# REPORT

# ON

# AUDIT & ASSESSMENT OF QUALITY OF SERVICE

# OF

# CELLULAR MOBILE TELEPHONE SERVICES

# FOR

# KARNATAKA CIRCLE
## (SOUTH ZONE)

*Report Period: Apr 2012 – June 2012*

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# CHAPTER-1: INTRODUCTION

## I.    Background

TRAI's mission is to create and nurture conditions for growth of telecommunications in the country in a manner and at a pace, which will enable India to play a leading role in emerging global information society. One of the main objectives of Telecom Regulatory Authority of India (TRAI) is to provide a fair and transparent policy environment, which promotes a level playing field and facilitates fair competition.

In pursuance of above objective TRAI has issued from time to time a large number of regulations, orders and directives to deal with issues coming before it and provided the required direction to the evolution of Indian telecom market from a Government owned monopoly to a multi-operator multi service open competitive market.

The directions, orders and regulations issued cover a wide range of subjects including tariff, interconnection and quality of service as well as governance of the Authority.

The purpose of lying 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 has been carrying out regular reviews of the status of quality of service of the networks of all operators. In continuation to these efforts, TRAI has selected through bidding process TCIL as the Audit Agency to audit and assess the Quality of Service rendered by the service providers' namely Basic (Wireline) Services, Cellular Mobile Telephone (Wireless) Services and Broadband Services. The Audit for various telecom circles within the Zones has been distributed across four quarterly periods.

The parameters that need to be measured for Basic and Cellular Mobile Services have been specified in the TRAI notification on Quality of Service of Basic (Wireline) and Cellular Mobile (wireless) Services, 2009. The parameters for Broadband Services have been specified in the TRAI notification for Quality of Services of Broadband Service Regulation, 2006.

# II. Objectives and Methodology

The primary objective is to audit and assess the Quality of Service being rendered by Basic, Cellular Mobile & Broadband services against the parameters notified by TRAI. The audit and assessment of Quality of Service is conducted for all the basic service providers, unified access service providers, cellular mobile service providers and ISPs (Internet Service Provider) for basic wireline, Cellular Mobile Telephone Services and broadband service. TCIL has undertaken the following audit works as per the Terms of Reference (TOR):

i)     Verification of the data submitted by the service providers to TRAI as part of QoS monitoring reports i.e. Quarterly Performance Monitoring Reports (PMRs) and monthly Point of Interconnection (POI) Congestion Reports with reference to the records maintained by the service provider.

ii)    Verification of the performance of service providers against the Quality of Service benchmarks laid down by TRAI using live measurement for 3 days during the month in which the audit and assessment is carried out.

iii)   Verification of the performance of service providers against the Quality of Service benchmarks laid down by TRAI using the data for the entire month during which the live measurement is carried out.

iv)    Drive tests of the mobile networks both operators assisted and independent drive test (as and where required).

v)     Billing and call center's data verification.

vi)    Live testing of the efficiency of the call center / customer care help line.

vii)   Level 1 (Emergency nos.) calling


To fulfill the above mentioned Scope of Work audit was performed on different Systems, Facilities and Field data collection.

**Systems audited:-**
1. Network Switching Centre (NSS)
2. Base Station Subsystem(BSS)
3. Billing Applications
4. Customer Care applications

**Facilities audited**:-
1. Billing documents.
2. Customer Care records.

**Field data collections carried out:-**
1. RF network coverage including KPIs (Key Performance Index)
2. Inter Operator Call Assessment
3. Checking of Customer Billing/Refund Complaints (Random sample)
4. Customer Care efficiency
5. The live calling was made to assess the quality of services for Inter Operator Call Assessment, Customer Billing/Refund Complaints and Customer Care efficiency.

In order to carry out the above scope of work:-

- ✓ TCIL auditors visited all the NSS (Network Sub System) and BSS (Base-station Sub System) to check data for all the operators in their respective service area.

- ✓ All the NSS and BSS data for the relevant details were collected either directly from the centralized NOC or through a remote access to the NOC.

- ✓ The Radio parameters were audited/verified from the data collected from OMC-R (Operation and Maintenance Center – Radio, as part of BSS data).

- ✓ The Drive test was conducted in high, low and medium dense areas including highways, commercial complex and residential areas and special attention was paid for the areas for which TRAI has received complaints.

- ✓ The POI and other network related parameters were audited/verified from the data collected from the OMC-S (Operation and Maintenance Center – Switch as part of NSS data).

- ✓ The data related to Billing and Customer care was checked for the previous month and verified with the customers by calling them on random basis. The process of registration and handling of the complaints was also studied for the various operators. Call centre number were called for measuring the efficiency of the call centre.

- ✓ The inter operator call assessment test was carried out during the time period as is specified in the tender document. TCBH (Time Consistent Busy Hour) is taken after observation of the traffic consistently for 3 days prior to the audit activity.

- ✓ Data has been collected for busy hour of network in case of live assessment & month of audit for all service providers & verified that service providers are providing busy hour data only for QoS service. We found that TCBH hour is matching with network busy hour as provided by service providers for Karnataka circle. But for parameters such as 'Worst affected cell exceeding 3% TCH drop' and 'BTSs accumulated down time' CBBH (Cell Bouncing Busy Hour) was taken instead of TCBH (Time Consistent Busy Hours) as per the TRAI new regulation 2009.

Audit and Assessment of QoS (Q2-2012): Karnataka Circle

# CHAPTER-2: EXECUTIVE SUMMARY

## I. Preface

This report highlights the findings for the audit & assessment of Quality of Service of Cellular Mobile Services in Karnataka Circle in 1st quarter (Apr – June 2012). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken during the period Oct – Dec 2011.

Following are the various operators covered in Karnataka circle (South Zone) for Cellular Mobile (Wireless) services QoS audit & assessment. The Month of audit & TCBH information is also given below:

| Sl. | Name of Service Provider | Month of Audit | TCBH Hour |
|---|---|---|---|
| **GSM Operators** | | | |
| 1 | Aircel Ltd | May-2012 | 1900-2000 Hrs |
| 2 | Airtel Ltd | May-2012 | 1900-2000 Hrs |
| 3 | BSNL | May-2012 | 1900-2000 Hrs |
| 4 | Idea | May-2012 | 2000-2100 Hrs |
| 5 | Reliance Communication (GSM) | May-2012 | 2100-2200 Hrs |
| 6 | Tata Communications (GSM) | May-2012 | 1900-2000 Hrs |
| 7 | Uninor | May-2012 | 1900-2000 Hrs |
| 8 | Videocon | May-2012 | 1900-2000 Hrs |
| 9 | Vodafone | May-2012 | 1900-2000 Hrs |
| **CDMA Operators** | | | |
| 10 | MTS (CDMA) | May-2012 | 1900-2000 Hrs |
| 11 | Reliance Communication (CDMA) | May-2012 | 2100-2200 Hrs |
| 12 | Tata Communications (CDMA) | May-2012 | 1900-2000 Hrs |

**Note:** Etisalat has stopped their operations in Karnataka circle. Hence their reports are not considered.

## II. Findings from Quality of Service Audit (Operator wise for each parameter)

### (A) Cellular Mobile Telephone Services

| S/N | **3 days Live Data Audit**<br>**Name of Parameter** | Bench-mark | Aircel | Airtel | BSNL | Idea | Rcom GSM | Tata GSM | Uninor | Videocon | Vodafone | Rcom CDMA | Tata CDMA | MTS |
|-----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | GSM Operators | | | | | | | | | CDMA | | |
| **1** | **Network Availability** | | | | | | | | | | | | | |
| | a) BTS accumulated downtime | <= 2% | 0.03% | 0.21% | 1.16% | 0.05% | 0.12% | 0.05% | 0.02% | 0.00% | 0.20% | 0.13% | 0.01% | 0.10% |
| | b) Worst affected BTSs due to downtime | <= 2% | 0.00% | 0.00% | 0.22% | 0.02% | 0.00% | 0.00% | 0.00% | 0.00% | 0.04% | 0.00% | 0.00% | 0.00% |
| **2** | **Connection Establishment (Accessibility)** | | | | | | | | | | | | | |
| | a) CSSR (Call Setup Success Rate) | >=95% | 99.54% | 99.58% | 99.15% | 98.31% | 99.75% | 98.67% | 99.17% | 100.00% | 99.10% | 98.96% | 99.04% | 99.10% |
| | b) SDCCH/PAGING congestion | <=1% | 0.01% | 0.10% | 0.30% | 0.10% | 0.01% | 0.06% | 0.02% | 0.40% | 0.12% | 0.00% | 0.00% | 0.00% |
| | c) TCH congestion | <=2% | 0.02% | 0.20% | 0.51% | 0.46% | 0.02% | 0.25% | 0.04% | 0.00% | 0.54% | 0.00% | 0.02% | 0.00% |
| **3** | **Connection maintenance (retainability)** | | | | | | | | | | | | | |
| | a) CDR | <=2% | 0.69% | 0.19% | 1.16% | 1.01% | 0.34% | 0.66% | 1.28% | 0.00% | 0.74% | 0.01% | 0.20% | 0.90% |
| | b) Worst affected cells>3% TCH drop | <=3% | 2.98% | 1.20% | 2.73% | 1.22% | 0.01% | 5.17% | 1.85% | 0.00% | 2.96% | 0.00% | 0.00% | 0.63% |
| | c) Good voice quality | >=95% | 98.63% | 99.40% | NR | 97.16% | 99.24% | 98.42% | 98.26% | 99.59% | 98.51% | 99.77% | NR | 100% |
| **4** | **POI congestion** | <=0.5% | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **5** | **Response time to customers for assistance** | | | | | | | | | | | | | |
| | a) Accessibility of call centre/Customer Care | >=95% | 100.00% | 100.00% | 100.00% | 99.00% | 99.40% | 100.00% | 100.00% | 100.00% | 100.00% | 98.35% | 100.00% | 100.00% |
| | b) % call answered by operators(voice to voice) within 60 sec. | >=90% | 94.00% | 70.00% | 93.00% | 90.00% | 85.35% | 95.00% | 97.00% | 100.00% | 98.00% | 90.51% | 96.00% | 98.00% |

NA: Not Applicable, NR: Not Received

### Observations:

From the 3 days live data assessment, it is found that the operators are meeting most of the network parameters, except the following:
a) For the parameter "Worst affected cells>3% TCH drop",  TATA GSM is found not meeting the benchmark
b) For the parameter "% of call answered by operator (Voice to voice)", Airtel, Rcom GSM is found not meeting the benchmark.
c) In case of POI parameter, Idea is found to have individual POIs with congestions as shown in the table.
d) For the parameter "Good Voice Quality", the BSNL, Tata (CDMA) are confirmed that the parameter is not system generated.

## One Month data Assessment:

| One Month Data Audit | | Bench-mark | Aircel | Airtel | BSNL | Idea | Rcom GSM | Tata GSM | Uninor | Videocon | Vodafone | Rcom CDMA | Tata CDMA | MTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S/N | Name of Parameter | | GSM Operators | | | | | | | | | CDMA | | |
| (A) | Network Service Quality Parameter | | | | | | | | | | | | | |
| 1 | Network Availability | | | | | | | | | | | | | |
| | a) BTS Accumulated Downtime | <=2% | 0.08% | 0.19% | 1.34% | 0.05% | 0.20% | 0.07% | 0.06% | 0.28% | 0.23% | 0.25% | 0.03% | 0.17% |
| | b) Worst affected BTSs due to downtime | <=2% | 0.00% | 0.41% | 3.44% | 0.17% | 0.18% | 0.02% | 0.00% | 0.00% | 1.06% | 0.47% | 0.00% | 0.00% |
| 2 | Connection Establishment (Accessibility) | | | | | | | | | | | | | |
| | a) CSSR (Call Setup Success Rate) | >=95% | 99.55% | 99.60% | 99.15% | 98.27% | 99.74% | 98.68% | 99.13% | 99.15% | 99.06% | 98.96% | 99.05% | 99.05% |
| | b) SDCCH/PAGING congestion | <=1% | 0.02% | 0.04% | 0.23% | 0.12% | 0.01% | 0.06% | 0.05% | 0.04% | 0.12% | 0.00% | 0.00% | 0.00% |
| | c) TCH congestion | <=2% | 0.02% | 0.04% | 1.17% | 0.57% | 0.02% | 0.24% | 0.07% | 0.00% | 0.57% | 0.01% | 0.01% | 0.00% |
| 3 | Connection maintenance (retainability) | | | | | | | | | | | | | |
| | a) CDR | <=2% | 0.69% | 0.19% | 1.21% | 1.05% | 0.35% | 0.68% | 1.26% | 1.68% | 0.77% | 0.01% | 0.20% | 0.95% |
| | b) Worst affected cells>3% TCH drop | <=3% | 1.35% | 0.96% | 2.31% | 1.33% | 0.01% | 2.74% | 1.55% | 0.00% | 2.95% | 0.02% | 0.00% | 0.63% |
| | c) Good voice quality | >=95% | 98.63% | 99.37% | NR | 97.15% | 99.22% | 98.42% | 98.33% | 99.78% | 98.51% | 99.77% | NR | 100% |
| 4 | POI congestion | <=0.5% | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (B) | Customer Service Quality Parameters | | | | | | | | | | | | | |
| 5 | Metering/billing credibility-Post paid | <= 0.1% | 0.04% | 0.02% | 0.07% | 0.15% | 0.10% | 0.01% | NA | NA | 0.01% | 0.07% | 0.49% | 0.01% |
| 6 | Metering /billing credibility-Pre paid | <= 0.1% | 0.03% | 0.00% | 0.01% | 0.02% | 0.10% | 0.00% | 0.00% | 0.00% | 0.00% | 0.04% | 0.00% | 0.00% |
| 7 | Resolution of billing/ charging complaints | 100% within 4 weeks | 100% | 100% | 100% | 100% | 100% | 100% | 100% | NA | 100% | 100% | 100% | 100% |
| | a) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints | <=1 week | 100% with in 1 week | 100% with in 1 week | 100% with in 1 week | 99% with in 1 week | 100% with in 1 week | 100% with in 1 week | 100% with in 1 week | NA | 100% with in 1 week | 100% with in 1 week | 100% with in 1 week | 100% with in 1 week |
| 8 | Response time to customers for assistance | | | | | | | | | | | | | |
| | a) Accessibility of call centre/Customer Care | >=95% | 100.00% | 100.00% | 100.00% | 99.00% | 99.38% | 100.00% | 96.00% | 100.00% | 100.00% | 97.93% | 100.00% | 99.60% |
| | b) % call answered by operators(voice to voice) within 60 sec. | >=90% | 92.68% | 79.02% | 96.00% | 89.73% | 91.56% | 99.63% | 95.00% | 100.00% | 99.25% | 94.70% | 99.00% | 96.40% |
| 9 | Termination/closure of service | <=7days | 100.00% | 100.00% | 100.00% | 97.46% | 100.00% | 100.00% | NA | NA | 100.00% | 100.00% | 100.00% | NA |
| 10 | Time taken for refunds of deposits after closures. | 100% within 60 days | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | NA | NA | 100.00% | 100.00% | 100.00% | NA |

NA: Not Applicable, NR: Not Received

Audit and Assessment of QoS (Q2-2012): Karnataka Circle

## Observations:

From the month data assessment, it is found that the operators are meeting most of the network parameters with some exceptional cases as given below:

For the parameter "Worst affected BTSs due to downtime" it is found that BSNL is not meeting the benchmark with a value of 3.44% respectively.

In case of POI parameter, there is no congestion found overall on the POI, but cases were found where Idea individual POIs are showing high utilization/usage. Some are in the range of over 100% though causing no traffic failure due to overflow technique i.e. the extra traffic is carried over by some other operating POI as has been designed to do so.

Performance related to customer care data is not found to be satisfactory for the parameter "calls answered by operators (voice-to-voice)" for Airtel, Idea are below benchmark performance is observed in case of Airtel (79.02%), Idea (89.73%) respectively.

The "Metering/billing credibility -postpaid" benchmark is not meeting by Idea, Rcom GSM, Tata CDMA with a values of 0.15%, 0.1%, 0.49% respectively.

The "Metering/billing credibility -prepaid" benchmark is not meeting by Rcom GSM with a value of 0.1% respectively.

The "Period of applying credit/waiver adjustment to customers" benchmark is not meeting by Idea with a value of 99% respectively.

In case of parameter "termination/closure of service", Idea is having below benchmark performance.

**Operator-Assisted Drive Test**

| SN | Parameter | City Name | Aircel | Airtel | BSNL | Idea | Rcom GSM | Tata GSM | Uninor | Vodafone | Rcom CDMA | Tata CDMA | MTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | GSM Operators | | | | | | CDMA Operators | | |
| 1.1 | Blocked Call Rate (<=3%) | Bangalore | 0.00% | 0.00% | 4.88% | 1.89% | 1.14% | 5.52% | 0.63% | 6.50% | 0.00% | 1.07% | 1.59% |
| | | Hassan | 0.00% | 18.30% | 4.46% | 0.00% | 0.95% | 1.08% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| | | Raichur | 0.92% | 12.90% | 0.00% | 0.90% | 0.63% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| 1.2 | Dropped Call Rate (<=2%) | Bangalore | 0.54% | 0.58% | 6.83% | 1.93% | 0.58% | 1.19% | 1.91% | 2.17% | 0.00% | 0.00% | 0.80% |
| | | Hassan | 0.00% | 0.00% | 0.89% | 1.14% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| | | Raichur | 0.92% | 0.00% | 0.05% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.75% | 0.00% |
| 1.3 | Percentage of connections with good voice quality (=>95%) | | | | | | | | | | | | |
| | (i) 0-4 (w/o frequency hopping) | Bangalore | | | | | | | | | 99.25% | 98.74% | 97.46% |
| | | Hassan | | | | | | | | | 99.82% | 99.95% | 97.65% |
| | | Raichur | | | | | | | | | 98.97% | 99.58% | 99.88% |
| | (ii) 0-5 ( with frequency hopping) | Bangalore | 98.42% | 95.90% | 97.00% | 97.69% | 95.09% | 94.50% | 92.50% | 95.00% | | | |
| | | Hassan | 98.54% | 96.20% | 95.55% | 96.78% | 95.39% | 96.80% | 94.24% | 96.50% | | | |
| | | Raichur | 99.31% | 94.20% | 91.30% | 99.05% | 96.70% | 92.90% | 92.54% | 97.30% | | | |
| 1.4 | Call Setup Success Rate (>=95%) | Bangalore | 99.90 | 99.41 | 95.12 | 98.10 | 97.14 | 84.42 | 99.36 | 81.65 | 100 | 98.92 | 98.40 |
| | | Hassan | 100 | 58.16 | 95.54 | 98.86 | 99.05 | 96.73 | 98 | 100 | 100 | 100 | 100 |
| | | Raichur | 99.08 | 60.21 | 100 | 99.09 | 99.36 | 98.82 | 100 | 95.65 | 100 | 100 | 100 |

**Observations:**
- In "Blocked Call rate" parameters some operators like BSNL( Bangalore & Hassan) , TTSL(GSM) and Vodafone in Bangalore are not complying the benchmark.
- "Dropped call rate" parameter is not met by BSNL & Vodafone in Bangalore city in Karnataka circle.
- As far as "Percentage of connection with good voice quality" parameter is concerned few operators are deviating from the benchmark in these cities as Airtel , BSNL, TTSL(GSM) & Uninor in Raichur and TTSL(GSM) in Bangalore & Uninor in Bangalore & Hassan city both.
- For Call Setup Success Rate TTSL(GSM) and Vodafone are not meeting the benchmark set by TRAI.

**Remarks:---**

As far as Airtel in Karnataka circle is concerned, it is said that more Blocked Call in Hassan & Raichur are due to USSD (Unstructured supplimentry service data) messages, which comes in text messages carrying information regarding prepaid balance delivered after every MOC( mobile originating call) end. If this event happens while new voice call is being attempted by the mobile then answer to paging of incoming USSD is considered as Blocked Call as shown more in TEMS Investigation Tool, version 13.1 used by Airtel during drive test in these cities. Due to this USSD messages call setup success rate also shows low value because initiation of call and successfully setup calls are having more gap, so the actual call attempt and established voice call would remain same and not considered as Blocked Call in this case said by Airtel in reply.

**Independent Drive Test**

| SN | Parameter | TATA GSM Bidar | VODAFONE Raichur | IDEA Chikmagalur | BSNL Dharwad | Aircel Madikeri |
|---|---|---|---|---|---|---|
| 1.1 | Call Attempts | 55 | 124 | 98 | 114 | 50 |
| 1.2 | Block Call Rate (<= 3%) | 3.64% | 2.20% | 0.00% | 2.63% | 6.00% |
| 1.3 | Drop Call Rate (<= 2%) | 0.00% | 0.8% | 0.00% | 0.00% | 0.02% |
| 1.4 | Percentage of Connections with good voice quality (>= 95%) | 94.44% | 97.8% | 96.00% | 96.10% | 95.89% |
| 1.5 | Service Coverage | | | | | |
| | Indoor (>= -75dbm) | 63.41 | 70.34 | 64.55 | 53.23 | 44.75 |
| | In-Vehicle (>= -85dbm) | 93.74 | 99.23 | 92.05 | 85.13 | 78.45 |
| | Outdoor -in City (>= -95dbm) | 99.73 | 100 | 99.13 | 98.9 | 92.64 |
| 1.6 | Call Setup Success Rate (>= 95%) | 99.36 | 95.65 | 100 | 97.37 | 94 |
| 1.7 | Handover Success Rate | 98.46 | 99.31 | 99.14 | 98.09 | 100 |

**Observations:**
- TATA is not meeting the benchmark of "Block Call rate" & "Good voice quality" parameters in Bidar city.
- Aircel is not meeting the benchmark of "Block Call rate" & "Call setup Success rate" parameters in Madikeri city.

# CHAPTER-3: PMR Data Verification Results

## I.  Cellular Mobile Telephone Service

| S/N | Name of Parameter | Bench-mark | Audit | Aircel | Airtel | BSNL | Idea | Rcom GSM | Tata GSM | Uninor | Videocon | Vodafone | Rcom CDMA | Tata CDMA | MTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PMR** | | | | | | | | | | | | | | |
| | | | | | | | | GSM Operators | | | | | CDMA Operators | | |
| (A) | **Network Service Quality Parameter** | | | | | | | | | | | | | | |
| 1 | **Network Availability** | | | | | | | | | | | | | | |
| | BTS Accumulated Downtime | <=2% | Reported | 0.23 | 0.23 | 0.9 | 0.05 | 0.21 | 0.07 | 0.35 | 0.03 | 0.03 | 0.14 | 0.02 | 0.18 |
| | | | Verified | 0.23 | 0.23 | 0.9 | 0.05 | 0.21 | 0.07 | 0.35 | 0.03 | 0.03 | 0.14 | 0.02 | 0.18 |
| | Worst affected BTSs due to downtime | <=2% | Reported | 0.79 | 0.92 | 1.87 | 0.22 | 0.89 | 0.23 | 0 | 0 | 0.08 | 0.06 | 0 | 0.18 |
| | | | Verified | 0.79 | 0.92 | 1.87 | 0.22 | 0.89 | 0.23 | 0 | 0 | 0.08 | 0.06 | 0 | 0.18 |
| 2 | **Connection Establishment (Accessibility)** | | | | | | | | | | | | | | |
| | CSSR (Call Setup Success Rate) | >=95% | Reported | 99.42 | 98.78 | 99 | 97.23 | 99.59 | 98.14 | 99.12 | 99.09 | 99.41 | 99.27 | 98.78 | 98.29 |
| | | | Verified | 99.42 | 98.78 | 99 | 97.23 | 99.59 | 98.14 | 99.12 | 99.09 | 99.41 | 99.27 | 98.78 | 98.29 |
| | SDCCH/PAGING congestion | <=1% | Reported | 0.05 | 0.38 | 0.2 | 0.16 | 0.06 | 0.1 | 0.16 | 0.06 | 0.1 | 0 | 0 | 0 |
| | | | Verified | 0.05 | 0.38 | 0.2 | 0.16 | 0.06 | 0.1 | 0.16 | 0.06 | 0.1 | 0 | 0 | 0 |
| | TCH congestion | <=2% | Reported | 0.06 | 0.34 | 0.97 | 0.75 | 0.08 | 0.45 | 0.27 | 0.03 | 0.26 | 0.15 | 0.09 | 0.31 |
| | | | Verified | 0.06 | 0.34 | 0.97 | 0.75 | 0.08 | 0.45 | 0.27 | 0.03 | 0.26 | 0.15 | 0.09 | 0.31 |
| 3 | **Connection maintenance (retainability)** | | | | | | | | | | | | | | |
| | CDR | <=2% | Reported | 0.76 | 0.69 | 1.17 | 1.12 | 0.66 | 0.8 | 0.19 | 1.23 | 0.66 | 0.53 | 0.44 | 0.84 |
| | | | Verified | 0.76 | 0.69 | 1.17 | 1.12 | 0.66 | 0.8 | 0.19 | 1.23 | 0.66 | 0.53 | 0.44 | 0.84 |
| | Worst affected cells>3% TCH drop | <=3% | Reported | 2.3 | 2.75 | 2.43 | 1.4 | 0.31 | 3.69 | 0 | 2.35 | 1.93 | 0.35 | 0.31 | 2.01 |
| | | | Verified | 2.3 | 2.75 | 2.43 | 1.4 | 0.31 | 3.69 | 0 | 2.35 | 1.93 | 0.35 | 0.31 | 2.01 |
| | Good voice quality | >=95% | Reported | 98.58 | 98.66 | 98.6 | 97.07 | 99.08 | 98.23 | 99.39 | 98.57 | 98.73 | 98.71 | 98.44 | 99.81 |
| | | | Verified | 98.58 | 98.66 | 98.6 | 97.07 | 99.08 | 98.23 | 99.39 | 98.57 | 98.73 | 98.71 | 98.44 | 99.81 |

| PMR S/N | Name of Parameter | Bench-mark | Audit | Aircel | Airtel | BSNL | Idea | Rcom GSM | Tata GSM | Uninor | Videocon | Vodafone | Rcom CDMA | Tata CDMA | MTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | POI congestion | <=0.5% | Reported | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.67 | 0 | 0 | 0 | 0 |
| | | | Verified | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.67 | 0 | 0 | 0 | 0 |
| (B) | Customer Service Quality Parameters | | | | | | | | | | | | | | |
| 5 | Metering/billing credibility-Post paid | <= 0.1% | Reported | 0.07 | 0.02 | 0 | 0.14 | 0.09 | 0 | 0 | 0 | 0.09 | 0.09 | 0 | 0 |
| | | | Verified | 0.07 | 0.02 | 0 | 0.14 | 0.09 | 0 | 0 | 0 | 0.09 | 0.09 | 0 | 0 |
| 6 | Metering /billing credibility-Pre paid | <= 0.1% | Reported | 0.09 | 0 | 0 | 0.01 | 0.07 | 0 | 0 | 0.07 | 0.09 | 0.02 | 0.01 | 0 |
| | | | Verified | 0.09 | 0 | 0 | 0.01 | 0.07 | 0 | 0 | 0.07 | 0.09 | 0.02 | 0.01 | 0 |
| 7 | Resolution of billing/ charging complaints | 100% within 4 weeks | Reported | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | | | Verified | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints | <=1 week | Reported | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 0 | 100 | 100 | 100 | 100 |
| | | | Verified | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 0 | 100 | 100 | 100 | 100 |
| 8 | Response time to customers for assistance | | | | | | | | | | | | | | |
| | Accessibility of call centre/Customer Care | >=95% | Reported | 100 | 99.54 | 98 | 97.34 | 99.42 | 100 | 96.67 | 98.18 | 100 | 98.1 | 98 | 96.32 |
| | | | Verified | 100 | 99.54 | 98 | 97.34 | 99.42 | 100 | 96.67 | 98.18 | 100 | 98.1 | 98 | 96.32 |
| | % call answered by operators(voice to voice) within 60 sec. | >=90% | Reported | 91.65 | 90.79 | 92 | 49.2 | 91.83 | 98 | 99.12 | 88.71 | 86.99 | 95.06 | 96 | 95.19 |
| | | | Verified | 91.65 | 90.79 | 92 | 49.2 | 91.83 | 98 | 99.12 | 88.71 | 86.99 | 95.06 | 96 | 95.19 |
| 9 | Termination/closure of service | | | | | | | | | | | | | | |
| | No.of requests for Termination / Closure of service complied within 7 days during the quarter | <=7days | Reported | 100 | 100 | 100 | 98.24 | 100 | 100 | 0 | 0 | 100 | 100 | 100 | 0 |
| | | | Verified | 100 | 100 | 100 | 98.24 | 100 | 100 | 0 | 0 | 100 | 100 | 100 | 0 |
| 10 | Time taken for refunds of deposits after closures. | 100% within 60 days | Reported | 100 | 100 | 100 | 100 | 100 | 100 | 0 | 0 | 100 | 100 | 100 | 0 |
| | | | Verified | 100 | 100 | 100 | 100 | 100 | 100 | 0 | 0 | 100 | 100 | 100 | 0 |

**Critical Analysis (PMR Verification):**

A).All the operator's data is almost matching with the PMR data.

Audit and Assessment of QoS (Q2-2012): Karnataka Circle

# Chapter -4 Detailed Findings & Analysis

## I. Cellular Mobile Telephone Service
### (A) MSC Audit
#### (1) 3days live data assessment & summarized findings

| S/N | Name of Parameter | Benchmark | Aircel | Airtel | BSNL | Idea | Rcom GSM | Tata GSM | Uninor | Videocon | Vodafone | Rcom CDMA | Tata CDMA | MTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | GSM Operators | | | | | | | | | CDMA | | |
| A | Network Service Quality Parameter | | | | | | | | | | | | | |
| 1 | Network Availability | | | | | | | | | | | | | |
| | a). BTS accumulated downtime | <= 2% | 0.03% | 0.21% | 1.16% | 0.05% | 0.12% | 0.05% | 0.02% | 0.00% | 0.20% | 0.13% | 0.01% | 0.10% |
| | b). Worst affected BTSs due to downtime | <= 2% | 0.00% | 0.00% | 0.22% | 0.02% | 0.00% | 0.00% | 0.00% | 0.00% | 0.04% | 0.00% | 0.00% | 0.00% |
| | c). Total no of BTSs in the licensed service area | | 2902 | 8821 | 5026 | 5177 | 3372 | 5350 | 2160 | 30 | 8049 | 1900 | 954 | 1182 |
| | d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during the 3days Live | | 61 | 1308 | 4211 | 173 | 290 | 206.21 | 36.47 | 0 | 1156 | 178 | 10.02 | 89.25 |
| | e) No. of BTSs having accumulated downtime of >24 hours in 3days Live | | 0 | 0 | 11 | 1 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 |
| 2 | Connection Establishment (Accessibility) | | | | | | | | | | | | | |
| | a) CSSR | >=95% | 99.54% | 99.58% | 99.15% | 98.31% | 99.75% | 98.67% | 99.17% | 100.00% | 99.10% | 98.96% | 99.04% | 99.10% |
| | b) SDCCH/PAGING congestion | <=1% | 0.01% | 0.10% | 0.30% | 0.10% | 0.01% | 0.06% | 0.02% | 0.40% | 0.12% | 0.00% | 0.00% | 0.00% |
| | c) TCH congestion | <=2% | 0.02% | 0.20% | 0.51% | 0.46% | 0.02% | 0.25% | 0.04% | 0.00% | 0.54% | 0.00% | 0.02% | 0.00% |
| 3 | Connection maintenance | | | | | | | | | | | | | |
| | a) CDR | <=2% | 0.69% | 0.19% | 1.16% | 1.01% | 0.34% | 0.66% | 1.28% | 0.00% | 0.74% | 0.01% | 0.20% | 0.90% |

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| S/N | Name of Parameter | Benchmark | Aircel | Airtel | BSNL | Idea | Rcom GSM | Tata GSM | Uninor | Videocon | Vodafone | Rcom CDMA | Tata CDMA | MTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | GSM Operators | | | | | | | | | CDMA | | |
| | b) Cells having > 3% TCH drop | <=3% | 2.98% | 1.20% | 2.73% | 1.22% | 0.01% | 5.17% | 1.85% | 0.00% | 2.96% | 0.00% | 0.00% | 0.63% |
| | c) Good voice quality | >=95% | 98.63% | 99.40% | NR | 97.16% | 99.24% | 98.42% | 98.26% | 99.59% | 98.51% | 99.77% | NR | 100% |
| | d) No. of cells > 3% TCH drop | | 252 | 295 | 407 | 188 | 1 | 812 | 118 | 0 | 696 | 0 | 0 | 26 |
| | e) Total no. of cells in the network | | 8462 | 24588 | 14910 | 15462 | 10116 | 15700 | 6376 | 90 | 23528 | 5700 | 2962 | 4123 |
| 4 | POI congestion | <=0.5% | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | a) Name of POI not meeting the benchmark | | | | | | | | | | | | | |
| | b) Total No. of circuits on POI | | 83781 | 242116 | 14697 | 158324 | 14740 | 22142 | 37509 | 511 | 130393 | 75956 | 69270 | 44307 |
| | c) Avg No. of call attempts on POI | | 481134 | 6533633 | 827618.33 | 3112072 | 211602.67 | 828027 | 674088.67 | 0 | 3369708 | 407731 | 1629978 | 909177 |
| | d) Avg traffic served on POI (Erlang) | | 12312.39 | 127984.08 | 19467.19 | 55564.53 | 5308.83 | 12775.2 | 15681.53 | 3.56 | 75603 | 18794.23 | 37661.44 | 17817 |
| | e) Total number of working POI Service Area wise | | 83391.47 | 154 | 33 | 47 | 21 | 23 | 67 | 15 | 184 | 30 | 128 | 59 |
| | f) Equipped Capacity of Network in respect of Traffic in erlang | | 81796 | 679502 | 297863 | 176565 | 72000 | 288507.26 | 68066 | 5000 | 194844 | 230000 | 257152 | 118706 |
| | g) Total traffic handled in TCBH in erlang | | 24267 | 463959 | 96992 | 142280.54 | 67615 | 120746.63 | 38239.71 | 0.04 | 187698.4 | 36126 | 138873 | 41941.47 |
| (B) | Customer Service Quality Parameters | | | | | | | | | | | | | |
| 5 | Response time to customers for assistance | | | | | | | | | | | | | |
| | a) Accessibility of call centre | >=95% | 100.00% | 100.00% | 100.00% | 99.00% | 99.40% | 100.00% | 100.00% | 100.00% | 100.00% | 98.35% | 100.00% | 100.00% |
| | b) % of call answered by operators(voice to voice) within 60 sec | >=90% | 94.00% | 70.00% | 93.00% | 90.00% | 85.35% | 95.00% | 97.00% | 100.00% | 98.00% | 90.51% | 96.00% | 98.00% |

NA: Not Applicable, NR: Not Received

**Parameter-wise Findings (Live Data Assessment):**

The parameter wise key takeouts for the Cellular Mobile Telephone Services providers in Karnataka Service Area are as given below:-

➢ **BTS Accumulated downtime (benchmark <=2%):** All operators are meeting the benchmark with values lying between 0% and 1.16%
➢ **Worst affected BTSs due to downtime (benchmark <=2%):** All the operators are meeting the benchmark with is specified by TRAI.
➢ **Call setup success rate (benchmark >=95%):** All operators are meeting the benchmark with values lying between 98.31% and 100%.
➢ **SDCCH/PAGING Channel congestion (benchmark <= 1%):** All operators are meeting the benchmark with values lying between 0% and 0.4%.
➢ **TCH congestion (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 0.54%.
➢ **Call drop rate (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 1.28%.
➢ **Cell exceeding 3% TCH drop (benchmark <= 3%):** Except for Tata GSM with a value of 5.17% rest of the operators are satisfying the benchmark with value in between 0% and 2.98%.
➢ **Connections with good voice quality (benchmark >= 95%):** Tata CDMA & BSNL has declared that the parameter is not system generated. Rests of the operators are meeting the benchmark with values lying between 97.16% and 99.77%.
➢ **POI Congestion (benchmark <= 0.5%):** All operators are meeting the benchmark. There was no congestion found overall on the POI, but Idea case were found where individual POIs are showing high utilization/usage. Some are in the range of over 100% though causing no traffic failure due to overflow technique i.e. the extra traffic is carried over by some other operating POI as has been designed to do so.
➢ **%age of call answered by operator (electronically) (benchmark >95):** All operators are meeting the benchmark with values in between 98.35% and 100%.
➢ **%age of call answered by operator (Voice to voice) (benchmark >90%): %):** Except for Airtel, Rcom GSM with a values of 70%, 85.35% respectively, rest of the operators are satisfying the benchmark with value in between 90% and 100%.

**(2) One Month audit data report & Summarized findings:**

| S/N | Name of Parameter | Benchmark | Aircel | Airtel | BSNL | Idea | Rcom GSM | Tata GSM | Uninor | Videocon | Vodafone | Rcom CDMA | Tata CDMA | MTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | GSM Operators | | | | | | | | | CDMA Operators | | |
| (A) | Network Service Quality Parameter | | | | | | | | | | | | | |
| 1 | Network Availability | | | | | | | | | | | | | |
| | a) BTS Accumulated Downtime | <=2% | 0.08% | 0.19% | 1.34% | 0.05% | 0.20% | 0.07% | 0.06% | 0.28% | 0.23% | 0.25% | 0.03% | 0.17% |
| | b) Worst affected BTSs due to downtime | <=2% | 0.00% | 0.41% | 3.44% | 0.17% | 0.18% | 0.02% | 0.00% | 0.00% | 1.06% | 0.47% | 0.00% | 0.00% |
| | c) Total no. of BTSs in the licensed service area | | 2902 | 8821 | 5026 | 5177 | 3372 | 5350 | 2160 | 30 | 8049 | 1900 | 954 | 1182 |
| | d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month | | 1697 | 12483 | 50123.73 | 1873 | 5139 | 2797 | 1033.5 | 63.31 | 13337 | 3550 | 203.35 | 1498.18 |
| | e) No. of BTSs having accumulated downtime of >24 hours in a month | | 0 | 36 | 173 | 9 | 6 | 1 | 0 | 0 | 85 | 9 | 0 | 0 |
| 2 | Connection Establishment (Accessibility) | | | | | | | | | | | | | |
| | a) CSSR (Call Setup Success Rate) | >=95% | 99.55% | 99.60% | 99.15% | 98.27% | 99.74% | 98.68% | 99.13% | 99.15% | 99.06% | 98.96% | 99.05% | 99.05% |
| | b) SDCCH/PAGING congestion | <=1% | 0.02% | 0.04% | 0.23% | 0.12% | 0.01% | 0.06% | 0.05% | 0.04% | 0.12% | 0.00% | 0.00% | 0.00% |
| | c) TCH congestion | <=2% | 0.02% | 0.04% | 1.17% | 0.57% | 0.02% | 0.24% | 0.07% | 0.00% | 0.57% | 0.01% | 0.01% | 0.00% |
| 3 | Connection maintenance (retainability) | | | | | | | | | | | | | |
| | a) CDR | <=2% | 0.69% | 0.19% | 1.21% | 1.05% | 0.35% | 0.68% | 1.26% | 1.68% | 0.77% | 0.01% | 0.20% | 0.95% |
| | b) Worst affected cells>3% TCH drop | <=3% | 1.35% | 0.96% | 2.31% | 1.33% | 0.01% | 2.74% | 1.55% | 0.00% | 2.95% | 0.02% | 0.00% | 0.63% |
| | c) Good voice quality | >=95% | 98.63% | 99.37% | NR | 97.15% | 99.22% | 98.42% | 98.33% | 99.78% | 98.51% | 99.77% | NR | 100% |
| | d) Total No. of cells exceeding 3% TCH drop (call drop) | | 114 | 235 | 345 | 205 | 1 | 430 | 99 | 0 | 693 | 1 | 0 | 26 |
| | e) Total no. of cells in the network | | 8462 | 24588 | 14910 | 15462 | 10116 | 15700 | 6376 | 90 | 23528 | 5700 | 2962 | 4123 |
| 4 | POI congestion | <=0.5% | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | a) Name of POI not meeting the benchmark | | | | | | | | | | | | | |

| S/N | Name of Parameter | Benchmark | Aircel | Airtel | BSNL | Idea | Rcom GSM | Tata GSM | Uninor | Videocon | Vodafone | Rcom CDMA | Tata CDMA | MTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | GSM Operators | | | | | | | | | CDMA Operators | | |
| | b) Total No. of call attempts on POI (Avg.) | | 468210 | 6943528 | 728663.81 | 3112072 | 212070.33 | 839121 | 647526.65 | 0 | 3390670 | 415218.37 | 1608618 | 897595 |
| | c) Total traffic served on POI (Erlang) (Avg.) | | 11882.59 | 132664.44 | 19334 | 53151.85 | 5209.36 | 12861.7 | 15437.93 | 4.06 | 74481 | 18813.61 | 37611 | 17460.4 |
| | d) Total No. of circuits on POI | | 83781 | 242116 | 14697 | 158324 | 14740 | 22142 | 37509 | 511 | 130393 | 75956 | 69270 | 44307 |
| | e) Total number of working POI Service Area wise | | 38 | 154 | 33 | 47 | 21 | 23 | 67 | 15 | 184 | 30 | 128 | 59 |
| | f) Capacity of POI | | 83391.47 | 235232.97 | 16939 | 155910 | 13821.06 | 21202 | 34734.19 | 337.84 | 126007 | 70813.96 | 63753.86 | 41136.86 |
| 5 | Network Data | | | | | | | | | | | | | |
| | a) Equipped Capacity of Network Erlang | | 81796 | 679502 | 297863 | 176565 | 72000 | 288507.26 | 68066 | 5000 | 194844 | 230000 | 257152 | 118706 |
| | b) Total traffic in TCBH in erlang (Avg.) | | 24267 | 463959 | 96992 | 142280.54 | 67615 | 120746.63 | 38239.71 | 0.04 | 187698.4 | 36126 | 138873 | 41941.47 |
| | c) Total no. of customers served (as per VLR) on last day of the month | | 812636 | 14753685 | 3725154 | 5234118 | 3198244 | 3746425 | 1084351 | 21 | 5521822 | 1853331 | 706469 | 1301007 |
| (B) | Customer Service Quality Parameters | | | | | | | | | | | | | |
| 6 | Metering/billing credibility-Post paid | <= 0.1% | 0.04% | 0.02% | 0.07% | 0.15% | 0.10% | 0.01% | NA | NA | 0.01% | 0.07% | 0.49% | 0.01% |
| | a) No. of bills issued during the period | | 6938 | 951334 | 130698 | 218570 | 69659 | 116803 | NA | NA | 455885 | 254360 | 289792 | 14596 |
| | b) No. of bills disputed including billing complaints during the period | | 3 | 193 | 86 | 328 | 69 | 1604 | NA | NA | 40 | 170 | 1424 | 2 |
| 7 | Metering /billing credibility-Pre paid | <= 0.1% | 0.03% | 0.00% | 0.01% | 0.02% | 0.10% | 0.00% | 0.00% | 0.00% | 0.00% | 0.04% | 0.00% | 0.00% |
| | a) No. of charging / credit / validity complaints during the quarter | | 586 | 288 | 816 | 1242 | 4679 | 192 | 18 | 0 | 232 | 1241 | 19 | 82 |
| | b) Total no. of pre-paid customers at the end of the quarter | | 1754022 | 18115698 | 6420947 | 5663476 | 4679648 | 6832309 | 2166819 | 8396 | 6413142 | 3132849 | 631488 | 2101641 |

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| S/N | Name of Parameter | Benchmark | Aircel | Airtel | BSNL | Idea | Rcom GSM | Tata GSM | Uninor | Videocon | Vodafone | Rcom CDMA | Tata CDMA | MTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | GSM Operators | | | | | | CDMA Operators | |
| 8 | **Resolution of billing/ charging complaints** | *100% within 4 weeks* | 100% | 100% | 100% | 100% | 100% | 100% | 100% | NA | 100% | 100% | 100% | 100% |
| | a) No. of billing/(post paid) and charging, credit/validity (pre paid) complaints resolved within 4 weeks during the quarter | | 589 | 481 | 902 | 1570 | 4748 | 1796 | 18 | 0 | 272 | 1411 | 1443 | 84 |
| | b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter | | 589 | 481 | 902 | 2923 | 4748 | 1796 | 18 | 0 | 272 | 1411 | 1443 | 84 |
| | c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter | | 589 | 481 | 86 | 514 | 2985 | 13 | 18 | 0 | 269 | 743 | 13 | 62 |
| | d) No. of complaints disposed on account of not considered as valid complaints during the quarter | | 0 | 0 | 816 | 2409 | 1763 | 1783 | 0 | 0 | 3 | 668 | 1430 | 22 |
| | e) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints | *<=1 week* | 100% with in 1 week | 100% with in 1 week | 100% with in 1 week | 99% with in 1 week | 100% with in 1 week | 100% with in 1 week | 100% with in 1 week | NA | 100% with in 1 week | 100% with in 1 week | 100% with in 1 week | 100% with in 1 week |
| 9 | **Response time to customers for assistance** | | | | | | | | | | | | | |
| | a) Accessibility of call centre/Customer Care | *>=95%* | 100.00% | 100.00% | 100.00% | 99.00% | 99.38% | 100.00% | 96.00% | 100.00% | 100.00% | 97.93% | 100.00% | 99.60% |
| | b) % call answered by operators(voice to voice) within 60 sec. | *>=90%* | 92.68% | 79.02% | 96.00% | 89.73% | 91.56% | 99.63% | 95.00% | 100.00% | 99.25% | 94.70% | 99.00% | 96.40% |
| | c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.). | | 30490 | 5202835 | 43856 | 2162350 | 1036308 | 821940 | 375767 | 7 | 148631 | 132383 | 33155 | 48803 |
| | d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.). | | 28257 | 4111204 | 42078 | 1940243 | 948942 | 818880 | 357667 | 7 | 147514 | 125378 | 32766 | 47051 |
| 10 | **Termination/closure of service** | *<=7days* | 100.00% | 100.00% | 100.00% | 97.46% | 100.00% | 100.00% | NA | NA | 100.00% | 100.00% | 100.00% | NA |

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| S/N | Name of Parameter | Benchmark | Aircel | Airtel | BSNL | Idea | Rcom GSM | Tata GSM | Uninor | Videocon | Vodafone | Rcom CDMA | Tata CDMA | MTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | GSM Operators | | | | | | | | | CDMA Operators | | |
| | a) Total No. of requests for Termination / Closure of service received during the quarter | | 340 | 6090 | 1828 | 315 | 191 | 2502 | NA | NA | 1340 | 692 | 8872 | NA |
| | b) No.of requests for Termination / Closure of service complied within 7 days during the quarter | | 340 | 6090 | 1828 | 307 | 191 | 2502 | NA | NA | 1340 | 692 | 8872 | NA |
| 11 | Time taken for refunds of deposits after closures. | 100% within 60 days | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | NA | NA | 100.00% | 100.00% | 100.00% | NA |

NA: Not Applicable, NR: Not Received

**Parameter-wise Findings (Month Data Assessment):**

The parameter wise key takeouts for the Cellular Mobile Telephone Services providers in Karnataka Service Area are as given below:-

➢ **BTS accumulated downtime (benchmark <=2%):** All operators are meeting the benchmark with values lying between 0.03% and 1.34%.
➢ **Worst affected BTSs due to downtime (benchmark <= 2%):** Except for BSNL with a value of 3.44% rest of all operators are meeting the benchmark with values lying between 0% and 1.06%.
➢ **Call setup success rate (benchmark >= 95%):** All operators are meeting the benchmark with values lying between 98.68% and 99.74%.
➢ **SDCCH/PAGING Channel congestion (benchmark <= 1%):** All operators are meeting the benchmark wit values lying between 0% and 0.23%.
   *Note: CDMA operators have provided the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.*
➢ **TCH congestion (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0% and 1.17%.
➢ **Call drop rate (benchmark <= 2%):** All operators are meeting the benchmark with values lying between 0.01% and 1.68%.
➢ **Cell exceeding 3% TCH drop (benchmark <= 3%):** All the operators are satisfying the benchmark with value in between 0% and 2.74%.
➢ **Connections with good voice quality (benchmark >= 95%):** BSNL, Tata CDMA, are declared that the parameter is not system generated. Rests of the operators are meeting the benchmark with values lying between 98.33% and 99.78%.
➢ **POI Congestion (benchmark <= 0.5%):** All the operators are meeting the benchmark provided by TRAI. There was no congestion found overall on the POI, but Idea case were found where individual POIs are showing high utilization/usage. Some are in the range of over 100% though causing no traffic failure due to overflow technique i.e. the extra traffic is carried over by some other operating POI as has been designed to do so.
➢ **%age of call answered by operator (electronically) (benchmark >95):** All operators are meeting the benchmark with values lying between 96% to 100%.
➢ **%age of call answered by operator (Voice to voice) (benchmark >90%):** Except for Airtel, Idea with a values of 79.02%, 89.73% respectively. Rest of all operators are meeting the benchmark with values lying between 91.56% to 100%.
➢ **Metering and billing credibility-Post paid (benchmark <= 0.1%):** Except for Idea, Rcom GSM, Tata CDMA with a values of 0.15%, 0.1%, 0.49% rest of all the operators are meeting the benchmark.
➢ **Metering and billing credibility-Pre paid (benchmark <= 0.1%):** Except for Rcom GSM with a value of 0.1% rest of all the operators are meeting the benchmark.
➢ **Resolution of billing/ charging complaints (benchmark 100% within 4 weeks):** All the operators are meeting the benchmark.
➢ **Period of applying credit/waiver adjustment to customers:** Except Idea with a value of 99% rest of all the operators are meeting the benchmark.
➢ **Termination/Closure of service (Benchmark <= 7 days):** Except for Idea with a value of 97.46% rest of the all operators have satisfied the benchmark.
➢ **Time taken for refunds of deposits after closures (benchmark 100% within <=60 days):** All operators have satisfied the benchmark.

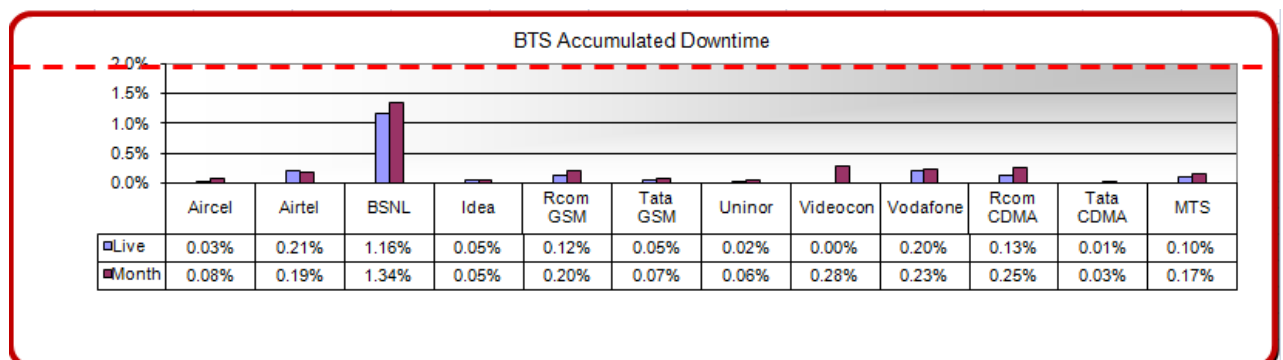**(3) Sample Coverage**

**Switches/BSC/BTS details of operators**:

| Sl. | Name of Service Provider | No. of MSC+GMSC | No. of BSC | No. of BTS |
|---|---|---|---|---|
| | **GSM Operators** | | | |
| 1 | Aircel Ltd | 3 | 20 | 2902 |
| 2 | Airtel Ltd | 57 | 100 | 8821 |
| 3 | BSNL | 12 | 104 | 5177 |
| 4 | Idea | 9 | 46 | 5108 |
| 5 | Reliance Communication (GSM) | 3 | 18 | 3372 |
| 6 | Tata Communications (GSM) | 11 | 32 | 5342 |
| 7 | Uninor | 3 | 14 | 2160 |
| 8 | Videocon | 1 | 2 | 30 |
| 9 | Vodafone | 14 | 100 | 8049 |
| | **CDMA Operators** | | | |
| 10 | MTS (CDMA) | 2 | 5 | 1182 |
| 11 | Reliance Communication (CDMA) | 10 | 6 | 1900 |
| 12 | Tata Communications (CDMA) | 9 | 11 | 954 |

**(4) Performance (Graphical Representation)**

**Comparison between Live measurements and One month data Audit – Cellular Mobile Telephone Services**

A)    NETWORK PERFORMANCE

I.   **BTS accumulated downtime:** All operators are meeting the TRAI benchmarks (<= 2 %) for both one month data and 3 days live data taken in the month of audit.



BTS Accumulated Downtime

| | Aircel | Airtel | BSNL | Idea | Rcom GSM | Tata GSM | Uninor | Videocon | Vodafone | Rcom CDMA | Tata CDMA | MTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Live | 0.03% | 0.21% | 1.16% | 0.05% | 0.12% | 0.05% | 0.02% | 0.00% | 0.20% | 0.13% | 0.01% | 0.10% |
| Month | 0.08% | 0.19% | 1.34% | 0.05% | 0.20% | 0.07% | 0.06% | 0.28% | 0.23% | 0.25% | 0.03% | 0.17% |

**II. Worst affected BTSs due to downtime**: Except for BSNL for Monthly audit data, rest of **all** operators are meeting the TRAI benchmarks (<= 2 %) for both one month data and 3 days live data taken in the month of audit.



Worst affectd BTSs due to Downtime

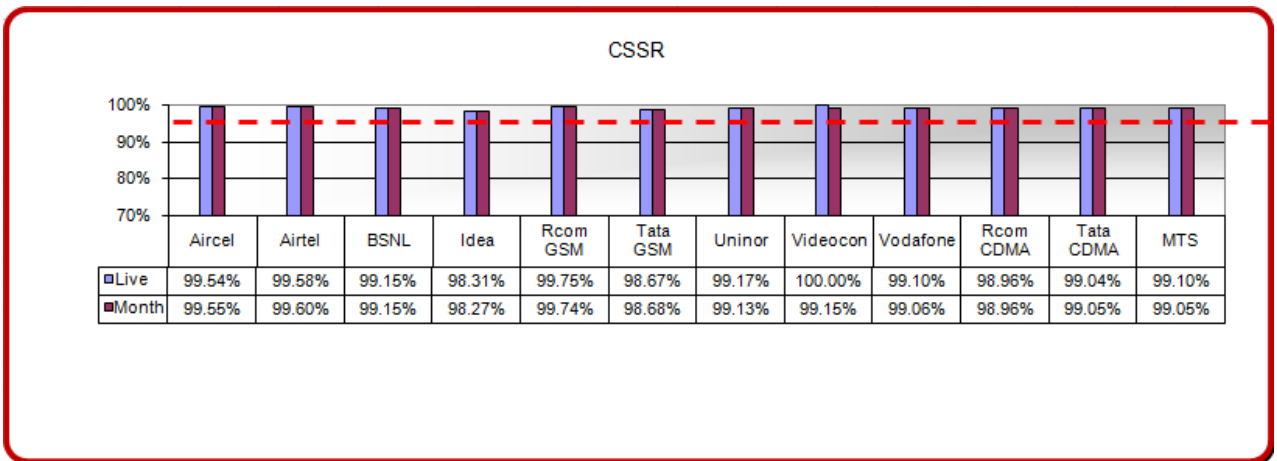| | Aircel | Airtel | BSNL | Idea | Rcom GSM | Tata GSM | Uninor | Videocon | Vodafone | Rcom CDMA | Tata CDMA | MTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Live | 0.00% | 0.00% | 0.22% | 0.02% | 0.00% | 0.00% | 0.00% | 0.00% | 0.04% | 0.00% | 0.00% | 0.00% |
| Month | 0.00% | 0.41% | 3.44% | 0.17% | 0.18% | 0.02% | 0.00% | 0.00% | 1.06% | 0.47% | 0.00% | 0.00% |
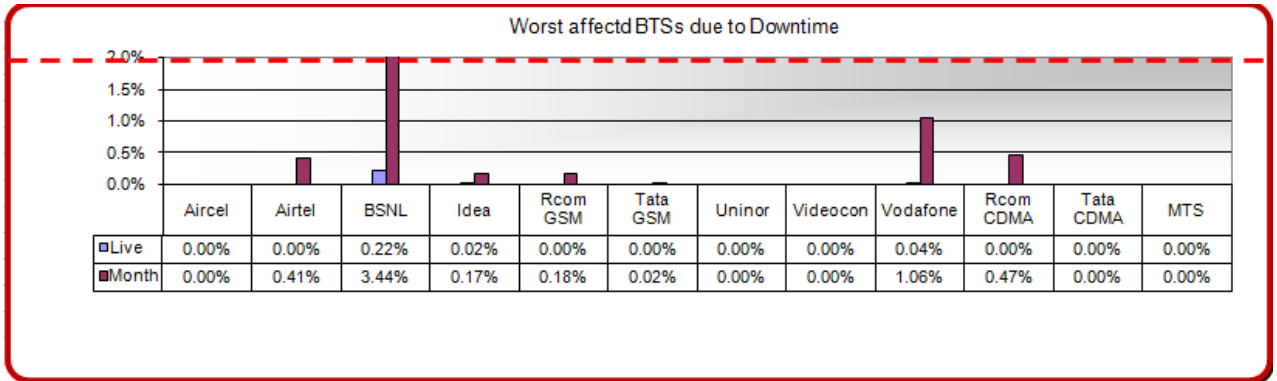
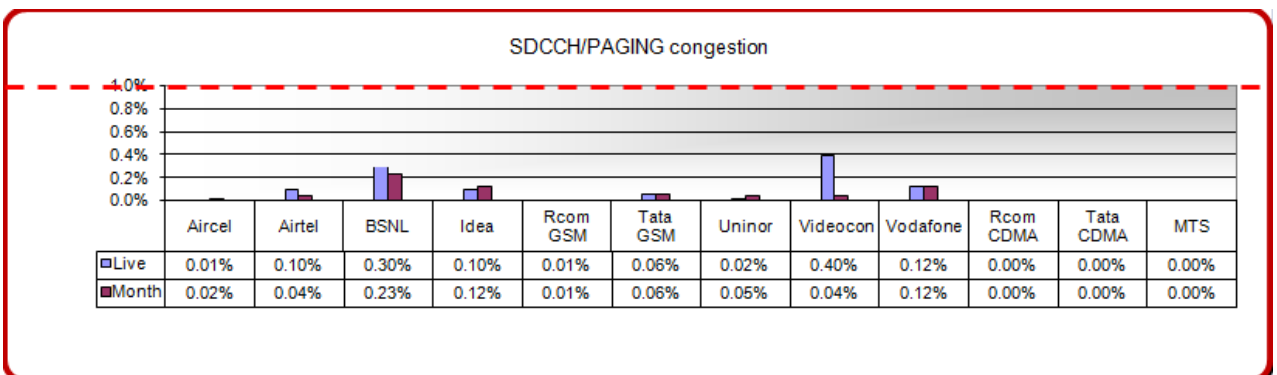**III. Call setup success rate:** All operators are meeting the TRAI benchmarks (>= 95 %) for both one month data and 3 days live data taken in the month of audit.



CSSR

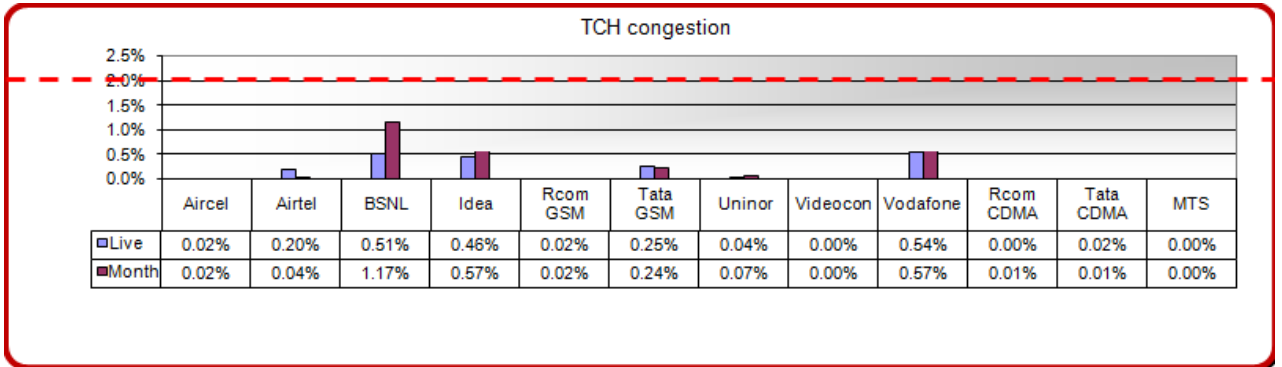| | Aircel | Airtel | BSNL | Idea | Rcom GSM | Tata GSM | Uninor | Videocon | Vodafone | Rcom CDMA | Tata CDMA | MTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Live | 99.54% | 99.58% | 99.15% | 98.31% | 99.75% | 98.67% | 99.17% | 100.00% | 99.10% | 98.96% | 99.04% | 99.10% |
| Month | 99.55% | 99.60% | 99.15% | 98.27% | 99.74% | 98.68% | 99.13% | 99.15% | 99.06% | 98.96% | 99.05% | 99.05% |

**IV. Blocked call rate:**
**SDCCH/Paging congestion (%):** All operators are meeting the TRAI benchmarks (<= 1 %) for both one month data and 3 days live data taken in the month of audit.



SDCCH/PAGING congestion

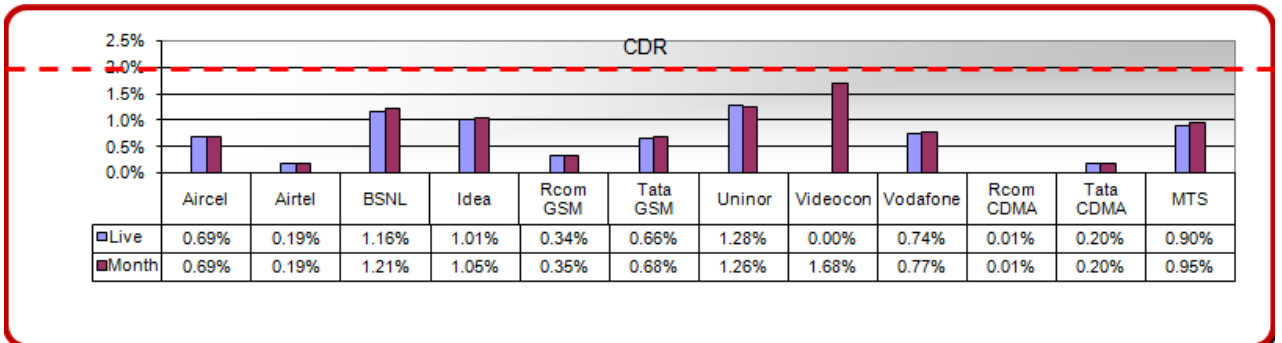| | Aircel | Airtel | BSNL | Idea | Rcom GSM | Tata GSM | Uninor | Videocon | Vodafone | Rcom CDMA | Tata CDMA | MTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Live | 0.01% | 0.10% | 0.30% | 0.10% | 0.01% | 0.06% | 0.02% | 0.40% | 0.12% | 0.00% | 0.00% | 0.00% |
| Month | 0.02% | 0.04% | 0.23% | 0.12% | 0.01% | 0.06% | 0.05% | 0.04% | 0.12% | 0.00% | 0.00% | 0.00% |

**TCH congestion (%):** All operators are meeting the TRAI benchmarks (<= 2%) for both one month data and 3 days live data taken in the month of audit.

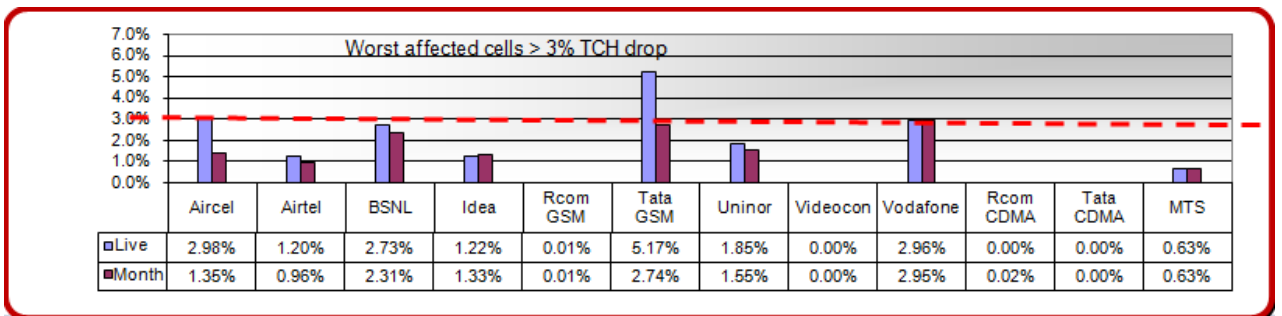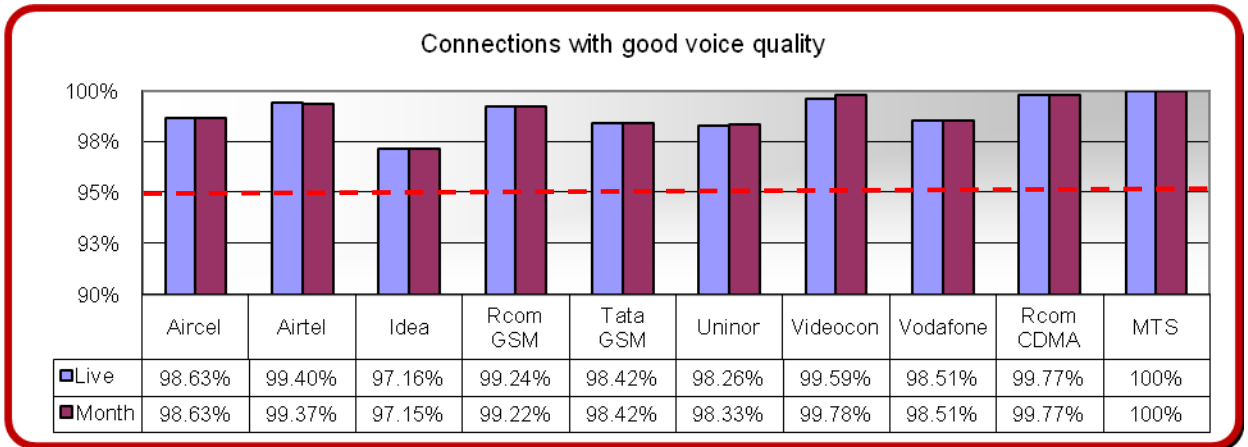| TCH congestion | Aircel | Airtel | BSNL | Idea | Rcom GSM | Tata GSM | Uninor | Videocon | Vodafone | Rcom CDMA | Tata CDMA | MTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Live | 0.02% | 0.20% | 0.51% | 0.46% | 0.02% | 0.25% | 0.04% | 0.00% | 0.54% | 0.00% | 0.02% | 0.00% |
| Month | 0.02% | 0.04% | 1.17% | 0.57% | 0.02% | 0.24% | 0.07% | 0.00% | 0.57% | 0.01% | 0.01% | 0.00% |

## V. Connection Maintainability (Retainability):

**Call drop rate (%):** All operators are meeting the TRAI benchmarks (<=2%) for both one month data and 3 days live data taken in the month of audit.

| CDR | Aircel | Airtel | BSNL | Idea | Rcom GSM | Tata GSM | Uninor | Videocon | Vodafone | Rcom CDMA | Tata CDMA | MTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Live | 0.69% | 0.19% | 1.16% | 1.01% | 0.34% | 0.66% | 1.28% | 0.00% | 0.74% | 0.01% | 0.20% | 0.90% |
| Month | 0.69% | 0.19% | 1.21% | 1.05% | 0.35% | 0.68% | 1.26% | 1.68% | 0.77% | 0.01% | 0.20% | 0.95% |

**Worst affected Cell exceeding 3% TCH Drop:** Tata GSM is not meeting the benchmark for live audit data with a value of 5.17% respectively. Rests of the operators are meeting the benchmark for both cases.
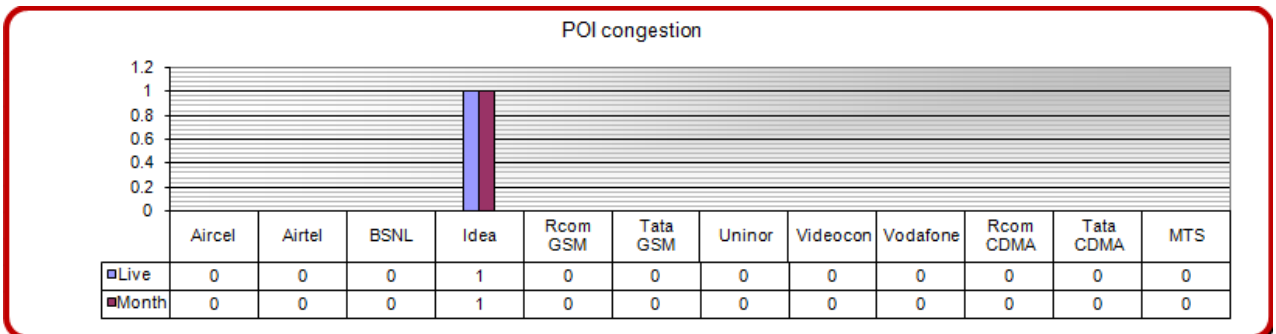
| Worst affected cells > 3% TCH drop | Aircel | Airtel | BSNL | Idea | Rcom GSM | Tata GSM | Uninor | Videocon | Vodafone | Rcom CDMA | Tata CDMA | MTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Live | 2.98% | 1.20% | 2.73% | 1.22% | 0.01% | 5.17% | 1.85% | 0.00% | 2.96% | 0.00% | 0.00% | 0.63% |
| Month | 1.35% | 0.96% | 2.31% | 1.33% | 0.01% | 2.74% | 1.55% | 0.00% | 2.95% | 0.02% | 0.00% | 0.63% |

Audit and Assessment of QoS (Q2-2012): Karnataka Circle

**Percentage of connections with good voice quality (benchmark >= 95%):** All operators are meeting the TRAI benchmarks (=> 95%) for both one month data and 3 days live data taken in the month of audit. Tata CDMA & BSNL has declared that this parameter is not system generated.



**Connections with good voice quality**

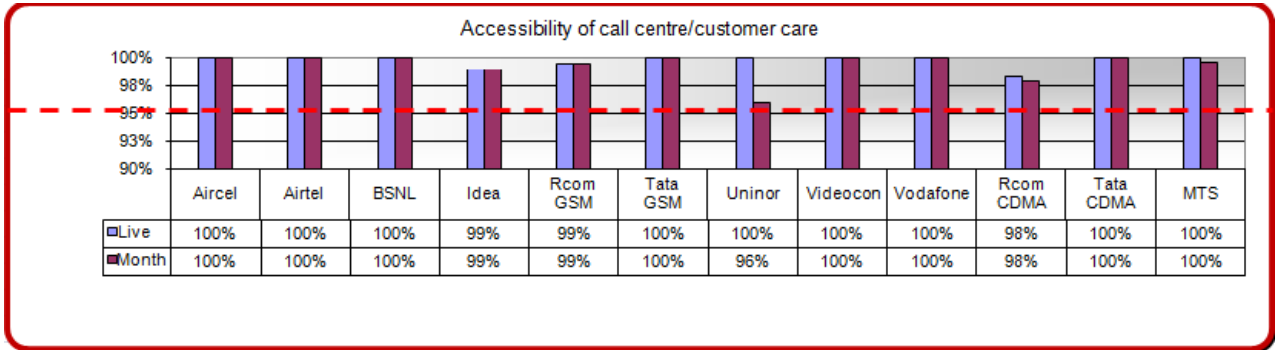| | Aircel | Airtel | Idea | Rcom GSM | Tata GSM | Uninor | Videocon | Vodafone | Rcom CDMA | MTS |
|---|---|---|---|---|---|---|---|---|---|---|
| Live | 98.63% | 99.40% | 97.16% | 99.24% | 98.42% | 98.26% | 99.59% | 98.51% | 99.77% | 100% |
| Month | 98.63% | 99.37% | 97.15% | 99.22% | 98.42% | 98.33% | 99.78% | 98.51% | 99.77% | 100% |

**No. of POI having > 0.5% Congestion:**

In case of Idea there was no congestion found overall on the POI, but cases were found where individual POIs are showing high utilization/usage. Some are in the range of over 100% though causing no traffic failure due to overflow technique i.e. the extra traffic is carried over by some other operating POI as has been designed to do so.
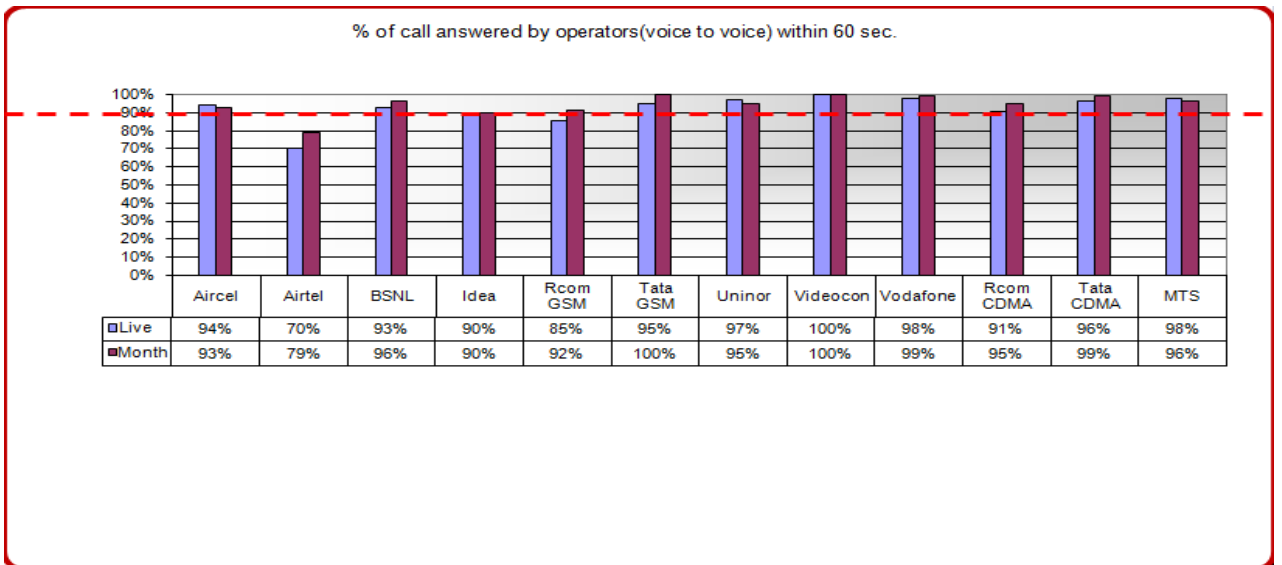


**POI congestion**

| | Aircel | Airtel | BSNL | Idea | Rcom GSM | Tata GSM | Uninor | Videocon | Vodafone | Rcom CDMA | Tata CDMA | MTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Live | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Month | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

B)    CUSTOMER SERVICE QUALITY PARAMETERS

**(I)   Response time to the customer for assistance**:

**Percentage of call answered (Electronically):** All operators are meeting the TRAI benchmarks (>= 95%) for both one month data and 3 days live data taken in the month of audit with a values in between 96% to 100%



**Accessibility of call centre/customer care**

| | Aircel | Airtel | BSNL | Idea | Rcom GSM | Tata GSM | Uninor | Videocon | Vodafone | Rcom CDMA | Tata CDMA | MTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Live | 100% | 100% | 100% | 99% | 99% | 100% | 100% | 100% | 100% | 98% | 100% | 100% |
| Month | 100% | 100% | 100% | 99% | 99% | 100% | 96% | 100% | 100% | 98% | 100% | 100% |

**Percentage of call answered by operators (Voice to voice) within 60 sec:** Airtel is not meeting the benchmark for both live & month audit data similarly Rcom GSM is showing below benchmark for live audit data. Rests of the operators are meeting the benchmark.



**% of call answered by operators(voice to voice) within 60 sec.**

| | Aircel | Airtel | BSNL | Idea | Rcom GSM | Tata GSM | Uninor | Videocon | Vodafone | Rcom CDMA | Tata CDMA | MTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Live | 94% | 70% | 93% | 90% | 85% | 95% | 97% | 100% | 98% | 91% | 96% | 98% |
| Month | 93% | 79% | 96% | 90% | 92% | 100% | 95% | 100% | 99% | 95% | 99% | 96% |

Audit and Assessment of QoS (Q2-2012): Karnataka Circle

**(5). Critical Analysis**

The above comparative study between live data & month data shows similar trends in both the cases. However, inconsistency in live & month data was found for parameters like

- "Worst affected BTSs due to downtime" benchmark is not meeting by BSNL for month audit data.
- "Worst affected cells >3% TCH drop" benchmark is not meeting by Tata GSM.
- "Metering/billing credibility for postpaid" benchmark is not meeting by Idea, Rcom GSM, Tata CDMA.
- "Metering/billing credibility for postpaid" benchmark is not meeting by Rcom GSM.
- "Period of applying credit/waiver to customers" benchmark is not meeting by Idea.
- "%age of calls answered by operator" benchmark is not meeting by Airtel, Idea, Rcom GSM.
- "Termination/ closure of service" benchmark is not meeting by Idea.

## (B) Redressal

### 1. Sample coverage

A sample of billing complaints was taken for each operator and calls were made for assessing the resolution of billing/charging complaints within 4 weeks as claimed by the respective operators.

### 2. Performance (live calling for billing complaints)

| Calling Operator | Aircel | Airtel | BSNL | Idea | Reliance (GSM) | Tata (GSM) | Uninor | Vodafone | Reliance (CDMA) | Tata (CDMA) | Sistema (MTS) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total No. of calls attempted** | 27 | 36 | NR | 21 | 17 | 20 | 15 | 24 | 17 | 14 | 10 |
| **Total No. of calls** | 11 | 14 | NR | 10 | 9 | 10 | 7 | 10 | 7 | 6 | 4 |
| **Cases resolved with 4 weeks** | 11 | 14 | NR | 10 | 9 | 10 | 7 | 10 | 7 | 6 | 4 |
| **%age of cases resolved** | 100% | 100% | NR | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

Note: The difference between call attempts and call answer is because of either Switch off, Number busy, No response or out of reach in the Network.

## 3. Live calling to call centre

| Calling Operator | Aircel | Airtel | BSNL | Idea | Tata GSM | Uninor | Videocon | Vodafone | MTS | Tata CDMA |
|---|---|---|---|---|---|---|---|---|---|---|
| Total No. of Calls Attempted | 100 | 100 | 100 | 100 | 100 | 100 | 2 | 100 | 100 | 100 |
| Total No. of calls connected to IVR | 100 | 100 | 100 | 99 | 100 | 100 | 2 | 100 | 100 | 100 |
| Calls got connected to agent within 60 Sec | 94 | 70 | 93 | 90 | 95 | 97 | 2 | 98 | 98 | 96 |
| %age of calls got answered | 94% | 70% | 93% | 90% | 95% | 97% | 100% | 98% | 98% | 96% |

## 4. Level 1 live calling

| | Emergency no. | No.of Calls | AIRCEL | AIRTEL | BSNL | IDEA | RCOM GSM | TATA GSM | VODAFONE | UNINOR | RCOM CDMA | TATA CDMA | MTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **BANGALORE TOWN** | | | | | | | | | | | | |
| | 100 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | 101 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | 108 (instead of 102 now 108 is available in AP) | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Andhra Pradesh Circle | **HASSAN TOWN** | | | | | | | | | | | | |
| | 100 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | 101 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | 108 (instead of 102 now 108 is available in AP) | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | **RAICHUR TOWN** | | | | | | | | | | | | |
| | 100 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | 101 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | 108 (instead of 102 now 108 is available in AP) | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

## 5. Critical Analysis

Random numbers were selected from the operators' database of billing/metering complaints and calls were made to the customers to get their feedback for complaint redressal. It was found that the operators had made refunds in 100% cases as claimed by their records.

In case of Call centre live calling all operators IVR calls are mostly get connected.

For emergency, Level 1 calling is done in all 3 drive test cities. All the operators are found to be functional in the respective towns.

Audit and Assessment of QoS (Q2-2012): Karnataka Circle

### (C) Inter operator call assessment

#### 1. Sample coverage

A sample of 2x50 test calls per Service Providers with in the licensed service area (Karnataka Circle) were made between 1100 to 1400 hrs and between 1600 to 1900 hrs so that TCBH hours for all the operators were covered.

#### 2. Performance based on live measurement

| Calling Operator | Aircel | Airtel | BSNL | Idea | Reliance (GSM) | Tata (GSM) | Uninor | Videocon | Vodafone | Reliance (CDMA) | Tata (CDMA) | Sistema (MTS) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aircel | - | 99% | 98% | 100% | 99% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Airtel | 100% | - | 100% | 98% | 99% | 100% | 100% | 100% | 100% | 100% | 99% | 100% |
| BSNL | 100% | 99% | - | 99% | 100% | 99% | 96% | 100% | 99% | 100% | 100% | 100% |
| Idea | 100% | 98% | 96% | - | 100% | 99% | 100% | 100% | 97% | 99% | 100% | 100% |
| Reliance (GSM) | 100% | 100% | 99% | 100% | - | 100% | 98% | 100% | 100% | 100% | 100% | 100% |
| Tata (GSM) | 100% | 100% | 99% | 100% | 99% | - | 98% | 100% | 100% | 100% | 99% | 100% |
| Uninor | 100% | 100% | 97% | 98% | 100% | 100% | - | 100% | 100% | 100% | 100% | 100% |
| Videocon | 100% | 100% | 99% | 100% | 99% | 100% | 99% | - | 100% | 99% | 100% | 99% |
| Vodafone | 100% | 100% | 99% | 99% | 100% | 100% | 98% | 100% | - | 100% | 100% | 100% |
| Reliance (CDMA) | 100% | 100% | 99% | 100% | 100% | 96% | 100% | 99% | 100% | - | 100% | 100% |
| Tata (CDMA) | 99% | 100% | 100% | 100% | 100% | 100% | 99% | 100% | 100% | 100% | - | 100% |
| Sistema (MTS) | 100% | 100% | 98% | 99% | 100% | 100% | 100% | 100% | 100% | 99% | 100% | - |

#### 3. Critical Analysis

In the inter-operator call assessment test, calls were made from one operator to other operators so as to check congestion on both the operators' network. In such cases, the radio part, switch part & the POI in-between the operators are involved and hence if any congestion is found in the network, it may be due to any of these parts. The result shows that there is not much congestion on the operator networks.

## (D). Drive test of the mobile network of service providers

### 1.Sample Coverage

The Operator Assisted Drive Test was conducted at Karnataka for all the operators. Route covered was about around 80-100Km depending on city areas within the speed limit of 30Km/hr.

### Drive Test Locations

*BANGALORE*

LOW DENSE:             CNR rao circle, CV Raman road, NH4 pipeline road, Kamakshi palya, Nagarbhavi, Marthalli ring road, Hindustan lever, Azad nagar, Mysore road.

MEDIUM DENSE:         Trinity Circle, Satyam computers, Golf course, Jaymahal, Basavangudi, Yedigur, Kanakpura road, Mekhri circle, Hebbal, Byataranapura, Nehru nagar, Yelahanka, International airport.

HIGH DENSE:           Koramangla, Jaksandra, Agara, Bellandur, Mahadeva nagar, Salem highway, Mahadevapura, Krishnaraja puram, TIN factory, TTK prestiage ltd, KR puram, GEC Alsothom, Madras NH road, Indira nagar, Someshwara temple, Bannerghatta road, Madivala, Sharjapur road.

*HASSAN*

LOW DENSE:             Southern hospital, Srisapathgiri, Mamatha street, Akashavani area.

MEDIUM DENSE:         Malnad college of engineering, Hassan stadium, Govt college park, Race course road, Vijayalakshmi nagar, Seegegudda, Ratna college of engineering, Pension Mohalla, Industrial area

HIGH DENSE:           Shiva Shankar, Sarvamangala nivasa, Jain temple, Ravindra nagar, SVBMED college, Barline mosque, KSRTC bus stand, Govt hospital, Satyamangala, Belur road, Hoysalanagar main road, Hotel aproova, BM road Hassan, Indira nagar, Hemavathi nagar, MG road.

*RAICHUR*

LOW DENSE:             IDSMT layout, Hyderabad road, university area, Medical college ara.

MEDIUM DENSE:         Scab law college, Mantralayam road, Tagore memorial college,Gandi chowk, Maleshwar chowk, Theen khandil .

HIGH DENSE:           SSRG womans college, LHSE, Maavinakere, Osmangunj, Raichur town hall, Geeta mandir, Nijalingappa colony, Mahaveer chowk, Ek minar, Super market, Bus stand area, Railway station road, Govt polytechnic, Jawahar nagar, Vidya nagar I & II phase.
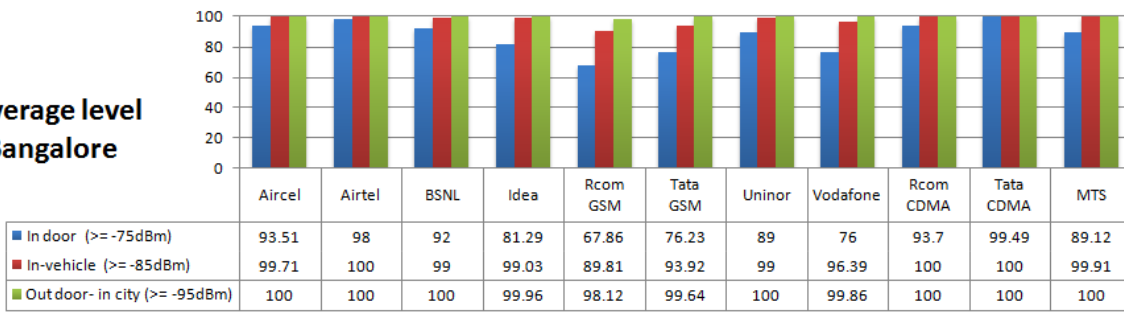
## 2. Performance of Operated assisted Drive test measurements:

| SN | Parameter | City Name | Aircel | Airtel | BSNL | Idea | Rcom GSM | Tata GSM | Uninor | Vodafone | Rcom CDMA | Tata CDMA | MTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | GSM Operators | | | | | | | | CDMA Operators | | |
| 1.1 | Call Attempts | Bangalore | 194 | 172 | 123 | 158 | 175 | 199 | 158 | 169 | 159 | 186 | 251 |
| | | Hassan | 110 | 153 | 112 | 88 | 105 | 92 | 100 | 69 | 187 | 103 | 124 |
| | | Raichur | 109 | 186 | 105 | 110 | 157 | 85 | 87 | 92 | 145 | 133 | 135 |
| 1.2 | Blocked Call Rate (<=3%) | Bangalore | 0.00% | 0.00% | 4.88% | 1.89% | 1.14% | 5.52% | 0.63% | 6.50% | 0.00% | 1.07% | 1.59% |
| | | Hassan | 0.00% | 18.30% | 4.46% | 0.00% | 0.95% | 1.08% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| | | Raichur | 0.92% | 12.90% | 0.00% | 0.90% | 0.63% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| 1.3 | Dropped Call Rate (<=2%) | Bangalore | 0.54% | 0.58% | 6.83% | 1.93% | 0.58% | 1.19% | 1.91% | 2.17% | 0.00% | 0.00% | 0.80% |
| | | Hassan | 0.00% | 0.00% | 0.89% | 1.14% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| | | Raichur | 0.92% | 0.00% | 0.05% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.75% | 0.00% |
| 1.4 | Percentage of connections with good voice quality (=>95%) | | | | | | | | | | | | |
| | (i) 0-4 (w/o frequency hopping) | Bangalore | | | | | | | | | 99.25% | 98.74% | 97.46% |
| | | Hassan | | | | | | | | | 99.82% | 99.95% | 97.65% |
| | | Raichur | | | | | | | | | 98.97% | 99.58% | 99.88% |
| | (ii) 0-5 ( with frequency hopping) | Bangalore | 98.42% | 95.90% | 97.00% | 97.69% | 95.09% | 94.50% | 92.50% | 95.00% | | | |
| | | Hassan | 98.54% | 96.20% | 95.55% | 96.78% | 95.39% | 96.80% | 94.24% | 96.50% | | | |
| | | Raichur | 99.31% | 94.20% | 91.30% | 99.05% | 96.70% | 92.90% | 92.54% | 97.30% | | | |
| 1.5 | Service Coverage | | | | | | | | | | | | |
| | In door (>= -75dBm) | Bangalore | 93.51 | 98 | 92 | 81.29 | 67.86 | 76.23 | 89 | 76 | 93.7 | 99.49 | 89.12 |
| | | Hassan | 77.41 | 98 | 78.29 | 87.53 | 66.95 | 76.49 | 65.32 | 56.47 | 39.15 | 98.36 | 91.21 |
| | | Raichur | 36.38 | 96 | 71.1 | 83.8 | 72.85 | 69.8 | 62.79 | 76.01 | 31.86 | 83.78 | 32.14 |
| | In-vehicle (>= -85dBm) | Bangalore | 99.71 | 100 | 99 | 99.03 | 89.81 | 93.92 | 99 | 96.39 | 100 | 100 | 99.91 |
| | | Hassan | 96.27 | 100 | 96.04 | 99.48 | 87.9 | 97.86 | 91.45 | 92.54 | 82.34 | 100 | 99.52 |
| | | Raichur | 78.7 | 99 | 97.7 | 99.47 | 93.79 | 96.49 | 97.17 | 98.07 | 68.92 | 99.16 | 84.2 |
| | Out door- in city (>= -95dBm) | Bangalore | 100 | 100 | 100 | 99.96 | 98.12 | 99.64 | 100 | 99.86 | 100 | 100 | 100 |
| | | Hassan | 99.9 | 100 | 100 | 99.98 | 98.31 | 99.94 | 99.56 | 99.79 | 99.01 | 100 | 100 |
| | | Raichur | 98.1 | 100 | 100 | 99.98 | 99.33 | 99.96 | 99.97 | 99.97 | 93.5 | 100 | 99.93 |
| 1.6 | Call Setup Success Rate (>=95%) | Bangalore | 99.90 | 99.41 | 95.12 | 98.10 | 97.14 | 84.42 | 99.36 | 81.65 | 100 | 98.92 | 98.40 |
| | | Hassan | 100 | 58.16 | 95.54 | 98.86 | 99.05 | 96.73 | 98 | 100 | 100 | 100 | 100 |
| | | Raichur | 99.08 | 60.21 | 100 | 99.09 | 99.36 | 98.82 | 100 | 95.65 | 100 | 100 | 100 |

**Graphical Representation:**



| | Aircel | Airtel | BSNL | Idea | Rcom GSM | Tata GSM | Uninor | Vodafone | Rcom CDMA | Tata CDMA | MTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| In door (>= -75dBm) | 93.51 | 98 | 92 | 81.29 | 67.86 | 76.23 | 89 | 76 | 93.7 | 99.49 | 89.12 |
| In-vehicle (>= -85dBm) | 99.71 | 100 | 99 | 99.03 | 89.81 | 93.92 | 99 | 96.39 | 100 | 100 | 99.91 |
| Out door- in city (>= -95dBm) | 100 | 100 | 100 | 99.96 | 98.12 | 99.64 | 100 | 99.86 | 100 | 100 | 100 |

Coverage level Bangalore



| | Aircel | Airtel | BSNL | Idea | Rcom GSM | Tata GSM | Uninor | Vodafone | Rcom CDMA | Tata CDMA | MTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| In door (>= -75dBm) | 77.41 | 98 | 78.29 | 87.53 | 66.95 | 76.49 | 65.32 | 56.47 | 39.15 | 98.36 | 91.21 |
| In-vehicle (>= -85dBm) | 96.27 | 100 | 96.04 | 99.48 | 87.9 | 97.86 | 91.45 | 92.54 | 82.34 | 100 | 99.52 |
| Out door- in city (>= -95dBm) | 99.9 | 100 | 100 | 99.98 | 98.31 | 99.94 | 99.56 | 99.79 | 99.01 | 100 | 100 |

Coverage level Hassan



| | Aircel | Airtel | BSNL | Idea | Rcom GSM | Tata GSM | Uninor | Vodafone | Rcom CDMA | Tata CDMA | MTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| In door (>= -75dBm) | 36.38 | 96 | 71.1 | 83.8 | 72.85 | 69.8 | 62.79 | 76.01 | 31.86 | 83.78 | 32.14 |
| In-vehicle (>= -85dBm) | 78.7 | 99 | 97.7 | 99.47 | 93.79 | 96.49 | 97.17 | 98.07 | 68.92 | 99.16 | 84.2 |
| Out door- in city (>= -95dBm) | 98.1 | 100 | 100 | 99.98 | 99.33 | 99.96 | 99.97 | 99.97 | 93.5 | 100 | 99.93 |

Coverage level Raichur

### 3. Critical Analysis

The drive test data was found to be satisfactory for most of the parameters. However, a few deviations found are listed below:

**Observations:**
- In "Blocked Call rate" parameters some operators like BSNL( Bangalore & Hassan) , TTSL(GSM) and Vodafone in Bangalore are not complying the benchmark.
- "Dropped call rate" parameter is not met by BSNL &  Vodafone in Bangalore  city in Karnataka circle.
-  As far as "Percentage of connection with good voice quality" parameter is concerned few operators are deviating from the benchmark in these cities as Airtel , BSNL, TTSL(GSM) & Uninor in Raichur and TTSL(GSM) in Bangalore & Uninor in  Bangalore & Hassan city both.
- For Call Setup Success Rate  TTSL(GSM) and Vodafone are not meeting the benchmark set by TRAI.

**Remarks:---**

As far as Airtel  in Karnataka circle is concerned, it is said that  more Blocked Call in Hassan & Raichur are due to USSD   (Unstructured supplimentry service data) messages, which comes in text messages carrying information regarding prepaid balance delivered after every MOC( mobile originating call) end. If this event happens while new voice call is being attempted by the mobile then answer to paging of incoming USSD is considered as Blocked Call as  shown more in TEMS Investigation Tool, version 13.1 used by Airtel during drive test in these cities. Due to this USSD messages  call setup success rate also shows low value because initiation of call and successfully setup calls are having more gap, so  the actual call attempt and established voice call would remain same and not considered as Blocked Call in this case said by Airtel in reply.

## (E). Independent Drive Test:

The Independent Drive Test was conducted in Karnataka for 5 different Cities namely ***"Bidar, Raichur,Chikmangalur,Dharwad, Madikeri "***. All the service providers city wise radio coverage with call testings were performed individually through drive test activity on different days.  Route covered was about around 90kms for Bidar (Tata GSM), 100kms for Raichur (Vodafone), 50kms for Chikmangalur (Idea), 90kms for Dharwad (BSNL) and 50kms for Madikeri (Aircel) depending on city areas within the speed limit of 30Km/hr.

**Drive Test Locations and Service provider's name:**

1) Bidar          :          TATA GSM
2) Raichur        :          VODAFONE
3) Chikmangalur   :          IDEA
4) Dharwad        :          BSNL
5) Madikeri       :          AIRCEL

**Area Coverage details:**

1) **BIDAR:** Gandhi  Gunj,  Bidar  Istitute  of  Medical  Science,GuruNayak  Dev Engg.College,Old Airport Colony, KSRTC Bus Stand, Railway Station road, Market road, Sangameswara Colony, Akka MahaDevi Colony, Bidar Fort, Nandi Nagar, Allam Prabhu Nagar, Rampura Colony, Dhrga pur, Multani Colony, Talghat, Taloedi.

**2) RAICHUR:** SSRG womans college, LHSE, Maavinakere, Osmangunj, Raichur town hall, Geeta mandir, Nijalingappa colony, Govt polytechnic, Jawahar nagar, Vidya nagar I & II phase, Scab law college, Mantralayam road, Tagore memorial college, IDSMT layout.

**3) CHIKMANGALUR:** Malandur road, Basavanahalli road, kempanahalli road, IG road, MG road, Vijayapura, KM road, Maduvan extension, Jyothi nagar, hornadu road, Engineering college, Kadur road, Mulubanahalli, MM halli, Giradevanahalli, Hiramangalore, Darmastala road, Chickamagalur bus stand, Court area, Mudigeri road, City market.
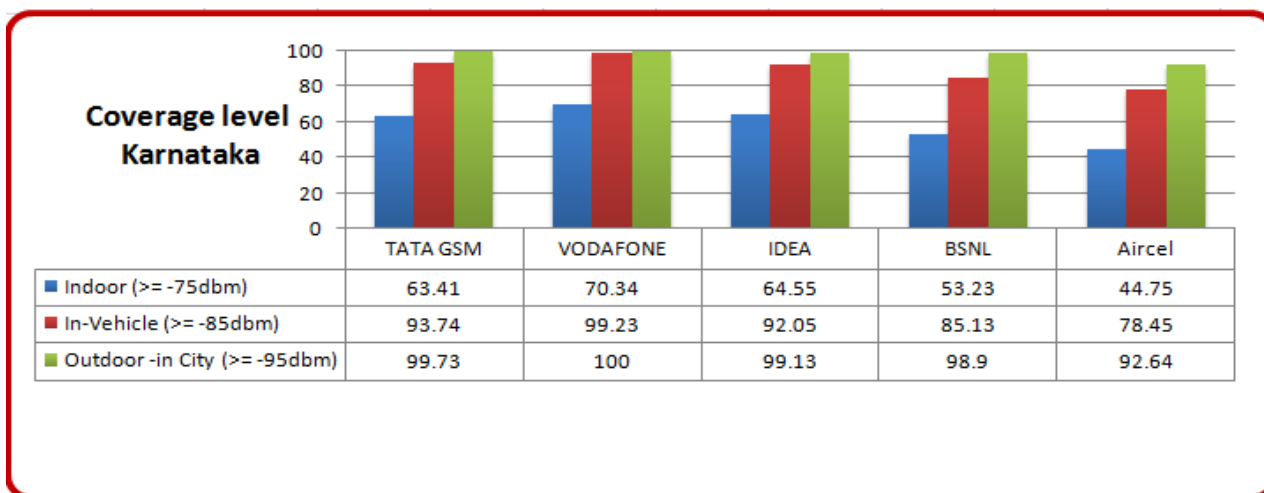
**4) DHARWAD:** New bus tand, Kittur chennamma park, Sadankeri, Dasankoppa, Srinagar, Nirmal nagar, Sapthapur, SDM dental college, Gandhi nagar, Rajathgiri, Tollanka, Narayanapur, Subhash road, CBT market, Mangalwarpet, Dharwad-Saundatti road, Dharwad- Hubli bypass road, Dharwad-Belgaum road, Kelgeri .

**5) MADIKERI:** Dassawal road, GT circle, Chikpet, Mysore road, Raja seat road, Kavli beedi, Ranipet, Convert junction, Mutton market, Mahadevpet, Bus stand, Mangalore road, Gaali bedu road, Habi falls road, Somwarpeta road.

1. *__Performance measurement of Independent drive test  in Karnataka circle__*

| | | TATA GSM | VODAFONE | IDEA | BSNL | Aircel |
|---|---|---|---|---|---|---|
| SN | Parameter | Bidar | Raichur | Chikmagalur | Dharwad | Madikeri |
| 1.1 | Call Attempts | 55 | 124 | 98 | 114 | 50 |
| 1.2 | Block Call Rate (<= 3%) | 3.64% | 2.20% | 0.00% | 2.63% | 6.00% |
| 1.3 | Drop Call Rate (<= 2%) | 0.00% | 0.80% | 0.00% | 0.00% | 0.02% |
| 1.4 | Percentage of Connections with good voice quality (>= 95%) | 94.44% | 97.8% | 96.00% | 96.10% | 95.89% |
| 1.5 | Service Coverage | | | | | |
| | Indoor (>= -75dbm) | 63.41 | 70.34 | 64.55 | 53.23 | 44.75 |
| | In-Vehicle (>= -85dbm) | 93.74 | 99.23 | 92.05 | 85.13 | 78.45 |
| | Outdoor -in City (>= -95dbm) | 99.73 | 100 | 99.13 | 98.9 | 92.64 |
| 1.6 | Call Setup Success Rate (>= 95%) | 99.36 | 95.65 | 100 | 97.37 | 94 |
| 1.7 | Handover Success Rate | 98.46 | 99.31 | 99.14 | 98.09 | 100 |

**Graphical Representation:**



| Coverage level Karnataka | TATA GSM | VODAFONE | IDEA | BSNL | Aircel |
|---|---|---|---|---|---|
| Indoor (>= -75dbm) | 63.41 | 70.34 | 64.55 | 53.23 | 44.75 |
| In-Vehicle (>= -85dbm) | 93.74 | 99.23 | 92.05 | 85.13 | 78.45 |
| Outdoor -in City (>= -95dbm) | 99.73 | 100 | 99.13 | 98.9 | 92.64 |



**Block Call Rate/ Drop Call Rate**

| | TATA GSM | VODAFONE | IDEA | BSNL |
|---|---|---|---|---|
| Block Call Rate (<= 3%) | 3.64% | 2.20% | 0.00% | 2.63% |
| Drop Call Rate (<= 2%) | 0.00% | 0.80% | 0.00% | 0.00% |
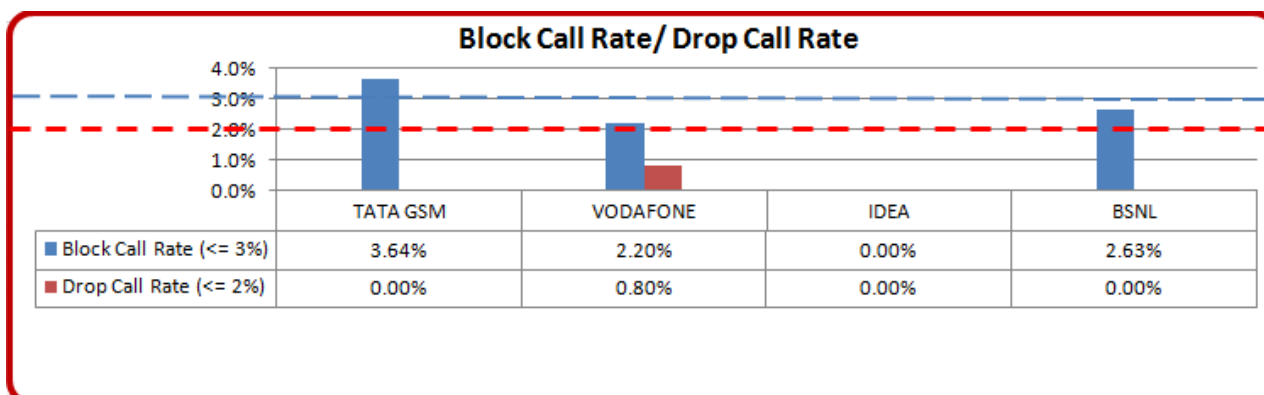
## 2. Critical Analysis

All the operators meeting the benchmark according to the guidelines given by TRAI, the service coverage is also found satisfactory. In the drive test, we considered high preference to railway stations, bus stations, Govt hospitals, crowded areas like market, Highways & major roads with in the town.

| Name of Operator | TATA GSM | VODAFONE | IDEA | BSNL | AIRCEL |
|---|---|---|---|---|---|
| Name of the City | Bidar | Raichur | Chikmagalur | Dharwad | Madikeri |
| **No. of Sites covering the City** | **33** | **41** | **13** | **24** | **4** |

In Bidar town, Tata GSM is not meeting the benchmarks of "Block call rate" and "good voice quality". The Bidar town is covered with 33 no. of BTSs by Tata GSM. The drive test is done with in municipal boundary & when we are moving out from the boundary, the coverage levels are going weak as they don't have any continuity sites.

In Raichur town, the Vodafone is meeting all the benchmarks. The Raichur town is covered with 41 no.of sites by Vodafone.

Idea is meeting all the benchmarks in Chikmangalur town. The drive test is done with in municipal boundary. Idea is covering the chikmangalur town with 13 no.of sites.

While in Dharwad town, BSNL is meeting all the benchmarks provided by TRAI. BSNL is covering the town with 24 no. of sites.

In Madikeri town, Aircel is not meeting the benchmarks for "Block call rate", & "CSSR" parameters. Aircel is covering the Madikeri town with 4 no.of sites.

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In Karnataka circle, all operators are providing the satisfactory coverage levels within the town municipal premises. When we going the outside the boundary, the coverage levels are becoming poor because there is no continuity sites in their respective cities.

## (F). Compliance report (Status of service providers with respect to the QoS)

From live, month, PMR and Drive Tests findings, it can be concluded that on an average, performance of the operators in the service area (Karnataka) is by and large satisfactory for **Network Parameters**. However, the benchmark of "Worst affected BTSs due to downtime" is not met by BSNL, "worst affected cells >3% TCH drop" is not met by Tata GSM.

Under **Customer Service Quality Parameter, "operator answered calls (voice-to-voice) within 60 seconds"** parameter is not meeting by Airtel, Idea, Rcom GSM.

Regarding **Metering/Billing Credibility** issues, Idea, Rcom GSM & Tata CDMA are showing below benchmark values for Post-paid connections.
Similarly, **Metering/Billing Credibility for Pre-paid** connections is not meeting by Rcom GSM.

Regaring **Period of applying credit/waiver adjustments**, Idea is showing below benchmark with a value of 99% respectively.

Regarding **Termination/Closure of Service** issues, Idea is showing below benchmark with a value of 97.46% i.e., beyond 7days.

During **Operated assisted Drive Tests**,
- In "Blocked Call rate" parameters some operators like BSNL( Bangalore & Hassan) , TTSL(GSM) and Vodafone in Bangalore are not complying the benchmark.
- "Dropped call rate" parameter is not met by BSNL & Vodafone in Bangalore city in Karnataka circle.
- As far as "Percentage of connection with good voice quality" parameter is concerned few operators are deviating from the benchmark in these cities as Airtel , BSNL, TTSL(GSM) & Uninor in Raichur and TTSL(GSM) in Bangalore & Uninor in Bangalore & Hassan city both.
- For Call Setup Success Rate TTSL(GSM) and Vodafone are not meeting the benchmark set by TRAI.

 **Remarks:---**
       As far as Airtel in Karnataka circle is concerned, it is said that  more Blocked Call in Hassan & Raichur are due to USSD   (Unstructured supplimentry service data) messages, which comes in text messages carrying information regarding prepaid balance delivered after every MOC( mobile originating call) end. If this event happens while new voice call is being attempted by the mobile then answer to paging of incoming USSD is considered as Blocked Call as  shown more in TEMS Investigation Tool, version 13.1 used by Airtel  during drive test in these cities. Due to this USSD messages  call setup success rate also shows low value because initiation of call and successfully setup calls are having more gap, so  the actual call attempt and established voice call would remain same and not considered as Blocked Call in this case said by Airtel in reply.

Duting **Independent drive tests**, Tata GSM is not meeting the benchmark of "Block Call rate", "Good voice quality".
Aircel is not meeting the benchamarks of "Block Call rate", "Call setup success rate".