TELECOM REGULATORY AUTHORITY OF INDIA

REPORT

ON

AUDIT & ASSESSMENT OF QUALITY OF SERVICE

OF

CELLULAR MOBILE TELEPHONE SERVICES

FOR

SOUTH ZONE

KARNATAKA

Report Period: Oct. - Dec. 2014

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CHAPTER-1: INTRODUCTION

1.0   Objectives of the Audit and Assessment of Quality of Service:

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

2.0.   Scope of work to be undertaken:

The scope of work Audit and Assessment of Quality of Service of 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 (Wire line Services): The parameters for Basic Telephone Service (Wire line) consist of various QoS indicators, which can be audited and assessed objectively, and include parameters like fault incidences, call completion rates / 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 Q2.

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

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

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

   a. In respect of Cellular Mobile Telephone service, all the service areas/circles in each Zone are to be audited in every quarter of the year i.e. a service area will be audited four times in a year.

   b. In respect of Basic service (wire line) and Broadband service, a service area/circle in the contracted Zone is to be audited only once in a year.

We under took the audit work for the Mobile services 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 on 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. The PMRs so generated were uploaded 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 on 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 were uploaded live on the server;

(d) Drive tests of the mobile networks of service providers; the results were uploaded live on 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: Karnataka

The audit and assessment of Quality of Service has been conducted for BSNL, MTNL, private basic service providers, unified access service providers, cellular mobile service providers and ISPs (providing broadband service) in various service areas for basic telephone service (wire line), cellular mobile

telephone service and broadband service. We were required to conduct the audit and assessment of Quality of Service of Broadband Service only in respect of the service providers who are having broadband subscriber base of more than 10,000 subscribers in 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) is supposed to be be intimated by TRAI from time to time and we carried out the audit and assessment of Quality of Service accordingly thereafter.

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

Generation of performance reports against QOS benchmarks:

4.0   Coverage, Sampling & Research Methodology for the Southern Zone (Karnataka):

Sample size for cellular mobile services:
100% Gate way 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 (Wire line) services: (Not covered in this Quarter)
The break-up of the total number of exchanges of BSNL, MTNL and private basic service operators circle/ service area-wise, including urban and rural exchanges, and the number of exchanges, both urban and rural, that shall be covered during the year (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 percent) of the Points of Presence of ISP spread over in 10% (ten percent) SDCAs in specified service area/telecom circle shall be covered. The POPs are 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 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 was also 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 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) has been randomly selected from the records /registers to make check back calls.

Sample for telephonic interview for service complaints/ requests:

The operator is required to provide the 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 has been drawn randomly to make check back calls. A notice of minimum3 (three) weeks was provided to the service provider by us for arranging and supplying the data required for audit of exchanges, ISP nodes and MSCs to be covered.

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

Test calls were made to assess the availability and efficiency of Level 1 services and complaint centre accessibility. The telephone /SIM Cards/Instruments for testing purposes were provided by the concerned service provider(s) in whose network the audit and assessment of Quality of Service is carried out. The details regarding test calls are:

(a) Testing of Level 1Services:

Level1 Services include police, fire, ambulance (Emergency services) in the case of both Mobile service providers and basic telephone service providers. Test calls were made from all the levels working in a particular SDCA visited. Again, the total sample sizes (150 per license service area per service per quarter) were equally distributed among the different SDCAs visited, and the distribution among the active levels is in proportion to the capacity of each level in that SDCA.

(b) Inter-operator call assessment:

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

A sample of 2 X50 test calls per service provider within the licensed service area was made at different point of time to the free test numbers of another service provider (50 calls between 1000 to1300

Hrs 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 were compiled and reported

separately for each service provider service area-wise.

The telephone/ SIM Cards /Instruments for testing purposes were provided by the concerned service provider(s) in 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 (wire line) and Cellular Mobile Telephone Service:

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

Response time to the customer for assistance:

        (a) Accessibility of call 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 was 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 out going circuits to IVR of call centre was measured as per the traffic counter available in the respective switch to assess the accessibility of call centre.

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

The procedure (IVR menu and sub-menu) and ease of accessing the operator within the benchmark laid down by TRAI, both post-paid and pre-paid customers were assessed and reported. In this regard para3.11.4 of the Explanatory Memorandum to the Standards of Quality of Service of Basic Telephone Service (Wire line) and Cellular Mobile Telephone Service Regulations, 2009 and provisions of the Telecom Consumers Complaint Redressal Regulations, 2012 was being 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 to1700 hrs.) for basic telephone service (wireline) and similarly, 2X50 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 (wire line):

- Call Centre records for complaints
- FRS details for fault complaints, fault repair and MTTR (Mean Time to Repair)
- Commercial records for billing details, billing disputes and redressal there of
- 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 verified and audited the following records in respect of Cellular Mobile Telephone Service:

- Call Centre records for complaints
- Network maintenance and planning department (OMC and Drive Test) records for QOS parameters
- System / Network outage details, Call Set-up Success Rate, Blocked Call Rate, Call Drop Rate, worst affected cells having more than 3 % TCH drop rate, Voice Quality, Service Coverage and POI congestion
- Commercial and customer care records for billing disputes, 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 were taken up by the auditing Agency for verifying their redressal as per the record of the service provider.

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

- Call Centre records for complaints
- FRS details for fault complaints, fault repair
- Records for requests for new connection, and supplementary services

- Commercial records for billing details, billing disputes and redressal there of
- 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 as given in the Explanatory Memorandum to the quality of Service of Broadband Service Regulations, 2006 dated 6th October 2006 (11 of 2006) was followed. The signature of the Nodal Officer nominated by the service provider for coordination with the audit agency were taken on all the formats containing the verified data for all the parameters

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

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

S.N	Parameter	Procedure
i)	Network availability (a) BTS accumulated down time (b) Worst affected BTSs due to down time	The fault Alarm tracking details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) were verified for arriving at the figures reported to TRAI.
ii)	Call Set-up Success Rate	The cell wise data generated through counters/ MMC available in the switch for traffic measurements were verified.
iii)	Blocked Call Rate	Both for SDCCH and TCH congestions the data in MSCs was verified and compared with the data reported to TRAI in the Quarterly PMRs.
iv)	Call Drop Rate	This parameter was measured by the system generated (defined counters are available in the system for traffic measurement) cell wise dropped call data and total calls established figures to arrive at the authenticity and accuracy of the benchmark reported to TRAI.
v)	% Connections with good voice quality	This parameter was measured from the system generated data on a scale from 0 to7 for GSM and FER value for CDMA technology. We also collected the relevant city wise drive log files for all drive tests conducted to verify the parameter.

vi)	Service coverage	We also collected the relevant city wise drive log files for all drive tests conducted to verify the parameter.
vii)	POI Congestion	The traffic data generated through Gateway MSCs (GMSCs) and reported to TRAI in POI congestion reports were verified
vii)	Metering and Billing Credibility	We audited the billing complaints details on complaints received during the quarter and used for arriving at the figures reported to TRAI.
ix)	% of Billing Complaints resolved	Audit of billing complaints resolved and the total complaints received were carried out to check the figures reported to TRAI. At the same time, we also conducted random live back checks of complaints.
x)	Period of applying credit/waiver/adjustment to customers account from the date of resolution	We checked the billing complaints for which credit/waiver/ adjustment were made on resolution of the complaints within one week.
xi)	Termination/closure of service	The data was verified for termination /closure of the services within 7 days from the date of request.
xii)	Time taken for refund of deposits after closure	We verified that 100 % deposits should be refunded within 60 days. At the same time, we also conducted a random live back check so fall 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 aims of these drive tests is to cross-check/ validate the data on Quality of Service being provided by the telecom service providers to TRAI. These drive tests were conducted in such a manner so as to enable identification of network element deficiency and initiation of improvements. The operator assistance was desired to ensure a greater audit transparency.

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

Independent Drive Tests: We shall do independent drive tests in Q4 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 will be uploaded, immediately on completion of the drive test, to the central server at TRAI.

Drive Test Methodology:

For drive test following procedure was adopted:

i. We obtained a coverage map from the service provider before starting the drive test and studied the coverage detail in terms of the signal strength. Based on the signal strength as depicted in the coverage map, the drive test was done to check the following parameters:

      a. Coverage-Signal strength

      b. Voice quality

      c. Call setup success rate

      d. Blocked calls e. Call drop rate

ii. The drive test covered selected cities and adjoining towns/ rural areas where the service provider has commenced service, including congested areas and indoor sites.

iii. The drive test covered 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 Dec. 2014.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** (Karnataka) in 2nd quarter (Oct. – Dec. 2014). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken during the period Oct. – Dec. 2014.

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

S.I.	Name of Service Provider	Month of Audit	TCBH Hour
GSM Operators			
1	Aircel Ltd	Oct.-Dec.'14	1900-2000 Hrs
2	Airtel Ltd	Oct.-Dec.'14	1900-2000 Hrs
3	BSNL	Oct.-Dec.'14	1900-2000 Hrs
4	Idea	Oct.-Dec.'14	1900-2000 Hrs
5	Reliance Communication (GSM)	Oct.-Dec.'14	1900-2000 Hrs
6	Tata Communications (GSM)	Oct.-Dec.'14	1900-2000 Hrs
7	Vodafone	Oct.-Dec.'14	1900-2000 Hrs
CDMA Operators			
8	MTS (CDMA)	Oct.-Dec.'14	1900-2000 Hrs
9	Reliance Communication (CDMA)	Oct.-Dec.'14	1900-2000 Hrs
10	Tata Communications (CDMA)	Oct.-Dec.'14	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-**
  - **Karnataka Circle (Oct.'14):** From the month data assessment, it is found that Aircel (2G & 3G) and TATA (2G & 3G) for Worst affected cells having more than 3% TCH drop (call drop) rate are not meeting the Network Parameters.
  - **Karnataka Circle (Nov.'14):** From the month Data Assessment, it is found that all the operators are meeting the Network Parameters except Aircel (2G & 3G) and TATA (2G & 3G)for Worst affected cells having more than 3% TCH drop (call drop) rate.
  - **Karnataka Circle (Dec.'14):** From the month Data Assessment, it is found that all the operators are meeting the Network Parameters except Aircel (2G & 3G) and TATA (2G & 3G)for Worst affected cells having more than 3% TCH drop (call drop) rate and Aircel 3G for SDCCH/ Paging Channel Congestion.
  - **Summarized PMR Data (Oct. - Dec.'14):** From the month Data Assessment, it is found that all the operators are meeting the Network Parameters except Aircel (2G & 3G) and TATA (2G & 3G)for Worst affected cells having more than 3% TCH drop (call drop) rate.

➢ **As per 3 Days Live Test Audit Report (2nd Quarter), Karnataka 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) & Aircel (2G & 3G) for all 3 days are 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).

❖ **Karnataka Circle:**

- In Chikmagalur BSNL failed to achieve Dropped Call Rate (<=2%) KPI benchmark.

- In Bellary RCOM CDMA for Blocked Call Rate (<=3%); IDEA, RCOM GSM & TATA GSM for 0-5(with frequency hopping) failed to achieve the respective benchmarks.

- In Bidar RCOM (GSM & CDMA) for Blocked Call Rate (<=3%) & Dropped Call Rate (<=2%); RCOM GSM & TATA GSM for 0-5(with frequency hopping) and TATA GSM for Call Setup Success Rate (>=95%) failed to achieve the respective benchmarks.

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

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

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

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

➢ **Live calling to call centre:-**

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

➢ **Inter Operator Call Assessment**

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

CUSTOMER SERVICE QUALITY PARAMETERS

❖ **2ⁿᵈ Quarter data Assessment (Karnataka Circle)**

- According to the parameter metering/billing credibility post-paid we found that all the service providers are meeting the benchmark

- According to the parameter metering /billing credibility pre-paid we found that all the service providers are meeting the benchmark except Vodafone.

- According to the parameter Resolution of billing/ charging complaints we found that all the service providers are meeting the benchmark.

- According to the parameter Period of applying credit/waiver/adjustment to the customer's account from the date of resolutions of complaints we found that all the service providers are meeting the benchmark.

- According to the parameter Accessibility of call centre/Customer Care we found that all the service providers are meeting the benchmark.

- According to the parameter % call answered by operators (voice to voice) within 90 sec we found that all the service providers are meeting the benchmark except MTS, Vodafone, TATA (CDMA & GSM) and Rcom CDMA.

- According to the parameter no. of requests for Termination / Closure of service complied within 7 days during the quarter we found that all the service providers are meeting the benchmark except Aircel.

- According to the parameter Time taken for refunds of deposits after closures we found that all the service providers are meeting the benchmark.

- According to the parameter Time taken for refunds of deposits after closures we found that all the service providers are meeting the benchmark except Aircel.

CHAPTER-3: AUDIT –PMR DATA VERIFICATION RESULTS

3.0   Cellular Mobile Telephone Service

3.1 PMR Data Verification Results for

3.1.1   Karnataka Circle (Oct.'14):

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	Month PMR Generation Data / Name of Parameter	Bench mark	Audit Period	Aircel	Aircel 3G	Airtel	Airtel 3G	BSNL	BSNL 3G	IDEA	Reliance	TATA	TATA 3G	Vodafone	Reliance	MTS	TATA
				GSM Operators											CDMA		
Network Service Quality Parameter																	
Network Availability																	
1	BTS accumulated downtime	2%	One Month	0.14%	0.18%	0.47%	0.07%	1.36%	0.69%	0.11%	0.32%	0.05%	0.07%	0.12%	0.34%	0.30%	0.06%
	Worst affected BTS due to downtime	2%	One Month	0.40%	0.30%	1.91%	0.33%	1.86%	1.91%	0.34%	0.95%	0.05%	0.05%	0.48%	0.71%	0.00%	0.25%
Connection establishment (Accessibility)																	
2	Call Setup Success Rate	95%	One Month	98.95%	98.45%	99.03%	98.93%	98.15%	98.03%	97.9%	99.74%	98.13%	98.68%	99.90%	98.54%	99.39%	99.00%
	SDCCH/ Paging Channel Congestion/RRC congestion	1%	One Month	0.12%	0.95%	0.21%	0.19%	0.08%	0.43%	0.28%	0.02%	0.18%	0.99%	0.05%	0.00%	0.00%	0.00%
	TCH congestion/ RAB Congestion	2%	One Month	0.31%	0.60%	0.35%	0.29%	0.59%	0.48%	0.18%	0.04%	0.22%	0.62%	0.10%	0.01%	0.10%	0.02%
Connection Maintainability (Retain ability)																	
3	Call Drop Rate	2%	One Month	1.20%	0.84%	0.71%	0.22%	1.13%	1.23%	0.85%	0.28%	0.79%	0.60%	0.60%	0.10%	0.59%	0.69%
	Worst affected cells having more than 3% TCH drop (call drop) rate	3%	One Month	6.62%	9.82%	1.17%	1.68%	2.68%	1.65%	2.23%	0.00%	5.92%	4.06%	2.86%	0.05%	1.57%	2.48%
	% of Connections with good voice quality	95%	One Month	96.86%	99.76%	99.18%	99.70%	97.34%	97.44%	96.3%	98.94%	97.44%	99.13%	98.62%	99.77%	99.14%	98.28%
	Point of Interconnections (POI) congestion (on individual POI)	0.5%	One Month	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.0%	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 Aircel (2G & 3G) and TATA (2G & 3G) for Worst affected cells having more than 3% TCH drop (call drop) rate are not meeting the Network Parameters.

3.1.2 Karnataka Circle (Nov.'14):

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.

Karnataka Circle (Nov.'14)																
Month PMR Generation Data		**Bench mark**	**Audit Period**	Aircel	Aircel 3G	Airtel	Airtel 3G	BSNL	BSNL 3G	IDEA	Relianc e	TATA	TATA 3G	Vodafo ne	Relianc e	MTS	TATA
S/N	**Name of Parameter**			**GSM Operators**												**CDMA**	
Network Service Quality Parameter																
Network Availability																
1	BTS accumulated downtime	2%	One Month	0.15%	0.13%	0.36%	0.06%	0.90%	0.49%	0.09%	0.35%	0.05%	0.05%	0.10%	0.33%	0.13%	0.07%
	Worst affected BTS due to downtime	2%	One Month	0.43%	0.21%	1.48%	0.28%	1.73%	1.91%	0.27%	0.56%	0.07%	0.00%	0.40%	0.64%	0.00%	0.25%
Connection establishment (Accessibility)																
2	Call Setup Success Rate	95%	One Month	98.67%	98.56%	99.07%	99.37%	98.14%	96.69%	97.94%	99.67%	98.32%	98.43%	99.94%	98.59%	99.29%	98.95%
	SDCCH/ Paging Channel Congestion/RRC congestion	1%	One Month	0.20%	0.78%	0.22%	0.02%	0.14%	0.39%	0.38%	0.02%	0.11%	1.02%	0.04%	0.00%	0.00%	0.00%
	TCH congestion/ RAB Congestion	2%	One Month	0.43%	0.66%	0.31%	0.16%	0.58%	0.51%	0.26%	0.05%	0.27%	0.89%	0.06%	0.01%	0.12%	0.02%
Connection Maintainability (Retain ability)																
3	Call Drop Rate	2%	One Month	1.29%	0.88%	0.73%	0.18%	1.10%	1.19%	0.58%	0.29%	0.74%	0.58%	0.57%	0.06%	0.53%	0.37%
	Worst affected cells having more than 3% TCH drop (call drop) rate	3%	One Month	7.22%	10.12%	1.03%	1.37%	2.19%	1.46%	1.42%	0.01%	5.69%	3.80%	2.78%	0.05%	1.41%	2.35%
	% of Connections with good voice quality	95%	One Month	96.68%	99.76%	99.22%	99.69%	97.26%	97.46%	96.33%	98.90%	97.57%	99.12%	98.69%	99.78%	99.17%	98.19%
	Point of Interconnections (POI) congestion (on individual POI)	0.5%	One Month	0.00%	0.00%	0.00%	0.00%	0.01%	0.01%	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 except Aircel (2G & 3G) and TATA (2G & 3G)for Worst affected cells having more than 3% TCH drop (call drop) rate.

3.1.3 Karnataka Circle (Dec.'14):

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.

	Karnataka Circle (Dec.'14)																
	Month PMR Generation Data	**Bench mark**	**Audit Period**	Aircel	Aircel 3G	Airtel	Airtel 3G	BSNL	BSNL 3G	IDEA	Relianc e	TATA	TATA 3G	Vodafo ne	Relianc e	MTS	TATA
S/N	**Name of Parameter**			GSM Operators											CDMA		
	Network Service Quality Parameter																
Network Availability																	
1	BTS accumulated downtime	2%	One Month	0.17%	0.17%	0.27%	0.05%	0.96%	0.56%	0.08%	0.38%	0.05%	0.05%	0.08%	0.38%	0.17%	0.07%
	Worst affected BTS due to downtime	2%	One Month	0.60%	0.48%	1.06%	0.14%	1.86%	1.98%	0.20%	1.05%	0.07%	0.13%	0.25%	1.05%	0.00%	0.25%
Connection establishment (Accessibility)																	
2	Call Setup Success Rate	95%	One Month	98.29%	97.97%	98.98%	99.30%	98.38%	98.04%	98.0%	99.55%	98.41%	98.72%	99.94%	99.55%	99.42%	98.92%
	SDCCH/ Paging Channel Congestion	1%	One Month	0.19%	1.04%	0.29%	0.03%	0.10%	0.46%	0.34%	0.02%	0.10%	0.84%	0.06%	0.02%	0.00%	0.00%
	TCH congestion/ RAB Congestion	2%	One Month	0.34%	1.00%	0.34%	0.19%	0.56%	0.51%	0.17%	0.06%	0.24%	0.65%	0.06%	0.06%	0.11%	0.01%
Connection Maintainability (Retain ability)																	
3	Call Drop Rate	2%	One Month	1.40%	1.19%	0.70%	0.18%	1.06%	1.16%	0.54%	0.31%	0.72%	0.49%	0.56%	0.31%	0.52%	0.33%
	Worst affected cells having more than 3% TCH drop (call drop) rate	3%	One Month	8.90%	12.28%	0.97%	1.38%	2.47%	1.51%	1.27%	0.02%	5.52%	3.13%	2.95%	0.02%	1.20%	2.43%
	% of Connections with good voice quality	95%	One Month	96.20%	99.76%	99.25%	99.69%	97.25%	97.49%	96.2%	98.84%	97.64%	99.12%	98.68%	98.84%	99.17%	98.29%
	Point of Interconnections (POI) congestion (on individual POI)	0.5%	One Month	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.0%	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 except Aircel (2G & 3G) and TATA (2G & 3G)for Worst affected cells having more than 3% TCH drop (call drop) rate and Aircel 3G for SDCCH/ Paging Channel Congestion.

3.1.4 Summarized PMR Data Results in Table of Karnataka Circle (Oct. - Dec.'14)

Verification of the Performance of Service Providers against the Quality of Service benchmarks laid down by TRAI using the data for the entire quarter during which the live measurement is carried out.

Karnataka Circle (Oct.- Dec.'14)
Month PMR Generation Data	**Bench mark**	**Audit Period**	Aircel	Aircel 3G	Airtel	Airtel 3G	BSNL	BSNL 3G	IDEA	Reliance	TATA	TATA 3G	Vodafone	Reliance	MTS	TATA
S/N	**Name of Parameter**			colspan="13"	**GSM Operators**	colspan="2"	**CDMA**
Network Service Quality Parameter
Network Availability
1	BTS accumulated downtime	2%	One Qtr	0.15%	0.16%	0.37%	0.06%	1.08%	0.58%	0.09%	0.35%	0.05%	0.06%	0.10%	0.35%	0.20%	0.07%
Worst affected BTS due to downtime	2%	One Qtr	0.48%	0.33%	1.48%	0.25%	1.82%	1.93%	0.27%	0.85%	0.07%	0.06%	0.38%	0.80%	0.00%	0.25%
Connection establishment (Accessibility)
2	Call Setup Success Rate	95%	One Qtr	98.64%	98.33%	99.03%	99.20%	98.22%	97.59%	97.93%	99.65%	98.29%	98.61%	99.93%	98.89%	99.37%	98.95%
SDCCH/ Paging Channel Congestion	1%	One Qtr	0.17%	0.92%	0.24%	0.08%	0.11%	0.43%	0.33%	0.02%	0.13%	0.95%	0.05%	0.01%	0.00%	0.00%
TCH congestion	2%	One Qtr	0.36%	0.76%	0.33%	0.21%	0.58%	0.50%	0.20%	0.05%	0.25%	0.72%	0.07%	0.03%	0.11%	0.02%
Connection Maintainability (Retain ability)
3	Call Drop Rate	2%	One Qtr	1.30%	0.97%	0.71%	0.20%	1.10%	1.19%	0.66%	0.29%	0.75%	0.56%	0.57%	0.16%	0.55%	0.46%
Worst affected cells having more than 3% TCH drop (call drop) rate	3%	One Qtr	7.58%	10.74%	1.05%	1.48%	2.45%	1.54%	1.64%	0.01%	5.71%	3.66%	2.87%	0.04%	1.39%	2.42%
% of Connections with good voice quality	95%	One Qtr	96.58%	99.76%	99.22%	99.69%	97.28%	97.46%	96.29%	98.90%	97.55%	99.12%	98.66%	99.46%	99.16%	98.25%
Point of Interconnections (POI) congestion (on individual POI)	0.5%	One Qtr	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Finding & Critical Analysis:

From the month Data Assessment, it is found that all the operators are meeting the Network Parameters except Aircel (2G & 3G) and TATA (2G & 3G)for Worst affected cells having more than 3% TCH drop (call drop) rate.

3.2 3 Days Live Test Audit Report (2nd Quarter), Karnataka 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.

SN	Name of Parameter	Bench mark	Audit Period	Aircel	Aircel 3G	Airtel	Airtel 3G	BSNL	BSNL 3G	IDEA	Reliance	TATA	TATA 3G	Vodafone	Reliance	MTS	TATA
Live Test Generation Data				GSM Operators											CDMA Operators		
KARNATAKA CIRCLE Q2 Oct.- Dec. -2014																
Network Service Quality Parameters																
Network Availability																
1	a) BTS Accumulated Downtime	<=2%	Day 1	0.17%	0.16%	0.26%	0.08%	1.11%	0.72%	0.09%	1.67%	0.08%	0.07%	0.06%	1.67%	0.17%	0.05%
			Day 2	0.85%	0.97%	0.26%	0.02%	1.39%	1.07%	0.11%	1.67%	0.12%	0.11%	0.12%	1.67%	0.27%	0.14%
			Day 3	0.11%	0.10%	0.28%	0.06%	1.14%	1.04%	0.07%	1.67%	0.12%	0.15%	0.11%	1.67%	0.12%	0.13%
	b) Worst affected BTSs due to downtime	<=2%	Day 1	0.00%	0.00%	0.00%	0.00%	0.07%	0.00%	0.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
			Day 2	0.00%	0.00%	0.00%	0.00%	0.09%	0.23%	0.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
			Day 3	0.00%	0.00%	0.00%	0.00%	0.15%	0.00%	0.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)																
2	a) CSSR (Call Setup Success Rate)	>=95%	Day 1	98.51%	98.69%	99.00%	99.37%	99.20%	98.23%	98.02%	99.30%	98.85%	98.68%	99.95%	98.54%	99.40%	98.84%
			Day 2	97.48%	98.31%	99.01%	99.40%	99.18%	98.25%	97.99%	99.68%	98.71%	98.30%	99.96%	98.65%	99.01%	99.11%
			Day 3	98.78%	97.80%	99.01%	99.22%	99.08%	97.99%	98.03%	99.60%	98.79%	98.76%	99.95%	98.03%	99.47%	99.13%
	b) SDCCH/PAGING Channel congestion	<=1%	Day 1	0.15%	0.01%	0.28%	0.01%	0.08%	0.31%	0.28%	NA	0.06%	0.95%	0.02%	NA	0.00%	NA
			Day 2	0.34%	0.01%	0.30%	0.00%	0.09%	0.30%	0.48%	NA	0.10%	0.93%	0.03%	NA	0.00%	NA
			Day 3	0.10%	0.01%	0.29%	0.01%	0.08%	0.28%	0.48%	NA	0.08%	0.85%	0.03%	NA	0.00%	NA
	c) TCH congestion	<=2%	Day 1	0.27%	0.69%	0.34%	0.15%	0.40%	0.86%	0.19%	0.06%	0.16%	0.65%	0.05%	0.01%	0.16%	0.03%
			Day 2	0.54%	0.76%	0.32%	0.10%	0.44%	0.91%	0.24%	0.06%	0.33%	0.84%	0.04%	0.01%	0.10%	0.01%
			Day 3	0.28%	0.80%	0.33%	0.20%	0.53%	1.41%	0.16%	0.06%	0.16%	0.61%	0.05%	0.02%	0.09%	0.01%
Connection maintenance (Retainability)																
3	a) CDR (Call Drop Rate)	<=2%	Day 1	1.30%	0.85%	0.69%	0.18%	0.74%	0.94%	0.53%	0.33%	0.68%	0.50%	0.56%	0.76%	0.49%	0.52%
			Day 2	1.53%	0.91%	0.68%	0.18%	0.71%	0.87%	0.54%	0.30%	0.75%	0.50%	0.55%	0.66%	0.50%	0.60%
			Day 3	1.39%	0.96%	0.70%	0.20%	0.74%	0.85%	0.54%	0.31%	0.72%	0.52%	0.54%	0.61%	0.52%	0.63%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Day 1	8.08%	9.94%	0.86%	1.36%	1.94%	1.91%	1.49%	0.00%	5.18%	3.52%	2.82%	0.17%	1.62%	2.54%
			Day 2	11.37%	12.07%	0.90%	1.35%	1.95%	1.89%	1.49%	0.00%	6.13%	3.52%	2.80%	0.17%	1.09%	2.87%
			Day 3	8.96%	11.80%	0.92%	1.36%	1.85%	1.98%	1.49%	0.02%	5.13%	3.23%	2.73%	0.21%	1.64%	2.46%
	c) Connections with good voice quality	>=95%	Day 1	96.21%	99.61%	99.24%	99.69%	97.23%	96.95%	96.20%	98.84%	98.20%	99.13%	98.67%	98.78%	99.17%	98.29%
			Day 2	95.80%	99.58%	99.26%	99.69%	97.45%	96.11%	96.16%	98.88%	98.22%	99.13%	98.65%	98.78%	99.15%	98.28%
			Day 3	96.08%	99.79%	99.25%	99.69%	97.17%	95.18%	96.22%	98.85%	98.19%	99.12%	98.66%	98.78%	99.17%	98.29%
4	No. of POI's having >=0.5% POI congestion	<=0.5 %	Day 1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
			Day 2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
			Day 3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Finding & Critical Analysis:

All the service providers are meeting all the benchmarks except Aircel (2G & 3G) and TATA (2G & 3G) for Worst affected cells>3% TCH drop (Call drop) rate.

3.3.0 Operator Assisted Drive Test (Karnataka 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).

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	Chikmagalur	368	462	388	390	NP	367	370	346	460	414
		Bellary	578	488	462	471	NP	584	434	588	592	575
		Bidar	459	391	520	471	NP	449	410	449	537	485
1.2	Blocked Call Rate (<=3%)	Chikmagalur	0.00%	0.00%	0.33%	0.00%	NP	0.24%	0.89%	0.52%	0.00%	0.00%
		Bellary	0.70%	0.93%	0.66%	0.00%	NP	1.11%	0.54%	3.73%	0.00%	0.00%
		Bidar	0.00%	1.55%	0.21%	0.00%	NP	3.48%	0.92%	3.48%	0.00%	0.00%
1.3	Dropped Call Rate (<=2%)	Chikmagalur	0.00%	0.00%	0.23%	2.22%	NP	0.24%	0.46%	0.00%	0.10%	0.00%
		Bellary	0. 00%	0.09%	0.00%	0.44%	NP	0.96%	0.26%	0.00%	0.00%	0.00%
		Bidar	0.00%	0.38%	0.16%	0.00%	NP	3.13%	0.92%	3.13%	0.92%	0.00%
	Percentage of connections with good voice quality (=>95%)											
1.4	(i) 0-4 (w/o frequency hopping)	Chikmagalur	-	-	-	-	NP	-	-	99.92%	99.66%	99.91%
		Bellary	-	-	-	-	NP	-	-	98.43%	99.27%	99.29%
		Bidar	-	-	-	-	NP	-	-	93.21%	99.33%	99.88%
	(ii) 0-5 (with frequency hopping)	Chikmagalur	99.11%	97.11%	97.84%	95.83%	NP	98.34%	96.13%	-	-	-
		Bellary	98.30%	93.32%	97.15%	96.60%	NP	92.25%	91.67%	-	-	-
		Bidar	98.37%	97.30%	98.44%	97.28%	NP	93.58%	89.30%	-	-	-
	Service Coverage											
1.5	In door (>= 75dBm)	Chikmagalur	93.40%	82.05%	46.48%	50.97%	NP	65.86%	65.59%	34.87%	29.35%	63.67%
		Bellary	81.60%	88.80%	59.98%	78.87%	NP	46.47%	55.98%	50.90%	19.59%	63.42%
		Bidar	75.80%	94.80%	86.54%	81.20%	NP	54.09%	61.50%	54.09%	62.16%	71.58%
	In-vehicle (>= -85dBm)	Chikmagalur	99.60%	97.99%	81.36%	91.03%	NP	88.14%	89.22%	69.33%	65.21%	88.78%
		Bellary	97.80%	88.80%	90.57%	93.20%	NP	79.45%	86.20%	84.32%	55.85%	90.51%
		Bidar	96.60%	94.80%	98.17%	92.40%	NP	83.46%	89.07%	82.03%	90.77%	93.21%
	Outdoor- in city (>= -95dBm)	Chikmagalur	100.00%	99.86%	96.80%	99.47%	NP	97.48%	100.00%	93.61%	90.28%	98.80%
		Bellary	100.00%	99.80%	99.12%	99.21%	NP	93.52%	99.42%	97.85%	89.57%	98.29%
		Bidar	100.00%	100.00%	99.75%	98.94%	NP	94.34%	97.13%	94.34%	98.51%	100.00%
1.6	Call Setup Success Rate (>=95%)	Chikmagalur	100.00%	100.00%	99.67%	95.39%	NP	99.76%	98.66%	99.48%	100.00%	100.00%
		Bellary	99.30%	99.06%	99.36%	99.46%	NP	98.77%	97.24%	96.27%	100.00%	99.40%
		Bidar	100.00%	98.45%	98.20%	99.39%	NP	96.52%	94.54%	98.63%	99.66%	100.00%
1.7	Km's driven	Chikmagalur	395									
		Bellary	358									
		Bidar	317									

Finding & Critical Analysis:

- In Chikmagalur BSNL failed to achieve Dropped Call Rate (<=2%) KPI benchmark.
- In Bellary RCOM CDMA for Blocked Call Rate (<=3%); IDEA, RCOM GSM & TATA GSM for 0-5(with frequency hopping) failed to achieve the respective benchmarks.
- In Bidar RCOM (GSM & CDMA) for Blocked Call Rate (<=3%) & Dropped Call Rate (<=2%); RCOM GSM & TATA GSM for 0-5(with frequency hopping) and TATA GSM for Call Setup Success Rate (>=95%) failed to achieve the respective benchmarks.

3.3.1 Rout covered during the Drive test in Karnataka Circle (Oct. - Dec.'14)

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), major roads and markets etc. In three month drive test done in three different SSA (Chikmagalur, Bellary and Bidar).

DETAIL OF THE ROUTES COVERED DURING THE DRIVE TESTS IN KARNATAKA								
NAME OF SSA	DRIVE TEST PERIOD	KM Driven	DAY 1		DAY 2		DAY 3	
			NAME OF SDCA COVERED	ROUTE COVERED	NAME OF SDCA COVERED	ROUTE COVERED	NAME OF SDCA COVERED	ROUTE COVERED
CHIKMAGALUR SSA	OCT.	395	CHIKMAGALUR CITY	CHIKMAGALUR CITY	KADUR, TARIKERE,	CHIKMAGALUR CITY	NARASIMARAJA PURA, KOPPA	CHIKMAGALUR CITY
BELLARY SSA	NOV.	358	BELLARY CITY	BELLARY CITY	SIRUGUPPA, HOSPET.	BELLARY CITY	KUDLIGI, SANDUR	BELLARY CITY
BIDAR SSA	DEC.	317	BIDAR CITY	BIDAR CITY	AURAD, BHALKI	BIDAR CITY	HOMNABAD, BASAVAKALYAN	BIDAR CITY

3.4   CUSTOMER SERVICE QUALITY PARAMETERS

3.4.1   2nd Quarter data Assessment (Oct.- Dec.'14):

Karnataka, Q2 (Oct.- Dec.'14)													

Customer Service Quality Parameters		**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**		
1	Metering/billing credibility Post paid	<= 0.1%	Reported	0.00%	0.01%	0.00%	0.04%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%
			Verified	0.00%	0.01%	0.00%	0.04%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%
2	Metering /billing credibility Pre paid	<= 0.1%	Reported	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.19%	0.00%	0.00%	0.01%
			Verified	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.19%	0.00%	0.00%	0.01%
3	Resolution of billing/ charging complaints	98% within 4 weeks	Reported	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
			Verified	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		100% within 6 weeks	Reported	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
			Verified	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
4	Period of applying credit/waiver/adjustment to the customer's account from the date of resolutions of complaints	<=1 week	Reported	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
			Verified	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
5	Response time to customers for assistance												
	a) Accessibility of call centre/Customer Care	>=95%	Reported	100.0%	100.0%	98.31%	99.00%	100.00%	98.00%	100.0%	98.00%	97.00%	99.9%
			Verified	100.0%	100.0%	98.31%	99.00%	100.00%	98.00%	100.0%	98.00%	97.00%	99.9%
	b) % call answered by operators (voice to voice) within 90 sec.	>=95%	Reported	97.00%	96.00%	98.00%	100.00%	95.00%	75.23%	93.00%	75.00%	90.20%	92.00%
			Verified	97.00%	96.00%	98.00%	100.00%	95.00%	75.23%	93.00%	75.00%	90.20%	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%	100%	100%	100.00%	100%	100%	100%	100%	100%	100%
			Verified	100%	100%	100%	100.00%	100%	100%	100%	100%	100%	100%
7	Time taken for refunds of deposits after closures.	100% within 60 days	Reported	98.00%	100%	100%	100.00%	100%	100%	100%	100%	100%	100%
			Verified	98.00%	100%	100%	100.00%	100%	100%	100%	100%	100%	100%

Finding & Critical Analysis:-

- According to the parameter metering/billing credibility post-paid we found that all the service providers are meeting the benchmark

- According to the parameter metering /billing credibility pre-paid we found that all the service providers are meeting the benchmark except Vodafone.

- According to the parameter Resolution of billing/ charging complaints we found that all the service providers are meeting the benchmark**.**

- According to the parameter Period of applying credit/waiver/adjustment to the customer's account from the date of resolutions of complaints we found that all the service providers are meeting the benchmark.

- According to the parameter Accessibility of call centre/Customer Care we found that all the service providers are meeting the benchmark.

- According to the parameter % call answered by operators (voice to voice) within 90 sec we found that all the service providers are meeting the benchmark except **MTS, Vodafone, TATA (CDMA & GSM)** and **Rcom CDMA.**

- According to the parameter no. of requests for Termination / Closure of service complied within 7 days during the quarter we found that all the service providers are meeting the benchmark except **Aircel.**

- According to the parameter Time taken for refunds of deposits after closures we found that all the service providers are meeting the benchmark**.**

- According to the parameter Time taken for refunds of deposits after closures we found that all the service providers are meeting the benchmark except Aircel**.**

3.5 Redressal

Sample coverage

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

3.5.1 Performance (live calling for billing complaints)

Calling Operator	Vodafone	Airtel	Idea	MTS	Aircel	BSNL	Rcom	Tata	RCOM CDMA	Tata CDMA
Calls Attempted	100	100	100	100	100	100	100	100	100	100
Total No. of calls	97	92	96	95	97	97	96	99	98	97
Cases resolved with 4 weeks	97	92	96	95	97	97	96	99	98	97
%age of cases resolved	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

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

Findings:-

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

3.5.2 Live calling to call centre

Calling Operator	Vodafone	Airtel	Idea	MTS	Aircel	BSNL	Rcom	Tata	RCOM CDMA	Tata CDMA
Total No. of Calls Attempted	100	100	100	100	100	100	100	100	100	100
Total No. of calls connected to IVR	99	98	100	98	96	98	95	99	98	99
Calls got connected to agent within 90 Sec	97	97	97	95	90	95	69	96	92	94
%age of calls got answered	97.98%	98.98%	97.00%	96.94%	93.75%	96.94%	72.63%	96.97%	93.88%	94.95%

Findings:-

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

3.5.3 Level 1 Live Calling (Emergency No.) Q2:-

Level 1 Live calling such as calling at emergency no. Police, Fire, Ambulance, traffic, railway etc. were made so as to check the service of such short codes. In Karnataka we have dialed 100 times from each service providers' number.

Emergency No.	No. of Calls	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Vodafone	Rcom CDMA	Tata CDMA	MTS
Police- 100	100	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Fire- 101	100	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Traffic - 103	100	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Ambulance - 102	100	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Railway- 139	100	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Senior Citizens- 1072	100	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Child help- 1089	100	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Women - 1091	100	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Electricity- 1917	100	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Kisan Call Centre- 1800 180 1551	100	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Critical Analysis:-

Level 1 calling such as calling at emergency no. like Police, Fire, Ambulance and others were made so as to check the service of such short codes. In different cities of Karnataka 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 (Karnataka 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	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Vodafone	Rcom CDMA	Tata CDMA	MTS
Aircel	-	100.00%	98.00%	97.00%	100.00%	98.00%	100.00%	100.00%	100.00%	100.00%
Airtel	100.00%	-	100.00%	100.00%	100.00%	100.00%	98.00%	100.00%	100.00%	98.00%
BSNL	98.00%	100.00%	-	100.00%	100.00%	100.00%	100.00%	99.00%	98.00%	100.00%
Idea	100.00%	100.00%	99.00%	-	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Rcom GSM	100.00%	97.00%	100.00%	100.00%	-	100.00%	99.00%	100.00%	100.00%	97.00%
Tata GSM	98.00%	100.00%	100.00%	100.00%	100.00%	-	100.00%	100.00%	100.00%	100.00%
Vodafone	99.00%	100.00%	100.00%	100.00%	98.00%	100.00%	-	100.00%	98.00%	99.00%
Rcom CDMA	100.00%	100.00%	100.00%	100.00%	100.00%	99.00%	100.00%	-	100.00%	100.00%
Tata CDMA	99.00%	98.00%	97.00%	99.50%	97.00%	100.00%	100.00%	96.00%	-	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 and the POI in between the operators are involved and hence if any congestion is found in the network, it may be due to any of these parts. The result shows that there is not much congestion on the operator network; however the congestion was shown with all the operators BSNL, Vodafone, Airtel, Rcom, Tata, Idea, Aircel and MTS service provider.

CAPTER-4: DETAILED FINDINGS, ANALYSIS AND GRAPHICAL REPRESENTATION

4.0   Cellular Mobile Telephone Service

4.1   3 Days Live Test Audit Report (2nd Quarter), Karnataka 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.

SN	Name of Parameter	Bench mark	Audit Period	Aircel	Aircel 3G	Airtel	Airtel 3G	BSNL	BSNL 3G	IDEA	Reliance	TATA	TATA 3G	Vodafone	Reliance	MTS	TATA
				GSM Operators											CDMA Operators		
	Network Service Quality Parameters																
	Network Availability																
1	a) BTS Accumulated Downtime	<=2%	Day 1	0.17%	0.16%	0.26%	0.08%	1.11%	0.72%	0.09%	1.67%	0.08%	0.07%	0.06%	1.67%	0.17%	0.05%
			Day 2	0.85%	0.97%	0.26%	0.02%	1.39%	1.07%	0.11%	1.67%	0.12%	0.11%	0.12%	1.67%	0.27%	0.14%
			Day 3	0.11%	0.10%	0.28%	0.06%	1.14%	1.04%	0.07%	1.67%	0.12%	0.15%	0.11%	1.67%	0.12%	0.13%
	b) Worst affected BTSs due to downtime	<=2%	Day 1	0.00%	0.00%	0.00%	0.00%	0.07%	0.00%	0.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
			Day 2	0.00%	0.00%	0.00%	0.00%	0.09%	0.23%	0.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
			Day 3	0.00%	0.00%	0.00%	0.00%	0.15%	0.00%	0.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Connection Establishment (Accessibility)																
2	a) CSSR (Call Setup Success Rate)	>=95%	Day 1	98.51%	98.69%	99.00%	99.37%	99.20%	98.23%	98.02%	99.30%	98.85%	98.68%	99.95%	98.54%	99.40%	98.84%
			Day 2	97.48%	98.31%	99.01%	99.40%	99.18%	98.25%	97.99%	99.68%	98.71%	98.30%	99.96%	98.65%	99.01%	99.11%
			Day 3	98.78%	97.80%	99.01%	99.22%	99.08%	97.99%	98.03%	99.60%	98.79%	98.76%	99.95%	98.03%	99.47%	99.13%
	b) SDCCH/PAGING Channel congestion	<=1%	Day 1	0.15%	0.01%	0.28%	0.01%	0.08%	0.31%	0.28%	NA	0.06%	0.95%	0.02%	NA	0.00%	NA
			Day 2	0.34%	0.01%	0.30%	0.00%	0.09%	0.30%	0.48%	NA	0.10%	0.93%	0.03%	NA	0.00%	NA
			Day 3	0.10%	0.01%	0.29%	0.01%	0.08%	0.28%	0.48%	NA	0.08%	0.85%	0.03%	NA	0.00%	NA
	c) TCH congestion	<=2%	Day 1	0.27%	0.69%	0.34%	0.15%	0.40%	0.86%	0.19%	0.06%	0.16%	0.65%	0.05%	0.01%	0.16%	0.03%
			Day 2	0.54%	0.76%	0.32%	0.10%	0.44%	0.91%	0.24%	0.06%	0.33%	0.84%	0.04%	0.01%	0.10%	0.01%
			Day 3	0.28%	0.80%	0.33%	0.20%	0.53%	1.41%	0.16%	0.06%	0.16%	0.61%	0.05%	0.02%	0.09%	0.01%
	Connection maintenance (Retainability)																
3	a) CDR (Call Drop Rate)	<=2%	Day 1	1.30%	0.85%	0.69%	0.18%	0.74%	0.94%	0.53%	0.33%	0.68%	0.50%	0.56%	0.76%	0.49%	0.52%
			Day 2	1.53%	0.91%	0.68%	0.18%	0.71%	0.87%	0.54%	0.30%	0.75%	0.50%	0.55%	0.66%	0.50%	0.60%
			Day 3	1.39%	0.96%	0.70%	0.20%	0.74%	0.85%	0.54%	0.31%	0.72%	0.52%	0.54%	0.61%	0.52%	0.63%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Day 1	8.08%	9.94%	0.86%	1.36%	1.94%	1.91%	1.49%	0.00%	5.18%	3.52%	2.82%	0.17%	1.62%	2.54%
			Day 2	11.37%	12.07%	0.90%	1.35%	1.95%	1.89%	1.49%	0.00%	6.13%	3.52%	2.80%	0.17%	1.09%	2.87%
			Day 3	8.96%	11.80%	0.92%	1.36%	1.85%	1.98%	1.49%	0.02%	5.13%	3.23%	2.73%	0.21%	1.64%	2.46%
	c) Connections with good voice quality	>=95%	Day 1	96.21%	99.61%	99.24%	99.69%	97.23%	96.95%	96.20%	98.84%	98.20%	99.13%	98.67%	98.78%	99.17%	98.29%
			Day 2	95.80%	99.58%	99.26%	99.69%	97.45%	96.11%	96.16%	98.88%	98.22%	99.13%	98.65%	98.78%	99.15%	98.28%
			Day 3	96.08%	99.79%	99.25%	99.69%	97.17%	95.18%	96.22%	98.85%	98.19%	99.12%	98.66%	98.78%	99.17%	98.29%
4	No. of POI's having >=0.5% POI congestion	<=0.5 %	Day 1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
			Day 2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
			Day 3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

KARNATAKA CIRCLE Q2 Oct.- Dec. -2014

Finding & Critical Analysis:

- Aircel (2G & 3G) and TATA (2G & 3G Services) for all 3 days for **worst affected cells having more than 3% TCH drop (call drop) rate.**

4.2 CUSTOMER SERVICE QUALITY PARAMETERS (Graphical Representation)

4.2.1 2nd Quarter data Assessment (Oct. - Dec.'14):

Karnataka, Q2 (Oct.- Dec.'14)													
Customer Service Quality Parameters		**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**		
1	Metering/billing credibility Post paid	<= 0.1%	Reported	0.00%	0.01%	0.00%	0.04%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%
			Verified	0.00%	0.01%	0.00%	0.04%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%
2	Metering /billing credibility Pre paid	<= 0.1%	Reported	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.19%	0.00%	0.00%	0.01%
			Verified	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.19%	0.00%	0.00%	0.01%
3	Resolution of billing/ charging complaints	98% within 4 weeks	Reported	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
			Verified	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		100% within 6 weeks	Reported	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
			Verified	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
4	Period of applying credit/waiver/adjustment to the customer's account from the date of resolutions of complaints	<=1 week	Reported	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
			Verified	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
5	Response time to customers for assistance												
	a) Accessibility of call centre/Customer Care	>=95%	Reported	100.0%	100.0%	98.31%	99.00%	100.00%	98.00%	100.0%	98.00%	97.00%	99.9%
			Verified	100.0%	100.0%	98.31%	99.00%	100.00%	98.00%	100.0%	98.00%	97.00%	99.9%
	b) % call answered by operators (voice to voice) within 90 sec.	>=95%	Reported	97.00%	96.00%	98.00%	100.00%	95.00%	75.23%	93.00%	75.00%	90.20%	92.00%
			Verified	97.00%	96.00%	98.00%	100.00%	95.00%	75.23%	93.00%	75.00%	90.20%	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%	100%	100%	100.00%	100%	100%	100%	100%	100%	100%
			Verified	100%	100%	100%	100.00%	100%	100%	100%	100%	100%	100%
7	Time taken for refunds of deposits after closures.	100% within 60 days	Reported	98.00%	100%	100%	100.00%	100%	100%	100%	100%	100%	100%
			Verified	98.00%	100%	100%	100.00%	100%	100%	100%	100%	100%	100%

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.
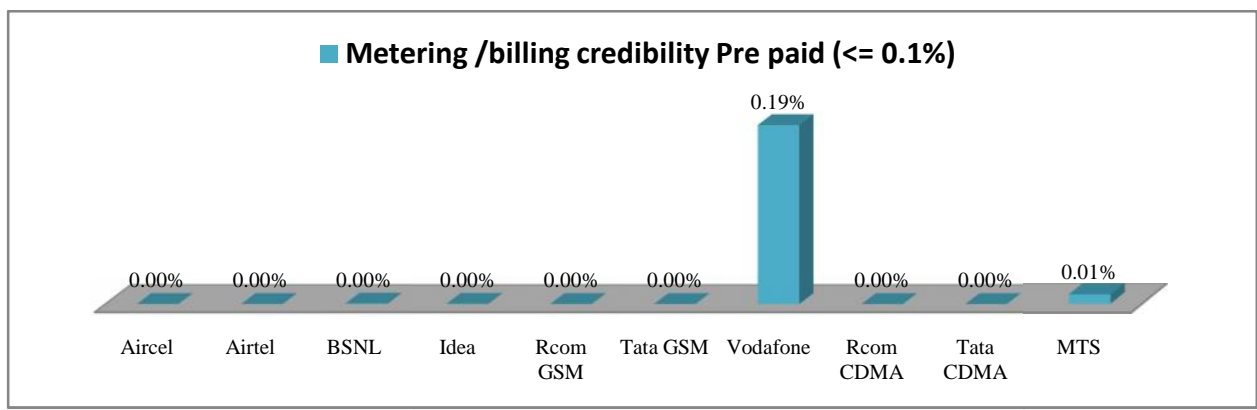
Fig. 2

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 except Vodafone.
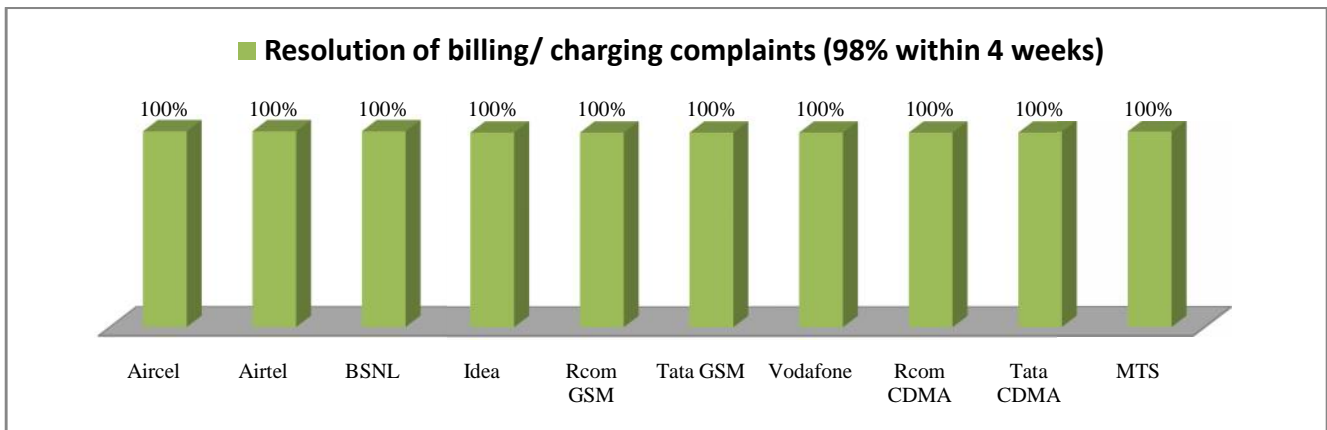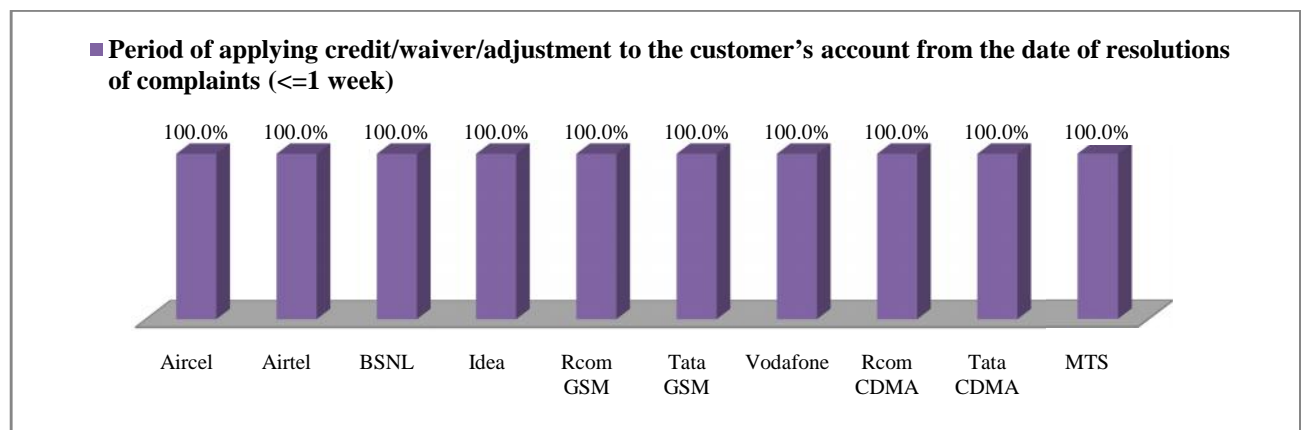

Fig. 3

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**.**

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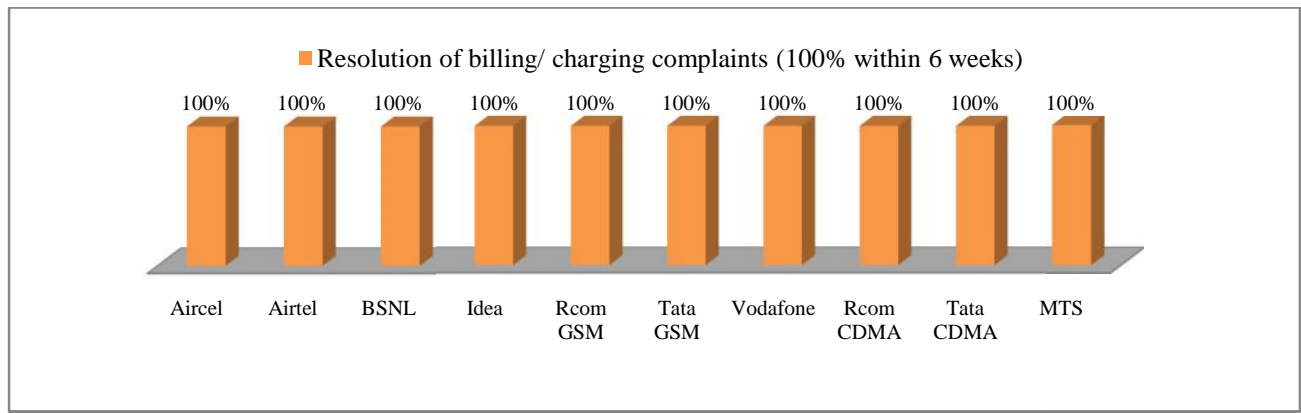
Fig. 4

According to the parameter Resolution of billing/ charging 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 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.5** we found that all the service providers are meeting the benchmark.
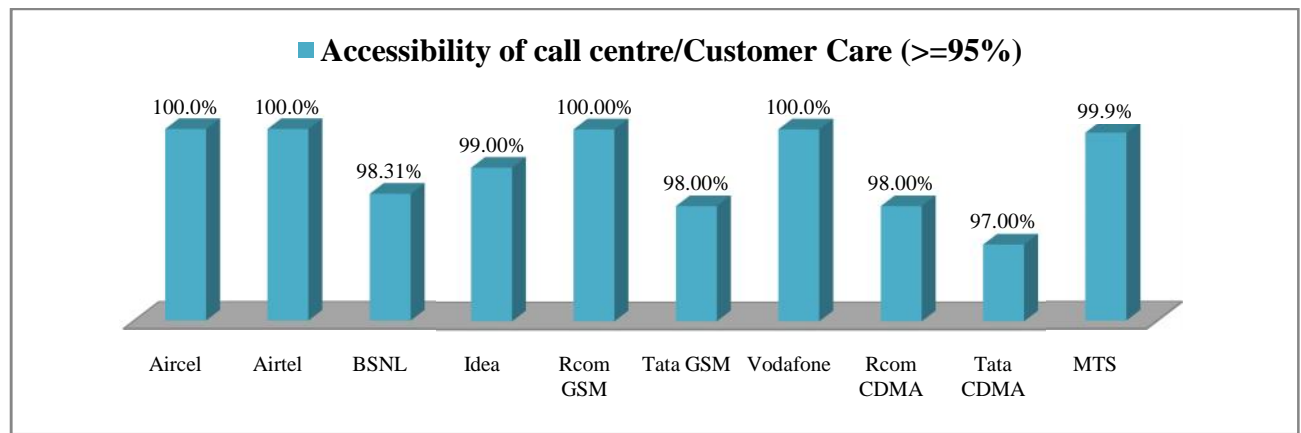
Fig. 6

According to the parameter Accessibility of call centre/Customer Care in the table **4.2.1** and the Fig.6 we found that all the service providers are meeting the benchmark.
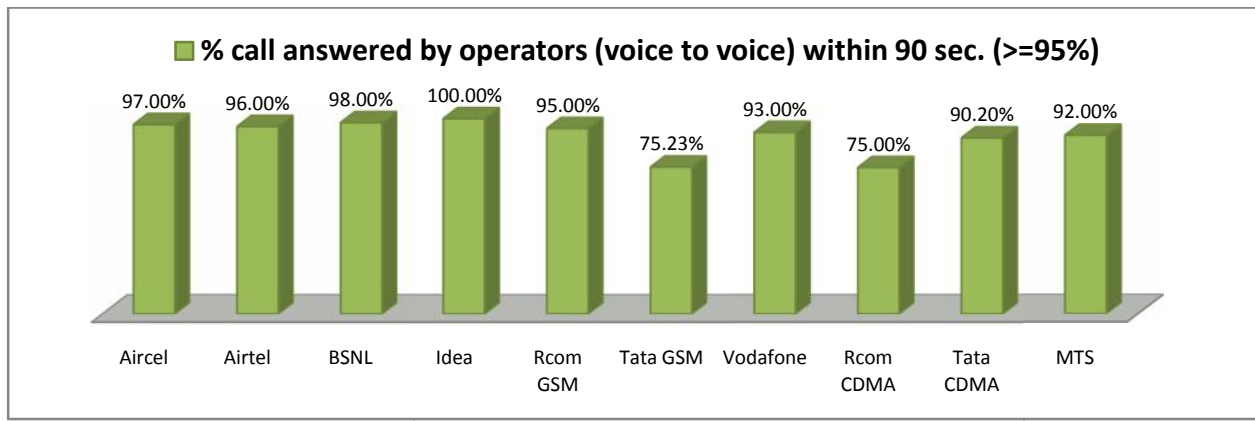
Fig. 7

According to the parameter % call answered by operators (voice to voice) within 90 sec in the table **4.2.1** and the Fig.7 we found that all the service providers are meeting the benchmark except **TATA (GSM & CDMA), Rcom CDMA, Vodafone** and **MTS.**
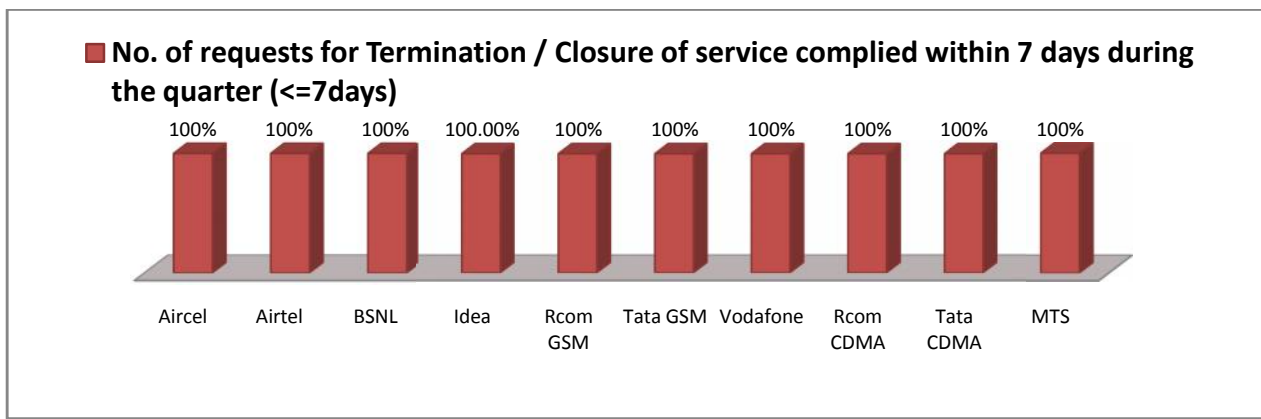
Fig. 8

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.8 we found that all the service providers are meeting the benchmark except Aircel**.**
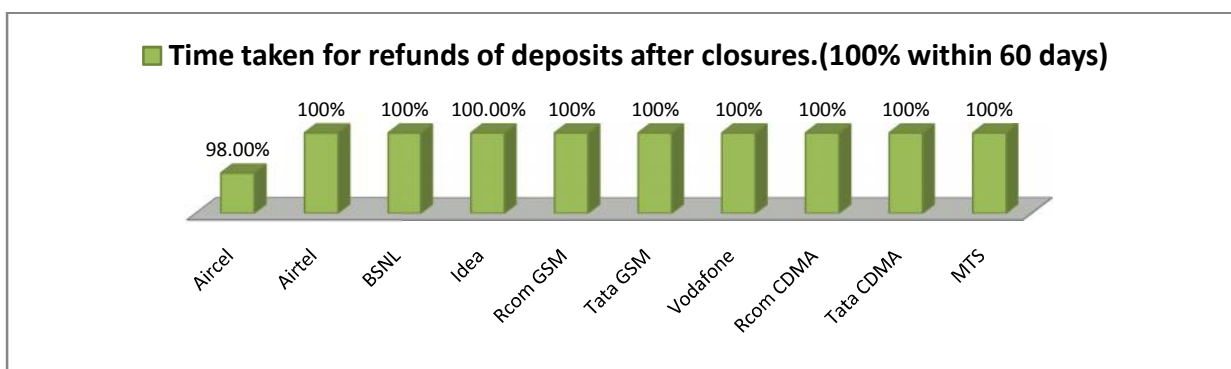
Fig. 9

According to the parameter Time taken for refunds of deposits after closures in the table **4.2.1** and the Fig.9 we found that all the service providers are meeting the benchmark except Aircel.

4.3 Summarized PMR Data Results in Table & Graphical

4.3.1 Karnataka Circle (Oct. - Dec.'14):

	Karnataka Circle (Oct.- Dec.'14)															
	Month PMR Generation Data	**Bench mark**	**Audit Period**	Aircel	Aircel 3G	Airtel	Airtel 3G	BSNL	BSNL 3G	IDEA	Relianc e	TATA	TATA 3G	Vodafo ne	Relianc e	MTS	TATA
S/N	**Name of Parameter**			**GSM Operators**											**CDMA**		
	Network Service Quality Parameter																
	Network Availability																
1	BTS accumulated downtime	2%	One Qtr	0.15%	0.16%	0.37%	0.06%	1.08%	0.58%	0.09%	0.35%	0.05%	0.06%	0.10%	0.35%	0.20%	0.07%
	Worst affected BTS due to downtime	2%	One Qtr	0.48%	0.33%	1.48%	0.25%	1.82%	1.93%	0.27%	0.85%	0.07%	0.06%	0.38%	0.80%	0.00%	0.25%
	Connection establishment (Accessibility)																
2	Call Setup Success Rate	95%	One Qtr	98.64%	98.33%	99.03%	99.20%	98.22%	97.59%	97.93%	99.65%	98.29%	98.61%	99.93%	98.89%	99.37%	98.95%
	SDCCH/ Paging Channel Congestion	1%	One Qtr	0.17%	0.92%	0.24%	0.08%	0.11%	0.43%	0.33%	0.02%	0.13%	0.95%	0.05%	0.01%	0.00%	0.00%
	TCH congestion	2%	One Qtr	0.36%	0.76%	0.33%	0.21%	0.58%	0.50%	0.20%	0.05%	0.25%	0.72%	0.07%	0.03%	0.11%	0.02%
	Connection Maintainability (Retain ability)																
3	Call Drop Rate	2%	One Qtr	1.30%	0.97%	0.71%	0.20%	1.10%	1.19%	0.66%	0.29%	0.75%	0.56%	0.57%	0.16%	0.55%	0.46%
	Worst affected cells having more than 3% TCH drop (call drop) rate	3%	One Qtr	7.58%	10.74%	1.05%	1.48%	2.45%	1.54%	1.64%	0.01%	5.71%	3.66%	2.87%	0.04%	1.39%	2.42%
	% of Connections with good voice quality	95%	One Qtr	96.58%	99.76%	99.22%	99.69%	97.28%	97.46%	96.29%	98.90%	97.55%	99.12%	98.66%	99.46%	99.16%	98.25%
	Point of Interconnections (POI) congestion (on individual POI)	0.5%	One Qtr	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Fig.1

According to the above graph and data on the table **4.3.1**and the **Fig.1** it is found that all the operators are meeting the Network Parameters.
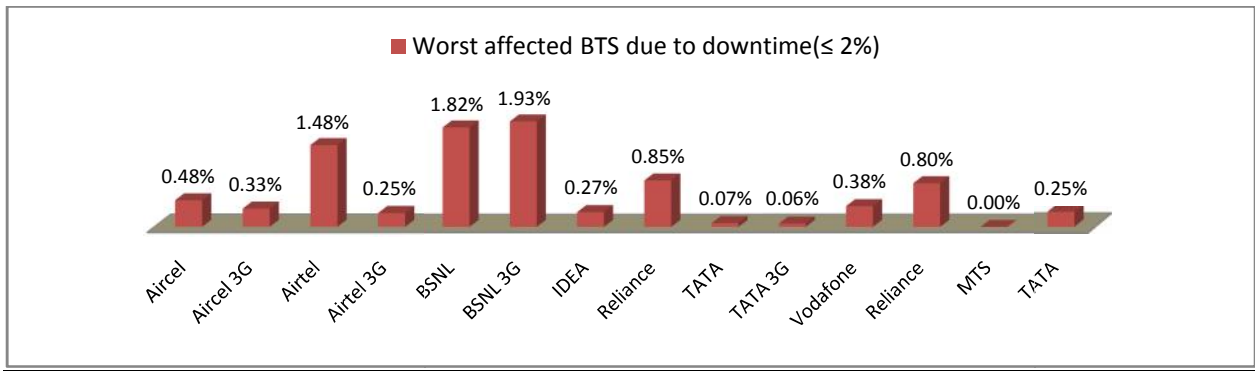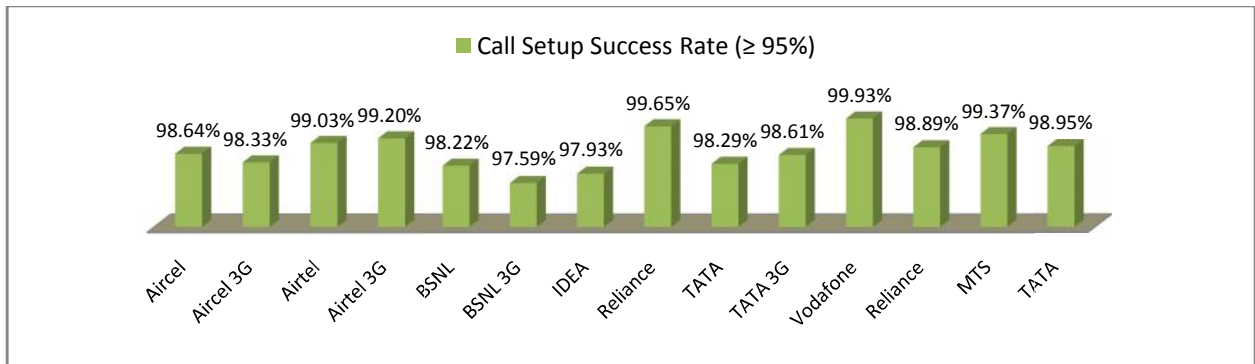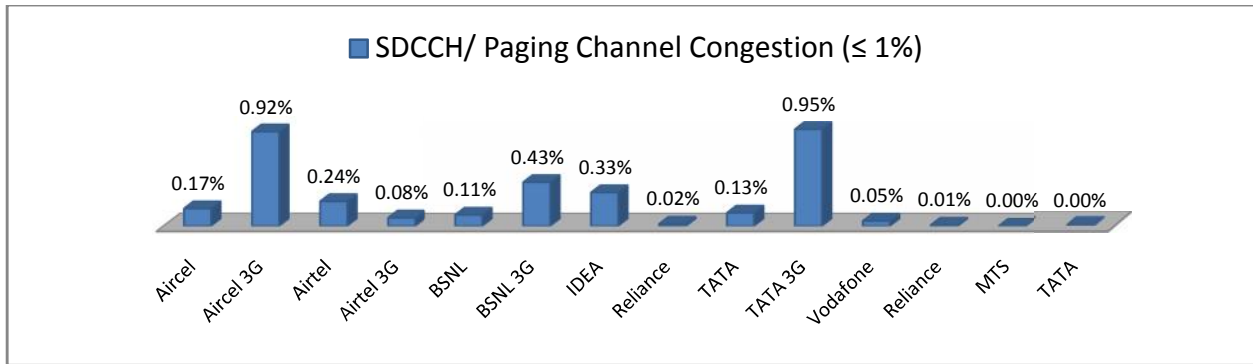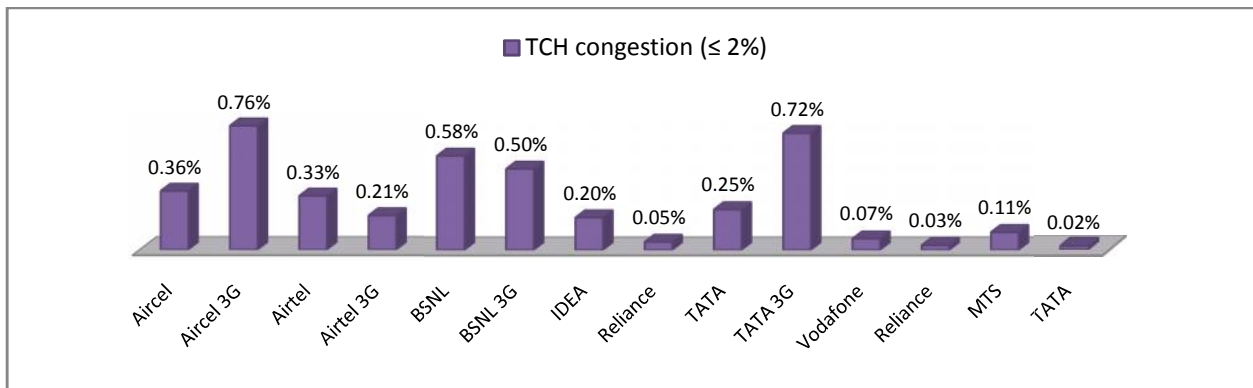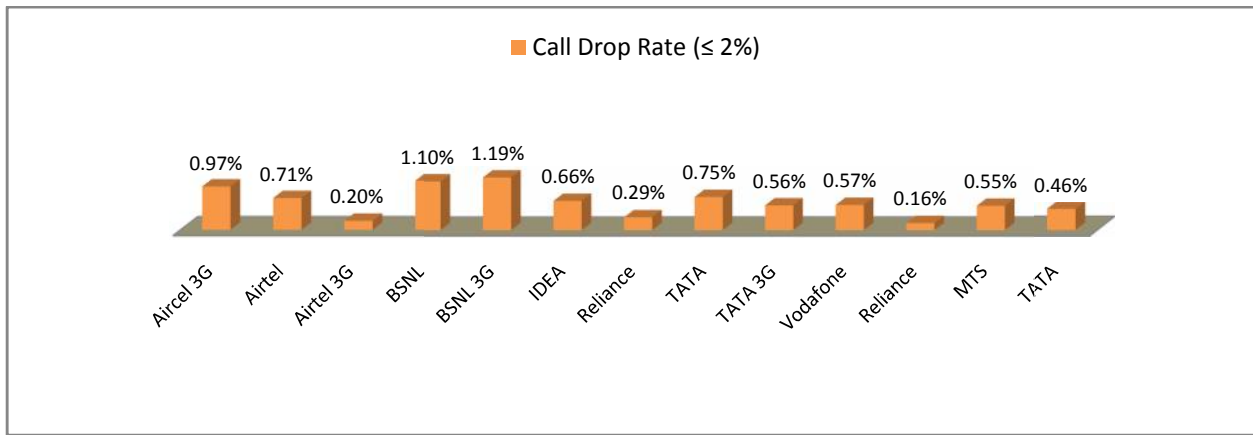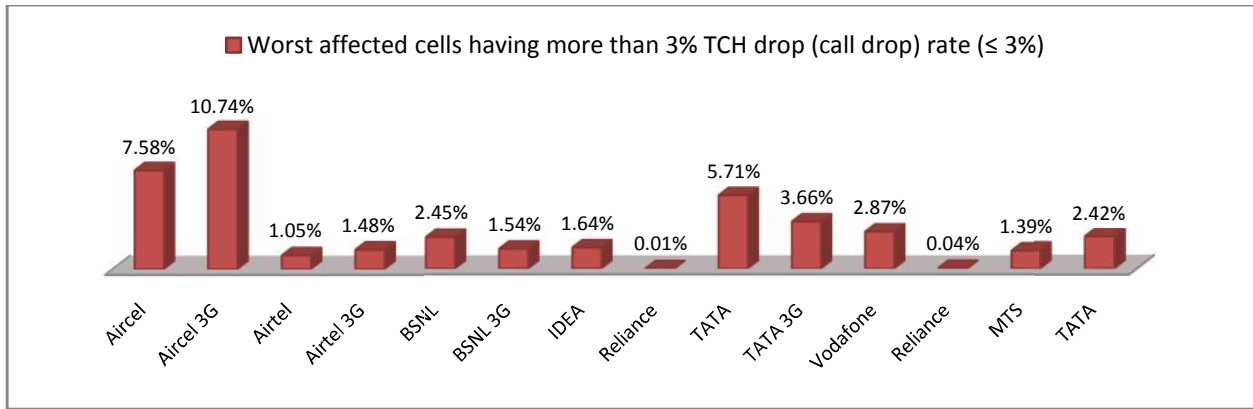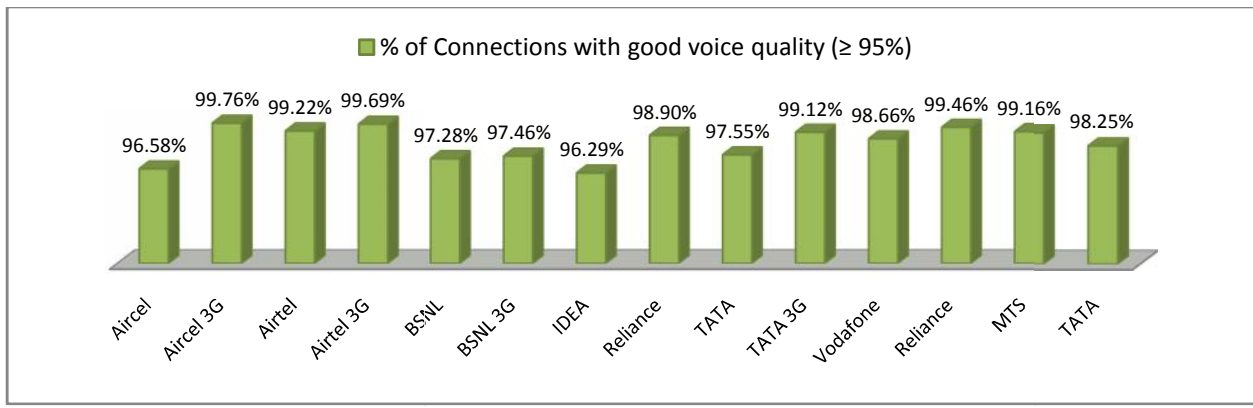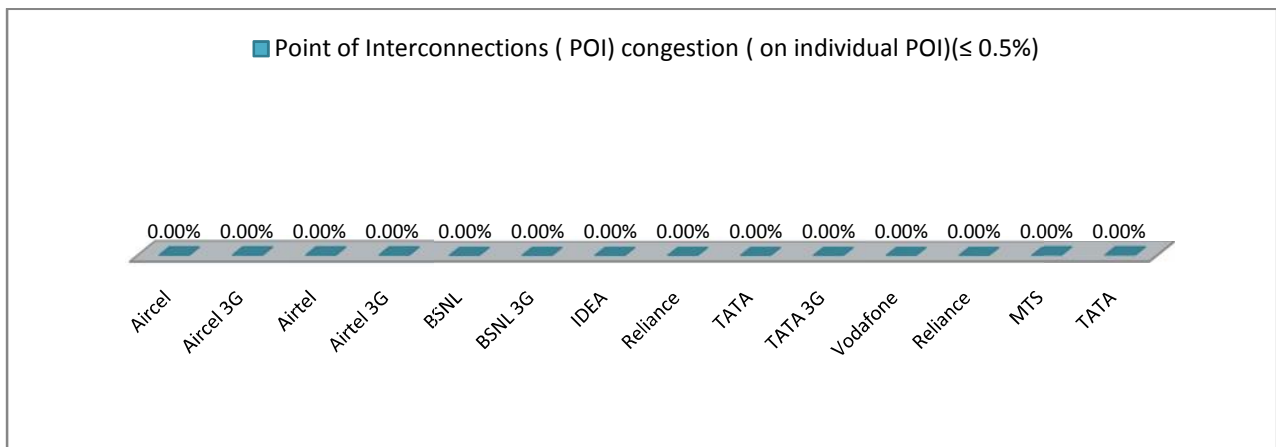

Fig.2

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

Fig. 3

According to the above graph and data on the table **4.3.1**and the **Fig.3** 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**and the **Fig.4** 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** and the **Fig.5** 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** and the **Fig.6** it is found that all the operators are meeting the Network Parameters.

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

Aircel 7.58% | Aircel 3G 10.74% | Airtel 1.05% | Airtel 3G 1.48% | BSNL 2.45% | BSNL 3G 1.54% | IDEA 1.64% | Reliance 0.01% | TATA 5.71% | TATA 3G 3.66% | Vodafone 2.87% | Reliance 0.04% | MTS 1.39% | TATA 2.42%

Fig.7

According to the above graph and data on the table **4.3.1** and the **Fig.7** it is found that all the operators are meeting the Network Parameters except Aircel 2G & 3G and TATA GSM & 3G.

% of Connections with good voice quality (≥ 95%)

Aircel 96.58% | Aircel 3G 99.76% | Airtel 99.22% | Airtel 3G 99.69% | BSNL 97.28% | BSNL 3G 97.46% | IDEA 96.29% | Reliance 98.90% | TATA 97.55% | TATA 3G 99.12% | Vodafone 98.66% | Reliance 99.46% | MTS 99.16% | TATA 98.25%

Fig. 8

According to the above graph and data on the table **4.3.1** and the **Fig.8** it is found that all the operators are meeting the Network Parameters.

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

Aircel 0.00% | Aircel 3G 0.00% | Airtel 0.00% | Airtel 3G 0.00% | BSNL 0.00% | BSNL 3G 0.00% | IDEA 0.00% | Reliance 0.00% | TATA 0.00% | TATA 3G 0.00% | Vodafone 0.00% | Reliance 0.00% | MTS 0.00% | TATA 0.00%

Fig. 9

According to the above graph and data on the table **4.3.1** and the **Fig.9** it is found that all the operators are meeting the benchmark of network parameter.

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

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	Chikmagalur	368	462	388	390	NP	367	370	346	460	414
		Bellary	578	488	462	471	NP	584	434	588	592	575
		Bidar	459	391	520	471	NP	449	410	449	537	485
1.2	Blocked Call Rate (<=3%)	Chikmagalur	0.00%	0.00%	0.33%	0.00%	NP	0.24%	0.89%	0.52%	0.00%	0.00%
		Bellary	0.70%	0.93%	0.66%	0.00%	NP	1.11%	0.54%	3.73%	0.00%	0.00%
		Bidar	0.00%	1.55%	0.21%	0.00%	NP	3.48%	0.92%	3.48%	0.00%	0.00%
1.3	Dropped Call Rate (<=2%)	Chikmagalur	0.00%	0.00%	0.23%	2.22%	NP	0.24%	0.46%	0.00%	0.10%	0.00%
		Bellary	0. 00%	0.09%	0.00%	0.44%	NP	0.96%	0.26%	0.00%	0.00%	0.00%
		Bidar	0.00%	0.38%	0.16%	0.00%	NP	3.13%	0.92%	3.13%	0.92%	0.00%
1.4	**Percentage of connections with good voice quality (=>95%)**											
	(i) 0-4 (w/o frequency hopping)	Chikmagalur	-	-	-	-	NP	-	-	99.92%	99.66%	99.91%
		Bellary	-	-	-	-	NP	-	-	98.43%	99.27%	99.29%
		Bidar	-	-	-	-	NP	-	-	93.21%	99.33%	99.88%
	(ii) 0-5 (with frequency hopping)	Chikmagalur	99.11%	97.11%	97.84%	95.83%	NP	98.34%	96.13%	-	-	-
		Bellary	98.30%	93.32%	97.15%	96.60%	NP	92.25%	91.67%	-	-	-
		Bidar	98.37%	97.30%	98.44%	97.28%	NP	93.58%	89.30%	-	-	-
1.5	**Service Coverage**											
	In door (>= 75dBm)	Chikmagalur	93.40%	82.05%	46.48%	50.97%	NP	65.86%	65.59%	34.87%	29.35%	63.67%
		Bellary	81.60%	88.80%	59.98%	78.87%	NP	46.47%	55.98%	50.90%	19.59%	63.42%
		Bidar	75.80%	94.80%	86.54%	81.20%	NP	54.09%	61.50%	54.09%	62.16%	71.58%
	In-vehicle (>= -85dBm)	Chikmagalur	99.60%	97.99%	81.36%	91.03%	NP	88.14%	89.22%	69.33%	65.21%	88.78%
		Bellary	97.80%	88.80%	90.57%	93.20%	NP	79.45%	86.20%	84.32%	55.85%	90.51%
		Bidar	96.60%	94.80%	98.17%	92.40%	NP	83.46%	89.07%	82.03%	90.77%	93.21%
	Outdoor- in city (>= -95dBm)	Chikmagalur	100.00%	99.86%	96.80%	99.47%	NP	97.48%	100.00%	93.61%	90.28%	98.80%
		Bellary	100.00%	99.80%	99.12%	99.21%	NP	93.52%	99.42%	97.85%	89.57%	98.29%
		Bidar	100.00%	100.00 %	99.75%	98.94%	NP	94.34%	97.13%	94.34%	98.51%	100.00%
1.6	Call Setup Success Rate (>=95%)	Chikmagalur	100.00%	100.00 %	99.67%	95.39%	NP	99.76%	98.66%	99.48%	100.00%	100.00%
		Bellary	99.30%	99.06%	99.36%	99.46%	NP	98.77%	97.24%	96.27%	100.00%	99.40%
		Bidar	100.00%	98.45%	98.20%	99.39%	NP	96.52%	94.54%	98.63%	99.66%	100.00%

4.4.1   Call Attempts: -

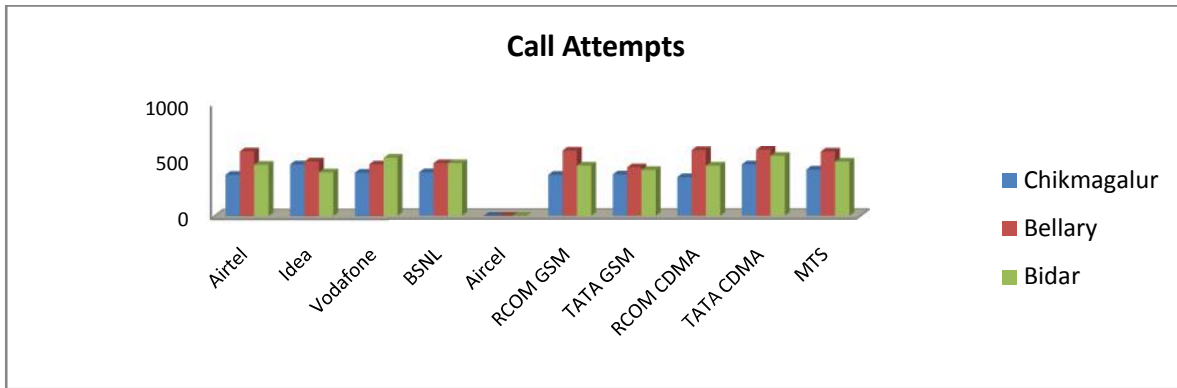**Fig.4.4.1**

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

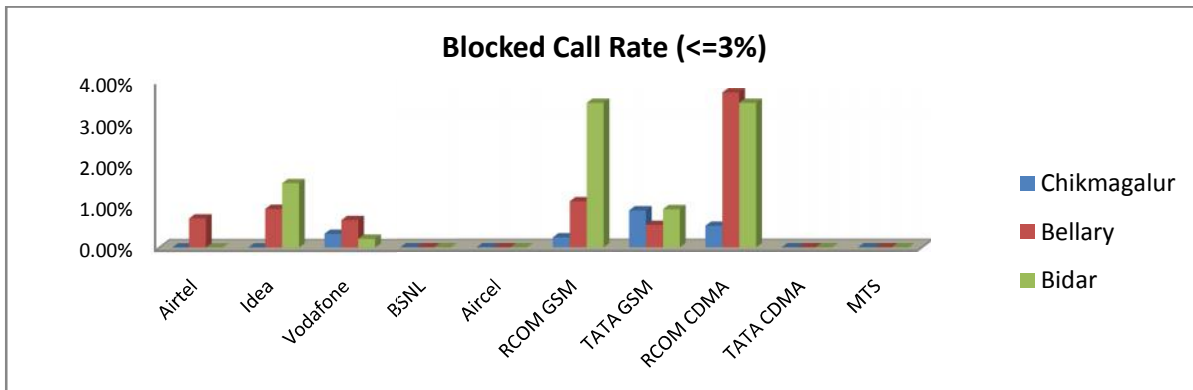### 4.4.2   Blocked Call Rate (<=3%):-

Fig.4.4.2

According to the table and the fig. 4.4.2 it shows that Rcom (GSM & CDMA) in Bidar and Rcom CDMA in Bellary are not meeting the benchmark of **Blocked Call Rate**.
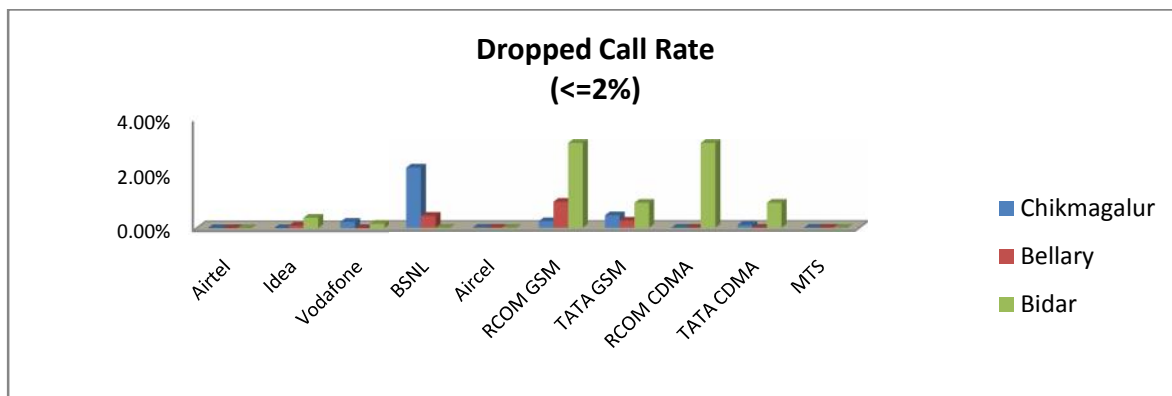
4.4.3   Dropped Call Rate (<=2%):

Fig. 4.4.3

According to the table and the fig. 4.4.3 it shows that BSNL in Chikmagalur & Rcom (GSM & CDMA) in Bidar is not meeting the benchmark of **Dropped Call Rate (<=2%).**

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

4.4.4.1 0-4 (w/o frequency hopping CDMA)
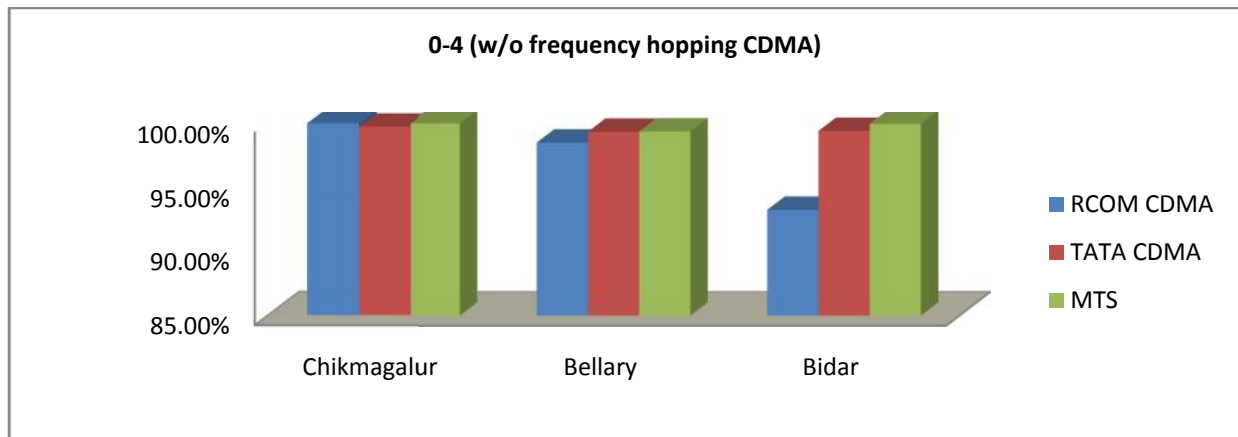
Fig. 4.4.4.1

According to the table and the fig. 4.4.4.1 it shows that all the service providers are meeting their benchmark for **0-4 (w/o frequency hopping CDMA)** except Rcom CDMA in Bidar.

4.4.4.2 0-5 (with frequency hopping GSM)
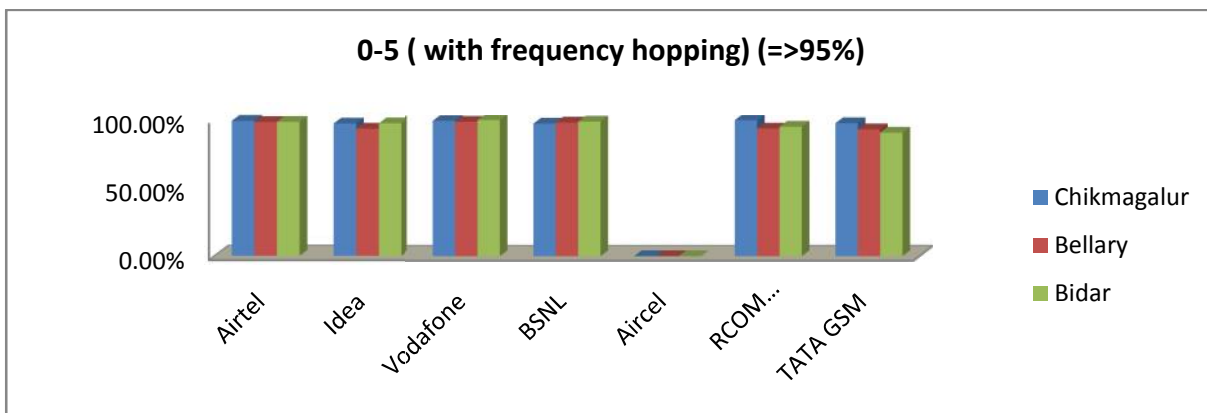
Fig. 4.4.4.2

According to the table and the fig. 4.4.4.1, it shows Idea, Rcom GSM & TATA GSM Bellary and Rcom GSM & Tata GSM in Bidar are not meeting the benchmark of **Voice Quality (0-5 (with frequency hopping GSM).**

4.4.5 Service Coverage

4.4.5.1 In door (>= -75dBm)
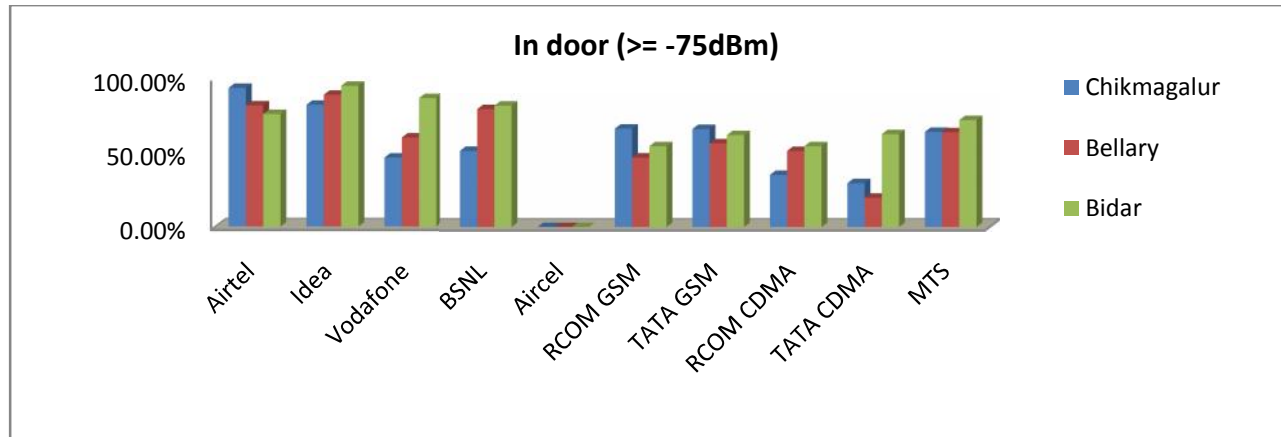
Fig.4.4.5.1

According to the table and the fig. 4.4.5.1, it shows that all service providers are meeting the benchmark for **indoor (>= -75dBm)**.

4.4.5.2 In-vehicle (>= -85dBm
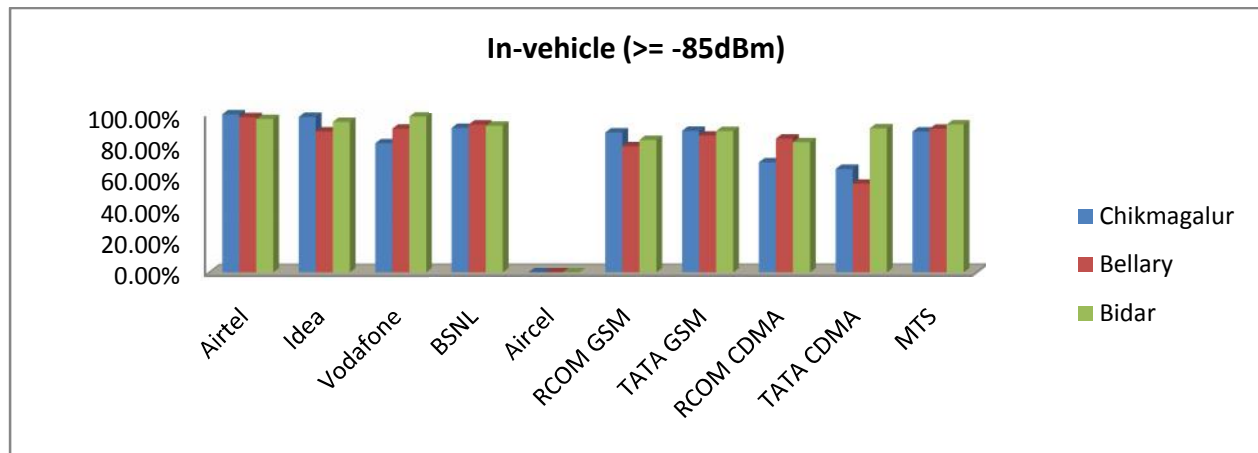
Fig. 4.4.5.2

According to the table and the fig. 4.4.5.2, it shows that all service providers are meeting their benchmark for **In-vehicle (>= -85dBm)**.
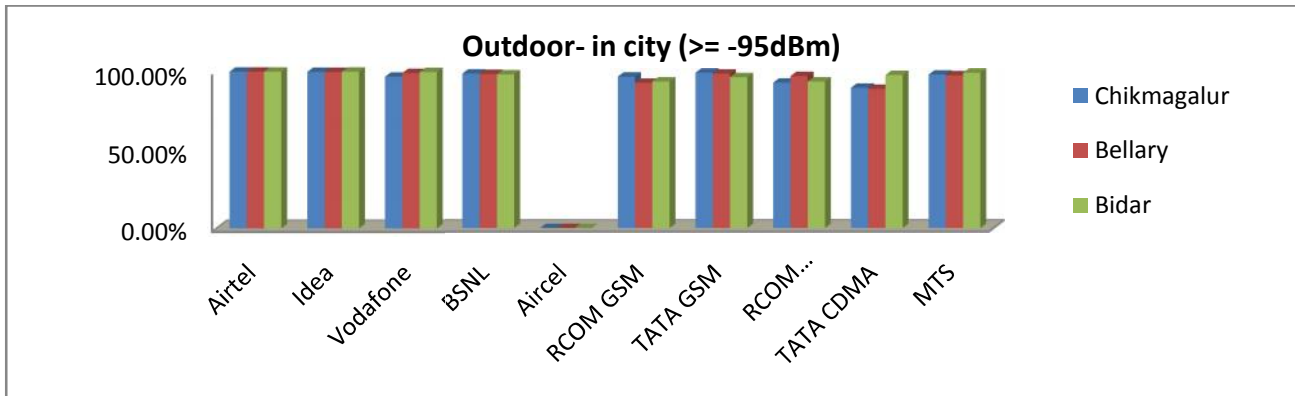
4.4.5.3 Outdoor- in city (>= -95dBm)

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 for **Outdoor- in city (>= -95dBm)**.

4.4.6   Call Setup Success Rate (>=95%)
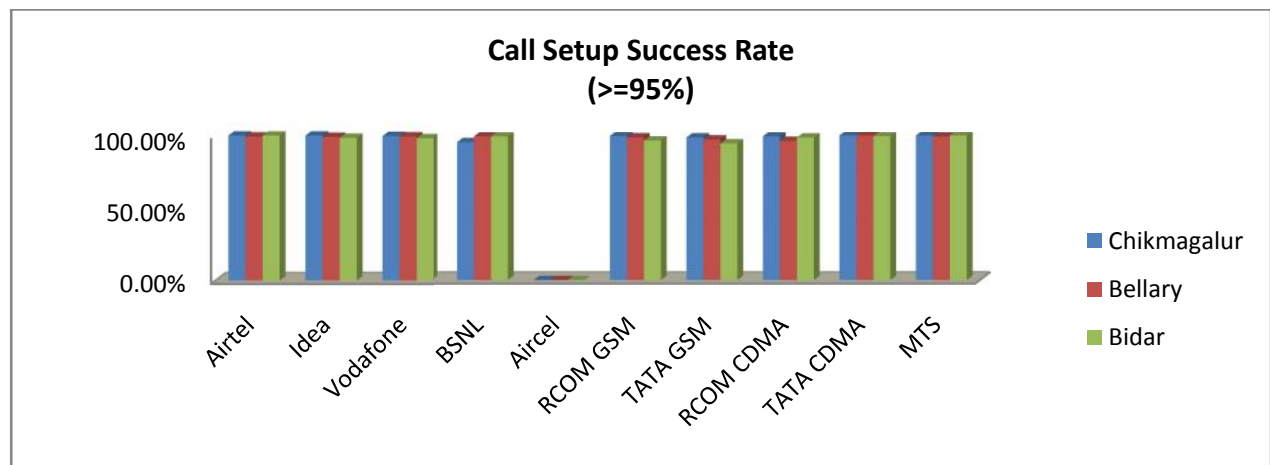
Fig. 4.4.6

According to the table and the fig. 4.4.6, it shows that all operators are meeting the benchmark for **Call Setup Success Rate** except Tata GSM in Bidar.

4.5 Live Test Summary and Graphical Representation for Q2_Karnataka Circle

				Aircel	Aircel 3G	Airtel	Airtel 3G	BSNL	BSNL 3G	IDEA	Reliance	TATA	TATA 3G	Vodafone	Reliance	MTS	TATA
KARNATAKA CIRCLE Q2 Oct.- Dec. -2014																	
	Live Test Generation Data	Bench mark	Audit Period	Aircel	Aircel 3G	Airtel	Airtel 3G	BSNL	BSNL 3G	IDEA	Reliance	TATA	TATA 3G	Vodafone	Reliance	MTS	TATA
SN	Name of Parameter			GSM Operators											CDMA Operators		
	Network Service Quality Parameters																	
	Network Availability																	
1	a) BTS Accumulated Downtime	<=2%	Day 1	0.17%	0.16%	0.26%	0.08%	1.11%	0.72%	0.09%	1.67%	0.08%	0.07%	0.06%	1.67%	0.17%	0.05%
			Day 2	0.85%	0.97%	0.26%	0.02%	1.39%	1.07%	0.11%	1.67%	0.12%	0.11%	0.12%	1.67%	0.27%	0.14%
			Day 3	0.11%	0.10%	0.28%	0.06%	1.14%	1.04%	0.07%	1.67%	0.12%	0.15%	0.11%	1.67%	0.12%	0.13%
	b) Worst affected BTSs due to downtime	<=2%	Day 1	0.00%	0.00%	0.00%	0.00%	0.07%	0.00%	0.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
			Day 2	0.00%	0.00%	0.00%	0.00%	0.09%	0.23%	0.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
			Day 3	0.00%	0.00%	0.00%	0.00%	0.15%	0.00%	0.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Connection Establishment (Accessibility)																	
2	a) CSSR (Call Setup Success Rate)	>=95%	Day 1	98.51%	98.69%	99.00%	99.37%	99.20%	98.23%	98.02%	99.30%	98.85%	98.68%	99.95%	98.54%	99.40%	98.84%
			Day 2	97.48%	98.31%	99.01%	99.40%	99.18%	98.25%	97.99%	99.68%	98.71%	98.30%	99.96%	98.65%	99.01%	99.11%
			Day 3	98.78%	97.80%	99.01%	99.22%	99.08%	97.99%	98.03%	99.60%	98.79%	98.76%	99.95%	98.03%	99.47%	99.13%
	b) SDCCH/PAGING Channel congestion	<=1%	Day 1	0.15%	0.01%	0.28%	0.01%	0.08%	0.31%	0.28%	NA	0.06%	0.95%	0.02%	NA	0.00%	NA
			Day 2	0.34%	0.01%	0.30%	0.00%	0.09%	0.30%	0.48%	NA	0.10%	0.93%	0.03%	NA	0.00%	NA
			Day 3	0.10%	0.01%	0.29%	0.01%	0.08%	0.28%	0.48%	NA	0.08%	0.85%	0.03%	NA	0.00%	NA
	c) TCH congestion	<=2%	Day 1	0.27%	0.69%	0.34%	0.15%	0.40%	0.86%	0.19%	0.06%	0.16%	0.65%	0.05%	0.01%	0.16%	0.03%
			Day 2	0.54%	0.76%	0.32%	0.10%	0.44%	0.91%	0.24%	0.06%	0.33%	0.84%	0.04%	0.01%	0.10%	0.01%
			Day 3	0.28%	0.80%	0.33%	0.20%	0.53%	1.41%	0.16%	0.06%	0.16%	0.61%	0.05%	0.02%	0.09%	0.01%
	Connection maintenance (Retainability)																	
3	a) CDR (Call Drop Rate)	<=2%	Day 1	1.30%	0.85%	0.69%	0.18%	0.74%	0.94%	0.53%	0.33%	0.68%	0.50%	0.56%	0.76%	0.49%	0.52%
			Day 2	1.53%	0.91%	0.68%	0.18%	0.71%	0.87%	0.54%	0.30%	0.75%	0.50%	0.55%	0.66%	0.50%	0.60%
			Day 3	1.39%	0.96%	0.70%	0.20%	0.74%	0.85%	0.54%	0.31%	0.72%	0.52%	0.54%	0.61%	0.52%	0.63%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Day 1	8.08%	9.94%	0.86%	1.36%	1.94%	1.91%	1.49%	0.00%	5.18%	3.52%	2.82%	0.17%	1.62%	2.54%
			Day 2	11.37%	12.07%	0.90%	1.35%	1.95%	1.89%	1.49%	0.00%	6.13%	3.52%	2.80%	0.17%	1.09%	2.87%
			Day 3	8.96%	11.80%	0.92%	1.36%	1.85%	1.98%	1.49%	0.02%	5.13%	3.23%	2.73%	0.21%	1.64%	2.46%
	c) Connections with good voice quality	>=95%	Day 1	96.21%	99.61%	99.24%	99.69%	97.23%	96.95%	96.20%	98.84%	98.20%	99.13%	98.67%	98.78%	99.17%	98.29%
			Day 2	95.80%	99.58%	99.26%	99.69%	97.45%	96.11%	96.16%	98.88%	98.22%	99.13%	98.65%	98.78%	99.15%	98.28%
			Day 3	96.08%	99.79%	99.25%	99.69%	97.17%	95.18%	96.22%	98.85%	98.19%	99.12%	98.66%	98.78%	99.17%	98.29%
4	No. of POI's having >=0.5% POI congestion	<=0.5 %	Day 1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
			Day 2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
			Day 3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

4.5.1 Network Availability

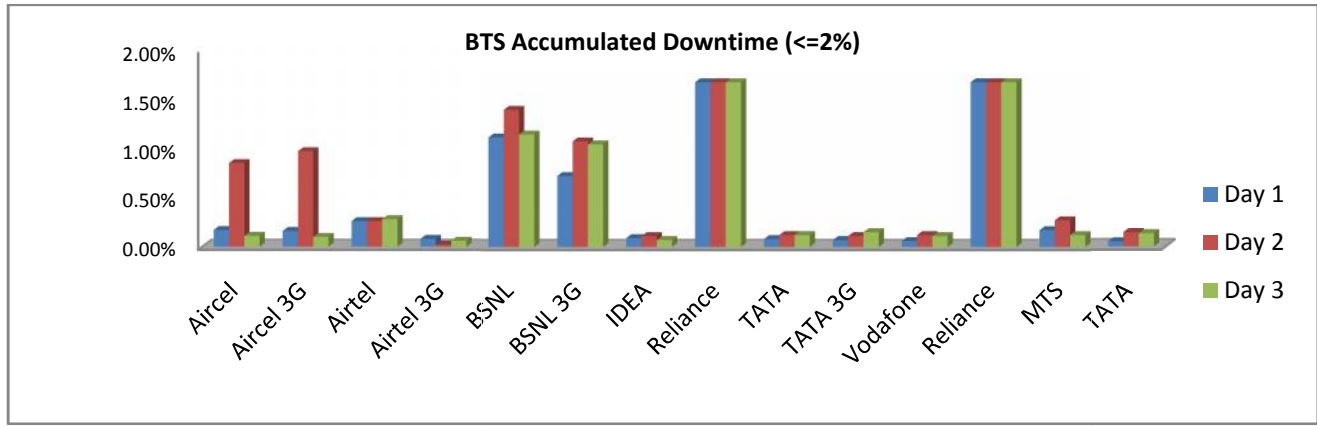### 4.5.1.1 BTS Accumulated Downtime

Fig. 4.5.1.1

- All operators are meeting the TRAI benchmarks **BTS Accumulated Downtime** for 3 days live data taken in the month of audit.

4.5.1.2 Worst affected BTS due to downtime (2%)
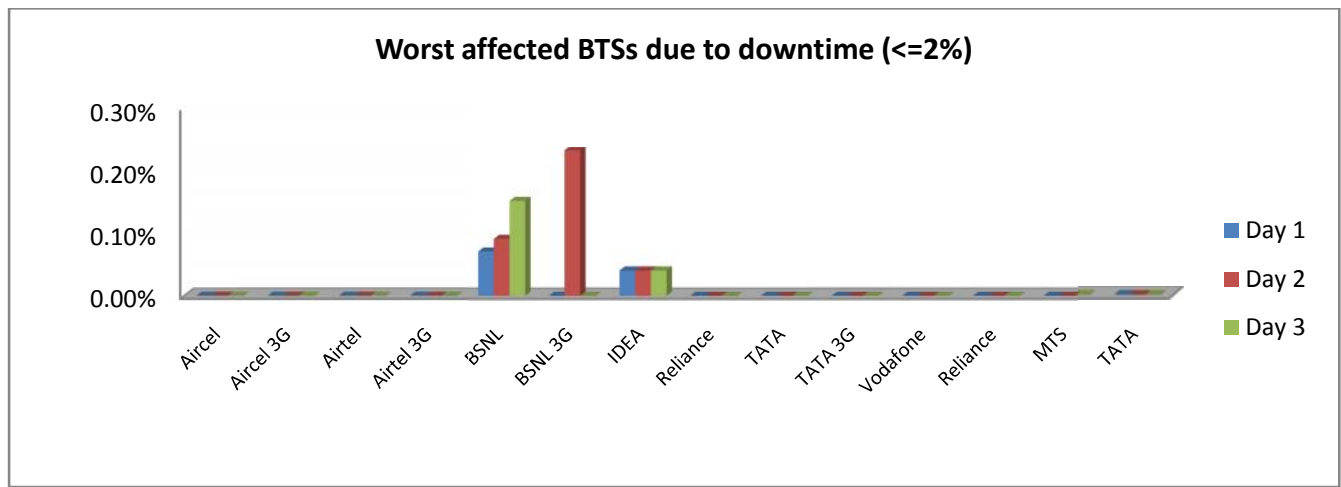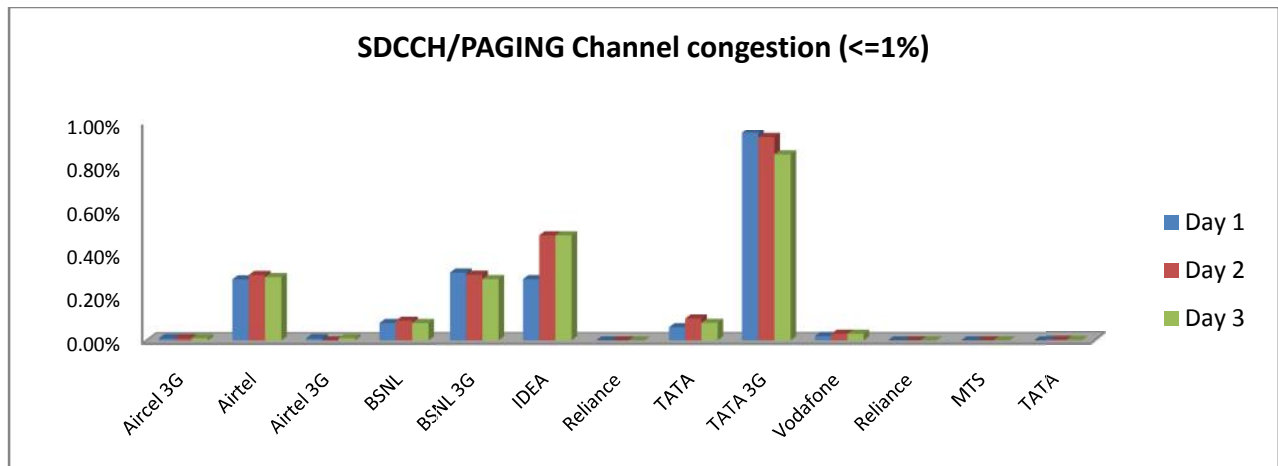

Fig. 4.5.1.2

- 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%
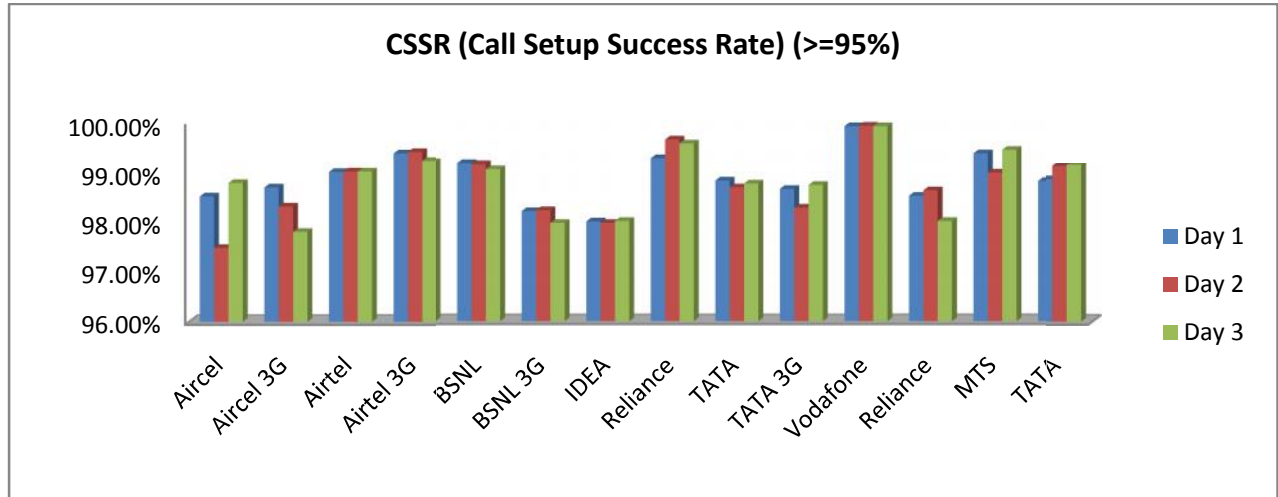
Fig. 4.5.2.1

- All operators are meeting the TRAI benchmarks **Call Setup Success Rate 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 **SDCCH/ Paging Channel Congestion 1%** for 3 days live data taken in the month of audit except Aircel 3G for day2.

4.5.2.3 TCH congestion 2%
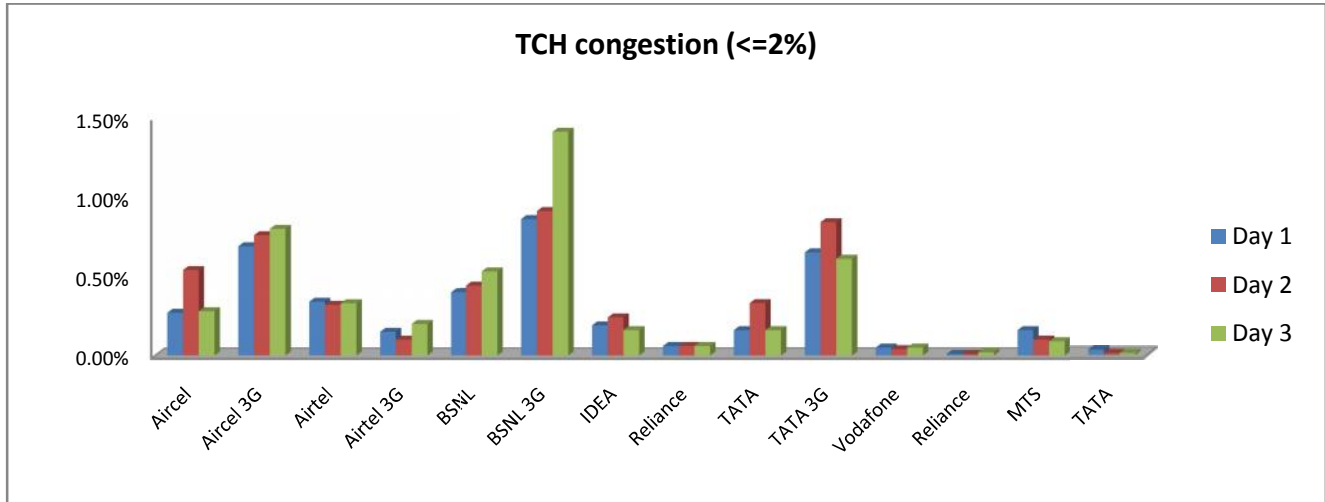
Fig. 4.5.2.3

- All operators are meeting the TRAI benchmarks TCH congestion (<=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%
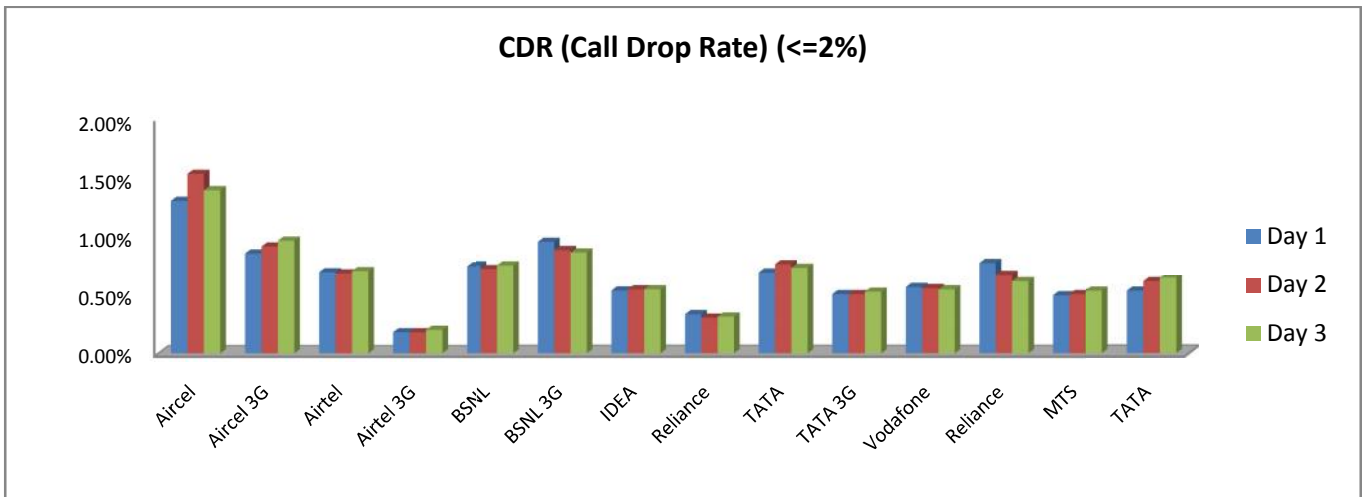
Fig. 4.5.3.1

- All operators are meeting the TRAI benchmark (<=2%) for 3 days live data taken in the month of audit.

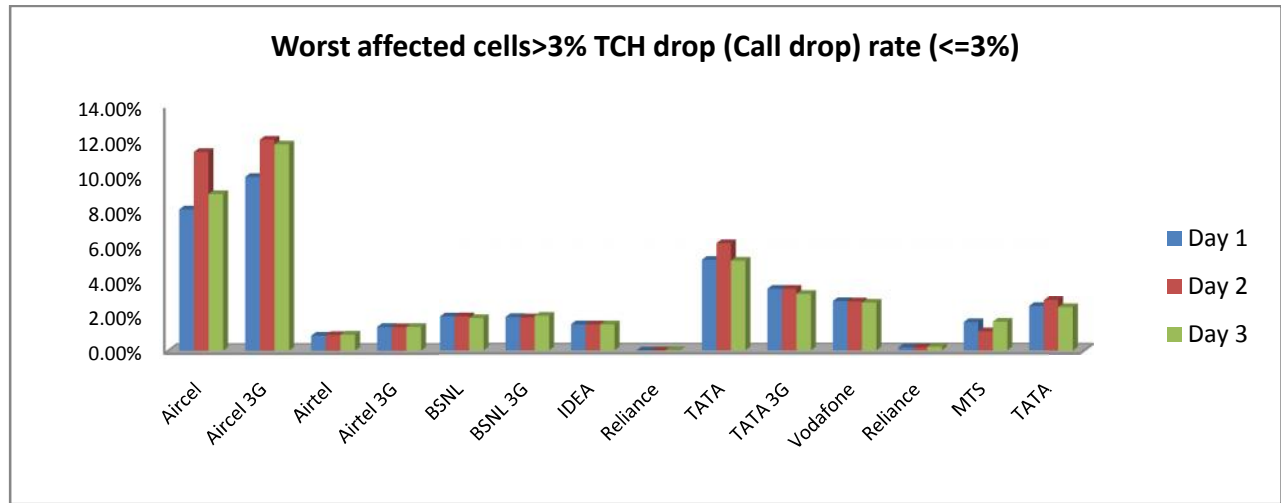**4.5.3.2 Worst affected cells having more than 3% TCH drop (call drop) rate**

Fig. 4.5.3.2

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

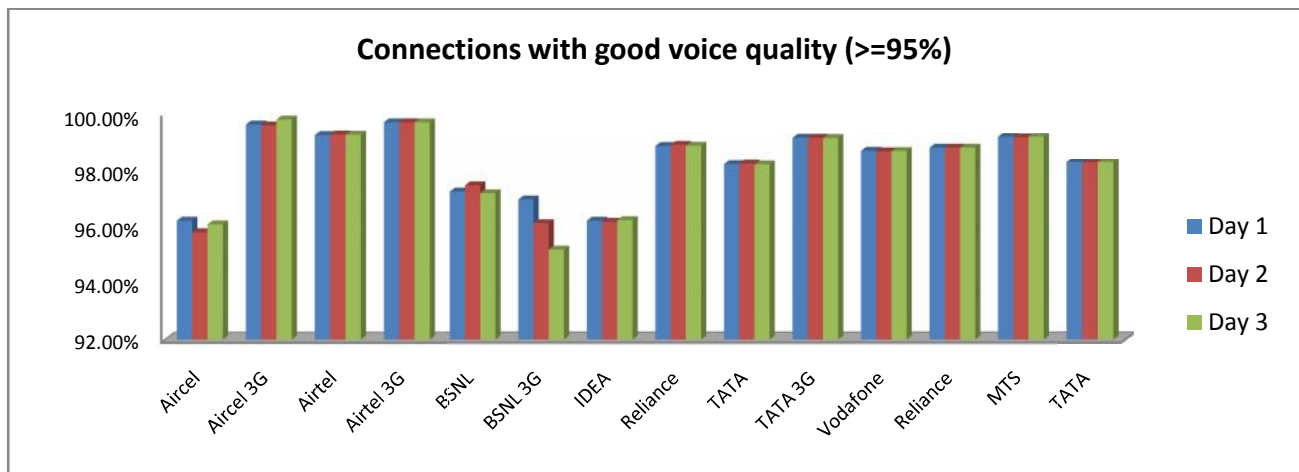**4.5.3.3 % of Connections with good voice quality   95%**

Fig. 4.5.3.3

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

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

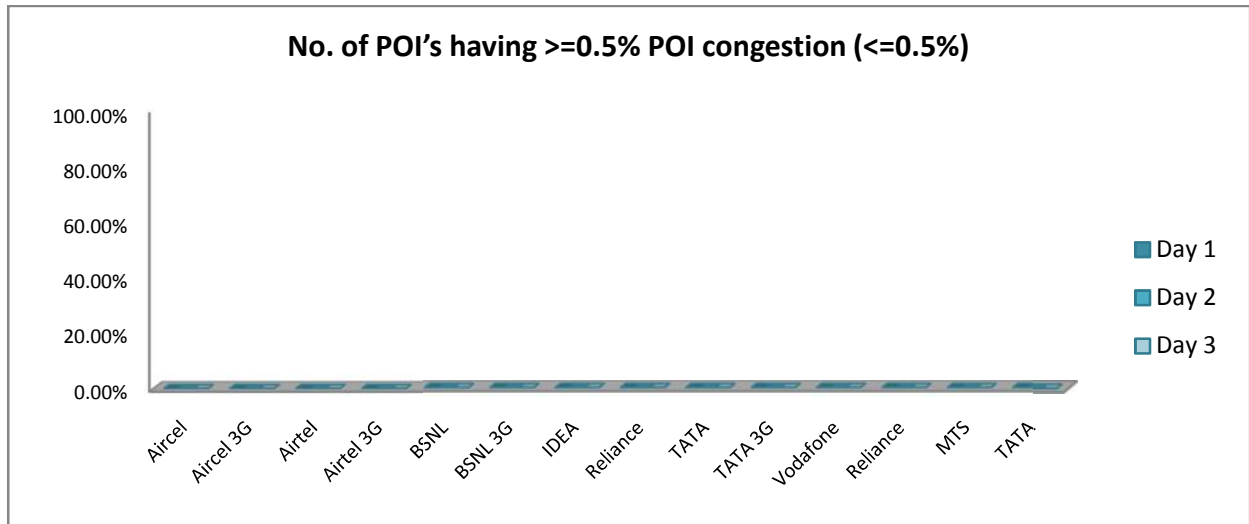**No. of POI's having >=0.5% POI congestion (<=0.5%)**

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.

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 for-**

- **Karnataka Circle (Oct.'14):** From the month data assessment, it is found that Aircel (2G & 3G) and TATA (2G & 3G) for Worst affected cells having more than 3% TCH drop (call drop) rate are not meeting the Network Parameters.

- **Karnataka Circle (Nov.'14):** From the month Data Assessment, it is found that all the operators are meeting the Network Parameters except Aircel (2G & 3G) and TATA (2G & 3G)for Worst affected cells having more than 3% TCH drop (call drop) rate.

- **Karnataka Circle (Dec.'14):** From the month Data Assessment, it is found that all the operators are meeting the Network Parameters except Aircel (2G & 3G) and TATA (2G & 3G)for Worst affected cells having more than 3% TCH drop (call drop) rate and Aircel 3G for SDCCH/ Paging Channel Congestion.

- **Summarized PMR Data (Oct. - Dec.'14):** From the month Data Assessment, it is found that all the operators are meeting the Network Parameters except Aircel (2G & 3G) and TATA (2G & 3G)for Worst affected cells having more than 3% TCH drop (call drop) rate.

➢ **As per 3 Days Live Test Audit Report (2nd Quarter), Karnataka 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) & Aircel (2G & 3G) for all 3 days are 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).

❖ **Karnataka Circle:**
- In Chikmagalur BSNL failed to achieve Dropped Call Rate (<=2%) KPI benchmark.
- In Bellary RCOM CDMA for Blocked Call Rate (<=3%); IDEA, RCOM GSM & TATA GSM for 0-5(with frequency hopping) failed to achieve the respective benchmarks.
- In Bidar RCOM (GSM & CDMA) for Blocked Call Rate (<=3%) & Dropped Call Rate (<=2%); RCOM GSM & TATA GSM for 0-5(with frequency hopping) and TATA GSM for Call Setup Success Rate (>=95%) failed to achieve the respective benchmarks.

➢ **Level 1 Live Calling (Emergency No.) Q2**
- Level 1 calling such as calling at emergency no. like Police, Fire, Ambulance and others were made so as to check the service of such short codes. In different cities of Karnataka it was found to be functional.

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

➢ **Live calling to call centre:-**
- In live calling to call centers we found that all the operators are meeting their benchmark except Aircel, Rcom (GSM & CDMA) and TATA CDMA for both Calls got connected to agent within 90 Sec and %age of calls got answered are not meeting the benchmark.

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

CUSTOMER SERVICE QUALITY PARAMETERS

❖ **2ⁿᵈ Quarter data Assessment (Karnataka Circle)**

- According to the parameter metering/billing credibility post-paid we found that all the service providers are meeting the benchmark

- According to the parameter metering /billing credibility pre-paid we found that all the service providers are meeting the benchmark except Vodafone.

- According to the parameter Resolution of billing/ charging complaints we found that all the service providers are meeting the benchmark.

- According to the parameter Period of applying credit/waiver/adjustment to the customer's account from the date of resolutions of complaints we found that all the service providers are meeting the benchmark.

- According to the parameter Accessibility of call centre/Customer Care we found that all the service providers are meeting the benchmark.

- According to the parameter % call answered by operators (voice to voice) within 90 sec we found that all the service providers are meeting the benchmark except MTS, Vodafone, TATA (CDMA & GSM) and Rcom CDMA.

- According to the parameter no. of requests for Termination / Closure of service complied within 7 days during the quarter we found that all the service providers are meeting the benchmark except Aircel.

- According to the parameter Time taken for refunds of deposits after closures we found that all the service providers are meeting the benchmark.

- According to the parameter Time taken for refunds of deposits after closures we found that all the service providers are meeting the benchmark except Aircel.