



**REPORT**  
**ON**  
**AUDIT & ASSESSMENT OF QUALITY OF SERVICE**  
**OF**  
**CELLULAR MOBILE TELEPHONE SERVICE**  
**FOR**  
**TELECOM REGULATORY AUTHORITY OF INDIA**  
**WEST ZONE – MADHYA PRADESH & CHHATTISGARH**  
**SERVICE AREA**  
**(APRIL 2014 – JUNE 2014)**

**PREPARED FOR:**

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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 **MP&CG circle** against the QoS bench marks laid down by TRAI in the respective regulations.



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## **1. BACKGROUND**



## 1. BACKGROUND

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

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

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

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

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

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

The Audit exercise would assess the Quality of Service of telecom operators providing Basic (Wire line), Cellular Mobile (Wireless) and Broadband services by auditing the relevant QoS records maintained by the



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

## **2. OBJECTIVES AND METHODOLOGY**





## **2. OBJECTIVES AND METHODOLOGY**

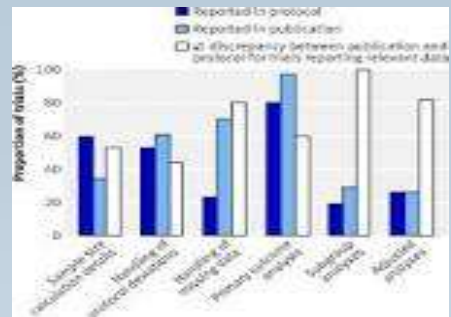
The primary objective is to audit and assess the Quality of Service being rendered by Basic, Cellular Mobile & Broadband service providers against the parameters notified by TRAI.

The audit and assessment of Quality of Service is carried out by **TUV SUD South Asia across all the Circles/Service areas of North and West Zones for Cellular Mobile Service. Apart from this, QoS audit for Basic (Wire line) and Broadband Services is also undertaken for Punjab, Rajasthan & Gujarat circles during the quarter April – June 2014.**

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

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

### 3. SAMPLE SIZE





### 3. SAMPLE SIZE

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

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

Sl. No.	Name of Service Provider	Dates of live measurement Audit			Audit Location
		April-14	May-14	June-14	
<b>GSM Operators</b>					
1	AIRCEL	08-10 Apr-14	10-12 May-14	07-09 June -14	Dishnet Wireless LTD. Office No. 2 ,Ground Floor Chinnar Incube Business Center, Hoshangabad Road Bhopal M.P. 462023
2	AIRTEL	11-13 Apr-14	12-14 May-14	09-11 June -14	47-49 Electronics Complex, Pardeshipura, Indore(M.P.) 452010
3	BSNL(MP)	14-16 Apr-14	12-14 May -14	11-13 June -14	BSNL Bhawan, Near paryawas bhawan Bhopal
4	BSNL(CG)	12-14 Apr-14	21-23 May-14	04-06 June -14	SDE Qos CM, 2nd floor Auto exchange BSNL Exchange near lala ganga complex GE Road Raipur.
5	VIDEOCON	18-20 Apr-14	13-15 May -14	08-10 June -14	Videocon Telecommunication Ltd. 2nd Floor Chinar Fortune City, Hoshangabad Road Bhopal (MP)
6	TATA GSM	16-18 Apr-14	15-17 May-14	09-11 June -14	3rd floor, Chinaar Business center, Chinaar Fortune City, Hoshangabad Road, Bhopal M.P. 462023
7	IDEA	06-08 Apr-14	13-15 May -14	14-16 June -14	139-140, Electronics Complex, Pardeshi Pura, Indore(M.P.) 452010
8	RCOM GSM	06-08 Apr-14	14-16 May -14	11-13 June -14	7th floor, Industry House, AB Road, Indore
9	VODAFONE	09-11 Apr-14	16- 18 May -14	09-11 June -14	Vodafone Spacetel Ltd, 2nd Floor Center Point New Market TT Nagr , Bhopal 462001
<b>CDMA Operators</b>					
10	RCOM CDMA	06-08 Apr-14	11-13 May-14	12-14 June -14	Reliance communication ltd, MCN Suvidh Vihar, Asharam Tiraha, Gandhi nagar, Narsing garh Bypass Road, Bhopal (M.P.) 462036
11	TATA CDMA	16-18 Apr-14	15-17 May-14	09-11 June -14	3rd floor, Chinaar Business center, Chinaar Fortune City, Hoshangabad Road, Bhopal M.P. 462023

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

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

### 3.2 SAMPLING FOR BASIC (WIRE LINE) SERVICES

The QoS audit for basic (wire line) service is to be done for the number of exchanges spread over in about 10% of SDCAs with each service providers in specified circles. As per the clause 17.3 of the tender document, the QoS audit of Basic Telephone Service (Wireline) in a service area / circle is to be done only once in a year. Thus, **QoS audit for basic (Wireline) service in MP&CG circle shall be done during the QE-September 2014.**

### 3.3 SAMPLING FOR BROADBAND SERVICE PROVIDERS

TUV-SUD South Asia has to conduct the audit and assessment of Quality of Service of Broadband Service only in respect of the service providers who are having broadband subscriber base of more than 10,000 subscribers in their licensed service area, for 5% of Point of Presence (PoPs) spread over in 10% SDCAs in specified Telecom Circle. As per the clause 17.3 of the tender document, the QoS audit of Broadband service in a service area / circle is to be done only once in a year. Thus, **QoS audit for Broadband service in MP&CG circle shall be done during the QE-September 2014.**

## **4. EXECUTIVE SUMMARY**



#### 4. EXECUTIVE SUMMARY

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

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

- **Essence of compliance report of service providers with respect to the QoS:**

(i) From **monthly audit**, it was concluded that on an average, performance of the operators in the MP&CG service area was satisfactory for **Network Parameters**. However, The audit with respect to the parameter **‘Worst affected cells having > 3% TCH drop’** revealed that Tata (GSM), Tata (CDMA) and Vodafone failed to meet the benchmark of this parameter with their quarterly average performance of as **4.99%, 5.49% and 4.13%** respectively.

In case of **three days live measurements** also, the parameter **‘Worst affected cells> 3 % TCH drops’** could not be complied with by **Tata (GSM), Tata (CDMA) and Vodafone** in all the three months of the quarter. Their performance was similar to what was observed during monthly audit. The quarterly average performance of **Tata (GSM), Tata (CDMA) and Vodafone** for this parameter was **5.03%, 5.72% and 4.20%** respectively.

(ii) With regard to the **Customer Service Quality Parameters**, it is revealed that all operators are in well compliance of the parameters on Metering and Billing Credibility, Response Time to Customers, Termination of Service and Time taken for refunds. However, **RCOM (CDMA)** has not met the benchmark for the parameter “% calls answered by Operators (voice to voice) within 60 seconds” with its performance as **89.78%**. In case of the parameter ‘Closure/Termination within 7 days’, **BSNL and Vodafone** were non-compliants with their performance as **98.80%** and **95.75%**.

(iii) The performance of the service providers with regard to the **drive test**, it was concluded that the service providers namely **BSNL, RCOM(GSM)/CDMA and Vodafone** could not perform well on the parameter **‘Good Voice Quality’ and ‘Call Drop rate’**, need to improve their networks in these SSAs for better performance in the interest of the consumers.

## **PMR AUDIT REPORT**



## 5. PMR AUDIT REPORTS:

### 5.1 MONTHLY PMR:

#### 5.1.1 BUSY HOUR OF VARIOUS SERVICE PROVIDERS:

Sl. No.	Name of Service Provider	Month of Audit	Network TCBH Hour
<b>GSM Operators</b>			
1	AIRTEL	June-14	19 Hrs-20 Hrs
2	AIRCEL	June-14	18 Hrs-19 Hrs
3	TATA GSM	June-14	20 Hrs-21 Hrs
4	BSNL (MP)	June-14	19 Hrs-20 Hrs
5	BSNL (CG)	June-14	19 Hrs-20 Hrs
6	IDEA CELLULAR	June-14	20 Hrs-21 Hrs
7	RCOM GSM	June-14	20 Hrs-21 Hrs
8	VIDEOCON	June-14	21 Hrs-22 Hrs
9	VODAFONE	June-14	20 Hrs-21 Hrs
<b>CDMA Operators</b>			
10	RCOM CDMA	June-14	20 Hrs-21 Hrs
11	TATA CDMA	June-14	20 Hrs-21 Hrs

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



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

Sl. No.	Name of Service Provider	No. of MSC + GMSC	No. of BSC	No. of BTS	NSS make	BSS make
<b>GSM Operators</b>						
1	AIRTEL	18	147	9219	NSN	NSN
2	AIRCEL	1	1	128	Huawei	Huawei
3	TATA GSM	4	26	2876	Huawei	Huawei
4	BSNL (MP)	9	88	4063	Alcatel	Alcatel
5	BSNL (CG)	5	44	1804	Alcatel	Alcatel
6	IDEA CELLULAR	33	72	9321	Ericsson	Ericsson
7	RCOM GSM	12	49	4512	Huawei, Ericsson	ZTE, Alcatel Lucent
8	VIDEOCON	1	10	1541	Huawei	Huawei
9	VODAFONE	7	49	5218	NSN	NSN
<b>CDMA Operators</b>						
10	RCOM CDMA	8	8	1808	Huawei, ZTE, Lucent	Lucent, Huawei
11	TATA CDMA	3	5	449	Huawei & Ericsson	Motorola & Huawei

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

CELLULAR MOBILE TELEPHONE SERVICES MP&CG CIRCLE – APRIL 14 MONTH														
PMR Generation Data		Bench- mark	Audit Period	AIRTEL	AIRCEL	TATA GSM	BSNL (MP)	BSNL (CG)	IDEA CELLULAR	RCOM GSM	VIDEOCON	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators								CDMA Operators		
<b>Network Service Quality Parameter</b>														
<b>Network Availability</b>														
1	a) BTS Accumulated Downtime	<=2%	Apr-14	0.11%	0.42%	0.00%	1.81%	1.49%	0.99%	0.22%	0.24%	0.07%	0.46%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	Apr-14	0.23%	1.56%	0.00%	1.55%	1.83%	1.93%	0.55%	0.91%	0.04%	0.78%	0.00%
<b>Connection Establishment (Accessibility)</b>														
2	a) CSSR (Call Setup Success Rate)	>=95%	Apr-14	99.42%	98.76%	98.63%	97.20%	95.09%	98.06%	98.64%	98.83%	99.51%	99.21%	99.25%
	b) SDCCH/PAGING Channel congestion	<=1%	Apr-14	0.07%	0.34%	0.03%	0.45%	0.47%	0.62%	0.07%	0.17%	0.10%	0.00%	0.00%
	c) TCH congestion	<=2%	Apr-14	0.31%	0.00%	0.03%	1.35%	1.77%	1.26%	0.22%	0.29%	0.49%	0.00%	0.02%
<b>Connection maintenance (Retainability)</b>														
3	a) CDR (Call Drop Rate)	<=2%	Apr-14	0.76%	0.73%	0.65%	1.79%	1.66%	0.85%	0.56%	0.64%	0.61%	0.08%	0.35%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Apr-14	0.97%	1.30%	5.01%	2.44%	2.69%	0.98%	0.01%	1.35%	4.33%	0.51%	5.69%
	c) Connections with good voice quality	>=95%	Apr-14	96.06%	99.36%	98.30%	NP	NP	98.93%	97.94%	98.22%	99.02%	99.85%	99.20%
4	No. of POI's having >=0.5% POI congestion		Apr-14	0	0	0	0	0	0	0	0	0	0	0

\*NP: Data not provided: ALCATEL LUCENT Technology being used by BSNL and OMCR does not support the parameter "Connections with good voice quality", hence BSNL has not provided data for this parameter.



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

CELLULAR MOBILE TELEPHONE SERVICES MP&CG CIRCLE – MAY 14 MONTH														
PMR Generation Data		Bench- mark	Audit Period	AIRTEL	AIRCEL	TATA GSM	BSNL (MP)	BSNL (CG)	IDEA CELLULAR	RCOM GSM	VIDEOCON	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators				
<b>Network Service Quality Parameter</b>														
<b>Network Availability</b>														
1	a) BTS Accumulated Downtime	<=2%	May-14	0.11%	0.67%	0.01%	1.77%	0.89%	1.03%	0.28%	0.33%	0.07%	0.56%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	May-14	0.33%	1.56%	0.00%	1.23%	1.94%	1.94%	1.10%	0.97%	0.10%	1.62%	0.00%
<b>Connection Establishment (Accessibility)</b>														
2	a) CSSR (Call Setup Success Rate)	>=95%	May-14	99.14%	98.68%	98.51%	96.62%	95.22%	97.83%	98.69%	99.01%	99.40%	98.77%	99.19%
	b) SDCCH/PAGING Channel congestion	<=1%	May-14	0.06%	0.30%	0.05%	0.60%	0.79%	0.56%	0.04%	0.15%	0.13%	0.00%	0.00%
	c) TCH congestion	<=2%	May-14	0.28%	0.00%	0.06%	1.71%	1.78%	1.46%	0.23%	0.19%	0.60%	0.00%	0.08%
<b>Connection maintenance (Retainability)</b>														
3	a) CDR (Call Drop Rate)	<=2%	May-14	0.75%	1.02%	0.70%	1.65%	1.81%	0.81%	0.56%	0.61%	0.63%	0.09%	0.32%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	May-14	0.98%	1.56%	4.82%	2.68%	2.74%	0.89%	0.03%	1.26%	3.87%	0.31%	5.32%
	c) Connections with good voice quality	>=95%	May-14	96.18%	99.03%	98.20%	NP	NP	98.86%	97.95%	98.34%	99.09%	99.85%	99.17%
4	No. of POI's having >=0.5% POI congestion		May-14	0	0	0	0	0	0	0	0	0	0	0

\*NP: Data not provided: ALCATEL LUCENT Technology being used by BSNL and OMCR does not support the parameter "Connections with good voice quality", hence BSNL has not provided data for this parameter.



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

CELLULAR MOBILE TELEPHONE SERVICES MP&CG CIRCLE – JUNE 14 MONTH														
PMR Generation Data		Bench- mark	Audit Period	AIRTEL	AIRCEL	TATA GSM	BSNL (MP)	BSNL (CG)	IDEA CELLULAR	RCOM GSM	VIDEOCON	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators								CDMA Operators		
<b>Network Service Quality Parameter</b>														
<b>Network Availability</b>														
1	a) BTS Accumulated Downtime	<=2%	Jun-14	0.19%	0.69%	0.01%	1.94%	1.37%	0.91%	0.39%	0.52%	0.09%	0.70%	0.04%
	b) Worst affected BTSs due to downtime	<=2%	Jun-14	0.53%	0.00%	0.00%	1.58%	1.88%	1.92%	1.60%	0.97%	0.11%	1.49%	0.00%
<b>Connection Establishment (Accessibility)</b>														
2	a) CSSR (Call Setup Success Rate)	>=95%	Jun-14	99.47%	98.76%	98.53%	96.29%	95.18%	97.75%	98.70%	98.97%	99.43%	99.01%	99.00%
	b) SDCCH/PAGING Channel congestion	<=1%	Jun-14	0.06%	0.19%	0.07%	0.67%	0.94%	0.55%	0.05%	0.14%	0.20%	0.00%	0.00%
	c) TCH congestion	<=2%	Jun-14	0.29%	0.00%	0.07%	1.76%	1.75%	1.53%	0.24%	0.25%	0.57%	0.00%	0.17%
<b>Connection maintenance (Retainability)</b>														
3	a) CDR (Call Drop Rate)	<=2%	Jun-14	0.77%	0.51%	0.75%	1.53%	1.79%	0.88%	0.56%	0.62%	0.68%	0.11%	0.44%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Jun-14	2.18%	1.56%	5.13%	2.44%	2.80%	1.19%	0.01%	1.31%	4.19%	0.68%	5.47%
	c) Connections with good voice quality	>=95%	Jun-14	96.26%	99.54%	98.10%	NP	NP	98.21%	97.95%	98.34%	99.10%	99.84%	99.19%
4	No. of POI's having >=0.5% POI congestion		Jun-14	0	0	0	0	0	0	0	0	0	0	0

\*NP: Data not provided: ALCATEL LUCENT Technology being used by BSNL and OMCR does not support the parameter "Connections with good voice quality", hence BSNL has not provided data for this parameter.



**5.1.6 QOS PERFORMANCE OF QUARTERLY PMR –AVERAGE OF QE- JUNE-14 (APRIL TO JUNE MONTHS AUDITED DATA)**

QUARTERLY QOS PERFORMANCE (AVERAGE OF THREE MONTHS) OF MP&CG CIRCLE														
PMR Generation Data		Bench- mark	Audit Period	AIRTEL	AIRCEL	TATA GSM	BSNL (MP)	BSNL (CG)	IDEA CELLULAR	RCOM GSM	VIDEOCON	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators								CDMA Operators		
<b>Network Service Quality Parameter</b>														
<b>Network Availability</b>														
1	a) BTS Accumulated Downtime	<=2%	Quarterly	0.14%	0.59%	0.01%	1.84%	1.25%	0.98%	0.30%	0.36%	0.08%	0.57%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.36%	1.04%	0.00%	1.45%	1.88%	1.93%	1.08%	0.95%	0.08%	1.30%	0.00%
<b>Connection Establishment (Accessibility)</b>														
2	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	99.34%	98.73%	98.56%	96.70%	95.16%	97.88%	98.68%	98.94%	99.45%	99.00%	99.15%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.06%	0.28%	0.05%	0.57%	0.73%	0.58%	0.05%	0.15%	0.14%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	0.29%	0.00%	0.05%	1.61%	1.77%	1.42%	0.23%	0.24%	0.55%	0.00%	0.09%
<b>Connection maintenance (Retainability)</b>														
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	0.76%	0.75%	0.70%	1.66%	1.75%	0.85%	0.56%	0.62%	0.64%	0.09%	0.37%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	1.38%	1.47%	<b>4.99%</b>	2.52%	2.74%	1.02%	0.02%	1.31%	<b>4.13%</b>	0.50%	<b>5.49%</b>
	c) Connections with good voice quality	>=95%	Quarterly	96.17%	99.31%	98.20%	NP	NP	98.67%	97.95%	98.30%	99.07%	99.85%	99.19%
4	No. of POI's having >=0.5% POI congestion		Quarterly	0	0	0	0	0	0	0	0	0	0	0

\*NP: Data not provided: ALCATEL LUCENT Technology being used by BSNL and OMCR does not support the parameter "Connections with good voice quality", hence BSNL has not provided data for this parameter.

### 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 circles.

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 all 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 MP&CG circle, all the operators were found meeting benchmark on the above parameters.

- **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 operators were complying with 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 0.09%) 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 operators (except **Tata (GSM), Vodafone and Tata - CDMA**) met the benchmark for this parameter. The quarterly average performance of Tata (GSM), Vodafone and Tata (CDMA) for this parameter was **4.99%, 4.13% and 5.49%** respectively.

- iii. Connections with good voice quality:

OMCR of BSNL does not support for the data of Voice Quality, so not provided the data for this parameter. The audit results for this parameter indicates that all operators have met the bench mark during the quarter.

**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) – APRIL-14 MONTH:**

CELLULAR MOBILE TELEPHONE SERVICES MP&CG CIRCLE - APRIL 14 MONTH														
Live measurement Data		Bench- mark	Average of 3 Days	AIRTEL	AIRCEL	TATA GSM	BSNL (MP)	BSNL (CG)	IDEA CELLULAR	RCOM GSM	VIDEOCON	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators							CDMA Operators			
<b>Network Service Quality Parameter</b>														
<b>Network Availability</b>														
1	a) BTS Accumulated Downtime	<=2%	Live data	0.08%	0.09%	0.00%	1.86%	1.28%	0.72%	0.07%	0.37%	0.06%	0.36%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.01%	0.00%	0.00%	0.96%	0.28%	0.80%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>														
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	99.42%	99.30%	98.62%	97.29%	95.06%	98.15%	98.60%	98.70%	99.51%	99.38%	99.21%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.09%	0.04%	0.04%	0.53%	0.74%	0.68%	0.02%	0.45%	0.08%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.31%	0.00%	0.03%	1.42%	1.95%	1.19%	0.19%	0.44%	0.49%	0.00%	0.01%
<b>Connection maintenance (Retainability)</b>														
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.76%	0.70%	0.66%	1.46%	1.43%	0.82%	0.55%	0.77%	0.61%	0.07%	0.33%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	1.75%	0.78%	5.03%	2.58%	2.46%	1.04%	0.01%	1.95%	4.68%	0.44%	6.21%
	c) Connections with good voice quality	>=95%	Live data	96.05%	99.79%	98.28%	NP	NP	98.92%	98.01%	98.28%	99.03%	99.84%	99.19%
4	No. of POI having >=0.5% congestion		Live data	0	0	0	0	0	0	0	0	0	0	0

\*NP: Data not provided: ALCATEL LUCENT Technology being used by BSNL and OMCR does not support the parameter "Connections with good voice quality", hence BSNL has not provided data for this parameter.



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

CELLULAR MOBILE TELEPHONE SERVICES MP&CG CIRCLE - MAY 14 MONTH														
Live measurement Data		Bench- mark	Average of 3 Days	AIRTEL	AIRCEL	TATA GSM	BSNL (MP)	BSNL (CG)	IDEA CELLULAR	RCOM GSM	VIDEOCON	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators									CDMA Operators	
<b>Network Service Quality Parameter</b>														
<b>Network Availability</b>														
1	a) BTS Accumulated Downtime	<=2%	Live data	0.11%	0.46%	0.01%	1.81%	1.48%	0.64%	0.10%	0.36%	0.06%	0.39%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.00%	0.96%	0.39%	0.86%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>														
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	99.46%	98.70%	98.57%	96.70%	95.34%	97.90%	98.73%	99.11%	99.38%	99.12%	99.14%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.05%	0.01%	0.10%	0.50%	0.63%	0.49%	0.02%	0.06%	0.19%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.23%	0.00%	0.06%	1.52%	1.94%	1.43%	0.20%	0.15%	0.62%	0.00%	0.18%
<b>Connection maintenance (Retainability)</b>														
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.75%	0.22%	0.71%	1.50%	1.82%	0.80%	0.54%	0.59%	0.64%	0.08%	0.31%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	1.78%	1.30%	5.01%	2.73%	2.52%	0.79%	0.03%	1.16%	4.07%	0.52%	5.54%
	c) Connections with good voice quality	>=95%	Live data	96.18%	99.74%	98.21%	NP	NP	98.99%	97.91%	98.29%	99.06%	99.84%	99.19%
4	No. of POI having >=0.5% congestion		Live data	0	0	0	0	0	0	0	0	0	0	0

\*NP: Data not provided: ALCATEL LUCENT Technology being used by BSNL and OMCR does not support the parameter "Connections with good voice quality", hence BSNL has not provided data for this parameter.



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

CELLULAR MOBILE TELEPHONE SERVICES MP&CG CIRCLE - JUNE 14 MONTH														
Live measurement Data		Bench- mark	Average of 3 Days	AIRTEL	AIRCEL	TATA GSM	BSNL (MP)	BSNL (CG)	IDEA CELLULAR	RCOM GSM	VIDEOCON	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators				
<b>Network Service Quality Parameter</b>														
<b>Network Availability</b>														
1	a) BTS Accumulated Downtime	<=2%	Live data	0.19%	1.99%	0.01%	1.89%	2.15%	1.13%	0.59%	0.45%	0.08%	0.93%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.03%	0.00%	0.00%	0.84%	0.09%	0.96%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>														
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	99.46%	98.30%	98.43%	96.07%	94.47%	97.76%	98.72%	98.92%	99.37%	98.89%	98.70%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.07%	0.13%	0.11%	0.71%	0.81%	0.53%	0.04%	0.12%	0.13%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.34%	0.00%	0.07%	1.75%	1.50%	1.52%	0.25%	0.27%	0.63%	0.00%	0.35%
<b>Connection maintenance (Retainability)</b>														
3	a) CDR (Call Drop Rate)	<=2%	Live data	0.16%	0.23%	0.79%	1.68%	1.51%	0.91%	0.53%	0.58%	0.63%	0.11%	0.42%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	1.83%	1.30%	5.06%	2.62%	2.84%	1.21%	0.03%	1.22%	3.84%	0.74%	5.40%
	c) Connections with good voice quality	>=95%	Live data	96.40%	99.52%	98.11%	NP	NP	98.18%	97.96%	98.40%	99.13%	99.84%	99.16%
4	No. of POI having >=0.5% congestion		Live data	0	0	0	0	0	0	0	0	0	0	0

\*NP: Data not provided: ALCATEL LUCENT Technology being used by BSNL and OMCR does not support the parameter "Connections with good voice quality", hence BSNL has not provided data for this parameter.



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

QUARTERLY QOS PERFORMANCE OF 3-DAYS LIVE MEASUREMENT (AVERAGE OF THREE MONTHS) – MP&CG CIRCLE														
Live measurement Data		Bench- mark	Average of 3 Days	AIRTEL	AIRCEL	TATA GSM	BSNL (MP)	BSNL (CG)	IDEA CELLULAR	RCOM GSM	VIDEOCON	VODAFONE	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators							CDMA Operators			
<b>Network Service Quality Parameter</b>														
<b>Network Availability</b>														
1	a) BTS Accumulated Downtime	<=2%	Quarterly	0.13%	0.85%	0.01%	1.85%	1.64%	0.83%	0.25%	0.39%	0.07%	0.56%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.01%	0.00%	0.00%	0.92%	0.25%	0.87%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>														
2	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	99.45%	98.77%	98.54%	96.69%	94.96%	97.94%	98.68%	98.91%	99.42%	99.13%	99.02%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.07%	0.06%	0.08%	0.58%	0.73%	0.57%	0.03%	0.21%	0.13%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	0.29%	0.00%	0.05%	1.56%	1.80%	1.38%	0.21%	0.29%	0.58%	0.00%	0.18%
<b>Connection maintenance (Retainability)</b>														
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	0.56%	0.38%	0.72%	1.55%	1.59%	0.84%	0.54%	0.65%	0.63%	0.09%	0.35%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	1.79%	1.13%	5.03%	2.64%	2.61%	1.01%	0.02%	1.44%	4.20%	0.57%	5.72%
	c) Connections with good voice quality	>=95%	Quarterly	96.21%	99.68%	98.20%	NP	NP	98.70%	97.96%	98.32%	99.07%	99.84%	99.18%
4	No. of POI having >=0.5% congestion		Quarterly	0	0	0	0	0	0	0	0	0	0	0

\*NP: Data not provided: ALCATEL LUCENT Technology being used by BSNL and OMCR does not support the parameter "Connections with good voice quality", hence BSNL has not provided data for this parameter.

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

From three days live measurement/assessment, it was revealed that the performance of the operators was satisfactory as they have largely met the benchmarks except for the parameter **'Worst affected cells> 3 % TCH drops'**, which could not be complied with by **Tata (GSM), Tata (CDMA) and Vodafone** in all the three months of the quarter. Their average performance for the quarter was **5.03%, 5.72%** and **4.20 %** respectively. The similar non-complied performance of these operators was also observed during the monthly PMR audit.

BSNL (CG) also failed to achieve the benchmark very marginally for parameter CSSR (**94.96%**).

*Thus, the assessment of QoS with regard to the parameter 'Worst affected cells> 3 % TCH drops' assessed during live measurement is a matter of concern for those operators who could not meet the benchmark.*



5.2.6 DETAILED NETWORK DATA ASSESSMENT OF CELLULAR MOBILE TELEPHONE SERVICES:

TABLE: 1

Detailed Network Data Assessment of Cellular Mobile Telephone Services- MP&CG Circle- April-14 month

S/N	Name of Parameter	Bench- mark	Audit Period	AIRTEL	AIRCEL	TATA GSM	BSNL (MP)	BSNL (CG)	IDEA CELLULAR	RCOM GSM	VIDEOCON	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators										CDMA Operators
<b>Network Service Quality Parameter</b>														
<b>Network Availability</b>														
1	a) Total no. of BTSs in the licensed service area		Apr-14	9237	128	2867	4063	1803	9309	4896	1546	5156	2043	448
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Apr-14	7468	386	29	52821	19344	66326	7757	2617	2454	6746	6
	c) BTS Accumulated Downtime	<=2%	Apr-14	0.11%	0.42%	0.00%	1.81%	1.49%	0.99%	0.22%	0.24%	0.07%	0.46%	0.00%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Apr-14	21	2	0	63	33	180	27	14	2	16	0
	e) Worst affected BTSs due to downtime	<=2%	Apr-14	0.23%	1.56%	0.00%	1.55%	1.83%	1.93%	0.55%	0.91%	0.04%	0.78%	0.00%
<b>Connection Establishment (Accessibility)</b>														
2	a) CSSR (Call Setup Success Rate)	<=2%	Apr-14	99.42%	98.76%	98.63%	97.20%	95.09%	98.06%	98.64%	98.83%	99.51%	99.21%	99.25%
	b) SDCCH/PAGING Congestion	<=3%	Apr-14	0.07%	0.34%	0.03%	0.45%	0.47%	0.62%	0.07%	0.17%	0.10%	0.00%	0.00%
	c) TCH congestion	<=2%	Apr-14	0.31%	0.00%	0.03%	1.35%	1.77%	1.26%	0.22%	0.29%	0.49%	0.00%	0.02%
<b>Connection Maintenance (Retainability)</b>														
3	a) Call Drop Rate (CDR)	<=2%	Apr-14	0.76%	0.73%	0.65%	1.79%	1.66%	0.85%	0.56%	0.64%	0.61%	0.08%	0.35%
	b) Worst affected cells>3% TCH drop	<=3%	Apr-14	0.97%	1.30%	5.01%	2.44%	2.69%	0.98%	0.01%	1.35%	4.33%	0.51%	5.69%
	c) % of connections with good voice quality	>=95%	Apr-14	96.06%	99.36%	98.30%	NP	NP	98.93%	97.94%	98.22%	99.02%	99.85%	99.20%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Apr-14	276	5	430	297	143	272	2	63	673	31	77
	e) Total no. of cells (Sector) in the licensed service area		Apr-14	28333	384	8588	12156	5322	27616	14688	4655	15533	6129	1353
<b>No. of POI's having &gt;=0.5% POI congestion</b>														
4	No. of POI's having >=0.5% POI congestion		Apr-14	0	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Apr-14	0	0	0	0	0	0	0	0	0	0	0
<b>Network Data</b>														
5	a) Equipped Capacity of Network in Erlang		Apr-14	310959	902	135012	224000	130000	460498	295000	62586	139630	146000	107625
	b) Total traffic in TCBH in erlang (Avg.)		Apr-14	234671	2	57084	79618	58081	382078	209825	25166	98056	74760	19344
	c) Total no. of customers served (as per VLR) on last day of the month		Apr-14	10364902	765	2585328	2002940	889423	18483457	8709154	1007493	4389927	2196777	247693



TABLE: 2

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live- MP&CG Circle- April-14 month														
S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRTEL	AIRCEL	TATA GSM	BSNL (MP)	BSNL (CG)	IDEA CELLULAR	RCOM GSM	VIDEOCON	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators										CDMA Operators
<b>Network Service Quality Parameter</b>														
1	<b>Network Availability</b>													
	a) Total no. of BTSs in the licensed service area		Live data	9227	128	2862	4063	1804	9260	4896	1546	5153	2043	448
	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	549	8	1	5427	1658	4789	234	407	221	534	2
	c) BTS Accumulated Downtime	<=2%	Live data	0.08%	0.09%	0.00%	1.86%	1.28%	0.72%	0.07%	0.37%	0.06%	0.36%	0.01%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	1	0	0	39	5	74	0	0	0	0	0
e) Worst affected BTSs due to downtime	<=2%	Live data	0.01%	0.00%	0.00%	0.96%	0.28%	0.80%	0.00%	0.00%	0.00%	0.00%	0.00%	
2	<b>Connection Establishment (Accessibility)</b>													
	a) CSSR (Call Setup Success Rate)	>=95%	Live data	99.42%	99.30%	98.62%	97.29%	95.06%	98.15%	98.60%	98.70%	99.51%	99.38%	99.21%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.09%	0.04%	0.04%	0.53%	0.74%	0.68%	0.02%	0.45%	0.08%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.31%	0.00%	0.03%	1.42%	1.95%	1.19%	0.19%	0.44%	0.49%	0.00%	0.01%
3	<b>Connection Maintenance (Retainability)</b>													
	a) Call Drop Rate (CDR)	<=2%	Live data	0.76%	0.70%	0.66%	1.46%	1.43%	0.82%	0.55%	0.77%	0.61%	0.07%	0.33%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	1.75%	0.78%	5.03%	2.58%	2.46%	1.04%	0.01%	1.95%	4.68%	0.44%	6.21%
	c) % of connections with good voice quality	>=95%	Live data	96.05%	99.79%	98.28%	NP	NP	98.92%	98.01%	98.28%	99.03%	99.84%	99.19%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	496	3	432	313	131	287	2	91	726	27	84
e) Total no. of cells (Sector) in the licensed service area		Live data	28328	384	8590	12130	5322	27687	14802	4655	15522	6135	1353	
4	<b>No. of POI's having &gt;=0.5% POI congestion</b>													
	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0	0	0



TABLE: 3

Detailed Network Data Assessment of Cellular Mobile Telephone Services- MP&CG Circle- May-14 month

S/N	Name of Parameter	Bench- mark	Audit Period	AIRTEL	AIRCEL	TATA GSM	BSNL (MP)	BSNL (CG)	IDEA CELLULAR	RCOM GSM	VIDEOCON	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators										CDMA Operators
<b>Network Service Quality Parameter</b>														
<b>Network Availability</b>														
1	a) Total no. of BTSs in the licensed service area		May-14	9214	128	2871	4063	1804	9371	4899	1549	5163	2043	448
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		May-14	7721	639	163	53398	11944	71571	10150	3755	2862	8538	67
	c) BTS Accumulated Downtime	<=2%	May-14	0.11%	0.67%	0.01%	1.77%	0.89%	1.03%	0.28%	0.33%	0.07%	0.56%	0.02%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		May-14	30	2	0	50	35	182	54	15	5	33	0
	e) Worst affected BTSs due to downtime	<=2%	May-14	0.33%	1.56%	0.00%	1.23%	1.94%	1.94%	1.10%	0.97%	0.10%	1.62%	0.00%
<b>Connection Establishment (Accessibility)</b>														
2	a) CSSR (Call Setup Success Rate)	<=2%	May-14	99.14%	98.68%	98.51%	96.62%	95.22%	97.83%	98.69%	99.01%	99.40%	98.77%	99.19%
	b) SDCCH/PAGING Congestion	<=3%	May-14	0.06%	0.30%	0.05%	0.60%	0.79%	0.56%	0.04%	0.15%	0.13%	0.00%	0.00%
	c) TCH congestion	<=2%	May-14	0.28%	0.00%	0.06%	1.71%	1.78%	1.46%	0.23%	0.19%	0.60%	0.00%	0.08%
<b>Connection Maintenance (Retainability)</b>														
3	a) Call Drop Rate (CDR)	<=2%	May-14	0.75%	1.02%	0.70%	1.65%	1.81%	0.81%	0.56%	0.61%	0.63%	0.09%	0.32%
	b) Worst affected cells>3% TCH drop	<=3%	May-14	0.98%	1.56%	4.82%	2.68%	2.74%	0.89%	0.03%	1.26%	3.87%	0.31%	5.32%
	c) % of connections with good voice quality	>=95%	May-14	96.18%	99.03%	98.20%	NP	NP	98.86%	97.95%	98.34%	99.09%	99.85%	99.17%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		May-14	277	6	415	325	146	248	4	59	602	19	72
	e) Total no. of cells (Sector) in the licensed service area		May-14	28357	384	8610	12141	5322	27768	14688	4667	15560	6129	1353
<b>No. of POI's having &gt;=0.5% POI congestion</b>														
4	No. of POI's having >=0.5% POI congestion		May-14	0	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		May-14	0	0	0	0	0	0	0	0	0	0	0
<b>Network Data</b>														
5	a) Equipped Capacity of Network in Erlang		May-14	310971	927	135406	224000	130000	463802	295000	63447	140328	146000	107625
	b) Total traffic in TCBH in erlang (Avg.)		May-14	215392	3	59543	77365	52729	395043	195937	24396	101039	73752	18058
	c) Total no. of customers served (as per VLR) on last day of the month		May-14	10415956	674	2742822	1977458	877619	18632788	8465958	1002703	4336665	2139422	231826



TABLE: 4

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live- MP&CG Circle- May-14 month

S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRTEL	AIRCEL	TATA GSM	BSNL (MP)	BSNL (CG)	IDEA CELLULAR	RCOM GSM	VIDEOCON	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators										CDMA Operators
<b>Network Service Quality Parameter</b>														
<b>Network Availability</b>														
1	a) Total no. of BTSs in the licensed service area		Live data	9232	128	2868	4063	1804	9307	4896	1548	5156	2043	448
	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	707	42	20	5285	1925	4276	356	399	227	578	0
	c) BTS Accumulated Downtime	<=2%	Live data	0.11%	0.46%	0.01%	1.81%	1.48%	0.64%	0.10%	0.36%	0.06%	0.39%	0.00%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	0	39	7	80	0	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.00%	0.96%	0.39%	0.86%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>														
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	99.46%	98.70%	98.57%	96.70%	95.34%	97.90%	98.73%	99.11%	99.38%	99.12%	99.14%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.05%	0.01%	0.10%	0.50%	0.63%	0.49%	0.02%	0.06%	0.19%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.23%	0.00%	0.06%	1.52%	1.94%	1.43%	0.20%	0.15%	0.62%	0.00%	0.18%
<b>Connection Maintenance (Retainability)</b>														
3	a) Call Drop Rate (CDR)	<=2%	Live data	0.75%	0.22%	0.71%	1.50%	1.82%	0.80%	0.54%	0.59%	0.64%	0.08%	0.31%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	1.78%	1.30%	5.01%	2.73%	2.52%	0.79%	0.03%	1.16%	4.07%	0.52%	5.54%
	c) % of connections with good voice quality	>=95%	Live data	96.18%	99.74%	98.21%	NP	NP	98.99%	97.91%	98.29%	99.06%	99.84%	99.19%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	506	5	431	331	134	220	5	54	632	32	75
	e) Total no. of cells (Sector) in the licensed service area		Live data	28357	384	8608	12138	5322	27888	14791	4661	15533	6135	1353
<b>No. of POI's having &gt;=0.5% POI congestion</b>														
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0	0	0





TABLE: 5

Detailed Network Data Assessment of Cellular Mobile Telephone Services- MP&CG Circle- June-14 month

S/N	Name of Parameter	Bench- mark	Audit Period	AIRTEL	AIRCEL	TATA GSM	BSNL (MP)	BSNL (CG)	IDEA CELLULAR	RCOM GSM	VIDEOCON	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators										CDMA Operators
<b>Network Service Quality Parameter</b>														
<b>Network Availability</b>														
1	a) Total no. of BTSs in the licensed service area		Jun-14	9219	128	2876	4063	1804	9371	4512	1541	5218	1808	449
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Jun-14	12503	635	114	56732	17783	61377	12628	5799	3507	9146	127
	c) BTS Accumulated Downtime	<=2%	Jun-14	0.19%	0.69%	0.01%	1.94%	1.37%	0.91%	0.39%	0.52%	0.09%	0.70%	0.04%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Jun-14	49	0	0	64	34	180	72	15	6	27	0
	e) Worst affected BTSs due to downtime	<=2%	Jun-14	0.53%	0.00%	0.00%	1.58%	1.88%	1.92%	1.60%	0.97%	0.11%	1.49%	0.00%
<b>Connection Establishment (Accessibility)</b>														
2	a) CSSR (Call Setup Success Rate)	<=2%	Jun-14	99.47%	98.76%	98.53%	96.29%	95.18%	97.75%	98.70%	98.97%	99.43%	99.01%	99.00%
	b) SDCCH/PAGING Congestion	<=3%	Jun-14	0.06%	0.19%	0.07%	0.67%	0.94%	0.55%	0.05%	0.14%	0.20%	0.00%	0.00%
	c) TCH congestion	<=2%	Jun-14	0.29%	0.00%	0.07%	1.76%	1.75%	1.53%	0.24%	0.25%	0.57%	0.00%	0.17%
<b>Connection Maintenance (Retainability)</b>														
3	a) Call Drop Rate (CDR)	<=2%	Jun-14	0.77%	0.51%	0.75%	1.53%	1.79%	0.88%	0.56%	0.62%	0.68%	0.11%	0.44%
	b) Worst affected cells>3% TCH drop	<=3%	Jun-14	2.18%	1.56%	5.13%	2.44%	2.80%	1.19%	0.01%	1.31%	4.19%	0.68%	5.47%
	c) % of connections with good voice quality	>=95%	Jun-14	96.26%	99.54%	98.10%	NP	NP	98.21%	97.95%	98.34%	99.10%	99.84%	99.19%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Jun-14	618	6	442	298	149	332	2	61	652	39	74
	e) Total no. of cells (Sector) in the licensed service area		Jun-14	28349	384	8624	12201	5322	27989	13536	4650	15577	5748	1354
<b>No. of POI's having &gt;=0.5% POI congestion</b>														
4	No. of POI's having >=0.5% POI congestion		Jun-14	0	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Jun-14	0	0	0	0	0	0	0	0	0	0	0
<b>Network Data</b>														
5	a) Equipped Capacity of Network in Erlang		Jun-14	310576	896	136108	224000	130000	466195	295000	63238	103460	146000	107871
	b) Total traffic in TCBH in erlang (Avg.)		Jun-14	208200	2	62899	77365	53470	407440	191372	24955	101802	71678	19776
	c) Total no. of customers served (as per VLR) on last day of the month		Jun-14	10441765	664	2820460	1957948	893463	18845631	8703064	1021261	4394502	2138792	221087



TABLE: 6

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live- MP&CG Circle- June-14 month														
S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRTEL	AIRCEL	TATA GSM	BSNL (MP)	BSNL (CG)	IDEA CELLULAR	RCOM GSM	VIDEOCON	VODAFONE	RCOM CDMA	TATA CDMA
				GSM Operators										CDMA Operators
<b>Network Service Quality Parameter</b>														
<b>Network Availability</b>														
1	a) Total no. of BTSs in the licensed service area		Live data	9209	128	2872	4063	1804	9361	4512	1549	5163	1945	448
	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	1287	183	26	5529	2787	7633	1931	501	291	1309	0
	c) BTS Accumulated Downtime	<=2%	Live data	0.19%	1.99%	0.01%	1.89%	2.15%	1.13%	0.59%	0.45%	0.08%	0.93%	0.00%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	3	0	0	34	1.67	90	0	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.03%	0.00%	0.00%	0.84%	0.09%	0.96%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>														
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	99.46%	98.30%	98.43%	96.07%	94.47%	97.76%	98.72%	98.92%	99.37%	98.89%	98.70%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.07%	0.13%	0.11%	0.71%	0.81%	0.53%	0.04%	0.12%	0.13%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.34%	0.00%	0.07%	1.75%	1.50%	1.52%	0.25%	0.27%	0.63%	0.00%	0.35%
<b>Connection Maintenance (Retainability)</b>														
3	a) Call Drop Rate (CDR)	<=2%	Live data	0.16%	0.23%	0.79%	1.68%	1.51%	0.91%	0.53%	0.58%	0.63%	0.11%	0.42%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	1.83%	1.30%	5.06%	2.62%	2.84%	1.21%	0.03%	1.22%	3.84%	0.74%	5.40%
	c) % of connections with good voice quality	>=95%	Live data	96.40%	99.52%	98.11%	NP	NP	98.18%	97.96%	98.40%	99.13%	99.84%	99.16%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	520	5	436	319	151	338	4	57	597	45	73
	e) Total no. of cells (Sector) in the licensed service area		Live data	28355	384	8620	12162	5322	28005	14235	4667	15560	6052	1353
<b>No. of POI's having &gt;=0.5% POI congestion</b>														
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	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 CUSTOMER SERVICE DELIVERY (CSD) AUDITED DATA FOR CELLULAR MOBILE SERVICES (QUARTERLY MONTHLY AVERAGE):**

CSD DATA FOR CELLULAR MOBILE TELEPHONE SERVICES- AVERAGE OF THREE MONTHS													
Quarterly CSD Audit Data		Bench- mark	Circle Name	AIRCEL	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	VIDEOCON	VODAFONE	RCOM (CDMA)	TATA (CDMA)
S/N	Name of Parameter			GSM Operators							CDMA Operators		
<b>Customer Service Quality Parameters</b>													
1	<b>Metering &amp; Billing Credibility -Post Paid</b>												
	A) No. Of bills issued during the quarter		MP&CG	3	137659	93877	335061	111674	34373	NA	98467	94835	19187
	B) No. of bills disputed including billing complaints during the quarter		MP&CG	0	25	6	198	108	0	NA	85	90	0
	C)% of billing complaints during the quarter	<= 0.1%	MP&CG	NA	0.02%	0.01%	0.06%	0.10%	NA	NA	0.09%	0.10%	NA
2	<b>Metering &amp; Billing Credibility -Pre Paid</b>												
	A) Total No. of Pre-paid customers at the end of the quarter		MP&CG	22691	10517436	2842903	17485435	9201143	3970268	2022336	4733295	2075484	410255
	B) Total No. of complaints relating to charging, Credit and Validity during the quarter		MP&CG	0	287	35.67	566	8991	0	82	2349	929	0
	C) % of Pre-paid Charging Complaints	<= 0.1%	MP&CG	NA	0.003%	0.001%	0.003%	0.10%	NA	0.00%	0.05%	0.04%	NA
3	<b>Resolution of Billing/Charging Complaints and Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints</b>												
	A) No. of Billing/Charging/Credit/Validity Complaints received during the quarter		MP&CG	0	312	39	4931	9099	165	82	2434	1020	3
	B) No. of billing complaints for Post paid customers/Charging/Credit/Validity complaints for pre-paid customers resolved within 4 weeks during the quarter		MP&CG	0	312	39	4931	9099	165	82	2434	1020	3



**CSD DATA FOR CELLULAR MOBILE TELEPHONE SERVICES- AVERAGE OF THREE MONTHS**

Quarterly CSD Audit Data		Bench- mark	Circle Name	AIRCEL	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	VIDEOCON	VODAFONE	RCOM (CDMA)	TATA (CDMA)
S/ N	Name of Parameter			GSM Operators								CDMA Operators	
	C) % of billing complaints (for post paid customer) / Charging/Credit/Validity (for Pre paid customer) resolved within 4 weeks	100 % within 4 week	MP&CG	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	D) % of Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints	<=1 week	MP&CG	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
4	<b>Response time to customers for assistance</b>												
	A) Total no of calls attempted to customer care/Call center		MP&CG	678	1177656	1205964	1237381	6964317	383527	46085	5547421	926569	20725
	B) Total no. of calls successfully established to customer care/Call center		MP&CG	668	1177656	1205964	1232268	6892444	379818	44176	5547421	915201	20228
	C) % Accessibility of Call centre /customer Care (Total call successfully established *100/ Total call attempt)	>=95%	MP&CG	98.43%	100.00%	100.00%	99.59%	98.97%	99.03%	95.86%	100.00%	98.77%	97.60%
	D) Total Calls reached to agent desk for Voice to Voice (Total call attempt)		MP&CG	199	2113031	456296	3573259	2052978	535604	528668	1309591	177699	27957
	E) Total number of calls answered by the operator (Voice to voice) within 60 seconds		MP&CG	194	1976638	425314	3265264	1889000	495525	479771	1191483	159540	26665
	F) % age of calls answered by operator(voice to voice) (Total call successfully established within 60 Sec. *100/ Total call attempt)	>=90%	MP&CG	97.49%	93.55%	93.21%	91.38%	92.01%	92.52%	90.75%	90.98%	89.78%	95.38%
5	<b>Termination/closure of service</b>												
	A) Total No. of requests for Termination / Closure of service received during the quarter		MP&CG	0	567	250	1028	108	344	NA	1201	49	61
	B) No. of requests for Termination / Closure of service complied within 7 days during the quarter		MP&CG	0	567	247	1028	108	344	NA	1150	49	61
	C) % of Termination/ Closure of service within 7 days	<=7days	MP&CG	NA	100.00%	98.80%	100.00%	100.00%	100.00%	NA	95.75%	100.00%	100.00%



CSD DATA FOR CELLULAR MOBILE TELEPHONE SERVICES- AVERAGE OF THREE MONTHS													
Quarterly CSD Audit Data		Bench- mark	Circle Name	AIRCEL	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	VIDEOCON	VODAFONE	RCOM (CDMA)	TATA (CDMA)
S/ N	Name of Parameter			GSM Operators								CDMA Operators	
6	Time taken for refunds of deposits after closures.												
	A) No. of Payments/ Refunds due during the quarter		MP&CG	0	107	690	555	238	284	NA	29	300	67
	B) No. of Payments/ Refunds Cleared during the quarter		MP&CG	0	107	690	555	238	284	NA	29	300	67
	C) Time taken for refunds of deposits after closures.	100% within 60 days	MP&CG	NA	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%

\*NA: Not Applicable

Videocon have no post-paid customers, so data for parameters related to post-paid bills not applicable for them.



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

CSD 3 DAYS LIVE DATA FOR CELLULAR MOBILE TELEPHONE SERVICES-AVERAGE OF 3 DAYS													
3 days live CSD Audit Data		Bench- mark	Circle Name	AIRCEL	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	VIDEOCON	VODAFONE	RCOM (CDMA)	TATA (CDMA)
S/ N	Name of Parameter			GSM Operators							CDMA Operators		
<b>Response time to customers for assistance</b>													
1	Total no of calls attempted to customer care/Call center		MP&CG	5	38938	40000	52760	236823	12670	1959	187235	28657	769
	Total no. of calls successfully established to customer care/Call center		MP&CG	5	38938	19557	52570	234368	12562	1895	187235	28322	742
	% Accessibility of Call centre /customer Care (Total call successfully established *100/ Total call attempt)	>=95%	MP&CG	87.50%	100.00%	48.89%	99.64%	98.96%	99.15%	96.72%	100.00%	98.83%	96.49%
2	Total Calls reached to agent desk for Voice to Voice (Total call attempt)		MP&CG	5	68527	20413	129391	62189	17790	20982	47615	560	853
	Total number of calls answered by the operator (Voice to voice) within 60 seconds		MP&CG	5	65269	19289	123193	60962	16832	19219	43698	518	821
	% age of calls answered by operator(voice to voice) (Total call successfully established within 60 Sec. *100/Total call attempts)	>=90%	MP&CG	100.00%	95.25%	94.49%	95.21%	98.03%	94.61%	91.60%	91.77%	92.50%	96.32%

### 5.3.3 KEY FINDINGS ON CUSTOMER SERVICE DELIVERY (CSD) PARAMETERS

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

The performance of the service providers with respect to the parameter metering and billing credibility for both post-paid and pre-paid was well within the prescribed bench mark against the benchmark of  $\leq 0.1\%$ .

#### 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 were found to have met the benchmarks for the above parameters.

#### 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, **RCOM (CDMA)** has not met the benchmark for the parameter “% calls answered by Operators (voice to voice) within 60 seconds” with its performance as **89.78%**.

#### 4. Termination/Closure of Service

In case of this parameters also, all service providers have settled the closure/termination within the benchmark of 7 days except **BSNL** and **Vodafone** as they were non-compliant with their performance of **98.80%** and **95.75%**.

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

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

The results for **three days live measurements** reveal that all operators (except **Aircel** and **BSNL**) have met the benchmarks for the parameters ‘Accessibility to call center’. The performance of **Aircel** and **BSNL** was **87.50%** and **48.89%** (way below the benchmark of  $\geq 95\%$ ) respectively. However, all service providers are in compliance with respect to the parameter “% calls answered by Operators (voice to voice) within 60 seconds”.



## **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 MP&CG 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)	VIDEOCON	VODAFONE	RCOM (CDMA)	TATA (CDMA)
AIRCEL	MP&CG	NIL	--	--	--	--	--	--	--	--	--
AIRTEL	MP&CG	NIL	--	100%	100%	100%	100%	100%	100%	100%	100%
BSNL	MP&CG	NIL	100%	--	98%	100%	100%	100%	100%	100%	100%
IDEA	MP&CG	NIL	100%	100%	--	100%	100%	100%	100%	100%	100%
RCOM (GSM)	MP&CG	NIL	100%	95%	100%	--	97%	100%	100%	100%	100%
TATA (GSM)	MP&CG	NIL	100%	94%	100%	100%	--	95%	100%	100%	100%
VIDEOCON	MP&CG	NIL	100%	100%	100%	100%	97%	--	100%	100%	100%
VODAFONE	MP&CG	NIL	100%	100%	100%	100%	100%	100%	--	100%	100%
RCOM (CDMA)	MP&CG	NIL	100%	100%	100%	100%	100%	100%	100%	--	100%
TATA (CDMA)	MP&CG	NIL	100%	100%	100%	100%	100%	100%	100%	100%	--

The result of the testing revealed that the inter connection performance among the operators was quite satisfactory. However, in case where Calls attempted from BSNL to Idea successful interconnection was 98.0%, RCOM GSM to BSNL & Tata (GSM) was 95% and 97%, Tata (GSM) to BSNL & Videocon was 94% and 95%, Videocon to Tata (GSM) was 97%. 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	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	VIDEOCON	VODAFONE	RCOM (CDMA)	TATA (CDMA)
Total No. of calls Attempted	MP&CG	100	100	100	100	100	100	100	100	100
Total No. of calls connected to IVR	MP&CG	100	100	100	100	100	100	100	100	100
Calls got connected to agent within 60 Sec	MP&CG	100	100	100	100	100	100	100	100	100
%age of calls got answered	MP&CG	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

In case of calls answered by operators (voice to voice) within 60 seconds when test calls were made to the call centers, the performance of all operators was also recorded 100%.

## 6.3 LIVE CALLING ASSESSMENT FOR BILLING COMPLIANTS:

TELEPHONIC INTERVIEW FOR BILLING COMPLAINTS										
Parameter	Circle Name	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	VIDEOCON	VODAFONE	RCOM (CDMA)	TATA (CDMA)
Total No. of calls Attempted	MP&CG	100	100	100	100	100	100	100	100	9
Total No. of calls Answered	MP&CG	92	88	87	93	89	87	85	90	9
Resolution of Billing complaints	MP&CG	92	88	87	93	89	87	85	90	9
%age of cases resolved	MP&CG	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

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



**6.4 LEVEL -1 CALLING ASSESSMENT:**

LEVEL 1 LIVE CALLING													
Emergency no.	SSA Name	SDCA Name	No. of calls made	AIRCEL	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	VIDEOCON	VODAFONE	RCOM (CDMA)	TATA (CDMA)
100, 101, 108,1090,1091	Gwalior	Ghtigaon,Bhitarwar,Dabra	20	NC	20	20	20	20	20	20	20	20	NC
100, 101, 108,1090,1091		Gwalior	20	NC	20	20	20	20	20	20	20	20	20
100, 101, 108,1090,1091		Seondha,Datiya,Bhander	15	NC	15	15	15	*	*	*	15	15	15
100, 101, 108,1090,1091	Khandwa	Khndwa, New-Harsud, Khalwa	20	NC	20	20	20	20	20	20	20	20	20
100, 101, 108,1090,1091		Burhanpur,Khakner	15	NC	15	15	15	15	*	*	15	15	15
100, 101, 108,1090,1091		Pandhana,Punhasa	15	NC	15	15	15	15	15	15	15	15	NC
100, 101, 108,1090,1091	Ratlam	Ratlam	20	NC	20	20	20	20	20	20	20	20	20
100, 101, 108,1090,1091		Jaora,A lote	15	10	15	15	15	15	15	15	15	15	NC
100, 101, 108,1090,1091		Sailana	15	NC	15	15	15	15	15	15	15	15	NC

- \*When dialing the emergency numbers there was an IVR message "please check the number" for all the operators in Khandwa, New-Harsud, Khalwa, Pandhana and Punhasa SDCAs.
- \*\*Airtel, TATA GSM, Idea, Videocon, Vodafone and BSNL were charging for the services on 1090 & 1091 helpline numbers at different SDCAs, The issue, however, was resolved on next day.
- All Service Providers emergency number are directly routing to Gwalior SSA from all covered rural SDCA except 108.
- Aircel having no services in major cities, so the service is not functional.
- NC – No Coverage in respective SDCAs.

## 7. DRIVE TEST



## **7. OPERATOR ASSISTED DRIVE TEST**

In terms of TRAI's letter dated 21<sup>st</sup> January, 2014, the drive tests were conducted for three consecutive days in one select SSA each month in each service area. Thus, the drive tests were carried out in three SSA's namely **Gwalior, Khandwa and Ratlam** in the months of April, May and June 2014 respectively. The total route Km covered during drive tests in respective SSAs was **370 Kms, 335 Kms and 339 Kms**. The performance of the operators has been highlighted below in the tables. The drive test was conducted simultaneously for all the operators following the same route of drive tests. The holding period for all test calls was 120 seconds. The drive test vehicle across all routes plied at a speed of about 30-50 km per hour

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



7.1 OPERATOR ASSISTED DRIVE TEST: GWALIOR SSA (APRIL-14)

DRIVE TEST TABLE: 1

S/N	Parameter	Days of drive test	AIRCEL		AIRTEL		BSNL		TATA GSM		IDEA		RCOM GSM		VIDEOCON		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	Day-1	NC	NC	93	10	129	10	104	10	97	10	110	11	102	10	97	10	55	10	109
Day-2	NC	NC			215	10	269	10	245	10	232	10	277	11	256	10	248	16	205	10	235	10		
Day-3	NC	NC			109	10	105	10	112	10	112	10	112	11	91	10	116	13	64	10	148	10		
Overall SSA	NC	NC			417	30	503	30	461	30	441	30	499	33	449	30	461	39	324	30	492	30		
2	Blocked Call Rate	Day-1	NC	NC	0.00%	0.00%	0.78%	0.00%	0.00%	0.00%	0.00%	0.00%	2.73%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		
		Day-2	NC	NC	0.00%	0.00%	1.49%	0.00%	1.22%	0.00%	0.86%	0.00%	7.22%	0.00%	0.00%	0.00%	0.81%	0.81%	0.00%	0.00%	1.70%	0.00%		
		Day-3	NC	NC	1.83%	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%	6.76%	0.00%		
		Overall SSA	NC	NC	0.48%	0.00%	0.99%	0.00%	0.65%	0.00%	0.45%	0.00%	4.61%	0.00%	0.00%	0.00%	0.43%	0.41%	0.00%	0.00%	2.85%	0.00%		
3	Dropped Call Rate (<=2%)	Day-1	NC	NC	0.00%	0.00%	1.56%	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%	0.92%	0.00%		
		Day-2	NC	NC	0.47%	0.00%	2.26%	0.00%	0.83%	0.00%	1.30%	0.00%	1.56%	0.00%	0.39%	0.00%	0.00%	0.00%	0.00%	0.00%	0.87%	0.00%		
		Day-3	NC	NC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.79%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	18.84%	0.00%		
		Overall SSA	NC	NC	0.24%	0.00%	1.61%	0.00%	0.44%	0.00%	0.68%	0.00%	1.26%	0.00%	0.22%	0.00%	0.00%	0.00%	0.00%	0.00%	6.07%	0.00%		
4	Percentage connections with good voice quality (=>95%)																							
	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Day-1	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.28%	100%	98.95%	100%	
		Day-2	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.19%	100%	97.12%	100%
		Day-3	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.56%	100%	96.25%	100%
		Overall SSA	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.65%	100%	97.31%	100%

**AUDIT & ASSESSMENT OF QOS FOR QE-JUNE-2014-MP&CG CIRCLE**

S/N	Parameter	Days of drive test	AIRCEL		AIRTEL		BSNL		TATA GSM		IDEA		RCOM GSM		VIDEOCON		VODAFONE		TATA CDMA		RCOM CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
			(b) 0-5 (with frequency hopping for GSM Operators)	Day-1	NC	NC	97.79%	98.79%	98.36%	98.36%	98.49%	98.49%	96.73%	96.73%	96.89%	96.89%	97.15%	97.17%	95.84%	95.84%	NA	NA	NA
	Day-2	NC	NC	94.54%	87.32%	94.14%	96.85%	97.87%	99.65%	97.06%	99.26%	92.95%	98.28%	94.60%	98.05%	93.29%	98.86%	NA	NA	NA	NA		
	Day-3	NC	NC	96.41%	99.24%	97.99%	99.48%	99.16%	99.73%	96.19%	96.61%	96.01%	100%	97.35%	99.48%	97.37%	98.94%	NA	NA	NA	NA		
	Overall SSA	NC	NC	95.71%	95.12%	95.82%	98.23%	98.32%	99.29%	96.77%	97.53%	95.63%	98.39%	95.50%	98.23%	94.78%	97.88%	NA	NA	NA	NA		
Service Coverage																							
5	In door (>= -75dBm)	Day-1	NC	NC	91.21%	100%	61.61%	61.61%	58.77%	58.77%	98.08%	98.08%	78.64%	78.64%	86.69%	86.69%	67.24%	67.24%	44.80%	44.80%	67.14%	100%	
		Day-2	NC	NC	91.07%	100%	93.05%	99.84%	85.65%	100%	95.44%	100%	81.34%	100%	96.17%	99.63%	87.16%	98.47%	70.63%	97.96%	58.76%	100%	
		Day-3	NC	NC	83.47%	100%	78.35%	57.67%	73.93%	97.39%	92.92%	100%	84.33%	100%	75.52%	100%	76.60%	100%	73.53%	97.85%	69.39%	100%	
		Overall SSA	NC	NC	88.58%	100%	85.98%	73.04%	78.14%	85.39%	99.68%	99.36%	80.10%	92.88%	90.52%	95.44%	80.00%	88.57%	67.19%	80.47%	63.42%	100%	
	In-vehicle (>= -85dBm)	Day-1	NC	NC	98.61%	100%	91.08%	91.08%	87.61%	100%	99.85%	100%	94.53%	100%	96.45%	100%	91.43%	100%	82.91%	82.91%	91.72%	100%	
		Day-2	NC	NC	99.23%	100%	99.71%	100%	98.43%	100%	99.68%	100%	97.60%	100%	99.48%	100%	94.43%	100%	97.15%	98.62%	92.27%	100%	
		Day-3	NC	NC	97.36%	100%	97.74%	100%	93.59%	100%	99.87%	100%	97.11%	100%	90.45%	100%	82.87%	100%	93.08%	98.00%	88.83%	100%	
		Overall SSA	NC	NC	98.40%	100%	98.07%	97.03%	95.36%	100%	99.76%	100%	95.76%	100%	97.23%	100%	93.07%	100%	94.03%	93.91%	91.22%	100%	
	Outdoor-in city (>= -95dBm)	Day-1	NC	NC	99.81%	100%	99.30%	99.30%	99.24%	100%	100%	100%	99.57%	100%	99.26%	100%	97.79%	100%	98.09%	98.09%	98.60%	100%	
		Day-2	NC	NC	99.85%	100%	100%	100%	99.99%	100%	100%	100%	99.99%	100%	99.90%	100%	95.22%	100%	98.88%	99.34%	99.96%	100%	
		Day-3	NC	NC	99.76%	100%	100%	100%	99.24%	100%	100%	100%	100%	100%	97.98%	100%	90.43%	100%	98.52%	99.48%	94.52%	100%	
		Overall SSA	NC	NC	99.81%	100%	99.89%	99.77%	99.63%	100%	100%	100%	99.75%	100%	99.42%	100%	96.75%	100%	98.68%	98.97%	98.20%	100%	
	6	Call Setup Success Rate (>=95%)	Day-1	NC	NC	97.85%	100%	99.22%	100%	100%	100%	100%	100%	97.27%	100%	100%	100%	97.94%	100%	100%	100%	100%	100%
			Day-2	NC	NC	100%	100%	98.51%	100%	99.00%	100%	99.14%	100%	92.78%	100%	100%	100%	96.77%	100%	100%	100%	98.30%	100%
			Day-3	NC	NC	98.17%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	98.28%	100%	100%	100%	93.24%	100%
			Overall SSA	NC	NC	99.04%	100%	99.01%	100%	99.35%	100%	99.55%	100%	95.39%	100%	100%	100%	97.40%	100%	100%	100%	97.15%	100%



AUDIT & ASSESSMENT OF QOS FOR QE-JUNE-2014-MP&CG CIRCLE



S/N	Parameter	Days of drive test	AIRCEL		AIRTEL		BSNL		TATA GSM		IDEA		RCOM GSM		VIDEOCON		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	
7	Hand Over Success Rate (HOSR)	Day-1	NC	NC	100%	100%	97.30%	100%	99.17%	100%	100%	100%	100%	100%	100%	97.52%	100%	100%	100%	100%	100%	100%	100%
		Day-2	NC	NC	100%	100%	97.31%	100%	98.44%	100%	98.83%	100%	98.05%	100%	97.34%	100%	99.66%	100%	100%	100%	100%	100%	100%
		Day-3	NC	NC	95.50%	100%	100%	100%	98.62%	100%	100%	100%	98.91%	100%	99.12%	100%	100%	100%	100%	100%	100%	100%	100%
		Overall SSA	NC	NC	98.79%	100%	98.20%	100%	98.60%	100%	99.27%	100%	98.27%	100%	97.58%	100%	99.78%	100%	100%	100%	100%	100%	100%

\*NA: Not Applicable

\*NC: No Coverage

7.2 OPERATOR ASSISTED DRIVE TEST: KHANDWA SSA (MAY-14)

DRIVE TEST TABLE: 2

S/N	Parameter	Classification of routes covered	AIRCEL		AIRTEL		BSNL		TATA GSM		IDEA		RCOM GSM		VIDEOCON		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	Major Roads	NC	NC	42	20	49	20	41	20	46	20	52	20	90	20	43	22	35	20	51	20	
		Highways	NC	NC	89	18	114	18	84	20	111	23	115	20	129	20	107	24	38	20	109	21	
		Within City	NC	NC	325	21	273	20	409	20	358	21	232	20	372	20	311	21	151	NC	235	21	
		Overall SSA	NC	NC	456	59	436	58	534	60	515	64	399	60	591	60	461	67	224	40	395	62	
2	Blocked Call Rate	Major Roads	NC	NC	0.00%	5.00%	2.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Highways	NC	NC	1.12%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	3.48%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Within City	NC	NC	0.92%	0.00%	0.00%	0.00%	0.49%	0.00%	0.28%	0.00%	0.86%	0.00%	1.34%	0.00%	0.00%	0.00%	0.00%	NC	0.43%	0.00%	
		Overall SSA	NC	NC	0.88%	1.69%	0.23%	0.00%	0.37%	0.00%	0.19%	0.00%	1.50%	0.00%	0.85%	0.00%	0.00%	0.00%	0.00%	0.00%	0.25%	0.00%	
3	Dropped Call Rate (<=2%)	Major Roads	NC	NC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	5.77%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Highways	NC	NC	0.00%	0.00%	0.00%	0.00%	0.00%	5.00%	0.00%	0.00%	4.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Within City	NC	NC	0.31%	0.00%	0.37%	0.00%	0.25%	0.00%	0.00%	0.00%	0.43%	0.00%	0.27%	0.00%	0.33%	0.00%	0.00%	NC	0.43%	0.00%	
		Overall SSA	NC	NC	0.22%	0.00%	0.23%	0.00%	0.19%	1.67%	0.00%	0.00%	2.29%	0.00%	0.17%	0.00%	0.22%	0.00%	0.00%	0.00%	0.25%	0.00%	
4	Percentage connections with good voice quality (=>95%)																						
	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Major Roads	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.74%	100%	96.49%	100%
		Highways	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.67%	99.91%	93.94%	100%
		Within City	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.72%	NC	98.33%	100%
		Overall SSA	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.55%	99.96%	96.86%	100%
	(b) 0-5 (with frequency hopping)	Major Roads	NC	NC	97.09%	97.41%	90.78%	95.38%	92.99%	99.88%	94.79%	96.50%	90.04%	98.57%	96.85%	97.15%	96.69%	99.38%	NA	NA	NA	NA	
Highways		NC	NC	97.79%	98.06%	94.23%	98.02%	94.84%	95.71%	96.51%	92.47%	92.12%	93.02%	96.88%	97.47%	97.49%	99.08%	NA	NA	NA	NA		
Within City		NC	NC	98.36%	99.44%	94.73%	99.98%	97.33%	99.76%	96.79%	99.64%	97.91%	100%	97.52%	99.65%	98.05%	99.49%	NA	NA	NA	NA		

**AUDIT & ASSESSMENT OF QOS FOR QE-JUNE-2014-MP&CG CIRCLE**

S/N	Parameter	Classification of routes covered	AIRCEL		AIRTEL		BSNL		TATA GSM		IDEA		RCOM GSM		VIDEOCON		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		NC	NC	98.13%	98.30%	94.21%	97.83%	96.64%	98.44%	95.55%	97.38%	95.26%	97.50%	97.27%	98.04%	97.78%	99.30%	NA	NA
5	Service Coverage	Major Roads	NC	NC	60.25%	99.34%	83.87%	99.21%	73.33%	94.33%	93.32%	94.72%	77.10%	96.56%	86.69%	85.72%	53.57%	100%	63.77%	72.56%	41.88%	72.29%
		Highways	NC	NC	87.47%	99.06%	81.27%	99.82%	61.58%	100%	94.56%	53.76%	64.20%	100%	81.58%	100%	67.58%	99.89%	44.70%	99.00%	36.75%	100%
		Within City	NC	NC	86.58%	70.93%	88.01%	99.36%	86.32%	98.32%	92.94%	100%	80.11%	100%	84.55%	70.92%	70.99%	97.53%	38.01%	NC	54.27%	99.58%
		Overall SSA	NC	NC	78.00%	89.78%	85.77%	99.46%	81.78%	97.55%	93.34%	82.83%	73.13%	98.85%	84.24%	85.55%	64.05%	99.14%	43.16%	85.78%	47.72%	90.62%
	In-door (>= -75dBm)	Major Roads	NC	NC	66.42%	100%	98.56%	99.98%	95.14%	97.82%	99.77%	100%	97.14%	100%	95.55%	99.75%	64.67%	100%	94.21%	98.40%	73.01%	99.80%
		Highways	NC	NC	98.75%	100%	97.54%	99.94%	89.41%	100%	99.93%	97.97%	93.90%	100%	95.13%	100%	91.77%	100%	86.64%	99.15%	72.07%	100%
		Within City	NC	NC	98.44%	96.26%	99.42%	100%	98.64%	99.94%	99.40%	100%	98.96%	100%	97.32%	99.25%	92.59%	99.93%	67.56%	NC	84.66%	100%
		Overall SSA	NC	NC	87.87%	98.75%	98.82%	99.97%	97.05%	99.25%	99.55%	99.32%	96.55%	100%	96.57%	99.67%	83.01%	99.98%	75.00%	98.78%	79.59%	99.93%
	In-vehicle (>= -85dBm)	Major Roads	NC	NC	66.67%	100%	99.94%	100%	99.58%	100%	100%	100%	99.07%	100%	98.47%	99.95%	66.58%	100%	99.62%	98.86%	95.70%	100%
		Highways	NC	NC	100%	100%	99.88%	100%	99.65%	100%	100%	100%	99.58%	100%	99.10%	100%	99.66%	100%	99.58%	99.54%	95.52%	100%
		Within City	NC	NC	99.99%	100%	99.97%	100%	99.92%	100%	100%	100%	100%	100%	99.43%	100%	98.72%	100%	93.35%	NC	98.21%	100%
		Overall SSA	NC	NC	88.88%	100%	99.94%	100%	99.85%	100%	100%	100%	99.66%	100%	99.21%	99.98%	88.32%	100%	95.40%	99.20%	97.12%	100%
	Outdoor-in city (>= -95dBm)	Major Roads	NC	NC	66.67%	100%	99.94%	100%	99.58%	100%	100%	100%	99.07%	100%	98.47%	99.95%	66.58%	100%	99.62%	98.86%	95.70%	100%
		Highways	NC	NC	100%	100%	99.88%	100%	99.65%	100%	100%	100%	99.58%	100%	99.10%	100%	99.66%	100%	99.58%	99.54%	95.52%	100%
		Within City	NC	NC	99.99%	100%	99.97%	100%	99.92%	100%	100%	100%	100%	100%	99.43%	100%	98.72%	100%	93.35%	NC	98.21%	100%
		Overall SSA	NC	NC	88.88%	100%	99.94%	100%	99.85%	100%	100%	100%	99.66%	100%	99.21%	99.98%	88.32%	100%	95.40%	99.20%	97.12%	100%
6	Call Setup Success Rate (>=95%)	Major Roads	NC	NC	100%	95.00%	97.96%	100%	100%	100%	100%	100%	100%	100%	100%	100%	95.45%	100%	100%	100%	100%	100%
		Highways	NC	NC	99.88%	100%	100%	100%	100%	100%	100%	100%	96.52%	100%	100%	100%	98.13%	100%	100%	100%	100%	100%
		Within City	NC	NC	99.08%	100%	100%	100%	99.51%	100%	99.72%	100%	99.14%	100%	98.66%	100%	97.11%	100%	100%	NC	99.57%	100%
		Overall SSA	NC	NC	99.12%	98.31%	99.77%	100%	99.63%	100%	99.81%	100%	98.50%	100%	99.15%	100%	97.61%	98.51%	100%	100%	99.75%	100%
7	Hand Over Success Rate (HOSR)	Major Roads	NC	NC	97.46%	100%	97.14%	100%	96.08%	100%	100%	100%	97.47%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Highways	NC	NC	99.25%	100%	98.94%	100%	98.75%	100%	98.65%	99.08%	96.23%	100%	95.74%	100%	94.90%	100%	96.47%	100%	100%	100%
		Within City	NC	NC	99.10%	100%	100%	100%	99.61%	100%	100%	100%	100%	100%	99.65%	100%	100%	100%	99.15%	NC	100%	100%
		Overall SSA	NC	NC	98.89%	100%	99.28%	100%	99.23%	100%	99.74%	99.15%	98.07%	100%	98.88%	100%	98.81%	100%	98.78%	100%	100%	100%

\*NA: Not Applicable; \*NC: No Coverage

7.3 OPERATOR ASSISTED DRIVE TEST: RATLAM SSA (JUNE-14)

DRIVE TEST TABLE: 3

S/N	Parameter	Classification of routes covered	AIRCEL		AIRTEL		BSNL		TATA GSM		IDEA		RCOM GSM		VIDEOCON		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	Major Roads	26	NC	46	25	46	25	70	25	55	25	47	27	40	25	45	25	27	25	50	26
		Highways	34	25	73	25	77	25	93	25	88	25	103	35	74	25	76	25	24	NC	106	27
		Within City	139	NC	360	37	357	31	372	43	424	45	363	28	344	35	394	43	168	NC	384	36
		Overall SSA	199	25	479	87	480	81	535	93	567	95	513	90	458	85	515	93	219	NC	540	89
2	Blocked Call Rate	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%	0.00%	0.00%	6.00%	0.00%
		Highways	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	4.85%	2.86%	1.35%	0.00%	0.00%	0.00%	0.00%	NC	5.66%	0.00%
		Within City	0.00%	0.00%	0.28%	0.00%	1.12%	0.00%	0.00%	0.00%	0.00%	0.00%	2.48%	0.00%	0.58%	0.00%	0.25%	0.00%	0.00%	NC	5.21%	0.00%
		Overall SSA	0.00%	0.00%	0.21%	0.00%	0.84%	0.00%	0.00%	0.00%	0.00%	0.00%	2.73%	1.11%	0.66%	0.00%	0.19%	0.00%	0.00%	0.00%	5.37%	0.00%
3	Dropped Call Rate (<=2%)	Major Roads	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.13%	7.41%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
		Highways	0.00%	0.00%	0.00%	0.00%	1.32%	0.00%	0.00%	0.00%	0.00%	0.00%	2.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NC	0.00%	0.00%
		Within City	0.00%	0.00%	0.56%	0.00%	1.13%	0.00%	0.27%	0.00%	0.24%	0.00%	2.54%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NC	0.82%	0.00%
		Overall SSA	0.00%	0.00%	0.42%	0.00%	1.05%	0.00%	0.19%	0.00%	0.18%	0.00%	2.40%	2.25%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.59%	0.00%
4	Percentage connections with good voice quality (=>95%)																					
	(a) 0-4 (w/o frequency)	Major Roads	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	100%	100%	99.48%	100%
	Highways	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.41%	NC	98.26%	100%

AUDIT & ASSESSMENT OF QOS FOR QE-JUNE-2014-MP&CG CIRCLE



S/N	Parameter	Classification of routes covered	AIRCEL		AIRTEL		BSNL		TATA GSM		IDEA		RCOM GSM		VIDEOCON		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	99.58%	NC	98.92%	100%
		Overall SSA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.61%	100%	98.85%	100%
5	(b) 0-5 ( with frequency hopping for GSM Operators)	Major Roads	98.97%	NC	95.18%	96.17%	78.84%	98.38%	96.34%	98.34%	95.11%	99.56%	92.47%	95.85%	95.57%	98.78%	97.35%	99.36%	NA	NA	NA	NA
		Highways	98.77%	98.75%	95.91%	97.73%	84.40%	98.84%	97.81%	99.68%	96.38%	98.22%	87.80%	99.90%	97.77%	96.51%	98.08%	99.43%	NA	NA	NA	NA
		Within City	99.01%	NC	96.39%	99.12%	88.22%	99.97%	97.88%	99.78%	96.20%	97.74%	93.78%	100%	97.44%	99.85%	98.38%	99.32%	NA	NA	NA	NA
		Overall SSA	99.01%	98.75%	96.20%	97.87%	86.65%	99.12%	97.74%	99.36%	96.14%	98.34%	92.64%	98.99%	97.31%	98.48%	98.24%	99.36%	NA	NA	NA	NA
Service Coverage																						
5	In door (>= - 75dBm)	Major Roads	95.34%	NC	86.25%	100%	88.41%	99.62%	92.53%	100%	91.88%	100%	76.55%	97.83%	81.40%	100%	95.87%	100%	75.46%	92.55%	42.51%	61.61%
		Highways	87.19%	100%	72.16%	99.05%	43.08%	96.31%	69.12%	88.28%	68.90%	65.57%	62.08%	100%	80.23%	100%	90.59%	100%	43.01%	NC	28.95%	22.46%
		Within City	90.91%	NC	75.64%	99.91%	83.69%	100%	81.28%	99.69%	88.67%	99.98%	74.96%	100%	83.44%	97.37%	92.20%	99.80%	52.47%	NC	43.10%	78.27%
		Overall SSA	90.77%	100%	76.10%	95.96%	84.04%	98.73%	80.71%	96.69%	86.01%	91.06%	72.86%	99.51%	82.86%	98.88%	92.29%	99.92%	54.26%	92.55%	40.29%	59.08%
5	In-vehicle (>= - 85dBm)	Major Roads	99.72%	NC	98.20%	100%	99.84%	100%	99.76%	100%	99.52%	100%	97.50%	100%	99.06%	100%	99.91%	100%	98.22%	98.98%	91.59%	100%
		Highways	92.48%	100%	94.81%	100%	98.29%	99.95%	95.09%	100%	91.31%	99.12%	91.25%	100%	96.71%	100%	99.27%	100%	79.84%	NC	70.69%	96.38%
		Within City	98.28%	NC	96.39%	100%	97.20%	100%	98.15%	100%	98.69%	100%	95.37%	100%	98.00%	100%	99.20%	100%	79.79%	NC	82.32%	100%
		Overall SSA	97.47%	100%	96.32%	100%	97.64%	99.98%	97.85%	100%	97.67%	99.77%	94.94%	100%	97.90%	100%	99.27%	100%	82.05%	98.98%	80.97%	99.00%
5	Outdoor-in city (>= - 95dBm)	Major Roads	99.99%	NC	100%	100%	100%	100%	100%	100%	100%	100%	99.84%	100%	99.98%	100%	100%	100%	99.74%	99.49%	97.94%	100%
		Highways	99.42%	100%	99.96%	100%	99.94%	100%	99.98%	100%	98.57%	100%	99.63%	100%	99.76%	100%	99.98%	100%	99.19%	NC	94.03%	100%
		Within City	99.99%	NC	99.96%	100%	99.95%	100%	99.98%	100%	99.96%	100%	98.95%	100%	99.68%	100%	99.97%	100%	97.25%	NC	98.56%	100%
		Overall	99.89%	100%	99.97%	100%	99.95%	100%	99.99%	100%	99.76%	100%	99.20%	100%	99.71%	100%	99.97%	100%	97.77%	99.49%	97.62%	100%

AUDIT & ASSESSMENT OF QOS FOR QE-JUNE-2014-MP&CG CIRCLE



S/N	Parameter	Classification of routes covered	AIRCEL		AIRTEL		BSNL		TATA GSM		IDEA		RCOM GSM		VIDEOCON		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	
			SSA																				
6	Call Setup Success Rate (>=95%)	Major Roads	100%	NC	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	94.00%	100%
		Highways	100%	100%	100%	100%	98.70%	100%	100%	100%	100%	100%	95.15%	97.14%	98.65%	100%	100%	100%	100%	100%	NC	94.34%	100%
		Within City	100%	NC	99.72%	100%	98.88%	100%	100%	100%	100%	100%	97.52%	100%	99.42%	100%	99.49%	100%	100%	100%	NC	94.79%	100%
		Overall SSA	100%	100%	99.79%	100%	98.96%	100%	100%	100%	100%	100%	97.27%	98.89%	99.34%	100%	99.61%	100%	100%	100%	100%	94.63%	100%
7	Hand Over Success Rate (HOSR)	Major Roads	100%	NC	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	98.85%	100%	100%	100%	100%	100%	100%	100%	100%
		Highways	100%	100%	99.32%	100%	96.43%	100%	100%	100%	100%	100%	96.95%	100%	98.72%	100%	100%	100%	100%	100%	NC	100%	100%
		Within City	100%	NC	98.53%	100%	98.40%	100%	100%	100%	99.74%	100%	97.45%	100%	99.42%	100%	100%	100%	100%	100%	NC	100%	100%
		Overall SSA	100%	100%	98.85%	100%	98.18%	100%	100%	100%	99.82%	100%	97.70%	100%	99.21%	100%	100%	100%	100%	100%	100%	100%	100%

\*NA: Not Applicable

\*NC: No Coverage



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

**DRIVE TEST TABLE: 4**

DRIVE TEST ROUTE OF APRIL TO JUNE - 14 – MP&CG CIRCLE							
Name of SSA	Drive test Period	Day 1		Day 2		Day 3	
		Name of SDCA Covered	Route Covered	Name of SDCA Covered	Route Covered	Name of SDCA Covered	Route Covered
<b>GWALIOR</b>	<b>Apr-14</b>	Dabra, Bhatirwar, Ghatigaon / <b>105 Km</b>	Ghatigaon :Sirsa Road, Panihar Road, Dhuwan Road, Station Road, Ab Road./ Bhatirwar : Silha Road, Kerua Road, Dabra Road./Dabra:Dabra To Gwalior, Datia Road, Bhatirwar Road, Chinour Road.  <b>Indoor:</b> Dabara Police Station	Gwalior / <b>155 Km</b>	Dd Nagar, liitm, Gwalior Fort Road, Bada, City Center, Thathipur, Army Cant, Maharajpura Road, Gole Ka Mandir, Railway Station, New High Court Road, Ag Office, Jhansi Road, Jh Hospital, Kampu, Gol Pahadiya, Transport Nagar.  <b>Indoor:</b> Maharaj Bada Gwalior	Datia, Bhandar, Seondha / <b>110 Km</b>	Datia:Gwalior Road, Jhansi Road, Unao Road, Bhandar Road, Indergarh Road, Railway Station Road, Udgawan Road./ Bhandar :Datia Road, Bichhodana Road, Pandokhar Road./ Seondha : Mau Road, Indergarh Road, Aswar Road, Lahar Road.  <b>Indoor:</b> Peetambara Tample Datia
<b>KHANDWA</b>	<b>May-14</b>	Punasa, Khandwa, Pandhana & Baldi / <b>130 Km</b>	Khandwa-Railway Station-Ganesh Talai -Anand Nagar - Pwd-Kishor Nagar-Imli Para ,Khalwa Town,New Harsood Town-Sector 3- Sector 1-Channera  <b>Indoor:</b> Railway Station Khandwa	Burhanpur & Khakner / <b>105 Km</b>	Buranpur Town-Lalbag-Subhash Chock-Anda Bajar-Gandhi Chock-Shikarpura-Bus Stand-Saniwara Gate,Khaknar Town  <b>Indoor:</b> Burhanpur Govt.Hospital	Harsud(Old & New) & Khalwa / <b>100 Km</b>	Pandhana Town,Hospital ,Market,Hss School,Punasha Town,Pwd Office,Tank Road  <b>Indoor:</b> Civil Hospital Punasa
<b>RATLAM</b>	<b>Jun-14</b>	Ratlam / <b>130km</b>	Parshwanath Nagar, Deesa Highway, Nh-14  <b>Indoor:</b> Station Ratlam	Jaora, A Lot / <b>119 Km</b>	Jaora:Ratlam Nimach State Highway,Ratlam State Highway To Narda Highway,Busstand To Railway Station, Gall Mandi, Main Market, Hussain Takari.  <b>Indoor:</b> Railway Station Alote	Sailana / <b>90 Km</b>	Ghantaghar Chowraha Sailana,Nawabganj Road To Nagar Nigam Sailana,Sailana Palace To Cactus Garden,Ratlam Highway To Sailana To Sailana Bus Stand  <b>Indoor:</b> Ghantaghar Chowraha Sailana



**7.5 SSA WISE DRIVE TEST OBSERVATION:**

**DRIVE TEST TABLE: 5**

**DRIVE TEST OBSERVATION OF GWALIOR SSA (APRIL-14)**

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	AIRTEL BHARTI	DABRA, BHATIRWAR, GHATIGAON	--	GWALIOR	Poor Rx level & quality found at cancer hospital and Tyagi nagar area	DATIA, HANDER, SEONDHA	Poor Rx level & quality found at Rajghat Colony (Rajaka talab),
2	AIRCEL		NC		NC		NC
3	BSNL		Poor Rx Level and Quality in Bhitwar		--		--
4	IDEA CELLULAR		--		Poor rx level & quality found at cancer hospital and Jaderua road New High Court		--
5	VODAFONE		poor Rx Level and Quality in Bhitwar State Highway, Village Street, Near Jhansi Highway		Poor Rx level & Quality At jalalpur, melaground, Surya Nagar		--
6	VIDEOCON		Poor Rx Level at Bhitwar ( Galla Mandi Road)		Poor Rx level & Quality at 6 No Square Morar, New HighCourt Road, Govindpuri, Jalalpur, Adityapuram		Poor Rx level in bachhreta Road(Bhander),In Datia Rx Level and Quality also Tharet road, NH 75 road
7	TATA GSM		Poor Rx Level at Bhitwar ( Galla Mandi Road)		Poor Rx level & Quality at 6 No Square Morar, New HighCourt Road, Govindpuri, Jalalpur, Adityapuram		Poor Rx level in SikandarPur Road(Bhander),In Datia Rx Level and Quality also Tharet road, NH 75 road
8	TATA CDMA		Poor Rx Level(power) In Dabra Town		--		--
9	RCOM GSM		--		Poor Rx Level & Quality in Kundan Nagar, MadhaoGanj, Chandrawadni Naka, Golpahadia, Laxmi Ganj		Poor Rx level & quality found at Rajghat Colony
10	RCOM CDMA		Poor Rx Quality & Level in Karera Road(Bhitwar)				Poor RxLevel & Quality In datia

NC: No Coverage



DRIVE TEST TABLE: 6

DRIVE TEST OBSERVATION OF KHANDWA SSA (MAY-14)

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	AIRTEL BHARTI	Punasa, Khandwa, Pandhana & Baldi	--	Burhanpur & khakner	Observed poor voice quality at Ichchapur road (Burhanpur road)	Harsud(old & New) & khalwa	--
2	AIRCEL		NC		NC		
3	BSNL		Observed poor voice quality at all over khandwa, Punasa Highway, Bhawanimata Khandwa		Observed poor voice quality at All over burhanpur, Lal Bag Burhanpur		--
4	IDEA CELLULAR		--		--		--
5	VODAFONE		Observed poor voice quality at HIGHWAY Highway		--		--
6	VIDEOCON		--		Observed poor voice quality at Mohana road		--
7	TATA GSM		Observed poor voice quality at Khandwa (Near civil line Khandwa, Bombay Bazar)		Observed poor voice quality at Burhanpur (St. Terresa school, Abhilas Nagar, Lal bag)		--
8	TATA CDMA		--		--		--
9	RCOM GSM		Observed poor voice quality at NVDA Colony, KishoreNagar, Singaji Nagar & Khandwa-Mundi State Highway, Pandhana-Khandwa Main Road (MP SH 50)		Observed poor voice quality at Indore-Ichapur Road, Loharmandi Road, Renuka Mata Mandir Road.		--
10	RCOM CDMA		Observed poor voice quality at MLB School, Civil Line, Kishor Nagar, Sreeji Budhwara		Observed poor voice quality at Indor Ichchapur road, Mohammadpura, Sundar nagar, Rajpura, Lal bag		--

NC: No Coverage

DRIVE TEST TABLE: 7

DRIVE TEST OBSERVATION OF RATLAM SSA (JUNE-14)

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	AIRTEL BHARTI	Ratlam	--	Jaora, Alot	--	Sailana	--
2	AIRCEL		NC		--		NC
3	BSNL		VIP Road, SH 31, Dholabar road, Ratneshwar road, Katjunagar ,Bajna Bus Stand , BohraBakhal , Deendayalnagar , ChandniChowk ,Station road, Collectrate, Anand colony		Observed poor voice quality at Jaora tal naka , Jaora peth,Jaora city center,		Observed poor voice quality at Jawar road,MDR Road,SH-10
4	IDEA CELLULAR		Railway-colony, Mangal-Vihar colony, Kalimi nagar, Ratlam new by pass.		Jaora:Observed poor voice quality at Neemach Highway, Ujjain Highway, Mill Area, Bohra Bkhal, BSNL exchange, station road / poor quality at Alot bypass, Poor Rx Level:Tal road		--
5	VODAFONE		--		--		--
6	VIDEOCON		Observed poor voice quality at Sailana road,Railway satation road,		Observed poor voice quality at Jaora, Kallu Kheda Road, Karju park,Chandralok Hotel		Poor level Banshwara road
7	TATA GSM		Observed poor voice quality at do batti choraha, Pratap nagar,Trplygate		--		--
8	TATA CDMA		Poor level at SH-31 Highway.		NC		NC
9	RCOM GSM		Observed poor voice quality at SH 39A, Ratlam new by pass, NH-79, Anand colony extension, Science college, Deen Dayal nagar.		Jaora:Observed very poor voice quality at NH-79, Mewati pura, Jaora mandi		--
10	RCOM CDMA		--		Jaora:Observed very poor voice quality at NH-79, Mewati pura,Jaora mandi		--

NC: No Coverage

## 7.6 KEY FINDINGS ON DRIVE TEST:

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

### Gwalior SSA ( April-14):

- (i) Drive test across Gwalior SSA covered Dabra, Bhatirwar, Ghatigaon, Gwalior, Datia, Bhandar and Seondha SDCAs.
- (ii) No service area: Aircel:- No Service in Gwalior SSA

**Drive Test Results:** The drive test results indicate that in general, performance of the service providers was satisfactory. However, **RCOM (CDMA) and Vodafone** could not perform within benchmark for parameter '**Call Drop rate**' and '**Voice Quality**' with their performance as **6.07(way beyond the benchmark of <= 2%)** and **94.78%** on overall SSA basis.

### Khandwa SSA (May-14)

- (i) Drive test across Khandwa SSA covered Punasa, Khandwa, Pandhana, Baldi, Burahanpur, Khakner, Harsud and Khalwa SDCAs.
- (ii) No Service area: Aircel: - No services in Khandwa SSA .

**Drive Test Results:** In this SSA also, the service providers well performed in the drive test. However, only **RCOM (GSM)** and **BSNL** could not do well in respect of parameters **Call Drop rate** and **Voice Quality** with their achieved level as **2.29%** and **94.21%** respectively on overall SSA basis. The performance of some of the service providers with respect to the parameter '**Voice Quality**' remained underperformed on the **High Ways**.

### Ratlam SSA ( June-14)

- (i) Drive test across Ratlam SSA covered Ratlam, Jaora and Sailna SDCAs.

**Drive Test Results:** As per the drive test outcome, **RCOM (GSM)** lagged behind in meeting the benchmarks of **Call drop rate** and **Voice Quality** with their performance as **2.40%** and **92.64%** respectively. **BSNL and RCOM (CDMA)** also could not perform well in respect of the parameters **Voice Quality** and **CSSR** with performance as **86.65%** and **94.63%** respectively.

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

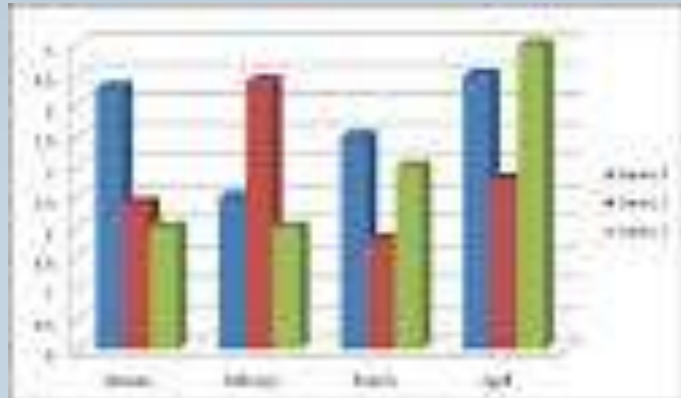
*Thus, on analyzing the overall performance of service providers on the basis of Drive tests, it was concluded that the service providers who could not perform well on the parameter 'Good Voice Quality' and 'Call Drop rate' need to improve their networks in these SSAs in the interest of the consumers.*

## 8. GRAPHICAL REPRESENTATION (CELLULAR MOBILE SERVICE PROVIDERS)

### AVERAGED QUARTERLY PMR

V/S

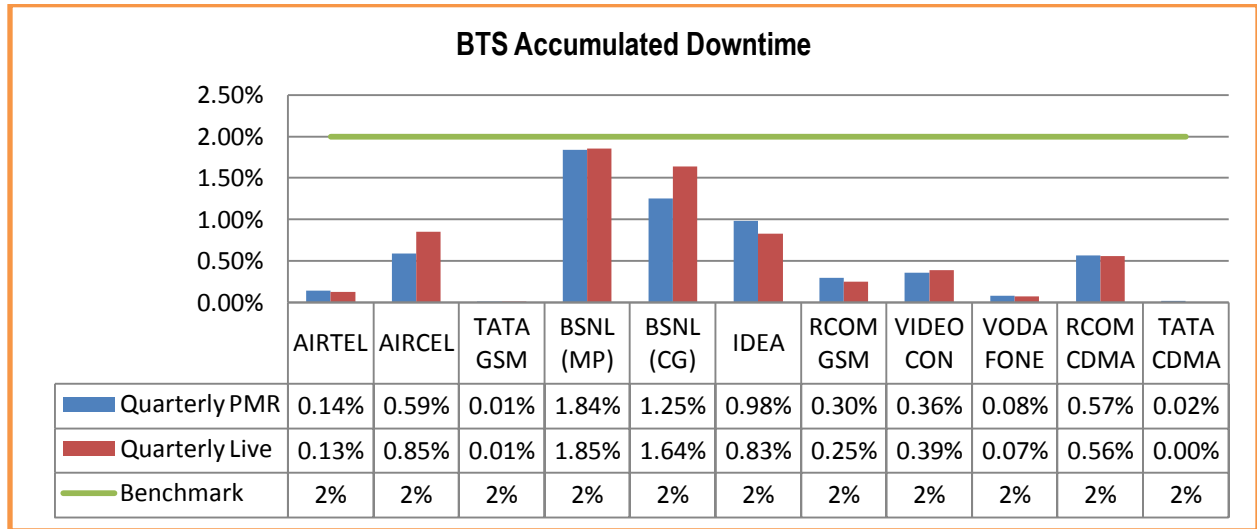
### AVERAGED QUARTERLY 3-DAYs LIVE MEASURMENT



## 8. GRAPHICAL REPRESENTATION:

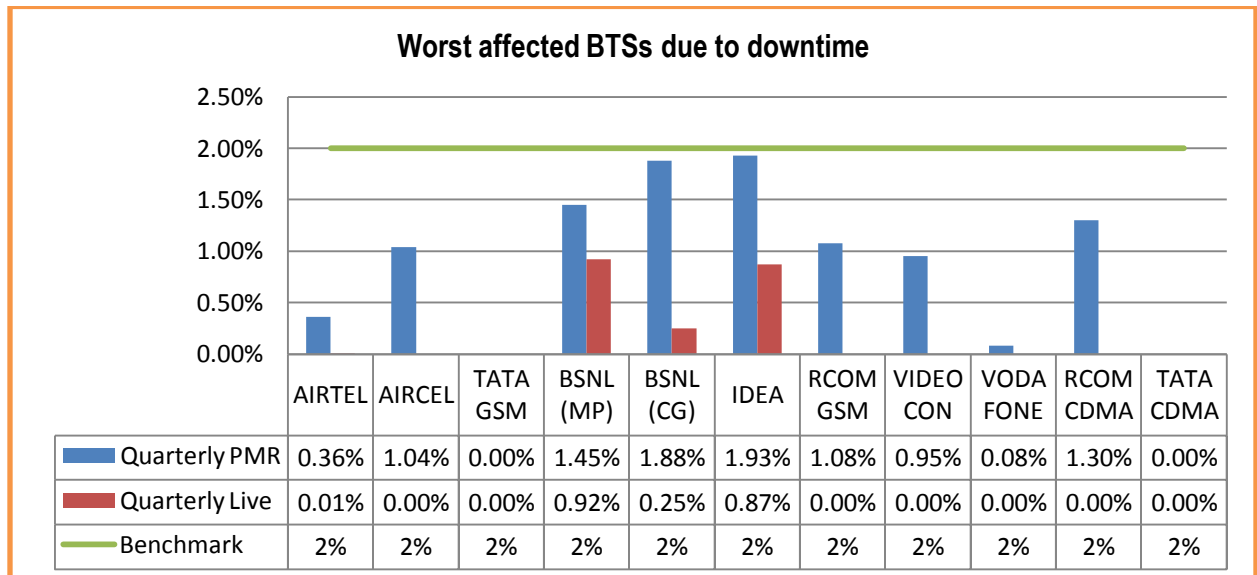
Graphical Representation of Performance of the Cellular Mobile Service Providers (PMR) V/S 3-Days Live Measurement (Quarterly Average Data):

### 1. BTS ACCUMULATED DOWNTIME :



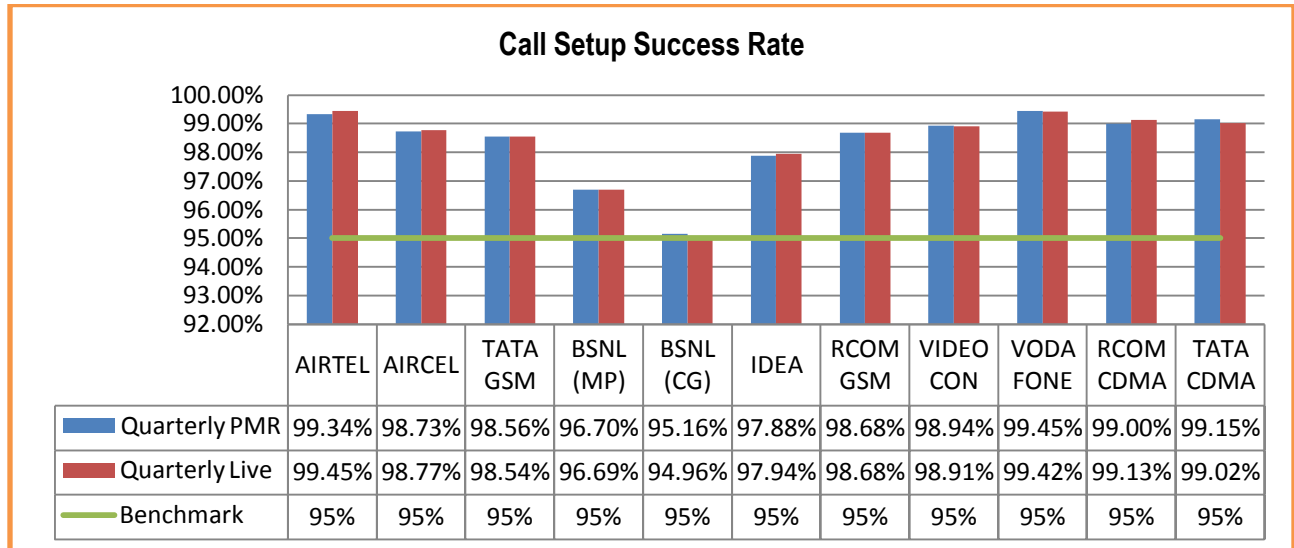
All operators are meeting the benchmarks.

### 2. WORST AFFECTED BTS DUE TO DOWNTIME:



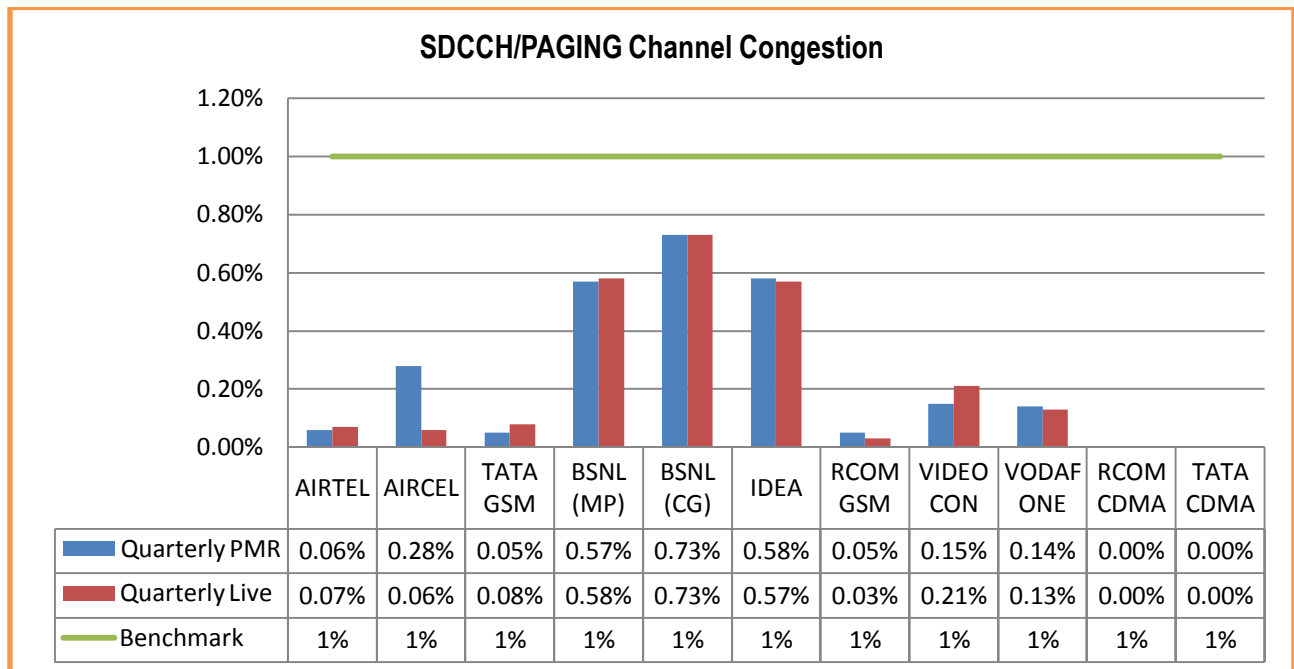
All operators are meeting the benchmarks.

**3. CALL SETUP SUCCESS RATE :**



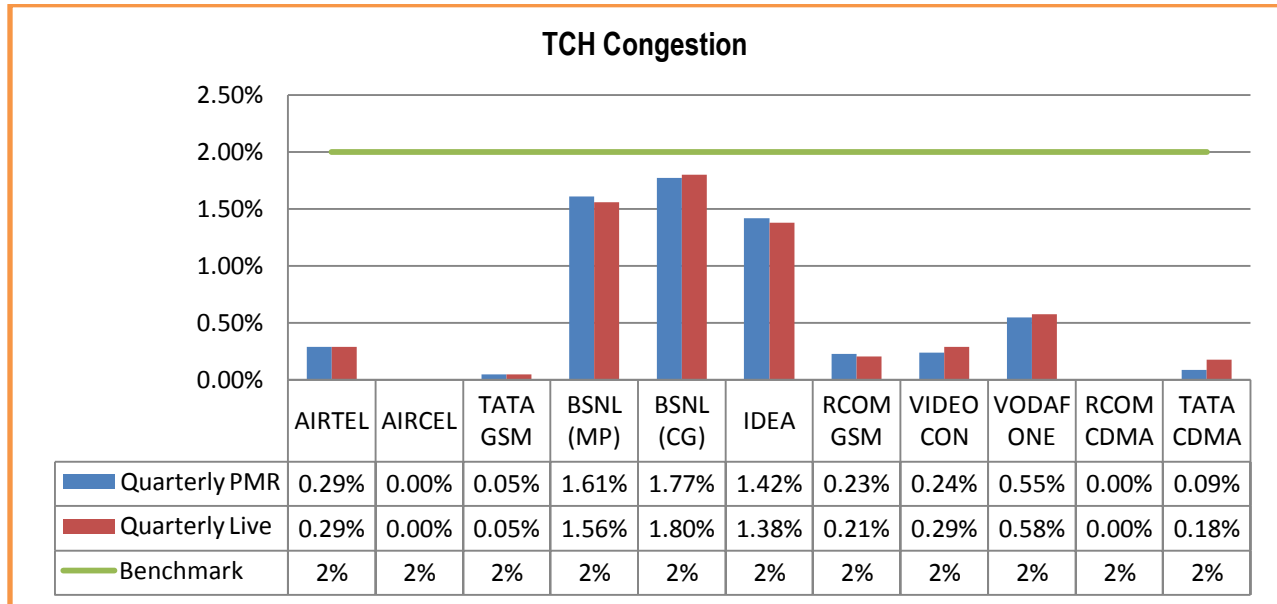
All operators are meeting the benchmarks except BSNL (CG) during 3 days live measurement.

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



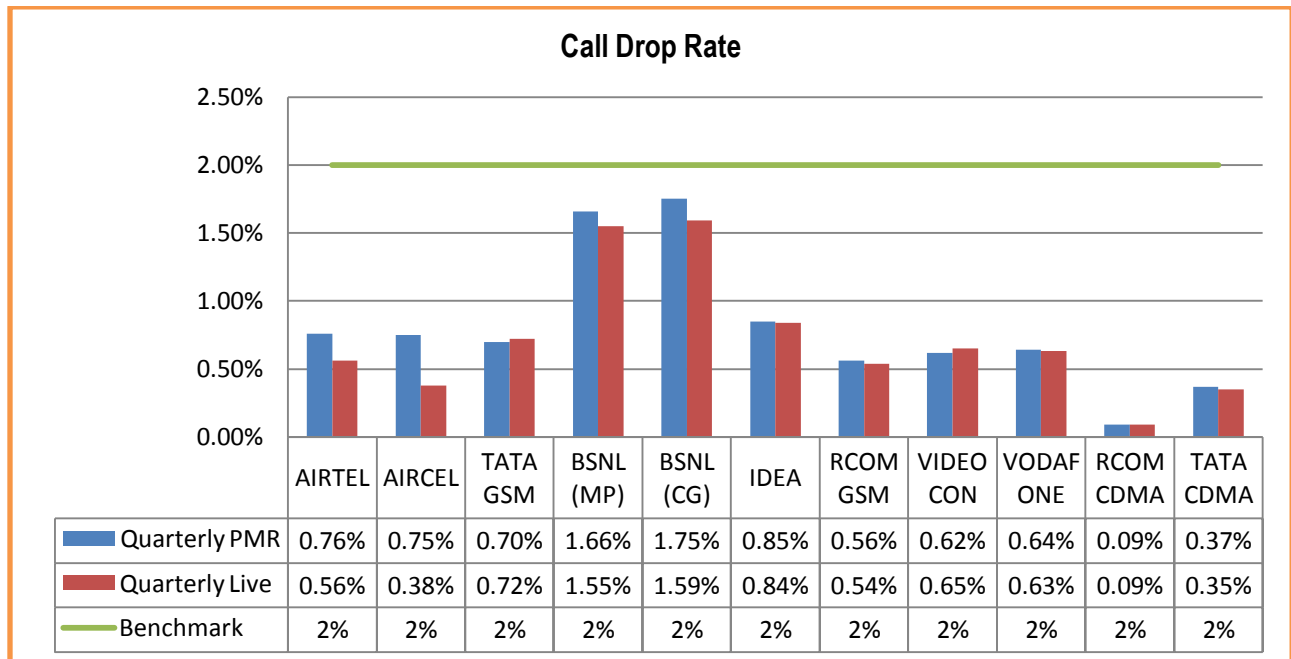
All operators are meeting the benchmarks.

**5. TCH CONGESTION :**



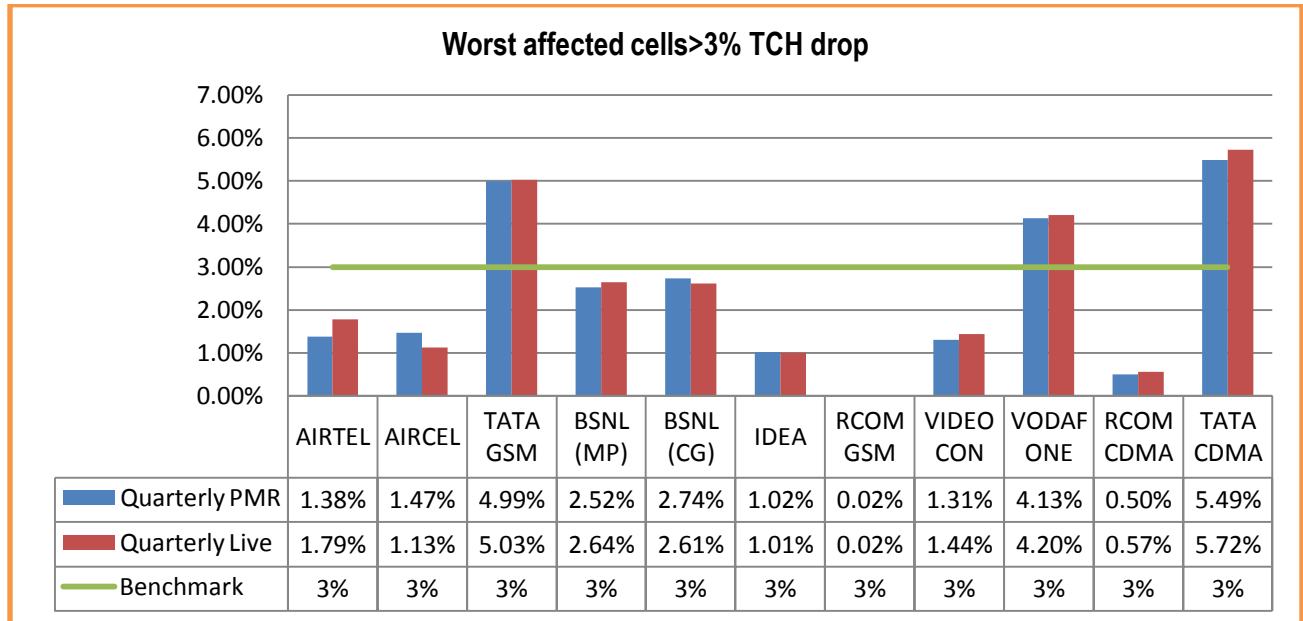
All operators are meeting the benchmarks.

**6. CALL DROP RATE :**



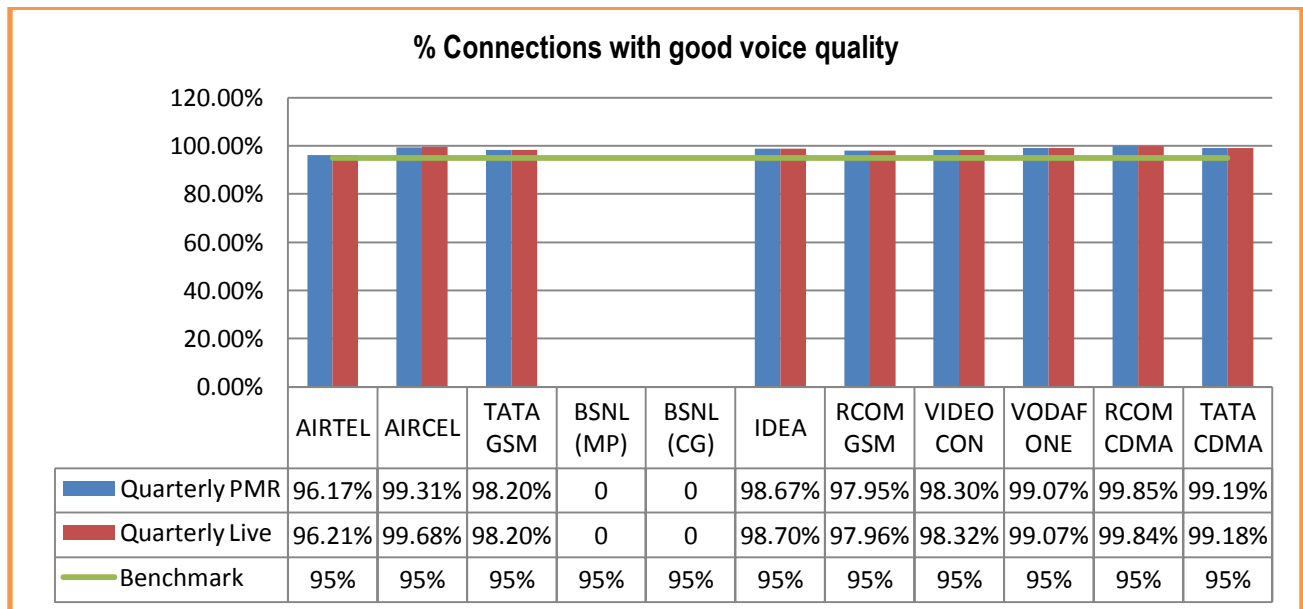
All operators are meeting the benchmarks.

**7. WORST AFFECTED CELLS>3% TCH DROP :**



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

**8. PERCENTAGE OF CONNECTIONS WITH GOOD VOICE QUALITY:**



All operators are meeting the benchmarks. Alcatel Lucent Technology being used by BSNL, OMCR does not support the parameter “Connections with good voice quality”, hence BSNL has not provided data for this parameter.