TELECOM REGULATORY AUTHORITY OF INDIA

REPORT

ON

AUDIT & ASSESSMENT OF QUALITY OF SERVICE

OF

CELLULAR MOBILE TELEPHONE SERVICES

FOR

SOUTH ZONE

KERALA

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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 to lay-down the standards of quality of service to be provided by the service providers and ensure the quality of service and conduct the periodical audit of such services provided by the service providers so as 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 providers for Basic (Wireline) Telephone Services, Broadband and Cellular Mobile Telephone Services, as per the scope of work detailed scope of work outlined.

2.0. Scope of work to be undertaken:

The scope of work Audit and Assessment of Quality of Service of service providers 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 centres with respect to their accessibility and percentage of calls answered by the operators and random customer feedback by calling the customers to get feedback of the services provided by the service providers.

(f) Transfer of data generated by the RF drive test / live measurements / PMR/ monthly audit to the server located at TRAI premises on real time basis.

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

Basic (Wireline Services): The parameters for Basic Telephone Service (Wireline) consist of various QoS indicators, which can be audited and assessed objectively, and include parameters like fault incidences, call completion rates/answer to seizure ratio, 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 telephone

connection, etc. This work was not carried out in the Q1.

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 parameters related to (i) Network Availability (ii) Connection Establishment, (iii) Connection Maintenance (iv) POI Congestion. The Customer Service Quality Parameters include metering and billing credibility (postpaid and prepaid), 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 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 Q1.

Broadband Services: The parameters of Quality of Service for broadband services, specified in the regulation 3 of Quality of Service of Broadband Services Regulations, 2006, include service provisioning/activation time, fault repair and restoration time, billing performance, response time to customer for assistance, bandwidth utilization/ throughput, service availability, packet loss and network latency.

Cellular Mobile Telephone Service:

S.N	Name of Parameter	Benchmark	Averaged over a
A	**Network Service Quality Parameters:**		
(i)	Network Availability		
	(a) BTSs Accumulated downtime (not available for service)	≤ 2%	One Month
	(b) Worst affected BTSs due to downtime	≤ 2%	One Month
(ii)	Connection Establishment (Accessibility)		
	(a) Call Set-up Success Rate(within licensee's own network)	≥ 95%	One Month
	(b) SDCCH/ Paging Channel Congestion	≤ 1%	One Month
	(c) TCH Congestion	≤ 2%	One Month

(iii)	Connection maintenance (Retain ability)		
	(a) Call Drop Rate	≤ 2%	One Month
	(b) Worst affected cells having more than 3% TCH drop (call drop) rate	≤ 5% up to 31.03.2011 ≤ 3% From 01.04.2011	One Month
	(c) connections with good voice quality	≥ 95%	One Month
(iv)	Point of Interconnection (POI) Congestion (on individual POI)	≤ 0.5%	One Month
B	**Customer Service Quality Parameters:**		
(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	≥ 95%	One Quarter
	(b)Percentage of calls answered by the operators (voice to voice) within 60 seconds	≥ 90%	One Quarter
(ix)	Termination/ closure of service	≤ 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	Averaged 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 ≤15 days: Rent rebate for 15 days. Faults pending for >15 Days: rent rebate for one month.	One Quarter
(iii)	Mean Time To Repair (MTTR)	≤ 8 Hrs	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) within 60 seconds	≥ 90%	One Quarter
(xi)	Termination/ closure of service	≤ 7 days	One Quarter

(xii)	Time taken for refund of deposits after closures	100% within 60 days.	One Quarter

(iii) Broadband Service:

S.N	Parameters	Benchmark
(i)	Service Provisioning/ Activation time	100% cases in =<15 working days (Subject to technical feasibility). In all cases where payment towards installation charge & security deposit is taken and the Broadband connection is not provided within 15 working days, a credit at the rate of Rs.10/ per day, subject to a maximum of installation charge or equivalent usage allowance shall be given to the customer, at the time of issue of first bill.
(ii)	Fault Repair/ Restoration Time	By next working day: > 90% and within 3 working days: 99% Rebate: (a) Faults Pending for > 3 working days and < 7 working days: rebate equivalent to 7 days of minimum monthly charge or equivalent usage allowance (b) Faults Pending for > 7 working days and < 15 working days: rebate equivalent to 15 days of minimum monthly charge or equivalent usage allowance (c) Faults Pending for > 15 working days: rebate equivalent
(iii)	Billing Performance Billing complaints per 100 bills issued %age of Billing Complaints resolved Time taken for refund of deposits after closure	 < 2% 100% within 4 weeks 100% within 60 days
(iv)	Response time to the customers for assistance	% age of calls answered by operator (Voice to Voice) Within 60 seconds > 60% Within 90 seconds > 80%

(v)	Bandwidth Utilization/ Throughput: a) Bandwidth Utilization i) POP to ISP Gateway Node [Intra-network] Link(s) ii) ISP Gateway Node to IGSP / NIXI Node upstream Link(s) for International connectivity b) Broadband Connection Speed (download)	<80% link(s)/route bandwidth utilization during peak hours (TCBH). If on any link(s)/route bandwidth utilization exceeds 90%, then network is considered to have congestion. For this additional provisioning of Bandwidth on immediate basis, but not later than one month, is mandated. Subscribed Broadband Connection Speed to be met >80% from ISP Node to User.
(vi)	Service Availability / Uptime	> 90% quarter ending June 2007; > 98% with effect from quarter ending September 2007 and onwards
(vii)	Packet Loss	<1%
(viii)	Network Latency (for wired broadband access) User reference point at POP / ISP Gateway Node to International Gateway (IGSP/NIXI) User reference point at ISP Gateway Node to International nearest NAP port abroad (Terrestrial)	<120 msec <350 msec

User reference point at ISP Gateway Node to International nearest NAP port abroad (Satellite)
<800 msec

Detailed Scope of Work implemented & Universe:

We undertook 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 as follows: -.

(a) 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 PMR at site and uploaded it on real time basis to the server at TRAI, Delhi.

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 PMRs 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 parameters specified in clause The PMRs so generated were up-loaded on the server latest by 7th of the following month;

(b) verification of the performance of service providers 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 to the server;

(c) verification of the performance of service providers 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 was uploaded live to the server;

(d) Drive tests of the mobile networks of service providers; the results were uploaded live to the server. We carried out an analysis of the drive test and loaded the results giving such information and in such format as agreed by TRAI.

(e) audit of the performance of call centers with respect to their accessibility and percentage of calls answered by the operators, test calling and random customer feedback by calling the customers to get feedback of the services of the service providers was also 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 shall be 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 are 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 their 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) shall be intimated by TRAI from time to time and we shall carry 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 shall be completed in the same quarterly period.

Generation of performance reports against QOS benchmarks:

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 areas in respective Zone in each of the quarterly period.

Number of exchanges to be covered for Basic (Wireline) 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 (i.e. four quarters) for audit and assessment of the Quality of Service shall be obtained from TRAI. As per the break-up of 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"s 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 per cent) of the Points of Presence of ISP spread over in 10% (ten per cent) SDCAs in specified service area/telecom circle shall be covered. The POPs are proposed to be evenly spread over in the licensed service area. A service area/circle shall be audited only once in a year.

4.1 Primary Data Collection and Quality Control: The primary data was collected only as per the structured questionnaire and through field visits as per mode and protocol indicated and already approved by TRAI.

The primary data was collected by Datamation's RAN Engineers. The following measures, amongst others, were adopted to ensure good quality of data:

- Contents of questionnaire along with techniques and tools to be used for the survey and data collection after approval of TRAI were shared with all the trained / skilled investigating personnel at the beginning of the survey through orientation;
- Standardized data collection tool and guidelines were designed by the project team;
- Monitoring and supervision of field Engineers was done by team leader and field team leaders.

4.2 Secondary data collection and use: To achieve the set objectives of the survey, information from secondary sources shall also be used, including information supplied from TRAI and various other relevant media/sources.

Data processing, analysis and Report writing: after collection of data and field work, data processing was done by editing, validation of data for removing duplication or incomplete information, etc. and tabulation. Analysis of data was done as per the scope of work and deliverables. After completion of compilation of data and analysis, reports were compiled and submitted to TRAI which will include details on comparable parameters state wise.

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 of 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 centre 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:

For this TRAI has already 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 measurements adhere to specifications.

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 redressal and provisioning of new broadband connections: (Not conducted this Quarter)

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

- In basic service (wireline) for those customers who reported a fault complaint, billing dispute
- In case of Mobile operators, who have had a recent 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: In order to get a correct and meaningful result from audit it is 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 a 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 audit shall be 100 subscribers or 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/ ISP Node of Broadband Service Provider. Here, the total sample size (10% of the applicants in the previous month or 100 whichever is less for every service provider) shall be 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 details of the service complaints/ requests for the month previous to the audit month for Cellular Mobile Telephone Services, Basic (wireline) Services and Broadband Services. For broadband services, complaints related to download speed are proposed to be covered. From the list of these complaints/requests (10% or 100 per service provider per license service area, whichever is less) sample shall be drawn randomly to make check back calls. A notice of minimum 3 (three) weeks is proposed to be 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) <u>Audit and Assessment of Call Centre/ customer care promptness and</u> <u>live measurement through test calls:</u>

Test calls shall be made to assess the availability and efficiency of Level 1 services and complaint centre accessibility. The telephone/SIM Cards/Instruments for testing purposes shall be 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 1 Services:

Level 1 Services such as police, fire, ambulance (Emergency services) in the case of both Mobile service providers and basic telephone service providers. Test calls shall be made from all the levels working in a particular SDCA visited. Again, the total sample sizes (150 per license service area per service per quarter) are proposed to be equally distributed among the different SDCAs visited, and the distribution among the active levels would be in proportion to the capacity of each level in that SDCA.

(b) Inter-operator call assessment:

Inter Network calls i.e. calls made from one operator to another within the same license are shall be made to judge the ease of connectivity amongst the operators.

A sample of 2 X 50 test calls per service provider within the licensed service area are proposed to be made at

different point of time to the free test numbers of another service provider (50 calls between 1000 to 1300 Hrs. and 50 calls between 1500 to 1700 hrs. for basic service and between 1100 to 1400 hrs. and between 1600 to 1900 hrs.) for cellular mobile service. The results of these calls shall be compiled and reported separately for each service provider service area-wise.

The telephone/SIM Cards/Instruments for testing purposes shall be provided by the concerned service provider(s) in whose 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 (wireline) and Cellular Mobile Telephone Service:

We shall measure the performance of both basic *telephone* service (wireline) & cellular mobile services against the benchmarks of the following Quality of Service parameters: -

Response time to the customer for assistance:

(a) Accessibility of call centre/customer care >= 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 of above parameters shall be made using the traffic data at the point of termination to call centre from mobile/ basic telephone network. Traffic at the tandem or trunk or gateway MSC outgoing circuits to IVR of call centre shall be 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 shall be analyzed during the time consistent busy hour (TCBH) of call centre. In addition, we shall also make the test calls and correlate the results with the traffic data analysis.

The procedure (IVR menu and sub-menu) and ease of accessing the operator within the benchmark laid down by TRAI, both for postpaid and prepaid customers shall be 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 (Wireline) and Cellular Mobile Telephone Service Regulations, 2009 and provisions of the Telecom Consumers Complaint Redressal Regulations, 2012 shall be followed.

(ii) Broadband service:

We propose to measure the performance of Broadband service against the benchmarks of the following Quality of Service parameters: -

Response time to the customer for assistance: % age of calls answered by operator (voice to voice):

Within 60 seconds = 60%

Within 90 seconds = 80%

Measurement:

A sample of 2 X 50 calls per service provider is proposed to be made at different point of time to the call centre 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 (wireline) and similarly, 2 X 50 calls to the call centre 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 a 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 (wireline):

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

We propose to verify and audit 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, redressal and refunds of payment
- Checking of customer complaint handling through live test at the call centre
- 100 Nos. of service complaints/ requests and 100 Nos. of billing related complaints shall be

taken up by the auditing Agency for verifying their redressal as per the record of the service provider.

We propose to verify & audit r ecords 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 redressal thereof
- Checking of customer complaint handling through live test at the call centre
- Service complaints/ requests and billing related complaints shall be taken up by the auditing agency for verifying their redressal 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/Throughput including Broadband Connection Speed, Packet Loss and Latency shall be measured on sample basis.

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

The network operation centre (NOC) or operation and maintenance centre (OMC) of service providers are generally on centralized basis either at service area as a whole or on regional basis. In some of the cases it is on national basis. Similarly, call centre and billing centres are also centralized. We shall take live measurements and collection of one month data or audit by actual visit to such NOC, OMC, call centre and billing centre.

Procedure to be followed by the audit agency for cellular mobile telephone service data generation, verification and audit

S. No.	Parameter	Procedure
i)	Network availability (a) BTS accumulated down time (b) Worst affected BTSs due to down time	The fault Alarm tracking details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) will be verified by Audit agency for arriving at the figures reported to TRAI.
ii)	Call Set-up Success Rate	The cell wise data generated through counters/MMC available in the switch for traffic measurements to be verified by the Audit agency.
iii)	Blocked Call Rate	Both for SDCCH and TCH congestions the data in MSCs shall be verified and compared with the data reported to TRAI in the Quarterly PMRs.
iv)	Call Drop Rate	This parameter is to be 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 is to be measured from the system generated data on a scale from 0 to 7 for GSM and FER value for CDMA technology. The Audit agency should also collect the relevant city wise drive log files for all drive tests conducted to verify the parameter.

vi)	Service coverage	The Audit agency should also collect 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 shall be verified.
vii)	Metering and Billing Credibility	The Audit agency should audit 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 should be carried out to check the figures reported to TRAI. At the same time, the Audit agency should also conduct random live back checks of complaints.
x)	Period of applying credit/waiver/adjustment to customers account from the date of resolution	The Audit agency should check the billing complaints for which credit/waiver/ adjustment to be made on resolution of the complaints within one week.
xi)	Termination/closure of service	The data should be verified for termination/closure of the services within 7 days from the date of request.
xii)	Time taken for refund of d deposits after closure	Audit agency should verify that 100 % deposits should be refunded within 60 days. At the same time, the Audit agency should also conduct random live back checks of 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.

There are 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 aim 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 deficiency and initiation of improvements. The operator assistance shall be 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 by us 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 did independent drive tests 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 tests 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 were 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 the routes 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 30-50 km/hour (around 30 km/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 unit's 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.

6.0 Reporting Formats:

We developed data formats including executive summary, critical findings and detailed data analysis thereof for 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 are 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 findings on audit and assessment of QOS provided by service providers carried out in accordance with Clause 2 above. The report contained performance of each service provider for each licensed service area against the Quality of Service parameters. The report also contained a comparative analysis of 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 say (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 incorporating modifications and corrections suggested by TRAI and its acceptance	D+8 weeks
3.	Commencement 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 of 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

I. Preface

This report presents the growth trends for the telecom services in India for the quarter ending September 2013.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** (Kerala) in 1st quarter (July – Sept 2013). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken during the period Jan – Mar 2012.

Following are the various operators covered in Kerala 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
GSM Operators			
1	AircelLtd	July-2013	1900-2000 Hrs
2	Airtel Ltd	July-2013	1900-2000 Hrs
3	BSNL	July-2013	1900-2000 Hrs
4	Idea	July-2013	1900-2000 Hrs
5	Reliance Communication (GSM)	July-2013	1900-2000 Hrs
6	Tata Communications (GSM)	July-2013	1900-2000 Hrs
7	Uninor	July-2013	1900-2000 Hrs
8	Vodafone	July-2013	1900-2000 Hrs
CDMA Operators			
9	MTS (CDMA)	July-2013	1900-2000 Hrs
10	Reliance Communication (CDMA)	July-2013	1900-2000 Hrs
11	Tata Communications (CDMA)	July-2013	1900-2000 Hrs

II. 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 (Jul'13) -** From the month Data Assessment, it is found that all the operators are meeting the network parameters.
  - **Kerala Circle (Aug'13):** From the month Data Assessment, it is found that all the operators are meeting the network parameters except **BSNL (3G)** is not meeting the benchmark for **Voice Quality.**
  - **Kerala Circle (Sep'13):** From the month Data Assessment, it is found that all the operators are meeting the network parameters except **BSNL 3G** is not meeting Benchmark for **Voice Quality Parameter**.

- **As per 3 Days Live Test Audit Report (1st 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.
  - TATA (2G & 3G Services) is not meeting the benchmark for **worst affected cells having more than 3% TCH drop (call drop) rate**
  - Aircel is not meeting the benchmark for **worst affected cells having more than 3% TCH drop (call drop) rate.**

- **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).
  - **Kerala Circle:**
    - According to the table and the fig. 4.4.2 it shows that Vodafone in Iduki is not meeting the benchmark of **Blocked Call Rate** and Aircel is not participated.
    - According to the table and the fig. 4.4.3 it shows that Idea, MTS & TATA (CDMA & GSM) are not meeting the benchmark of **Dropped Call Rate** in Pathanamthitta and also Idea is not meeting the benchmark of **Dropped Call Rate** in Trissur.
    - According to the table and the fig. 4.4.4.1 it shows that the vodafone service providers is meeting their benchmark in all the city and Airtel, Idea, BSNL, Rcom (GSM & CDMA) and

TATA CDMA (in Trivandrum, Kollam, Kottayam and Pathanamthitta) are not available, however Aircel is not participated.

- According to the table and the fig. 4.4.4.1, it shows that Vodafone is not meeting the benchmark in any city and Idea is not meeting the benchmark of **Voice Quality (0-5 (with frequency hopping)** in Kollam, Kottayam, Trissur and Kannur.
- According to the table and the fig. 4.4.6, it shows that TATA (GSM & CDMA) is not meeting the benchmark of **Call Setup Success Rate** in Pathanamthitta, however Aircel is not participated.

➢ **Level 1 Live Calling (Emergency No.) Q1**

- 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 Kerala it was found to be functional.

➢ **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 & the POI in between the operators are involved and hence if any congestion is found in the network, it may be due to any of these parts. The result shows that there is not much congestion on the operator network; however most of the congestion was shown with BSNL service provider.

CUSTOMER SERVICE QUALITY PARAMETERS

❖ **1st Quarter data Assessment (Kerala Circle)**

- According to the parameter metering/billing credibility post-paid in the table **4.2.1** and the **Fig.1** we found that all the service providers are meeting the benchmark.
- According to the parameter metering /billing credibility pre-paid in the table **4.2.1** and the **Fig. 2** we found that all the service providers are meeting the benchmark.
- According to the parameter Resolution of billing/ charging complaints in the table **4.2.1** and the **Fig. 3** we found that all the service providers are meeting the benchmark except **BSNL.**
- 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 **4.2.1** and the **Fig. 4** we found that all the service providers are meeting the benchmark.

- According to the parameter Accessibility of call centre/Customer Care in the table **4.2.1** and the **Fig. 5** 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 **4.2.1** and the **Fig. 6** we found that all the service providers are meeting the benchmark except **BSNL, Airtel, TATA GSM, Vodafone, Rcom (GSM & CDMA).**
- According to the 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. 7** we found that all the service providers are meeting the benchmark except **MTS (NA).**
- According to the parameter Time taken for refunds of deposits after closures in the table **4.2.1** and the**Fig.8**wefound that all the service providers are meeting the benchmark except **TATA (GSM & CDMA) and MTS (NA).**

CHAPTER-3: AUDIT –PMR DATA VERIFICATION RESULTS

3.0 Cellular Mobile Telephone Service

3.1 PMR Data Verification Results for

3.1.1 Kerala Circle (Jul'13):

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.

S.N	Parameter name	Bench mark	Audit	Averaged period	Vodafone	Airtel GSM	Idea GSM	Aircel GSM	BSNL GSM	Rcom GSM	RCOM CDMA	Tata GSM	Tata CDMA	MTS CDMA
Network Availability														
1	BTS accumulated downtime	≤ 2%	Report	One month	0.03	0.02	0.52	0.35	0.77	0.03	0.04	0.01	0.02	0.04
			Verified		0.03	0.02	0.52	0.35	0.77	0.03	0.04	0.01	0.02	0.04
2	Worst affected BTS due to downtime	≤ 2%	Report	One month	0.00	0.02	1.22	0.00	0.01	0.00	0.00	0.00	0.00	0.00
			Verified		0.00	0.02	1.22	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Connection establishment (Accessibility)														
3	Call Setup Success Rate	≥ 95%	Report	One month	99.50	99.86	99.99	99.83	98.24	99.76	99.37	99.01	99.11	99.37
			Verified		99.50	99.86	99.99	99.83	98.24	99.76	99.37	99.01	99.11	99.37
4	SDCCH/ Paging Channel Congestion	≤ 1%	Report	One month	0.09	0.02	0.18	0.00	0.27	0.00	0.00	0.00	0.00	0.00
			Verified		0.09	0.02	0.18	0.00	0.27	0.00	0.00	0.00	0.00	0.00
5	TCH congestion	≤ 2%	Report	One month	0.50	0.04	0.69	0.04	1.76	0.01	0.03	0.02	0.04	0.02
			Verified		0.50	0.04	0.69	0.04	1.76	0.01	0.03	0.02	0.04	0.02
Connection Maintainability (Retain ability)														
6	Call Drop Rate	≤ 2%	Report	One month	0.77	0.23	0.60	0.92	0.67	0.12	0.19	0.64	0.45	0.64
			Verified		0.77	0.23	0.60	0.92	0.67	0.12	0.19	0.64	0.45	0.64
7	Worst affected cells having more than 3% TCH drop (call drop) rate	≤ 3%	Report	One month	0.77	0.58	1.75	2.97	0.02	0.36	0.53	1.00	2.38	2.83
			Verified		0.77	0.58	1.75	2.97	0.02	0.36	0.53	1.00	2.38	2.83
8	% of Connections with good voice quality	≥ 95%	Report	One month	96.59	99.51	95.20	97.68	99.88	99.24	99.73	98.21	99.13	99.11
			Verified		96.59	99.51	95.20	97.68	99.88	99.24	99.73	98.21	99.13	99.11
9	Point of Interconnections (POI) congestion (on individual POI)	≤ 0.5%	Report	One month	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Verified		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Finding & Critical Analysis:

- From the month Data Assessment, it is found that all the operators are meeting the Network Parameters.

3.1.2 Kerala Circle (Aug'13):

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.

Note:- NP= -0.01

S.N	Parameter name	Bench mark	Audit	Average period	Voda fone	Airtel GSM	Idea GSM	Idea 3G	Aircel GSM	BSNL GSM	BSNL 3G	Rcom GSM	RCOM CDMA	Tata GSM	Tata CDMA	Tata 3G	MTS CDMA
	Network Availability																
1	BTS accumulated downtime	≤ 2%	Report	One month	0.03	0.02	0.20	0.05	0.04	0.66	0.39	0.04	0.05	0.01	0.01	1.15	0.02
			Verified		0.03	0.02	0.20	0.05	0.04	0.66	0.39	0.04	0.05	0.01	0.01	1.15	0.02
2	Worst affected BTS due to downtime	≤ 2%	Report	One month	0.04	0.04	0.57	0.00	0.00	0.01	1.45	0.00	0.08	0.00	0.00	0.00	0.00
			Verified		0.04	0.04	0.57	0.00	0.00	0.01	1.45	0.00	0.08	0.00	0.00	0.00	0.00
	Connection establishment (Accessibility)																
3	Call Setup Success Rate	≥ 95%	Report	One month	99.19	99.82	99.99	99.82	99.63	98.17	99.32	99.69	99.37	99.02	98.89	99.59	99.64
			Verified		99.19	99.82	99.99	99.82	99.63	98.17	99.32	99.69	99.37	99.02	98.89	99.59	99.64
4	SDCCH/ Paging Channel Congestion	≤ 1%	Report	One month	0.09	0.05	0.20	0.04	0.01	0.27	0.20	0.05	0.00	0.01	0.00	0.02	0.00
			Verified		0.09	0.05	0.20	0.04	0.01	0.27	0.20	0.05	0.00	0.01	0.00	0.02	0.00
5	TCH congestion	≤ 2%	Report	One month	0.81	0.07	0.81	0.17	0.01	1.83	1.59	0.02	0.00	0.01	0.05	0.09	0.02
			Verified		0.81	0.07	0.81	0.17	0.01	1.83	1.59	0.02	0.00	0.01	0.05	0.09	0.02
	Connection Maintainability (Retain ability)																
6	Call Drop Rate	≤ 2%	Report	One month	0.72	0.23	0.62	0.19	1.34	0.64	1.04	0.11	0.00	0.58	0.61	0.35	0.55
			Verified		0.72	0.23	0.62	0.19	1.34	0.64	1.04	0.11	0.00	0.58	0.61	0.35	0.55
7	Worst affected cells having more than 3% TCH drop (call drop) rate	≤ 3%	Report	One month	0.71	0.65	1.93	1.90	2.55	0.02	0.09	0.13	0.25	0.38	1.11	0.61	2.84
			Verified		0.71	0.65	1.93	1.90	2.55	0.02	0.09	0.13	0.25	0.38	1.11	0.61	2.84
8	% of Connections with good voice quality	≥ 95%	Report	One month	96.85	99.74	95.20	99.99	97.19	99.86	**91.75**	99.34	99.74	98.28	99.12	99.82	98.26
			Verified		96.85	99.74	95.20	99.99	97.19	99.86	**91.75**	99.34	99.74	98.28	99.12	99.82	98.26
9	Point of Interconnections (POI) congestion (on individual POI)	≤ 0.5%	Report	One month	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
			Verified		0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.00

Finding & Critical Analysis:

- BSNL (3G) is not meeting the benchmark for Voice Quality.

3.1.3 Kerala Circle (Sep'13):

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.

Network Service Quality parameters																	
S.No	Parameter name	Bench mark	Audit	Averaged period	Voda fone	Idea GSM	Idea 3G	BSNL GSM	BSNL 3G	Aircel GSM	Airtel GSM	Rcom GSM	RCOM CDMA	Tata GSM	Tata CDMA	Tata 3G	MTS CDMA
	Network Availability																
1	BTS accumulated downtime	≤ 2%	Report	One month	0.02	0.09	0.69	0.02	0.26	0.07	0.02	0.03	0.04	0.01	0.09	0.86	0.02
			Verified		0.02	0.09	0.69	0.02	0.26	0.07	0.02	0.03	0.04	0.01	0.09	0.86	0.02
2	Worst affected BTS due to downtime	≤ 2%	Report	One month	0.06	0.26	0.03	0.01	0.36	0.00	0.02	0.09	0.00	0.00	0.00	0.00	0.00
			Verified		0.06	0.26	0.03	0.01	0.36	0.00	0.02	0.09	0.00	0.00	0.00	0.00	0.00
	Connection establishment (Accessibility)																
3	Call Setup Success Rate	≥ 95%	Report	One month	99.41	99.98	99.70	98.32	99.02	99.71	99.80	99.83	99.37	98.98	98.85	99.59	99.64
			Verified		99.41	99.98	99.70	98.32	99.02	99.71	99.80	99.83	99.37	98.98	98.85	99.59	99.64
4	SDCCH/ Paging Channel Congestion	≤ 1%	Report	One month	0.08	0.17	0.68	0.27	0.14	0.11	0.06	0.02	0.00	0.01	0.00	0.02	0.00
			Verified		0.08	0.17	0.68	0.27	0.14	0.11	0.06	0.02	0.00	0.01	0.00	0.02	0.00
5	TCH congestion	≤ 2%	Report	One month	0.59	0.73	0.17	1.68	1.99	0.00	0.08	0.01	0.01	0.02	0.04	0.08	0.01
			Verified		0.59	0.73	0.17	1.68	1.99	0.00	0.08	0.01	0.01	0.02	0.04	0.08	0.01
	Connection Maintainability (Retain ability)																
6	Call Drop Rate	≤ 2%	Report	One month	0.64	0.57	0.17	0.64	1.16	0.80	0.24	0.11	0.02	0.61	0.97	0.37	0.57
			Verified		0.64	0.57	0.17	0.64	1.16	0.80	0.24	0.11	0.02	0.61	0.97	0.37	0.57
7	Worst affected cells having more than 3% TCH drop (call drop) rate	≤ 3	Report	One month	0.64	1.48	1.52	1.89	0.07	2.97	0.62	0.09	0.19	0.84	2.01	0.43	2.73
			Verified		0.64	1.48	1.52	1.89	0.07	2.97	0.62	0.09	0.19	0.84	2.01	0.43	2.73
8	% of Connections with good voice quality	≥ 95%	Report	One month	97.22	95.20	98.99	99.88	**92.36**	98.16	99.73	99.35	99.74	98.26	99.13	99.82	98.25
			Verified		97.22	95.20	98.99	99.88	**92.36**	98.16	99.73	99.35	99.74	98.26	99.13	99.82	98.25
9	Point of Interconnections (POI) congestion (on individual POI)	≤ 0.5%	Report	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	0.00
			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	0.00

Finding & Critical Analysis:

- BSNL 3G is not meeting Benchmark for Voice Quality Parameter.

3.2 3 Days Live Test Audit Report (1st 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.

S.No	Parameter name	Bench mark	Date	Vodafone	Airtel GSM	Idea GSM	Idea 3G	MTS CDMA	Aircel GSM	BSNL GSM	BSNL 3G	Rcom GSM	RCOM CDMA	Tata GSM	Tata 3G	Tata CDMA
1	BTS accumulated downtime	≤ 2%	Day 1	0.00	0.00	0.01	0.03	0.00	0.00	0.02	0.00	0.05	0.06	0.01	0.00	0.00
			Day 2	0.00	0.00	0.01	0.02	0.00	0.00	0.02	0.00	0.09	0.12	0.01	0.00	0.00
			Day 3	0.00	0.00	0.01	0.03	0.00	0.00	0.02	0.00	0.05	0.06	0.01	0.00	0.00
2	Worst affected BTS due to downtime	≤ 2%	Day 1	0.00	0.00	0.02	0.00	0.00	0.00	0.06	0.00	0.03	0.02	0.00	0.00	0.00
			Day 2	0.00	0.00	0.02	0.00	0.00	0.00	0.06	0.00	0.08	0.10	0.00	0.00	0.00
			Day 3	0.00	0.00	0.02	0.00	0.00	0.00	0.05	0.00	0.04	0.04	0.00	0.00	0.00
Connection establishment (Accessibility)																
3	Call Setup Success Rate	≥ 95%	Day 1	99.59	99.81	99.98	99.86	99.71	99.94	99.14	99.15	99.82	99.36	98.97	99.56	99.01
			Day 2	99.46	99.81	99.97	99.86	99.68	99.26	99.07	99.26	99.83	99.35	98.96	99.50	98.98
			Day 3	99.33	99.82	99.97	99.86	99.71	99.93	99.14	99.19	99.82	99.37	98.97	99.59	99.01
4	SDCCH/ Paging Channel Congestion	≤ 1%	Day 1	0.02	0.04	0.13	0.01	0.00	0.02	0.48	0.27	0.00	0.00	0.00	0.05	0.00
			Day 2	0.06	0.05	0.15	0.05	0.00	0.00	0.63	0.27	0.00	0.00	0.01	0.07	0.00
			Day 3	0.11	0.05	0.19	0.21	0.00	0.00	0.66	0.29	0.00	0.00	0.05	0.05	0.00
5	TCH congestion	≤ 2%	Day 1	0.41	0.07	0.85	0.02	0.01	0.00	0.86	0.59	0.01	0.00	0.01	0.11	0.00
			Day 2	0.54	0.07	0.78	0.04	0.00	0.00	0.93	0.73	0.01	0.00	0.02	0.15	0.00
			Day 3	0.67	0.07	0.77	0.06	0.01	0.00	0.86	0.63	0.01	0.00	0.01	0.12	0.01
Connection Maintainability (Retain ability)																
6	Call Drop Rate	≤ 2%	Day 1	0.66	0.27	0.52	0.17	0.56	0.92	0.48	0.93	0.10	0.00	0.60	0.32	0.84
			Day 2	0.65	0.25	0.52	0.17	0.51	1.38	0.47	0.91	0.10	0.01	0.60	0.34	0.84
			Day 3	0.60	0.23	0.56	0.18	0.56	0.00	0.46	0.88	0.10	0.00	0.59	0.34	1.53
7	Worst affected cells having more than 3% TCH drop (call drop) rate	≤ 3%	Day 1	2.02	0.51	1.59	1.35	2.86	**6.11**	2.83	0.07	0.00	0.00	**4.20**	**5.03**	1.64
			Day 2	2.03	0.40	1.64	1.63	2.53	**4.89**	2.82	0.07	0.00	0.00	**4.12**	**4.77**	1.34
			Day 3	2.00	0.39	2.03	1.63	1.92	2.85	2.73	0.07	0.00	0.00	**4.44**	**4.43**	2.68
8	% of Connections with good voice quality	≥ 95%	Day 1	97.19	99.72	95.48	99.02	98.25	97.02	NA	99.83	99.35	99.25	98.30	99.83	99.16
			Day 2	97.28	99.72	95.53	99.07	98.24	99.42	NA	99.83	99.36	99.33	98.28	99.83	99.14
			Day 3	97.19	99.70	95.25	99.02	98.26	99.31	NA	99.82	99.36	99.34	98.32	99.83	99.16
9	Point of Interconnections (POI) congestion (on individual POI)	≤ 0.5%	Day 1	0.11	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Day 2	0.17	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Day 3	0.08	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Finding & Critical Analysis:

- TATA (2G & 3G Services) is not meeting the benchmark for **worst affected cells having more than 3% TCH drop (call drop) rate**
- Aircel is not meeting the benchmark for **worst affected cells having more than 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 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).

Drive Test Measurements												
S N	Parameter	City Name	GSM Operators							CDMA Operators		
			Airtel	Idea	Vodafone	BSNL	Aircel	RCOM GSM	TATA GSM	RCOM CDMA	TATA CDMA	MTS
1.1	Call Attempts	Trivandrum	170	145	138	118	NP	153	128	151	169	116
		Kollam	120	128	148	109	NP	141	131	143	136	94
		Kottayam	183	133	107	139	NP	119	138	121	134	141
		Pathanamthitta	152	120	162	151	NP	66	139	65	103	129
		Alleppey	179	110	109	134	NP	108	162	111	116	117
		Trissur	181	143	157	143	NP	141	175	140	143	134
		Palakkad	183	165	163	215	NP	188	218	190	120	151
		Kannur	206	195	223	233	NP	185	232	187	171	174
		Iduki	157	132	132	147	NP	137	135	142	110	119
1.2	Blocked Call Rate (<=3%)	Trivandrum	0.00%	1.38%	2.00%	0.00%	NP	0.00%	0.00%	0.00%	0.00%	0.00%
		Kollam	0.83%	1.56%	1.00%	0.00%	NP	0.00%	0.00%	0.00%	0.00%	0.00%
		Kottayam	0.55%	0.75%	2.00%	2.16%	NP	0.84%	0.00%	0.00%	0.00%	0.71%
		Pathanamthitta	0.66%	0.83%	3.00%	1.98%	NP	0.00%	0.00%	0.00%	0.00%	1.55%
		Alleppey	1.68%	0.00%	0.00%	0.00%	NP	0.90%	0.00%	0.00%	0.00%	0.00%
		Trissur	1.10%	0.00%	1.91%	0.00%	NP	0.00%	0.00%	0.00%	0.00%	0.00%
		Palakkad	2.19%	0.61%	1.23%	0.47%	NP	0.00%	0.00%	0.00%	0.00%	0.00%
		Kannur	0.00%	0.51%	1.35%	2.14%	NP	0.00%	0.00%	1.60%	0.00%	0.00%
		Iduki	0.64%	0.00%	3.79%	1.37%	NP	0.00%	0.00%	0.00%	0.00%	0.80%
1.3	Dropped Call Rate (<=2%)	Trivandrum	0.59%	0.70%	0.00%	0.84%	NP	0.00%	0.00%	0.00%	0.00%	0.86%
		Kollam	0.00%	0.00%	0.00%	0.92%	NP	0.00%	0.00%	0.00%	0.70%	0.00%
		Kottayam	0.00%	0.00%	1.00%	0.72%	NP	0.00%	0.00%	1.70%	0.74%	0.71%
		Pathanamthitta	0.67%	5.22%	0.00%	1.35%	NP	0.00%	5.60%	0.00%	3.80%	2.36%
		Alleppey	0.00%	0.00%	0.00%	1.49%	NP	0.00%	0.00%	0.00%	1.72%	0.00%
		Trissur	0.00%	2.10%	0.00%	0.70%	NP	0.00%	0.57%	0.00%	1.39%	0.00%
		Palakkad	0.00%	0.00%	0.00%	0.00%	NP	0.00%	0.00%	0.00%	0.00%	0.00%
		Kannur	0.49%	1.54%	1.37%	1.28%	NP	0.00%	0.43%	0.00%	0.58%	0.00%
		Iduki	0.64%	0.76%	0.81%	0.69%	NP	0.07%	1.52%	0.07%	0.91%	0.90%

1.4	**Percentage Of Connections With Good Voice Quality (=>95%)**											
	(i)0-4 (w/o frequency hopping)	Trivandrum	NA	NA	91.37%	NA	NP	NA	NA	NA	NA	98.26%
		Kollam	NA	NA	92.02%	NA	NP	NA	NA	NA	NA	97.77%
		Kottayam	NA	NA	90.95%	NA	NP	NA	NA	NA	NA	98.92%
		Pathanamthitta	NA	NA	90.57%	NA	NP	NA	NA	NA	NA	96.56%
		Alleppey	NA	NA	91.89%	NA	NP	NA	NA	NA	95.48%	99.21%
		Trissur	NA	NA	87.60%	NA	NP	NA	NA	NA	96.90%	99.43%
		Palakkad	NA	NA	89.46%	NA	NP	NA	NA	NA	99.76%	99.49%
		Kannur	NA	NA	87.73%	NA	NP	NA	NA	NA	95.99%	99.41%
		Iduki	NA	NA	88.05%	NA	NP	NA	NA	NA	98.82%	98.26%
	(ii) 0-5 (with frequency hopping)	Trivandrum	95.00%	96.15%	90.91%	95.11%	NP	96.00%	95.58%	99.71%	99.03%	99.30%
		Kollam	95.00%	93.10%	91.14%	95.78%	NP	98.00%	96.50%	97.73%	97.52%	99.29%
		Kottayam	95.80%	94.29%	92.35%	95.70%	NP	99.00%	95.23%	98.73%	97.32%	99.65%
		Pathanamthitta	97.70%	95.77%	89.03%	96.70%	NP	95.00%	93.27%	98.11%	97.38%	99.92%
		Alleppey	96.40%	98.63%	91.41%	96.20%	NP	98.00%	95.66%	98.00%	97.30%	99.80%
		Trissur	96.50%	93.64%	86.94%	98.60%	NP	98.46%	96.35%	99.74%	98.17%	99.86%
		Palakkad	95.30%	95.01%	89.04%	96.22%	NP	97.69%	95.66%	99.77%	99.96%	99.78%
		Kannur	95.50%	94.41%	94.01%	96.92%	NP	97.80%	95.37%	99.39%	97.43%	99.80%
		Iduki	97.20%	97.39%	94.22%	95.86%	NP	97.88%	95.25%	97.12%	99.74%	98.56%
1.5	**Service Coverage**											
	In door (>= -75dBm)	Trivandrum	41.93%	54.57%	71.87%	88.41%	NP	85.40%	82.34%	73.00%	76.75%	61.91%
		Kollam	36.99%	55.99%	61.24%	68.36%	NP	80.54%	71.86%	32.35%	88.20%	71.00%
		Kottayam	50.69%	52.81%	74.60%	69.60%	NP	46.00%	70.70%	62.02%	93.80%	44.62%
		Pathanamthitta	46.14%	22.66%	47.20%	69.00%	NP	55.74%	44.36%	36.40%	53.92%	30.59%
		Alleppey	45.00%	39.07%	63.12%	69.20%	NP	65.00%	65.38%	42.00%	76.41%	39.61%
		Trissur	72.00%	62.29%	87.99%	76.60%	NP	81.63%	86.09%	56.51%	99.26%	46.79%
		Palakkad	64.00%	60.84%	84.07%	89.70%	NP	75.73%	89.89%	57.98%	96.13%	64.68%
		Kannur	57.00%	73.63%	36.00%	81.50%	NP	76.05%	80.22%	42.09%	78.84%	63.13%
		Iduki	43.00%	17.89%	48.82%	81.69%	NP	52.89%	47.89%	36.70%	55.86%	37.42%
	In-vehicle (>= -85dBm)	Trivandrum	78.07%	89.22%	96.4%	99.39%	NP	98.90%	97.28%	97.00%	97.83%	98.05%
		Kollam	75.76%	91.97%	93.73%	93.13%	NP	96.53%	95.78%	68.76%	99.03%	99.49%
		Kottayam	88.64%	93.51%	97.00%	92.70%	NP	84.00%	93.61%	94.31%	99.17%	81.30%
		Pathanamthitta	80.14%	68.68%	82.37%	92.00%	NP	78.40%	70.95%	66.81%	68.35%	49.06%
		Alleppey	86.00%	88.33%	96.69%	93.90%	NP	92.00%	90.74%	90.00%	91.11%	92.07%
		Trissur	96.00%	95.62%	99.49%	96.00%	NP	98.13%	98.36%	98.01%	100.00%	94.61%
		Palakkad	97.00%	95.27%	99.23%	99.50%	NP	97.40%	99.18%	97.76%	99.75%	96.06%

		Kannur	90.00%	96.89%	77.26%	97.20%	NP	94.32%	94.41%	82.20%	98.00%	91.62%
		Iduki	79.00%	64.06%	88.78%	96.30%	NP	80.92%	75.39%	69.41%	80.62%	65.97%
	Outdoor- in city (>= -95dBm)	Trivandrum	97.65%	99.57%	99.91%	99.99%	NP	100.00%	99.88%	100.00%	99.99%	100.00%
		Kollam	97.29%	99.31%	99.87%	99.80%	NP	99.97%	99.66%	99.72%	99.99%	100.00%
		Kottayam	99.69%	99.97%	99.95%	99.80%	NP	100.00%	99.41%	99.91%	99.86%	99.2%
		Pathanamthitta	95.16%	95.80%	97.85%	99.70%	NP	94.47%	89.76%	96.86%	87.27%	77.6%
		Alleppey	99.00%	99.81%	99.96%	99.90%	NP	100.00%	98.79%	100.00%	99.16%	100.00%
		Trissur	99.00%	99.97%	100.00%	99.80%	NP	100.00%	100.00%	100.00%	100.00%	100.00%
		Palakkad	100.00%	99.94%	100.00%	100.00%	NP	99.92%	100.00%	99.46%	99.99%	100.00%
		Kannur	99.00%	99.91%	97.12%	100.00%	NP	99.05%	99.34%	99.17%	99.98%	100.00%
		Iduki	98.00%	97.34%	99.30%	99.85%	NP	95.59%	94.71%	95.39%	96.51%	85.00%
1.6	**Call SetupSuccess Rate (>=95%)**	Trivandrum	100%	98.62%	98.55%	100.00%	NP	100.00%	100.00%	100.00%	100.00%	100.00%
		Kollam	99.17%	98.44%	99.32%	100.00%	NP	100.00%	99.23%	100.00%	99.26%	100.00%
		Kottayam	99.45%	97.74%	98.13%	97.84%	NP	99.16%	100.00%	100.00%	99.25%	99.30%
		Pathanamthitta	99.34%	95.83%	98.14%	98.01%	NP	100.00%	89.92%	100.00%	79.60%	98.40%
		Alleppey	98.32%	100%	100.00%	100.00%	NP	99.10%	100.00%	100.00%	100.00%	100.00%
		Trissur	98.89%	97.90%	98.09%	100.00%	NP	100.00%	99.43%	100.00%	100.00%	100.00%
		Palakkad	97.81%	99.39%	98.77%	99.53%	NP	100.00%	100.00%	100.00%	100.00%	100.00%
		Kannur	100.00%	98.46%	98.65%	97.85%	NP	100.00%	100.00%	98.40%	100.00%	100.00%
		Iduki	99.36%	98.48%	96.21%	98.64%	NP	100.00%	97.78%	100.00%	100.00%	99.00%
1.7	**HandOver Success Rate (HOSR)**	Trivandrum	97.85%	99.44%	99.74%	99.23%	NP	100.00%	100.00%	100.00%	100.00%	100.00%
		Kollam	98.31%	98.22%	100.00%	98.61%	NP	100.00%	99.32%	100.00%	100.00%	100.00%
		Kottayam	98.87%	99.46%	98.06%	98.34%	NP	100.00%	99.39%	100.00%	100.00%	100.00%
		Pathanamthitta	99.17%	97.14%	99.2%	98.00%	NP	100.00%	98.86%	100.00%	100.00%	99.89%
		Alleppey	99.02%	99.63%	98.15%	99.25%	NP	99.30%	98.88%	100.00%	100.00%	100.00%
		Trissur	98.93%	99.37%	98.45%	98.92%	NP	100.00%	99.36%	100.00%	100.00%	100.00%
		Palakkad	94.95%	99.43%	98.95%	98.67%	NP	100.00%	99.12%	100.00%	100.00%	100.00%
		Kannur	98.75%	98.77%	98.93%	94.44%	NP	99.73%	96.61%	100.00%	100.00%	100.00%
		Iduki	99.26%	100.00%	98.28%	98.70%	NP	100.00%	100.00%	100.00%	100.00%	100.00%

Finding & Critical Analysis:

- **Aircel not participated in Drive Test audit for all the 9 Towns.**
- Vodafone is not meeting the Benchmark of Blocked Call Rate @ **IDUKI Town.**
- Idea, MTS, TATA GSM & CDMA is not meeting the Benchmark of Dropped Call Rate @ Pathanmthitta and Idea is not meeting the Benchmark of Dropped Call Rate @ Trissur Town.
- TATA GSM & CDMA is not meeting the Benchmark of CSSR @ Pathanmthitta

3.4 CUSTOMER SERVICE QUALITY PARAMETERS

3.4.1 1st Quarter data Assessment:

I.	Kerala												
PMR		Benchmark	Audit	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Vodafone	Rcom CDMA	Tata CDMA	MTS
S.N	Name of Parameter			GSM Operators							CDMA Operators		
(B)	**Customer Service Quality Parameters**												
1	Metering/billing credibility Post paid	<= 0.1%	Reported	0.04	0.02	0.10	0.08	0.09	0.02	0.05	0.04	0.03	0.00
			Verified	0.04	0.02	0.10	0.08	0.09	0.02	0.05	0.04	0.03	0.00
2	Metering /billing credibility Pre paid	<= 0.1%	Reported	0.07	0.00	0.00	0.03	0.08	0.00	0.03	0.01	0.02	0.00
			Verified	0.07	0.00	0.00	0.03	0.08	0.00	0.03	0.01	0.02	0.00
3	Resolution of billing/ charging complaints	100% within 4 weeks	Reported	100.00	100.00	97.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
			Verified	100.00	100.00	97.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
4	Period of applying credit/waiver/adjustment to the customer's account from the date of resolutions of complaints	<=1 week	Reported	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
			Verified	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
5	Response time to customers for assistance												
	a) Accessibility of call centre/Customer Care	>=95%	Reported	100.00	100.00	96.00	99.26	97.12	100.00	100.00	98.55	99.00	97.00
			Verified	100.00	100.00	96.00	99.26	97.12	100.00	100.00	98.55	99.00	97.00
	b) % call answered by operators (voice to voice) within 60 sec.	>=90%	Reported	94.87	88.00	80.00	90.00	50.00	88.00	84.00	57.50	94.00	92.00
			Verified	94.87	88.00	80.00	90.00	50.00	88.00	84.00	57.50	94.00	92.00
6	Termination/closure of service												
	No. of requests for Termination / Closure of service complied within 7 days during the quarter	<=7days	Reported	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00
			Verified	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00
7	Time taken for refunds of deposits after closures.	100% within 60 days	Reported	100.00	100.00	100.00	100.00	100.00	95.00	100.00	100.00	97.00	0.00
			Verified	100.00	100.00	100.00	100.00	100.00	95.00	100.00	100.00	97.00	0.00

Finding & Critical Analysis:-

- According to the parameter metering/billing credibility post-paid in the table **4.2.1** and the **Fig.1** we found that all the service providers are meeting the benchmark.
- According to the parameter metering /billing credibility pre-paid in the table **4.2.1** and the **Fig. 2** we found that all the service providers are meeting the benchmark.
- According to the parameter Resolution of billing/ charging complaints in the table **4.2.1** and the **Fig. 3** we found that all the service providers are meeting the benchmark except **BSNL.**
- 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 **4.2.1** and the **Fig. 4** we found that all the service providers are meeting the benchmark except.
- According to the parameter Accessibility of call centre/Customer Care in the table **4.2.1** and the **Fig. 5** 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 **4.2.1** and the **Fig. 6** we found that all the service providers are meeting the benchmark except **BSNL, Airtel, TATA GSM, Vodafone, Rcom (GSM & CDMA).**
- According to the 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. 7** we found that all the service providers are meeting the benchmark except **MTS (NA).**
- According to the parameter Time taken for refunds of deposits after closures in the table **4.2.1** and the**Fig.8**wefound that all the service providers are meeting the benchmark except **TATA (GSM & CDMA) and MTS (NA).**

3.5 Redressal

3.5.1 Level 1 Live Calling (Emergency No.) Q1:- Level 1Live calling such as calling at emergency no. Police, Fire, and Ambulance were made so as to check the service of such short codes. In different cities of Kerala we have dialed 3times from each service providers' no.

Emergency No.	No. of calls	Vodafone	Airtel	Idea	MTS	Aircel	BSNL	Rcom GSM	Tata GSM	RCOM CDMA	Tata CDMA
TRIVANDRUM											
100(Police)	3	3	3	3	3	3	3	3	3	3	3
101 (Fire)	3	3	3	3	3	3	3	3	3	3	3
108(Ambulance)	3	3	3	3	3	3	3	3	3	3	3
KOLLAM											
100(Police)	3	3	3	3	3	3	3	3	3	3	3
101 (Fire)	3	3	3	3	3	3	3	3	3	3	3
108(Ambulance)	3	3	3	3	3	3	3	3	3	3	3
KOTTAYAM											
100(Police)	3	3	3	3	3	3	3	3	3	3	3
101 (Fire)	3	3	3	3	3	3	3	3	3	3	3
108(Ambulance)	3	3	3	3	3	3	3	3	3	3	3
PATHANAMTHITTA											
100(Police)	3	3	3	3	3	3	3	3	3	3	3
101 (Fire)	3	3	3	3	3	3	3	3	3	3	3
108(Ambulance)	3	3	3	3	3	3	3	3	3	3	3
ALLEPPEY											
100(Police)	3	3	3	3	3	3	3	3	3	3	3
101 (Fire)	3	3	3	3	3	3	3	3	3	3	3
108(Ambulance)	3	3	3	3	3	3	3	3	3	3	3
TRISSUR											
100(Police)	3	3	3	3	3	3	3	3	3	3	3
101 (Fire)	3	3	3	3	3	3	3	3	3	3	3
108(Ambulance)	3	3	3	3	3	3	3	3	3	3	3
PALAKKAD											
100(Police)	3	3	3	3	3	3	3	3	3	3	3
101 (Fire)	3	3	3	3	3	3	3	3	3	3	3
108(Ambulance)	3	3	3	3	3	3	3	3	3	3	3
KANNUR											
100(Police)	3	3	3	3	3	3	3	3	3	3	3
101 (Fire)	3	3	3	3	3	3	3	3	3	3	3
108(Ambulance)	3	3	3	3	3	3	3	3	3	3	3
IDUKI											
100(Police)	3	3	3	3	3	3	3	3	3	3	3
101 (Fire)	3	3	3	3	3	3	3	3	3	3	3
108(Ambulance)	3	3	3	3	3	3	3	3	3	3	3

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. In different cities of Kerala it was found to be functional.

3.6 Inter Operator Call Assessment

3.6.1 Sample coverage

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

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%	98.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Airtel	100.00%	-	100.00%	100.00%	96.50%	99.00%	97.00%	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	100.00%	99.00%	100.00%	100.00%	-	97.00%	97.00%	100.00%	100.00%	100.00%
Rcom GSM	100.00%	100.00%	100.00%	100.00%	97.00%	-	100.00%	100.00%	100.00%	100.00%
Tata GSM	100.00%	100.00%	100.00%	100.00%	99.00%	98.00%	-	100.00%	100.00%	100.00%
RCOM CDMA	100.00%	100.00%	100.00%	100.00%	96.00%	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%	98.00%	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 & the POI in between the operators are involved and hence if any congestion is found in the network, it may be due to any of these parts. The result shows that there is not much congestion on the operator network; however most of the congestion was shown with BSNL service provider.

CAPTER-4: DETAILED FINDINGS, ANALYSIS AND GRAPHICAL REPRESENTATION

4.0 Cellular Mobile Telephone Service

4.1 3 Days Live Test Audit Report (1st 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.

S.No	Parameter name	Bench mark	Date	Vodafone	Airtel GSM	Idea GSM	Idea 3G	MTS CDMA	Aircel GSM	BSNL GSM	BSNL 3G	Rcom GSM	RCOM CDMA	Tata GSM	Tata 3G	Tata CDMA
1	BTS accumulated downtime	≤ 2%	Day 1	0.00	0.00	0.01	0.03	0.00	0.00	0.02	0.00	0.05	0.06	0.01	0.00	0.00
			Day 2	0.00	0.00	0.01	0.02	0.00	0.00	0.02	0.00	0.09	0.12	0.01	0.00	0.00
			Day 3	0.00	0.00	0.01	0.03	0.00	0.00	0.02	0.00	0.05	0.06	0.01	0.00	0.00
2	Worst affected BTS due to downtime	≤ 2%	Day 1	0.00	0.00	0.02	0.00	0.00	0.00	0.06	0.00	0.03	0.02	0.00	0.00	0.00
			Day 2	0.00	0.00	0.02	0.00	0.00	0.00	0.06	0.00	0.08	0.10	0.00	0.00	0.00
			Day 3	0.00	0.00	0.02	0.00	0.00	0.00	0.05	0.00	0.04	0.04	0.00	0.00	0.00
Connection establishment (Accessibility)																
3	Call Setup Success Rate	≥ 95%	Day 1	99.59	99.81	99.98	99.86	99.71	99.94	99.14	99.15	99.82	99.36	98.97	99.56	99.01
			Day 2	99.46	99.81	99.97	99.86	99.68	99.26	99.07	99.26	99.83	99.35	98.96	99.50	98.98
			Day 3	99.33	99.82	99.97	99.86	99.71	99.93	99.14	99.19	99.82	99.37	98.97	99.59	99.01
4	SDCCH/ Paging Channel Congestion	≤ 1%	Day 1	0.02	0.04	0.13	0.01	0.00	0.02	0.48	0.27	0.00	0.00	0.00	0.05	0.00
			Day 2	0.06	0.05	0.15	0.05	0.00	0.00	0.63	0.27	0.00	0.00	0.01	0.07	0.00
			Day 3	0.11	0.05	0.19	0.21	0.00	0.00	0.66	0.29	0.00	0.00	0.05	0.05	0.00
5	TCH congestion	≤ 2%	Day 1	0.41	0.07	0.85	0.02	0.01	0.00	0.86	0.59	0.01	0.00	0.01	0.11	0.00
			Day 2	0.54	0.07	0.78	0.04	0.00	0.00	0.93	0.73	0.01	0.00	0.02	0.15	0.00
			Day 3	0.67	0.07	0.77	0.06	0.01	0.00	0.86	0.63	0.01	0.00	0.01	0.12	0.01
Connection Maintainability (Retain ability)																
6	Call Drop Rate	≤ 2%	Day 1	0.66	0.27	0.52	0.17	0.56	0.92	0.48	0.93	0.10	0.00	0.60	0.32	0.84
			Day 2	0.65	0.25	0.52	0.17	0.51	1.38	0.47	0.91	0.10	0.01	0.60	0.34	0.84
			Day 3	0.60	0.23	0.56	0.18	0.56	0.00	0.46	0.88	0.10	0.00	0.59	0.34	1.53
7	Worst affected cells having more than 3% TCH drop (call drop) rate	≤ 3%	Day 1	2.02	0.51	1.59	1.35	2.86	6.11	2.83	0.07	0.00	0.00	4.20	5.03	1.64
			Day 2	2.03	0.40	1.64	1.63	2.53	4.89	2.82	0.07	0.00	0.00	4.12	4.77	1.34
			Day 3	2.00	0.39	2.03	1.63	1.92	2.85	2.73	0.07	0.00	0.00	4.44	4.43	2.68
8	% of Connections with good voice quality	≥ 95%	Day 1	97.19	99.72	95.48	99.02	98.25	97.02	101.00	99.83	99.35	99.25	98.30	99.83	99.16
			Day 2	97.28	99.72	95.53	99.07	98.24	99.42	101.00	99.83	99.36	99.33	98.28	99.83	99.14
			Day 3	97.19	99.70	95.25	99.02	98.26	99.31	101.00	99.82	99.36	99.34	98.32	99.83	99.16
9	Point of Interconnections (POI) congestion (on individual POI)	≤ 0.5%	Day 1	0.11	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Day 2	0.17	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Day 3	0.08	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Finding & Critical Analysis:

- TATA (2G & 3G Services) is not meeting the benchmark for **worst affected cells having more than 3% TCH drop (call drop) rate**
- Aircel is not meeting the benchmark for **worst affected cells having more than 3% TCH drop (call drop) rate**.

4.2 CUSTOMER SERVICE QUALITY PARAMETERS (Graphical Representation)

4.2.1 1st Quarter data Assessment:

I.	Kerala												
PMR		Benchmark	Audit	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Vodafone	Rcom CDMA	Tata CDMA	MTS
S.N	Name of Parameter			GSM Operators							CDMA Operators		
(B)	**Customer Service Quality Parameters**												
1	Metering/billing credibility Post paid	<= 0.1%	Reported	0.04	0.02	0.10	0.08	0.09	0.02	0.05	0.04	0.03	0.00
			Verified	0.04	0.02	0.10	0.08	0.09	0.02	0.05	0.04	0.03	0.00
2	Metering /billing credibility Pre paid	<= 0.1%	Reported	0.07	0.00	0.00	0.03	0.08	0.00	0.03	0.01	0.02	0.00
			Verified	0.07	0.00	0.00	0.03	0.08	0.00	0.03	0.01	0.02	0.00
3	Resolution of billing/ charging complaints	100% within 4 weeks	Reported	100.00	100.00	**97.00**	100.00	100.00	100.00	100.00	100.00	100.00	100.00
			Verified	100.00	100.00	**97.00**	100.00	100.00	100.00	100.00	100.00	100.00	100.00
4	Period of applying credit/waiver/adjustment to the customer's account from the date of resolutions of complaints	<=1 week	Reported	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
			Verified	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
5	Response time to customers for assistance												
	a) Accessibility of call centre/Customer Care	>=95%	Reported	100.00	100.00	96.00	99.26	97.12	100.00	100.00	98.55	99.00	97.00
			Verified	100.00	100.00	96.00	99.26	97.12	100.00	100.00	98.55	99.00	97.00
	b) % call answered by operators (voice to voice) within 60 sec.	>=90%	Reported	94.87	**88.00**	**80.00**	90.00	**50.00**	**88.00**	**84.00**	**57.50**	94.00	92.00
			Verified	94.87	**88.00**	**80.00**	90.00	**50.00**	**88.00**	**84.00**	**57.50**	94.00	92.00
6	Termination/closure of service												
	No. of requests for Termination / Closure of service complied within 7 days during the quarter	<=7days	Reported	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00
			Verified	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00
7	Time taken for refunds of deposits after closures.	100% within 60 days	Reported	100.00	100.00	100.00	100.00	100.00	**95.00**	100.00	100.00	**97.00**	0.00
			Verified	100.00	100.00	100.00	100.00	100.00	**95.00**	100.00	100.00	**97.00**	0.00

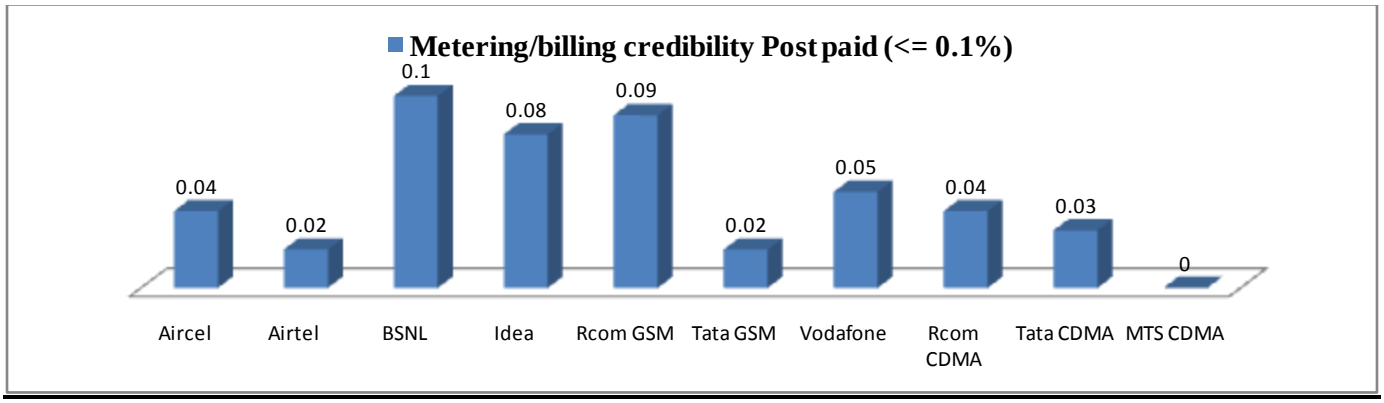

Fig. 1

According to the parameter metering/billing credibility post-paid in the table **4.2.1** and the **Fig.1** we found that all the service providers are meeting the benchmark

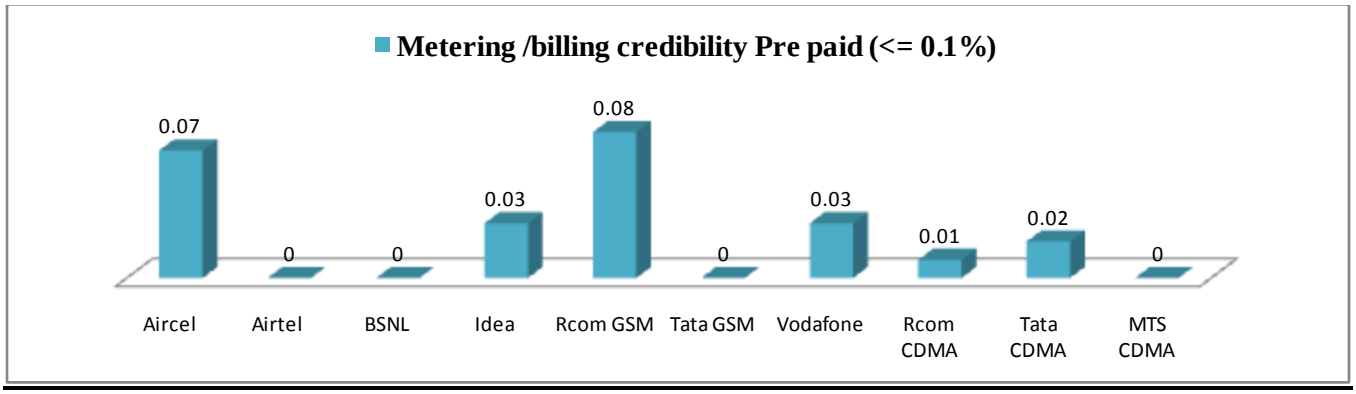

Fig. 2

According to the parameter metering /billing credibility pre-paid in the table **4.2.1** and the **Fig. 2** we found that all the service providers are meeting the benchmark

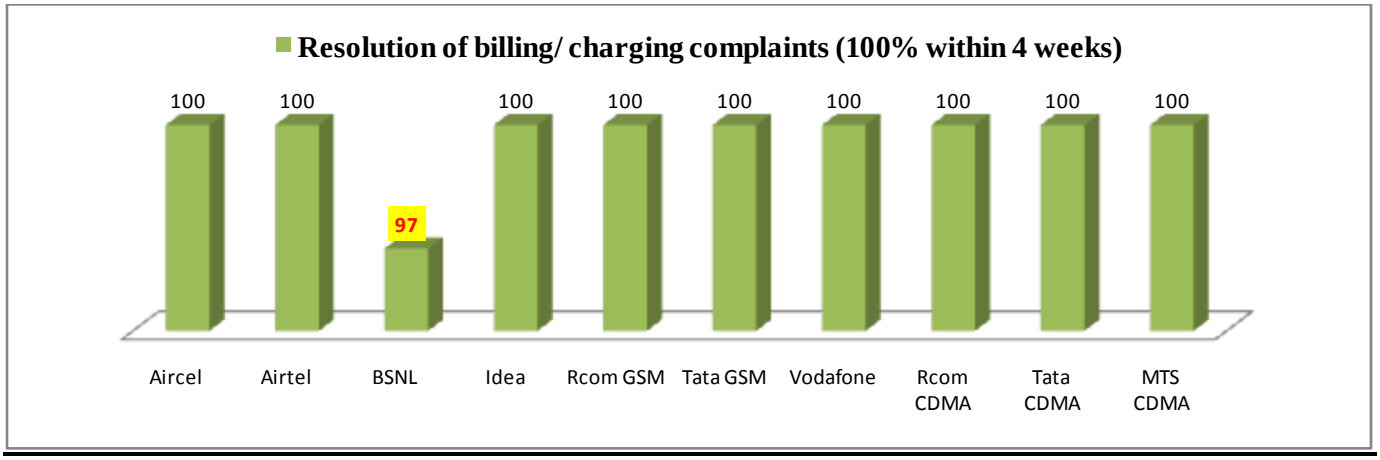

Fig. 3

According to the parameter Resolution of billing/ charging complaints in the table **4.2.1** and the **Fig. 3** we found that all the service providers are meeting the benchmark except **BSNL.**

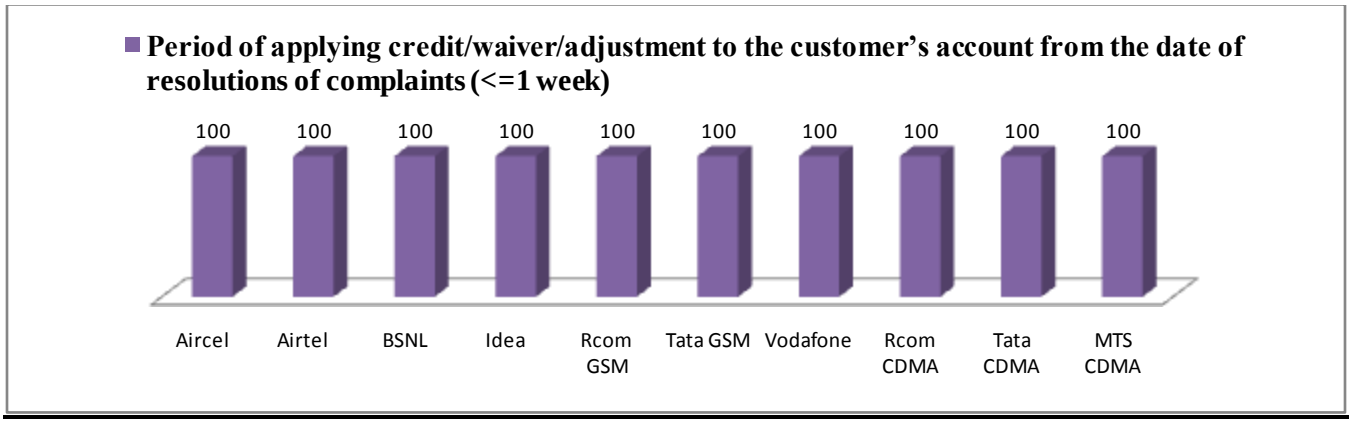

Fig. 4

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 **4.2.1** and the **Fig. 4** we found that all the service providers are meeting the benchmark.

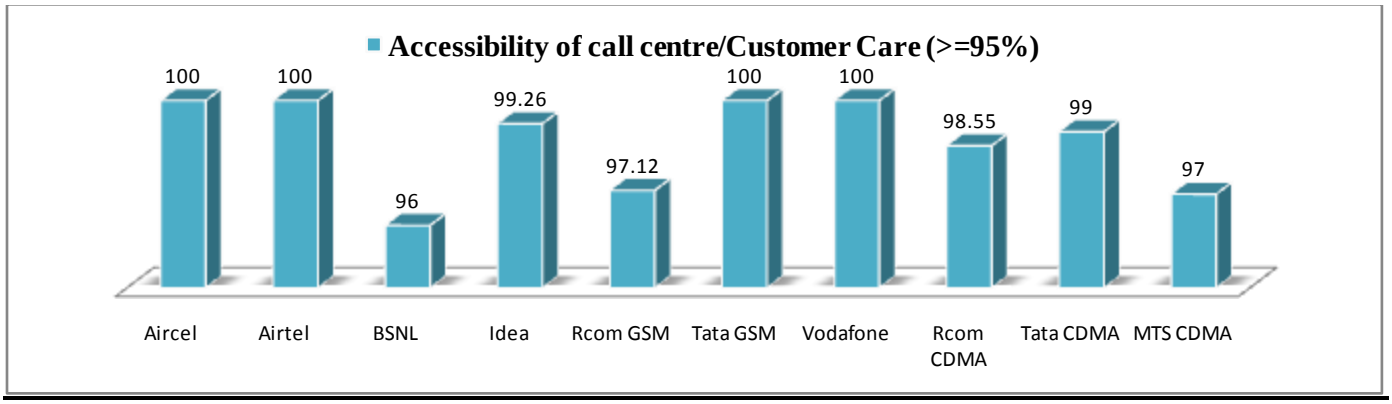

Fig. 5

According to the parameter Accessibility of call centre/Customer Care in the table **4.2.1** and the **Fig. 5** we found that all the service providers are meeting the benchmark.

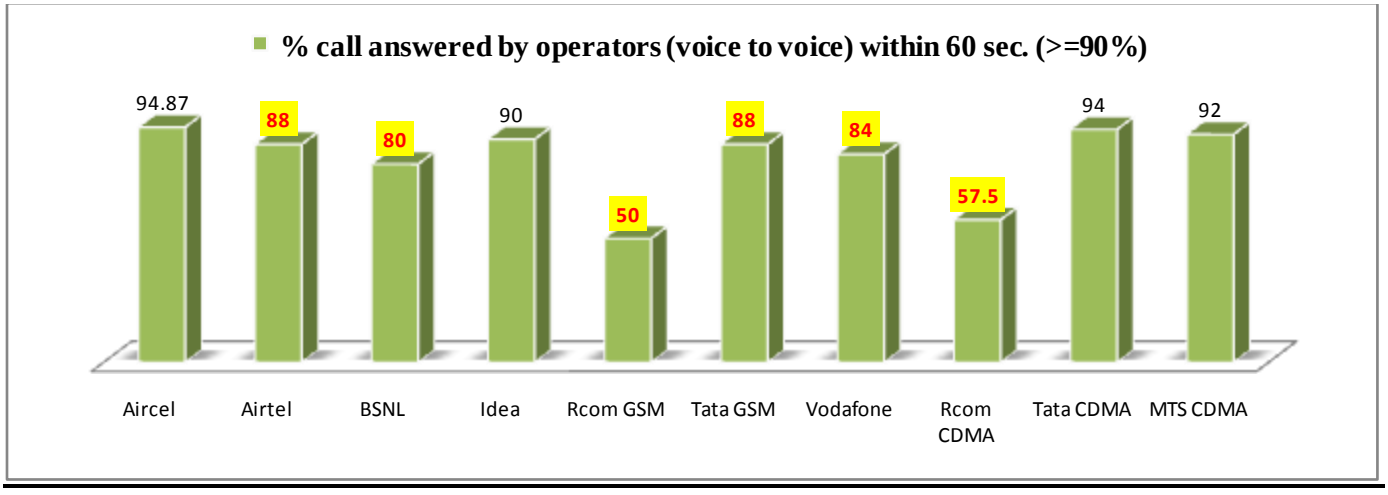

Fig. 6

According to the parameter % call answered by operators (voice to voice) within 60 sec in the table **4.2.1** and the **Fig. 6** we found that all the service providers are meeting the benchmark except **BSNL, Airtel, TATA GSM, Vodafone, Rcom (GSM & CDMA).**

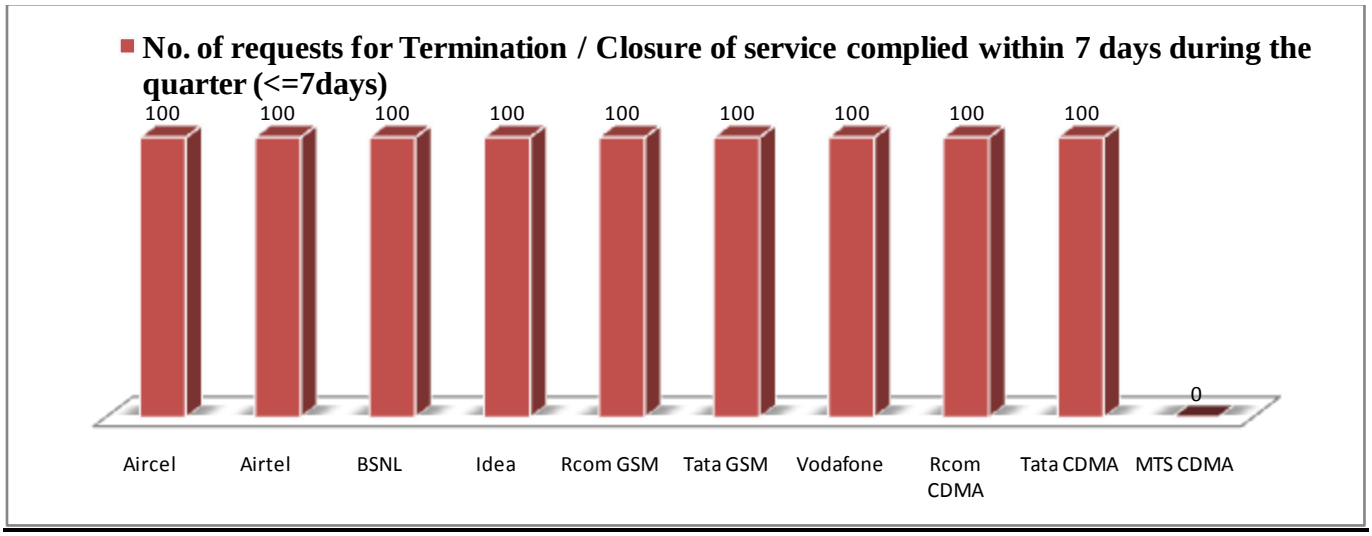

Fig. 7

According to the 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. 7** we found that all the service providers are meeting the benchmark except **MTS (NA).**

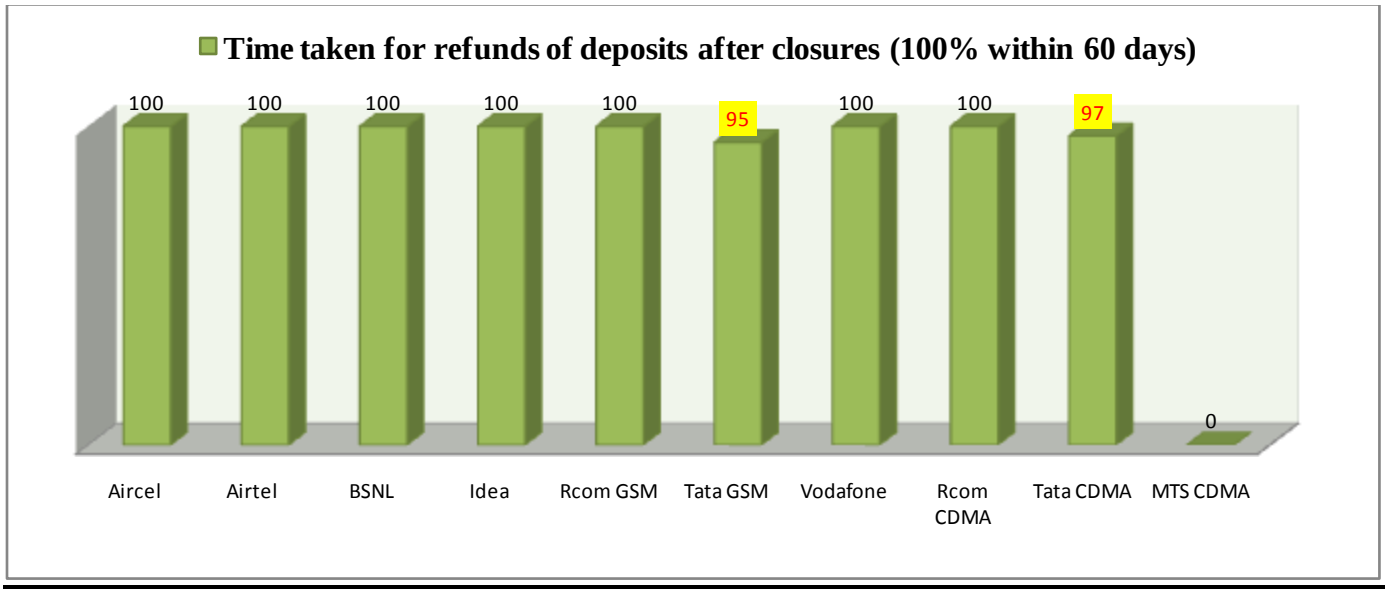

Fig. 8

According to the parameter Time taken for refunds of deposits after closures in the table **4.2.1** and the**Fig.8**wefound that all the service providers are meeting the benchmark except **TATA (GSM & CDMA) and MTS (NA).**

4.3 PMR Data Results in Graphical

4.3.1 Kerala Circle (Jul'13):

S.N	Parameter name	Bench mark	Averaged period	Vodafone	Airtel GSM	Idea GSM	Aircel GSM	BSNL GSM	Rcom GSM	RCOM CDMA	Tata GSM	Tata CDMA	MTS CDMA
Network Availability													
1	BTS accumulated downtime	≤ 2%	One month	0.03	0.02	0.52	0.35	0.77	0.03	0.04	0.01	0.02	0.04
2	Worst affected BTS due to downtime	≤ 2%	One month	0.00	0.02	1.22	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Connection establishment (Accessibility)													
3	Call Setup Success Rate	≥ 95%	One month	99.50	99.86	99.99	99.83	98.24	99.76	99.37	99.01	99.11	99.37
4	SDCCH/ Paging Channel Congestion	≤ 1%	One month	0.09	0.02	0.18	0.00	0.27	0.00	0.00	0.00	0.00	0.00
5	TCH congestion	≤ 2%	One month	0.50	0.04	0.69	0.04	1.76	0.01	0.03	0.02	0.04	0.02
Connection Maintainability (Retain ability)													
6	Call Drop Rate	≤ 2%	One month	0.77	0.23	0.60	0.92	0.67	0.12	0.19	0.64	0.45	0.64
7	Worst affected cells having more than 3% TCH drop (call drop) rate	≤ 3%	One month	0.77	0.58	1.75	2.97	0.02	0.36	0.53	1.00	2.38	2.83
8	% of Connections with good voice quality	≥ 95%	One month	96.59	99.51	95.20	97.68	99.88	99.24	99.73	98.21	99.13	99.11
9	Point of Interconnections (POI) congestion (on individual POI)	≤ 0.5%	One month	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

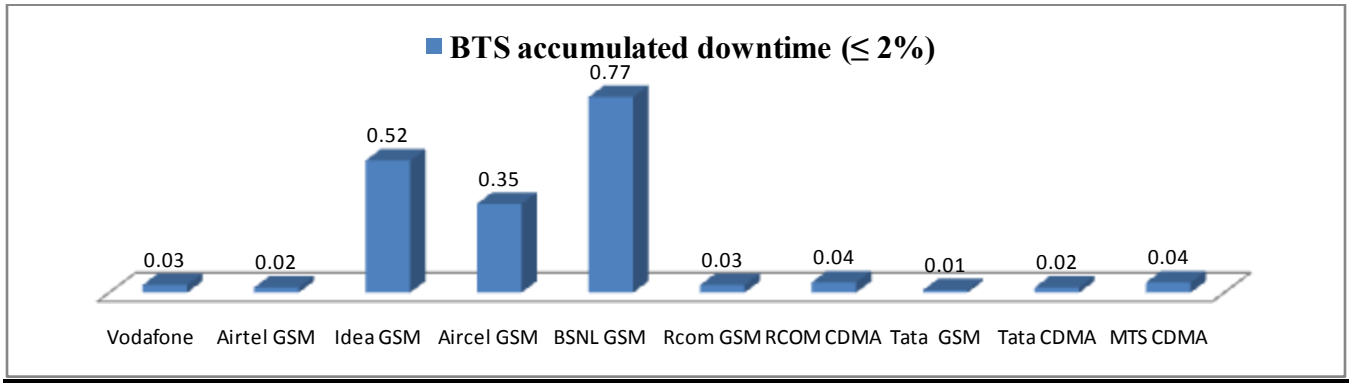

Fig.1

According to the above graph and data on the table **4.3.1**, it is found that all the operators are meeting the Network Parameters.

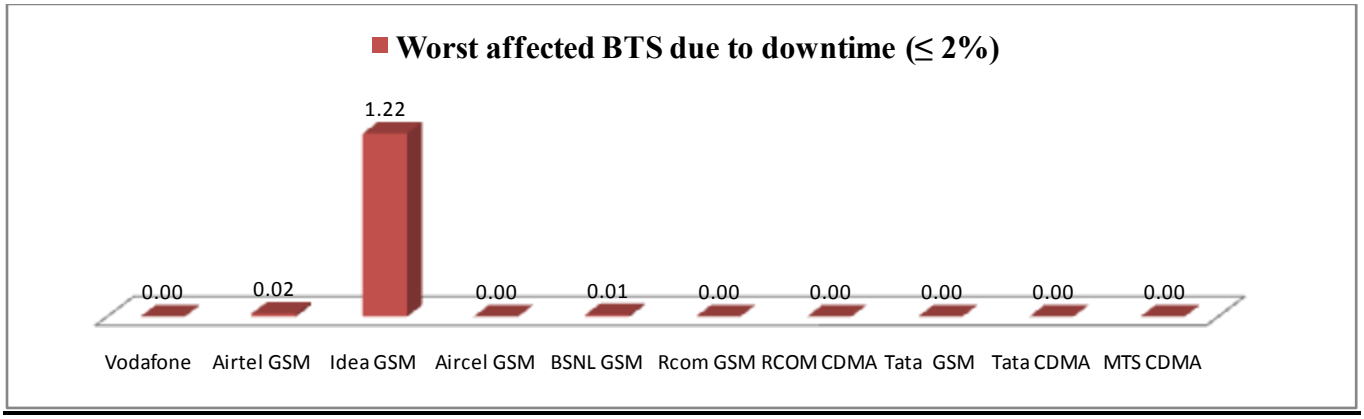

Fig.2

According to the above graph and data on the table **4.3.1**, it is found that all the operators are meeting the Network Parameters.

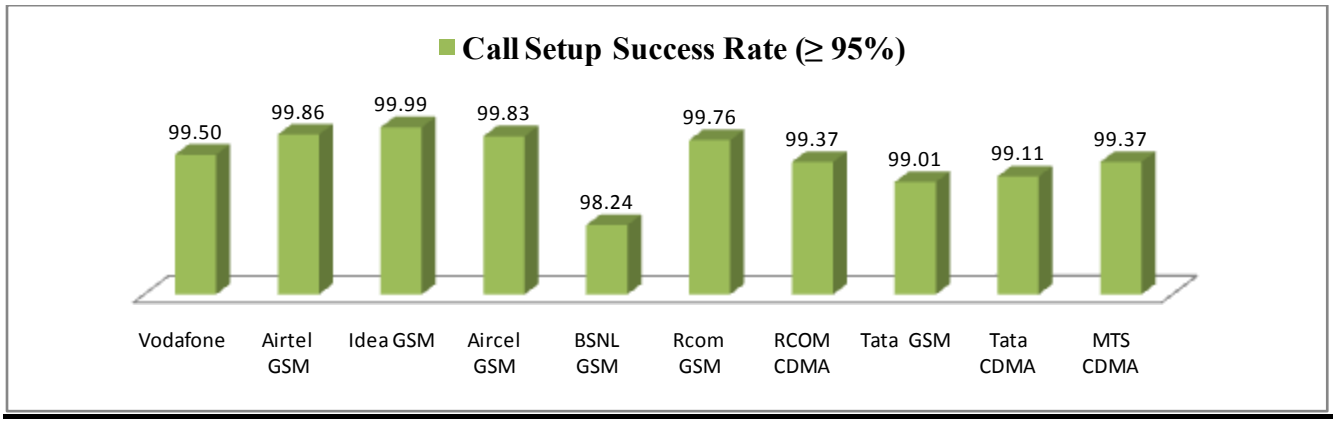

Fig. 3

According to the above graph and data on the table **4.3.1**, it is found that all the operators are meeting the Network Parameters.

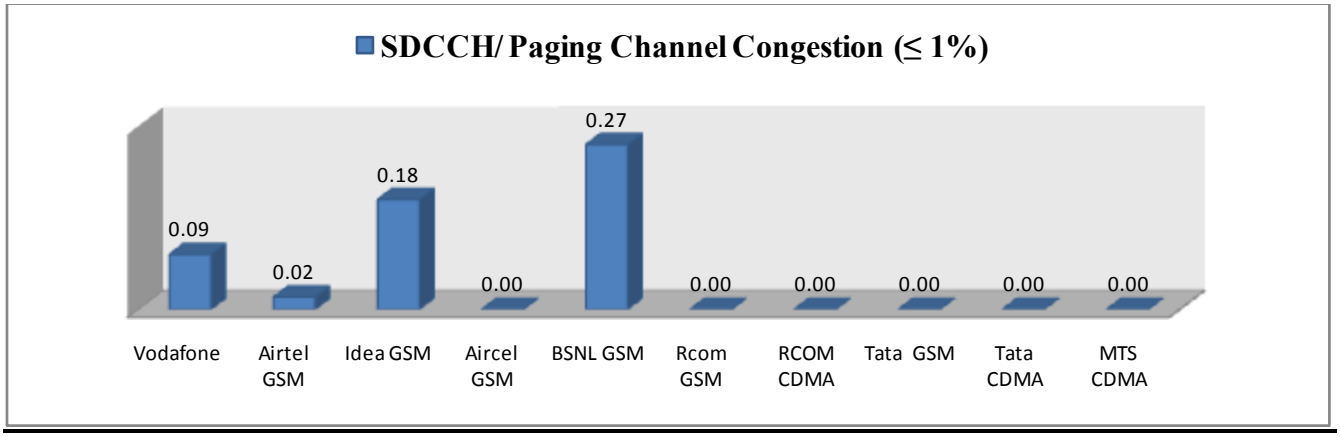

Fig. 4

According to the above graph and data on the table **4.3.1**, it is found that all the operators are meeting the Network Parameters.

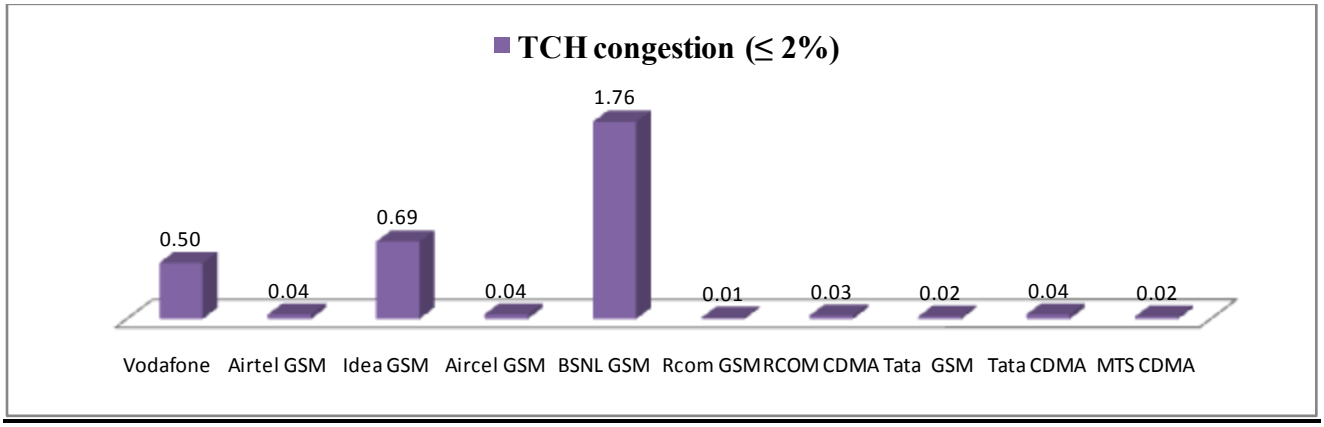

Fig. 5

According to the above graph and data on the table **4.3.1**, it is found that all the operators are meeting the Network Parameters.

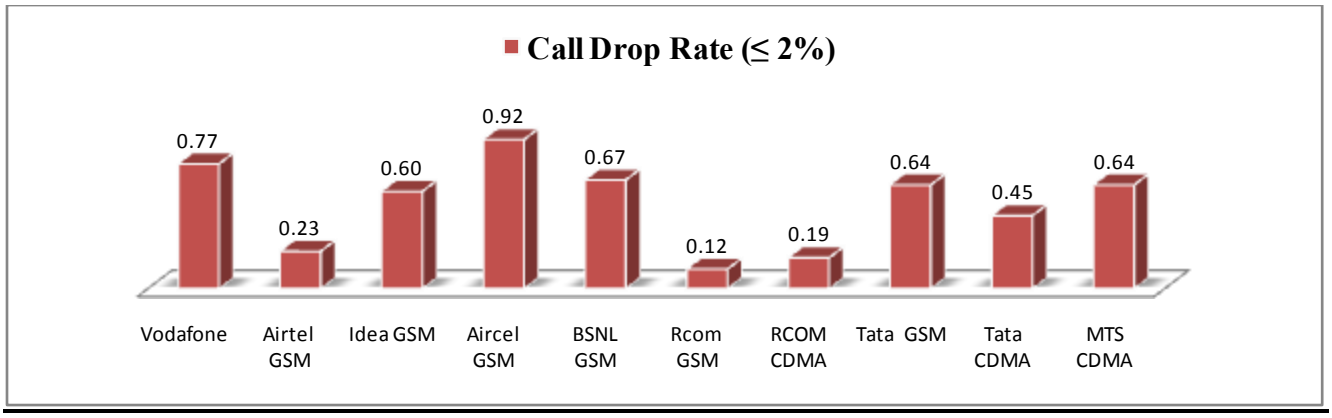

Fig. 6

According to the above graph and data on the table **4.3.1**, it is found that all the operators are meeting the Network Parameters.

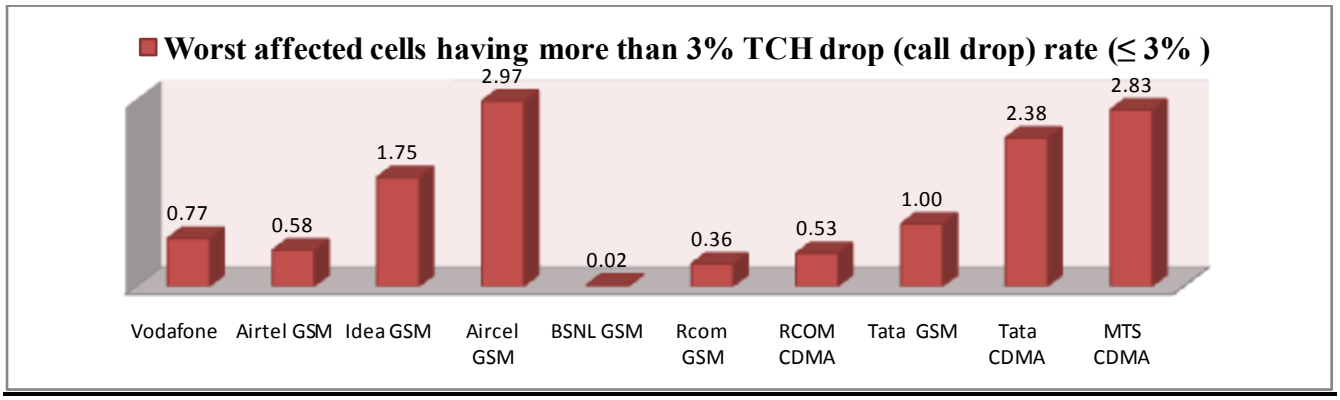

Fig.7

According to the above graph and data on the table **4.3.1**, it is found that all the operators are meeting the Network Parameters.

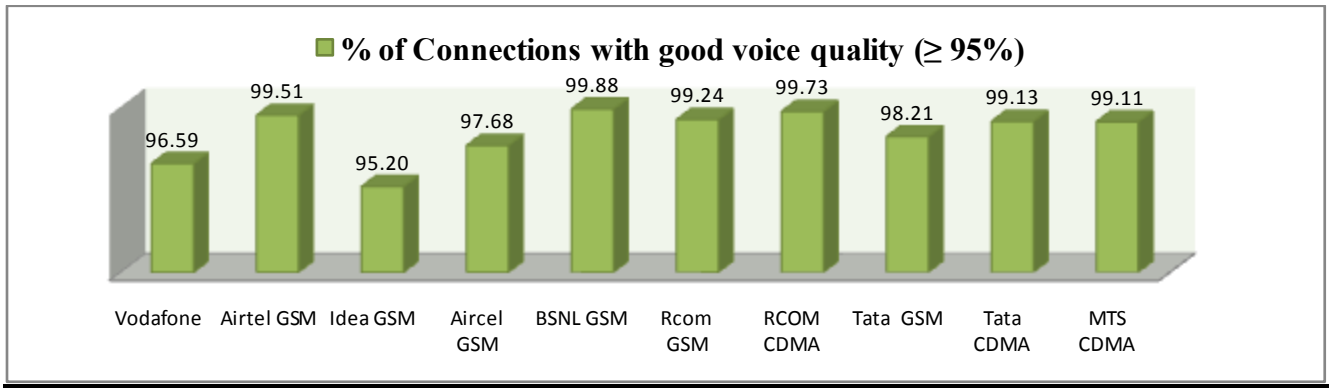

Fig. 8

According to the above graph and data on the table **4.3.1**, it is found that all the operators are meeting the Network Parameters.

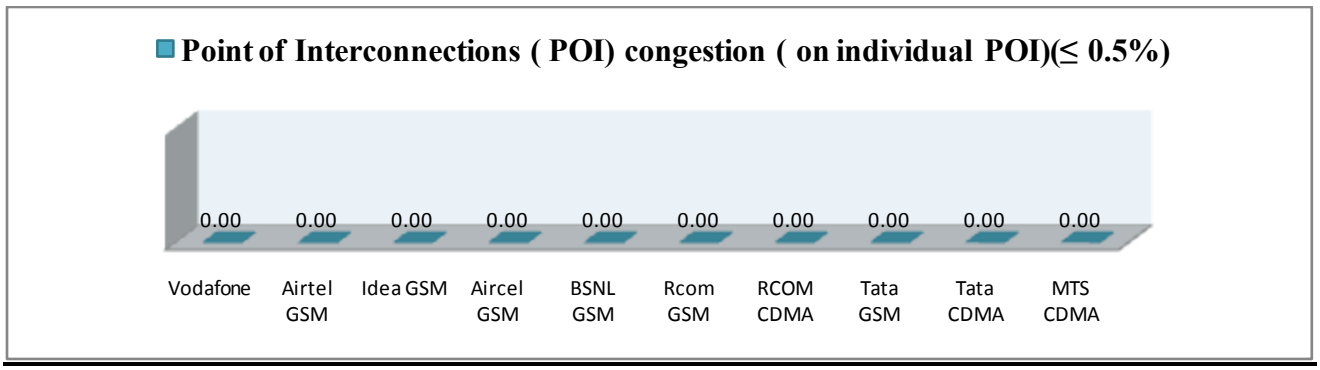

Fig. 9

According to the above graph and data on the table **4.3.1**, it is found that all the operators are meeting the network parameter.

4.3.2 Kerala Circle (Aug'13):

Note: NP= -0.01

S.N	Parameter name	Bench mark	Average period	Vodafone	Airtel GSM	Idea GSM	Idea 3G	Aircel GSM	BSNL GSM	BSNL 3G	Rcom GSM	RCOM CDMA	Tata GSM	Tata CDMA	Tata 3G	MTS CDMA
Network Availability																
1	BTS accumulated downtime	≤ 2%	One month	0.03	0.02	0.20	0.05	0.04	0.66	0.39	0.04	0.05	0.01	0.01	1.15	0.02
2	Worst affected BTS due to downtime	≤ 2%	One month	0.04	0.04	0.57	0.00	0.00	0.01	1.45	0.00	0.08	0.00	0.00	0.00	0.00
Connection establishment (Accessibility)																
3	Call Setup Success Rate	≥ 95%	One month	99.19	99.82	99.99	99.82	99.63	98.17	99.32	99.69	99.37	99.02	98.89	99.59	99.64
4	SDCCH/ Paging Channel Congestion	≤ 1%	One month	0.09	0.05	0.20	0.04	0.01	0.27	0.20	0.05	0.00	0.01	0.00	0.02	0.00
5	TCH congestion	≤ 2%	One month	0.81	0.07	0.81	0.17	0.01	1.83	1.59	0.02	0.00	0.01	0.05	0.09	0.02
Connection Maintainability (Retain ability)																
6	Call Drop Rate	≤ 2%	One month	0.72	0.23	0.62	0.19	1.34	0.64	1.04	0.11	0.00	0.58	0.61	0.35	0.55
7	Worst affected cells having more than 3% TCH drop (call drop) rate	≤ 3%	One month	0.71	0.65	1.93	1.90	2.55	0.02	0.09	0.13	0.25	0.38	1.11	0.61	2.84
8	% of Connections with good voice quality	≥ 95%	One month	96.85	99.74	95.20	99.99	97.19	99.86	**91.75**	99.34	99.74	98.28	99.12	99.82	98.26
9	Point of Interconnections (POI) congestion (on individual POI)	≤ 0.5%	One month	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.00

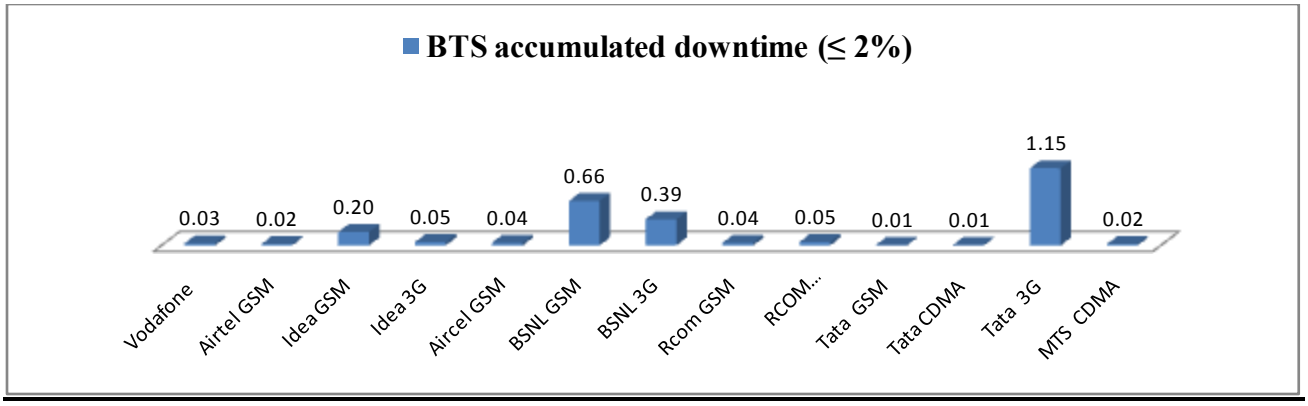

Fig.1

According to the above graph and data on the table **4.3.2**, it is found that all the operators are meeting the Network Parameters.

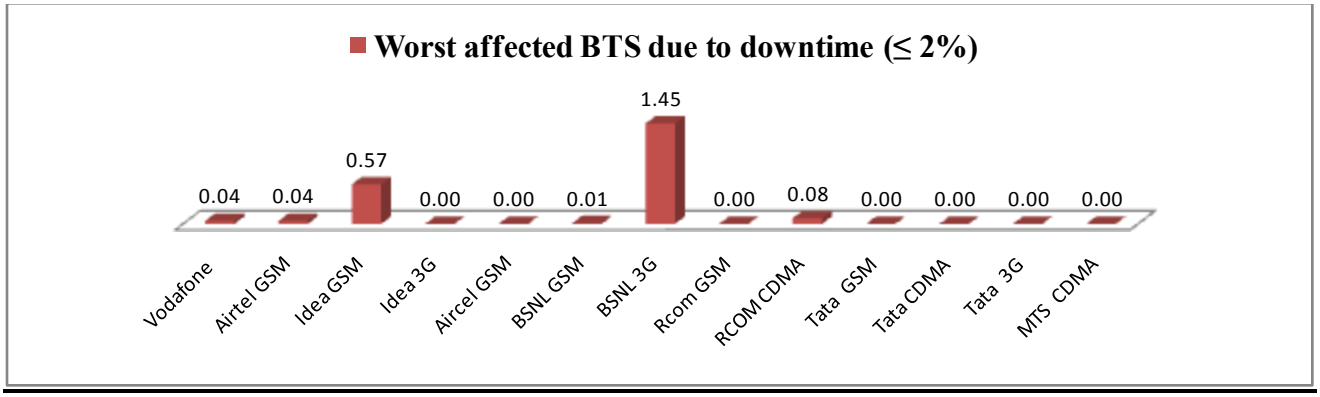

Fig.2

According to the above graph and data on the table **4.3.2**, it is found that all the operators are meeting the Network Parameters.

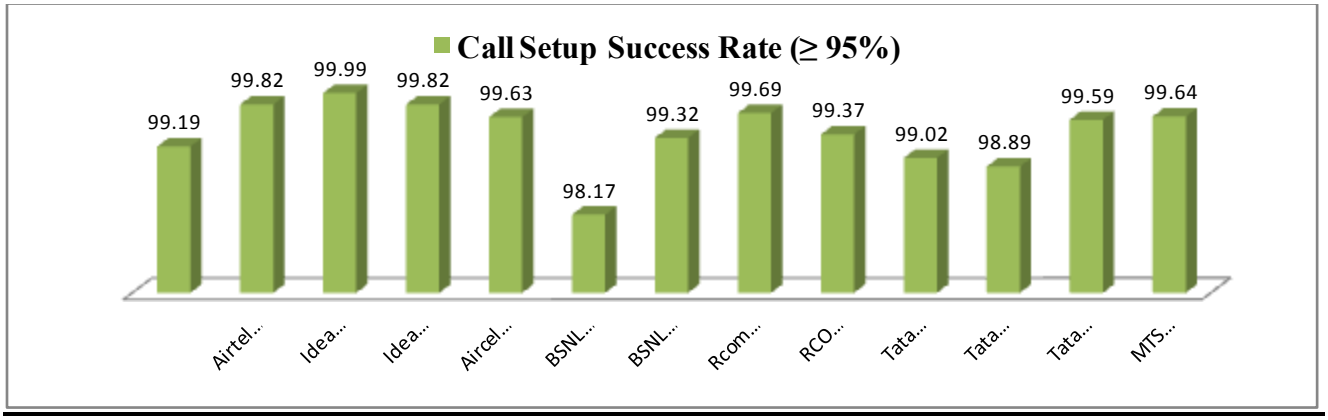

Fig. 3

According to the above graph and data on the table **4.3.2**, it is found that all the operators are meeting the Network Parameters.

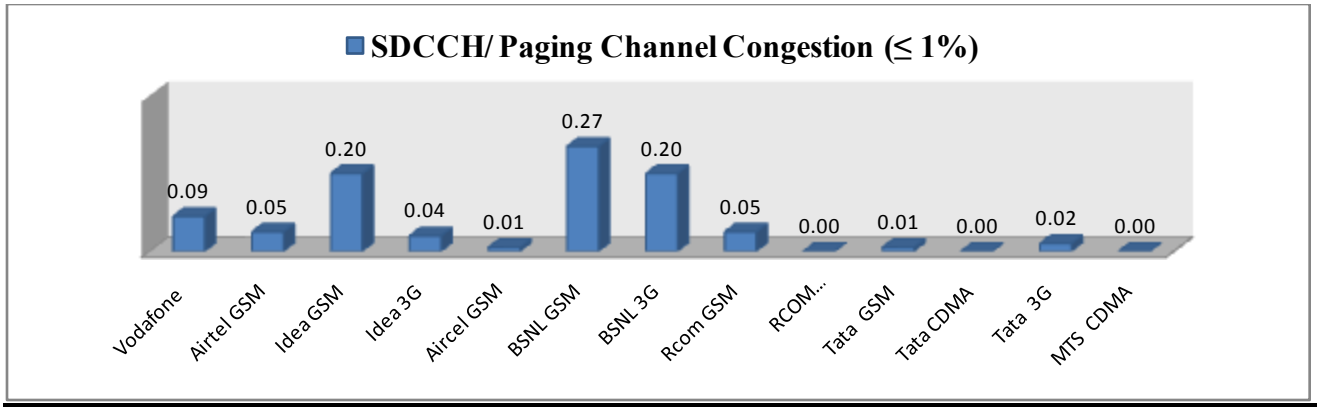

Fig. 4

According to the above graph and data on the table **4.3.2**, it is found that all the operators are meeting the Network Parameters.

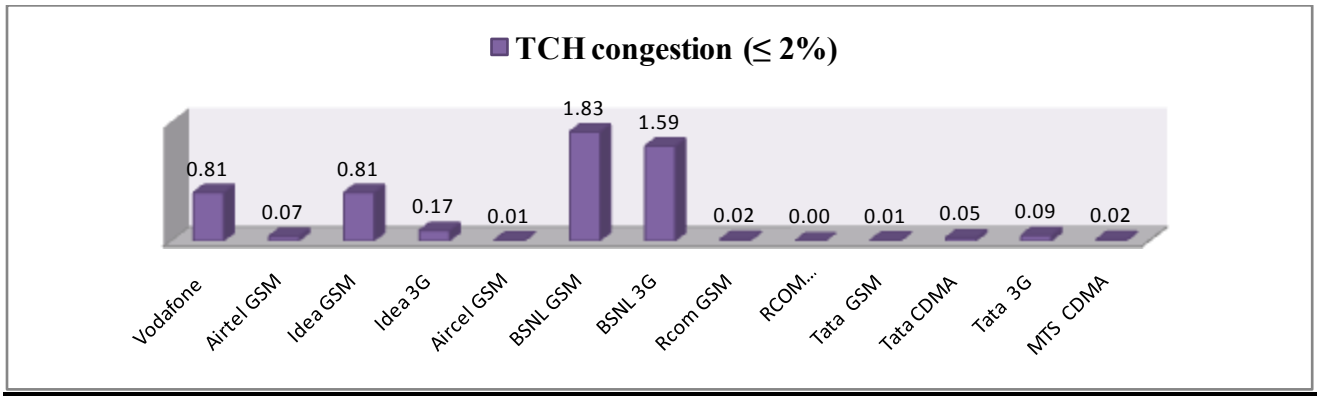

Fig. 5

According to the above graph and data on the table **4.3.2**, it is found that all the operators are meeting the Network Parameters.

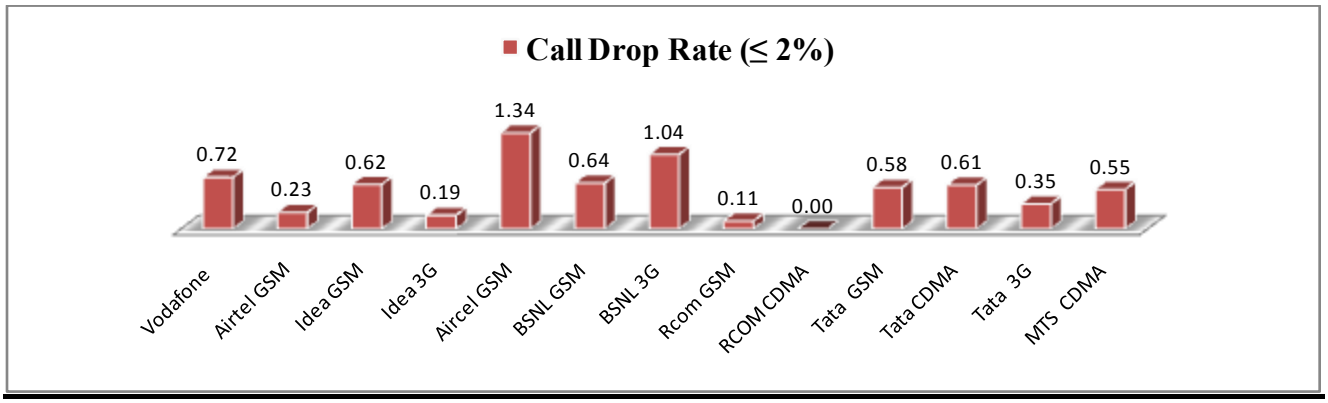

Fig. 6

According to the above graph and data on the table **4.3.2**, it is found that all the operators are meeting the Network Parameters.

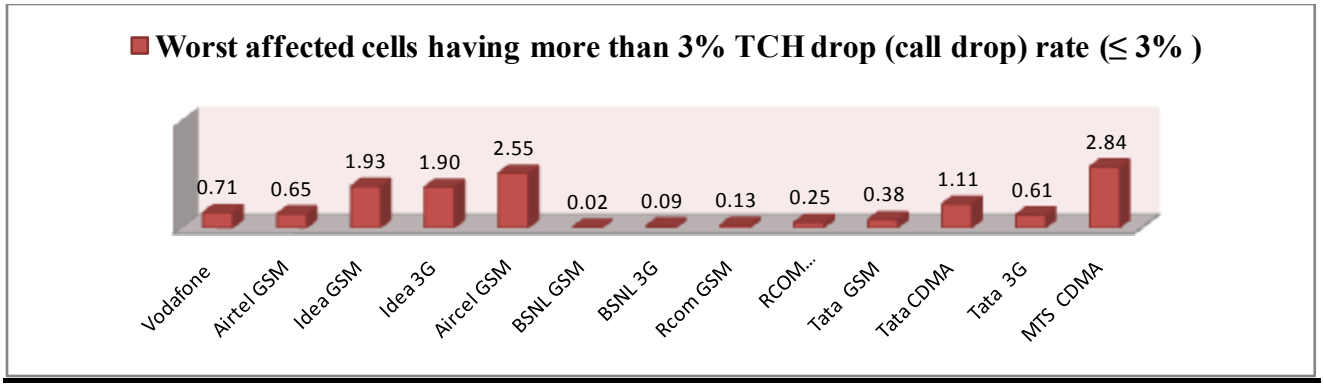

Fig.7

According to the above graph and data on the table **4.3.2**, it is found that all the operators are meeting the Network Parameters.

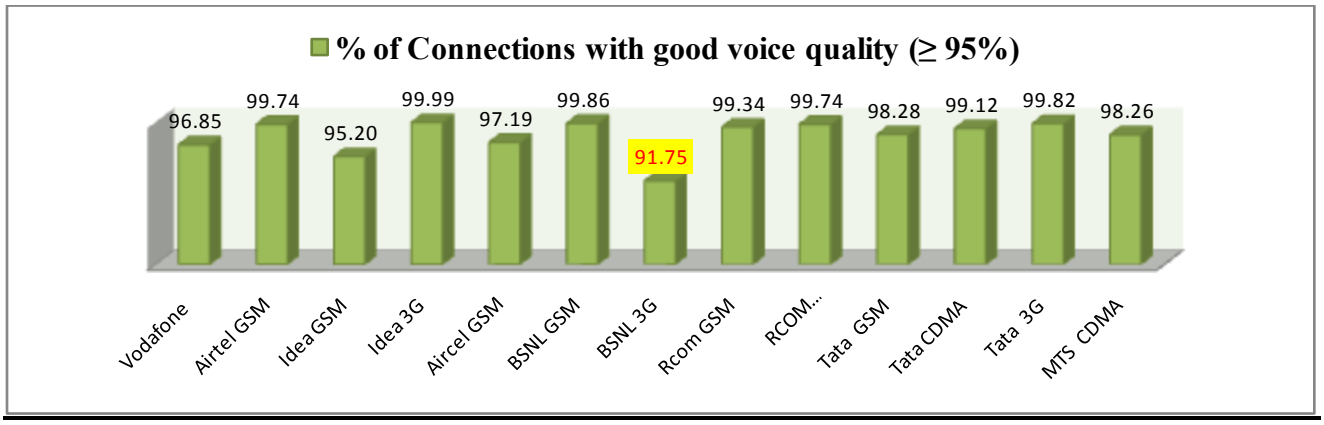

Fig. 8

According to the above graph and data on the table **4.3.2**, it is found that all the operators are meeting the benchmark except **BSNL 3G**.

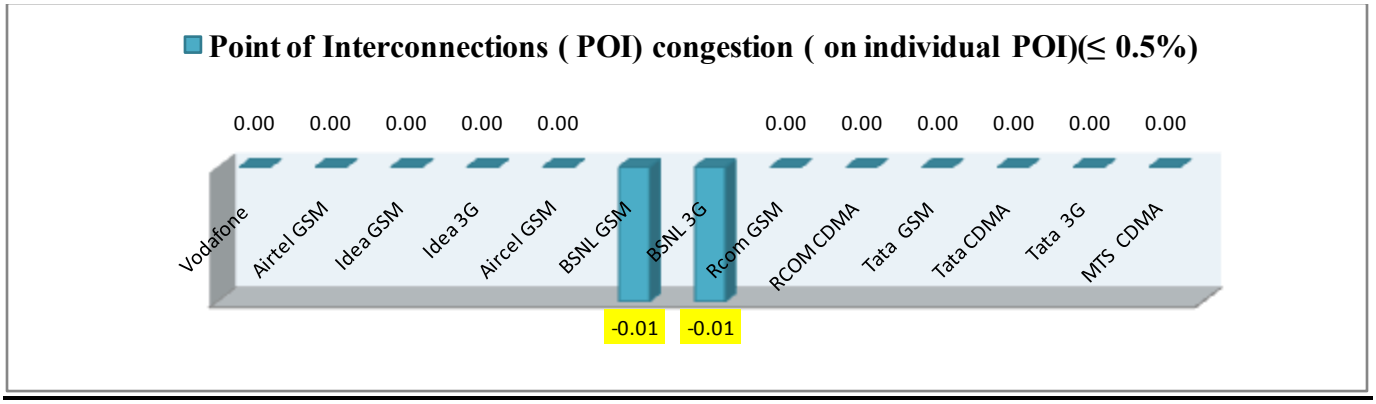

Fig. 9

According to the above graph and data on the table **4.3.2**, it is found that all the operators are meeting the benchmark except BSNL 2G & BSNL 3G (NP)

4.3.3 Kerala Circle (Sep'13):

S.N	Parameter name	Bench mark	Averaged period	Vodafone	Idea GSM	Idea 3G	BSNL GSM	BSNL 3G	Aircel GSM	Airtel GSM	Rcom GSM	RCOM CDMA	Tata GSM	Tata CDMA	Tata 3G	MTS CDMA
Network Availability																
1	BTS accumulated downtime	≤ 2%	One month	0.02	0.09	0.69	0.02	0.26	0.07	0.02	0.03	0.04	0.01	0.09	0.86	0.02
2	Worst affected BTS due to downtime	≤ 2%	One month	0.06	0.26	0.03	0.01	0.36	0.00	0.02	0.09	0.00	0.00	0.00	0.00	0.00
Connection establishment (Accessibility)																
3	Call Setup Success Rate	≥ 95%	One month	99.41	99.98	99.70	98.32	99.02	99.71	99.80	99.83	99.37	98.98	98.85	99.59	99.64
4	SDCCH/ Paging Channel Congestion	≤ 1%	One month	0.08	0.17	0.68	0.27	0.14	0.11	0.06	0.02	0.00	0.01	0.00	0.02	0.00
5	TCH congestion	≤ 2%	One month	0.59	0.73	0.17	1.68	1.99	0.00	0.08	0.01	0.01	0.02	0.04	0.08	0.01
Connection Maintainability (Retain ability)																
6	Call Drop Rate	≤ 2%	One month	0.64	0.57	0.17	0.64	1.16	0.80	0.24	0.11	0.02	0.61	0.97	0.37	0.57
7	Worst affected cells having more than 3% TCH drop (call drop) rate	≤ 3	One month	0.64	1.48	1.52	1.89	0.07	2.97	0.62	0.09	0.19	0.84	2.01	0.43	2.73
8	% of Connections with good voice quality	≥ 95%	One month	97.22	95.20	98.99	99.88	**92.36**	98.16	99.73	99.35	99.74	98.26	99.13	99.82	98.25
9	Point of Interconnections (POI) congestion (on individual POI)	≤ 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	0.00

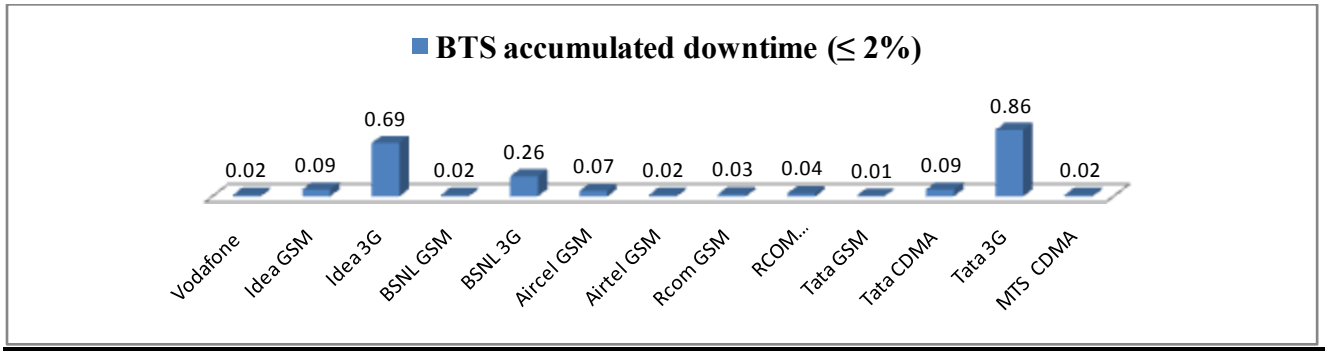

Fig.1

According to the above graph and data on the table 4.3.3, it is found that all the operators are meeting the Network Parameters.

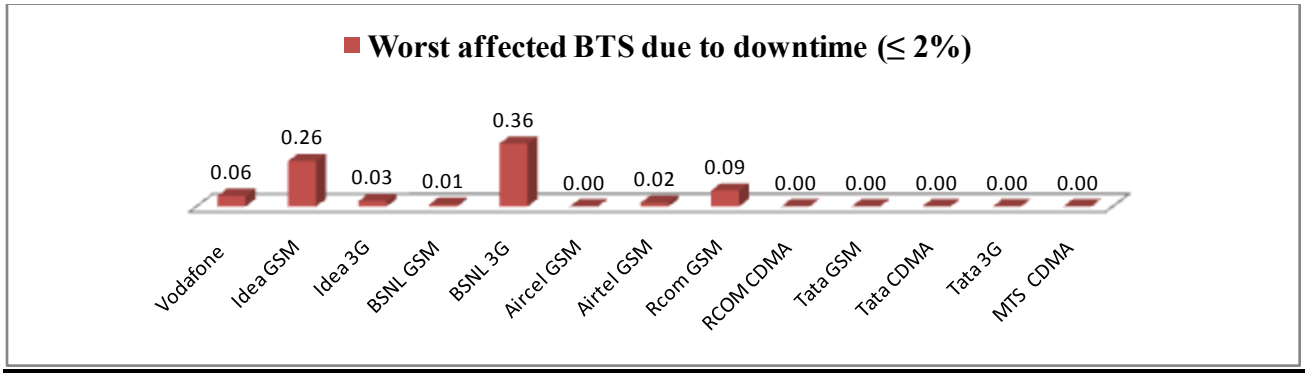

Fig. 2

According to the above graph and data on the table 4.3.3, it is found that all the operators are meeting the Network Parameters.

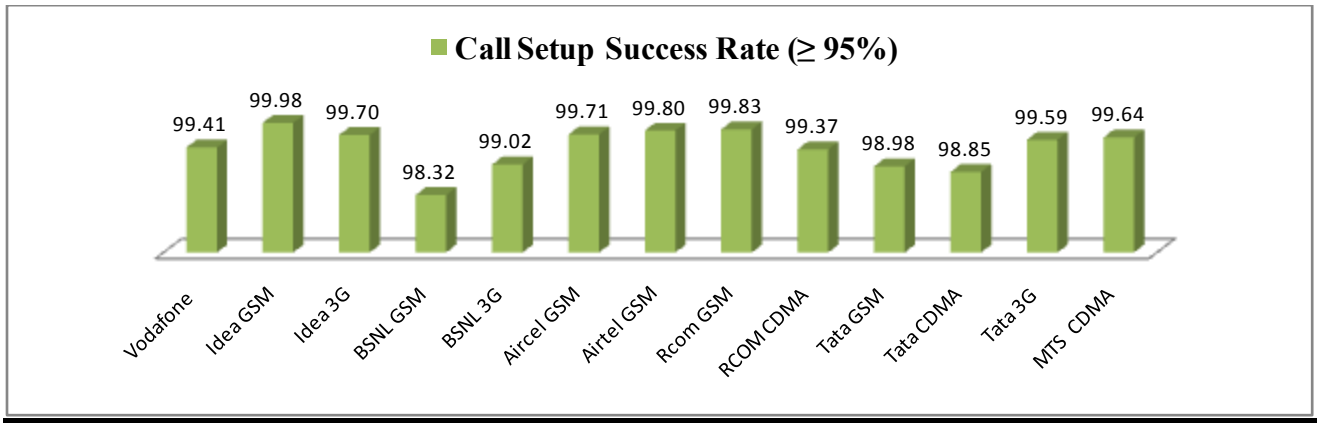

Fig. 3

According to the above graph and data on the table, it is found that all the operators are meeting the Network Parameters.

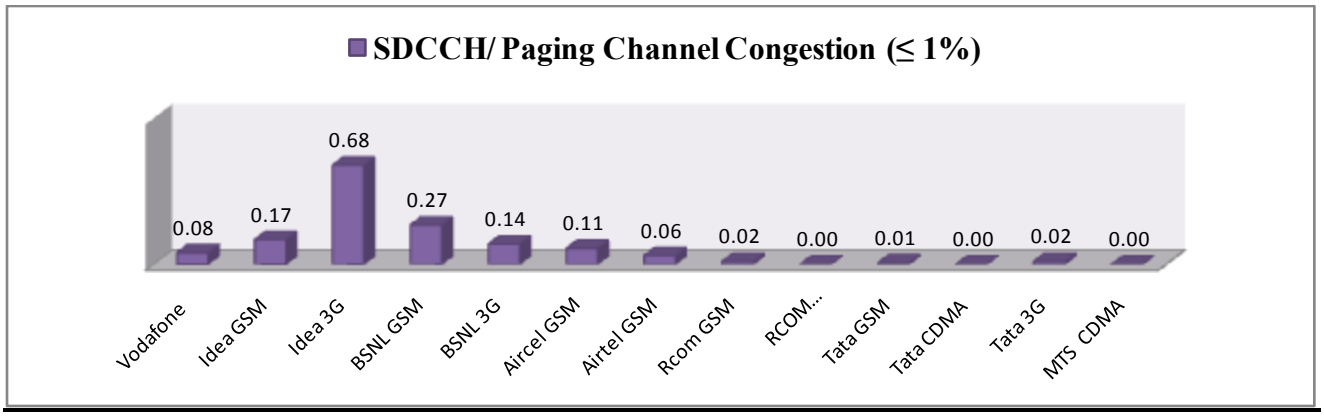

Fig. 4

According to the above graph and data on the table, it is found that all the operators are meeting the Network Parameters.

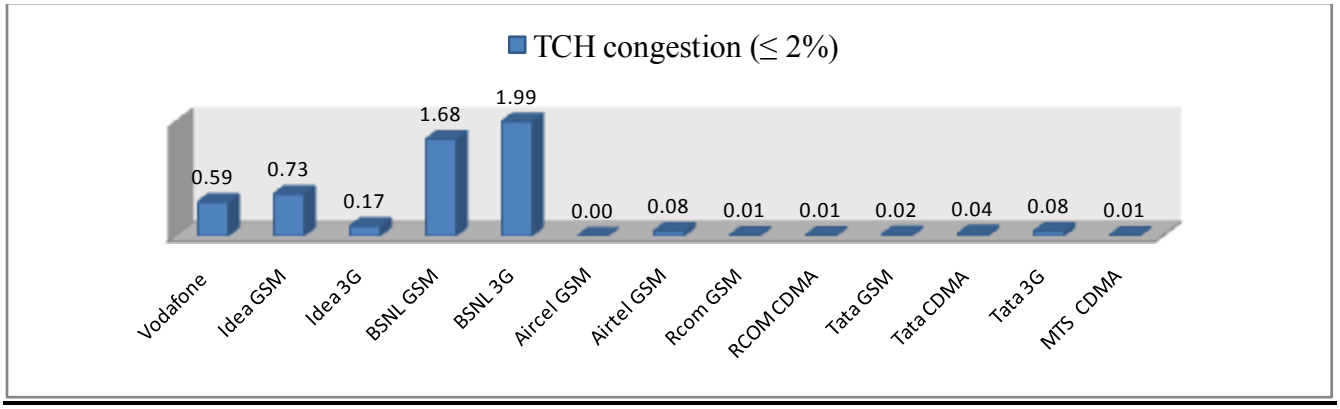

Fig. 5

According to the above graph and data on the table, it is found that all the operators are meeting the Network Parameters.

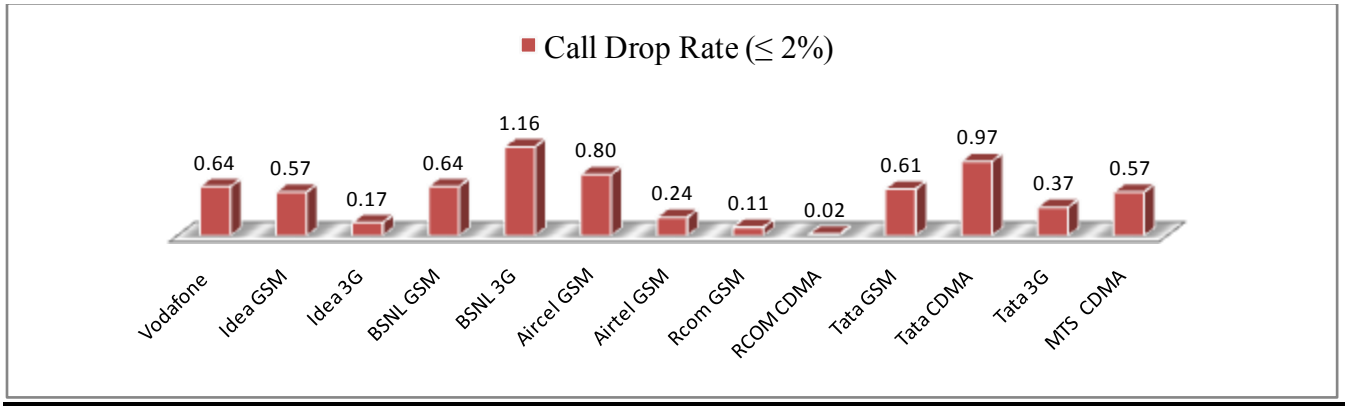

Fig.6

According to the above graph and data on the table, it is found that all the operators are meeting the Network Parameters

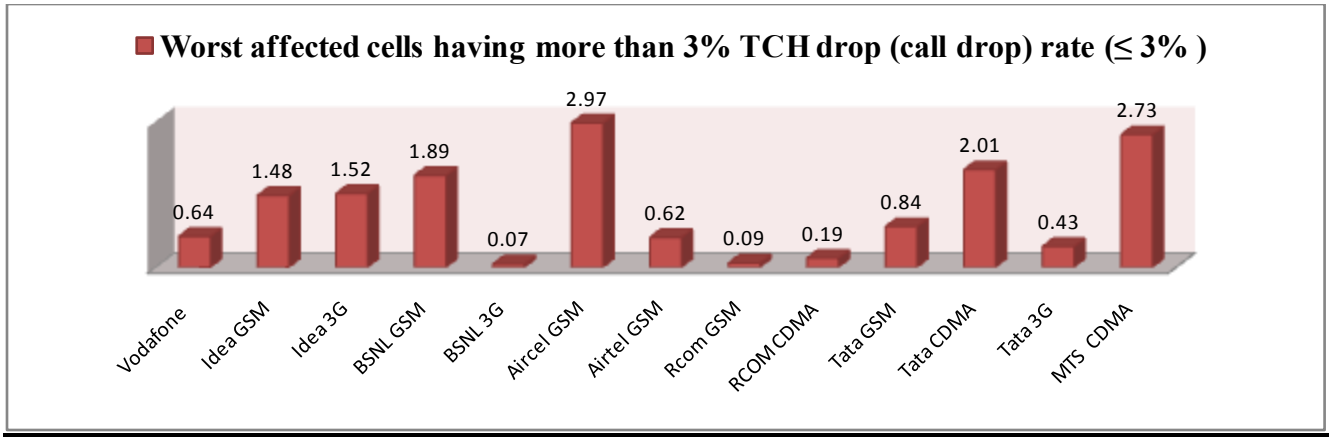

Fig.7

According to the above graph and data on the table, it is found that all the operators are meeting the Network Parameters

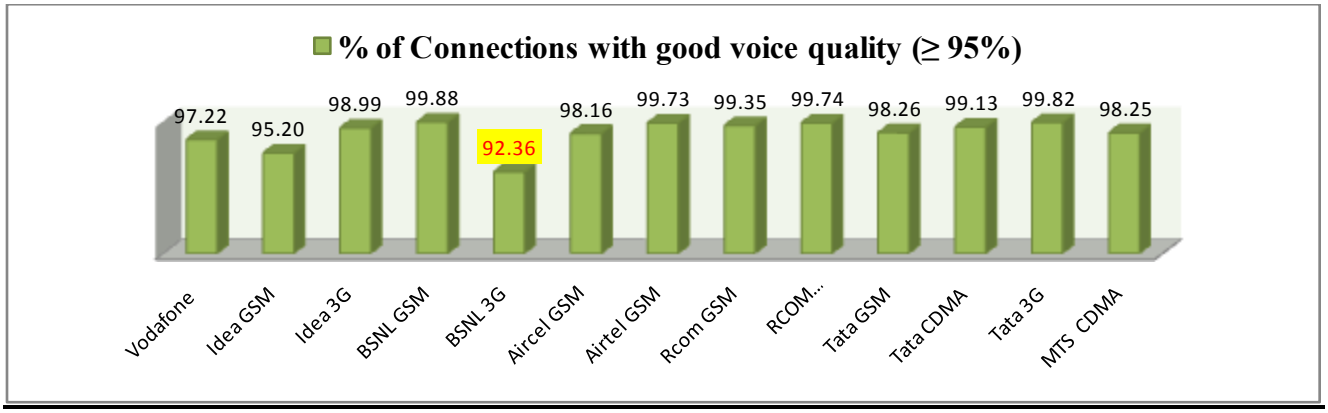

Fig.8

According to the above graph and data on the table, it is found that all the operators are meeting the benchmark except BSNL 3G.

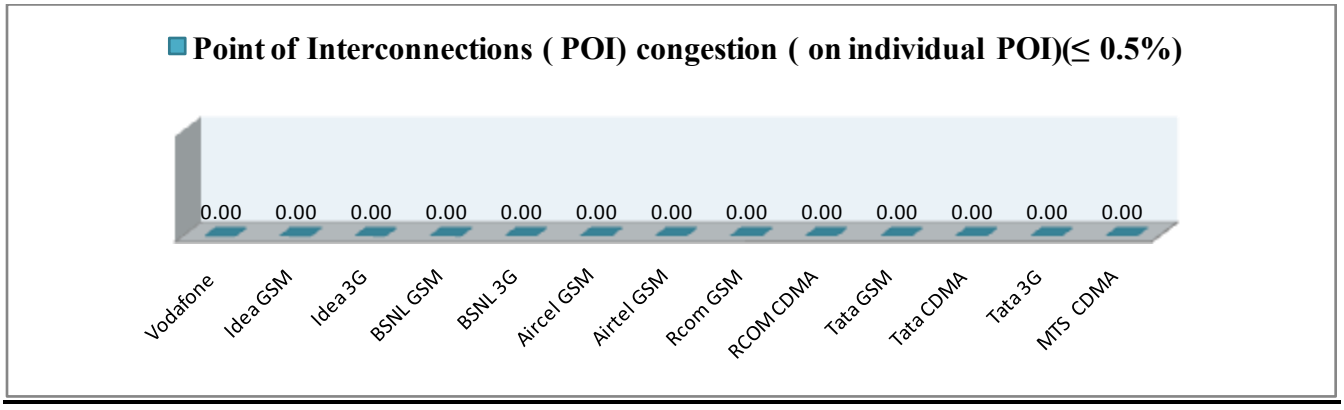

Fig.9

According to the above graph and data on the table, it is found that all the operators are meeting the Network Parameters.

4.4 Drive Test Measurements Audit Report Kerala Circle (Graphical Representation)

4.4.1 Call Attempts: -

Note :-NP= 0

City Name	GSM Operators							CDMA Operators		
	Airtel	Idea	Vodafone	BSNL	Aircel	RCOM	TATA	RCOM	TATA	MTS
Trivandrum	170	145	138	118	0	153	128	151	169	116
Kollam	120	128	148	109	0	141	131	143	136	94
Kottayam	183	133	107	139	0	119	138	121	134	141
Pathanamthitta	152	120	162	151	0	66	139	65	103	129
Alleppey	179	110	109	134	0	108	162	111	116	117
Trissur	181	143	157	143	0	141	175	140	143	134
Palakkad	183	165	163	215	0	188	218	190	120	151
Kannur	206	195	223	233	0	185	232	187	171	174
Iduki	157	132	132	147	0	137	135	142	110	119

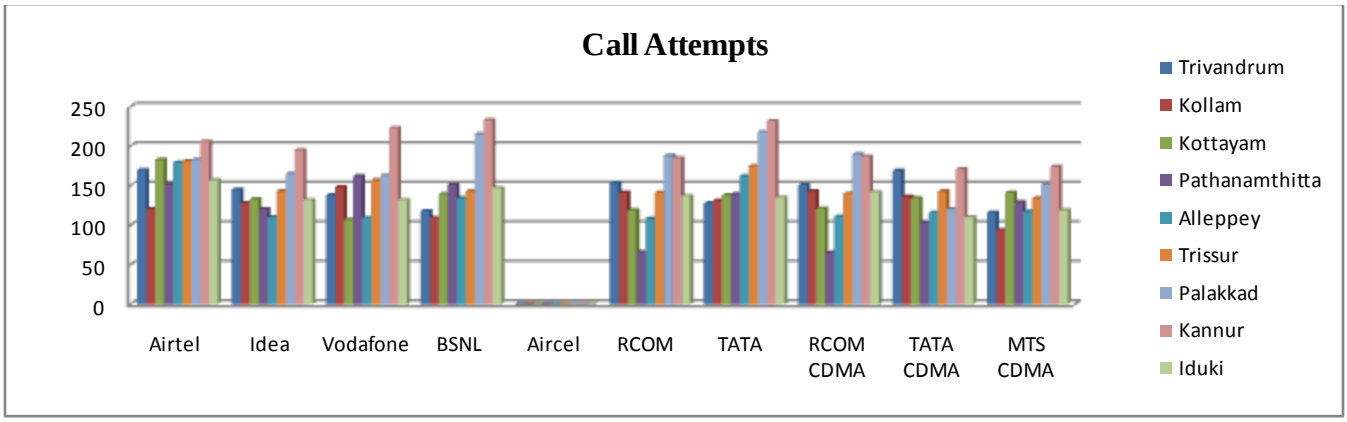

Fig.4.4.1

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%):-

Note: NP- (-1.00%)

City Name	Airtel	Idea	Vodafone	BSNL	Aircel	RCOM	TATA	RCOM CDMA	TATA CDMA	MTS CDMA
Trivandrum	0.00%	1.38%	2.00%	0.00%	-1.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Kollam	0.83%	1.56%	1.00%	0.00%	-1.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Kottayam	0.55%	0.75%	2.00%	2.16%	-1.00%	0.84%	0.00%	0.00%	0.00%	0.71%
Pathanamthitta	0.66%	0.83%	3.00%	1.98%	-1.00%	0.00%	0.00%	0.00%	0.00%	1.55%
Alleppey	1.68%	0.00%	0.00%	0.00%	-1.00%	0.90%	0.00%	0.00%	0.00%	0.00%
Trissur	1.10%	0.00%	1.91%	0.00%	-1.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Palakkad	2.19%	0.61%	1.23%	0.47%	-1.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Kannur	0.00%	0.51%	1.35%	2.14%	-1.00%	0.00%	0.00%	1.60%	0.00%	0.00%
Iduki	0.64%	0.00%	3.79%	1.37%	-1.00%	0.00%	0.00%	0.00%	0.00%	0.80%

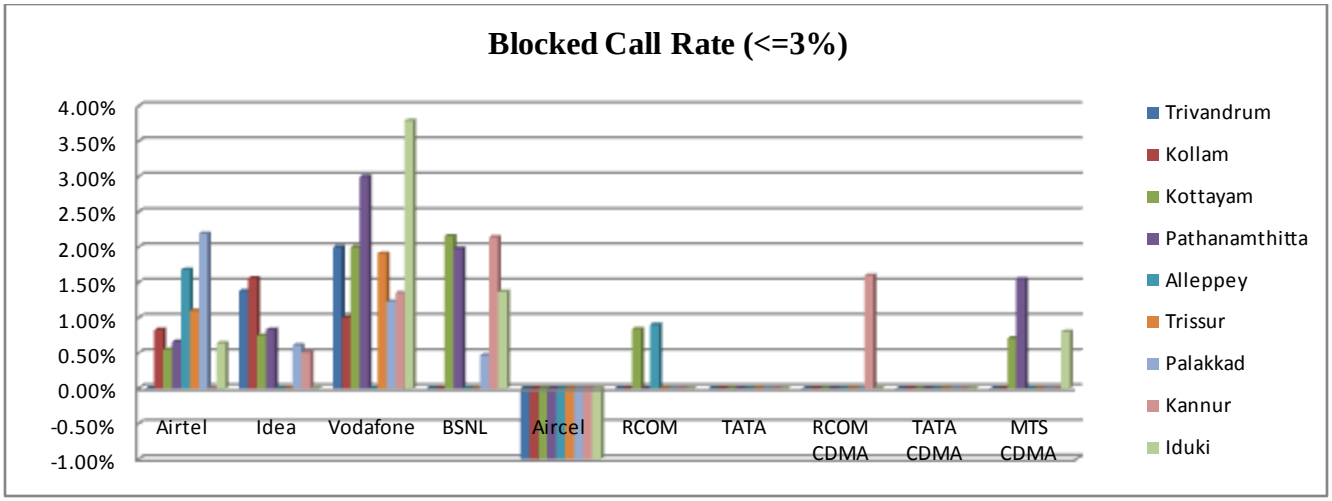

Fig.4.4.2

According to the table and the fig. 4.4.2 it shows that Vodafone in Iduki is not meeting the benchmark of **Blocked Call Rate** and Aircel is not participated.

4.4.3 Dropped Call Rate (<=2%):

Note: NP- (-1.00%)

City Name	Airtel	Idea	Vodafone	BSNL	Aircel	RCOM	TATA	RCOM CDMA	TATA CDMA	MTS CDMA
Trivandrum	0.59%	0.70%	0.00%	0.84%	-1.00%	0.00%	0.00%	0.00%	0.00%	0.86%
Kollam	0.00%	0.00%	0.00%	0.92%	-1.00%	0.00%	0.00%	0.00%	0.70%	0.00%
Kottayam	0.00%	0.00%	1.00%	0.72%	-1.00%	0.00%	0.00%	1.70%	0.74%	0.71%
Pathanamthitta	0.67%	5.22%	0.00%	1.35%	-1.00%	0.00%	5.60%	0.00%	3.80%	2.36%
Alleppey	0.00%	0.00%	0.00%	1.49%	-1.00%	0.00%	0.00%	0.00%	1.72%	0.00%
Trissur	0.00%	2.10%	0.00%	0.70%	-1.00%	0.00%	0.57%	0.00%	1.39%	0.00%
Palakkad	0.00%	0.00%	0.00%	0.00%	-1.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Kannur	0.49%	1.54%	1.37%	1.28%	-1.00%	0.00%	0.43%	0.00%	0.58%	0.00%
Iduki	0.64%	0.76%	0.81%	0.69%	-1.00%	0.07%	1.52%	0.07%	0.91%	0.90%

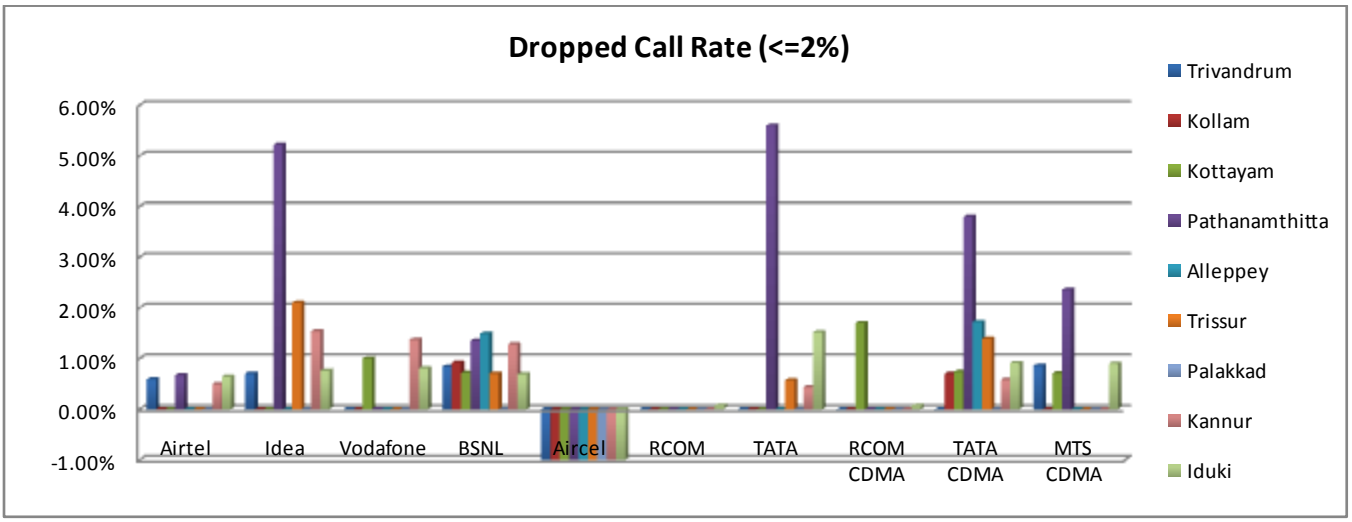

Fig. 4.4.3

According to the table and the fig. 4.4.3 it shows that Idea, MTS & TATA (CDMA & GSM) are not meeting the benchmark of **Dropped Call Rate** in Pathanamthitta and also Idea is not meeting the benchmark of **Dropped Call Rate** in Trissur.

4.4.4 Percentage of connections with good voice quality (=>95%)

4.4.4.1 0-4 (w/o frequency hopping)

Note: NP= 101.00%, NA= 102.00%

City Name	Airtel	Idea	Vodafone	BSNL	Aircel	RCOM	TATA	RCOM CDMA	TATA CDMA	MTS CDMA
Trivandrum	102.00%	102.00%	91.37%	102.00%	101.00%	102.00%	102.00%	102.00%	102.00%	98.26%
Kollam	102.00%	102.00%	92.02%	102.00%	101.00%	102.00%	102.00%	102.00%	102.00%	97.77%
Kottayam	102.00%	102.00%	90.95%	102.00%	101.00%	102.00%	102.00%	102.00%	102.00%	98.92%
Pathanamthitta	102.00%	102.00%	90.57%	102.00%	101.00%	102.00%	102.00%	102.00%	102.00%	96.56%
Alleppey	102.00%	102.00%	91.89%	102.00%	101.00%	102.00%	102.00%	102.00%	95.48%	99.21%
Trissur	102.00%	102.00%	87.60%	102.00%	101.00%	102.00%	102.00%	102.00%	96.90%	99.43%
Palakkad	102.00%	102.00%	89.46%	102.00%	101.00%	102.00%	102.00%	102.00%	99.76%	99.49%
Kannur	102.00%	102.00%	87.73%	102.00%	101.00%	102.00%	102.00%	102.00%	95.99%	99.41%
Iduki	102.00%	102.00%	88.05%	102.00%	101.00%	102.00%	102.00%	102.00%	98.82%	98.26%

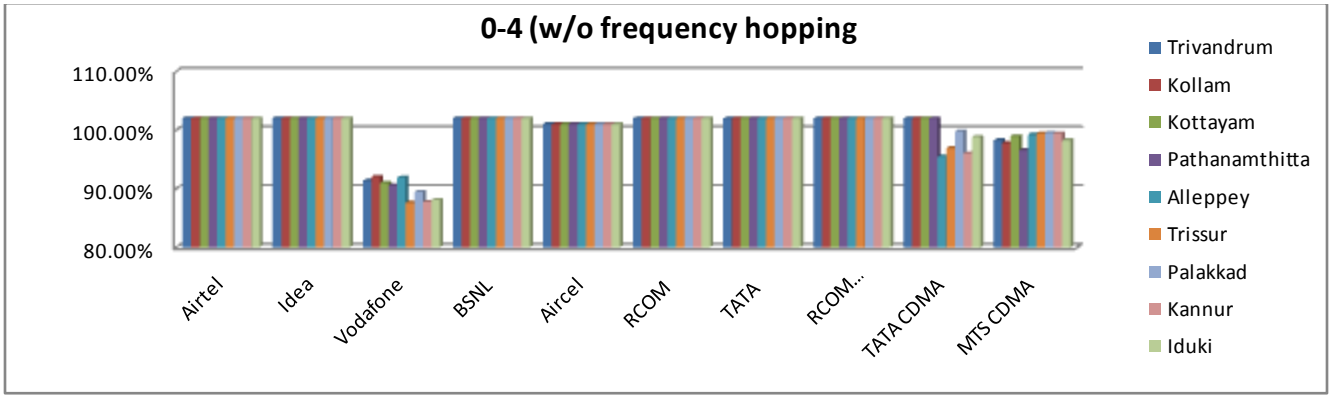

Fig. 4.4.4.1

According to the table and the fig. 4.4.4.1 it shows that the vodafone service providers is meeting their benchmark in all the city and Airtel, Idea, BSNL, Rcom (GSM & CDMA) and TATA CDMA (in Trivandrum, Kollam, Kottayam and Pathanamthitta)are not available, however Aircel is not participated.

4.4.4.2 0-5 (with frequency hopping)

Note: NP= 101.00%

City Name	Airtel	Idea	Vodafone	BSNL	Aircel	RCOM	TATA	RCOM CDMA	TATA CDMA	MTS CDMA
Trivandrum	95.00%	96.15%	90.91%	95.11%	101.00%	96.00%	95.58%	99.71%	99.03%	99.30%
Kollam	95.00%	93.10%	91.14%	95.78%	101.00%	98.00%	96.50%	97.73%	97.52%	99.29%
Kottayam	95.80%	94.29%	92.35%	95.70%	101.00%	99.00%	95.23%	98.73%	97.32%	99.65%
Pathanamthitta	97.70%	95.77%	89.03%	96.70%	101.00%	95.00%	93.27%	98.11%	97.38%	99.92%
Alleppey	96.40%	98.63%	91.41%	96.20%	101.00%	98.00%	95.66%	98.00%	97.30%	99.80%
Trissur	96.50%	93.64%	86.94%	98.60%	101.00%	98.46%	96.35%	99.74%	98.17%	99.86%
Palakkad	95.30%	95.01%	89.04%	96.22%	101.00%	97.69%	95.66%	99.77%	99.96%	99.78%
Kannur	95.50%	94.41%	94.01%	96.92%	101.00%	97.80%	95.37%	99.39%	97.43%	99.80%
Iduki	97.20%	97.39%	94.22%	95.86%	101.00%	97.88%	95.25%	97.12%	99.74%	98.56%

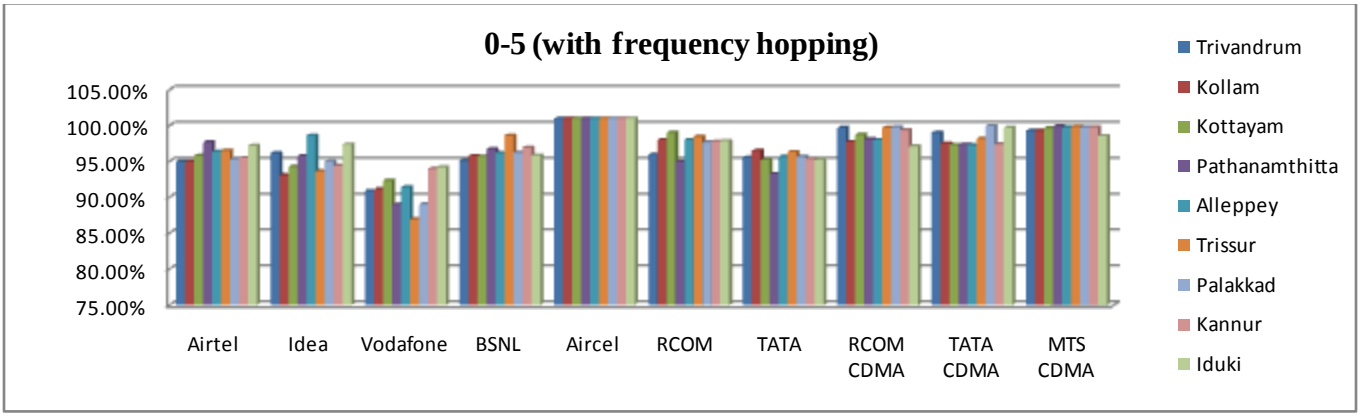

Fig. 4.4.4.2

According to the table and the fig. 4.4.4.1, it shows that Vodafone is not meeting the benchmark in any city and Idea is not meeting the benchmark of **Voice Quality (0-5 (with frequency hopping)** in Kollam, Kottayam, Trissur and Kannur.

4.4.5 Service Coverage

4.4.5.1 In door (>= -75dBm)

Note: NP= 101.00%

City Name	Airtel	Idea	Vodafone	BSNL	Aircel	RCOM	TATA	RCOM CDMA	TATA CDMA	MTS CDMA
Trivandrum	41.93%	54.57%	71.87%	88.41%	101.00%	85.40%	82.34%	73.00%	76.75%	61.91%
Kollam	36.99%	55.99%	61.24%	68.36%	101.00%	80.54%	71.86%	32.35%	88.20%	71.00%
Kottayam	50.69%	52.81%	74.60%	69.60%	101.00%	46.00%	70.70%	62.02%	93.80%	44.62%
Pathanamthitta	46.14%	22.66%	47.20%	69.00%	101.00%	55.74%	44.36%	36.40%	53.92%	30.59%
Alleppey	45.00%	39.07%	63.12%	69.20%	101.00%	65.00%	65.38%	42.00%	76.41%	39.61%
Trissur	72.00%	62.29%	87.99%	76.60%	101.00%	81.63%	86.09%	56.51%	99.26%	46.79%
Palakkad	64.00%	60.84%	84.07%	89.70%	101.00%	75.73%	89.89%	57.98%	96.13%	64.68%
Kannur	57.00%	73.63%	36.00%	81.50%	101.00%	76.05%	80.22%	42.09%	78.84%	63.13%
Iduki	43.00%	17.89%	48.82%	81.69%	101.00%	52.89%	47.89%	36.70%	55.86%	37.42%

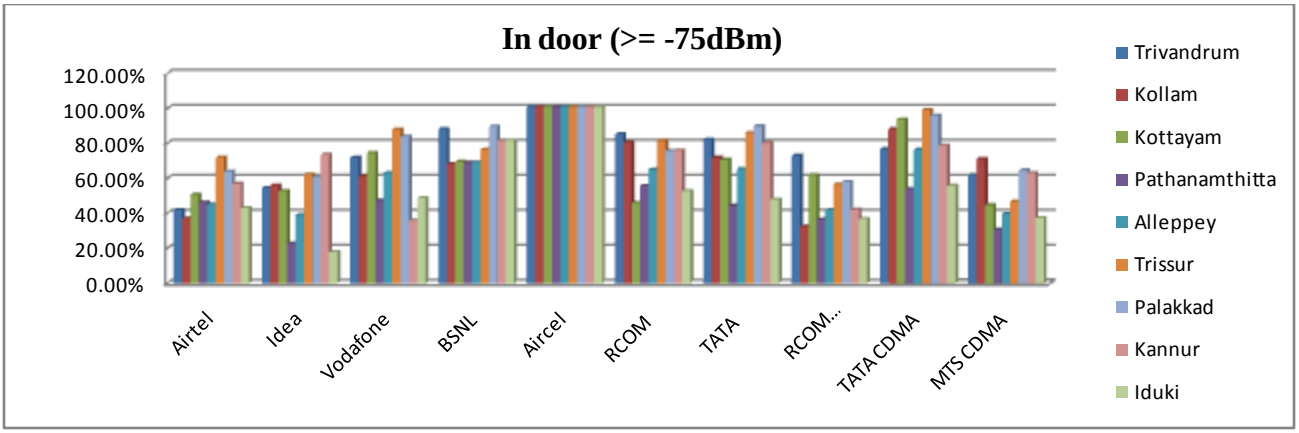

Fig.4.4.5.1

According to the table and the fig. 4.4.5.1, it shows that all service providers are meeting the benchmark of **indoor (>= -75dBm)** and Aircel is not participated

4.4.5.2 In-vehicle (>= -85dBm)

Note: NP= 101.00%

City Name	Airtel	Idea	Vodafone	BSNL	Aircel	RCOM	TATA	RCOM CDMA	TATA CDMA	MTS CDMA
Trivandrum	78.07%	89.22%	96.40%	99.39%	101.00%	98.90%	97.28%	97.00%	97.83%	98.05%
Kollam	75.76%	91.97%	93.73%	93.13%	101.00%	96.53%	95.78%	68.76%	99.03%	99.49%
Kottayam	88.64%	93.51%	97.00%	92.70%	101.00%	84.00%	93.61%	94.31%	99.17%	81.30%
Pathanamthitta	80.14%	68.68%	82.37%	92.00%	101.00%	78.40%	70.95%	66.81%	68.35%	49.06%
Alleppey	86.00%	88.33%	96.69%	93.90%	101.00%	92.00%	90.74%	90.00%	91.11%	92.07%
Trissur	96.00%	95.62%	99.49%	96.00%	101.00%	98.13%	98.36%	98.01%	100.00%	94.61%
Palakkad	97.00%	95.27%	99.23%	99.50%	101.00%	97.40%	99.18%	97.76%	99.75%	96.06%
Kannur	90.00%	96.89%	77.26%	97.20%	101.00%	94.32%	94.41%	82.20%	98.00%	91.62%
Iduki	79.00%	64.06%	88.78%	96.30%	101.00%	80.92%	75.39%	69.41%	80.62%	65.97%

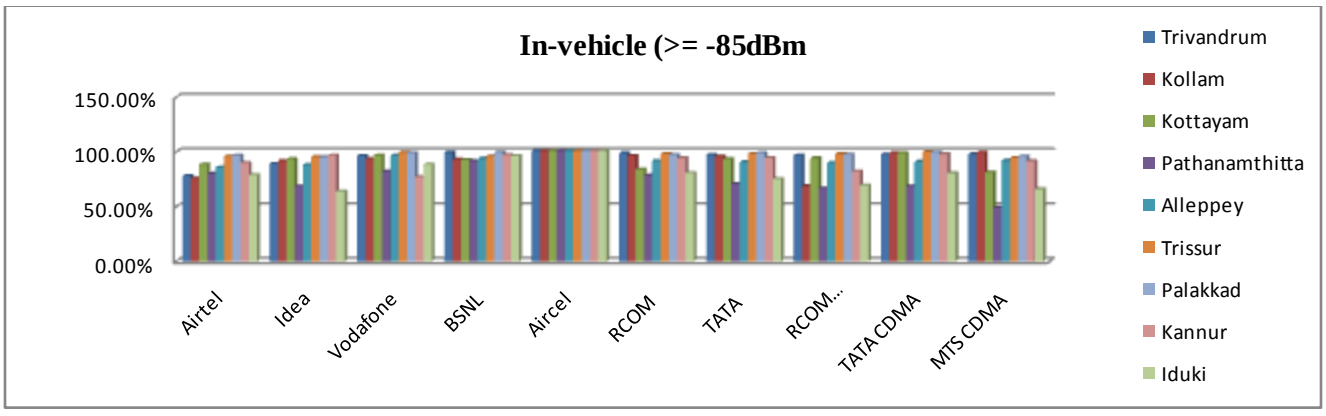

Fig. 4.4.5.2

According to the table and the fig. 4.4.5.2, it shows that all service providers are meeting their benchmark of **In-vehicle (>= -85dBm)** and Aircel is not participated

4.4.5.3 Outdoor- in city (>= -95dBm)

Note: NP= 101.00%

City Name	Airtel	Idea	Vodafone	BSNL	Aircel	RCOM	TATA	RCOM CDMA	TATA CDMA	MTS CDMA
Trivandrum	97.65%	99.57%	99.91%	99.99%	101.00%	100.00%	99.88%	100.00%	99.99%	100.00%
Kollam	97.29%	99.31%	99.87%	99.80%	101.00%	99.97%	99.66%	99.72%	99.99%	100.00%
Kottayam	99.69%	99.97%	99.95%	99.80%	101.00%	100.00%	99.41%	99.91%	99.86%	99.20%
Pathanamthitta	95.16%	95.80%	97.85%	99.70%	101.00%	94.47%	89.76%	96.86%	87.27%	77.60%
Alleppey	99.00%	99.81%	99.96%	99.90%	101.00%	100.00%	98.79%	100.00%	99.16%	100.00%
Trissur	99.00%	99.97%	100.00%	99.80%	101.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Palakkad	100.00%	99.94%	100.00%	100.00%	101.00%	99.92%	100.00%	99.46%	99.99%	100.00%
Kannur	99.00%	99.91%	97.12%	100.00%	101.00%	99.05%	99.34%	99.17%	99.98%	100.00%
Iduki	98.00%	97.34%	99.30%	99.85%	101.00%	95.59%	94.71%	95.39%	96.51%	85.00%

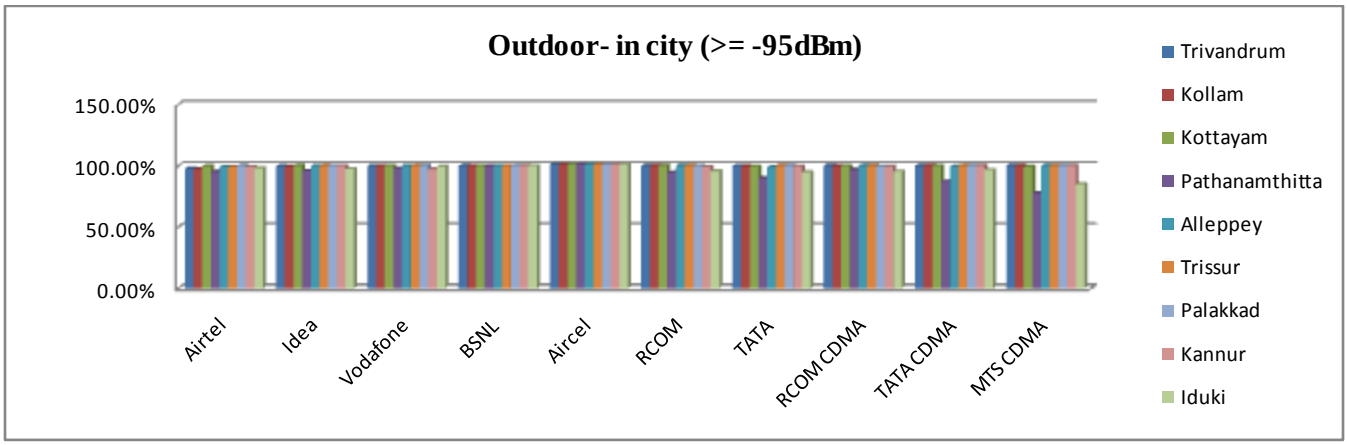

Fig. 4.4.5.3

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 (>= -95dBm)** and Aircel is not participated

4.4.6 Call Setup Success Rate (>=95%)

Note: NP= 101.00%

City Name	Airtel	Idea	Vodafone	BSNL	Aircel	RCOM	TATA	RCOM CDMA	TATA CDMA	MTS CDMA
Trivandrum	100%	98.62%	98.55%	100.00%	101.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Kollam	99.17%	98.44%	99.32%	100.00%	101.00%	100.00%	99.23%	100.00%	99.26%	100.00%
Kottayam	99.45%	97.74%	98.13%	97.84%	101.00%	99.16%	100.00%	100.00%	99.25%	99.30%
Pathanamthitta	99.34%	95.83%	98.14%	98.01%	101.00%	100.00%	89.92%	100.00%	79.60%	98.40%
Alleppey	98.32%	100%	100.00%	100.00%	101.00%	99.10%	100.00%	100.00%	100.00%	100.00%
Trissur	98.89%	97.90%	98.09%	100.00%	101.00%	100.00%	99.43%	100.00%	100.00%	100.00%
Palakkad	97.81%	99.39%	98.77%	99.53%	101.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Kannur	100.00%	98.46%	98.65%	97.85%	101.00%	100.00%	100.00%	98.40%	100.00%	100.00%
Iduki	99.36%	98.48%	96.21%	98.64%	101.00%	100.00%	97.78%	100.00%	100.00%	99.00%

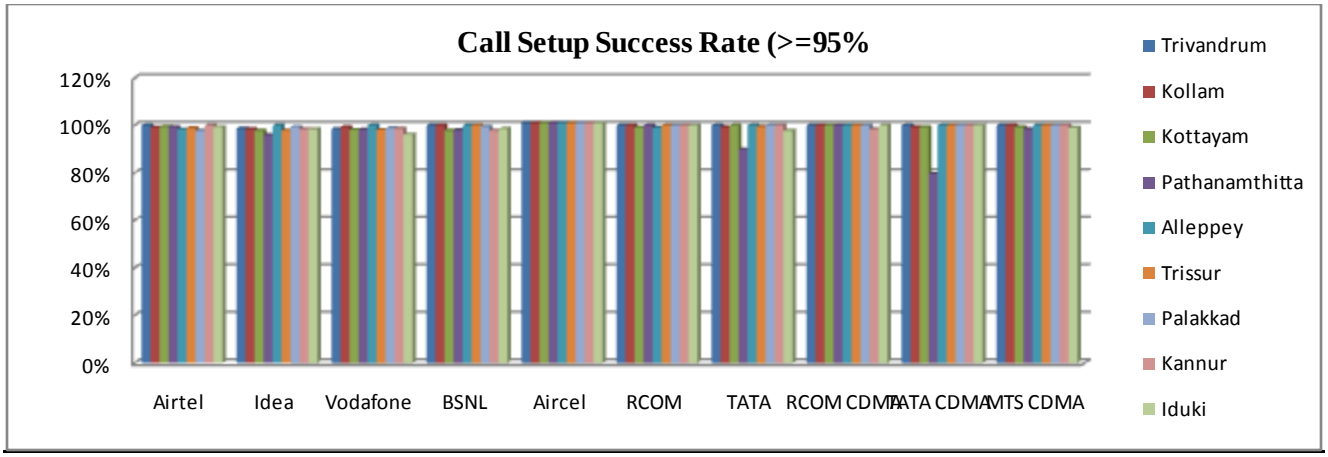

Fig. 4.4.6

According to the table and the fig. 4.4.6, it shows that TATA (GSM & CDMA) is not meeting the benchmark of **Call Setup Success Rate** in Pathanamthitta, however Aircel is not participated.

4.4.7 Handover Success Rate (HOSR)

Note: NP= 101.00%

City Name	Airtel	Idea	Vodafone	BSNL	Aircel	RCOM	TATA	RCOM CDMA	TATA CDMA	MTS CDMA
Trivandrum	97.85%	99.44%	99.74%	99.23%	101.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Kollam	98.31%	98.22%	100.00%	98.61%	101.00%	100.00%	99.32%	100.00%	100.00%	100.00%
Kottayam	98.87%	99.46%	98.06%	98.34%	101.00%	100.00%	99.39%	100.00%	100.00%	100.00%
Pathanamthitta	99.17%	97.14%	99.20%	98.00%	101.00%	100.00%	98.86%	100.00%	100.00%	99.89%
Alleppey	99.02%	99.63%	98.15%	99.25%	101.00%	99.30%	98.88%	100.00%	100.00%	100.00%
Trissur	98.93%	99.37%	98.45%	98.92%	101.00%	100.00%	99.36%	100.00%	100.00%	100.00%
Palakkad	94.95%	99.43%	98.95%	98.67%	101.00%	100.00%	99.12%	100.00%	100.00%	100.00%
Kannur	98.75%	98.77%	98.93%	94.44%	101.00%	99.73%	96.61%	100.00%	100.00%	100.00%
Iduki	99.26%	100.00%	98.28%	98.70%	101.00%	100.00%	100.00%	100.00%	100.00%	100.00%

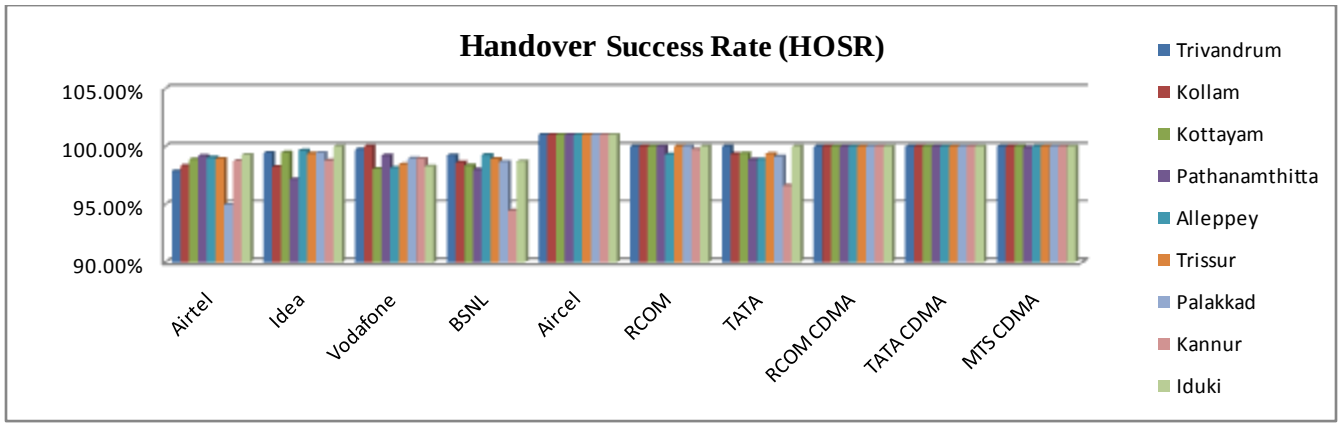

Fig.4.4.7

4.5 LIVE TEST SUMMARY and Graphical Representation for Q1_KERALA Circle

Three Days Live Test Performance Audit Summary Report
Telecom Circle : **KERALA Circle**
Zone : South
Period : 1st July To 30th Sep2013

S.N	Parameter name	Bench mark	Date	Voda fone	Airtel GSM	Idea GSM	Idea 3G	MTS CDMA	Aircel	BSNL GSM	BSNL-3G	Rcom GSM	Rcom CDMA	Tata GSM	Tata 3G	Tata CDMA
1	BTS accumulated downtime	≤ 2%	Day 1	0.00	0.00	0.01	0.03	0.00	0.00	0.02	0.00	0.05	0.06	0.01	0.00	0.00
			Day 2	0.00	0.00	0.01	0.02	0.00	0.00	0.02	0.00	0.09	0.12	0.01	0.00	0.00
			Day 3	0.00	0.00	0.01	0.03	0.00	0.00	0.02	0.00	0.05	0.06	0.01	0.00	0.00
2	Worst affected BTS due to downtime	≤ 2%	Day 1	0.00	0.00	0.02	0.00	0.00	0.00	0.06	0.00	0.03	0.02	0.00	0.00	0.00
			Day 2	0.00	0.00	0.02	0.00	0.00	0.00	0.06	0.00	0.08	0.10	0.00	0.00	0.00
			Day 3	0.00	0.00	0.02	0.00	0.00	0.00	0.05	0.00	0.04	0.04	0.00	0.00	0.00
Connection establishment (Accessibility)																
3	Call Setup Success Rate	≥ 95%	Day 1	99.59	99.81	99.98	99.86	99.71	99.94	99.14	99.15	99.82	99.36	98.97	99.56	99.01
			Day 2	99.46	99.81	99.97	99.86	99.68	99.26	99.07	99.26	99.83	99.35	98.96	99.50	98.98
			Day 3	99.33	99.82	99.97	99.86	99.71	99.93	99.14	99.19	99.82	99.37	98.97	99.59	99.01
4	SDCCH/ Paging Channel Congestion	≤ 1%	Day 1	0.02	0.04	0.13	0.01	0.00	0.02	0.48	0.27	0.00	0.00	0.00	0.05	0.00
			Day 2	0.06	0.05	0.15	0.05	0.00	0.00	0.63	0.27	0.00	0.00	0.01	0.07	0.00
			Day 3	0.11	0.05	0.19	0.21	0.00	0.00	0.66	0.29	0.00	0.00	0.05	0.05	0.00
5	TCH congestion	≤ 2%	Day 1	0.41	0.07	0.85	0.02	0.01	0.00	0.86	0.59	0.01	0.00	0.01	0.11	0.00
			Day 2	0.54	0.07	0.78	0.04	0.00	0.00	0.93	0.73	0.01	0.00	0.02	0.15	0.00
			Day 3	0.67	0.07	0.77	0.06	0.01	0.00	0.86	0.63	0.01	0.00	0.01	0.12	0.01
Connection Maintainability (Retain ability)																
6	Call Drop Rate	≤ 2%	Day 1	0.66	0.27	0.52	0.17	0.56	0.92	0.48	0.93	0.10	0.00	0.60	0.32	0.84
			Day 2	0.65	0.25	0.52	0.17	0.51	1.38	0.47	0.91	0.10	0.01	0.60	0.34	0.84
			Day 3	0.60	0.23	0.56	0.18	0.56	0.00	0.46	0.88	0.10	0.00	0.59	0.34	1.53
7	Worst affected cells having more than 3% TCH drop (call drop) rate	≤ 3%	Day 1	2.02	0.51	1.59	1.35	2.86	**6.11**	2.83	0.07	0.00	0.00	**4.20**	**5.03**	1.64
			Day 2	2.03	0.40	1.64	1.63	2.53	**4.89**	2.82	0.07	0.00	0.00	**4.12**	**4.77**	1.34
			Day 3	2.00	0.39	2.03	1.63	1.92	2.85	2.73	0.07	0.00	0.00	**4.44**	**4.43**	2.68
8	% of Connections with good voice quality	≥ 95%	Day 1	97.19	99.72	95.48	99.02	98.25	97.02	NA	99.83	99.35	99.25	98.30	99.83	99.16
			Day 2	97.28	99.72	95.53	99.07	98.24	99.42	NA	99.83	99.36	99.33	98.28	99.83	99.14
			Day 3	97.19	99.70	95.25	99.02	98.26	99.31	NA	99.82	99.36	99.34	98.32	99.83	99.16
9	Point of Interconnections (POI) congestion (on individual POI)	≤ 0.5%	Day 1	0.11	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Day 2	0.17	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Day 3	0.08	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

4.5.1 Network Availability

4.5.1.1 BTS accumulated downtime (≤ 2%)

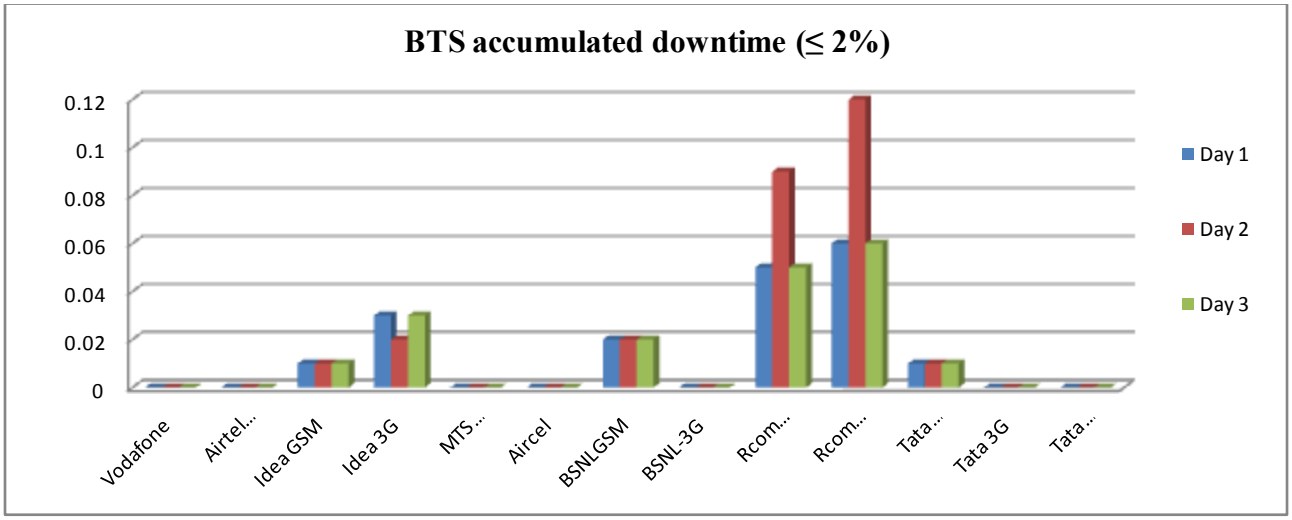

Fig. 4.5.1.1

- All operators are meeting the TRAI benchmarks **BTS accumulated downtime (≤ 2%)** for 3 days live data taken in the month of audit.

4.5.1.2 Worst affected BTS due to downtime (≤ 2%)

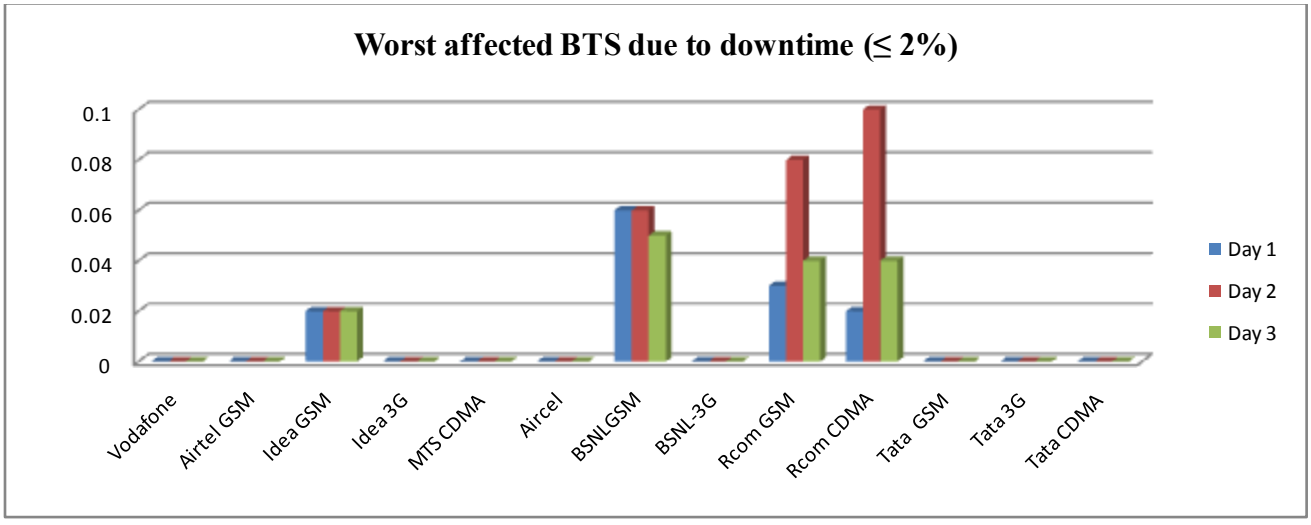

Fig. 4.5.1.2

- All operators are meeting the TRAI benchmarks **Worst affected BTS due to downtime (≤ 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≥ 95%

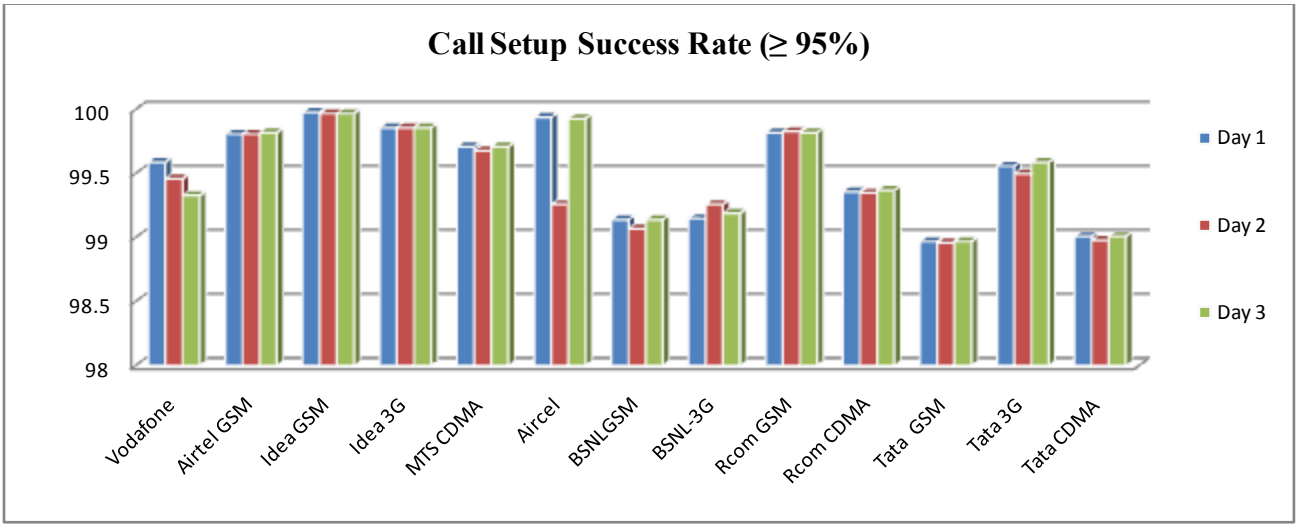

Fig. 4.5.2.1

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

4.5.2.2 SDCCH/ Paging Channel Congestion ≤ 1%

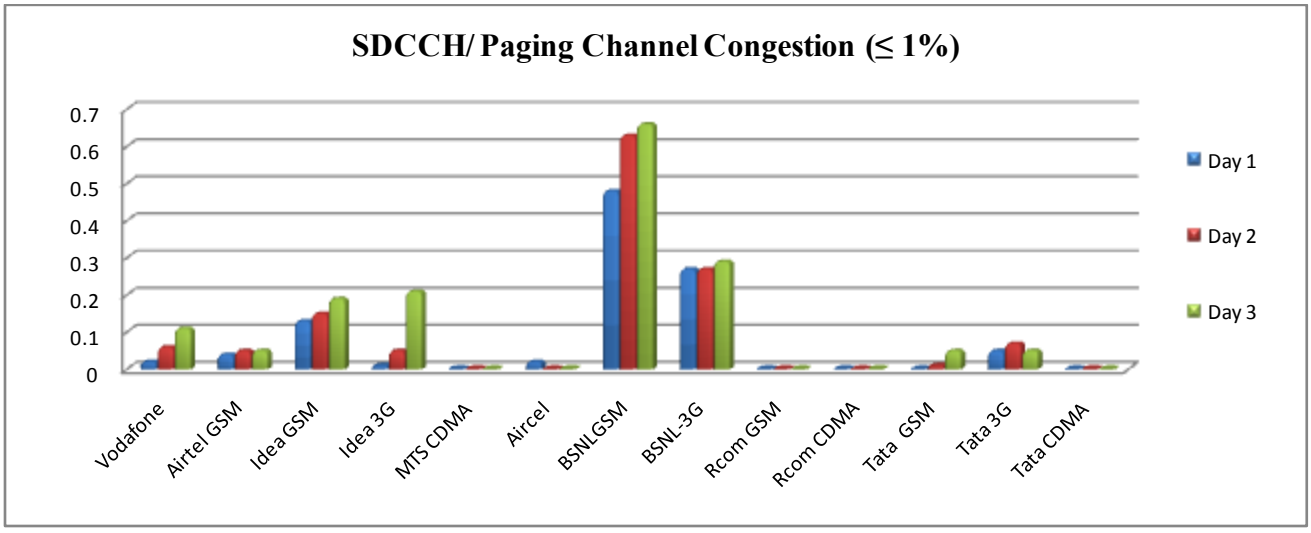

Fig. 4.5.2.2

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

4.5.2.3 TCH congestion ≤ 2%

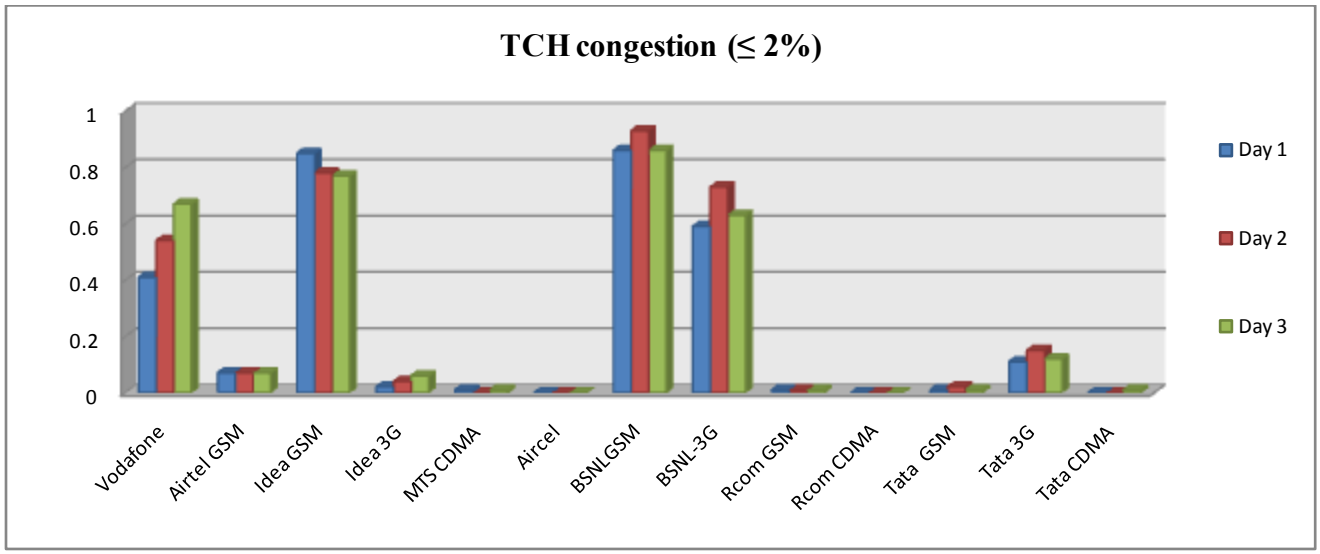

Fig. 4.5.2.3

- All operators are meeting the TRAI benchmarks (<= 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 ≤ 2%

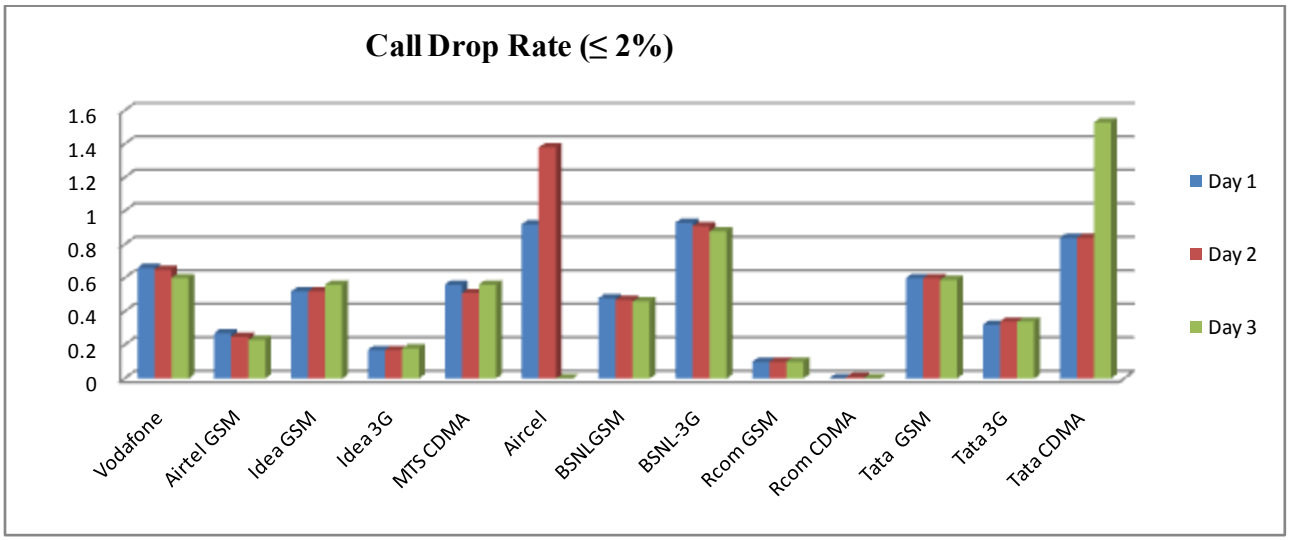

Fig. 4.5.3.1

- All operators are meeting the TRAI benchmarks (<=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

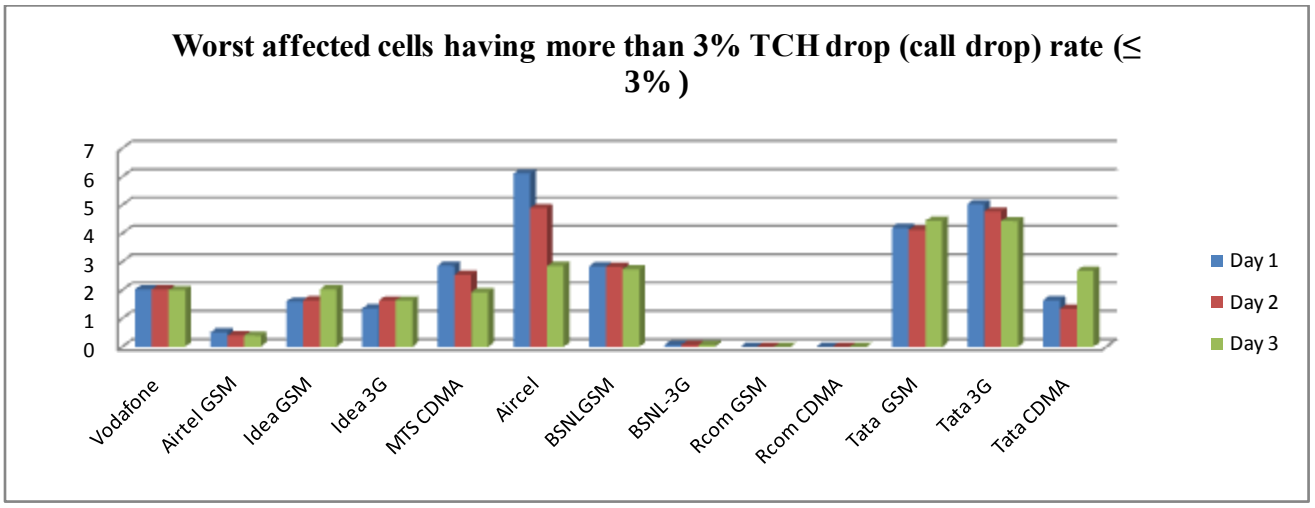

Fig. 4.5.3.2

- Aircel (2G Services) in day1 & day2 and TATA (GSM & 3G) are not meeting the benchmark for Worst affected cells having more than 3% TCH drop (call drop) rate.

4.5.3.3 % of Connections with good voice quality ≥ 95%

Note NA= 101.00

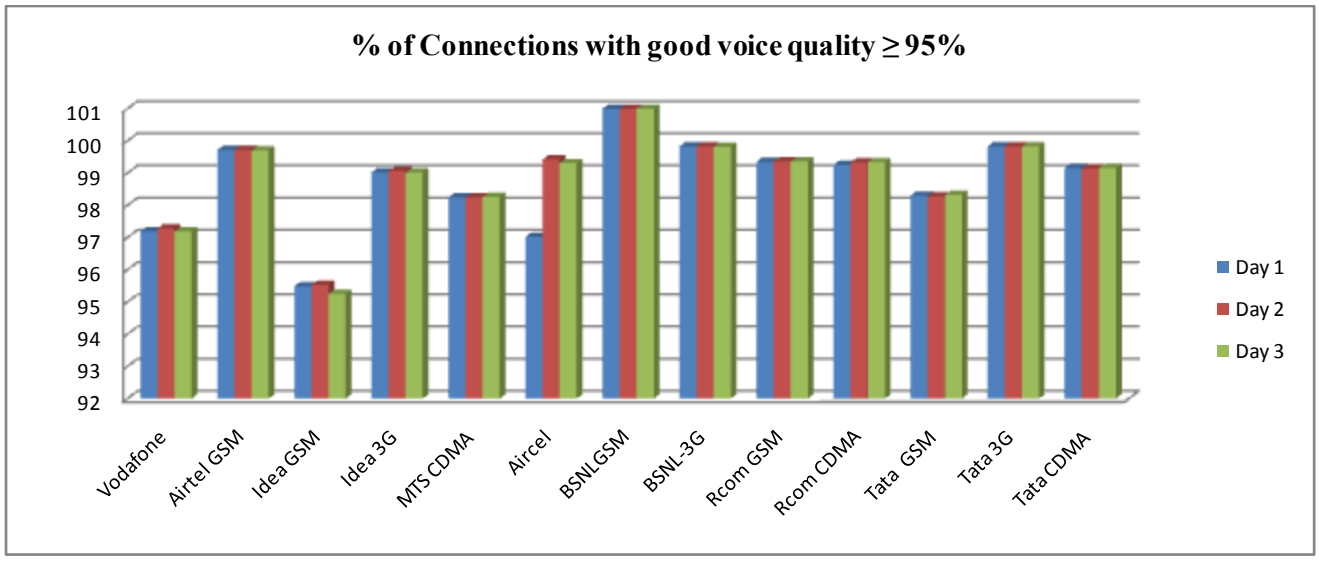

Fig. 4.5.3.3

- All operators are meeting the TRAI benchmarks (=> 95%) for 3 days live data taken in the month of audit except BSNL GSM(NA)

4.5.3.4 Point of Interconnections (POI) congestion (on individual POI) ≤ 0.5%

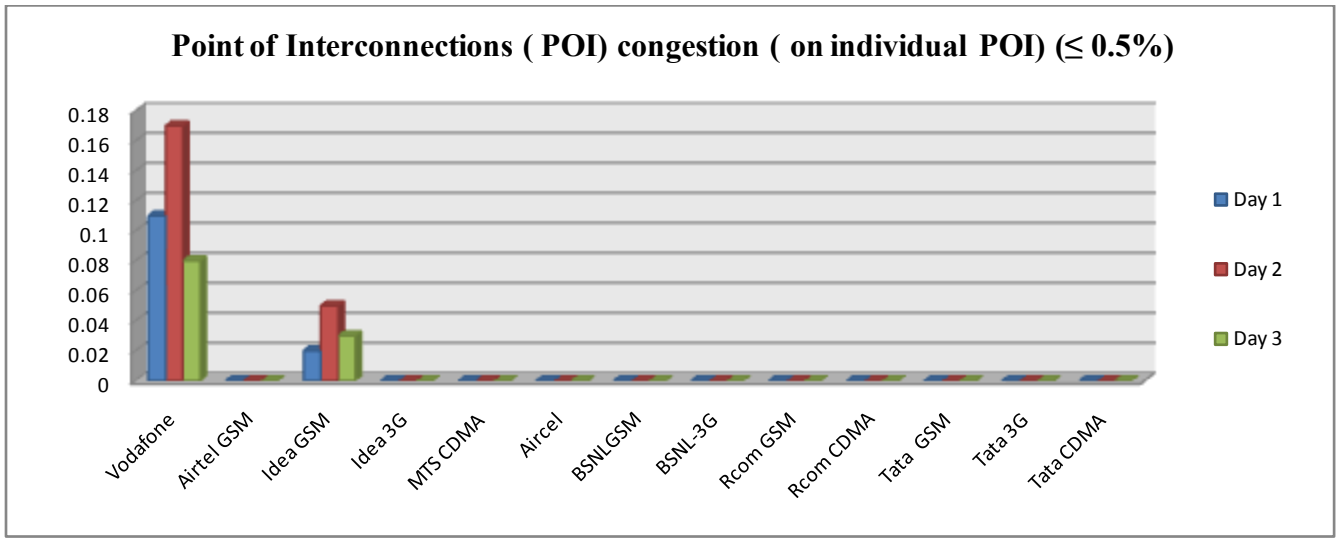

Fig. 4.5.3.4

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

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

From live, month, PMR and Drive Tests findings, it can be concluded that on an average, performance of the operators in the service area (Kerala) is satisfactory for Network Parameters. However, the benchmark for "**Voice Quality**" is not met by BSNL (3G Services) in the month of August & September.

Under Customer Service Quality Parameter, "From the 1st quarter data assessment, it is found that the performance related to customer care data is not found to be satisfactory for the parameter "calls answered by operators (voice-to-voice)" for Airtel, BSNL, Vodafone, Tata GSM , Rcom GSM & Rcom CDMA and also the parameter "Time taken for refunds of deposits after closures" in the table **4.2.1** and the**Fig.8** we found that all the service providers are meeting the benchmark except **TATA (GSM & CDMA) and MTS (NA).**

The "Metering/billing credibility – pre-paid" benchmark is meeting by all service providers in Kerala circle

During Operated assisted Drive Tests, the benchmark for block call rate should be <=3% however it is greater than the bench mark in **Iduki** Vodafone and the "dropped Call Rate" bench mark should be <=2% however in Pathanamthitta Idea, MTS & TATA (CDMA & GSM) are not meeting the benchmark and TATA (GSM & CDMA) is not meeting the benchmark of **Call Setup Success Rate** in Pathanamthitta, however Aircel is not participated.

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.

- **As per PMR Data Verification Results (Kerala Circle)**
  - **Kerala Circle (Jul'13) -** From the month Data Assessment, it is found that all the operators are meeting the network parameters.
  - **Kerala Circle (Aug'13):** From the month Data Assessment, it is found that all the operators are meeting the network parameters except **BSNL (3G)** is not meeting the benchmark for **Voice Quality.**
  - **Kerala Circle (Sep'13):** From the month Data Assessment, it is found that all the operators are meeting the network parameters except **BSNL 3G** is not meeting Benchmark for **Voice Quality Parameter**.

- **As per 3 Days Live Test Audit Report (1st 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.
  - TATA (2G & 3G Services) is not meeting the benchmark for **worst affected cells having more than 3% TCH drop (call drop) rate**
  - Aircel is not meeting the benchmark for **worst affected cells having more than 3% TCH drop (call drop) rate.**
- **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).

❖ **Kerala Circle:**

- According to the table and the fig. 4.4.2 it shows that Vodafone in Iduki is not meeting the benchmark of **Blocked Call Rate** and Aircel is not participated.
- According to the table and the fig. 4.4.3 it shows that Idea, MTS & TATA (CDMA & GSM) are not meeting the benchmark of **Dropped Call Rate** in Pathanamthitta and also Idea is not meeting the benchmark of **Dropped Call Rate** in Trissur.

- According to the table and the fig. 4.4.4.1 it shows that the vodafone service providers is meeting their benchmark in all the city and Airtel, Idea, BSNL, Rcom (GSM & CDMA) and TATA CDMA (in Trivandrum, Kollam, Kottayam and Pathanamthitta) are not available, however Aircel is not participated.
- According to the table and the fig. 4.4.4.1, it shows that Vodafone is not meeting the benchmark in any city and Idea is not meeting the benchmark of **Voice Quality (0-5 (with frequency hopping)** in Kollam, Kottayam, Trissur and Kannur.
- According to the table and the fig. 4.4.6, it shows that TATA (GSM & CDMA) is not meeting the benchmark of **Call Setup Success Rate** in Pathanamthitta, however Aircel is not participated.

➢ **Level 1 Live Calling (Emergency No.) Q1**

- 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 Kerala it was found to be functional.

➢ **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 & the POI in between the operators are involved and hence if any congestion is found in the network, it may be due to any of these parts. The result shows that there is not much congestion on the operator network; however most of the congestion was shown with BSNL service provider.

CUSTOMER SERVICE QUALITY PARAMETERS

❖ **1st Quarter data Assessment (Kerala Circle)**

- According to the parameter metering/billing credibility post-paid in the table **4.2.1** and the **Fig.1** we found that all the service providers are meeting the benchmark.
- According to the parameter metering /billing credibility pre-paid in the table **4.2.1** and the **Fig. 2** we found that all the service providers are meeting the benchmark.
- According to the parameter Resolution of billing/ charging complaints in the table **4.2.1** and the **Fig. 3** we found that all the service providers are meeting the benchmark except **BSNL.**

- 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 **4.2.1** and the **Fig. 4** we found that all the service providers are meeting the benchmark.
- According to the parameter Accessibility of call centre/Customer Care in the table **4.2.1** and the **Fig. 5** 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 **4.2.1** and the **Fig. 6** we found that all the service providers are meeting the benchmark except **BSNL, Airtel, TATA GSM, Vodafone, Rcom (GSM & CDMA).**
- According to the 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. 7** we found that all the service providers are meeting the benchmark except **MTS (NA).**
- According to the parameter Time taken for refunds of deposits after closures in the table **4.2.1** and the**Fig.8**wefound that all the service providers are meeting the benchmark except **TATA (GSM & CDMA) and MTS (NA).**