumba	√	√	√	√	NC at Kusumba	√	√	√	NC at Kusumba	NC at Kusumba

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 **Akola, Bhandara and Dhulia** in the months of July, August and September 2015 respectively. The total route Kms covered during drive tests in respective SSAs was **325 Kms, 305 Kms and 314 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 AKOLA SSA IN JULY 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	51	NC	119	25	95	25	96	25	89	25	21	503	78	25	93	25	83	25	61	NC	
		Major Roads	65	25	121	25	109	24	109	25	106	26	110	25	103	25	115	25	105	25	70	25	
		Within City	193	25	255	25	273	25	305	25	275	29	103	25	281	25	292	26	275	25	211	25	
		Overall SSA	309	50	495	75	477	74	510	75	470	80	290	25	462	75	500	76	463	75	342	76	
2	Blocked Call Rate	Highways	0.00%	NC	0.00%	0.00%	7.37%	4.00%	1.04%	0.00%	0.00%	0.00%	0.00%	1.39%	0.00%	0.00%	0.00%	0.00%	0.00%	1.20%	0.00%	0.00%	NC
		Major Roads	0.00%	0.00%	0.00%	0.00%	1.83%	0.00%	0.92%	0.00%	0.00%	0.00%	3.64%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		Within City	1.04%	0.00%	0.00%	0.00%	3.30%	0.00%	0.98%	0.00%	0.00%	0.00%	0.00%	0.00%	1.07%	0.00%	0.00%	0.00%	0.36%	0.00%	1.42%	0.00%	
		Overall SSA	0.65%	0.00%	0.00%	0.00%	3.77%	1.35%	0.98%	0.00%	0.00%	0.00%	1.03%	0.00%	0.65%	0.00%	0.00%	0.00%	0.43%	0.00%	0.88%	0.00%	
3	Dropped Call Rate (<=2%)	Highways	0.00%	NC	0.00%	0.00%	2.27%	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%	NC
		Major Roads	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%	0.95%	0.00%	1.45%	0.00%	
		Within City	1.05%	0.00%	0.00%	0.00%	2.27%	0.00%	0.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.36%	0.00%	0.00%	0.00%	0.36%	0.00%	0.48%	0.00%	
		Overall SSA	0.65%	0.00%	0.00%	0.00%	1.74%	0.00%	0.59%	0.00%	0.00%	0.00%	0.00%	0.00%	0.22%	0.00%	0.00%	0.00%	0.43%	0.00%	0.59%	0.00%	
4	Percentage connections with good voice quality (=>95%)																						
	(a) 0-4 (w/o frequency hopping for CDMA)	Highways	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	100%	100%	97.98%	NC
		Major Roads	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	100%	100%	99.14%	100%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	100%	100%	98.61%	99.93%

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



OPERATOR ASSISTED DRIVE TEST AT AKOLA SSA IN JULY 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	100%	100%	98.61%	99.97%
	(b) 0-5 (with frequency hopping for GSM Operators)	Highways	96.17%	NC	97.18%	95.19%	82.94%	95.14%	96.51%	99.99%	96.65%	98.68%	100%	94.56%	94.63%	99.76%	96.34%	96.81%	NA	NA	NA	NA
		Major Roads	96.42%	96.94%	98.00%	98.31%	90.54%	96.79%	97.26%	99.95%	96.90%	99.26%	96.39%	99.45%	96.72%	99.16%	96.88%	96.70%	NA	NA	NA	NA
		Within City	95.90%	99.55%	97.89%	98.57%	94.13%	93.59%	96.38%	100%	95.76%	99.29%	94.41%	99.58%	95.16%	99.53%	95.86%	98.17%	NA	NA	NA	NA
		Overall SSA	96.05%	98.19%	97.76%	97.35%	91.21%	95.15%	96.59%	99.98%	96.15%	99.08%	94.02%	100%	95.45%	99.48%	96.18%	97.21%	NA	NA	NA	NA
	Service Coverage																					
5	In door (>= -75dBm)	Highways	18.23%	NC	49.63%	19.69%	56.20%	4.42%	90.67%	99.96%	69.20%	66.30%	37.69%	53.71%	45.80%	100%	89.30%	100%	100%	100%	37.54%	NC
		Major Roads	31.83%	4.05%	58.21%	100%	33.56%	15.25%	91.34%	99.45%	73.37%	64.70%	43.92%	100%	56.60%	94.60%	91.58%	100%	100%	100%	55.25%	98.71%
		Within City	29.71%	1.53%	65.59%	72.51%	32.44%	97.71%	91.32%	91.16%	80.23%	44.10%	48.41%	99.39%	64.70%	13.50%	96.10%	100%	100%	100%	57.41%	89.39%
		Overall SSA	26.62%	2.86%	60.20%	58.50%	40.74%	16.81%	91.20%	96.90%	74.27%	58.37%	50.65%	59.60%	59.84%	69.59%	93.75%	100%	100%	100%	57.56%	94.05%
	In-vehicle (>= -85dBm)	Highways	32.85%	NC	81.26%	97.24%	86.22%	50.95%	99.77%	100%	94.50%	100%	60.51%	76.59%	79.50%	100%	97.66%	100%	100%	100%	72.03%	NC
		Major Roads	33.51%	33.72%	85.23%	100%	72.80%	88.61%	99.69%	100%	96.37%	99.40%	64.71%	100%	79.20%	100%	99.46%	100%	100%	100%	86.02%	100%
		Within City	33.52%	34.67%	89.28%	99.75%	53.71%	62.94%	99.80%	94.99%	97.57%	89.70%	75.57%	100%	91.00%	93.40%	99.64%	100%	100%	100%	86.70%	99.05%
		Overall SSA	33.32%	34.17%	86.50%	98.82%	70.91%	79.23%	99.77%	98.35%	96.14%	96.37%	76.54%	99.60%	87.00%	97.82%	99.22%	100%	100%	100%	85.57%	100%
	Outdoor-in city (>= -95dBm)	Highways	48.92%	NC	94.70%	99.37%	100%	95.58%	100%	100%	99.67%	100%	90.25%	94.98%	96.80%	100%	99.19%	100%	100%	100%	95.20%	NC
		Major Roads	34.66%	62.23%	98.28%	100%	90.58%	100%	100%	100%	99.77%	100%	93.40%	100%	98.50%	100%	99.94%	100%	100%	100%	97.79%	100%
		Within City	36.76%	63.80%	98.05%	99.83%	77.11%	65.21%	100%	100%	99.93%	99.80%	94.23%	100%	99.00%	100%	99.89%	100%	100%	100%	98.95%	100%
		Overall SSA	40.06%	62.97%	97.32%	99.69%	88.64%	98.65%	100%	100%	99.79%	99.93%	94.71%	100%	99.00%	100%	99.77%	100%	100%	100%	98.27%	100%

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



OPERATOR ASSISTED DRIVE TEST AT AKOLA SSA IN JULY 15 MONTH- MAHARSHTRA & 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	100%	NC	100%	100%	92.63%	96.00%	98.96%	100%	100%	100%	100%	98.61%	100%	100%	100%	100%	100%	98.80%
Major Roads	100%	100%			100%	100%	98.17%	100%	99.08%	100%	100%	100%	96.36%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Within City	98.96%	100%			100%	100%	96.70%	100%	99.02%	100%	99.27%	100%	100%	100%	98.93%	100%	100%	100%	99.64%	100%	98.58%	100%	
Overall SSA	99.35%	100%			100%	100%	96.23%	98.65%	99.02%	100%	99.57%	100%	98.97%	100%	99.35%	100%	100%	100%	99.57%	100%	99.12%	100%	
7	Hand Over Success Rate (HOSR)	Highways	100%	NC	100%	100%	86.29%	97.22%	99.13%	100%	99.23%	100%	100%	99.47%	96.38%	100%	100%	100%	100%	100%	100%	100%	NC
		Major Roads	100%	100%	100%	100%	98.52%	100%	100%	100%	100%	100%	97.65%	100%	97.53%	100%	100%	100%	100%	100%	100%	100%	
		Within City	98.82%	100%	100%	100%	95.98%	100%	99.58%	100%	99.85%	100%	100%	100%	96.11%	100%	100%	100%	100%	100%	100%	100%	
		Overall SSA	99.11%	100%	100%	100%	94.56%	98.41%	99.58%	100%	99.77%	100%	99.73%	100%	96.44%	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 BHANDARA SSA IN AUGUST 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	175	25	132	25	128	25	121	25	131	26	49	390	97	25	154	25	132	25	49
Major Roads	159	25			116	26	143	24	99	25	102	26	122	25	87	25	107	29	118	25	121	25		
Within City	200	25			163	25	174	25	130	25	157	25	108	25	140	25	166	25	130	25	108	25		
Overall SSA	534	75			411	76	445	74	350	75	390	77	160	25	324	75	427	79	380	75	164	25		
2	Blocked Call Rate	Highways	2.29%	0.00%	0.00%	0.00%	0.78%	4.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.28%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.51%	
		Major Roads	1.89%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.46%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Within City	1.50%	0.00%	0.00%	0.00%	0.57%	0.00%	0.00%	0.00%	0.00%	0.00%	0.93%	0.00%	0.71%	0.00%	0.00%	0.00%	0.00%	0.00%	0.93%	0.00%		
		Overall SSA	1.87%	0.00%	0.00%	0.00%	0.45%	1.35%	0.00%	0.00%	0.00%	0.00%	0.63%	0.00%	0.31%	0.00%	0.00%	0.00%	0.00%	0.00%	0.61%	0.00%		
3	Dropped Call Rate (<=2%)	Highways	1.17%	0.00%	0.00%	0.00%	1.72%	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%	0.77%		
		Major Roads	0.64%	0.00%	0.00%	0.00%	1.52%	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%	0.83%	0.00%		
		Within City	1.52%	0.00%	0.00%	0.00%	0.62%	0.00%	0.77%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.87%	0.00%		
		Overall SSA	1.15%	0.00%	0.00%	0.00%	1.22%	0.00%	0.29%	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%		
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	98.75%	99.87%	98.93%	99.05%		
		Major Roads	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.81%	99.21%	99.48%	100%		
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.98%	98.68%	98.87%	100%		

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



OPERATOR ASSISTED DRIVE TEST AT BHANDARA SSA IN AUGUST 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
			Operators)																			
		Overall SSA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.51%	99.26%	99.05%	98.90%
(b) 0-5 (with frequency hopping for GSM Operators)	Highways	95.89%	99.47%	97.85%	99.45%	91.31%	95.83%	96.64%	99.82%	96.90%	99.72%	93.52%	92.79%	96.80%	99.51%	96.09%	92.84%	NA	NA	NA	NA	
	Major Roads	96.97%	99.15%	97.98%	98.16%	85.87%	80.19%	97.02%	99.60%	97.01%	99.69%	90.59%	99.51%	96.67%	99.73%	96.54%	96.53%	NA	NA	NA	NA	
	Within City	96.58%	97.18%	98.08%	99.15%	89.02%	98.28%	95.87%	96.69%	96.96%	99.84%	93.22%	95.61%	96.80%	95.46%	96.28%	95.60%	NA	NA	NA	NA	
	Overall SSA	96.48%	98.58%	97.98%	98.91%	89.00%	88.04%	96.33%	98.63%	96.95%	99.75%	94.20%	88.19%	96.76%	98.30%	96.29%	95.22%	NA	NA	NA	NA	
Service Coverage																						
5	In door (>= -75dBm)	Highways	26.12%	63.78%	41.56%	92.97%	48.48%	13.35%	91.19%	99.79%	86.03%	86.68%	45.39%	42.50%	52.10%	10.20%	84.87%	100%	99.96%	100%	56.89%	49.24%
		Major Roads	32.60%	39.96%	40.32%	98.36%	40.78%	94.97%	91.55%	99.99%	80.08%	100%	35.41%	99.78%	53.50%	100%	88.08%	100%	99.98%	100%	37.12%	99.78%
		Within City	24.86%	0.90%	58.39%	72.51%	41.88%	27.99%	91.31%	99.58%	83.36%	100%	46.07%	99.79%	60.80%	39.80%	81.86%	99.54%	99.99%	100%	54.50%	98.97%
		Overall SSA	27.58%	36.35%	47.85%	96.81%	43.71%	45.44%	91.34%	99.79%	83.16%	95.56%	32.01%	76.23%	56.15%	50.22%	84.54%	99.85%	99.98%	100%	47.11%	3.43%
5	In-vehicle (>= -85dBm)	Highways	44.54%	88.88%	63.88%	99.88%	90.24%	100%	99.06%	100%	98.37%	99.75%	75.62%	60.08%	74.30%	84.10%	96.65%	100%	99.98%	100%	81.72%	79.25%
		Major Roads	52.96%	92.16%	70.86%	99.55%	81.22%	100%	99.43%	100%	97.87%	100%	55.05%	100%	85.50%	100%	98.85%	100%	99.99%	100%	69.44%	100%
		Within City	52.51%	88.86%	85.42%	99.75%	82.48%	100%	99.01%	100%	97.08%	100%	69.54%	100%	90.30%	99.60%	95.63%	99.93%	100%	100%	84.24%	100%
		Overall SSA	50.07%	89.87%	74.18%	99.81%	84.65%	100%	99.14%	100%	97.78%	99.92%	48.42%	99.75%	84.15%	94.45%	96.84%	99.98%	99.99%	100%	76.45%	99.75%
5	Outdoor-in city (>= -95dBm)	Highways	93.23%	99.93%	88.39%	100%	98.19%	100%	100%	100%	99.88%	100%	94.59%	80.53%	95.80%	99.90%	99.51%	100%	100%	100%	97.03%	96.90%
		Major Roads	94.18%	99.89%	92.50%	100%	95.66%	100%	100%	100%	99.54%	100%	83.98%	100%	98.60%	100%	99.68%	100%	100%	100%	95.10%	100%
		Within City	94.11%	99.75%	97.83%	99.83%	97.23%	100%	100%	100%	99.57%	100%	92.97%	100%	99.10%	100%	99.66%	100%	100%	100%	98.83%	100%
		Overall SSA	93.84%	99.86%	93.18%	100%	97.03%	100%	100%	100%	99.66%	100%	67.99%	100%	98.15%	99.97%	99.62%	100%	100%	100%	95.97%	100%

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



OPERATOR ASSISTED DRIVE TEST AT BHANDARA SSA IN AUGUST 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	
			6	Call Setup Success Rate (>=95%)	Highways	97.71%	100%	100%	100%	90.63%	96.00%	100%	100%	100%	96.15%	100%	98.72%	100%	100%	100%	100%	100%	100%
Major Roads	98.11%	100%			100%	100%	92.31%	100%	100%	100%	98.04%	96.15%	97.54%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Within City	98.50%	100%			100%	100%	93.10%	100%	100%	100%	98.73%	100%	99.07%	100%	98.57%	100%	100%	100%	100%	100%	100%	99.07%	100%
Overall SSA	98.13%	100%			100%	100%	92.13%	98.65%	100%	100%	98.97%	97.40%	99.38%	100%	99.38%	100%	100%	100%	100%	100%	100%	99.39%	100%
7	Hand Over Success Rate (HOSR)	Highways	100%	100%	100%	100%	96.32%	96.67%	100%	100%	98.87%	100%	100%	100%	98.36%	100%	100%	100%	100%	100%	100%	100%	100%
		Major Roads	98.04%	100%	100%	100%	98.64%	100%	100%	100%	98.48%	100%	100%	100%	98.13%	100%	100%	100%	100%	100%	100%	100%	100%
		Within City	97.50%	100%	100%	100%	95.65%	100%	100%	100%	99.52%	100%	100%	100%	96.86%	97.73%	100%	100%	100%	100%	100%	100%	100%
		Overall SSA	98.27%	100%	100%	100%	96.75%	98.41%	100%	100%	99.03%	100%	100%	100%	97.57%	97.92%	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 DHULIA SSA IN SEPTEMBER 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	207	10	202	11	89	NA	146	17	188	10	219	10	136	10	153	10	95	14	189	10
		Major Roads	98	10	97	11	116	11	68	10	83	10	73	10	68	10	92	10	28	NC	67	10
		Within City	244	10	174	10	152	10	156	10	164	10	176	10	161	10	238	13	106	10	165	10
		Overall SSA	549	30	473	32	357	21	370	37	435	30	468	76	365	30	483	33	229	24	421	76
2	Blocked Call Rate	Highways	1.45%	0.00%	0.00%	0.00%	2.25%	NA	2.05%	0.00%	0.00%	0.00%	30.59%	0.00%	0.00%	0.00%	0.00%	0.00%	1.05%	0.00%	5.29%	0.00%
		Major Roads	1.02%	0.00%	0.00%	0.00%	12.07%	0.00%	0.00%	0.00%	0.00%	0.00%	12.33%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NC	0.00%	0.00%
		Within City	1.64%	0.00%	0.00%	0.00%	2.63%	0.00%	1.92%	0.00%	0.00%	0.00%	3.98%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.61%	0.00%
		Overall SSA	1.46%	0.00%	0.00%	0.00%	5.60%	0.00%	0.00%	0.00%	0.00%	0.00%	17.74%	0.00%	0.00%	0.00%	0.00%	0.00%	0.44%	0.00%	2.61%	0.00%
3	Dropped Call Rate (<=2%)	Highways	0.98%	0.00%	0.00%	0.00%	8.05%	NA	0.00%	0.00%	0.00%	0.00%	1.97%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.79%	0.00%
		Major Roads	1.03%	0.00%	0.00%	0.00%	26.47%	0.00%	0.00%	0.00%	0.00%	0.00%	10.94%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NC	0.00%	0.00%
		Within City	0.00%	0.00%	0.00%	0.00%	0.68%	0.00%	0.00%	0.00%	0.00%	0.00%	0.59%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.61%	0.00%
		Overall SSA	0.55%	0.00%	0.00%	0.00%	10.39%	0.00%	0.00%	0.00%	0.00%	0.00%	2.86%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.46%	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	100%	100%	97.18%	99.17%
		Major Roads	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	100%	NC	99.27%	100%

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



OPERATOR ASSISTED DRIVE TEST AT DHULIA SSA IN SEPTEMBER 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	100%	100%
	Overall SSA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	100%	100%	97.58%	99.82%	
(b) 0-5 (with frequency hopping for GSM Operators)	Highways	96.05%	99.19%	97.87%	98.71%	84.34%	NA	97.81%	99.98%	96.15%	99.40%	89.04%	94.96%	96.30%	99.80%	95.77%	99.80%	NA	NA	NA	NA	
	Major Roads	95.99%	99.57%	98.65%	99.85%	82.23%	96.69%	98.54%	100%	96.88%	98.33%	91.57%	99.86%	96.83%	99.80%	97.06%	99.28%	NA	NA	NA	NA	
	Within City	95.29%	96.74%	97.84%	95.80%	81.83%	91.54%	97.58%	99.96%	95.55%	99.26%	88.79%	99.64%	95.44%	99.26%	96.87%	98.18%	NA	NA	NA	NA	
	Overall SSA	95.70%	98.53%	98.03%	97.92%	82.87%	93.93%	97.84%	99.98%	96.08%	99.00%	89.36%	99.29%	96.02%	99.62%	96.57%	99.05%	NA	NA	NA	NA	
Service Coverage																						
5	In door (>= - 75dBm)	Highways	16.97%	19.33%	32.20%	88.19%	37.84%	NA	90.95%	97.22%	72.63%	80.74%	30.67%	0.00%	47.76%	99.86%	67.04%	100%	99.98%	100%	30.89%	73.38%
		Major Roads	28.02%	98.53%	34.84%	46.77%	41.68%	98.10%	90.96%	99.73%	79.17%	100%	45.71%	100%	59.04%	99.58%	77.29%	100%	100%	NC	42.60%	100%
		Within City	26.37%	38.86%	38.44%	67.36%	50.22%	100%	91.67%	96.44%	77.08%	100%	41.47%	92.31%	65.05%	94.11%	78.03%	100%	100%	100%	39.74%	89.68%
		Overall SSA	23.80%	52.24%	35.02%	67.20%	43.24%	99.05%	91.27%	97.69%	75.39%	93.66%	39.60%	64.10%	57.35%	97.83%	74.11%	100%	100%	100%	38.21%	87.69%
5	In-vehicle (>= - 85dBm)	Highways	42.50%	70.90%	56.96%	100%	57.15%	NA	99.65%	99.81%	94.06%	100%	57.31%	21.43%	78.40%	99.99%	91.47%	100%	100%	100%	61.53%	99.28%
		Major Roads	62.32%	100%	69.65%	99.85%	59.42%	99.62%	99.35%	100%	97.50%	100%	77.69%	100%	81.77%	99.99%	93.13%	100%	100%	NC	75.42%	100%
		Within City	58.74%	93.27%	69.90%	100%	65.46%	100%	99.24%	99.97%	98.10%	100%	67.35%	100%	90.76%	99.99%	95.79%	100%	100%	100%	71.55%	100%
		Overall SSA	54.54%	88.06%	64.29%	99.95%	60.67%	99.81%	99.41%	99.91%	96.09%	100%	66.21%	100%	84.37%	99.99%	93.76%	100%	100%	100%	69.05%	100%
5	Outdoor-in city (>= - 95dBm)	Highways	98.30%	98.14%	84.22%	100%	63.01%	NA	100%	100%	99.25%	100%	86.52%	94.29%	96.80%	99.99%	98.56%	100%	100%	100%	90.21%	100%
		Major Roads	97.38%	100%	93.46%	100%	64.98%	100%	100%	100%	99.88%	100%	93.10%	100%	97.75%	99.99%	99.75%	100%	100%	NC	98.79%	100%
		Within City	98.09%	99.90%	94.02%	100%	66.51%	100%	100%	100%	99.96%	100%	89.85%	100%	99.26%	99.99%	99.69%	100%	100%	100%	96.51%	100%

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



OPERATOR ASSISTED DRIVE TEST AT DHULIA SSA IN SEPTEMBER 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	97.93%	99.35%	89.69%	100%	64.83%	100%	100%	100%	99.69%	100%	89.48%	100%	98.05%	99.99%	99.31%	100%	100%	100%	100%
6	Call Setup Success Rate (>=95%)	Highways	98.55%	100%	100%	100%	97.75%	100%	97.95%	100%	99.47%	100%	69.41%	100%	99.26%	100%	100%	100%	98.95%	100%	94.71%	100%
		Major Roads	98.98%	100%	100%	100%	87.93%	100%	100%	100%	100%	100%	87.67%	100%	100%	100%	100%	100%	100%	NC	100%	100%
		Within City	98.36%	100%	100%	100%	97.37%	90.00%	98.08%	100%	100%	100%	96.02%	100%	100%	100%	100%	100%	100%	100%	99.39%	100%
		Overall SSA	98.54%	100%	100%	100%	94.40%	95.24%	98.38%	100%	99.77%	100%	82.26%	100%	99.73%	100%	100%	100%	99.56%	100%	97.39%	100%
7	Hand Over Success Rate (HOSR)	Highways	100%	100%	100%	100%	95.06%	100%	100%	100%	99.63%	100%	100%	100%	94.87%	100%	100%	100%	100%	100%	100%	100%
		Major Roads	100%	100%	100%	100%	98.88%	100%	100%	100%	100%	100%	100%	100%	93.75%	100%	100%	100%	100%	NC	100%	100%
		Within City	100%	100%	100%	100%	98.69%	100%	99.51%	100%	100%	100%	100%	100%	98.13%	100%	100%	100%	100%	100%	100%	100%
		Overall SSA	100%	100%	100%	100%	97.84%	100%	99.74%	100%	99.84%	100%	100%	100%	96.19%	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 JULY TO SEPTEMBER 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
Akola	July-15	Risod, Washim & Malegoan /100KM	<p>Risod :</p> <p>High-Ways - 1) Washim HW Major Road - Civil Line, Shivajinagar, Amardas Baba Road, Melhar Road,Akola Road,Duttnagar Phulenagar</p> <p>Within City-Loni Fhata ,Amardas baba Road,Jama Masjid Chowk, Pinglashi Devi ,Nizampur Road, Hingoli Road,Gajanand Nagar,Risod Main Road,Ektanagar</p> <p>Washim :</p> <p>High Ways - 1) Washim Road, 2) Pusad Road, 3)Mangrul Pir Road , 4) Akola Road</p> <p>WithIn City - BSNL Exchange road, Ambedkar Chowk, Balaji Mnadir Road, PathiChowk, Shivaji Chowk,Lakhada Road,Hiwra Ganpati Road,Padmatirth,Ram Talkies ,Sindhi bazar,IUDP,Array Collage,Collector Office,Kata Road, Major Road-Bazar Road,Bus stand</p>	Akola /140KM	<p>Akola :</p> <p>Within City - Ram Lata ,Nehru Chowk ,Ashok Vatika Chowk ,Collector Office Road ,Tahsil road ,Mohamamd Ali road ,Tajana Peth ,Fateh Chowk to Telipura ,Cloth Market ,Pagdi Pull ,Lakad Gunj ,Alankar Ashray ,Tilak Road ,Dabki Road ,Renuka Nagar ,Jai Hind Chowk ,Gandhi Road ,Navrang Society ,Mankarna Plot ,Ramdas peth ,Akot file ,Jawaharnagar ,Dwarkanagar , ,Ramnagar ,Ambedkarnagar ,Shastrinagar ,Ratanlal Plot Chowk ,Umri Road ,Vasant Stadium ,Station Road ,Durga Chowk ,Marathanagar ,Prasad Nagar ,Durga Chowk ,Sudhir Colony ,Krushinagar ,PDKV ,ShiverMIDC Phase 2 ,3 ,4 ,Malkapur Road</p> <p>High Ways-1) NH-6 Old and New</p> <p>Major Road - . Anikat ,Collector Office Road ,Ashok Vatika ,railway station Akot Road.</p>	Barshi Takli, Murtizapur, Akot / 85KM	<p>Barshi Takli :</p> <p>High Ways - 1)Akola Mangrul Phir Road 2)Dhaba Road 3)kapsi road Major Road : Bus stand Road,Railway Station Road,,Khadakpura Chowk,Ramnagar,Naik nagar,Main road,Minara Masjid Lane,Digras Road,Ginning Road</p> <p>Murtizapur :</p> <p>High Ways - 1)Akola Road 2)karanja Road 3)Hadgoan Road 4)Amravati Road 5)AH46 6)Shivajinagar Road 7)Hirpur Road 8)Daryapur Road</p> <p>Major Road -Murtizapur road,MIDC,Nimb Road,Amravati Road,Kokanwadi,Main Road,Vrundavan nagar With In City - Pratiknagar,Station Road,Bus stand Road,main Road</p> <p>Akot :</p> <p>Major Road -Popatked Road,Anjangoan Road,Akola Road Within City - daryapur road,Hivarkhed road,Krishra</p>

DRIVE TEST ROUTE OF JULY TO SEPTEMBER 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
			Road, Zilla Parisad, Kashagar Karyalay, Police station Road, Nanded Road. Malegoan High-Ways - 1) Shirpur Road Major Road- Karanja Road, Nagardas Bypass, Selu Bypass Within City - Malegoan Road, Main Road, Bus stand Road Selu Bazar. Indoor: Maniprabha Hotel Premises Washim		Indoor: Ram Lata Hotel Premises & Akola		mandir road, Akola naka, Luxury stand road, station Road, Jijimata nagar, Hiwarkhed road. Indoor: Vyas Hotel Premises, Murtizapur.
Bhandara	Aug-15	Deori, Arjuni Moregoan & Sakoli / 85Km	Deori : High-Ways -Sirpur Road ,Nh-6 ,Arjuni Moregoan Road Major Road - Amagoan Road , Tahsil office , Sukhinagar , Bus stand , Trimurtinagar , ITI College Within City-Amagoan Road , Exchange road , Chicgad Road , Police staion Road , Mahobar bhai Patel Highschool , Sanjaynagar , Sharda chowk , Shedepar road , Cheche wada , Kargil chowk , Durga chowk , Arjuni Moregoan : High Ways - Wadsa road , Naregoan road , Sakoli road Major Road-Court road , Main road	Tumsar, Mohadi & Bhandara /135Km	Tumsar : City - Bus stand road , Durga chowk , SC bose hospital , Gokarbhadi road , Mahegoan , Katangi road , Jaibhim chowk , Gandhinagar , Vishal school , Saranga tslkies road , Ambedkar nagar , Sardar nagar , hanuman nagar , gandhiputla , Nagar parishad , Rajendra nagar , Devadi road , Court road , Vinoba bhava road. High Ways-Sihora road , Khapa road , gondi a road , Ramtek road , station road. Major Road - Sri ramnagar , mahakali nagar , Main road , Station road , Bus stand road.	Tirora & Gondia /85Km	Tirora : High Ways - tumsar-Tirora road , Kachewani road , Gondia Road Major Road : Balaghat-Tirora road , bajar road , Chandra bagha road , Bhandara road , Bus stand road , Bus stand road , Gondia naka , Birshi phata naka City- GT Road , Ganpati chowk , Vidyalay Rani avanti Chowk , Gandhi chowk , station road , Snehal theatre , Chnadra bagha road , Balaghat Road , Gondia : High Ways - Kudwa road , i road , Khammari-Kohmara road. Major Road-Fulchar to goregoan

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



DRIVE TEST ROUTE OF JULY TO SEPTEMBER 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
			,SSJ college road ,station road ,ITkheda road ,lakhander road ,Tadgoan road ,Civil lines ,Bus stand road ,Tahsil road ,Bondgaon devi road ,Dabana Road , Sakoli :- Within City:Kumbali ,Dharmपुरi ,Lakhander road ,Main road ,Bus stand road ,Post office road ,Police staion road ,Ekode road ,Panchayat road ,Ambedkar chowk ,Nagzira road ,Adarsh nagar ,Rajendra colony ,Nehrunagar. High-Ways - NH-6 ,Sendurwafa road. Indoor: Gaurav Hotel Premises, Arjuni Moregoan .		Mohadi City- Mohadi Bus stand ,Shivaji Chowk ,Shri talkies ,road ,Indira Gandhi chowk ,Karmchari , Shivajinagarrudev Chintamani school ,Exchange road ,main road ,Tumsar Road ,Diwani Fauzdari Nyaaylay ,MIDC ,Shivaji chowk ,Dongargoan ,Road ,Mahalgaon road ,ZP school ,Jamb road . Highways-Mohadi road ,Bhandara Road. Bhandara- Highways -NH-6 City--Zp chowk ,Patvari Bhavan ,Takiya ward ,babanagar ,rajiv gandhi chowk ,Jail road ,GM office ,Mahada colony ,Khat road ,Matrusmrutinagar ,rajivnagar ,om shantinagar ,Khokaila ,New shivajinagar ,Sahkarnagar ,Shivaji Putla ,Shastri chowk ,Nashik nagar ,Shanti nagar ,Zhulelal chowk ,Mendha road ,Bhim chowk ,Graham sevak colony ,sakhar sahab ,Graham sevak colony ,JM patel colege road ,MCM Chowk ,Kukade nursing Home ,Gandhi chowk ,Police staion ,LBS school. Major road -Railway station		road ,Police staion Headquarters ,Mama chowk ,Ingle chowk ,chota gondia ,Rani Avanti chowk ,Durga chowk ,Gokuldharm. City: Angur Bagicha ,Chiragade School road ,Indra prashta Colony ,New Gajanan Colony ,Dwarka Chowk ,Chota pal Chowk ,pal chowk ,Ram nagar ,Civil line ,Railway station ,Gobind singh Marg ,Sindhi Colony ,Yadav chowk ,Circus ground ,Shri Ram Chowk ,agneshnagar ,Jain stamb chowk ,Gandhi Putla ,Main road ,Gorchal Chowk. Indoor: Kesar Hotel Premises,Gondia

DRIVE TEST ROUTE OF JULY TO SEPTEMBER 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
					road , Bada bazar ,Garden road. Indoor: The spice hotel, Bhandara		
Dhulia	Sep-15	Sakri, Pimpalner, Navapur / 90 KM	<p>Sakari: Sakri Highway ,Sakri within city ,BSNL Exchange ,Nehru Nagar ,Nagare Nagar ,Shikshak Colony ,Ganesh Nagar ,Bus Stop ,SG Patil College ,Ahhirao Hospital ,Sakri-Dondaicha Road.</p> <p>Pimpalner :Pimpalner Highway ,Pimpalner major road ,Sukhapur ,NK Patil College ,Bus Stand ,Prabhat Hotel , Samode ,Samode Bus Stop.</p> <p>Navapur-Navapur Highway ,Navapur within city , Saraf Galli , Nehru Road ,Bus Station ,Shivram patilnagar ,Tintemba ,Navapur Railway Station ,Light Bazaar road ,Avdhoot Wadi Road.</p> <p>Indoor: BSNL Telephone Campus, Navapur.</p>	Shahda, Shirpur, Sindhkheda / 92 KM	<p>Shahada - Shahada Highway ,Shahada within city ,Shahada major road ,Shahada Police Station ,Doordarshan colony ,Gokulbhai Nagar ,Vijay Nagar ,Gandhi Nagar ,Lonkheda ,P.S.G.V.P Mandals College of Pharmacy.</p> <p>Shirpur – Shirpur Highway ,Shirpur within City ,Bus Station ,Varvad ,Police Station ,S.P.T.M College ,Shree Nagar ,R.C Patel Institute of Technology ,Swami Vivekanand Nagar ,H.R. Patel Institute.</p> <p>Sindhkheda - Sindhkheda Highway ,Sindhkheda Major Road ,Sindhkheda Bus Stop ,Haidar Ali chowk , Maliwada , Virdel Bus Stop.</p> <p>Indoor: City Bus Stand campus, Sindhkheda.</p>	Dhule, Kusumba / 132 KM	<p>Dhule - Dhule highway ,Dhule major road ,Dhule within city ,BSNL Exchange ,Mahindale ,D.ED College ,Police Station ,Bhajirao Patil college ,Government ITI College ,Fagane ,Vaibhav Nagar ,Dhule highway ,Dhule major road ,Dhule within city , BSNL Exchange ,Mahindale ,Government D.ED College ,Police Station ,Zulal Bhajirao Patil college ,Government ITI College ,Fagane ,Vaibhav Nagar</p> <p>Kusumba - Kusumba Highway ,Major Road ,Indira Nagar ,Panzara colony.</p> <p>Indoor: BSNL Campus, Mohadi</p>

7.2 SSA WISE DRIVE TEST OBSERVATION:

DRIVE TEST TABLE: 5

DRIVE TEST OBSERVATION OF AKOLA SSA (JULY-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	Risod, Washim, Malegoan	-	Akola	Akola SDCA : Poor Rx Quality observed at Akot file and Ramdas Peth	Barshi Takli, Murtizapur, Akot	Akot : Poor Rx Quality Observed at Hiwarkheda Road
2	AIRTEL		Malegaon SDCA :Poor Rx Quality Observed at some parts of Malegoan bypass		Poor Rx Quality observed at Dabki Road		Akot SDCA :Poor Rx Quality Observed at Shivajinagar Akot
3	BSNL		Washim SDCA : Poor Rx Quality Observed at Washim HW		Akola SDCA : Poor Rx Quality Observed at Washim Bypass		Barshi Takli : Poor Rx Quality Observed at Kapsi Road
4	IDEA		-		-		-
5	UNINOR		Malegaon SDCA Poor Rx quality Observed at Bus stand Malegoan		Akola SDCA : Poor Rx Quality observed at Akola MIDC		Poor Rx Quality observed at Amravati Road
6	VODAFONE		Malegaon SDCA : Poor Rx Quality Observed at NH-207,208		Akola SDCA : Poor Rx Qulaity Observed at Nh-161		Akot SDCA :Poor Rx Quality observed at Akot Road
7	TATA GSM		-		Akola SDCA : Poor Rx Quality Observed at Jawahar nagar		-
8	TATA CDMA		-		Akola SDCA : Poor Rx Quality Observed at Washim Bypass		Akot SDCA :Poor Rx Quality observed at Akot Road
9	RCOM GSM		Risod SDCA :Poor RX Quality Observed at Risod Main Road		Akola SDCA : Poor Rx Quality observed at Akot file and Ramdas Peth,Gorakshan Chowk		Akot SDCA :Poor Rx Quality observed at Akot Road
10	RCOM CDMA		-		Akola SDCA : Poor Rx Quality Observed at Washim Bypass		Akot SDCA :Poor Rx Quality observed at Akot Road

Common Troublesome Areas: Akot file, Washim Bypass, Akot Road and Dabki Road.

DRIVE TEST TABLE: 6

DRIVE TEST OBSERVATION OF BHANDARA SSA (AUGUST-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	Deori, Arjuni Moregoan, Sakoli	Moregoan : Poor Rx Quality Observed at Nh-6 and Nagzira road	Tumsar, Mohadi ,Bhandara	Bhandara SDCA : poor Rx Quality Observed at Railway Station Road	Tirora, Gondia	Tirora SDCA : Poor Rx Quality Observed at Bhalaghat Road
2	AIRTEL		Moregoan : Poor Rx Quality Observed at Nh-6 and Sakoli road		Bhandara SDCA :poor Rx Quality Observed at Railway Station Road Bhandara and Nh-249		-
3	BSNL		Moregoan : Poor Rx Quality Observed at Nh-6 and Nagzira road		Bhandara SDCA :poor Rx Quality Observed at Railway Station Road		-
4	IDEA		Sakoli Road : Poor Rx Quality Observed at Nimgoan Road		Mohadi : Poor Rx Quality Observed at Paraswada road		-
5	UNINOR		Moregoan : Poor Rx Quality Observed at Nh-6 and Sakoli road		Bhandara SDCA :poor Rx Quality Observed at Railway Station Road		-
6	VODAFONE		Moregoan : Poor Rx Quality Observed at Nh-6 and Sakoli road		Bhandara SDCA : Poor Rx Quality Observed at Khat road		Gondia SDCA : Poor Rx Quality observed at Nh-249
7	TATA GSM		Moregoan : Poor Rx Quality Observed at Nh-6 and Sakoli road		-		-
8	TATA CDMA		-		Bhandara SDCA :poor Rx Quality Observed at Railway Station Road		-
9	RCOM GSM		Moregoan : Poor Rx Quality Observed at Nh-6 and Sakoli road		Bhandara SDCA :poor Rx Quality Observed at Railway Station Road		Gondia SDCA : Poor Rx Quality Observed at Civil Lines and Gajanan Colony
10	RCOM CDMA		Moregoan : Poor Rx Quality Observed at Nh-6 and Sakoli road		Bhandara SDCA :poor Rx Quality Observed at Railway Station Road		Gondia SDCA : Poor Rx Quality Observed at Civil Lines

Common Troublesome Areas: Nh-6, Sakoili Road,Railway station Road Bhandara, Civil lines Gondia.

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DRIVE TEST TABLE: 7

DRIVE TEST OBSERVATION OF DHULIA SSA (SEPTEMBER-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	Sakri, Pimpalner, Navapur	Pimpalner SDCA: Poor Rx. Quality observed at Navapur Road , Navapur SDCA : Poor Rx. Quality observed at Sakri Road & near BSNL trle. Exchange area.	Shahada, Shirpur, Sindkheda.	Shahada SDCA : Poor Rx. Quality observed at shirpur raod.	Dhule, Kusumba	Dhule SDCA: Poor Rx. Quality observed on Dhule-Jalgaon NH-6 highway. Kusumba SDCA : No network coverage observed	
2	AIRTEL		Pimpalner SDCA: Poor Rx. Quality observed at Navapur Road , Sakri SDCA : Poor Rx. Quality observed at Nagre Nagar area & Dhule-Navapur HW. Also poor Rx. level observed observed on Pimpalner HW.		Shindkheda SDCA : Poor Rx. Quality observed on Chimthana Road & Nardana Road		-	
3	BSNL		-					
4	IDEA		Navapur SDCA: Poor Rx. Quality observed at Sakri Road & near BSNL trle. Exchange area.		-		-	
5	UNINOR		Pimpalner SDCA : Poor Rx. Quality observed at Navapur Road , Navapur SDCA : Poor Rx. Quality observed at Sakri Road & near BSNL trle. Exchange area.		Shahada SDCA : Poor Rx. Quality observed at shirpur raod.		Dhule, Kusumba	Kusumba SDCA : Porr Rx. Quality observed on Dhule road , Sakri road & also on Malegaon Road
6	VODAFONE		Pimpalner SDCA : Poor Rx. Quality observed at Navapur Road,		Shirpur SDCA : Poor Rx. Quality obserwad at Dahiwad Road,			-
7	TATA GSM		Navapur SDCA : Poor Rx. Quality observed at Sakri Road & near BSNL trle. Exchange area.		-		-	Dhule SDCA : Poor Rx. Quality observed on Dhule-Jalgaon NH-6 highway
8	TATA CDMA		-		-		-	-
9	RCOM GSM		Pimpalner SDCA : Poor Rx. Quality observed at Navapur Road , Navapur SDCA : Poor Rx. Quality observed at Sakri Road & near BSNL trle. Exchange area.		Shahada SDCA : Poor Rx. Quality observed at shirpur raod.			Dhule SDCA : Poor Rx. Quality observed on Dhule-Jalgaon NH-6 highway. Kusumba SDCA : No network coverage observed
10	RCOM CDMA		Navapur SDCA : Poor Rx. Quality observed at Sakri Road & near BSNL trle. Exchange area.		-			Kusumba SDCA : No network coverage observed

Common Troublesome Areas: Pimpalner SDCA : Poor Rx. Quality observed at Navapur Road . Navapur SDCA : Poor Rx. Quality observed at Sakri Road & near BSNL trle. Exchange area.

DRIVE TEST TABLE: 8

NO NETWORK COVERAGE STATUS OF DRIVE TEST – JULY TO SEPTEMBER 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	July-15	Aircel	Akola	Risod, Washim, Malegoan, Akola, Barshi Takli, Murtizapur and Akot	Risod, Washim, Malegoan	Aircel is in ICR with Reliance GSM at Akola, Barshi Takli, Murtizapur, Akot SDCA
		Airtel			No Coverage Issue	Nil
		BSNL			No Coverage Issue	Nil
		Idea			No Coverage Issue	Nil
		Uninor			No Coverage Issue	Nil
		Vodafone			No Coverage Issue	Nil
		Tata GSM			No Coverage Issue	Tata GSM own BTS As well as in ICR with Rcom GSM at Barshi Takli, Akot and Murtizapur SDCA
		Tata CDMA			Malegoan	Nil
		RCOM GSM			No Coverage Issue	Reliance GSM is in ICR with Tata GSM at Risod, Malegoan, Washim SDCA
		RCOM CDMA			Risod, Washim, Malegoan	Nil
2	Aug-15	Aircel	Bhandara	Deori, Arjuni Moregoan, Sakoli, Tumsar, Mohadi, Bhandara, Tirora and Gondia	No Coverage Issue	Aircel is in ICR with Reliance GSM at whole SSA
		Airtel			No Coverage Issue	Nil
		BSNL			No Coverage Issue	Nil
		Idea			No Coverage Issue	Nil
		Uninor			Tirora	Nil
		Vodafone			No Coverage Issue	Nil
		Tata GSM			No Coverage Issue	TATA GSM is in ICR with Reliance GSM at Arjuni Moregoan and Mohadi SDCA
		Tata CDMA			Mohadi	Nil
		RCOM GSM			No Coverage Issue	Nil
		RCOM CDMA			No Coverage Issue	Nil
3	Sep-15	Aircel	Dhule	Sakri, Pimpalner, Navapur, Shahada, Shirpur, Sindkheda, Dhule and Kusumba	Kusumba	Aircel is in ICR with Reliance GSM at whole SSA
		Airtel			No Coverage Issue	Nil
		BSNL			No Coverage Issue	Nil
		Idea			No Coverage Issue	Nil
		Uninor			No Coverage Issue	Nil
		Vodafone			No Coverage Issue	Nil
		Tata GSM			No Coverage Issue	Nil
		Tata CDMA			Pimpalner, Shahada, Shirpur, Shindkheda, Kusumba	Nil
		RCOM GSM			Kusumbha	Nil
		RCOM CDMA			Kusumbha	Nil

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 July -15**, drive test was conducted across **Akola** SSA , covering Risod, Washim, Malegoan, Akola, Barshi Takli, Murtizapur and Akot SDCAs (Total 325 Kms). The non-compliance of the service providers in respect of some of the parameters on overall SSA basis is summarised below:

BSNL lagged behind in achieving the benchmarks for parameter **Voice Quality and Blocked Call Rate** with its performance as **91.21% and 3.77%** respectively on overall SSA basis. **RCOM GSM** remained under performed for parameter **Voice Quality (94.02%)**.

- (ii) **In the Month of August -15** , drive test was conducted across **Bhandara** SSA covering Deori, Arjuni Moregoan, Sakoli, Tumsar, Mohadi ,Bhandara, Tiroar and Gondia SDCAs (Total 305Kms.) The results of the drive test exposed that only **BSNL and RCOM (GSM)** could not comply with the benchmark of the parameter **Voice Quality** with their achievement as **89.00% (outdoor) / 88.04% (indoor) and 94.20% (Outdoor) / 88.19% (indoor) respectively**. **BSNL** also failed to meet the benchmark of parameter **CSSR (92.13%)**.

- (iii) **In the month of September -15** , drive test was conducted across **Dhulia** SSA covering Sakri, Pimpalner, Navapur, Shahada, Shirpur, Sindkheda, Dhule and Kusumba SDCAs (Total 314 Kms). **BSNL and RCOM (GSM)** remained under performed with respect to the parameters **CDR, Voice Quality, CSSR and Blocked Call rate**. **The performance level of BSNL for these parameters was 10.39%, 82.87% (outdoor) / 93.93% (indoor), 94.40% (outdoor) and 5.60%** respectively. Whereas performance of **RCOM (GSM)** was **2.86%, 89.36% (outdoor), 82.26% (outdoor) and 17.74%** respectively.

- (iv) 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.

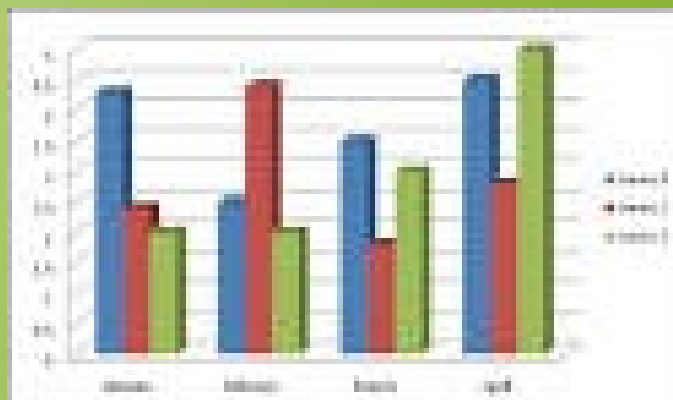
*Thus the analysis of Drive tests revealed that Service providers namely **BSNL and RCOM (GSM)** remained non-complied and need to improve their network performance with respect to the parameters **Voice Quality, Call Drop rate and Call setup success rate / Blocked Call Rate** at different locations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

8. GRAPHICAL REPRESENTATION (CELLULAR MOBILE SERVICE PROVIDERS)

AVERAGED QUARTERLY PMR

V/S

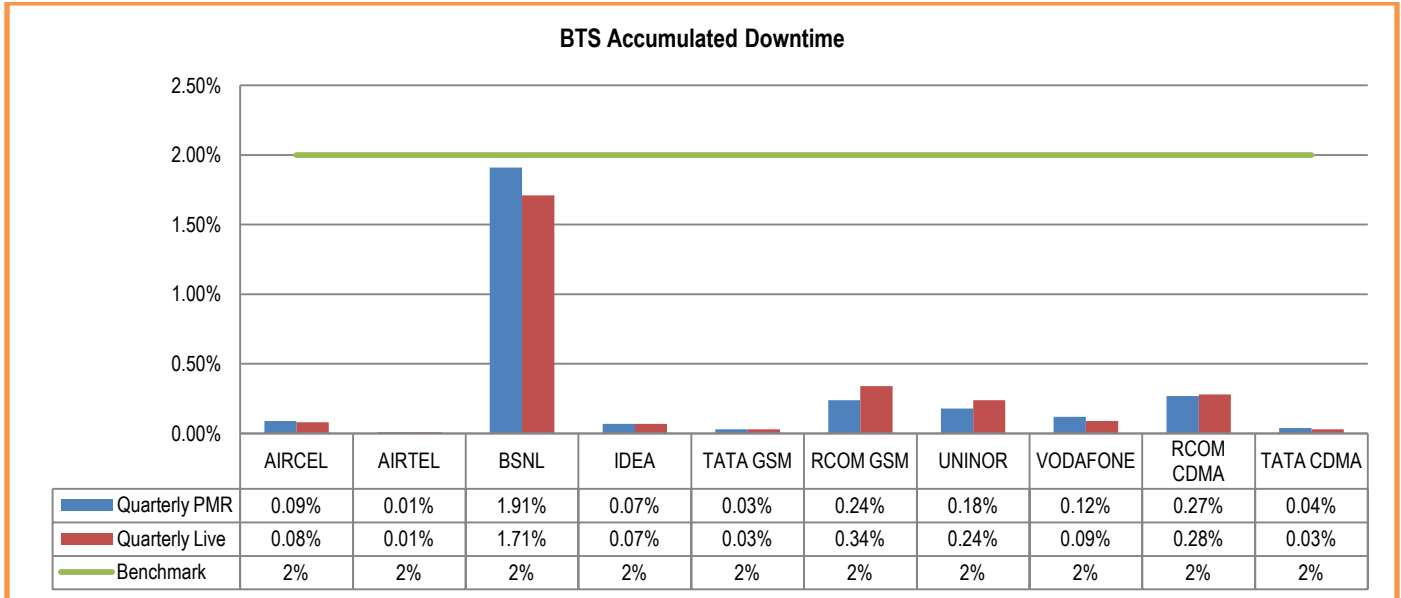
AVERAGED QUARTERLY 3-DAYs LIVE MEASURMENT



8) GRAPHICAL REPRESENTATION (CMTS):

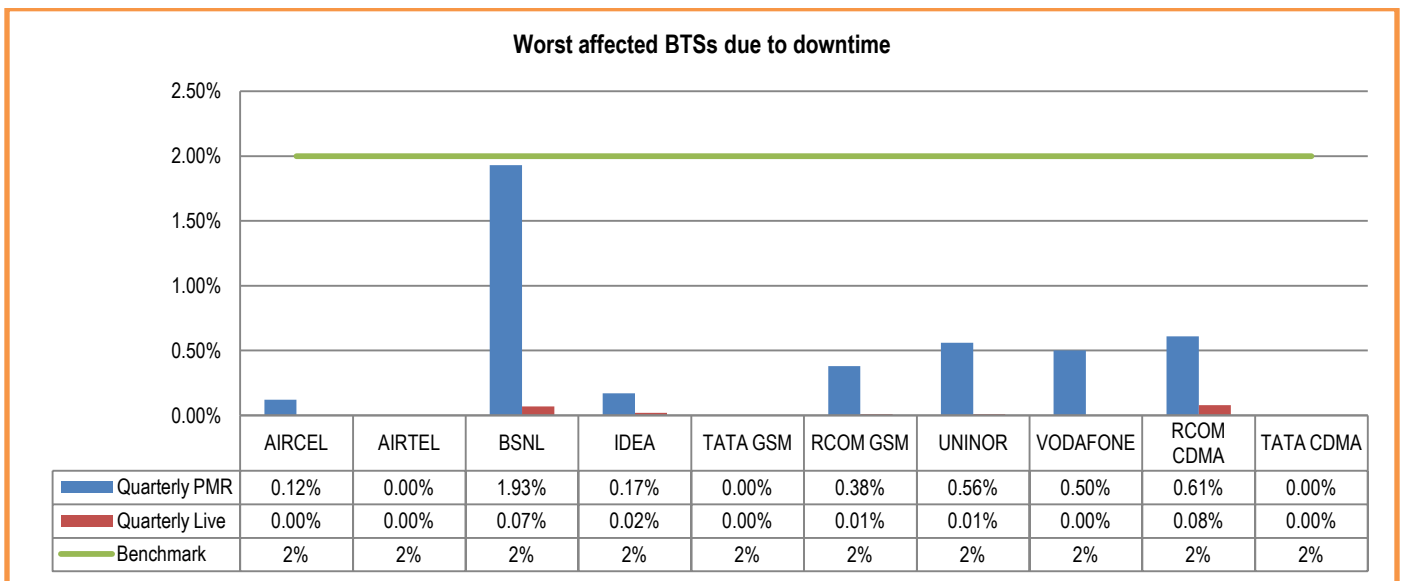
Graphical Representation of Performance of the Cellular Mobile Service Providers (PMR) V/S 3-Days Live Measurement (Quarterly Average Data):

1) BTS ACCUMULATED DOWNTIME:



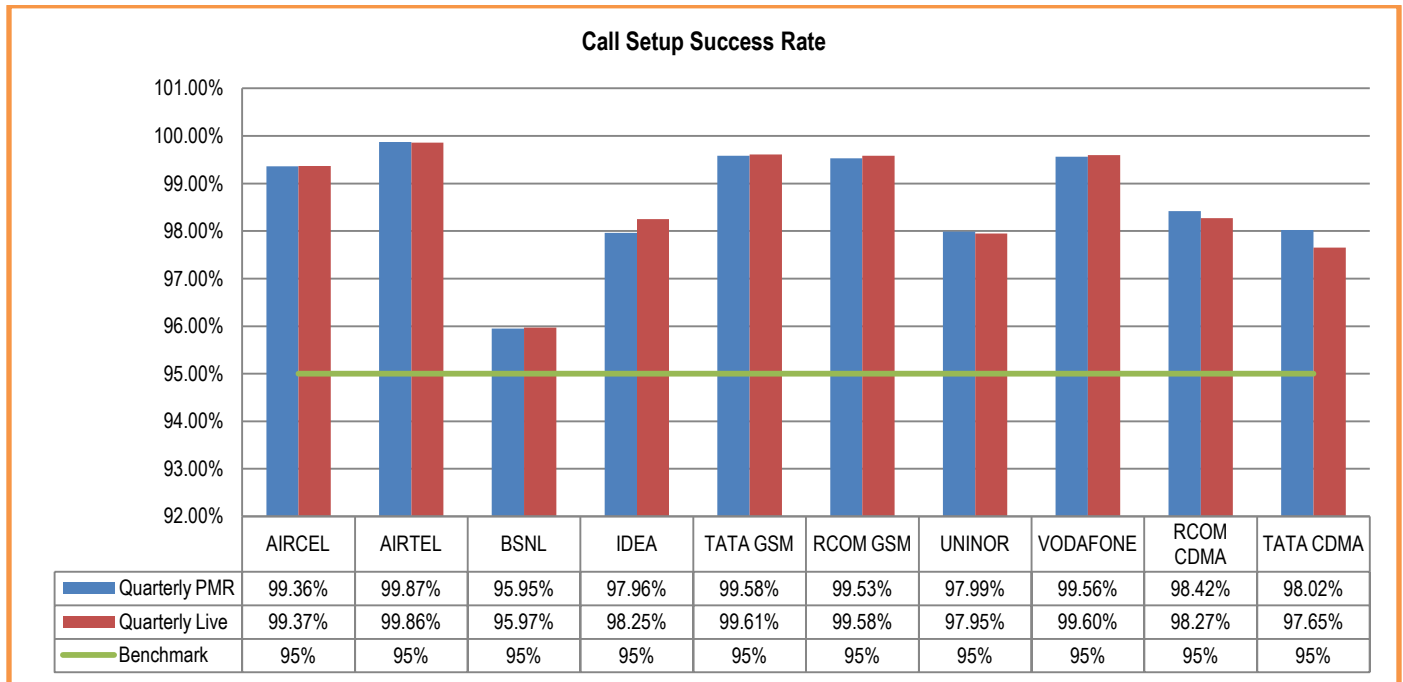
All operators are meeting the benchmarks.

2) WORST AFFECTED BTSS DUE TO DOWNTIME:



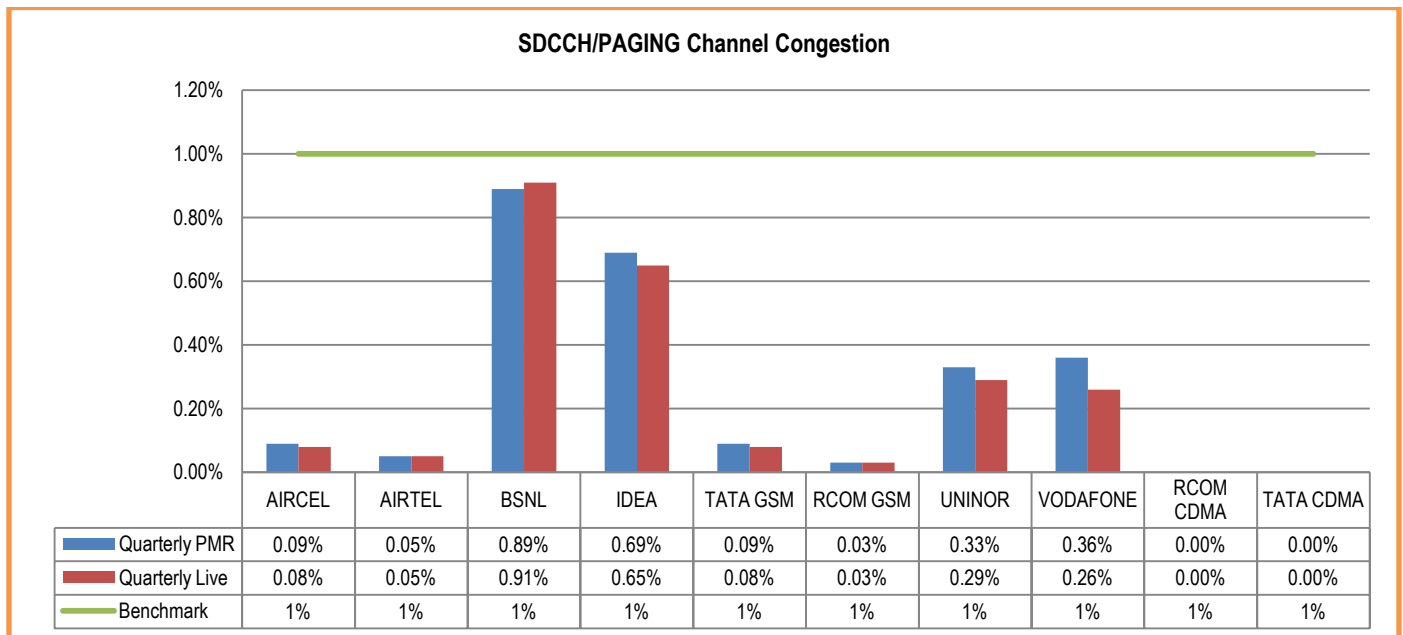
All operators are meeting the benchmarks.

3) CALL SETUP SUCCESS RATE :



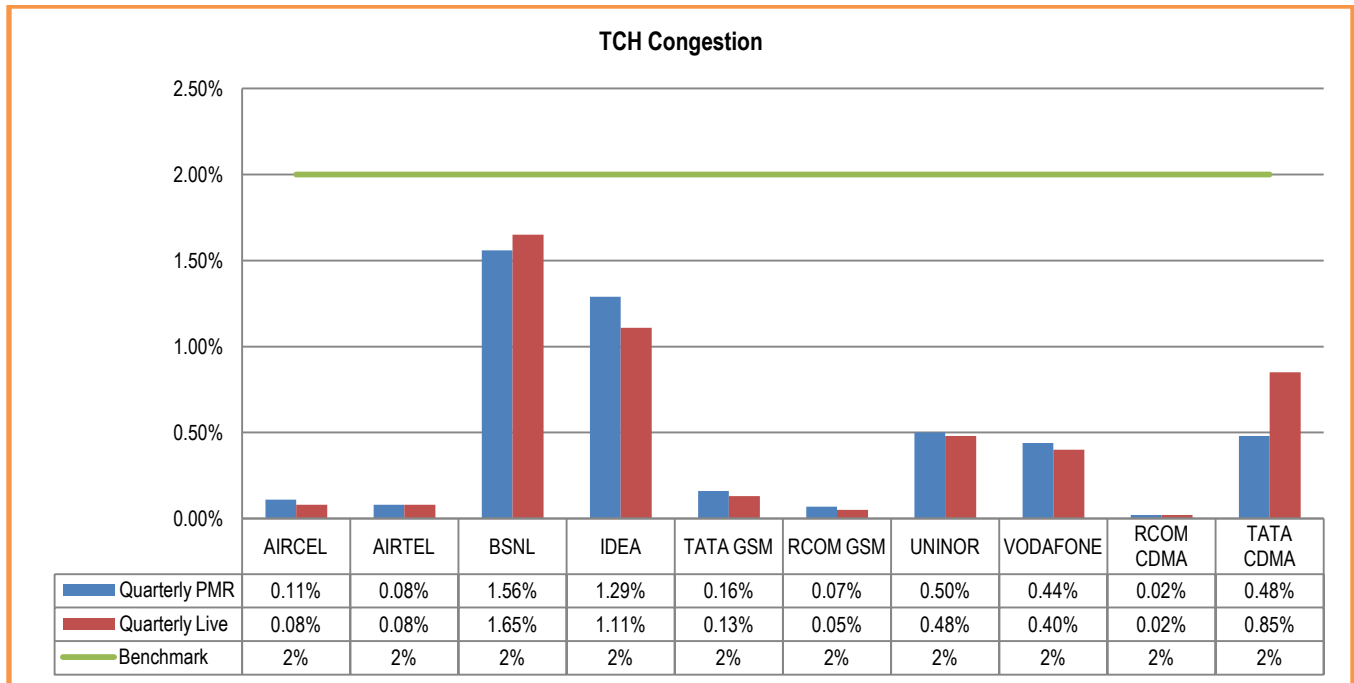
All operators are meeting the benchmarks.

4) SDCCH/PAGING CHANNEL CONGESTION :



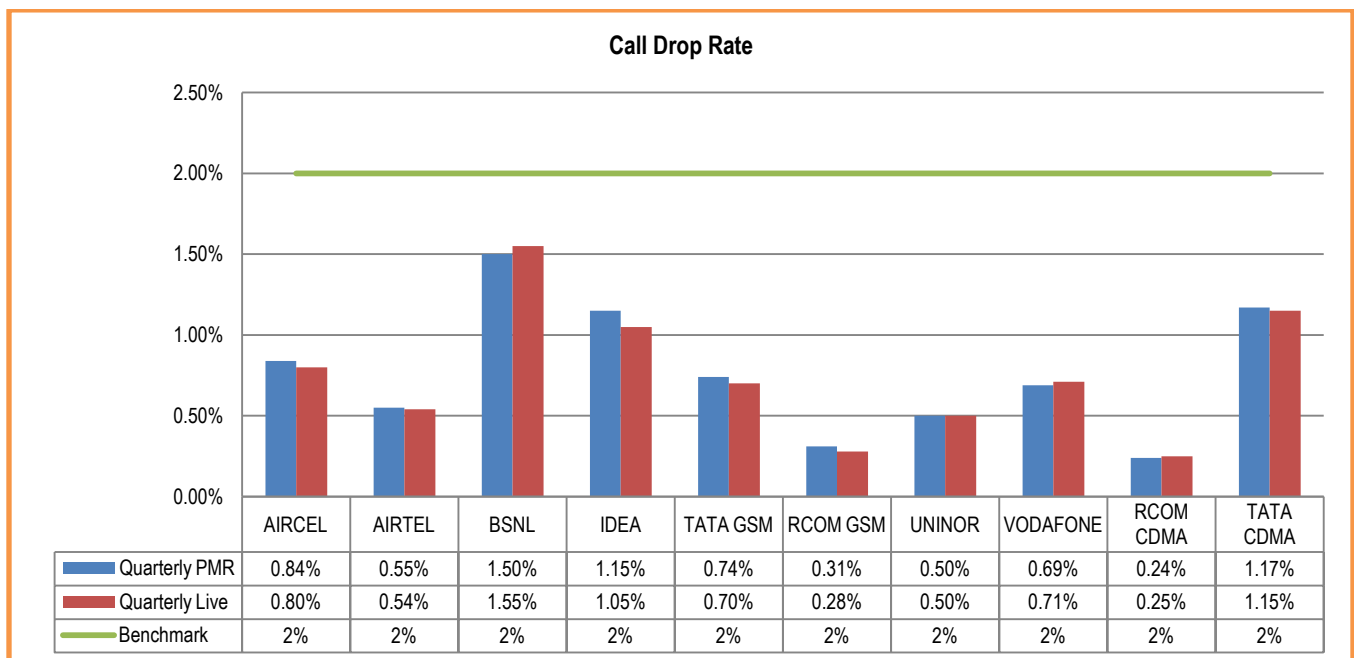
All operators are meeting the benchmarks.

5) TCH CONGESTION:



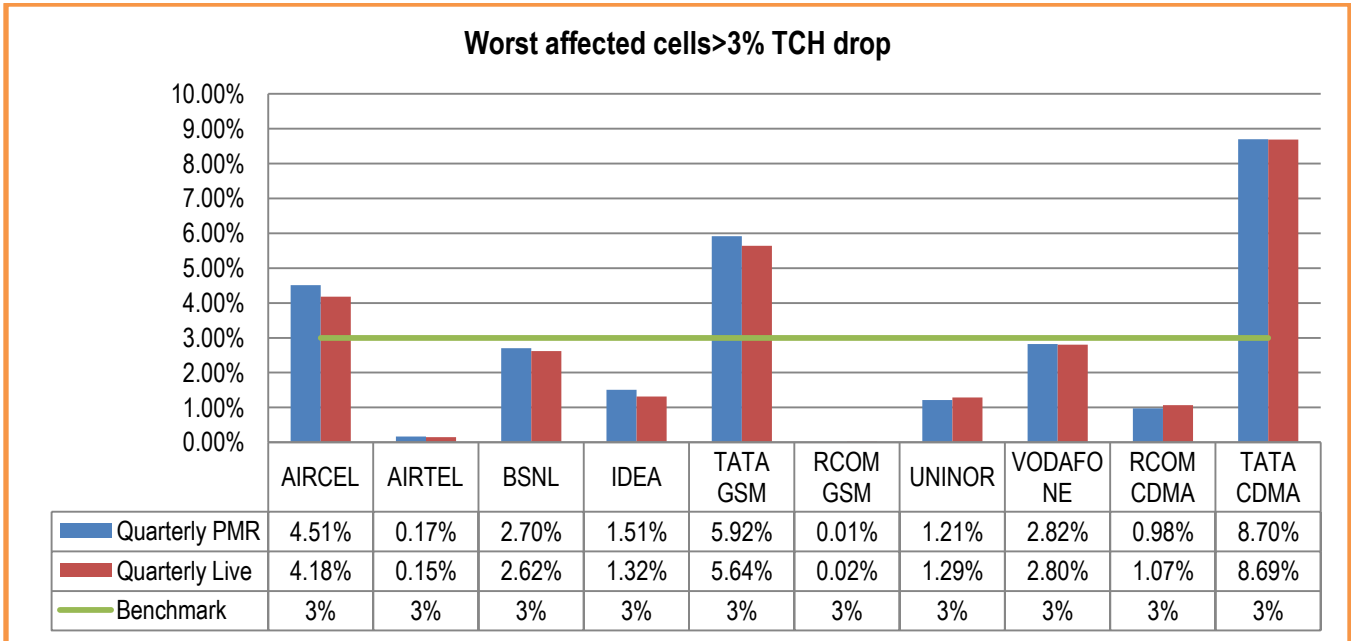
All operators are meeting the benchmarks.

6) CALL DROP RATE:



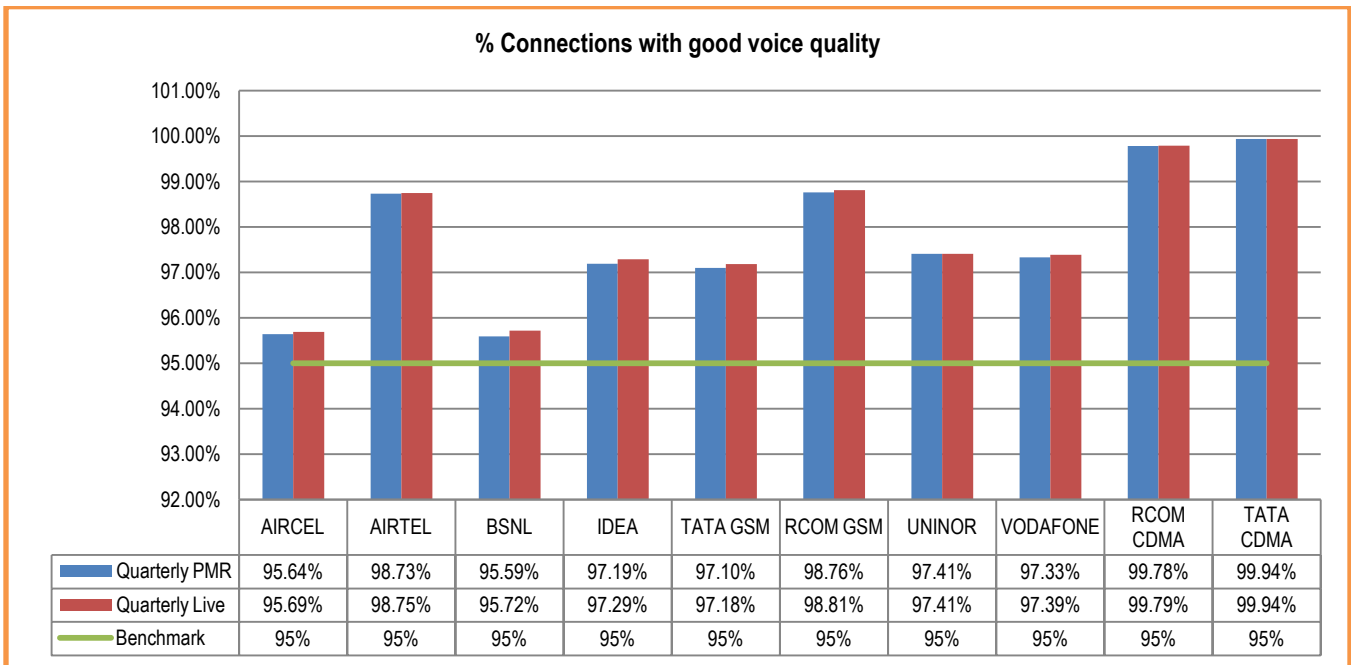
All operators are meeting the benchmarks.

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.

9) PMR VERIFICATION TABLE:

(i) NETWORK RELATED PARAMETERS:

Name of Service Provider	Parameter	BTS Accumulated Downtime	Worst affected BTSs due to downtime	CSSR (Call Setup Success Rate)	SDCCH / PAGING Channel congestion	TCH congestion	CDR (Call Drop Rate)	Worst affected cells>3% TCH drop (Call drop) rate	Connections with good voice quality	No. of POI's having >=0.5% POI congestion
Benchmark		≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%	≤ 0.5%
AIRCEL	Reported	0.08	0.12	99.36	0.09	0.11	0.84	4.49	95.64	0
	Verified	0.09%	0.12%	99.36%	0.09%	0.11%	0.84%	4.51%	95.64%	0
AIRTEL	Reported	0.01	0.00	99.87	0.05	0.08	0.55	0.17	98.72	0
	Verified	0.01%	0.00%	99.87%	0.05%	0.08%	0.55%	0.17%	98.73%	0
BSNL	Reported	1.91	1.93	95.95	0.89	1.56	1.50	2.70	95.59	0
	Verified	1.91%	1.93%	95.95%	0.89%	1.56%	1.50%	2.70%	95.59%	0
IDEA	Reported	0.07	0.17	97.96	0.68	1.30	1.15	1.50	97.20	0
	Verified	0.07%	0.17%	97.96%	0.69%	1.29%	1.15%	1.51%	97.19%	0
TATA GSM	Reported	0.03	0.00	99.58	0.07	0.11	0.74	5.91	97.10	0
	Verified	0.03%	0.00%	99.58%	0.09%	0.16%	0.74%	5.92%	97.10%	0
RCOM GSM	Reported	0.24	0.38	99.54	0.03	0.07	0.31	0.02	98.76	0
	Verified	0.24%	0.38%	99.53%	0.03%	0.07%	0.31%	0.01%	98.76%	0
UNINOR	Reported	0.18	0.56	97.99	0.33	0.50	0.50	1.21	97.41	0
	Verified	0.18%	0.56%	97.99%	0.33%	0.50%	0.50%	1.21%	97.41%	0
VODAFONE	Reported	0.12	0.50	99.56	0.36	0.44	0.69	2.79	97.33	0
	Verified	0.12%	0.50%	99.56%	0.36%	0.44%	0.69%	2.82%	97.33%	0
RCOM CDMA	Reported	0.27	0.61	98.42	0.00	0.02	0.24	0.98	99.78	0
	Verified	0.27%	0.61%	98.42%	0.00%	0.02%	0.24%	0.98%	99.78%	0
TATA CDMA	Reported	0.04	0.00	98.02	0.00	0.48	1.17	8.48	99.94	0
	Verified	0.04%	0.00%	98.02%	0.00%	0.48%	1.17%	8.70%	99.94%	0

- The above data is averaged for three months of the quarter ending September-2015.
- The PMR data provided by the service providers is largely matching with verified (audited) data. However the variation in data has been indicated by yellow colour.
- Aircel, Tata GSM and Tata CDMA have not met the benchmark for the parameter “Worst affected cells>3% TCH drop”.

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(ii) CUSTOMER SERVICE DELIVERY (CSD) RELATED PARAMETER:

Name of Service Provider	Parameter	Metering and billing credibility - post paid	Metering and billing credibility - pre paid	Resolution of billing / charging / validity complaints	Resolution of billing / charging / validity complaints	Period of applying credit/ waiver/ adjustment to customer's account from the date of resolution of complaints	Accessibility of call centre/ customer care	Percentage of calls answered by the operators (voice to voice) within 90 seconds	%age requests for Termination / Closure of service	Time taken for refund of deposits after closures
Benchmark		<= 0.1%	<= 0.1%	98% within 4 weeks	100% within 6 weeks	<=1 week	≥ 95%	≥ 95%	100% within <=7days	100% within 60 days
AIRCEL	Reported	0.04	0.00	100.00	100.00	100.00	98.17	95.83	100.00	100.00
	Verified	0.04%	0.00%	100.00%	100.00%	100.00%	98.17%	95.83%	100.00%	100.00%
AIRTEL	Reported	0.02	0.00	100.00	100.00	100.00	100.00	86.83	100.00	100.00
	Verified	0.01%	0.00%	100.00%	100.00%	100.00%	99.99%	86.83%	100.00%	100.00%
BSNL	Reported	0.00	0.02	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	Verified	0.00%	0.05%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
IDEA	Reported	0.10	0.15	100.00	100.00	100.00	98.28	99.65	100.00	100.00
	Verified	0.10%	0.15%	100.00%	100.00%	100.00%	98.28%	99.64%	100.00%	100.00%
RCOM (GSM)	Reported	0.09	0.09	100.00	100.00	100.00	99.59	18.26	100.00	100.00
	Verified	0.09%	0.09%	100.00%	100.00%	100.00%	99.59%	18.26%	100.00%	100.00%
TATA (GSM)	Reported	0.00	0.00	100.00	100.00	100.00	97.53	92.58	100.00	100.00
	Verified	0.00%	0.00%	100.00%	100.00%	100.00%	97.53%	92.58%	100.00%	100.00%
VODAFONE	Reported	0.00	0.00	100.00	100.00	100.00	99.95	98.49	100.00	92.25
	Verified	0.07%	0.03%	100.00%	100.00%	100.00%	99.95%	98.49%	100.00%	92.25%
UNINOR	Reported	NA	0.00	100.00	100.00	NA	99.58	98.69	NA	NA
	Verified	NA	0.00%	100.00%	100.00%	100.00%	99.57%	98.69%	NA	NA
RCOM (CDMA)	Reported	0.09	0.07	100.00	100.00	100.00	99.62	32.60	100.00	99.33
	Verified	0.09%	0.07%	100.00%	100.00%	100.00%	NP	32.60%	100.00%	99.33%
TATA (CDMA)	Reported	0.00	0.00	100.00	100.00	100.00	99.62	97.91	100.00	100.00
	Verified	0.00%	0.00%	100.00%	100.00%	100.00%	99.62%	97.91%	100.00%	100.00%

- The above data is average for three months of the quarter ending September-2015.
- Airtel, Tata GSM and RCOM (GSM & CDMA) have not met the benchmark for the parameter “% call answered by operators (voice to voice) within 90 sec”.
- Vodafone and RCOM CDMA have not met the benchmark for the parameter “Time taken for refund of deposits after closures”.
- Idea has not met the benchmark for the parameter “Metering and billing credibility - pre paid”.
- NA: Not Applicable, Uninor have no post-paid customers, so data for parameters related to post-paid bills not applicable for them.