



**TELECOM REGULATORY AUTHORITY OF INDIA**

**REPORT**

**ON**

**AUDIT & ASSESSMENT OF QUALITY OF SERVICE**

**OF**

**CELLULAR MOBILE TELEPHONE SERVICES**

**FOR**

**KERALA CIRCLE**

***Report Period: Jan - Mar 2016***

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## **CHAPTER-1: INTRODUCTION**

### **1.0 Objectives of the Audit and Assessment of Quality of service:**

Telecom Regulatory Authority of India has been entrusted important task of laying down the standards to be provided by the service providers and ensuring that the quality of service is provided as per norms; and also TRAI is responsible for conducting the periodical audit of such services provided by the service providers to protect the interest of the consumers of telecommunications service .TRAI engaged Datamation for the Southern Zone(Kerala circle)for the audit and assessment of Quality of Service of service provided for Basic(Wire line) Telephone Services, Broadband and Cellular Mobile Telephone Services by various Operators as per the scope of work detailed in the tender document.

### **2.0. Scope of work to be undertaken:**

The scope of work Audit and Assessment of Quality of Service of a service provider as mandated by TRAI includes:

- a) Preparation of Performance Monitoring reports(PMRs) and up-loading in the system.
- b) Live measurements of the performance of Service Providers(SPs) against the benchmarks for three days during each audit.
- c) Monthly audit based on one month data of the SPs.
- d) Drive test of the RF networks.
- e) Audit of the performance of call centers with respect to the inaccessibility and the percentage of calls answered by the operator standard on customer feedback by calling the customers to get feedback of the services provided by the service providers.
- f) Transfer of data generated by the RF drive test/live measurements/PMR/monthly audit to the server located at TRAI premises on a real time basis.

### **3.0.Quality Parameters to be audited in respect of the Basic (Wire line), Telephone Services, and Mobile Telephone Services:**

**Basic (Wire line Services):** The parameters for Basic Telephone Service (Wire line) consist of various QoS indicators, which can be audited and assessed objectively, and include parameters like fault incidences, call completion rates / answerer to POI congestion and customer service parameters viz. mean time to repair faults, metering and billing credibility(post-paid and pre-paid), resolution of billing/charging complaints, period of applying credit /waiver /adjustment to customer's account, response time to the customer for assistance ,termination/closure of service, time taken for refund of security deposit after closures ;provision of a telephone after registration of demand, shift of the telephone connection, etc. This work was not carried out in the Q2.

**Mobile Telephone Services:** The parameters of Quality of Service for cellular mobile telephone services have been specified under the head (A) Network Service Quality Parameters(B)Customer Service Quality Parameters. The Network Service Quality Parameters include the parameter related to (i) Network Availability (ii) Connection Establishment, (iii) Connection Maintenance (iv) POI Congestion. The Customer Service Quality Parameters include metering and billing credibility (post-paid and pre-paid), resolution of billing/charging complaints, and period of applying credit/waiver/adjustment to customer's account, response time to the customer for assistance, termination / closure of service and time taken for refund of security deposit after closures. The parameters related to the Service coverage are to be audited and monitored during drive test. All of these parameters have been covered in the Q2.

**Cellular Mobile Telephone Service:**

S.N	Name of Parameter	Benchmark	Avg. over a Period
<b>A</b>	<b>Network Service Quality Parameters:</b>		
(i)	Network Availability		
	(a) BTSs Accumulated downtime (not available for service)	$\leq 2\%$	One Month
	(b) Worst affected BTSs due to downtime	$\leq 2\%$	One Month
(ii)	Connection Establishment (Accessibility)		
	(a) Call Set-up Success Rate(within licensee's own network)	$\geq 95\%$	One Month
	(c) SDCCH/ Paging Channel	$\leq 1\%$	One Month
	(c)TCH Congestion	$\leq 2\%$	One Month
(iii)	Connection maintenance (Retain ability)		
	(a) Call Drop Rate	$\leq 2\%$	One Month

	(b)Worst affected cells having more than 3%TCH drop (call drop)rate	$\leq 5\%$ up to 31.03.2011 $\leq 3\%$ From 01.04.2011	One Month
	(c) connections with good voice quality	$\geq 95\%$	One Month
(iv)	Point of Interconnection(POI) Congestion ( on individual	$\leq 0.5\%$	One Month
<b>B</b>	<b>Customer Service Quality Parameters:</b>		
(v)	Metering and billing credibility– post-Paid	Not more than 0.1% of bills issued should be disputed over a billing cycle	One Billing Cycle
(vi)	Metering and billing credibility– pre-paid	Not more than 1 complaint per 1000 customers i.e.0.1% complaints for metering, charging, credit, and validity	One Quarter
vii)	(a)Resolution of billing/charging complaints	100% within 4 weeks	One Quarter
	(b)Period of applying credit/ waiver/ adjustment to customer’s account from the date of resolution of complaints	within 1 week of resolution of complaint	One Quarter
(viii)	Response Time to the customer for assistance		
	(a) Accessibility of call Centre/ customer care	$\geq 95\%$	One Quarter
	(b)Percentage of calls answered by the operators(voice to voice) within 60 seconds	$\geq 90\%$	One Quarter
(ix)	Termination/closure of service	$\leq 7$ days	One Quarter
(x)	Time taken for refund of deposits after closures	100% within 60 days	One Quarter

**(ii) Basic Service (wire line):**

S.N	Name of Parameter	Benchmark	Avg. over a Period
(i)	Fault incidences(No. of faults/100 subscribers/month)	≤5	One Quarter
(ii)	Fault repair by next working day	For urban areas: By next working day:≥90%and within 3 days: 100%. For rural and hilly areas: By next working day:≥90%and Within 5 days:100%. Rent Rebate Faults pending for>3 days and ≤7 days: Rent rebate for 7 days. Faults pending for>7 days and≤15days: Rent rebatefor15 days. Faults pending for>15Days: rent rebate for one month.	One Quarter
(iii)	Mean Time To Repair (MTTR)	≤8Hrs	One Quarter
(iv)	(a) Call Completion Rate within a local network shall be better than	≥55%	One Quarter
	or, (b)Answer to Seizure Ratio (ASR)	≥75%	One Quarter
(v)	Point of Interconnection(POI) Congestion (on individual POI)	≤0.5%	One month
(vi)	Metering and billing credibility–post paid	Not more than 0.1%of bills issued should be disputed over a billing cycle	One Billing Cycle
(vii)	Metering and billing credibility-pre-paid	Not more than 1 complaint per 1000 customers, i.e.,0.1% complaints for metering, charging, credit, and validity	One Quarter
(viii)	Resolution of billing/ charging Complaints	100%within 4 weeks	One Quarter
(ix)	Period of applying credit/ waiver/ adjustment to customer's account from the date of resolution of complaints	within 1 week of resolution of complaint	One Quarter
(x)	Response Time to the customer for assistance		
	(a) Accessibility of call Centre/ customer care	≥95%	One Quarter
	(b)Percentage of calls answered by the operators (voice to voice) within60 seconds	≥ 90%	One Quarter
(xi)	Termination/closure of service	≤7days	One Quarter
(xii)	Time taken for refund of deposits after Closures	100%within 60 days.	One Quarter

### **Detailed Scope of Work implemented & Universe:**

We have been undertaking audit and assessment of Quality of Service provided by every service provider (licensee) in each of the telecom circles/metro service areas under the respective Zone in the following manner:-

- a) In respect of Cellular Mobile Telephone service, all the service areas/circles in each Zone are to be audited in every quarter of the year i.e. a service area will be audited four times in a year.
- b) In respect of Basic service (wire line) and Broadband service , a service area /circle in the contracted Zone is to be audited only once in a year. We undertook the audit work for the Mobile services as follows: -.
- c) Generation of reports at service providers site as part of QOS monitoring reports i.e. quarterly Performance Monitoring Reports (PMRs) and monthly Point of Interconnect (POI) Congestion Reports for Basic and Cellular Mobile Services with reference to the records maintained by the service provider and the system logs for the period. We generated the quarterly PMRs at site and uploaded it on real time basis on the server at TRAI, Delhi.
- d) The PMR report formats and parameters were finalized and any modifications or additions of parameters were undertaken in consultation with TRAI. The scope covered all future PMR parameters as and when defined by TRAI during the duration of the contract. The PMR were generated on monthly basis for the Network Service Quality Parameters of cellular mobile telephone services and on quarterly basis for Customer Service Quality Parameters of cellular mobile telephone services, basic (wire line) services and broadband services as per the parameter specified. The PMRs so generated were up-loaded on the server.
- e) Verification of the performance of service provide against the Quality of Service benchmarks laid down by TRAI using live measurement for three days for the parameters for the services as specified during the month in which the audit and assessment is carried out. The results were uploaded live on the server;
- f) Verification of the performance of service provider against the Quality of Service benchmarks, for the parameters and for the services as specified in clause 1.9, laid down by TRAI using the data for the entire month during which the live measurement as per clause (b) above is carried out; the results were uploaded live on the server;

- g) Drive tests of the mobile networks of service providers; the results were uploaded live on the server.
- h) We carried out an analysis of the drive test and loaded the results giving such in form action and in such format as agreed by TRAI.
- i) Audit of the performance of call centers with respect to the inaccessibility and the percentage of calls answered by the operators, test calling and random customer feed back by calling the customer to get feedback of the services of the service providers weasel so carried out by Datamation. The Automatic Call Distribution (ACD) records were also verified for the calls answered by the operators within 60 seconds.

### **3.1 Sampling Universe:**

The Telecom Licensed Service Areas / Circle for the purpose of audit and assessment are:

**South Zone: KERALA**

The audit and assessment of Quality of Service has been conducted for BSNL, MTNL, private basic Service providers, unified access service providers, cellular mobile service providers and ISPs (providing broadband service) in various service areas for basic telephone service (wire line), cellular mobile telephone service and broadband service. We were required 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 the licensed service area. The updated data in respect of licensees (service providers) who have commissioned service and their subscriber base/Mobile Switching Centre(MSCs)/BTS"/Exchanges/Internet Service Providers Central Nodes (ISP Nodes) is supposed to be be intimated by TRAI from time to time and we carried out the audit and assessment of Quality of Service accordingly thereafter.

The audit and assessment of Quality of Service for all the service providers in a Telecom Circle/Metro Service Area/Licensed Service Area were completed in the same quarterly period.

Generation of performance reports against QOS benchmark

#### **4.0 Coverage, Sampling & Research Methodology for the Southern Zone (KERALA):**

##### **Sample size for cellular mobile services:**

100% Gateway MSCs (GMSC) and Mobile Switching Centre (MSC) of all the Cellular Mobile Service Provider(CMSP) or Unified Access Service Providers(UASP) were covered in specified circles/service area assign respective Zone in each of the quarterly period.

##### **Number of exchanges to be covered for Basic (Wire line) services: (Not covered in this Quarter)**

The break-up of the total number of exchanges of BSNL, MTNL and private basic service operators circle/service area-wise, including urban and rural exchanges, and the number of exchanges, both urban and rural, that shall be covered during the year for audit and assessment of the Quality of Service shall be obtained from TRAI. As per the break-up of a number of exchanges to be covered in a year, 556 urban exchanges and 1508 rural exchanges, totaling 2064 exchanges are proposed to be covered. The exchanges shall evenly be spread over in about 10% of SDCAs to the extent possible with each service provider in specified circles/service areas. A service area/circle in the contracted Zone shall be audited only once in a year.

##### **Number of POPs to be covered for Broadband Services: (Not covered in this Quarter)**

We propose to first visit the ISP Central Node in licensed service area and identify the total number of Point of Presence (POPs) in each service area. Thereafter, the sample for audit and assessment of Point of Presence shall be decided in such a way that minimum 5 % ( five percent) of the Points of Presence of ISP Spread over in 10 % (ten percent) SDCAs in specified service area/telecom circle shall be covered. The POPs are repurposed to be evenly spread over the licensed service area. A service area/circle shall be audited only once in a year.

## **5.0. Procedure adopted for Quality and Assessment of the Services:**

The generation and verification of performance of service providers against QOS benchmarks involved measuring of specified reporting parameters, checking of complete records, analysis of procedure and method utilized by various service providers in measuring the parameters and method averaging for the purpose of reporting. We included critical findings licensee-wise in each *quarterly* report.

### **Audit methods and procedures:**

To measure each quality of service parameter defined by TRAI, the two main sources of data collection identified were:

- Audit of the MIS reports at exchanges (OMC or MSCs) or ISP Node of the service provider.
- Primary data collection and check back calls (live observations done during the visits)

The audit was conducted in each center of study to generate various types of data. Thus, for data collection, following activities were undertaken during the appraisal exercise.

### **Collection of MIS data of OMC or MSC or ISP Node:**

Forth is TRAI has suggested to the service providers to maintain the QoS source data in a proper format. From the source data, we generated the quarterly/monthly performance monitoring reports (PMR). Methodology adopted was checked against instructions and standards to see if the measurement sad here to specifications.

## **6.0.Live Measurements and Live Data Collation:**

During the audit and assessment, following activities were undertaken for live measurements and live data collection.

### **a) Audit and Assessment of complaint redresses and provisioning of new broadband Connections:**

Telephonic interviews are proposed to be conducted among a sample of subscribers of telephone–

- In basic service (wire-line) for those customers who reported a fault complaint, billing dispute
- In case of Mobile operators, who have had are sent billing dispute
- In case of Broadband service for those who requested for a new connection reported a fault complaint, billing dispute, complaint of Broadband connection speed (download).

#### **Data shall be obtained on:**

- Occurrence of fault complaints
- Clearance of fault within stipulated time
- Incidence of billing disputes
- Clearance of billing complaints within stipulated time
- Attendance to requests for closure/ termination of service

**Sampling Procedure & quality control:** order to get a correct and meaningful result from audacities important to ensure that the right sampling procedure is followed. Equally important is the process of ensuring that quality control parameters are put in place. Care shall be taken to distribute the sample to obtain random list. The distribution of sample sizes shall be evenly distributed. The sampling procedure for various activities to be carried is given below:

#### **Sample for telephonic interview for billing complaints:**

The sample size for telephonic interview of billing complaints in each audits hall be 100subscribersor the total number of complaints, whichever is less per service provider for each service in a licensed service area. All the complaints booked shall be treated as the total population for selection of samples.

#### **Sample for telephonic interview for new connection for Broadband Service:**

The sampling frame shall be for Point of Presence/ISPNo de of Broadband Service Provider. Here, the total sample size(10%oftheapplicantsinthepreviousmonthor100whicheverislessforevery service provider) has been randomly selected from the records/registers to make check back calls.

**Sample for telephonic interview for service complaints/ requests:**

The operator is required to provide the detail of the service complaints/requests for the month previous to the audit month for Cellular Mobile Telephone Services, Basic (wire line) Services and Broadband Services. For broadband services, complaints related to down load speed are proposed to covered. From the list of these complaints/requests(10% or100 per service provider per license service area, whichever is less)sample has been drawn randomly to make check back calls.Anoticeofminimum3(three)weeks was provided to the service provider by us for arranging and supplying the data required for audit of exchanges ,ISP nodes and MSCs to be covered.

**b) Audit and Assessment of Call Centre / customer care promptness and live measurement through the set calls:**

Test calls were made to assess the availability and efficiency ofLevel1servicesandcomplaintcentre accessibility. The telephone /SIM Cards/Instruments for testing purposes were provided by the concerned service provider(s) in whose network the audit and assessment of Quality of Service is carried out. The details regarding test calls are:

**(a) Testing of Level 1Services:**

Level1Services include police, fire, ambulance (Emergency services)in the case of both Mobile service providers and basic telephone service providers. Test calls were made from all the levels working in a particular SDCA visited .Again, the total sample sizes (150perlicenseservice are apes service per quarter) were equally distributed among the different SDCAs visited, and the distribution among the active levels is in proportion to the capacity of each level in that SDCA.

**(b) Inter-operator call assessment:**

Internetwork calls me. e. calls made from one operator to another within the same license was made to judge the ease of connectivity amongst the operators.

A sample of 2X50 test calls per service provider within the licensed service area was made at different point of time to the free test numbers of another service provider (50 calls between 1000 to1300 Hrs and50 calls between1500 to1700 hrs for basic service and between1100 to1400 hrs and between 1600 to1900 hrs) for cellular mobile service. The results of these calls were compiled and reported separately for each service provider service area-wise.

The telephone/SIM Cards/Instruments for testing purposes were provided by the concerned service provider(s)in who see network the audit and assessment of Quality of Service is carried out.

**(c) Testing of Complaint Centre Accessibility and response time:**

**(i) Basic Telephone Service (wire line) and Cellular Mobile Telephone Service:**

We measured the performance of both basic telephone service (wire line) & cellular mobile services against the benchmarks of the following Quality of Service parameters:-

Response time to the customer for assistance:

(a) Accessibility of call center /customer care  $\geq 95\%$

(b) % age of calls answered by the operator (voice to voice): Within 60 seconds = 90%

The procedure for assessment of the performance in respect to of above parameters was made using the traffic data at the point of termination to call Centre from mobile/basic telephone network. Traffic at the candor trunk or gateway MSC outgoing circuits to IVR of call center was measured as per the traffic counter available in the respective switch to assess the accessibility of call Centre.

In the case of parameter % of call answered by the operator voice to voice, assessment of IVR traffic data and CRM traffic data was analyzed during the time consistent busy hour (TCBH) of call center. In addition, we also made the test calls and correlated the results with the traffic data analysis.

The procedure (IVR menu and sub-menu) and ease of accessing the operator within the benchmark aid down by TRAI, both post-paid and pre-paid customers were assessed and reported. In this regard para 3.11.4 of the Explanatory Memorandum to the Standards of Quality of Service of Basic Telephone Service (Wire line) and Cellular Mobile Telephone Service Regulations, 2009 and provisions of the Telecom Consumers Complaint Redressal Regulations, 2012 will be followed.

**Measurement:**

A sample of 2X 50 calls per service provider is proposed to be made at different point of time to the call center of each service provider from each licensed service area (50 calls between 1000 to 1300 Hrs. and 50 calls between 1500 to 1700 hrs.) for basic telephone service (wire line) and similarly, 2X 50 calls to the call center of each service provider (50 calls between 1100 to 1400 hrs. and 50 calls between 1600 to 1900 hrs.)

for cellular mobile telephone service from each licensed service area to ensure statistical significance.

The time to connect to IVR shall be noted for all these calls. This is the wait time before an automatic answer machine (IVR) message begins. We then propose to measure the gap between the time when the last digit of the number is dialed and the time when the IVR message begins. Similarly the wait time before each Call Centre agent responds to a test call shall be measured for all such test calls.

### **Verification and audit of records:**

We propose to verify and audit the following records in respect of Basic Telephone Service (wire

line):

- Call Centre records for complaints

- FRS details for fault complaints, fault repair and MTTR (Mean Time to

- Repair)
- Commercial records for billing details, billing disputes and redress or

- thereof
- Past traffic reports at local and TAX(Trunk Automatic exchanges) for

- Call

- Completion Rate/*Answer to Seizure Ratio* calculations

- Checking of customer complaint handling through live test at the call center

- 100 Nos. of service complaints /requests and 100Nos.of billing related complaints shall be taken up by the auditing agency for verifying their reprisal as per the record of the service provider.

**We verified and audited the following records in respect of Cellular Mobile Telephone Service:**

- Call Centre records for complaints
- Network maintenance and planning department (OMC and Drive Test) records for QOS parameters
- System/Network outage details, Call Set-up Success Rate, Blocked Call Rate, Call Drop Rate, worst affected cells having more than 3 % TCH drop rate ,Voice Quality ,Service Coverage and POI congestion
- Commercial and customer care records for billing disputes, reprisal and refunds of payment
- Checking of customer complaint handling through live test at the call centre
- 100 Nos. of service complaints/requests and 100Nos.of billing related complaints w a s taken up by the auditing Agency for verifying their redressal as per the record of the service provider.

**We propose to verify &audit records maintained by Broadband service providers relating to:**

- Call Centre records for complaints
  - FRS details for fault complaints, fault repair
  - Records for requests for new connection, and supplementary services
  - Commercial records for billing details, billing disputes and redressed there of
  - Checking of customer complaint handling through live test at the call center
  - Service complaints/request sand billing related complaints hall be taken up by the auditing agency for verifying their redresser as per the record of the service provider.
- 
- bandwidth Utilization/Throughput
  - Broadband connection speed
  - Service Availability/Uptime
  - Packet Loss and Latency measurements

Network performance parameters like Bandwidth Utilization/Through put including Broadband Connection Speed, Packet Loss and Latency shall be measured on sample basis.

The detailed methodology for each Quality of Service parameters given in the Explanatory Memorandum to the Quality of Service of Broadband Service Regulations, 2006 dated 6th 2006(11of2006) was followed. The signature of the Nodal Officer nominated by the service provider for coordination with the audit agency was taken on all the formats containing the verified data for all the parameters

We shall take live measurements and collection of one month data or audit by actual visit to such NOC, OMC, call center and billing Centre.

**Procedure followed for cellular mobile telephone service data generation ,verification and audit**

S.N	Parameter	Procedure
i)	Network availability (a)BTS accumulated down time (b)Worst affected BTSs due to down time	The fault Alarm tracking details a the OMC(MSC) for the network outages(due to own network elements and infrastructure service provider end outages) were verified for arriving at the figures reported to T RAI.
ii)	Call Set-up Success Rate	The cell wise data generated through counters/MMC available in the switch for traffic measurements were verified.
iii)	Blocked Call Rate	Both for SDCCH and TCH congestions the data in MSCs was verified and compared with the data report end to TRAI in the Quarterly PMRs.
iv)	Call Drop Rate	This parameter was measured by the system generated (defined counters are available in the system for traffic measurement)cell wise dropped call data and total calls established figures to arrive at the authenticity and accuracy of the benchmark reported to TRAI.
v)	%Connections with good voice quality	This parameter was measured from the system generated dataonascalefrom0to7forGSMandFERvaluefor CDMA technology. We also collected the relevant city wise drive log files for all drive tests conducted to verify the parameter.



vi)	Service coverage	We also collected the relevant city wise drive log files for all drive tests conducted to verify the parameter.
vii)	POI Congestion	The traffic data generated through Gateway MSCs (GMSCs) and reported to TRAI in POI congestion reports were verified
vii)	Metering and Billing Credibility	We audited the billing complaints details on complaints received during the quarter and used for arriving at the figures reported to TRAI.
ix)	%of Billing Complaints resolved	Audit of billing complaints resolved and the total complaints received were carried out to check the figures reported to TRAI. At the same time, we also conducted random live back checks of complaints.
x)	Period of applying credit/waiver/adjustment To customers account from the date of the resolution	We checked the billing complaints for which credit/waiver/adjustment was made on the resolution of the complaints within one week.
xi)	Termination/closure of service	The data were verified for termination/closure of the services within 7 days from the date of request.
xii)	Time taken for refund of deposits after closure	We verified that 100% deposits should be refunded within 60 days. At the same time, we also conducted a random live back check so all such subscribers entitled for a refund.

## **Drive Tests:**

In the case of Cellular Mobile Service, the exercise of QoS assessment shall not be limited to generation, verification and audit of data, but we shall also verify the parameters by conducting extensive drive test in all service areas, as per the details given below, to assess the network performance.

The reared two types of drive tests that were conducted. One is operator assisted drive test and the other is independent drive tests. The details of these drive tests are given below:

**Operator Assisted Drive Tests:** The primary aims of these drive tests is to cross-check/validate the data on Quality of Service being provided by the telecom service providers to TRAI. These drive tests were conducted in such a manner so as to enable identification of network element deficiencies and initiation of improvements. The operator assistance was desired to ensure a greater audit transparency.

In each licensed service area drive test in three cities, having high population, medium population and low population, were conducted every month for each service provider covering a minimum distance of 100 kilometers in city area and adjoining areas including important indoor sites. These cities were proposed and finalized by TRAI. The results of analysis of data generated during such drive tests were uploaded, immediately on completion of the drive test, to the central server at TRAI.

**Independent Drive Tests:** We shall do independent drive tests in Q2 spread across the contracted zone limited to a Maximum of 10 drive tests per licensed service area, in a year. The location for these drive test was selected based on the subscriber complaints being received by TRAI or as decided by TRAI. Independent drive test covered a city and adjoining areas covering a minimum distance of 100 kilometers including congested areas and important indoor sites. The results of analysis of data generated during such drive tests will be uploaded, immediately on completion of the drive test, to the central server at TRAI.

### **Drive Test Methodology:**

For drive test following procedure was adopted:

- i. We obtained a coverage map from the service provider before starting the drive test and studied the coverage detail in terms of the signal strength .Based on the signal strength as depicted in the coverage map, the drive test was done to check the following parameters:
  - a. Coverage-Signal strength
  - b. Voice quality
  - c. Call setup success rate
  - d. Blocked calls e. Call drop rate
- ii. The drive test covered selected cities and adjoining towns/rural areas where the service provider has commenced service, including congested areas and indoor sites.
- iii. The drive test covered their outers including expressways, major and secondary roads/streets, Commercial, residential areas/Commercials estates to check the in-building network performance.
- iv. The drive tests of each mobile network were conducted between 10 am and 8 pm on weekdays.
- v. The Vehicle used in the drive tests was equipped with the test tool that automatically generates calls on the mobile telephone networks.
- vi. The speed of the vehicle was kept at around 30-50km/hour (around 30km/hr in case of geographically small cities)
- vii. The holding period of each test call was 120 seconds.
- viii. A test call was generated 10 seconds after the previous test call is completed.
- ix. Measurement using engineering handsets was not done
- x. The dedicated originating and terminating mobile units antenna was placed at the same height and in the same vehicle. Moreover, the height of the antenna was uniform in case of all service providers.

## 7.0. Reporting Formats:

We developed data formats including executive summary, critical findings and detailed data analysis the re off or reporting the results of such audit and assessment. We submitted to TRAI sample design and sample reporting formats within 4 weeks of signing of the agreement. All these reports were enabled as online reports with sufficient flexibility of querying against various parameters.

### 6.1 Deliverables:

**Quarterly Reports:** We re-submitting quarterly reports in the formats approved by TRAI for the purpose. Five copies of such report during the quarterly period were submitted to TRAI within the time period given in the delivery schedule.

The report also contained the Audit results of service areas including executive summary, critical findings and comparison of performance of the service providers on various qualities of service parameters for which Audit work was undertaken during the *quarter*.

Reports were submitted for approval within one month of the completion of each *quarter* for audit and assessment of QoS parameters for basic service, cellular mobile service and broadband service. The report contained the finding so an audit and assessment of QOS provided by service providers carried out in accordance with Clause 2 above. The report contained a performance of each service provider for each licensed service area against the Quality of Service parameters. The report also contained a comparative analysis of the performance of all the service providers in a licensed service area. The report also contained an Executive Summary and critical finding along with detailed analysis.

A separate report shall also be submitted for each company/group of companies at the end of the year. The report contained an Executive Summary and critical finding along with detailed analysis to share with the service provider and take further follow-up action.

### 7.0. Work Plan and Delivery Schedule:

S. No.	Deliverable	Period
	Date of award of work as per the contract says (D)	
1.	Submission of all sample design and reporting formats by the Audit Agency	D+4 weeks
2.	Submission of final design and reporting formats by the Audit agency In cooperating modifications and corrections suggested by TRAI and its	D+8 weeks
3.	Comment cement of audit and assessment of Quality of Service	Beginning of–the quarter following date of award of work(D) or any subsequent quarter, as decided by TRAI
4.	Submission of first quarterly report	One month from the end of the first quarter
5.	Submission of second quarterly report	One month from the end of the second quarter
6.	Submission of third quarterly report	One month from the end of the third quarter
7.	Submission of fourth quarterly report	One month from the end of the fourth quarter
8.	Commencement of audit and assessment of Quality of Service for the first quarter for the extended period	From the end of the fourth quarter or any later period as decided by TRAI
9.	Submission off first quarterly report for the extended period, if any	One month from the end of the first Quarter of extended period
10.	Submission of second quarterly report for the extended period ,if any	One month from the end of the second Quarter of extended period
11.	Submission of third quarterly report for the extended period, if any	One month from the end of the third Quarter of extended period
12.	Submission of fourth quarterly report for the extended period ,if any	One month from the end of the fourth Quarter of extended period

## **CHAPTER-2: EXECUTIVE SUMMARY**

### **2.1.Preface**

This report presents the growth trends for the telecom services in India for the quarter ending Dec.2015. This report provides a broad perspective on the Telecom Services to serve as a reference document for various stakeholders, research agencies and analysts. Under the Unified Access Service (UAS) Regime, the details of subscriber base under wireless services, both GSM & CDMA technologies have been combined.

This report highlights the findings for the audit & assessment of Quality of Service of Cellular Mobile Services, Wire line Services & Broadband Services in **South Circle()** in 2nd Quarter (Jan-Mar'16). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken during the period (Jan-Mar'16)..

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

S.I.	Name of Service Provider	Month of Audit	TCBH Hour
<b>GSM Operators</b>			
1	Aircel Ltd	Jan-Mar.'16	1900-2000 Hrs
2	Airtel Ltd	Jan-Mar.'16	1900-2000 Hrs
3	BSNL	Jan-Mar.'16	1900-2000 Hrs
4	Idea	Jan-Mar.'16	1900-2000 Hrs
5	Reliance Communication (GSM)	Jan-Mar.'16	1900-2000 Hrs
6	Tata Communications (GSM)	Jan-Mar.'16	1900-2000 Hrs
7	Vodafone	Jan-Mar.'16	1900-2000 Hrs
<b>CDMA Operators</b>			
8	MTS	Jan-Mar.'16	1900-2000 Hrs
9	Reliance Communication (CDMA)	Jan-Mar.'16	1900-2000 Hrs
10	Tata Communications (CDMA)	Jan-Mar.'16	1900-2000 Hrs

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

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.

➤ **As per PMR Data Verification Results for-**

- **KERALA Circle (JAN'16)** - From the month Data Assessment, it is found all the operator are meeting the bench mark except Tata cdma in worst affected cells having more than 3% TCH drop (call drop) rate
- **KERALA Circle (FEB.'16):** From the month Data Assessment, it is found all the operator are meeting the bench mark
- **KERALA Circle (MAR.')**: From the month Data Assessment, it is found all the operator are meeting the bench mark
- **KERALA Circle(JAN-MAR.'16):-** From the month Data Assessment, it is found all the operator are meeting the bench mark

➤ **As per 3 Days Live Test Audit Report (2<sup>ND</sup> Quarter), Circle:-**

Verification of the Performance of Service Providers against the Quality of Service benchmarks laid down by TRAI using Live measurements for 3 days during the month in which the Audit and Assessment is carried out.

- Aircel 2g not meeting the benchmark for **worst affected cells having more than 3% TCH drop (call drop) rate** for Day1 .



➤ **As per Operator Assisted Drive Test:**

The Operator Assisted Drive Test was conducted for all the Operators. Route covered was about 100 Km depending on city areas within the speed limit of 30-40 km/hour. In all the cities Zones were selected for covering different density areas (High/Medium/Low)

**circle:**

- Aircel not participated in Drive Test audit.  
Aircel not participated in all the 3 SSA Drive Tests & given the justification mail to the Nodal Officer.
- All operators achieved KPI threshold for Blocked Call Rate ( $\leq 3\%$ ) Rcom NOT MEETING THE BENCH MARK .
- All operators achieved KPI threshold for Dropped Call benchmark.
- All operators achieved KPI threshold benchmark for the Voice Quality parameter (0-5 (with frequency hopping)).
- All operators achieved KPI threshold benchmark for Call Setup Success Rate ( $\geq 95\%$ ).AIRCEL NOT MEETING THE BENCH MARK .

➤ **Level 1 Live Calling (Emergency No.) Q2**

Level 1 calling such as calling at emergency no. like Police, Fire, and Ambulance etc.were made so as to check the service of such short codes. In different cities of it was found to be functional.

➤ **Performance(live calling for billing complaints):**

We have made live calling to customers as per their complaints details and we verified their complaint and we found that most of the complaints are resolved within the time line and all the operators are meeting the TRAI benchmarks.

**Live calling to call center:-**

In live calling to call centers, we found that all the operators are meeting their benchmark.

➤ **Inter Operator Call Assessment**

In the inter-operator call assessment test, calls were made from one operator to other operator so as to check congestion on both the operators' network. In such cases, the radio part, switch part and the POI in between the operators are involved and hence if any congestion is found in the network, it feb be due to any of these parts. The result shows that there is not much congestion on the operator network; however the congestion was shown with all the operators BSNL, Vodafone, Airtel, Rcom, Tata, Idea, Aircel and MTS service provider.

➤ **CUSTOMER SERVICE QUALITY PARAMETERS**

❖ **2<sup>nd</sup> Quarter data Assessment (Jan-Mar.'16)**

- According to the parameter metering/billing credibility post-paid in the table **3.7.1** we found that all the service providers are meeting the benchmark.
- According to the parameter metering /billing credibility pre-paid in the table **3.7.1** we found that all the service providers are meeting the benchmark.
- According to the parameter Resolution of billing/ charging complaints in the table **3.7.1** we found that all the service providers are meeting the benchmark.
- According to the parameter Period of applying credit/waiver/adjustment to the customer's account from the date of resolutions of complaints in the table **3.7.1** we found that all the service providers are meeting the benchmark.
- According to the parameter Accessibility of call centre/Customer Care in the table **3.7.1** we found that all the service providers are meeting the benchmark.
- According to the parameter % call answered by operators (voice to voice) within 60 sec in the table **3.7.1** all the service providers are meeting the benchmark
- According to the parameter no. of requests for Termination / Closure of service complied within 7 days during the quarter in the table **3.7.1** we found that all the service providers are meeting the benchmark.

According to the parameter Time taken for refunds of deposits after closures in the table 3.7.1 we found that all operators meeting the benchmark.

## CHAPTER-3:AUDIT -PMR DATA VERIFICATION RESULTS

### 3.0 Cellular, Mobile Telephone Service

#### 3.1 PMR Data Verification Results

##### 3.1.1 KERALA Circle (Jan'16):

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.

January month PMR Generation Data		Bench- mark	Audit Period	Aircel	TATA 3G	AIRTEL 2G	Idea 3G	BSNL	IDEA	Reliance 2G	TATA	Vodafone	Reliance	MTS	TATA
S/N	Name of Parameter			2G				GSM Operators					CDMA		
<b>Network Service Quality Parameter</b>															
<b>Network Availability</b>															
1	a) BTS Accumulated Downtime	<=2%	One Month	0.12	0.02	0.75%	0.06	0.24%	0.05%	0.2	0.05	0.03%	0.03	0.01%	0.04%
	b) Worst affected BTSs due to downtime	<=2%	One Month	0	0.00	0.86%	0.02	0.09%	0.09%	0.64	0.00%	0.02%	0	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>															
2	a) CSSR (Call Setup Success Rate)	>=95%	One Month	99.53%	98.58	98.00%	99.52	99.75%	99.81%	96.63	98.89%	99.82%	98.36	99.53%	98.79%
	b) SDCCH/PAGING Channel congestion	<=1%	One Month	0.08%	0.34	0.38%	0.62	0.22%	0.44%	0.07	0.04%	0.39%	0	0.00%	0.00%
	c) TCH congestion	<=2%	One Month	0.04%	0.53	1.24%	0.24	1.25%	0.97%	0.28	0.05%	0.18%	0.83	0.00%	0.06%
<b>Connection maintenance (Retainability)</b>															
3	a) CDR (Call Drop Rate)	<=2%	One Month	0.47%	0.28	0.92%	0.28	0.56%	0.56%	0.05	0.45%	0.39%	0.09	0.13%	0.30%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	One Month	2.83%	1.52	2.48%	1.03	1.17%	1.82%	0.49	2.48%	1.23%	0.79	1.52%	3.60%
	c) Connections with good voice quality	>=95%	One Month	97.32%	99.76	97.84%	97.66	99.94%	95.67%	99.52	98.82%	97.89%	99.25	99.20%	99.15%
4	No. of POI's having >=0.5% POI congestion	<=0.5%	One Month	0.00%	0.00	0.00%	0	0.55%	0.00%	0.00%	0.00%	0.11%	0	0.00%	0.00%

### Finding & Critical Analysis:

From the month data assessment, it is found that all the operators are meeting the network parameters except TATA CDMA for worst affected cells having more than 3% TCH drop (call drop) rate. Since Airtel 3G Kerala&Vodafone3G are Sharing ICR with Idea Kerala network they are not providing 3G PMR reports Given the Justification mails to the Auditor Kerala Circle.

#### 3.1.2.KERALA Circle (Feb.16):

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.

Kerala Circle (February'16)																
February month PMR Generation Data		Benchmark	Audit Period	Aircel 2G	TATA 3G	Airtel 2G	IDEA 3G	BSNL	IDEA	Reliance	TATA	Vodafone	Reliance	MTS	TATA	
S/N	Name of Parameter			GSM Operators									CDMA			
<b>Network Service Quality Parameter</b>																
<b>Network Availability</b>																
1	a) BTS Accumulated Downtime	<=2%	One Month	0.23%	0.03	0.15%	0.07	0.32%	0.08%	0.23%	0.07	0.04%	0.05%	0.02%	0.02%	
	b) Worst affected BTSs due to downtime	<=2%	One Month	0.15%	0.00	0.11%	0.04	0.13%	0.09%	1.03%	0.00%	0.04%	0.11%	0.00%	0.00%	
<b>Connection Establishment (Accessibility)</b>																
2	a) CSSR (Call Setup Success Rate)	>=95%	One Month	99.72%	98.76	98.51%	99.50	99.59%	99.90%	95.49%	98.71%	99.69%	98.37%	99.57%	98.57%	
	b) SDCCH/PAGING Channel congestion	<=1%	One Month	0.07%	0.19	0.49%	0.60	0.24%	0.48%	0.12%	0.03%	0.68%	0.00%	0.00%	0.01%	
	c) TCH congestion	<=2%	One Month	0.04%	0.36	1.34%	0.26	1.41%	0.97%	0.27%	0.04%	0.31%	0.84%	0.00%	0.21%	
<b>Connection maintenance (Retainability)</b>																
3	a) CDR (Call Drop Rate)	<=2%	One Month	0.48%	0.28	1.03%	0.27	0.55%	0.56%	0.05%	0.43%	0.29%	0.13%	0.12%	0.21%	
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	One Month	2.73%	1.42	2.13%	1.17	0.93%	1.80%	0.56%	2.44%	1.16%	1.01%	1.43%	1.86%	
	c) Connections with good voice quality	>=95%	One Month	97.23%	99.75	98.14%	97.59	99.95%	95.84%	99.53%	98.88%	97.82%	99.18%	99.20%	99.15%	
4	No. of POI's having >=0.5% POI congestion	<=0.5%	One Month	0.00%	0.00	0.00%	0.00	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	

**finding:**

- From the month data assessment, it is found that all the operators are meeting the benchmark for network parameter for the parameter worst affected cells having more than 3% TCH drop (call drop) rate.

### 3.1.3 KERALA Circle (March'16):

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.

#### KERALA Circle (Mar'16)

February month PMR Generation Data		Benchmark	Audit Period	Aircel 2G	TAT A 3G	Airtel 2G	IDEA 3G	BSNL	IDEA	Reliance	TATA	Vodafone	Reliance	MTS	TATA
S/N	Name of Parameter			GSM Operators										CDMA	
<b>Network Service Quality Parameter</b>															
1	a) BTS Accumulated Downtime	<=2%	One Month	0.13	0.02	0.10%	0.05	0.30%	0.06	0.20%	0.06%	0.02%	0.00%	0.02%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	One Month	0.00%	0.00	0.16%	0.05	0.11%	0.10	0.77%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>															
2	a) CSSR (Call Setup Success Rate)	>=95%	One Month	98.72%	99.17	98.32	99.45	98.69%	99.86	97.16%	98.90%	99.74%	98.37%	99.57%	98.64%
	b) SDCCH/PAGING Channel congestion	<=1%	One Month	0.09%	0.08	0.35%	0.47	0.31%	0.33	0.06%	0.05%	0.09%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	One Month	0.06%	0.14	1.56%	0.18	1.31%	0.72	0.22%	0.05%	0.26%	0.83%	0.00%	0.01%
<b>Connection maintenance (Retainability)</b>															
3	a) CDR (Call Drop Rate)	<=2%	One Month	0.43%	0.28	0.97%	0.29	0.56%	0.57	0.05%	0.47%	0.37%	0.09%	0.12%	0.22%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	One Month	2.83%	1.47	2.83%	1.24	1.25%	1.62	0.62%	2.63%	0.97%	0.90%	1.32%	1.86%
	c) Connections with good voice quality	>=95%	One Month	97.10%	99.74	97.56	97.66	99.95%	96.24	99.53%	98.91%	97.97%	99.18%	99.19%	99.15%
4	No. of POI's having >=0.5% POI congestion	<=0.5%	One Month	0.00%	0.00	0.00%	0.00	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Datamation

## Finding & Critical Analysis:

All the operator are meeting the benchmark meeting the benchmark .Vodafone 3G is sharing network with idea network.

### 3.1.4 PMR Summarized Data Results in Table KERALA Circle Q2 (Jan-Mar'16):

		KERALA CIRCLE Q2 (JAN-MAR'16)													
Q2(jan-mar'16) PMR Generation Data		Bench- mark	Audit Period	Aircel 2G	TATA 3G	Airtel 2G	IDEA 3G	BSNL	IDEA	Reliance	TATA	Vodafone	Reliance	MTS	TATA
S/N	Name of Parameter			GSM Operators									CDMA		
<b>Network Service Quality Parameter</b>															
<b>Network Availability</b>															
1	a) BTS Accumulated Downtime	<=2%	One Month	0.16	0.02	0.33	0.06	0.28	0.06	0.21	0.06	0.03	0.02	0.02	0.03
	b) Worst affected BTSs due to downtime	<=2%	One Month	0.05	0.00	0.37	0.04	0.11	0.09	0.81	0.00	0.02	0.00	0.00	0.00
<b>Connection Establishment (Accessibility)</b>															
2	a) CSSR (Call Setup Success Rate)	>=95 %	One Month	99.65	98.84	98.27	99.49	99.34	99.86	96.43	98.83	99.75	98.36	99.56	98.66
	b) SDCCH/PAGING Channel congestion	<=1%	One Month	0.08%	0.20	0.40	0.56	0.26	0.42	0.08	0.04	0.39	0.00	0.00	0.00
	c) TCH congestion	<=2%	One Month	0.05%	0.34	1.38	0.23	1.32	0.89	0.26	0.05	0.25	0.83	0.00	0.09
<b>Connection maintenance (Retainability)</b>															
3	a) CDR (Call Drop Rate)	<=2%	One Month	0.46	0.28	0.97	0.28	0.56	0.56	0.05	0.45	0.35	0.09	0.12	0.24
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	One Month	2.80%	1.47	2.48	1.15	1.12	1.75	0.56	2.52	1.12	0.83	1.42	2.44
	c) Connections with good voice quality	>=95 %	One Month	97.22 %	99.75	97.85	97.63	99.95	98.92	99.53	98.87	97.89	99.23	99.20	99.15
4	No. of POI's having >=0.5% POI congestion	<=0.5%	One Month	0.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

**Finding & Critical Analysis:-** According to the summarized data for the month of JAN, FEB and MAR. We found that All the operator are meeting the benchmark for worst affected cells having more than 3% TCH drop (call drop) rate.

### 3.2.1 Comparison of TRAI DATA & PMR DATACOLLECTED BY AGENCIES for the Q2(January-March16).

Q2(jan-mar'16) PMR Generation Data		KERALA CIRCLE Q2 (JAN-MAR'16)													
S/N	Name of Parameter	Bench- mark	Audit Period	Aircel 2G	TATA 3G	Airtel 2G	IDEA 3G	BSNL	IDEA	Reliance	TATA	Vodafone	Reliance	MTS	TATA
				GSM Operators							CDMA				
<b>Network Service Quality Parameter</b>															
<b>Network Availability</b>															
1	a) BTS Accumulated Downtime	<=2%	VERIFIED	0.16	0.02	0.41	0.06	0.29	0.06	0.07	0.06	0.03	0.00	0.02	0.03
			REPORTED	0.16	0.02	0.33	0.06	0.28	0.06	0.21	0.06	0.03	0.02	0.02	0.03
	b) Worst affected BTSs due to downtime	<=2%	VERIFIED	0.05	0.00	0.45	0.03	0.11	0.09	0.21	0.00	0.02	0.00	0.00	0.00
			REPORTED	0.05	0.00	0.37	0.04	0.11	0.09	0.81	0.00	0.02	0.00	0.00	0.00
<b>Connection Establishment (Accessibility)</b>															
2	a) CSSR (Call Setup Success Rate)	>=95%	VERIFIED	98.99	98.84	98.26	99.49	99.68	99.86	96.42	98.83	99.72	98.37	99.55	98.67
			REPORTED	99.65	98.84	98.27	99.49	99.34	99.86	96.43	98.83	99.75	98.36	99.56	98.66
	b) SDCCH/PAGING Channel congestion	<=1%	VERIFIED	0.08%	0.2	0.42	0.56	0.26	0.42	0.08	0.04	0.39	0.00	0.00	0.00
			REPORTED	0.08%	0.2	0.40	0.56	0.26	0.42	0.08	0.04	0.39	0.00	0.00	0.00
	c) TCH congestion	<=2%	VERIFIED	0.05%	0.34	1.32	0.23	1.32	0.89	0.26	0.05	0.26	0.83	0.00	0.03
			REPORTED	0.05%	0.34	1.38	0.23	1.32	0.89	0.26	0.05	0.25	0.83	0.00	0.09
<b>Connection maintenance (Retainability)</b>															
3	a) CDR (Call Drop Rate)	<=2%	VERIFIED	0.46	0.28	0.98	0.28	0.56	0.56	0.05	0.45	0.36	0.10	0.12	0.24
			REPORTED	0.46	0.28	0.97	0.28	0.56	0.56	0.05	0.45	0.35	0.09	0.12	0.24
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	VERIFIED	2.80%	1.47	2.36	1.15	1.11	1.75	0.55	2.52	1.67	0.90	1.42	2.44
			REPORTED	2.80%	1.47	2.48	1.15	1.12	1.75	0.56	2.52	1.12	0.83	1.42	2.44
	c) Connections with good voice quality	>=95%	VERIFIED	97.22%	99.75	97.94	97.64	99.92	98.92	99.53	98.87	97.94	99.20	99.19	99.15
			REPORTED	97.22%	99.75	97.85	97.63	99.95	98.92	99.53	98.87	97.89	99.23	99.20	99.15
4	No. of POI's having >=0.5% POI congestion	<=0.5%	VERIFIED	0.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			REPORTED	0.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00



**Findings –**

- There are difference in BTS accumulated downtime in Airtel 2G and Rcom gsm, in Worst affected BTS due to downtime have some difference a/c to comparison with TRAI data
- There are difference in Call Setup Success Rate in AIRCEL,BSNL and ,in SDCCH/ Paging Channel Congestion.
- In Call Drop Rate Aircel 2G, Vodafone ,RCOM CDMA and in Worst affected cells having more than 3% TCH drop (call drop) rate all the operators have differences .



**Not matching with TRAI data.**



**Not matching the TRAI DATA**

### 3.2.2 3 Days Live Test Audit Report(2<sup>nd</sup> Quarter),

**KERALA Circle:** Verification of the Performance of Service Providers against the Quality of Service benchmarks laid down by TRAI using Live measurements for 3 days during the month in which the Audit and Assessment is carried out. Live measurements for 3 days during the month in which the Audit and Assessment is carried out.

KERALA CIRCLE-QUARTER 2 (JAN-MAR'16)															
Live Test Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	BSNL	IDEA	VODAFONE	TATA	RCOM	MTS	RCOM	TATA	TATA	IDEA
S/N	Name of Parameter			GSM Operators						CDMA Operators			3G		
<b>Network Service Quality Parameters</b>															
1	a) BTS Accumulated Downtime	<=2%	Day 1	0.17	0.27	0.25	0.05	0.02	0.05	0.2	0.03	0.01	0.02	0.01	0.05
			Day 2	0.14	0.28	0.21	0.03	0.02	0.06	0.22	0.02	0.02	0.02	0.02	0.05
			Day 3	0.13	0.27	0.27	0.03	0.03	0.06	0.22	0	0.01	0.05	0.02	0.09
	b) Worst affected BTSs due to downtime	<=2%	Day 1	0.2	0.29	0.09	0.1	0.03	0	0.89	0	0	0	0	0.06
			Day 2	0.7	0.29	0.13	0.11	0.01	0	0.88	0	0	0	0	0.06
			Day 3	0.5	0.31	0.11	0.08	0.01	0	0.79	0	0	0	0	0.03
<b>Connection Establishment (Accessibility)</b>															
2	a) CSSR (Call Setup Success Rate)	>=95%	Day 1	98.52	98.19	98.87	99.75	99.77	98.88	96.55	99.6	98.19	98.68	98.82	99.44
			Day 2	99.15	98.15	99.3	99.91	99.69	98.84	96.41	99.61	98.33	98.61	98.82	99.45
			Day 3	98.86	98.18	99.22	99.9	99.69	98.86	96.44	99.56	98.39	98.53	98.83	99.51
	b) SDCCH/PAGING Channel congestion	<=1%	Day 1	0.08	0.39	0.23	0.39	0.42	0.04	0.09	0	0	0	0.21	0.56
			Day 2	0.05	0.38	0.27	0.39	0.41	0.04	0.08	0	0	0	0.27	0.57
			Day 3	0.06	0.51	0.27	0.49	0.39	0.03	0.08	0	0	0	0.19	0.49
	c) TCH congestion	<=2%	Day 1	0.07	1.49	1.29	0.85	0.26	0.06	0.24	0	0.8	0.11	0.32	0.24
			Day 2	0.07	1.43	1.33	0.85	0.26	0.05	0.25	0	0.81	0.11	0.37	0.24
			Day 3	0.06	1.33	1.31	0.89	0.24	0.05	0.27	0	0.85	0.09	0.36	0.26
<b>Connection maintenance (Retainability)</b>															
3	a) CDR (Call Drop Rate)	<=2%	Day 1	0.46	0.88	0.54	0.54	0.38	0.44	0.05	0.12	0.07	0.26	0.25	0.29
			Day 2	0.35	0.87	0.59	0.59	0.33	0.46	0.05	0.13	0.11	0.27	0.29	0.31
			Day 3	0.39	0.84	0.48	0.56	0.36	0.44	0.03	0.14	0.07	0.22	0.29	0.26
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Day 1	3.06	2.61	1.19	1.71	1.12	2.46	0.51	1.42	0.77	2.51	1.49	1.17
			Day 2	2.66	2.55	1.14	1.73	1.12	2.46	0.52	1.47	0.88	2.41	1.49	1.17
			Day 3	2.77	2.58	1.14	1.73	1.16	2.55	0.59	1.16	0.87	2.41	1.46	1.13
	c) Connections with good voice quality	>=95%	Day 1	96.89	97.55	99.69	98.9	97.85	98.81	99.6	99.21	99.21	99.2	99.73	97.55
			Day 2	97.13	97.56	99.75	98.92	97.89	98.91	99.57	99.19	99.25	99.21	99.81	97.59
			Day 3	97.21	97.56	98.75	98.92	97.89	99.14	99.48	99.2	99.17	99.13	99.77	97.62
4	No. of POI's having >=0.5% POI congestion	<=0.5%	Day 1	0	0	0	0	0	0	0	0	0	0	0	0
			Day 2	0	0	0	0	0	0	0	0	0	0	0	0
			Day 3	0	0	0	0	0	0	0	0	0	0	0	0

**Finding: All operators are meeting benchmark except aircel 2g in 1<sup>st</sup> day for Worst affected cells >3% TCH drop (Call drop) rate**

### 3.3 Operator Assisted Drive Test (KERALA Circle):

The Operator Assisted Drive Test was conducted for all the Operators. Route covered was more than 100 Km depending on city areas within the speed limit of 30-40 km/hour. In all the cities Zones we reselected for covering different density areas (High/Medium/Low).

Drive Test Measurements													
S.N	Parameter	City Name	Airtel	Idea	Vodafone	BSNL	Aircel	RCOM 2G	Tata GSM	RCOM CDMA	Tata CDMA	MTS	
1.1	Call Attempts	Trivandrum	587	554	542	458	420	415	515	429	404	471	
		Palakkad	538	527	498	350	518	324	395	365	306	418	
		Ernakulam	595	658	505	419	NP	364	454	400	469	445	
1.2	Blocked Call Rate (<=3%)	Trivandrum	0.00%	0.00%	1.11%	1.50%	0.87%	5%	0.00%	0.00%	0.00%	0.64%	
		Palakkad	0.00%	0.00%	0.80%	1.47%	0.67%	6%	0.00%	0.00%	0.00%	0.48%	
		Ernakulam	0.34%	0.00%	0.70%	1.43%	NP	5%	1.18%	2%	0.00%	0.00%	
1.3	Dropped Call Rate (<=2%)	Trivandrum	0.17%	0.18%	0.00%	1.10%	1.13%	2%	0.00%	2%	0.50%	0.64%	
		Palakkad	0.37%	0.00%	0.00%	0.34%	0.41%	0.00%	0.25%	3%	0.00%	0.96%	
		Ernakulam	0.51%	0.00%	0.40%	0.24%	NP	3%	0.70%	5%	0.43%	1.40%	
1.4	Percentage of connections with good voice quality (=>95%)												
	(i) 0-4 (w/o frequency hopping)	Trivandrum	0	-	-	-	-	-	99.58%	-	99.53%	97.82%	98.91%
		Palakkad	-	-	-	-	-	-	-	-	99.53%	98.88%	98.86%
		Ernakulam	-	-	-	-	NP	-	-	-	99.65%	96.04%	96.71%
	(ii) 0-5 (with frequency hopping)	Trivandrum	98.39%	92.52%	94.22%	96.00%	97.11%	99.22%	97.82%	-	-	-	-
		Palakkad	98.20%	93.50%	95.85%	97.36%	100%	97.82%	-	-	-	-	-
Ernakulam		97.60%	93.95%	97.22%	95.38%	NP	97.20%	96.90%	-	-	-	0	
1.5	Service Coverage												
	In door (>= 75dBm)	Trivandrum	75.40%	60.09%	47.38%	82.50%	54.54%	59.46%	73.58%	45.07%	22.99%	52.48%	
		Palakkad	76.45%	61.01%	57.77%	85.37%	34.05%	58.60%	64.46%	52.36%	10.03%	53.12%	
		Ernakulam	77.39%	89.52%	78.93%	69.78%	NP	57.14%	46.51%	39.95%	17.70%	50.13%	
	In-vehicle (> - 85dBm)	Trivandrum	94.78%	87.61%	87.91%	90.70%	76.64%	84.52%	89.48%	65.45%	48.68%	79.54%	
		Palakkad	95.62%	92.79%	91.29%	97.66%	63.34%	85.77%	87.72%	76.92%	31.60%	80.44%	
		Ernakulam	95.14%	98.46%	97.40%	92.37%	NP	82.39%	77.02%	67.90%	40.50%	76.23%	
	Outdoor-in city (> -95dBm)	Trivandrum	99.68%	98.18%	99.58%	98.10%	94.54%	98.01%	95.47%	87.55%	73.13%	95.42%	
		Palakkad	99.82%	99.85%	99.61%	97.93%	89.15%	98.30%	98.86%	98.96%	66.89%	96.27%	
		Ernakulam	99.57%	99.69%	99.91%	99.22%	NP	96.79%	94.08%	96.43%	80.40%	95.88%	
	1.6	Call Setup Success Rate (>=95%)	Trivandrum	100.00%	99.64%	97.61%	97.50%	99.05%	98.80%	100.00%	100.00%	99.75%	99.36%
			Palakkad	99.81%	99.05%	98.39%	99.51%	89.15%	98.15%	100.00%	100.00%	100.00%	99.52%
Ernakulam			99.66%	99.33%	98.22%	98.57%	NP	98.63%	98.93%	99.50%	98.82%	95.88%	
1.7	Hand Over Success Rate (HOSR)	Trivandrum	99.51%	98.37%	98.83%	98.50%	99.42%	99.16%	-	100.00%	100.00%	99.89%	
		Palakkad	99.82%	99.04%	98.83%	98.26%	99.74%	99.76%	99.79%	100.00%	-	99.98%	
		Ernakulam	98.75%	99.66%	99.08%	98.55%	NP	100.00%	100.00%	100.00%	99.19%	100.00%	
1.8	Km's driven	Trivandrum	392 Km										
		Palakkad	440 Km										
		Ernakulam	444 Km										

### **Finding & Critical Analysis:**

***NP(Not Participated) : Aircel Kerala not participated Ernakulum SSA TRAI OA Drive & given the justification mail also to the Auditor regarding the same.***

**NOTE:1.4(i)** ) 0-4 (w/o frequency hopping is not applicable for 2G technology similarly 1.4(ii) (ii) 0-5 (with frequency hopping) is not applicable for CDMA technology. So respective boxes are kept blank.

- Aircel not participated in all the 3 SSA Drive Tests & given the justification mail to the Nodal Officer.
- All operators achieved KPI threshold for Blocked Call Rate ( $\leq 3\%$ ) Rcom NOT MEETING THE BENCH MARK .
- All operators achieved KPI threshold for Dropped Call benchmark.
- All operators achieved KPI threshold benchmark for the Voice Quality parameter (0-5 (with frequency hopping)).
- All operators achieved KPI threshold benchmark for Call Setup Success Rate ( $\geq 95\%$ ).AIRCEL NOT MEETING THE BENCH MARK .

 **Not matching with TRAI data.** |

### 3.4 CUSTOMER SERVICE QUALITY PARAMETERS

2<sup>nd</sup> Quarter data Assessment (Jan- Mar.'16) comparison with TRAI data:

Customer Service Quality Q2(Jan-Mar'16)														
S. no	Parameters	Benchmark	Audit	Airce	Airtel	BSNL	Idea	R COM	Tata	Vodafone	RCO MCDMA	Tata	MTS	
								GSM	GSM		CDMA	CDMA		
1	Metering/billing credibility Post	<= 0.1%	Reported	0.00	0.02	0.02	0.09	0.08	0.00	0.10	0.07	0.01	0.06	
			Verified	0.00	0.02	0.02	0.09	0.08	0.00	0.10	0.07	0.01	0.06	
2	Metering /billing credibility Prepaid	<= 0.1%	Reported	0.00	0.00	0.01	0.19	0.09	0.00	0.05	0.01	0.00	0.00	
			Verified	0.00	0.00	0.01	0.19	0.09	0.00	0.05	0.01	0.00	0.00	
3	Resolution of billing/ charging	100% within 4 week	Reported	100	100	98.39	99.93	100	100	100	100	100	100	
			Verified	100	100	98.40	99.94	100	100	100	100	100	100	
		100% within 6 week	Reported	100	100	100	100	100	100	100	100	100	100	100
			Verified	100	100	100	100	100	100	100	100	100	100	100
4	Period of applying, edit/waiver/adjustment to the customer count from date of resolution of complain	<=1 week	Reported	100	100	100	100	100	100	99.38	100	100	100	
			Verified	100	100	100	100	100	100	100	99.39	100	100	100
<b>Response time to customers for assistance</b>														
5	a) Accessibility of call, Centre/Customer Care	>=95 %	Reported	97.31	99.87	98.00	99.63	98.59	98.80	100	96.55	99.43	98.70	
			Verified	97.31	99.87	98.00	99.63	98.59	98.80	100	96.55	99.43	98.70	
	b) % call answered by operators	>=95 %	Reported	98.31	96.62	95.00	99.44	96.86	92.81	100	96.82	98.09	97.00	
			Verified	98.31	96.62	95.00	99.44	96.86	92.80	100	96.82	98.09	97.00	
<b>Termination/closure of service</b>														
6	No. of requests for Termination /clause of service request within 7 days during the quarter	<=7d ays	Reported	100	100	100	100	100	100	100	100	100	100	
			Verified	100	100	100	100	100	100	100	100	100	100	
7	Time taken for refunds of deposits after closures.	100% within 60 days	Reported	100	100	100	100	100	100	100	100	97.83	100	
			Verified	100	100	100	100	100	100	100	100	100	97.83	100

### **Finding &Critical Analysis:-**

- According to the parameter metering/billing credibility post-paid in the table we found that all the service providers are meeting the benchmark.
- According to the parameter metering /billing credibility pre-paid in the table we found that all the service providers, except IDEA 2G are meeting the benchmark.
- According to the parameter Resolution of billing/ charging complaints in the table we found that all the service providers are meeting the benchmark. Except BSNL,IDEA
- According to the parameter Period of applying credit/waiver/adjustment to the customer's account from the date of resolutions of complaints in the table we found that all the service providers are meeting the benchmark EXCEPT VODAFONE.
- According to the parameter Accessibility of call center/Customer Care in the table we found that all the service providers are meeting the benchmark.
- According to the parameter % call answered by operators (voice to voice) within 60 sec in the table all the service providers are meeting the benchmark EXCEPT TATA GSM
- According to the parameter no. of requests for Termination / Closure of service complied within 7 days during the quarter in the table we found that all the service providers are meeting the benchmark.
- According to the parameter Time taken for refunds of deposits after closures in the table we found that all operators meeting the benchmark. EXCEPT TATA CDMA.

### 3.5 Redressal

#### 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 these specific operators.

#### 3.5.1 Performance (live calling for billing complaints)

Calling Operator	Vodafone	Airtel	Idea	MTS	Aircel	BSNL	R COM GSM	Tata	R COM CDMA	Tata CDMA
<b>Calls Attempted</b>	100	100	100	100	100	100	100	100	100	100
<b>Total No. of calls</b>	97	96	98	95	97	99	96	99	98	97
<b>Cases resolved with 4 weeks</b>	97%	96%	98%	95%	97%	99%	96%	99%	98%	97%
<b>%age of cases resolved</b>	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

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

#### Findings:-

We have made live calling to customers as per their complaints details and we verified their complaint and we found that most of the complaints are resolved within the time line and all the operators are meeting the TRAI benchmarks.

#### 3.5.2. Live calling to call centre

Calling Operator	Vodafone	Airtel	Idea	MTS	Aircel	BSNL	R COM	Tata	R COM CDMA	Tata CDMA
<b>Total No. of Calls Attempted</b>	25	25	25	25	25	25	25	25	25	25
<b>Total No. of calls connected to IVR</b>	25	25	25	25	25	25	25	25	25	25
<b>Calls got connected to agent within 90</b>	25	25	25	25	25	25	25	25	25	25

Sec										
%age of calls got answered	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

### Findings:-

In live calling to call centers we found that all the operators are meeting their benchmark except RCOM(GSM& CDMA) for both Calls got connected to agent within 90 Sec and %age of calls got answered are not meeting the benchmark.

### Parameter Level1-1 Live Calling (Emergency No's)

Emergency No	No of Calls/operator	For all operato.res
100 - Police	5	Ok
101 - Fire	5	Ok
102 - Ambulance	5	Ok
104 - Health Information Helpline	5	Does not exist.
108 - Emergency and Disaster Management Helpline	5	Ok
138 - All India Helpline for Passengers	5	Ok
149 - Public Road Transport Utility Service	5	Does not exist.
181 - Chief Minister Helpline	5	Does not exist.
182 - Indian Railway Security Helpline	5	Ok
1033- Road Accident Management Service	5	Ok
1037- Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'	5	Does not exist.
1056- Emergency Medical Services	5	Ok(BSNL) , Does not exist for all other operators.
106X - State of the Art Hospitals	5	Does not exist.
1063- Public Grievance Cell DoT Hq	5	Ok
1064- Anti Corruption Helpline	5	Does not exist.
1070- Relief Commission for Natural Calamities	5	Ok
1071- Air Accident Helpline	5	Does not exist.
1072- Rail Accident Helpline	5	Ok
1073- Road Accident Helpline	5	Does not exist.
1077- Control Room for District Collector	5	Does not exist.
1090- Call Alart ( Crime Branch)	5	Ok



<b>1091 - Women Helpline</b>	5	Ok
<b>1097 - National AIDS Helpline to NACO</b>	5	Ok

<b>1099 - Central Accident and Trauma Services (CATS)</b>	5	Ok
<b>10580 - Educational &amp; Vocational Guidance and Counseling</b>	5	Does not exist.
<b>10589 - Mother and Child Tracking ( MCTH)</b>	5	Does not exist.
<b>10740 - Central Pollution Control Board</b>	5	Does not exist.
<b>10741 - Pollution Control Board</b>	5	Does not exist.
<b>1511 - Police Related Service for all Metro Railway Project</b>	5	Does not exist.
<b>1512 - Prevention of Crime in Railway</b>	5	Ok
<b>155304 - Municipal Corporations 1514 - National Career Service(NCS)</b>	5	Does not exist.
<b>15100 - Free Legal Service Helpline</b>	5	Ok
<b>155304 - Municipal Corporations</b>	5	Does not exist.
<b>1514 - National Career Service(NCS)</b>	5	Does not exist.
<b>155214 - Labor Helpline</b>	5	Ok
<b>1903 - Sashastra Seema Bal (SSB)</b>	5	Ok
<b>1909 - National Do Not Call Registry</b>	5	Ok
<b>1912 - Complaint of Electricity</b>	5	Ok
<b>1916 - Drinking Water Supply</b>	5	
<b>1950 - Election Commission of India</b>	5	Ok

### **3.7 Level 1 Live Calling (Emergency No.)Q2:-**

Level 1 Live calling such as calling 39 emergency no's such as Police, Fire, and Ambulance etc .were made so as to check the service of such toll free numbers, it is observed that many toll free numbers are not connecting .

#### **Critical Analysis:-**

Level 1 calling such as calling at emergency no. like Police, Fire, and Ambulance were made so as to check the service of such short codes. it was found to be functional for all numbers except below numbers which are not connecting by any of the operators.

**Only BSNL is connecting to the toll-free number of 1056 - Emergency Medical Services which is highlighted in yellow colour.**

104 - Health Information Helpline

149 - Public Road Transport Utility Service

181 - Chief Minister Helpline

1037 - Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline' 106X - State of the Art Hospitals

1064 - Anti Corruption Helpline

10580 - Educational& Vocational Guidance and Counseling

1071 - Air Accident Helpline

1073 - Road Accident Helpline

1077 - Control Room for District Collector

1071 - Air Accident Helpline

1072 - Rail Accident Helpline

10589 - Mother and Child Tracking ( MCTH

10740 - Central Pollution Control Board

10741 - Pollution Control Board

1073 - Road Accident Helpline

1511 - Police Related Service for all Metro Railway Project

1077 - Control Room for District Collector1077 - Control Room for District Collector

10580 - Educational& Vocational Guidance and Counseling

10589 - Mother and Child Tracking ( MCTH)

10740 - Central Pollution Control Board

10741 - Pollution Control Board

1511 - Police Related Service for all Metro Railway Project

155304 - Municipal Corporations

1514 - National Career Service(NCS)

155304 - Municipal Corporations

1514 - National Career Service(NCS)

1916 - Drinking Water Supply

### 3.8. Inter Operator Call Assessment

#### 3.A Sample coverage

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

#### 3.3.1 Performance Based on Live Measurement

Calling Operator	Vodafone	Airtel	Idea	Aircel	BSNL	RCOM GSM	Tata GSM	RCOM CDMA	Tata CDMA	MTS
Vodafone	-	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Airtel	100.00%	-	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Idea	100.00%	100.00%	-	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Aircel	100.00%	100.00%	100.00%	-	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
BSNL	99.00%	99.00%	100.00%	100.00%	-	100.00%	100.00%	100.00%	100.00%	99.00%
RCOM GSM	100.00%	100.00%	100.00%	100.00%	100.00%	-	100.00%	100.00%	100.00%	100.00%
Tata GSM	100.00%	100.00%	100.00%	100.00%	99.00%	100.00%	-	100.00%	100.00%	100.00%
RCOM CDMA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	-	100.00%	100.00%
Tata CDMA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	-	100.00%
MTS	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	-

#### Critical Analysis:-

In the inter-operator call assessment test, calls were made from one operator to other operator so as to check congestion on both the operators' network. In such cases, the radio part, switch part and the POI in between the operators are involved and hence if any congestion is found in the network, it might be due to any of these parts. The result shows that there is no congestion on the entire mobile operators network.

## CAPTER-4:

### DETAILED FINDINGS, ANALYSIS AND GRAPHICAL REPRESENTATION

#### 4.0 CUSTOMER SERVICE QUALITY PARAMETERS(Graphical Representation)

##### 4.1.1. Data Assessment(jan-mar'16):

Customer Service Quality Q2(Jan-Mar'16)													
S.No	Parameters	Bench mark	Audit	Aircel	Airtel	bsnl	Idea	R	Tata	Vodafone	RCOMCDMA	Tata	MTS
								COM	GSM	GSM	A	CDMA	CDMA
1	Metering/billing credibility Post	<= 0.1%	2nd quar.	0.00	0.02	0.02	0.09	0.08	0.00	0.10	0.07	0.01	0.06
2	Metering /billing credibility Prepaid	<= 0.1%	2nd quar.	0.00	0.00	0.01	0.19	0.09	0.00	0.05	0.01	0.00	0.00
3	Resolution of billing/ charging	100% within 4 week	2nd quar.	100	100	98.40	99.94	100	100	100	100	100	100
		100% within 6 week	2nd quar.	100	100	100	100	100	100	100	100	100	100
4	Period of applying, edit/waiver/adjustment to the customer count from date of resolution of complain	<=1 week	2nd quar.	100	100	100	100	100	100	99.39	100	100	100
<b>Response time to customers for assistance</b>													
5	a) Accessibility of call, Centre/Customer Care	>=95 %	2nd quar.	97.31	99.87	98.00	99.63	98.59	98.80	100	96.55	99.43	98.70
	b) % call answered by operators	>=95 %	2nd quar.	98.31	96.62	95.00	99.44	96.86	92.80	100	96.82	98.09	97.00
<b>Termination/closure of service</b>													
6	No. of requests for Termination /clouse of service request within 7 days during the quarter	<=7days	2nd quar.	100	100	100	100	100	100	100	100	100	100
7	Time taken for refunds of deposits after closures.	100% within 60 days	2nd quar.	100	100	100	100	100	100	100	100	97.83	100

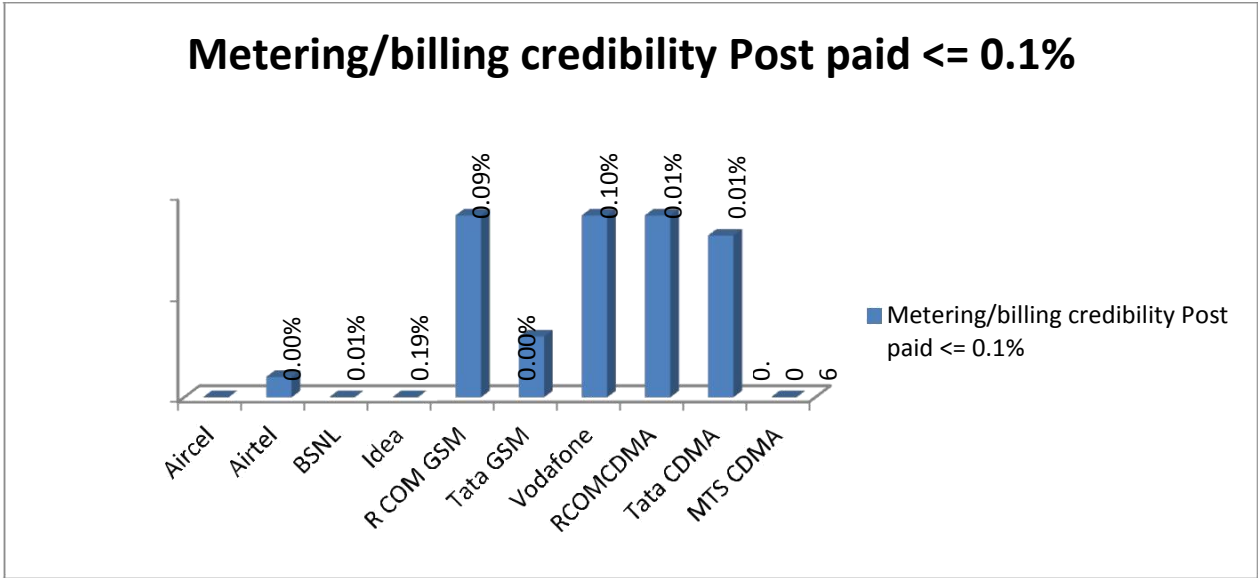


Fig. 1

Metering/billing credibility post-paid in the table 4.2.1 and the Fig.1

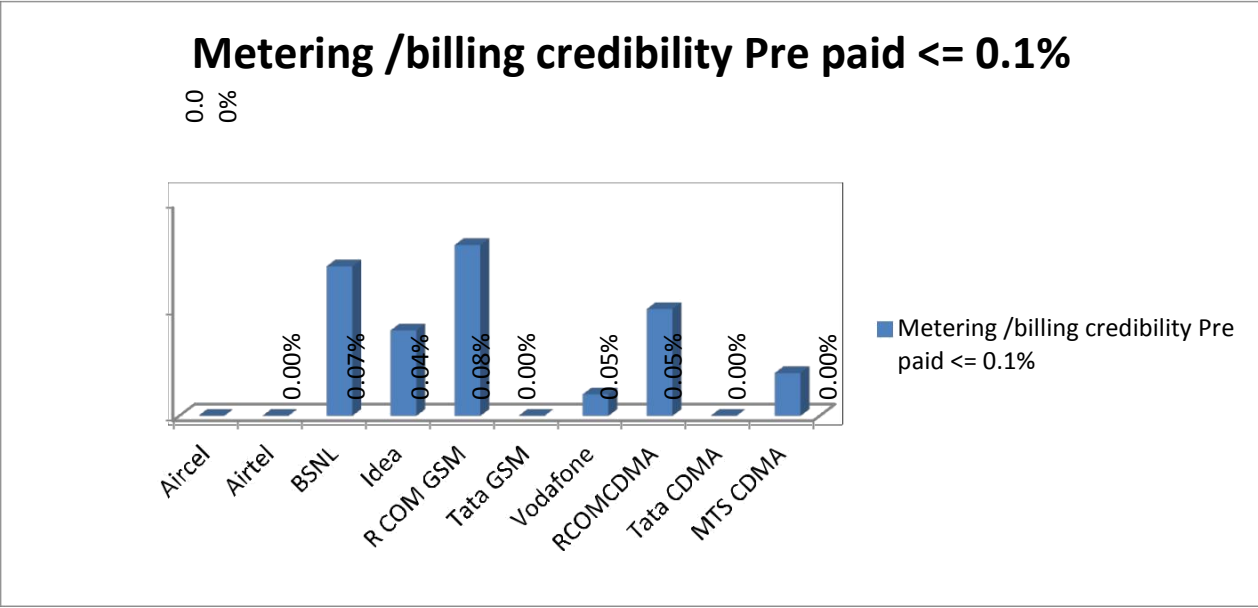
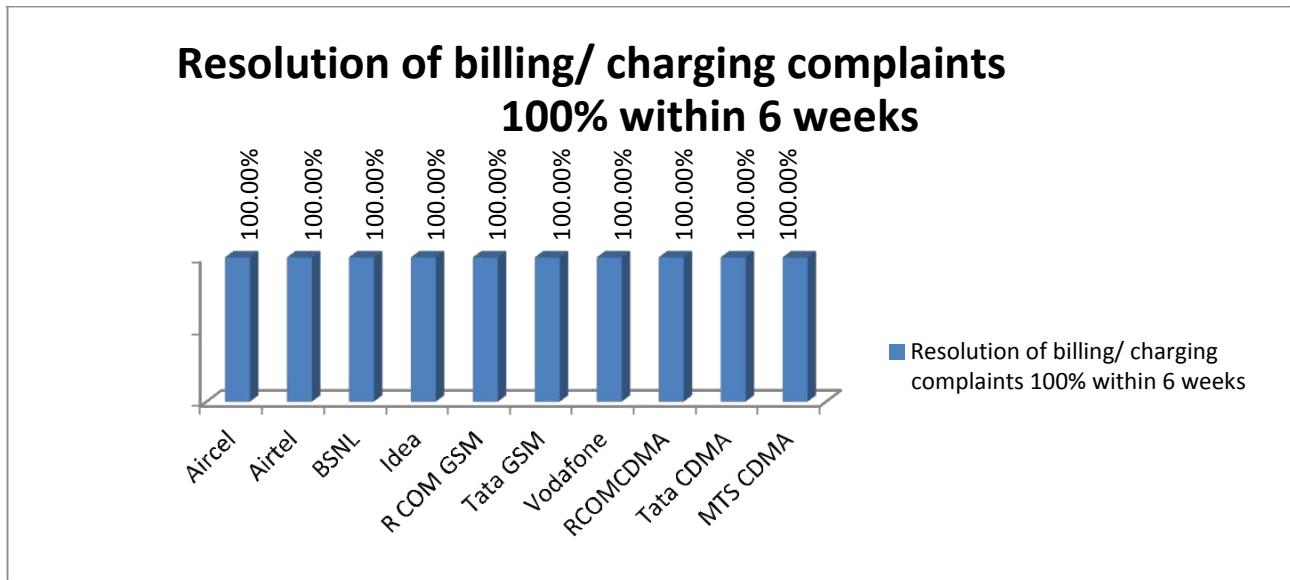
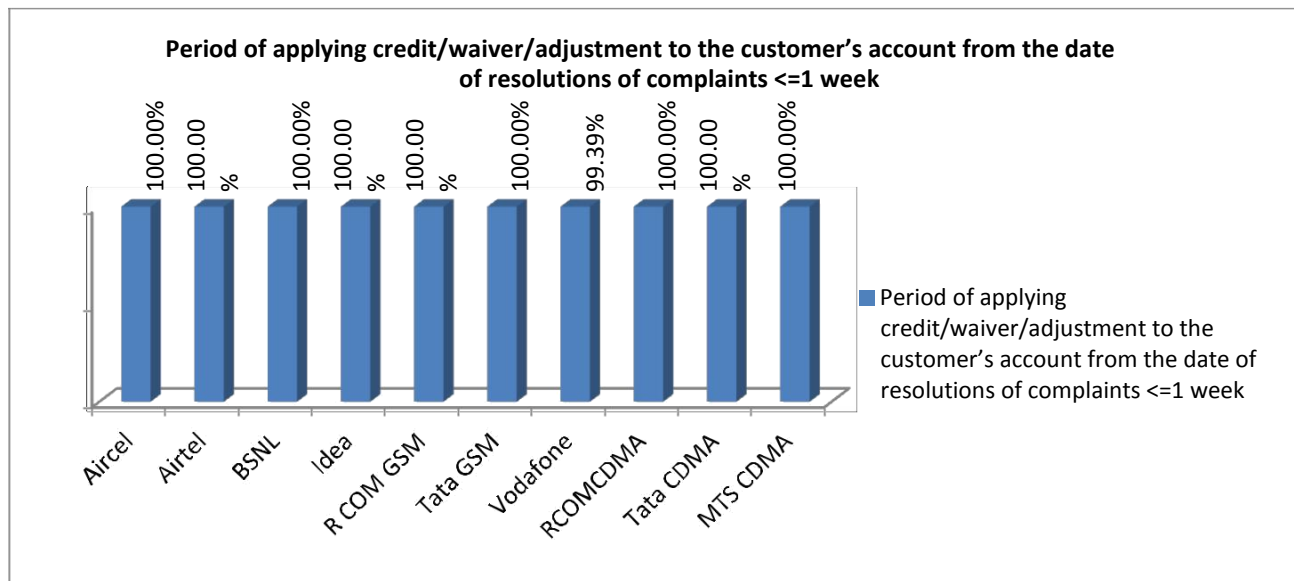


Fig. 2

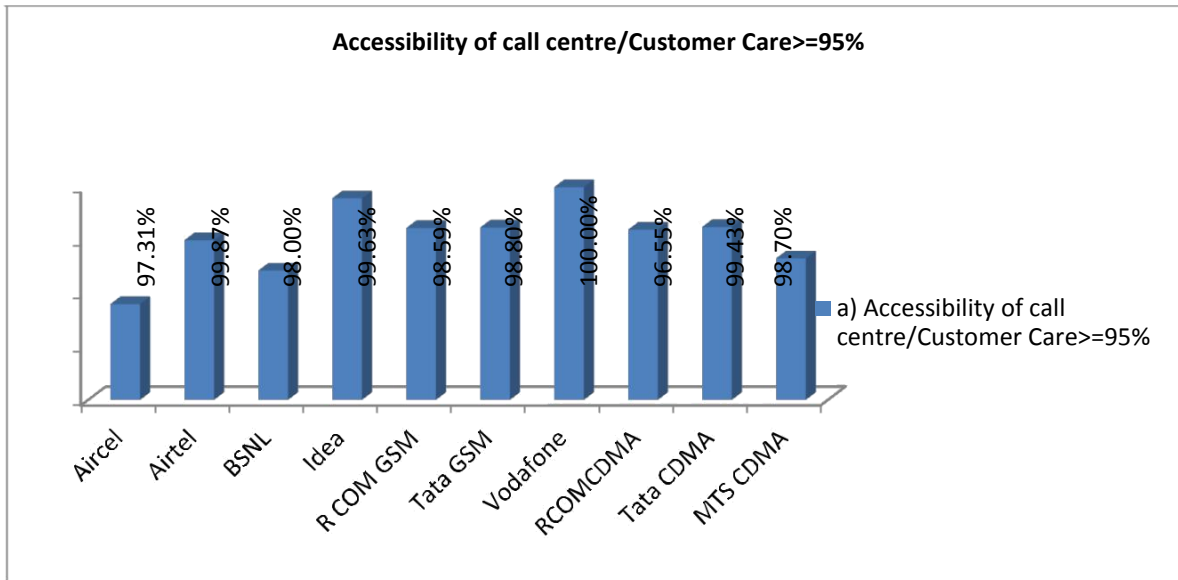
Metering/billing credibility post-paid in the table 4.2.1 and the Fig.1



**Fig. 4**  
Resolution of billing/ charging complaints in the table 4.2.1 and the Fig.4

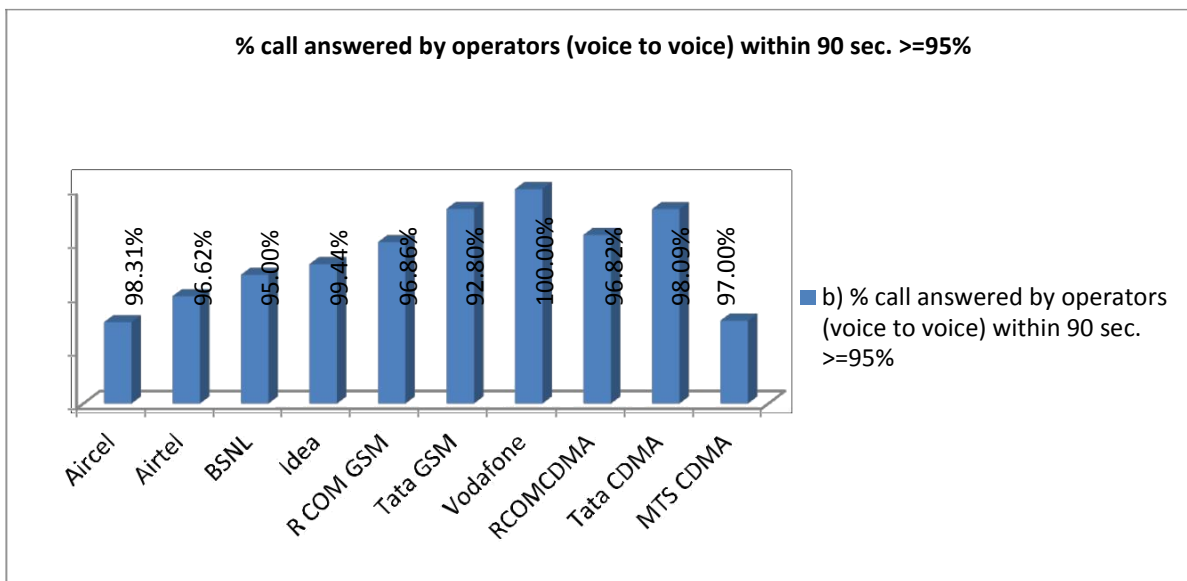


**Fig. 5**  
Period of applying credit/waiver/adjustment to the customer's account from the date of resolutions of complaint in the table 4.2.1 and the Fig.5



**Fig. 6**

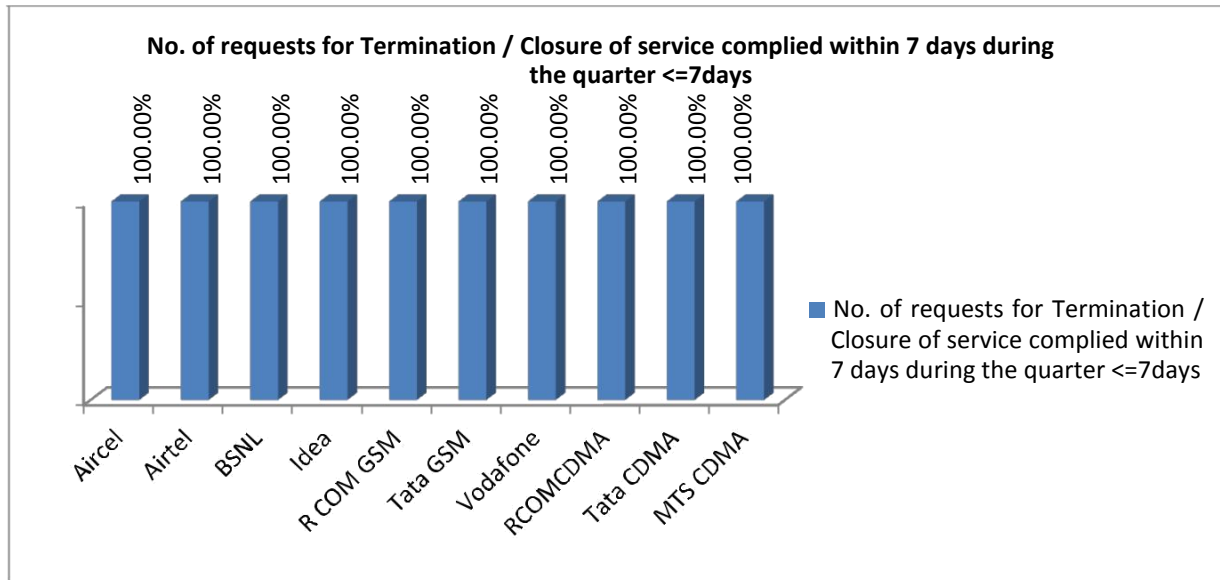
Parameter Accessibility of call Centre/Customer Care in the table 4.2.1 and the Fig.6



**Fig. 7**

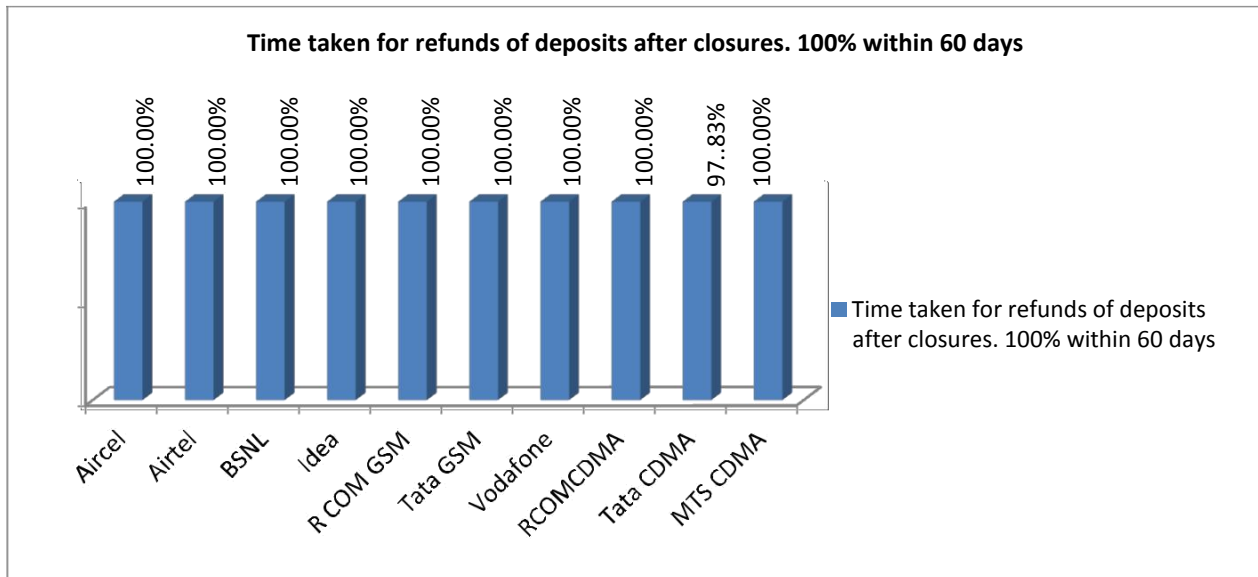
Parameter % call answered by operators (voice to voice) within 90 sec in the table 4.2.1 and the Fig.7





**Fig. 8**

Parameter no. of requests for Termination / Closure of service complied within 7 days during the quarter in the table 4.2.1 and the Fig.8



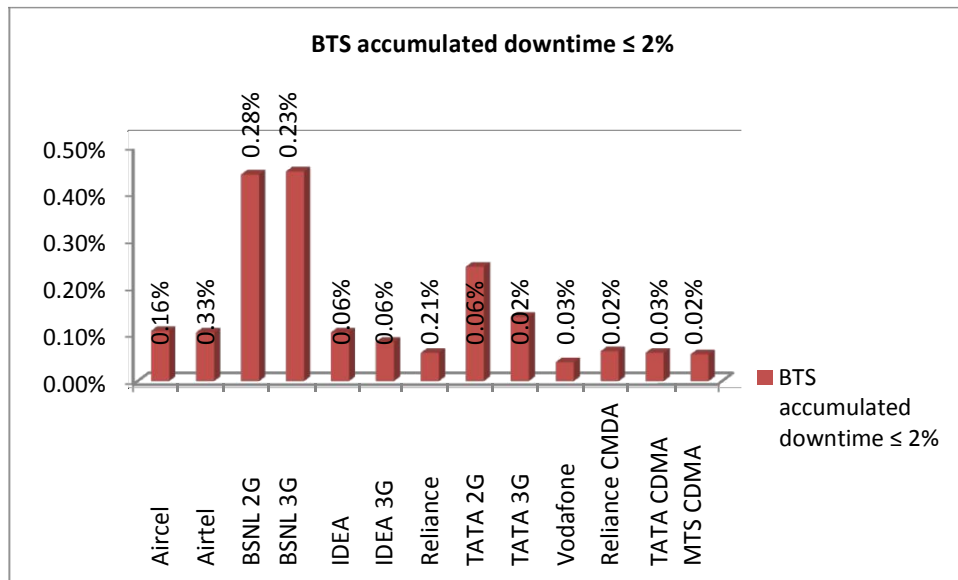
**Fig. 9**

Time taken for refunds of deposits after closures in the table 4.2.1 and the Fig.9

### 4.3.PMR Summarized Data Results in Table JAN- MAR'16 & Graphical

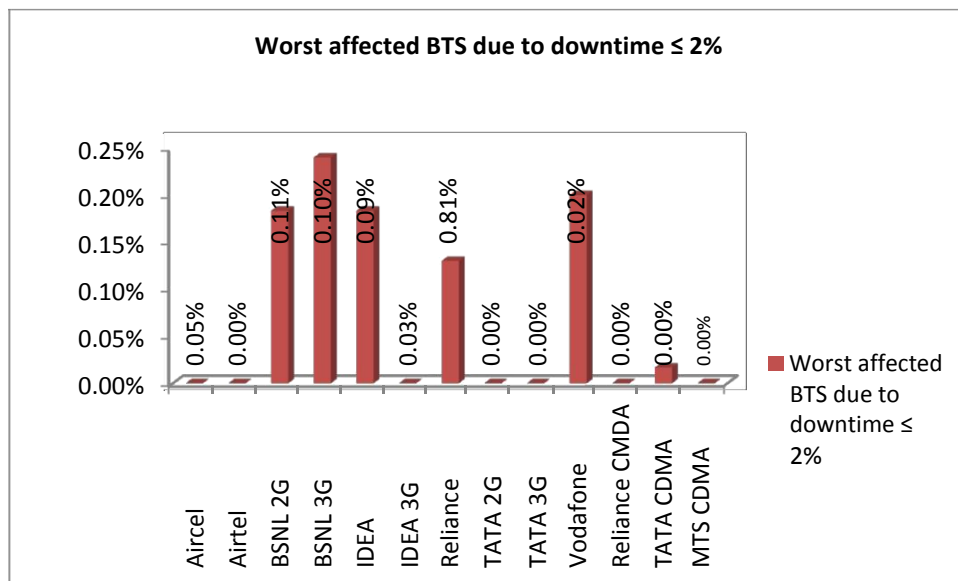
#### 4.3.1.KERALA Circle (Jan-Mar.'16):

		KERALA CIRCLE Q2 (JAN-MAR'16)													
Q2(jan-mar'16) PMR Generation Data		Bench- mark	Audit Period	Aircel 2G	TATA 3G	Airtel 2G	IDEA 3G	BSNL	IDEA	Reliance	TATA	Vodafone	Reliance	MTS	TATA
S/N	Name of Parameter					GSM Operators						CDMA			
		<b>Network Service Quality Parameter</b>													
		<b>Network Availability</b>													
1	a) BTS Accumulated Downtime	<=2%	One Month	0.16	0.02	0.33	0.06	0.28	0.06	0.21	0.06	0.03	0.02	0.02	0.03
	b) Worst affected BTSs due to downtime	<=2%	One Month	0.05	0.00	0.37	0.04	0.11	0.09	0.81	0.00	0.02	0.00	0.00	0.00
		<b>Connection Establishment (Accessibility)</b>													
2	a) CSSR (Call Setup Success Rate)	>=95 %	One Month	99.65	98.84	98.27	99.49	99.34	99.86	96.43	98.83	99.75	98.36	99.56	98.66
	b) SDCCH/PAGING Channel congestion	<=1%	One Month	0.08%	0.20	0.40	0.56	0.26	0.42	0.08	0.04	0.39	0.00	0.00	0.00
	c) TCH congestion	<=2%	One Month	0.05%	0.34	1.38	0.23	1.32	0.89	0.26	0.05	0.25	0.83	0.00	0.09
		<b>Connection maintenance (Retainability)</b>													
3	a) CDR (Call Drop Rate)	<=2%	One Month	0.46	0.28	0.97	0.28	0.56	0.56	0.05	0.45	0.35	0.09	0.12	0.24
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	One Month	2.80%	1.47	2.48	1.15	1.12	1.75	0.56	2.52	1.12	0.83	1.42	2.44
	c) Connections with good voice quality	>=95 %	One Month	97.22 %	99.75	97.85	97.63	99.95	98.92	99.53	98.87	97.89	99.23	99.20	99.15
4	No. of POI's having >=0.5% POI congestion	<=0.5%	One Month	0.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00



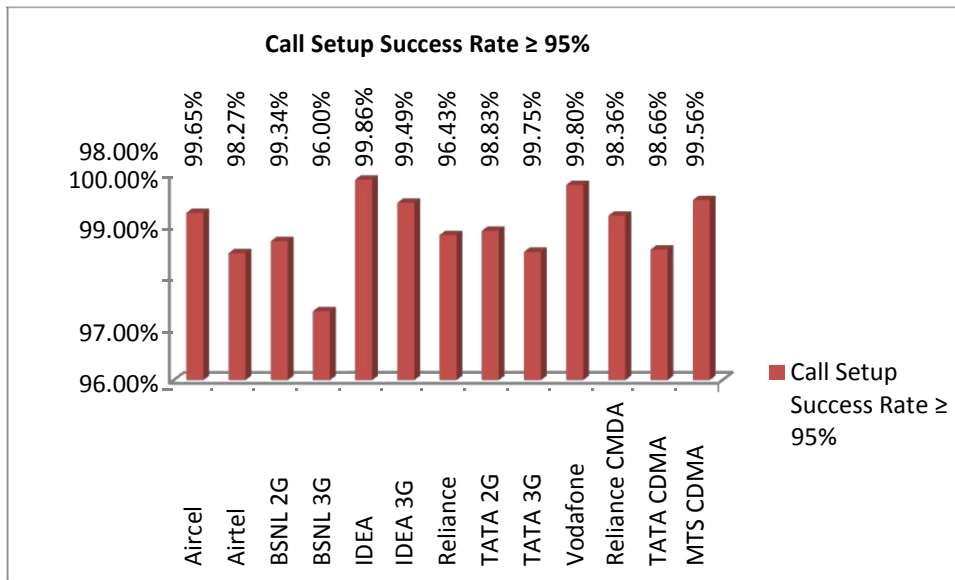
**Fig.1**

According to the **Fig.1** and data on the table **4.3.1**, it is found that all the operators are meeting the benchmark for BTS accumulated downtime.



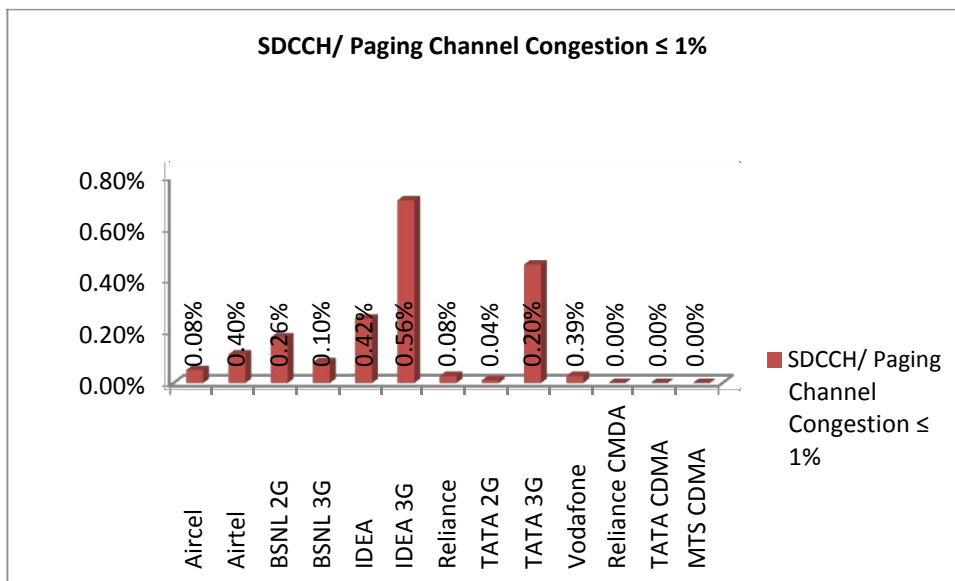
**Fig.2**

According to the **Fig.2** and data on the table **4.3.1**, it is found that all the operators are meeting the benchmark for worst affected BTS due to downtime.



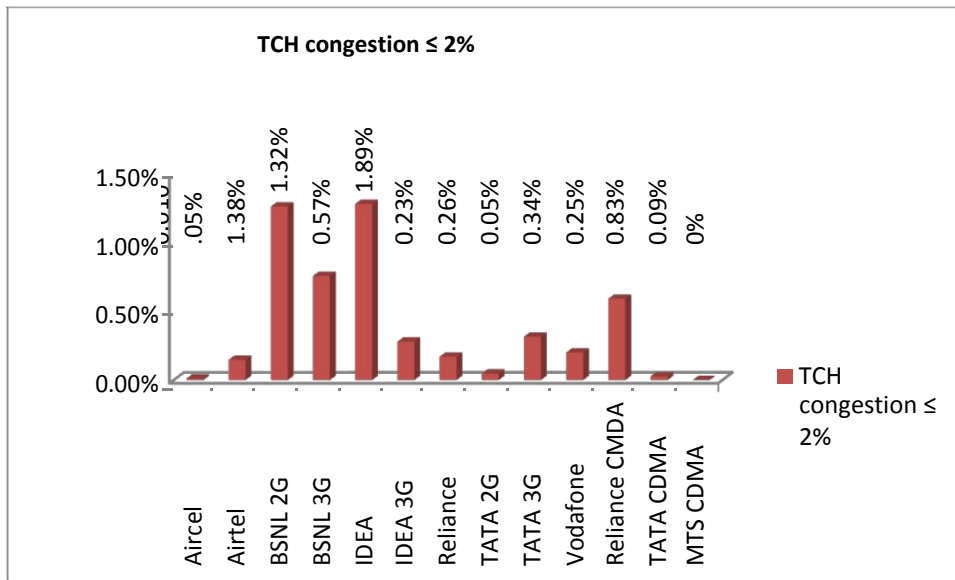
**Fig. 3**

According to the **Fig.3** and data on the table **4.3.1**, it is found that all the operators are meeting the benchmark for CSSR.



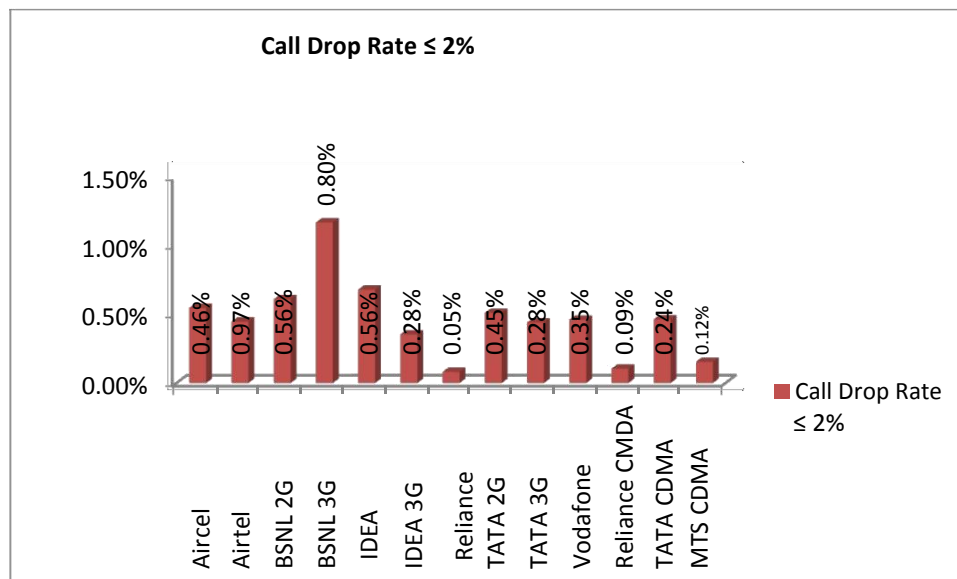
**Fig.4**

According to the **Fig.4** and data on the table **4.3.1**, it is found that all the operators are meeting the benchmark for SD congestion.



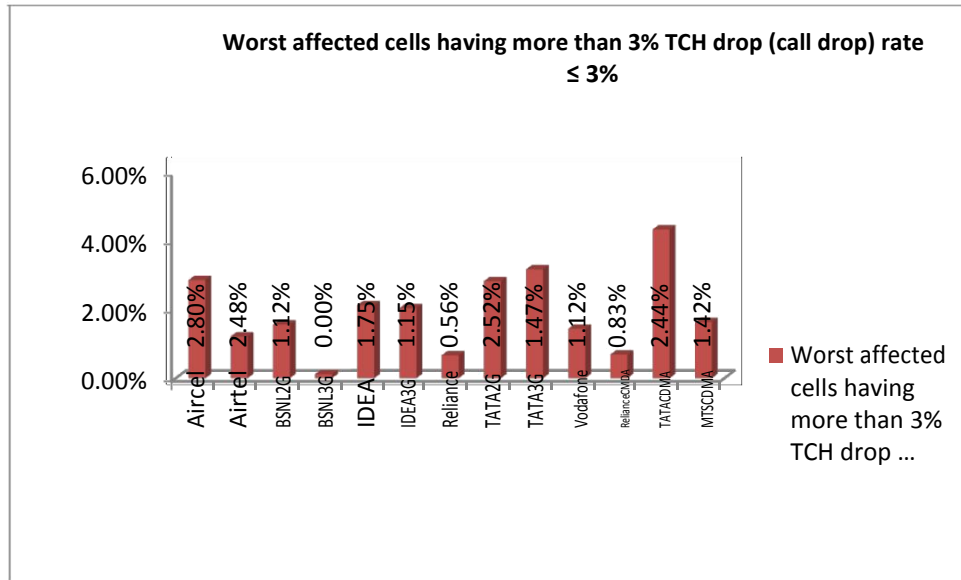
**Fig. 5**

According to the **Fig.5** and data on the table **4.3.1**, it is found that all the operators are meeting the benchmark for TCH congestion.



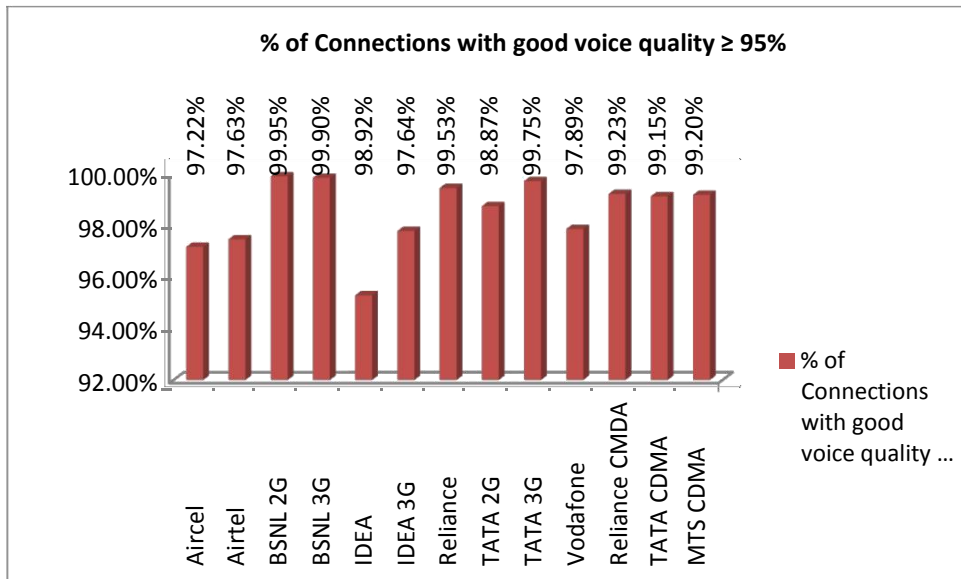
**Fig. 6**

According to the above graph and data on the table **4.3.1**, it is found that all the operators are meeting the benchmark for DCR. worst affected cells having more than 3% TCH drop (call drop) rate ( $\leq 3\%$ ) except TATA 2G & TATA CDMA.



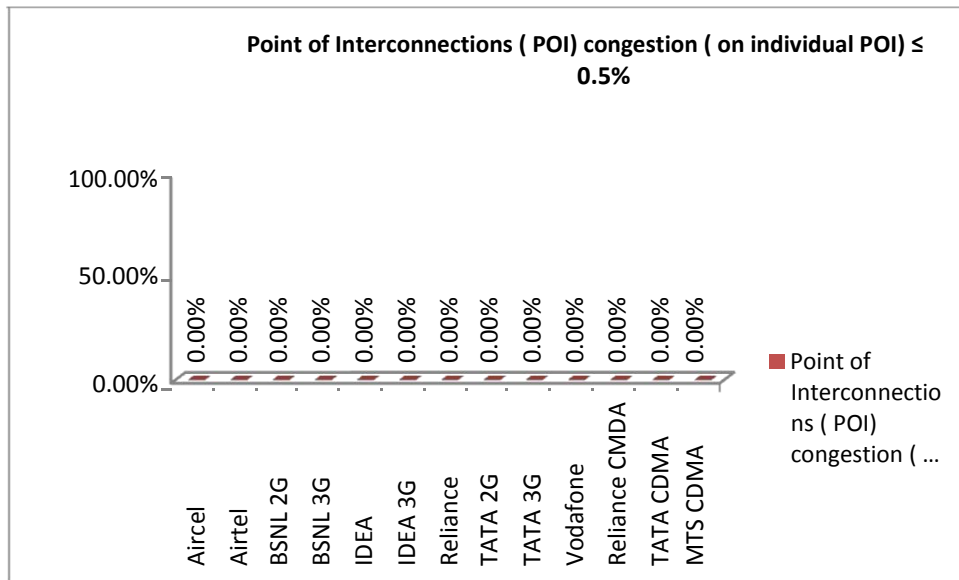
**Fig.7**

According to the **Fig.7** and data on the table **4.3.1**, it is found that all the operators are meeting the benchmark for Worst affected cells having DCR  $\geq 3\%$  except Tata CDMA and 3G.



**Fig. 8**

According to the **Fig.8** and data on the table **4.3.1**, it is found that all the operators are meeting the benchmark for Voice quality.



**Fig.8**

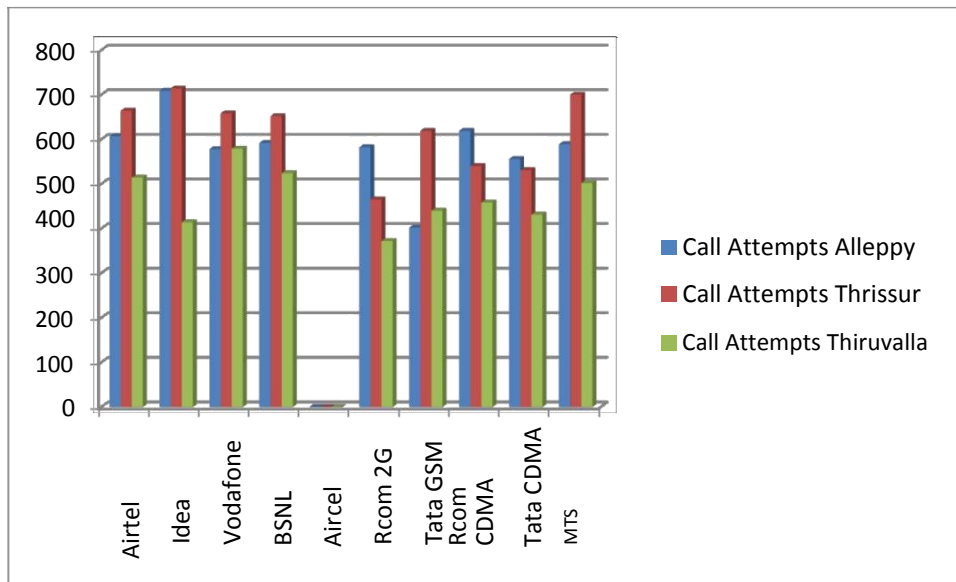
According to the **Fig.9** and data on the table **4.3.1**, it is found that all the operators are meeting the benchmark for POI congestion.

#### 4.4 Drive Test Measurements Audit Report KERALA Circle (Graphical Representation)

Drive Test Measurements													
S.N	Parameter	City Name	Airtel	Idea	Vodafone	BSNL	Aircel	RCOM 2G	Tata GSM	RCOM CDMA	Tata CDMA	MTS	
1.1	Call Attempts	Trivandrum	587	554	542	458	420	415	515	429	404	471	
		Palakkad	538	527	498	350	518	324	395	365	306	418	
		Ernakulam	595	658	505	419	NP	364	454	400	469	445	
1.2	Blocked Call Rate (<=3%)	Trivandrum	0.00%	0.00%	1.11%	1.50%	0.87%	5%	0.00%	0.00%	0.00%	0.64%	
		Palakkad	0.00%	0.00%	0.80%	1.47%	0.67%	6%	0.00%	0.00%	0.00%	0.48%	
		Ernakulam	0.34%	0.00%	0.70%	1.43%	NP	5%	1.18%	2%	0.00%	0.00%	
1.3	Dropped Call Rate (<=2%)	Trivandrum	0.17%	0.18%	0.00%	1.10%	1.13%	2%	0.00%	2%	0.50%	0.64%	
		Palakkad	0.37%	0.00%	0.00%	0.34%	0.41%	0.00%	0.25%	3%	0.00%	0.96%	
		Ernakulam	0.51%	0.00%	0.40%	0.24%	NP	3%	0.70%	5%	0.43%	1.40%	
1.4	Percentage of connections with good voice quality (=>95%)												
	(i) 0-4 (w/o frequency hopping)	Trivandrum	0	-	-	-	-	-	99.58%	-	99.53%	97.82%	98.91%
		Palakkad	-	-	-	-	-	-	-	-	99.53%	98.88%	98.86%
		Ernakulam	-	-	-	-	NP	-	-	-	99.65%	96.04%	96.71%
	(ii) 0-5 (with frequency hopping)	Trivandrum	98.39%	92.52%	94.22%	96.00%	97.11%	99.22%	97.82%	-	-	-	-
		Palakkad	98.20%	93.50%	95.85%	97.36%	100%	97.82%	-	-	-	-	-
Ernakulam		97.60%	93.95%	97.22%	95.38%	NP	97.20%	96.90%	-	-	-	0	
1.5	Service Coverage												
	In door (>= 75dBm)	Trivandrum	75.40%	60.09%	47.38%	82.50%	54.54%	59.46%	73.58%	45.07%	22.99%	52.48%	
		Palakkad	76.45%	61.01%	57.77%	85.37%	34.05%	58.60%	64.46%	52.36%	10.03%	53.12%	
		Ernakulam	77.39%	89.52%	78.93%	69.78%	NP	57.14%	46.51%	39.95%	17.70%	50.13%	
	In-vehicle (>= - 85dBm)	Trivandrum	94.78%	87.61%	87.91%	90.70%	76.64%	84.52%	89.48%	65.45%	48.68%	79.54%	
		Palakkad	95.62%	92.79%	91.29%	97.66%	63.34%	85.77%	87.72%	76.92%	31.60%	80.44%	
		Ernakulam	95.14%	98.46%	97.40%	92.37%	NP	82.39%	77.02%	67.90%	40.50%	76.23%	
	Outdoor-in city (>= -95dBm)	Trivandrum	99.68%	98.18%	99.58%	98.10%	94.54%	98.01%	95.47%	87.55%	73.13%	95.42%	
		Palakkad	99.82%	99.85%	99.61%	97.93%	89.15%	98.30%	98.86%	98.96%	66.89%	96.27%	
		Ernakulam	99.57%	99.69%	99.91%	99.22%	NP	96.79%	94.08%	96.43%	80.40%	95.88%	
	1.6	Call Setup Success Rate (>=95%)	Trivandrum	100.00%	99.64%	97.61%	97.50%	99.05%	98.80%	100.00%	100.00%	99.75%	99.36%
			Palakkad	99.81%	99.05%	98.39%	99.51%	89.15%	98.15%	100.00%	100.00%	100.00%	99.52%
Ernakulam			99.66%	99.33%	98.22%	98.57%	NP	98.63%	98.93%	99.50%	98.82%	95.88%	
1.7	Hand Over Success Rate (HOSR)	Trivandrum	99.51%	98.37%	98.83%	98.50%	99.42%	99.16%	-	100.00%	100.00%	99.89%	
		Palakkad	99.82%	99.04%	98.83%	98.26%	99.74%	99.76%	99.79%	100.00%	-	99.98%	
		Ernakulam	98.75%	99.66%	99.08%	98.55%	NP	100.00%	100.00%	100.00%	99.19%	100.00%	
1.8	Km's driven	Trivandrum	392 Km										
		Palakkad	440 Km										
		Ernakulam	444 Km										



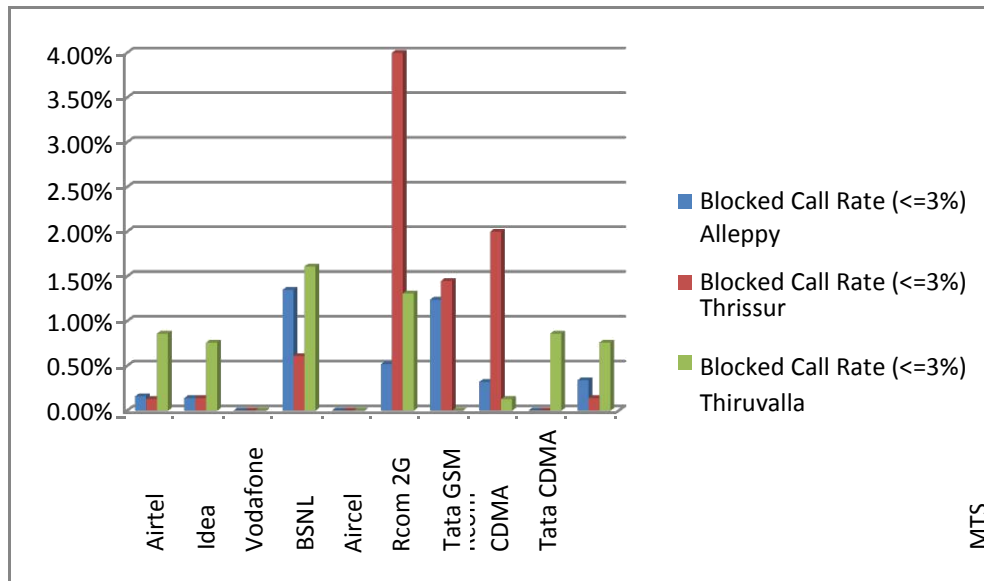
#### 4.4.1 Call Attempts: -



**Fig.4.4.1**

According to the table and the fig. 4.4.1 it shows the no. of call attempted in different city.

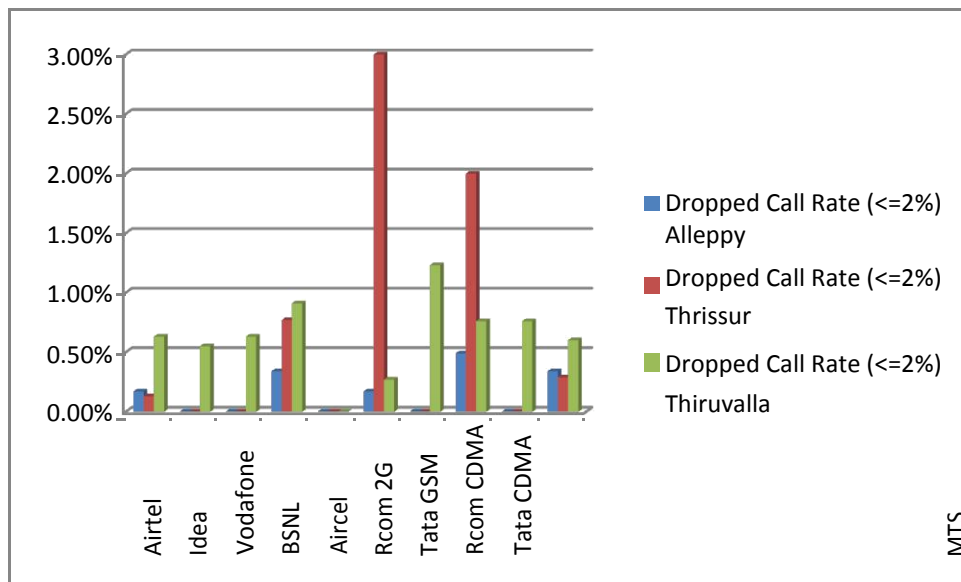
#### 4.4.2 Blocked Call Rate (<=3%):-



**Fig.4.4.2**

According to the table and the fig. 4.4.2 it shows that All operator meeting the benchmark except Rcom 2G in Thrissur SSA.

#### 4.4.3 Dropped Call Rate (<=2%):



**Fig.4.4.3**

According to the table and the fig. 4.4.3 it shows that All operator meeting the benchmark except RCOM 2G in Thrissur SSA.

#### 4.4.4 Percentage of connections with good voice quality ( $\geq 95\%$ )

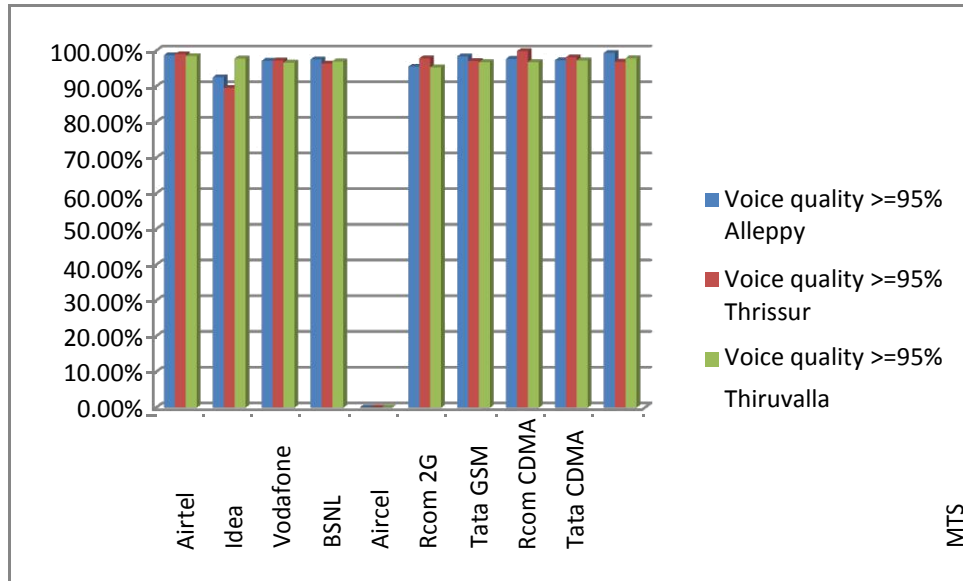
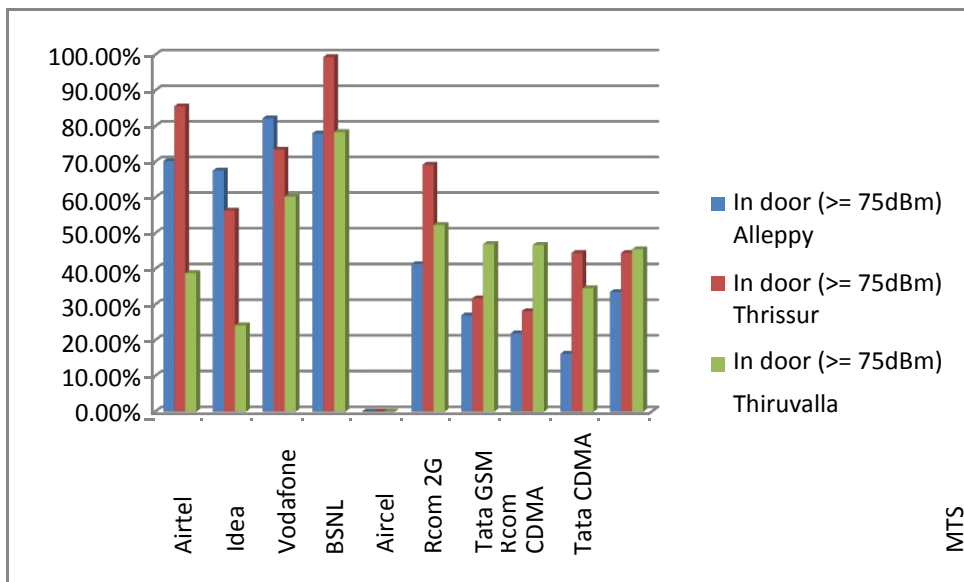


Fig.4.4.4

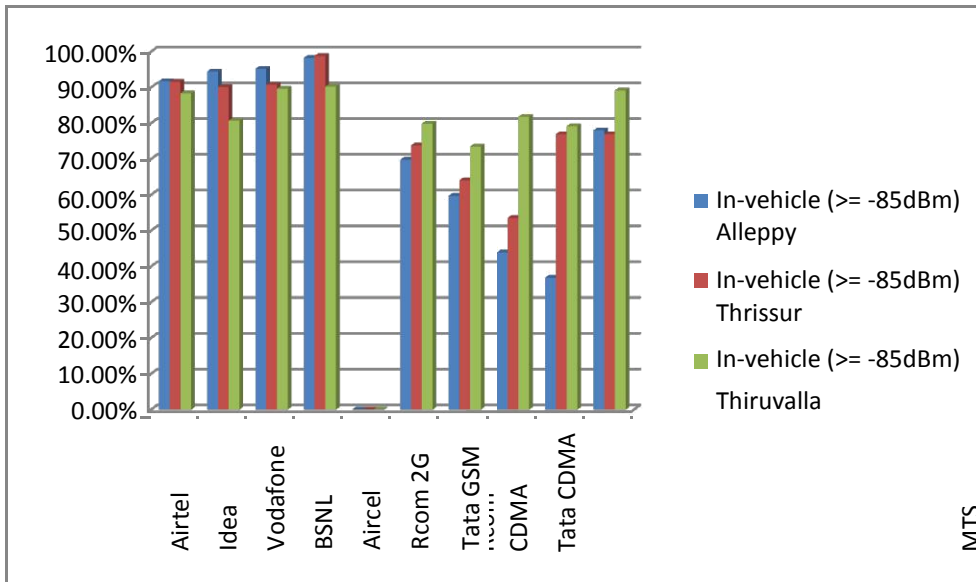
According to the table and the fig. 4.4.4 it shows that All operator meeting the benchmark

#### 4.4.5 Service Coverage

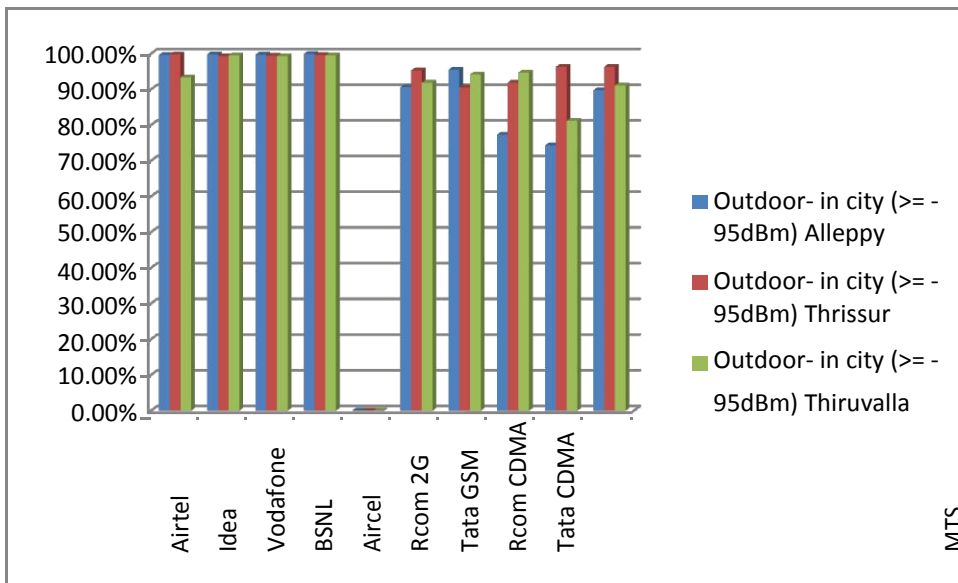
##### 4.4.5.1 Indoor ( $\geq -75\text{dBm}$ )



#### 4.4.5.2 In-vehicle ( $\geq -85\text{dBm}$ )



#### 4.4.5.3 Outdoor- in city ( $\geq -95\text{dBm}$ )



**Fig. 4.4.5.3**

According to the table and the fig. 4.4.5.3, it shows that all service providers are meeting their benchmark of **Outdoor- in city ( $\geq -95\text{dBm}$ )**.

#### 4.4.6 Call Setup Success Rate (>=95%)

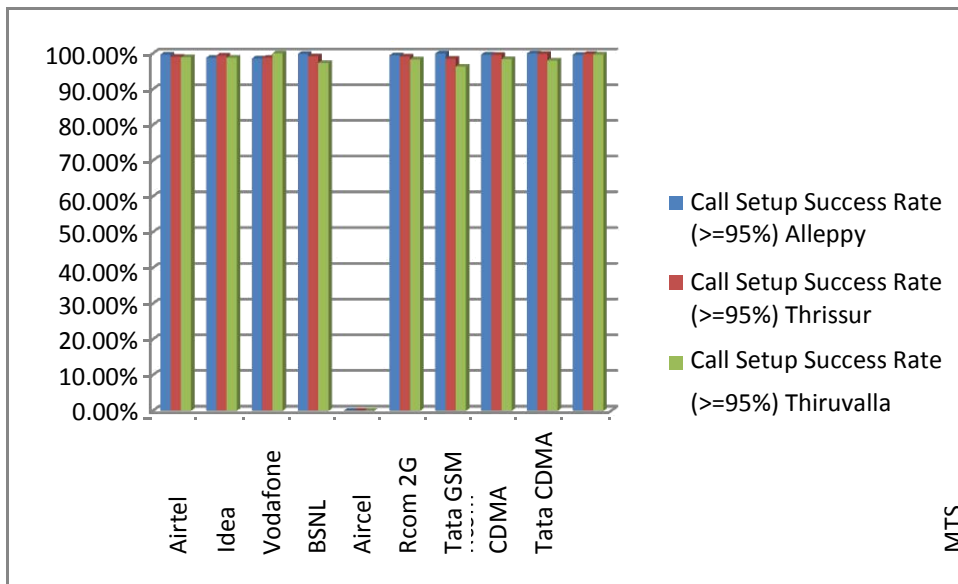


Fig. 4.4.6

According to the table and the fig. 4.4.6, it shows that all operator meeting the benchmark of **Call Setup Success Rate**.

#### 4.4.7 Handover Success Rate (HOSR)

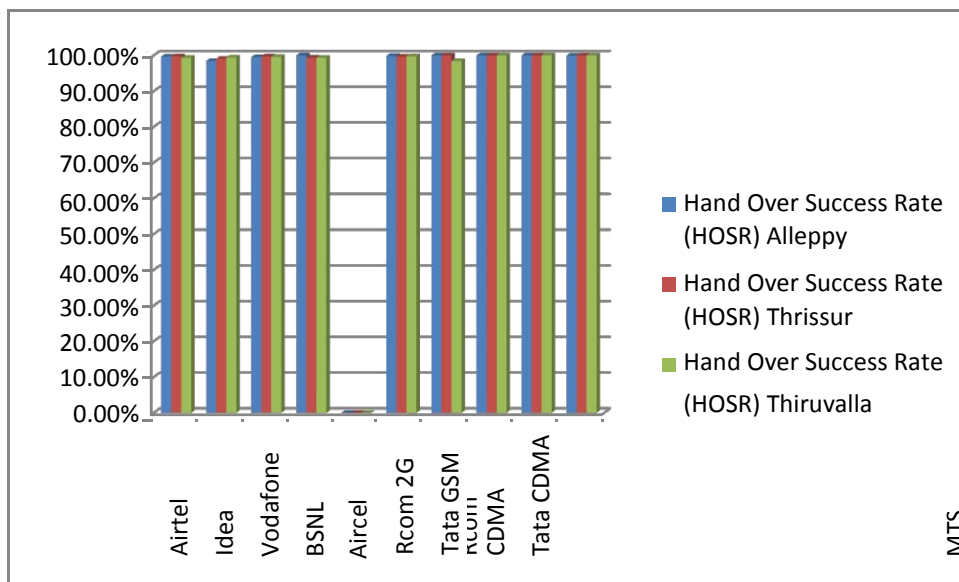


Fig.4.4.7

According to the table and the fig. 4.4.6, it shows that all operator meeting the benchmark of **HOSR**

## 4.5 Live Test Summary and Graphical Representation for KERALA Circle JAN-MAR 2016

KERALA CIRCLE-QUARTER 2 (JAN-MAR'16)																
Live Test Generation Data		Bench - mark	Audit Period	AIRC EL	AIRT EL	BS NL	IDE A	VODAF ONE	TAT A	RCO M	MT S	RCO M	TAT A	TAT A	IDE A	
S/ N	Name of Parameter			GSM Operators						CDMA Operators			3G			
<b>Network Service Quality Parameters</b>																
1	a) BTS Accumulated Downtime	<=2 %	Day 1	0.17	0.27	0.25	0.05	0.02	0.05	0.2	0.03	0.01	0.02	0.01	0.05	
			Day 2	0.14	0.28	0.21	0.03	0.02	0.06	0.22	0.02	0.02	0.02	0.02	0.02	0.05
			Day 3	0.13	0.27	0.27	0.03	0.03	0.06	0.22	0	0.01	0.05	0.02	0.02	0.09
	b) Worst affected BTSs due to downtime	<=2 %	Day 1	0.2	0.29	0.09	0.1	0.03	0	0.89	0	0	0	0	0.06	
			Day 2	0.7	0.29	0.13	0.11	0.01	0	0.88	0	0	0	0	0.06	
			Day 3	0.5	0.31	0.11	0.08	0.01	0	0.79	0	0	0	0	0.03	
<b>Connection Establishment (Accessibility)</b>																
2	a) CSSR (Call Setup Success Rate)	>=95 %	Day 1	98.52	98.19	98.87	99.75	99.77	98.88	96.55	99.6	98.19	98.68	98.82	99.44	
			Day 2	99.15	98.15	99.3	99.91	99.69	98.84	96.41	99.61	98.33	98.61	98.82	99.45	
			Day 3	98.86	98.18	99.22	99.9	99.69	98.86	96.44	99.56	98.39	98.53	98.83	99.51	
	b) SDCCH/PAGING Channel congestion	<=1 %	Day 1	0.08	0.39	0.23	0.39	0.42	0.04	0.09	0	0	0	0.21	0.56	
			Day 2	0.05	0.38	0.27	0.39	0.41	0.04	0.08	0	0	0	0.27	0.57	
			Day 3	0.06	0.51	0.27	0.49	0.39	0.03	0.08	0	0	0	0.19	0.49	
	c) TCH congestion	<=2 %	Day 1	0.07	1.49	1.29	0.85	0.26	0.06	0.24	0	0.8	0.11	0.32	0.24	
			Day 2	0.07	1.43	1.33	0.85	0.26	0.05	0.25	0	0.81	0.11	0.37	0.24	
			Day 3	0.06	1.33	1.31	0.89	0.24	0.05	0.27	0	0.85	0.09	0.36	0.26	
<b>Connection maintenance (Retainability)</b>																
3	a) CDR (Call Drop Rate)	<=2 %	Day 1	0.46	0.88	0.54	0.54	0.38	0.44	0.05	0.12	0.07	0.26	0.25	0.29	
			Day 2	0.35	0.87	0.59	0.59	0.33	0.46	0.05	0.13	0.11	0.27	0.29	0.31	
			Day 3	0.39	0.84	0.48	0.56	0.36	0.44	0.03	0.14	0.07	0.22	0.29	0.26	
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3 %	Day 1	3.12	2.61	1.19	1.71	1.12	2.46	0.51	1.42	0.77	2.51	1.49	1.17	
			Day 2	2.66	2.55	1.14	1.73	1.12	2.46	0.52	1.47	0.88	2.41	1.49	1.17	
			Day 3	2.77	2.58	1.14	1.73	1.16	2.55	0.59	1.16	0.87	2.41	1.46	1.13	
	c) Connections with good voice quality	>=95 %	Day 1	96.89	97.55	99.69	98.9	97.85	98.81	99.6	99.21	99.21	99.2	99.73	97.55	
			Day 2	97.13	97.56	99.75	98.92	97.89	98.91	99.57	99.19	99.25	99.21	99.81	97.59	
			Day 3	97.21	97.56	98.75	98.92	97.89	99.14	99.48	99.2	99.17	99.13	99.77	97.62	
4	No. of POI's having >=0.5% POI congestion	<=0.5 %	Day 1	0	0	0	0	0	0	0	0	0	0	0	0	
			Day 2	0	0	0	0	0	0	0	0	0	0	0	0	
			Day 3	0	0	0	0	0	0	0	0	0	0	0	0	

## Network Availability

### 4.5.1.1 BTS accumulated downtime ( $\leq 2\%$ )

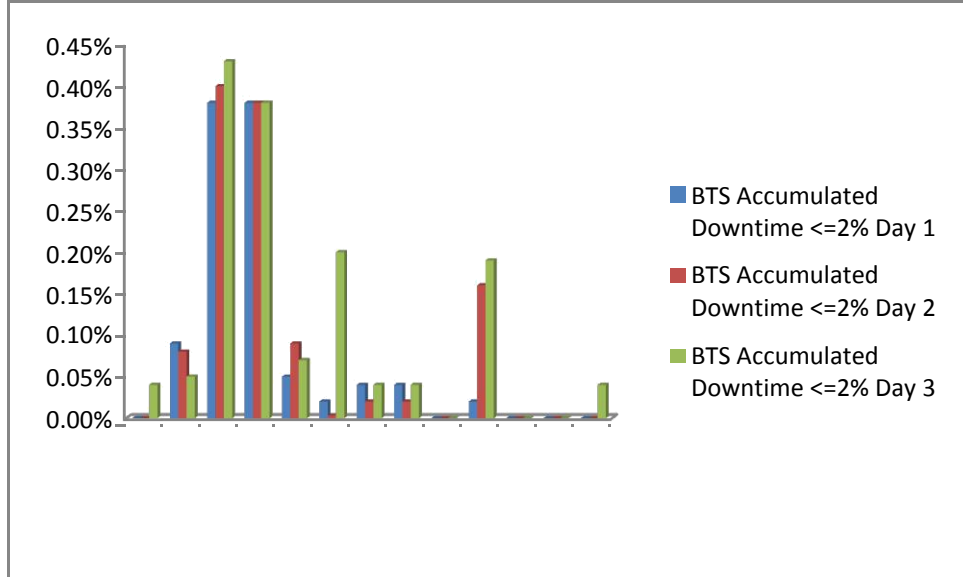


Fig. 4.5.1.1

- All operators are meeting the TRAI benchmarks **BTS accumulated downtime ( $\leq 2\%$ )** for 3 days live data taken in the month of audit except MTS for day 1.

### 4.5.1.2 Worst affected BTS due to downtime ( $\leq 2\%$ )

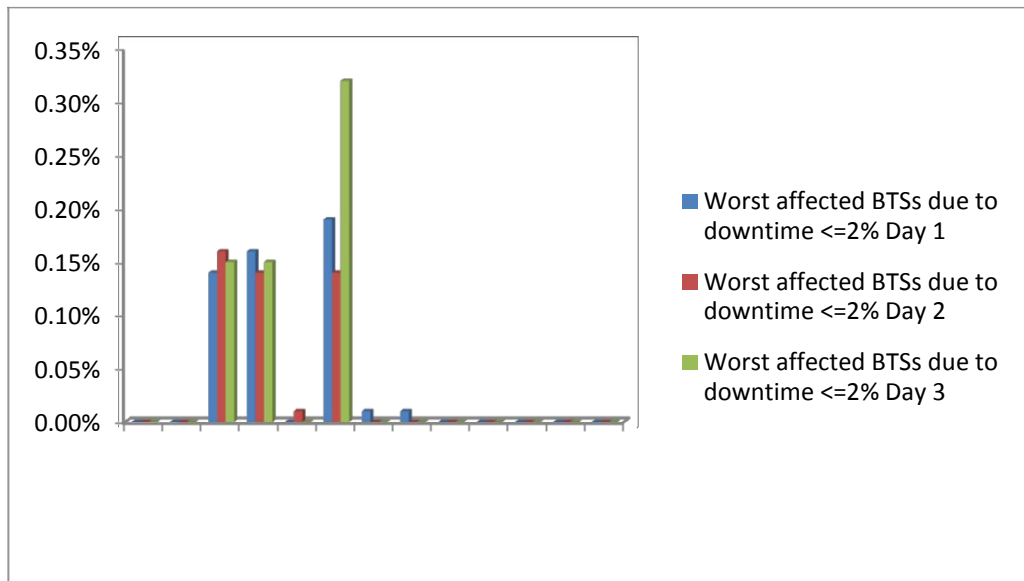


Fig. 4.5.1.2

- All operators are meeting the TRAI benchmarks **Worst affected BTS due to downtime ( $\leq 2\%$ )** for 3 days live data taken in the month of audit.

## 4.5.2 Connection establishment (Accessibility)

### 4.5.2.1 Call Setup Success Rate $\geq 95\%$

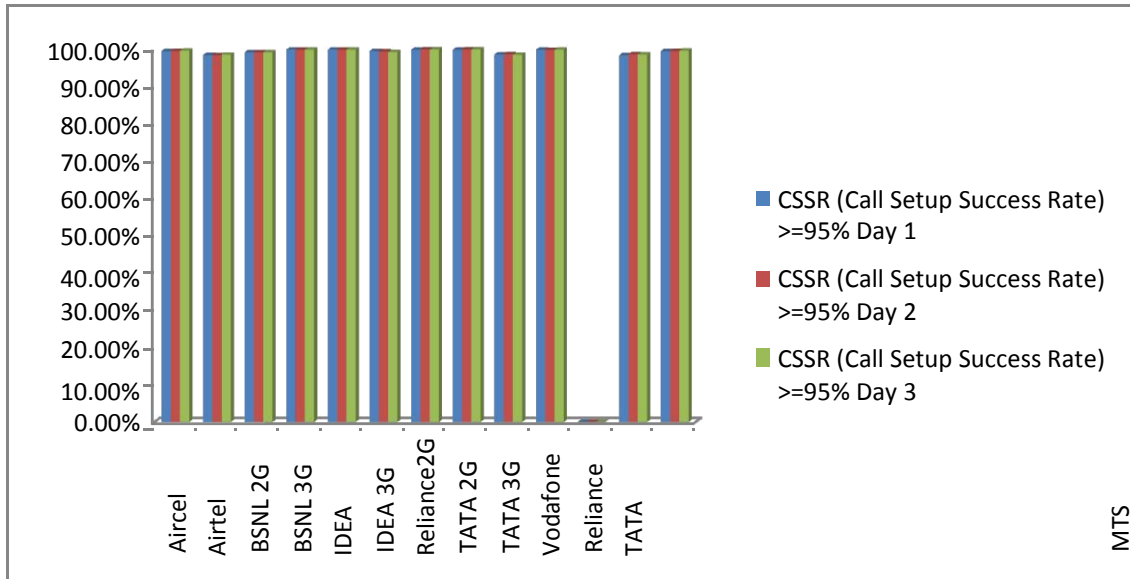


Fig. 4.5.2.1

- All operators are meeting the TRAI benchmarks ( $\geq 95\%$ ) for 3 days live data taken in the month of audit.

### 4.5.2.2 SDCCH/ Paging Channel Congestion

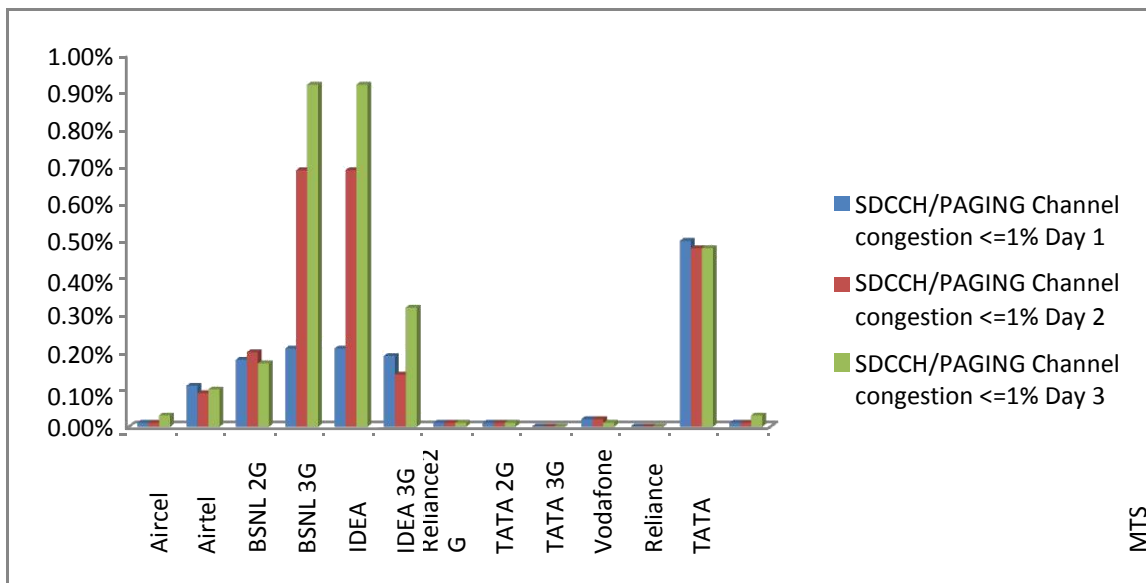


Fig. 4.5.2.2

- All operators are meeting the TRAI benchmarks ( $\leq 1\%$ ) for 3 days live data taken in the month of audit.



### 4.5.2.3 TCH congestion $\leq 2\%$

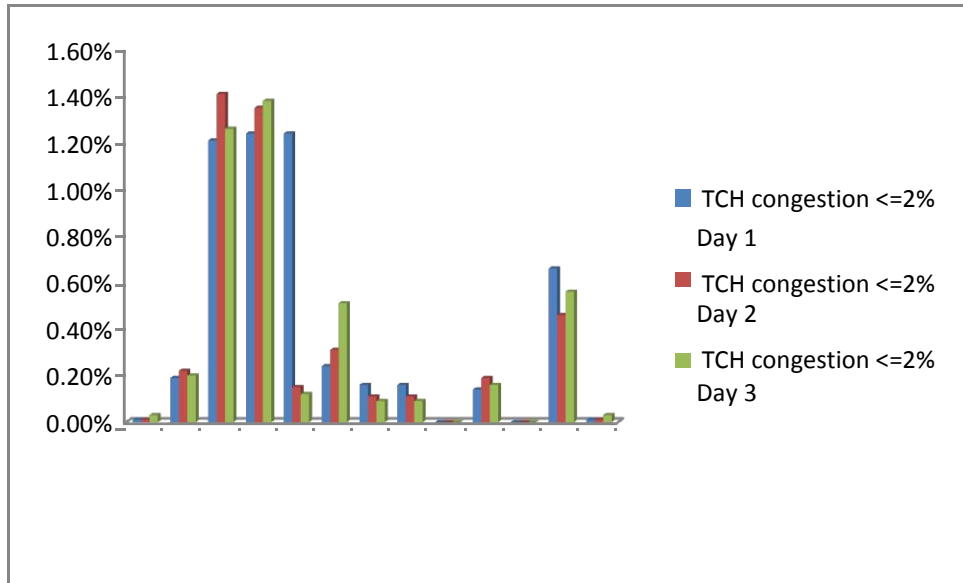


Fig. 4.5.2.3

- All operators are meeting the TRAI benchmarks ( $\leq 2\%$ ) for 3 days live data taken in the month of audit.

### 4.5.3 Connection Maintainability (Retain ability)

#### 4.5.3.1 Call Drop Rate $\leq 2\%$

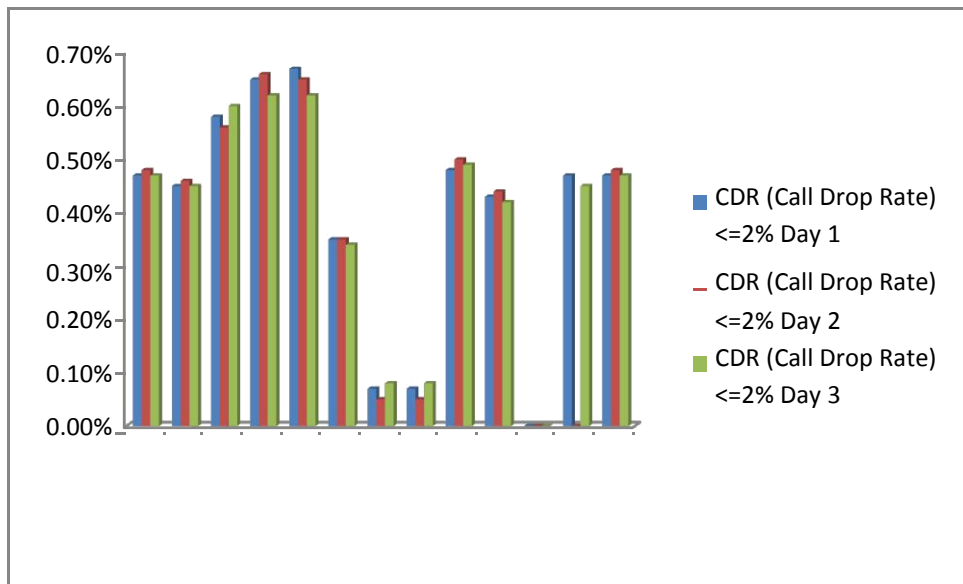


Fig. 4.5.3.1

- All operators are meeting the TRAI benchmarks ( $\leq 2\%$ ) for 3 days live data taken in the month of audit.

#### 4.5.3.2 Worst affected cells having more than 3% TCH drop (call drop) rate

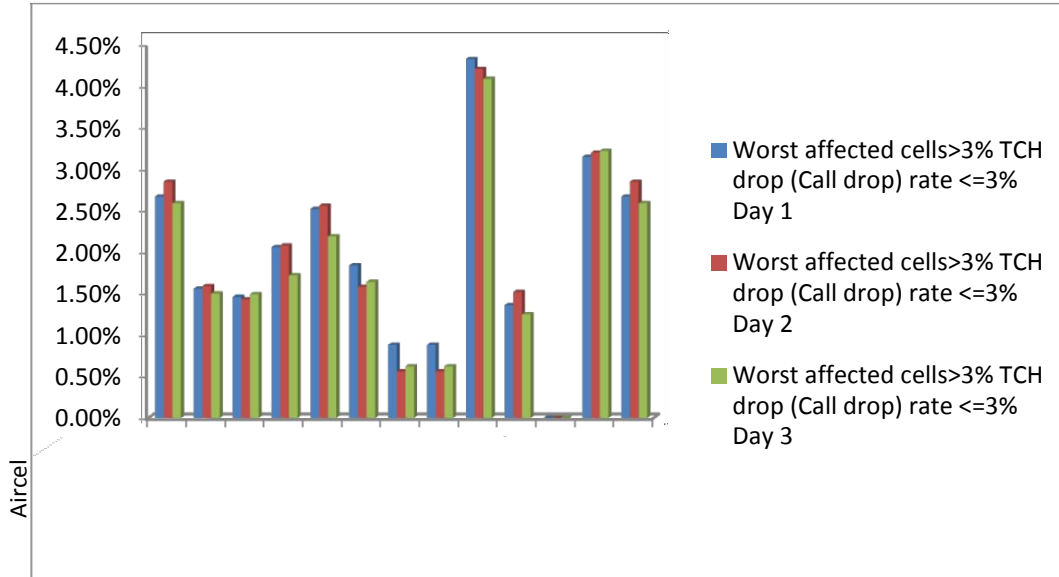


Fig. 4.5.3.2

- TATA(GSM&CDMA) are not meeting the benchmark for Worst affected cells having more than 3% TCH drop (call drop) rate in day 1, 2, 3.

#### 4.5.3.3 % of Connections with good voice quality $\geq 95\%$

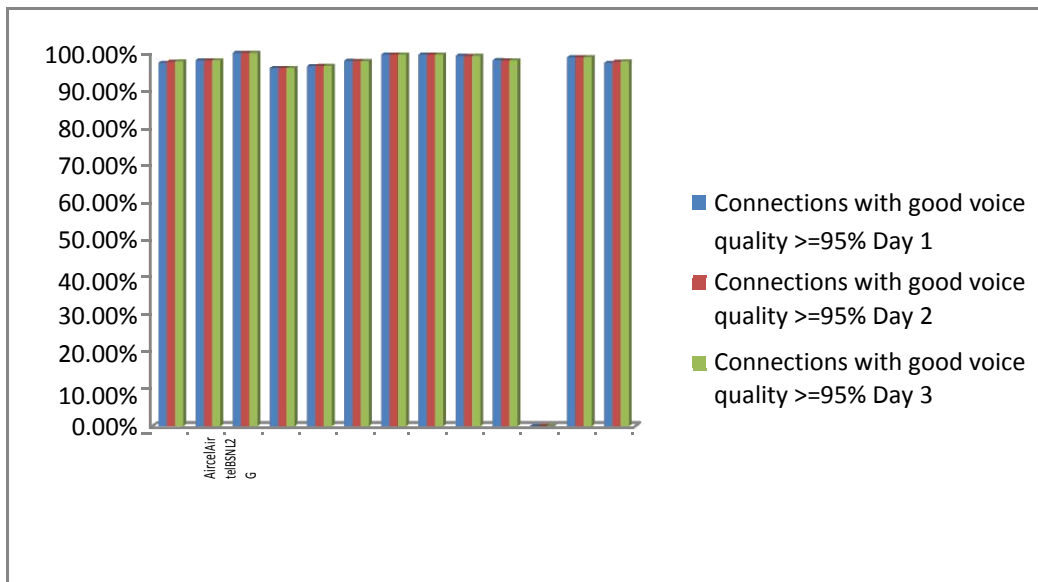


Fig. 4.5.3.3

- All operators are meeting the TRAI benchmarks ( $\Rightarrow 95\%$ ) for 3 days live data taken in the month of audit.

#### 4.5.3.4 Point of Interconnections (POI) congestion (on individual POI) $\leq 0.5\%$

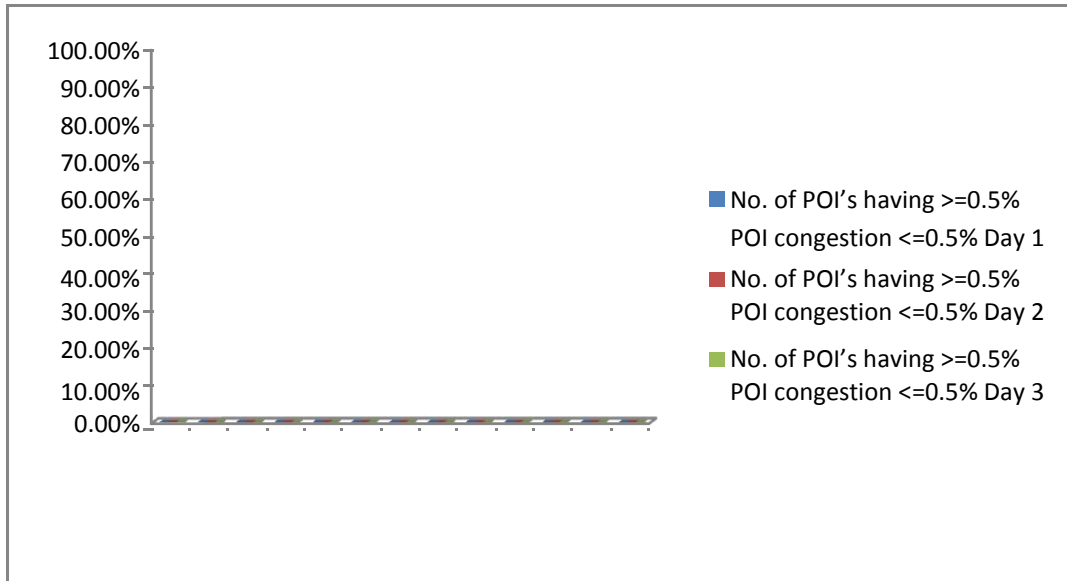


Fig. 4.5.3.4

- All operators are meeting the TRAI benchmarks ( $\leq 0.5\%$ ) for 3 days live data taken in the month of audit.

## CHAPTER-5: FINDINGS AND ANALYSIS

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.

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.

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.

### ➤ As per PMR Data Verification Results for-

- **KERALA Circle (jan'16)** - From the month Data Assessment, it is found that( TATA CDMA) are not meeting the benchmark for worst affected cells having more than 3% TCH drop (call drop) rate.
- **KERALA Circle (feb.'16):**From the month Data Assessment, it is found that All operator are meeting the bench mark.
- **KERALA Circle (mar.'16):** From the month Data Assessment, it is found that All operator are meeting the bench mark.
- **KERALA Circle(jan-mar'16):-** From the month Data Assessment, it is found that All operator are meeting the bench mark.
- .

### ➤ As per 3 Days Live Test Audit Report (2<sup>nd</sup> Quarter), Circle:-

Verification of the Performance of Service Providers against the Quality of Service benchmarks laid down by TRAI using Live measurements for 3 days during the month in which the Audit and Assessment is carried out.

Datamation

- Aircel, 2G in 1<sup>st</sup> day not meeting the benchmark for **worst affected cells having more than 3% TCH drop (call drop) rate** for all the 3 Days and TATA 3G for Day1 & Day2.

### **As per Operator Assisted Drive Test:**

The Operator Assisted Drive Test was conducted for all the Operators. Route covered was about 100 Km depending on city areas within the speed limit of 30-40 km/hour. In all the cities Zones were selected for covering different density areas (High/Medium/Low)



#### **Circle:**



Aircel not participated in Drive Test audit.



All operators achieved KPI threshold for Blocked Call Rate (<=3%).



All operators achieved KPI threshold for Dropped Call benchmark.



All operators achieved KPI threshold benchmark for the Voice Quality parameter (0-5 (with frequency hopping)).



All operators achieved KPI threshold benchmark for Call Setup Success Rate (>=95%).



### **Level 1 Live Calling (Emergency No.) Q2**

- Level 1 calling such as calling at emergency no. like Police, Fire, and Ambulance were made so as to check the service of such short codes. In different cities of it was found to be functional .



### **Performance(live calling for billing complaints):**

- We have made live calling to customers as per their complaints details and we verified their complaint and we found that most of the complaints are resolved within the time line and all the operators are meeting the TRAI benchmarks.



### **Live calling to call centre:-**

- In live calling to call centers we found that all the operators are meeting their benchmark .



### **Inter Operator Call Assessment**

- In the inter-operator call assessment test, calls were made from one operator to other operator so as to check congestion on both the operators' network. In such cases, the radio part, switch part and 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 no congestion found on the operator network.



## **CUSTOMER SERVICE QUALITY PARAMETERS**



### **2<sup>nd</sup> Quarter data Assessment (jan- mar.'16)**

- According to the parameter metering/billing credibility post-paid in the table we found that all the service providers are meeting the benchmark.
- According to the parameter metering /billing credibility pre-paid in the table we found that all the service providers, except IDEA 2G are meeting the benchmark.
- According to the parameter Resolution of billing/ charging complaints in the table we found that all the service providers are meeting the benchmark. Except BSNL,IDEA
- According to the parameter Period of applying credit/waiver/adjustment to the customer's account from the date of resolutions of complaints in the table we found that all the service providers are meeting the benchmark EXCEPT VODAFONE.
- According to the parameter Accessibility of call center/Customer Care in the table we found that all the service providers are meeting the benchmark.
- According to the parameter % call answered by operators (voice to voice) within 60 sec in the table all the service providers are meeting the benchmark EXCEPT TATA GSM
- According to the parameter no. of requests for Termination / Closure of service complied within 7 days during the quarter in the table we found that all the service providers are meeting the benchmark.
- According to the parameter Time taken for refunds of deposits after closures in the table we found that all operators meeting the benchmark. EXCEPT TATA CDMA.