EAST ZONE

TRAI AUDIT WIRELESS REPORT-ASSAM CIRCLE - JFM QUARTER, 2015

Prepared By -

IMRB International | eTech

Prepared For-

TRAI

सत्यमेव जयते

Telecom Regulatory Authority of India

(IS/ISO 9001-2008 Certified Organisation)

1 TABLE OF CONTENTS

2 INTRODUCTION

2.1 ABOUT TRAI

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

In pursuance of above objective, TRAI has been issuing regulations, order and directives to deal with the issues or complaints raised by the operators as well as the consumers. These regulations, order and directives have helped to nurture the growth of multi operator multi service - an open competitive market from a government owned monopoly. Also, the directions, orders and regulations issued cover a wide range of subjects including tariff, interconnection and quality of service as well as governance of the Authority.

TRAI initiated a regulation - The Standard of Quality of Service of Basic Telephone Service (Wireline) and Cellular Mobile Telephone Service regulations, 2009 (7 of 2009) dated March 20, 2009 and Quality of Service of Broadband Service Regulations, 2006 (11 of 2006) dated January 6, 2006 that provide the benchmarks for the parameters on customer perception of service to be achieved by service provider.

In order to assess the above regulations, TRAI has commissioned a third party agency to conduct the audit of the service providers and check the performance of the operators on the various benchmarks set by Telecom Regulatory Authority of India (TRAI).

2.2 OBJECTIVES

The primary objective of the Audit module is to

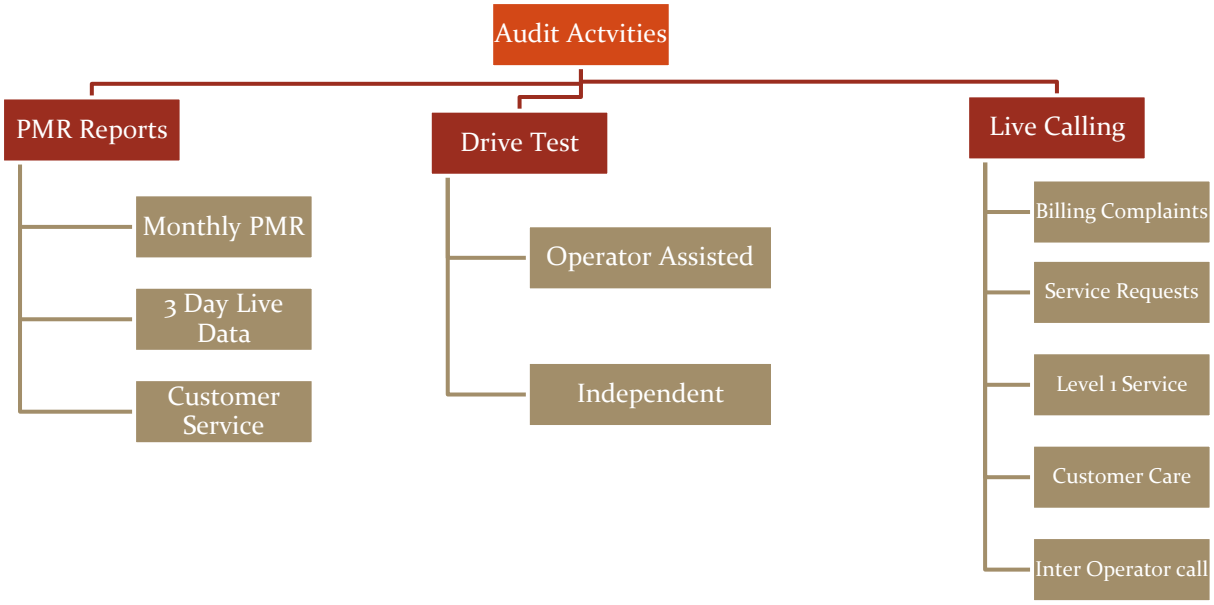
- Audit and Assess the Quality of Services being rendered by Basic (Wireline), Cellular Mobile (Wireless), and Broadband service against the parameters notified by TRAI. (The parameters of Quality of Services (QoS) have been specified by in the respective regulations published by TRAI).
- This report covers the audit results of the audit conducted for Cellular Mobile (Wireless) services in Assam Circle.

2.3 COVERAGE

The audit was conducted in Assam circle covering all the SSAs (Secondary Switching Areas).

Image Source: BSNL website

2.4 FRAMEWORK USED

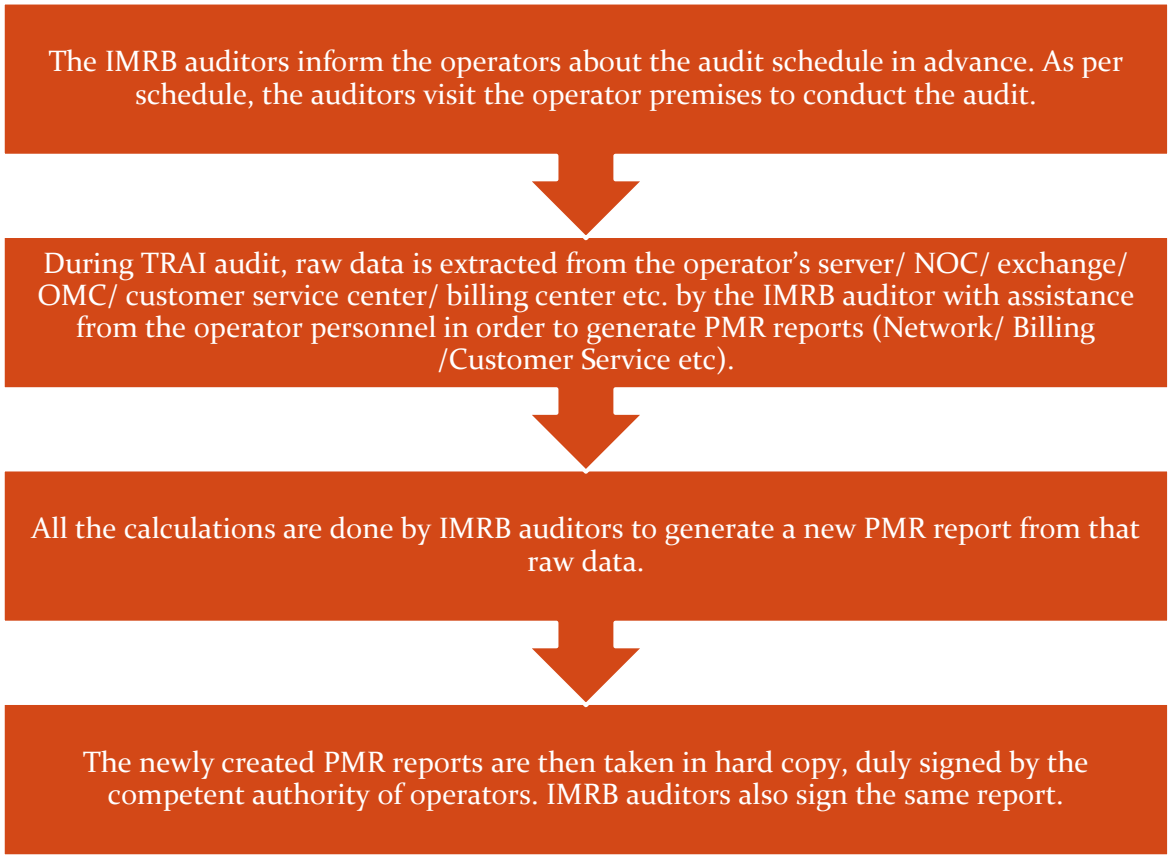


Let's discuss each of the activity in detail and the methodology adopted for each of the module.

2.4.1 PMR REPORTS

2.4.1.1 SIGNIFICANCE AND METHODOLOGY

PMR or Performance Monitoring Reports are generated to assess the various Quality of Service parameters involved in the mobile telephony service, which indicate the overall health of service for an operator.



The PMR report for network parameters is taken for each month of the audit quarter and is generally extracted and verified in the first week of the subsequent month of the audit month. For example, February 2015 audit data was collected in the month of March 2015.

The PMR report for customer service parameters is extracted from Customer Service Center and verified once every quarter in the subsequent month of the last month of the quarter. For example, data for quarter ending Mar 2015 (JFM'15) was collected in the month of Apr 2015.

The raw data is extracted from operator's systems to create PMR in the following three formats.

- Monthly PMR (Network Parameters)
- 3 Day Live Measurement Data (Network Parameters)
- Customer Service Data

Let us understand these formats in detail.

2.4.1.2 MONTHLY PMR

This involved calculation of the various Quality of Service network parameters through monthly Performance Monitoring Reports (PMR). The PMR reports were generated from the data extracted from operator's systems in presence of IMRB representative at the operator's premises for the month of Oct, Nov and Dec 2015. The performance of operators on various parameters was assessed against the benchmarks. Parameters include-

Network Availability

- BTS accumulated downtime
- Worst affected BTS due to downtime

Connection Establishment (Accessibility)

- Call Set Up success Rate (CSSR)

Network Congestion Parameters

- SDCCH/Paging Channel Congestion
- TCH Congestion
- Point of Interconnection

Connection Maintenance

- Call Drop rate
- Worst affected cells having more than 3% TCH drop

Voice Quality

- % Connections with good voice quality

All the parameters have been described in detail along with key findings of the parameters in section 5 of the report. The benchmark values for each parameter have been given in the table below.

2.4.1.3 AUDIT PARAMETERS - NETWORK

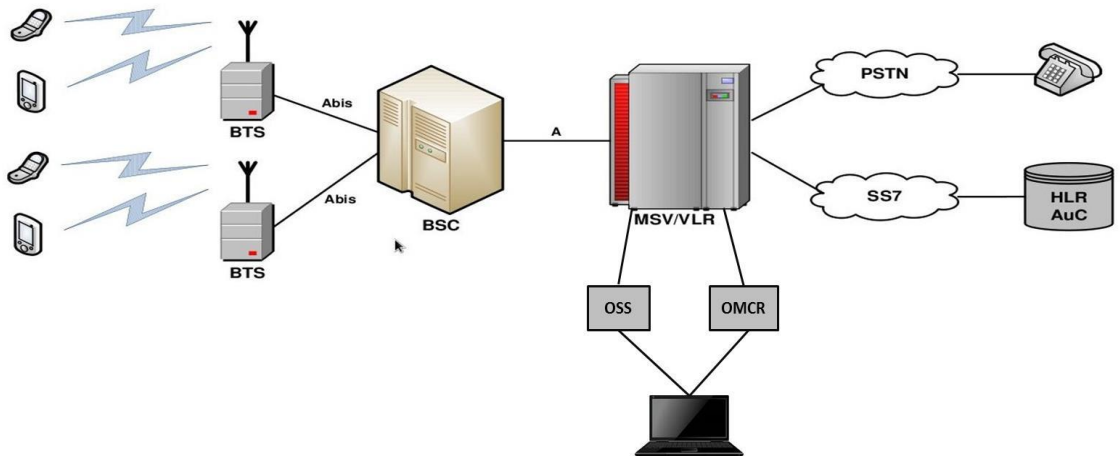
Let us now look at the various parameters involved in the audit reports.

Network Related

Network Availability	
BTSs Accumulated downtime (not available for service)	≤ 2%
Worst affected BTSs due to downtime	≤ 2%
Connection Establishment (Accessibility)	
Call Set-up Success Rate (within licensee's own network)	≥ 95%
SDCCH/ Paging Channel Congestion	≤ 1 %
TCH Congestion	≤ 2%
Connection Maintenance (Retainability)	
Call Drop Rate	≤ 2%
Worst affected cells having more than 3% TCH drop (call drop) rate	≤ 3%
Connections with good voice quality	≥ 95%
Point of Interconnection	
(POI) Congestion (on individual POI)	≤ 0.5%

2.4.1.4 POINT OF DATA EXTRACTION

The data is extracted from a terminal/computer connected to OMCR & OSS on the operator network.



2.4.1.5 STEP BY STEP AUDIT PROCEDURE

The key steps followed for extraction of reports at the operator premises are given below.

All the operators operating in the Wireless domain are informed about the Audit. Tender document and latest list of licencees as per TRAI is taken as a reference document for assimilating the presence of operators.

Audit formats and schedule is shared with the operators in advance. Details include day of the visit and date of 3 day data collection and other requirements.

IMRB auditors visit the operator's server/exchange/central NOC to extract data from operator's systems. Operator personnel assist the auditor in extraction process.

The extracted data is validated and verfied by the IMRB auditors.

IMRB auditors then prepare a PMR report from the extracted data with assistance from the operator.

IMRB auditors validate the values with raw data and also provide their comments, wherever required.

The final audit or PMR sheet is signed by the operator person in-charge along with authorized stamp.

Data has been extracted and calculated as per the counter details provided by the operators. The details of counters have been provided in section 8.15 of the report. The calculation methodology for each parameter has been stated in the table given below.

2.4.1.6 CALCULATION METHODOLOGY – NETWORK PARAMETERS

Parameter	Calculation Methodology
BTS Accumulated Downtime	Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month / (24 x Number of days in a month x Number of BTSs in the network in licensed service area) x 100
Worst Affected BTS Due to Downtime	(Number of BTSs having accumulated downtime greater than 24 hours in a month / Number of BTS in Licensed Service Area) * 100
Call Setup Success Rate	(Calls Established / Total Call Attempts) * 100
SDCCH/ Paging Channel Congestion	SDCCH / TCH Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An) Where: A1 = Number of attempts to establish SDCCH / TCH made on day 1 C1 = Average SDCCH / TCH Congestion % on day 1 A2 = Number of attempts to establish SDCCH / TCH made on day 2 C2 = Average SDCCH / TCH Congestion % on day 2 An = Number of attempts to establish SDCCH / TCH made on day n Cn = Average SDCCH / TCH Congestion % on day n
TCH Congestion	
POI Congestion	POI Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An) Where: A1 = POI traffic offered on all POIs (no. of calls) on day 1 C1 = Average POI Congestion % on day 1 A2 = POI traffic offered on all POIs (no. of calls) on day 2 C2 = Average POI Congestion % on day 2 An = POI traffic offered on all POIs (no. of calls) on day n Cn = Average POI Congestion % on day n
Call Drop Rate	Total Calls Dropped / Total Calls Established x 100
Worst Affected Cells having more than 3% TCH drop	Total number of cells having more than 3% TCH drop during CBBH/ Total number of cells in the LSA x 100
Connections with good voice quality	No. of voice samples with good voice quality / Total number of samples x 100

2.4.1.7 3 DAY LIVE DATA

The main purpose of 3 day live measurement is to evaluate the network parameters on intraday basis. While the monthly PMR report provides an overall view of the performance of QoS parameters, the 3 day live data helps looking at intraday performance on the network parameters discussed earlier. All the calculations are done on the basis of that raw data of 3 days.

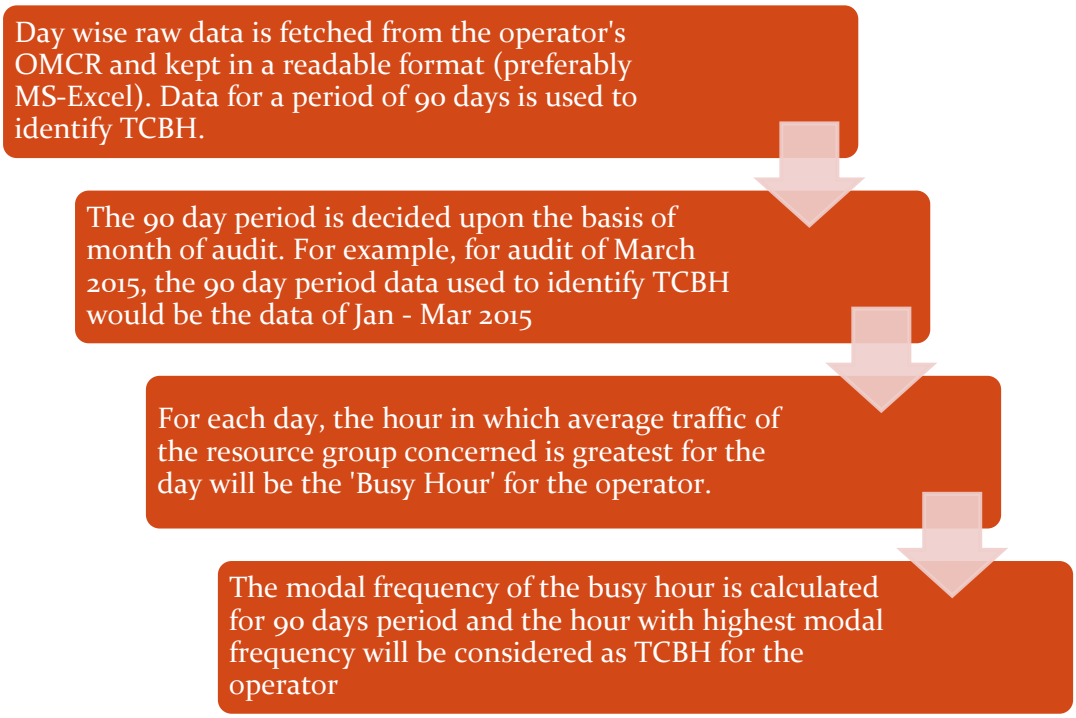
The 3 day live data provides a sample of 9 days in a quarter (3 days each month of a quarter) with hourly performance, which enables the auditor to identify and validate intraday issues for an operator on the QoS network parameters. For example, network congestion being faced by an operator during busy/peak hours.

Network related parameters were evaluated for a period of 3 days in each month. 3 day live audit was conducted for 3 consecutive weekdays for each month. The data was extracted from each operator's server/ NOC etc. at the end of the 3rd day. The extracted data is then used to create a report (similar to PMR report) to assess the various QoS parameters.

2.4.1.8 TCBH – SIGNIFICANCE AND SELECTION METHODOLOGY

As per QoS regulations 2009 (7 of 2009), Time Consistent Busy Hour" or "TCBH" means the one hour period starting at the same time each day for which the average traffic of the resource group concerned is greatest over the days under consideration and such Time Consistent Busy Hour shall be established on the basis of analysis of traffic data for a period of ninety days.

Step by step procedure to identify TCBH for an operator:



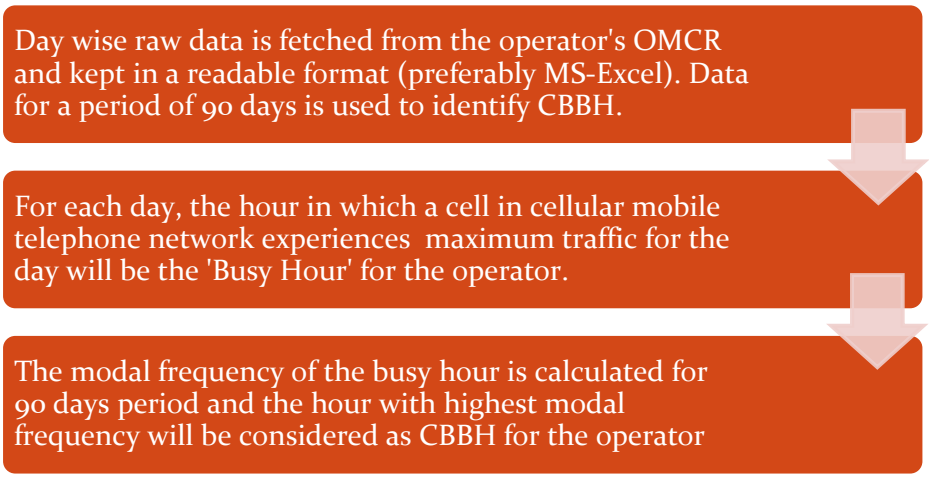
During audit, the auditors identified from the raw data that the TCBH for the operators in JFM'15 was the time period as given below.

Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
19:00-20:00	19:00-20:00	19:00-20:00	18:00-19:00	19:00-20:00	19:00-20:00	19:00-20:00

2.4.1.9 CBBH – SIGNIFICANCE AND SELECTION METHODOLOGY

As per QoS regulations 2009 (7 of 2009), Cell Bouncing Busy Hour (CBBH) means the one hour period in a day during which a cell in cellular mobile telephone network experiences the maximum traffic.

Step by step procedure to identify CBBH for an operator:



During audit, the auditors identified from the raw data that the CBBH for the operators in JFM'15 was the time period as given below.

Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
19:00-20:00	19:00-20:00	19:00-20:00	18:00-19:00	19:00-20:00	19:00-20:00	19:00-20:00

2.4.1.10 CUSTOMER SERVICE PARAMETERS

The data to generate PMR report for customer service parameters is extracted at the operator premises and verified once every quarter in the subsequent month of the last month of the quarter. For example, data for quarter ending Mar 2015 (JFM'15) was collected in the month of Apr 2015. To extract the data for customer service parameters for the purpose of audit, IMRB auditors primarily visit the following locations/ departments/ offices at the operator's end.

- Central Billing Center
- Central Customer Service Center

The operators are duly informed in advance about the audit schedule.

The Customer Service Quality Parameters include the following:

- Metering and billing credibility (postpaid and prepaid)
- Resolution of billing/charging complaints
- Period of applying credit/waiver/adjustment to customer's account
- Response time to the customer for assistance
- Termination/closure of service
- Time taken for refund of security deposit after closures.

Most of the customer service parameters were calculated by averaging over the quarter; however billing parameters were calculated by averaging over one billing cycle for a quarter.

All the parameters have been described in detail along with key findings of the parameter in section 6 of the report. The benchmark values for each parameter have been given in the table below.

2.4.1.11 AUDIT PARAMETERS – CUSTOMER SERVICE

Metering and Billing Credibility	Benchmark
No of billing complaints received - Post paid	≤ 0.1%
No. of billing complaints received- Prepaid	≤ 0.1%
Resolution of billing/ charging complaints within 4 weeks	98%
Resolution of billing/ charging complaints within 6 weeks	100%
Period of applying credit/ waiver within 1 week of resolution of complaint	100%
Response Time to the Customer form Assistance	
Accessibility of call centre/customer care	≥ 95%
Percentage of calls answered by the operators (voice to voice) within 90 seconds	≥ 95%
Termination/ closure of service	≤ 7 days
Time taken for refund of deposits after closures within 60 days	100%

2.4.1.12 CALCULATION METHODOLOGY – CUSTOMER SERVICE PARAMETERS

Parameter	Calculation Methodology
Metering and billing credibility - Postpaid	Total billing complaints received during the relevant billing cycle / Total bills generated during the relevant billing cycle *100
Metering and billing credibility – Prepaid	Total charging complaints received during the quarter/ Total number of subscribers reported by the operator at the end of the quarter * 100
Resolution of billing/ charging complaints (Postpaid + Prepaid)	There are two benchmarks involved here: Billing or Charging Complaints resolved in 4 weeks from date of receipt / Total billing or charging complaints received during the quarter) x 100 Billing or Charging Complaints resolved in 6 weeks from date of receipt / Total billing or charging complaints received during the quarter) x 100
Period of applying credit waiver	Number of cases where credit waiver is applied within 7 days/ total number of cases eligible for credit waiver * 100
Call centre performance IVR (Calling getting connected and answered by IVR)	Number of calls connected and answered by IVR/ All calls attempted to IVR * 100
Call centre performance (Voice to Voice)	Call centre performance Voice to Voice = (Number of calls answered by operator within 90 seconds/ All calls attempted to connect to the operator) * 100 The calculation excludes the calls dropped before 90 seconds
Time taken for termination/ closure of service	Number of closures done within 7 days/ total number of closure requests * 100
Time taken for refund for deposit after closures	Number of cases of refund after closure done within 60 days/ total number of cases of refund after closure * 100

2.4.2 LIVE CALLING

2.4.2.1 SIGNIFICANCE AND METHODOLOGY

The main purpose of live calling is to verify the performance of various customer service parameters by doing test calls to the subscribers/ specific numbers. Below is a step wise procedure of live calling.

The IMRB auditor visits each operator premises to do live calling. The operators provide the raw data of customer complaints (billing & service) and also the list of customer service numbers to be verified through live calling

IMRB auditors then make live calls using operator SIM to a random sample of subscribers from the raw data provided to verify the resolution of complaints

The auditors also verify the performance of call center, level 1 services by calling the numbers using operator SIM. The list of call center numbers is provided by the operator. The process followed to test Level 1 services has been stated below.

Using operator SIM, the auditors also make test calls to subscribers of other operators to assess the inter-operator call connectivity in the same licensed service area

Live calling activity was carried out during the period of Mar 2015. The data considered for live calling was for the month prior to the month in which the live calling activity was being conducted. In this case, data of Feb 2015 was considered for live calling activity conducted in Mar 2015.

A detailed explanation of each parameter is explained below.

2.4.2.2 BILLING COMPLAINTS

Live calling is done to verify Resolution of billing complaints within stipulated time. The process for this parameter is stated below.

- Auditors request the operator provided the database of all the subscribers who reported billing complaints in one month prior to IMRB auditor visit. In case of BSNL, data for the complaints from the subscribers belonging to the sample exchanges is requested specifically
- A sample of 10% or 100 complainants, whichever is less, is selected randomly from the list provided by operator

Calls are made by auditors to the sample of subscribers to check and record whether the complaint was resolved within the timeframes as mentioned in the benchmark.

All the complaints related to billing as per clause 3.7.2 of QoS regulation of 20th March, 2009 were considered as population for selection of samples. A complete list of the same has been provided in Section 6.1.1.

TRAI benchmark-

Resolution of billing/ charging complaints - 98% within 4 weeks, 100% within 6 weeks

2.4.2.3 SERVICE COMPLAINTS REQUESTS

"Service request" means a request made to a service provider by its consumer pertaining to his account, and includes.

- A request for change of tariff plan
- A request for activation or deactivation of a value added service or a supplementary service or a special pack
- A request for activation of any service available on the service provider's network
- A request for shift or closure or termination of service or for billing details

All the complaints other than billing were covered. A total of 100 calls per service provider for each service in licensed service area were done by the IMRB auditors.

2.4.2.4 LEVEL 1 SERVICE

Level 1 is used for accessing special services like emergency services, supplementary services, inquiry and operator-assisted services.

Level 1 Services include services such as police, fire, ambulance (Emergency services). Test calls were made from operator SIMs. A total of 150 test calls were made per service provider in the quarter.

While most of the Level 1 services are toll free, it has been observed that some Level 1 services may not be toll free. In JFM'15, IMRB has tried contacting the list of Level 1 services provided by TRAI as per the NNP (National Numbering Plan).

2.4.2.4.1 PROCESS TO TEST LEVEL 1 SERVICES

- On visiting the operator's premises (Exchange/Central Server etc.), auditors ask the operator authorized personnel to provide a list of Level 1 services being active in their service. The list should contain a description of the numbers along with dialing code.
- Operators might provide a long list of L1 services. To identify emergency L1 service numbers, auditors check if there is any number that starts with code '10' in that list. If auditors find any emergency number in addition to the below list, that number is also tested during live calling.
- On receiving the list, auditors verify it if the below given list of numbers are active in the service provider's network.
- If there are any other additional numbers provided by the operator, auditors also do live calling on those numbers along with below list.
- If any of these numbers is not active, then we would write the same in our report, auditors write in the report.

- Post verifying the list, auditors do live calling by equally distributing the calls among the various numbers and update the results in the live calling sheet.

L1 Code	Description
100	Police
101	Fire
102	Ambulance
104	Health Information Helpline
108	Emergency and Disaster Management Helpline
138	All India Helpine for Passangers
149	Public Road Transport Utility Service
181	Chief Minister Helpline
182	Indian Railway Security Helpline
1033	Road Accident Management Service
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'
1056	Emergency Medical Services
106X	State of the Art Hospitals
1063	Public Grievance Cell DoT Hq
1064	Anti Corruption Helpline
1070	Relief Commission for Natural Calamities
1071	Air Accident Helpline
1072	Rail Accident Helpline
1073	Road Accident Helpline
1077	Control Room for District Collector
1090	Call Alart (Crime Branch)
1091	Women Helpline
1097	National AIDS Helpline to NACO
1099	Central Accident and Trauma Services (CATS)
10580	Educationa & Vocational Guidance and Counselling
10589	Mother and Child Tracking (MCTH)
10740	Central Pollution Control Board
10741	Pollution Control Board
1511	Police Related Service for all Metro Railway Project
1512	Prevention of Crime in Railway
1514	National Career Service(NCS)
15100	Free Legal Service Helpline
155304	Municipal Corporations
155214	Labour Helpline
1903	Sashastra Seema Bal (SSB)
1909	National Do Not Call Registry
1912	Complaint of Electricity
1916	Drinking Water Supply
1950	Election Commission of India

2.4.2.5 CUSTOMER CARE

Live calling is done to verify response time for customer assistance is done to verify the performance of call center in terms of

- Calls getting connected and answered by operator's IVR.
- % age of calls answered by operator / voice to voice) within 90 seconds: In 95% of the cases or more

The process for this parameter is stated below.

- Overall sample size is 100 calls per service provider per circle at different points of time, evenly distributed across the selected exchanges – 50 calls between 1100 HRS to 1400 HRS and 50 calls between 1600 HRS to 1900 HRS.
- Time to answer the call by the operator was assessed from the time interviewer pressed the requisite button for being assisted by the operator.
- All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.

2.4.2.6 INTER OPERATOR CALL ASSESEMENT

A total of 100 calls per service provider to all the other service providers in a licensed service area were done for the purpose of audit.

2.4.3 DRIVE TEST

2.4.3.1 SIGNIFICANCE AND METHODOLOGY

Drive test, as the name suggests, is conducted to measure the outdoor coverage in a moving vehicle in a specified network coverage area.
The main purpose of the drive test is to check the health of the mobile network of various operators in the area in terms of coverage (signal strength), voice quality, call drop rate, call set up success rate etc.

To assess the indoor coverage, the test is also conducted at two static indoor locations in each SSA, such as Malls, office buildings, shopping complexes, government buildings etc.

IMRB conducted two types of drive tests as mentioned below.

- Operator Assisted Drive Test
- Independent Drive Test

The main difference between the two is that in the operator assisted, operators participate in the drive test along with their hardware, software, phones etc. while in the independent drive test IMRB conducts the drive test on solitary basis and uses its own hardware. Operators generally do not have any knowledge of the drive test being conducted.
A detailed explanation of the two methodologies has been provided below.

2.4.3.2 OPERATOR ASSISTED DRIVE TEST

A total of 3 SSA were selected and audited in each quarter, 1 SSA in each month. The methodology adopted for the drive test-

- 3 consecutive days drive test in one SSA every month. SSA would be defined as per BSNL and month wise SSA list will be finalized by regional TRAI office.
- On an average, a minimum of 100 kilometers were covered each day

- Route map was designed in such a way that all the major roads, highways and all the important towns and villages were covered as part of audit.
- Special emphasis was given to those areas where the number of complaints received were on the higher side, if provided by TRAI.
- The route is defined in a way that we cover maximum area in the SSA and try to cover maximum villages and cities within the SSA. The route is designed such that there is no overlap of roads and we can start from the point from where we had left last day (if possible).
- The route was classified as-
    - With In city
    - Major Roads
    - Highways
    - Shopping complex/ Mall
    - Office Complex/ Government Building
- There were no fixed calls which we need to do for within city, major roads and highways, but a minimum of 30 calls in each route, i.e., within city, major roads and highways on each day. For indoors, 20 calls each for shopping and office complex each day preferably in relatively bigger city.
- The drive test covered selected cities and adjoining towns/rural areas where the service provider has commenced service, including congested areas and indoor sites.
- The drive test of each mobile network was conducted between 10 am and 8 pm on weekdays.
- The Vehicle used in the drive tests was equipped with the test tool that automatically generates calls on the mobile telephone networks.
- The speed of the vehicle was kept at around 30 km/hr.
- The holding period of each test call was 120 seconds.
- A test call was generated 10 seconds after the previous test call is completed.
- Height of the antenna was kept uniform in case of all service providers.

2.4.3.3 INDEPENDENT DRIVE TEST

The number of independent drive tests to be conducted and their locations are decided basis TRAI recommendation.

- A minimum of 100 kilometers was traversed during the independent drive test in a SSA. The SSA would be defined as per BSNL and SSA list will be finalized by regional TRAI office.
- Route map was designed in such a way that all the major roads, highways and all the important towns and villages were covered as part of audit.
- Special emphasis was given to those areas where the number of complaints received were on the higher side, if provided by TRAI.
- The route is defined in a way that we cover maximum area in the SSA and try to cover maximum villages and cities within the SSA. The route is designed such that there is no overlap of roads (if possible).
- The route was classified as-
    - With In city
    - Major Roads
    - Highways
    - Shopping complex/ Mall
    - Office Complex/ Government Building
- There were no fixed calls which we need to do for within city, major roads and highways, but a minimum of 30 calls in each route, i.e., within city, major roads and highways on each day. For

indoors, 20 calls each for shopping and office complex each day preferably in relatively bigger city.

- The drive test covered selected cities and adjoining towns/rural areas where the service provider has commenced service, including congested areas and indoor sites.
- The drive test of each mobile network was conducted between 10 am and 8 pm on weekdays.
- The Vehicle used in the drive tests was equipped with the test tool that automatically generates calls on the mobile telephone networks.
- The speed of the vehicle was kept at around 30 km/hr.
- The holding period of each test call was 120 seconds.
- A test call was generated 10 seconds after the previous test call is completed.
- Height of the antenna was kept uniform in case of all service providers.

2.4.3.4 PARAMETERS EVALUATED DURING DRIVE TEST

The parameters which were captured during the drive test include. Below are the parameters which are captured for the GSM and CDMA operators.

- Coverage-Signal strength (GSM)
  - ✓ Total calls made (A)
  - ✓ Number of calls with signal strength between 0 to -75 dBm
  - ✓ Number of calls with signal strength between 0 to -85 dBm
  - ✓ Number of calls with signal strength between 0 to -95 dBm
- Coverage-Signal strength (CDMA)
  - ✓ Total Ec/Io BINS (A)
  - ✓ Total Ec/Io BINS with less than –15 (B)
  - ✓ Low Interference = [1 - (B/A)] x 100
- Voice quality (GSM)
  - ✓ Total RxQual Samples– A
  - ✓ RxQual samples with 0-5 value – B
  - ✓ %age samples with good voice quality = B/A x 100
- Voice quality (CDMA)
  - ✓ Total FER BINs (forward FER) – A
  - ✓ FER BINs with 0-2 value (forward FER) – B
  - ✓ FER BINs with 0-4 value (forward FER) – C
  - ✓ %age samples with FER bins having 0-2 value (forward FER) = B/A x 100
  - ✓ %age samples with FER bins having 0-4 value (forward FER) = C/A x 100
  - ✓ No. of FER samples with value > 4 = [A-C]
- Call setup success rate
  - ✓ Total number of call attempts – A
  - ✓ Total Calls successfully established – B
  - ✓ Call success rate (%age) = (B/A) x 100
- Blocked calls
  - ✓ 100% - Call Set up Rate
- Call drop rate
  - ✓ Total Calls successfully established – A
  - ✓ Total calls dropped after being established – B
  - ✓ Call Drop Rate (%age) = (B/A) x 100

2.5 OPERATORS COVERED

Name of Operator	Number of Subscriber as per VLR
Aircel(DWL)	3596924
Airtel	4767186
BSNL CDMA	10278
BSNL GSM	1052511
Idea	756780
Reliance GSM	1934716
Vodafone	3006828

Mar'15 VLR data was considered for the number of subscribers.

2.6 COLOUR CODES TO READ THE REPORT

Not Meeting the benchmark

Best Performing Operator

3 EXECUTIVE SUMMARY

The objective assessment of Quality of Service (QoS) carried out by IMRB gives an insight into the overall performance of various operators in the Assam circle, with a parameter wise performance evaluation as compared to TRAI benchmark.

3.1 PMR DATA – 3 MONTHS- CONSOLIDATED

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	3.32%	18.18%	94.34%	1.40%	3.93%	1.58%	13.26%	91.40%
Airtel	0.13%	0.54%	97.48%	0.45%	1.10%	0.92%	0.93%	98.61%
BSNL CDMA	13.80%	24.04%	98.18%	NA	0.00%	1.65%	9.99%	94.84%
BSNL GSM	2.12%	3.58%	95.96%	0.84%	1.12%	1.84%	3.45%	94.64%
Idea	0.69%	1.25%	97.19%	0.58%	1.84%	1.29%	1.10%	95.08%
Reliance GSM	0.31%	1.34%	98.61%	0.02%	0.07%	0.68%	0.15%	98.27%
Vodafone	0.49%	1.58%	99.52%	0.13%	0.48%	0.55%	2.79%	98.17%

NA: SDCCH/ Paging channel congestion not applicable for CDMA operators. Hence, it has been reported as NA for BSNL CDMA.

Following are the parameter wise observations for wireless operators for Assam circle:

BTSs Accumulated Downtime:

Aircel, BSNL CDMA & BSNL GSM did not meet the benchmark. Minimum BTS Accumulated downtime was recorded for Airtel at 0.13%.

Worst Affected BTSs Due to Downtime:

Aircel, BSNL CDMA and BSNL GSM failed to meet the benchmark. Minimum worst affected BTSs due to downtime was recorded for Airtel at 0.54%.

Call Set-up Success Rate (CSSR):

BSNL GSM failed to meet the benchmark for CSSR. During the audits, the maximum CSSR was observed for Vodafone with 99.52%.
All the operators were found to be calculating the parameter as per the norm specified by TRAI, as given in parameter description section.

Network Congestion parameters:

Aircel failed to meet the benchmark on SDCCH / Paging Channel Congestion as well as TCH congestion.

Reliance GSM recorded the best SDCCH / Paging Channel Congestion as well as TCH congestion.

The calculation methodology (given in parameter description section) followed by the operators was found to be in complete accordance with what has been specified by TRAI.

Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Vodafone at 0.55%.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel, BSNL CDMA and BSNL GSM failed to meet the benchmark. Best performance was recorded for Reliance GSM at 0.15%.

Voice Quality

Aircel, BSNL CDMA and BSNL GSM failed to meet the benchmark. Best performance was recorded for Airtel at 98.61%.

All the service providers were measuring this parameter as per the TRAI guidelines that have been stated in parameter description section.

Below are the month wise summary tables for each network parameter basis PMR data.

3.1.1 PMR DATA - JANUARY

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	3.28%	17.26%	95.47%	1.51%	2.75%	1.64%	15.16%	90.69%
Airtel	0.16%	0.76%	97.61%	0.31%	1.10%	1.02%	0.99%	98.49%
BSNL CDMA	13.39%	23.97%	98.38%	NA	0.00%	1.46%	10.04%	94.87%
BSNL GSM	2.56%	6.92%	95.68%	0.90%	1.01%	2.02%	4.35%	92.64%
Idea	0.36%	0.66%	97.70%	0.33%	1.89%	1.34%	1.15%	95.16%
Reliance GSM	0.32%	1.72%	98.64%	0.02%	0.07%	0.67%	0.10%	98.29%
Vodafone	0.57%	1.67%	99.60%	0.11%	0.40%	0.54%	2.69%	98.16%

3.1.2 PMR DATA – FEBRUARY

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	3.13%	16.81%	94.12%	1.52%	4.11%	1.55%	12.03%	91.74%
Airtel	0.12%	0.52%	97.15%	0.65%	1.20%	0.92%	0.94%	98.61%
BSNL CDMA	13.78%	20.99%	98.16%	NA	0.00%	1.62%	10.19%	94.97%
BSNL GSM	2.00%	1.99%	96.17%	0.75%	1.09%	1.68%	3.01%	95.10%
Idea	0.86%	1.23%	97.36%	0.57%	1.94%	1.31%	1.04%	95.05%
Reliance GSM	0.33%	1.15%	98.57%	0.02%	0.07%	0.68%	0.17%	98.26%
Vodafone	0.46%	1.54%	99.45%	0.14%	0.55%	0.56%	2.79%	98.16%

3.1.3 PMR DATA - MARCH

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	3.56%	20.46%	93.42%	1.17%	4.93%	1.54%	12.59%	91.76%
Airtel	0.12%	0.33%	97.69%	0.39%	1.01%	0.82%	0.87%	98.73%
BSNL CDMA	14.23%	27.16%	98.00%	NA	0.00%	1.88%	9.75%	94.69%
BSNL GSM	1.79%	1.84%	96.03%	0.86%	1.27%	1.82%	2.99%	96.18%
Idea	0.86%	1.86%	96.50%	0.83%	1.69%	1.23%	1.11%	95.03%
Reliance GSM	0.29%	1.15%	98.62%	0.02%	0.06%	0.68%	0.17%	98.26%
Vodafone	0.44%	1.53%	99.52%	0.13%	0.48%	0.54%	2.90%	98.20%

3.2 3 DAY DATA – CONSOLIDATED

A three day live measurement was conducted to measure the QoS provided by the operators. It was seen from the live data collected, that the performance of the operators across all parameters more or less corroborated with the audit data collected.

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own	SDCCH/ Paging Chl. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Worst affected cells having more than 3%	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	3.14%	2.32%	97.75%	0.52%	1.36%	1.22%	12.25%	93.12%
Airtel	0.11%	0.00%	97.51%	0.31%	1.17%	0.88%	0.89%	98.64%
BSNL CDMA	13.41%	3.44%	98.08%	NA	0.33%	1.59%	7.42%	94.84%
BSNL GSM	2.15%	0.66%	92.40%	0.50%	1.75%	2.08%	4.38%	94.64%
Idea	0.70%	0.93%	99.08%	0.27%	0.49%	1.01%	1.08%	95.76%
Reliance GSM	2.14%	1.34%	98.62%	0.02%	0.07%	0.64%	0.15%	98.19%
Vodafone	0.38%	0.09%	99.80%	0.07%	0.20%	0.46%	2.59%	98.56%

NA: SDCCH/ Paging channel congestion not applicable for CDMA operators. Hence, it has been reported as NA for BSNL CDMA.

BTSs Accumulated Downtime:

Aircel, BSNL CDMA, BSNL GSM and Reliance GSM failed to meet the TRAI specified benchmark. Minimum BTS Accumulated downtime was recorded for Airtel at 0.11%.

Worst Affected BTSs Due to Downtime:

Aircel and BSNL CDMA failed to meet the TRAI specified benchmark. Airtel was the best performer with 0% worst affected BTSs due to downtime.

Call Set-up Success Rate (CSSR):

BSNL GSM failed to meet the benchmark for CSSR. During the audits, the maximum CSSR was observed for Vodafone with 99.80%.
All the operators were found to be calculating the parameter as per the norm specified by TRAI, as given in parameter description section.

Network Congestion parameters:

All operators met the benchmark on SDCCH / Paging Channel Congestion as well as TCH congestion.

Reliance GSM recorded the best SDCCH / Paging Channel Congestion as well as TCH congestion.

The calculation methodology (given in parameter description section) followed by the operators was found to be in complete accordance with what has been specified by TRAI.

Call Drop Rate:

BSNL GSM failed to meet the benchmark. Minimum call drop rate was recorded for Vodafone at 0.46%.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel, BSNL CDMA and BSNL GSM failed to meet the benchmark. Best performance was recorded for Reliance GSM at 0.15%.

Voice Quality

Aircel, BSNL CDMA and BSNL GSM failed to meet the benchmark. Best performance was recorded for Airtel at 98.64%.

All the service providers were measuring this parameter as per the TRAI guidelines that have been stated in parameter description section.

Below are the month wise summary tables for each network parameter basis 3 day live data.

3.2.1 3 DAY DATA - JANUARY

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	3.14%	2.36%	97.86%	0.41%	1.24%	1.30%	13.12%	92.87%
Airtel	0.15%	0.00%	97.84%	0.29%	0.97%	0.90%	0.84%	98.56%
BSNL CDMA	13.25%	4.96%	98.14%	NA	0.98%	1.86%	6.84%	94.87%
BSNL GSM	2.36%	1.41%	92.20%	0.67%	1.87%	2.32%	6.68%	92.64%
Idea	0.39%	0.41%	99.13%	0.26%	0.56%	1.01%	1.18%	95.83%
Reliance GSM	0.34%	1.72%	98.68%	0.02%	0.07%	0.63%	0.10%	98.23%
Vodafone	0.42%	0.10%	99.79%	0.08%	0.21%	0.46%	2.65%	98.57%

3.2.2 3 DAY DATA – FEBRUARY

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	2.74%	1.97%	97.79%	0.53%	1.34%	1.21%	11.63%	93.35%
Airtel	0.09%	0.00%	96.98%	0.28%	1.56%	0.89%	0.90%	98.62%
BSNL CDMA	12.57%	2.48%	97.84%	NA	0.00%	1.04%	7.57%	94.97%
BSNL GSM	2.05%	0.29%	92.56%	0.44%	1.54%	1.93%	3.22%	95.10%
Idea	1.00%	1.07%	99.07%	0.24%	0.60%	1.08%	0.96%	95.72%
Reliance GSM	3.04%	1.15%	98.62%	0.02%	0.06%	0.65%	0.17%	98.17%
Vodafone	0.40%	0.07%	99.76%	0.08%	0.24%	0.49%	2.51%	98.59%

3.2.3 3 DAY DATA - MARCH

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	3.53%	2.62%	97.59%	0.63%	1.50%	1.16%	11.99%	93.13%
Airtel	0.08%	0.00%	97.72%	0.35%	0.99%	0.84%	0.93%	98.73%
BSNL CDMA	14.41%	2.88%	98.26%	NA	0.00%	1.88%	7.86%	94.69%
BSNL GSM	2.05%	0.29%	92.45%	0.40%	1.84%	1.99%	3.24%	96.18%
Idea	0.70%	1.32%	99.05%	0.30%	0.32%	0.94%	1.11%	95.73%
Reliance GSM	3.04%	1.15%	98.57%	0.02%	0.07%	0.65%	0.17%	98.17%
Vodafone	0.32%	0.10%	99.84%	0.06%	0.16%	0.43%	2.62%	98.53%

3.3 LIVE CALLING DATA - CONSOLIDATED

Name of Service Provider	Metering and Billing		Service Requests	Level 1 Service	Response time to customer for assistance	
	%age complaints resolved within 4 weeks	%age complaints resolved within 6 weeks	Complaint /Request attended to Satisfaction	Calls answered	Accessibility of call centre/ customer care	Percentage of calls answered by the operators (voice to voice) within 90 seconds
Benchmark	98.00%	100.00%		≥ 95%	≥ 95%	≥ 95%
Aircel(DWL)	63.00%	74.00%	83.00%	96.67%	100.00%	100.00%
Airtel	80.00%	87.00%	78.00%	100.00%	97.00%	94.85%
BSNL CDMA	NA	NA	NA	100.00%	100.00%	78.41%
BSNL GSM	70.00%	78.00%	73.00%	100.00%	100.00%	68.42%
Idea	74.00%	81.00%	84.00%	100.00%	100.00%	84.00%
RTL	81.00%	88.00%	52.00%	100.00%	100.00%	81.43%
Vodafone	82.00%	90.00%	88.00%	100.00%	100.00%	86.00%

Resolution of billing complaints

As per the consumers (live calling exercise) none of the operators was able to meet the benchmark of resolving 98% complaints within 4 weeks and 100% complaints within 6 weeks.

Note: Auditors did not receive the raw data for live calling from the central billing center of BSNL CDMA as the operator was unable to provide the same due to low base of complaints.

IMRB International | eTech
TRAI Telecom Regulatory Authority of India (IS/ISO 9001-2008 Certified Organisation)

Complaint/Request Attended to Satisfaction

All operators performed satisfactorily in terms of satisfaction of the customers for service requests. Vodafone recorded the best performance at 88%.

Note: Auditors did not receive the raw data for live calling from the central customer service center of BSNL CDMA as the operator was unable to provide the same due to low base of complaints.

Level 1 Service

As per the live calling results, all operators met the TRAI benchmark for level 1 service with calls being answered. The details of live calling done for the level 1 service have been provided in the annexure for each operator.

Accessibility of Call Centre/Customer Care-IVR

For the IVR aspect, all operators met the TRAI benchmark of 95% with most of the operators recording 100% for the parameter.

Customer Care / Helpline Assessment

Excluding Aircel, all operators failed to meet the benchmark for the parameter.

3.4 BILLING AND CUSTOMER CARE - CONSOLIDATED

Name of Service Provider	Metering and billing credibility		Billing Complaints		Response time to customer for assistance	Customer care	
	Postpaid Subscribers	Prepaid Subscribers	% of complaints resolved in 4 weeks	% of complaints resolved in 6 weeks	% of cases where credit/wavier is received within one week	Percentage of calls answered by the operators IVR	Percentage of calls answered by the operators (voice to voice) within 90 seconds
Benchmark	≤ 0.1%	≤ 0.1%	≥ 98%	≥ 100%	≥ 100%	≥ 95%	≥ 95%
Aircel(DWL)	0.04%	0.63%	100.00%	100.00%	100.00%	92.83%	92.97%
Airtel	0.04%	0.02%	100.00%	100.00%	100.00%	99.99%	98.85%
BSNL CDMA	0.05%	0.00%	100.00%	100.00%	100.00%	100.00%	97.17%
BSNL GSM	0.01%	0.07%	100.00%	100.00%	100.00%	98.68%	96.02%
Idea	0.07%	0.17%	100.00%	100.00%	100.00%	99.45%	98.47%
RTL	0.09%	0.08%	100.00%	100.00%	100.00%	98.99%	84.29%
Vodafone	0.33%	0.10%	100.00%	100.00%	100.00%	99.99%	100.00%

Metering and Billing Credibility – Postpaid Subscribers

For the billing disputes of postpaid subscribers, it was observed that Vodafone failed to meet the TRAI benchmark for the parameter. BSNL GSM had the best performance with 0.01% billing disputes.

Metering and Billing Credibility – Prepaid Subscribers

For the prepaid customers, Aircel and Idea failed to meet the benchmark of billing disputes. BSNL CDMA performed the best with 0.00% disputes.

Resolution of billing complaints

All operators met the TRAI benchmark of resolution of billing complaints within 4 weeks as well as 6 weeks.

It is to be noted that Aircel, Airtel, Idea and Vodafone have reported high ratio of invalid complaints. Auditors recommend further investigation of the issue independently by TRAI. For details, kindly refer to the annexure (section 8.7).

Response Time to customer for assistance - % of cases in which advance waiver is received within one week

All the operators met the TRAI benchmark of providing credit or waiver within one week in case of complaints received.

Customer Care Percentage of calls answered by the IVR

Aircel did not meet the benchmark of 95% of its IVR call being attended. BSNL CDMA recorded the best performance for the parameter.

Customer Care Percentage of calls answered by the operators (Voice to Voice) within 90 seconds

Aircel and Reliance GSM failed to meet the TRAI specified benchmark of 95%. Vodafone recorded the best performance for the parameter.

3.5 INTER OPERATOR CALL ASSESSMENT - CONSOLIDATED

Inter operator call Assessment To↓ From→	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	RTL	Vodafone
Aircel(DWL)	NA	91.00%	89.00%	85.00%	91.00%	89.00%	93.00%
Airtel	93.00%	NA	92.00%	93.00%	89.00%	90.00%	91.00%
BSNL CDMA	87.00%	100.00%	NA	95.00%	95.00%	94.00%	95.00%
BSNL GSM	89.00%	92.00%	89.00%	NA	90.00%	93.00%	91.00%
Idea	95.00%	95.00%	91.00%	93.00%	NA	91.00%	90.00%
RTL	92.00%	92.00%	93.00%	91.00%	91.00%	NA	89.00%
Vodafone	94.00%	91.00%	90.00%	91.00%	90.00%	92.00%	NA

Maximum Problem faced by the calling operator to other operator. The orange colour denotes performance below circle average.

In the inter-operator call assessment, most of the operators did not face any problems in connecting to other operators.

4 CRITICAL FINDINGS

PMR Consolidated (Network Parameters)

Aircel, BSNL CDMA and BSNL GSM failed to meet the benchmark for majority network parameters.

3 Day Live Measurement (Network Parameters)

Aircel, BSNL CDMA and BSNL GSM failed to meet the benchmark for majority network parameters.

For Worst affected BTS due to downtime, significant difference was observed between PMR & live measurement data for Aircel, BSNL CDMA and BSNL GSM. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

Live Calling

None of the operators met the benchmark for complaints resolved within 4 weeks, complaints resolved within 6 weeks and Level 1 services.

As per live calling conducted for 'level 1' services, a number of Category-I (i.e. mandatory) services were not being operated by most of the operators.

Billing and Customer Service

Vodafone failed to meet the benchmark of metering and billing credibility for postpaid while Aircel and Idea failed to meet the benchmark of metering and billing credibility for prepaid.

It is to be noted that Aircel, Airtel, Idea and Vodafone have reported high ratio of invalid complaints. Auditors recommend further investigation of the issue independently by TRAI and operators should provide detailed explanation of reasons for reporting majority of their complaints as invalid to TRAI.

Drive Test (Operator Assisted)

During all the drive tests, it was observed that BSNL CDMA is the key concern operator in terms of Voice Quality, CSSR and Call Drop Rate. BSNL GSM also missed benchmark for the key parameters during all drive tests.

5 PARAMETER DESCRIPTION & DETAILED FINDINGS - COMPARISON BETWEEN PMR DATA, 3 DAY LIVE DATA AND LIVE CALLING DATA

5.1 BTS ACCUMULATED DOWNTIME

5.1.1 PARAMETER DESCRIPTION

- The parameter of network availability would be measured from following sub-parameters

    1. BTSs Accumulated downtime (not available for service)
    2. Worst affected BTSs due to downtime

1. **Definition - BTSs (Base Transceiver Station) accumulated downtime** (not available for service) shall basically measure the downtime of the BTSs, including its transmission links/circuits during the period of a month, but excludes all planned service downtime for any maintenance or software up gradation. For measuring the performance against the benchmark for this parameter the downtime of each BTS lasting more than 1 hour at a time in a day during the period of a month were considered.

2. **Computation Methodology –**
   BTS accumulated downtime (not available for service) = Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month / (24 x Number of days in a month x Number of BTSs in the network in licensed service area) x 100

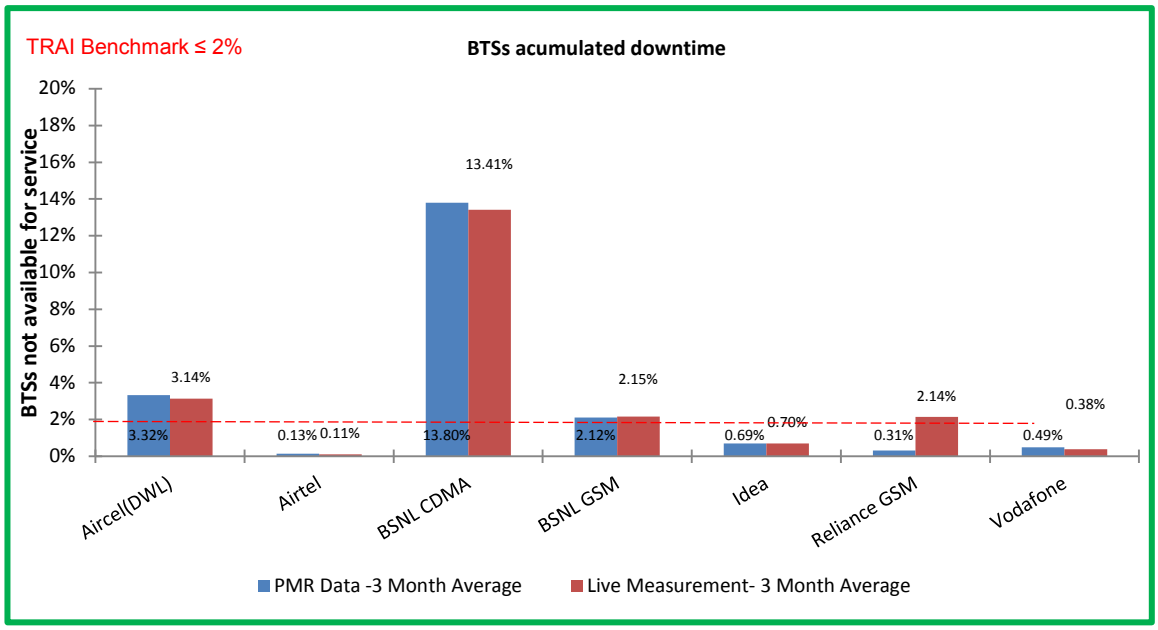
3. **TRAI Benchmark –**

    a. BTSs Accumulated downtime (not available for service) ≤ 2%

4. **Audit Procedure –**

    - The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) was audited
    - All the BTS in service area were considered. Planned outages due to network up gradation, routine maintenance were not considered.
    - Any outage as a result of force majeure were not considered at the time of calculation
    - Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.
    - List of operating sites with cell details and ids are taken from the operator.
    - When there is any outage a performance report gets generated in line with that cell resulting and master base of the Accumulated downtime and worst affected BTS due to downtime.

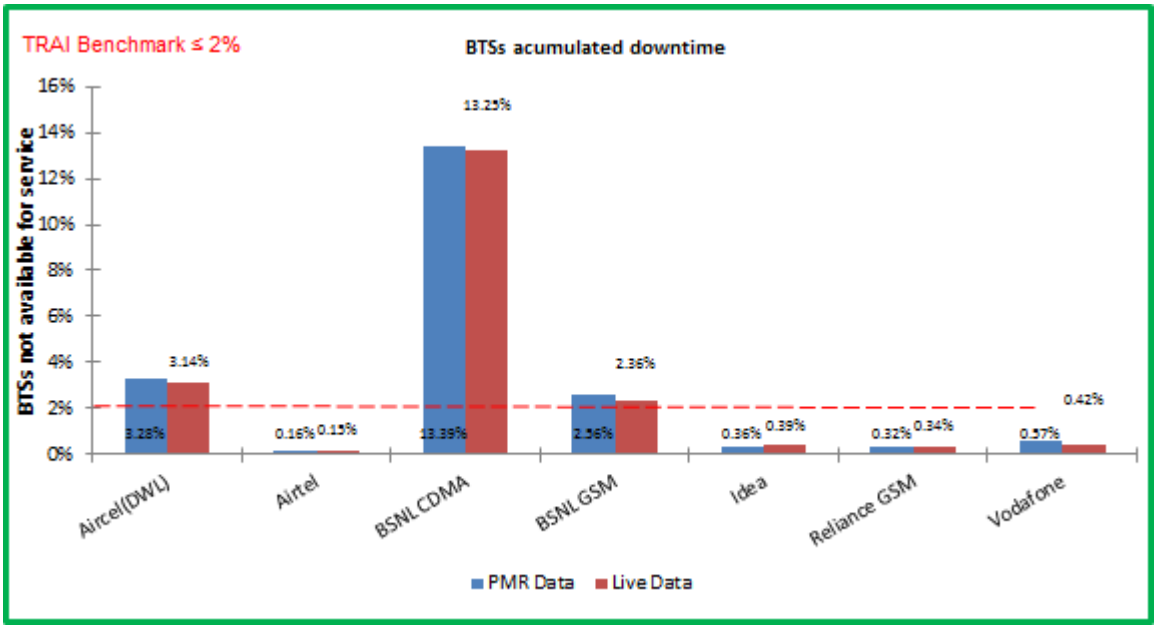
5.1.2 KEY FINDINGS - CONSOLIDATED



Data Source: Operations and Maintenance Center (OMC) of the operators

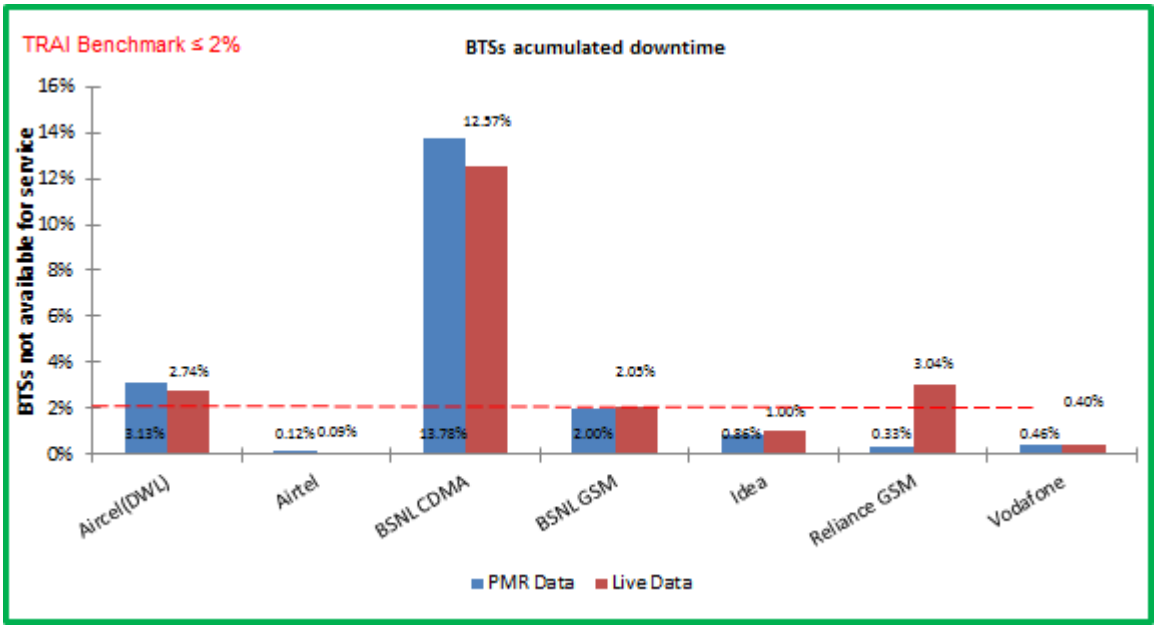
Aircel, BSNL CDMA and BSNL GSM did not meet the benchmark on aspect of BTS accumulated downtime as per audit/PMR data.

5.1.2.1 KEY FINDINGS – MONTH 1



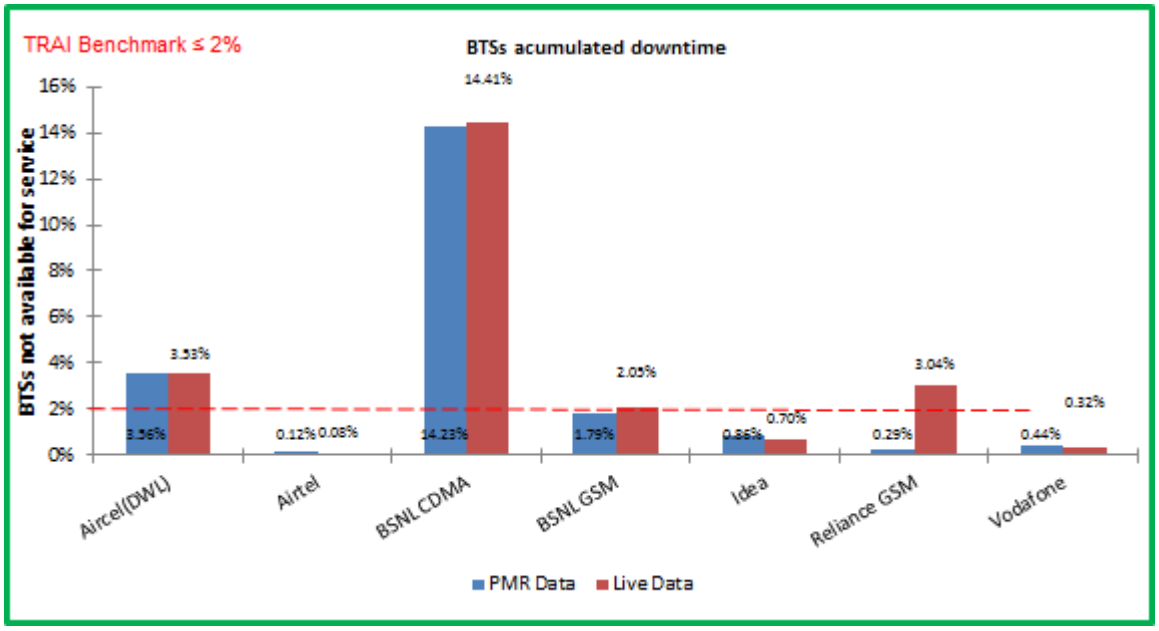
Data Source: Operations and Maintenance Center (OMC) of the operators

5.1.2.2 KEY FINDINGS – MONTH 2



Data Source: Operations and Maintenance Center (OMC) of the operators

5.1.2.3 KEY FINDINGS – MONTH 3



Data Source: Operations and Maintenance Center (OMC) of the operators

5.2 WORST AFFECTED BTS DUE TO DOWNTIME

5.2.1 PARAMETER DESCRIPTION

1. **Definition – Worst Affected BTS due to downtime** shall basically measure percentage of BTS having downtime greater than 24 hours in a month. Planned outages were not considered as part while computing.

   For measuring the parameter "Percentage of worst affected BTSs due to downtime" the downtime of each BTS lasting for more than 1 hour at a time in a day during the period of a month was considered.

2. **Computation Methodology –**

   Worst affected BTSs due to downtime = (Number of BTSs having accumulated downtime greater than 24 hours in a month / Number of BTS in Licensed Service Area) * 100

3. **TRAI Benchmark –**

   a. Worst affected BTSs due to downtime ≤ 2%

4. **Audit Procedure –**

   i. The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) was audited

   ii. All the BTS in service area were considered. Planned outages due to network up gradation, routine maintenance were not considered.

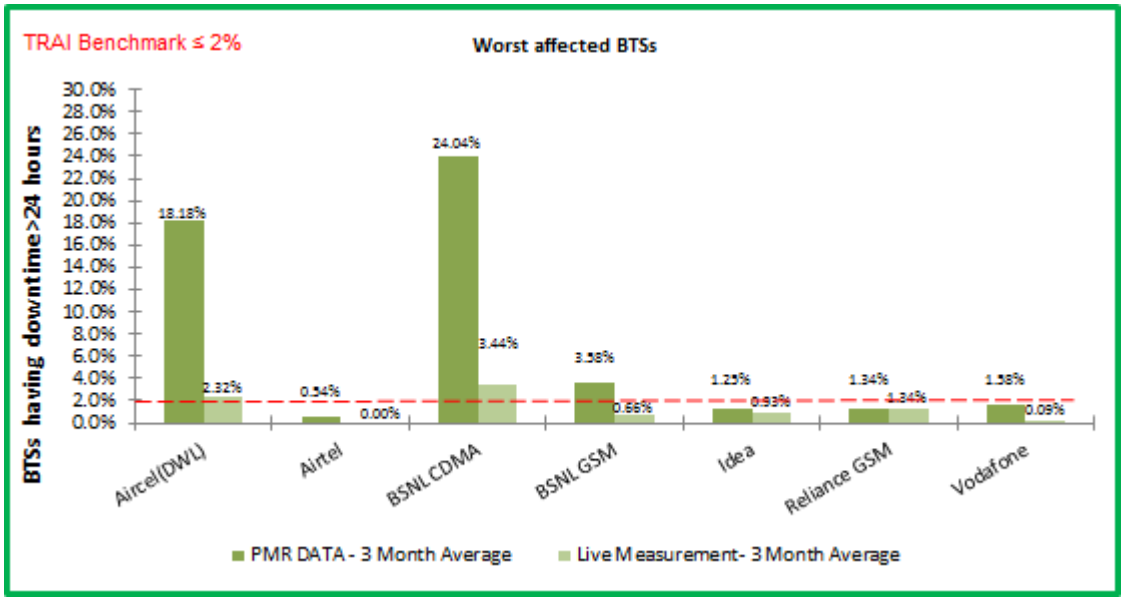
   iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

   iv. Any outage as a result of force majeure was not considered at the time of calculation.

   v. List of operating sites with cell details and ids are taken from the operator.

   vi. All the BTS having down time greater than 24 hours is assessed and values of BTS accumulated downtime is computed in accordance.

5.2.2 KEY FINDINGS – CONSOLIDATED

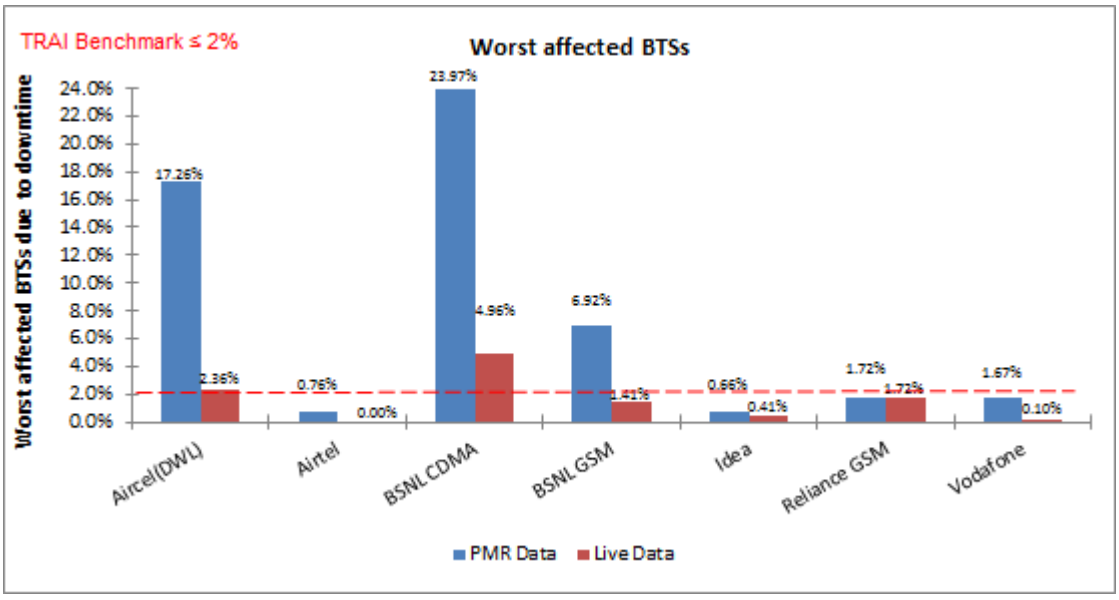


Data Source: Operations and Maintenance Center (OMC) of the operators

Aircel, BSNL CDMA, and BSNL GSM did not meet the benchmark for worst affected BTSs due to downtime as per audit/PMR data.

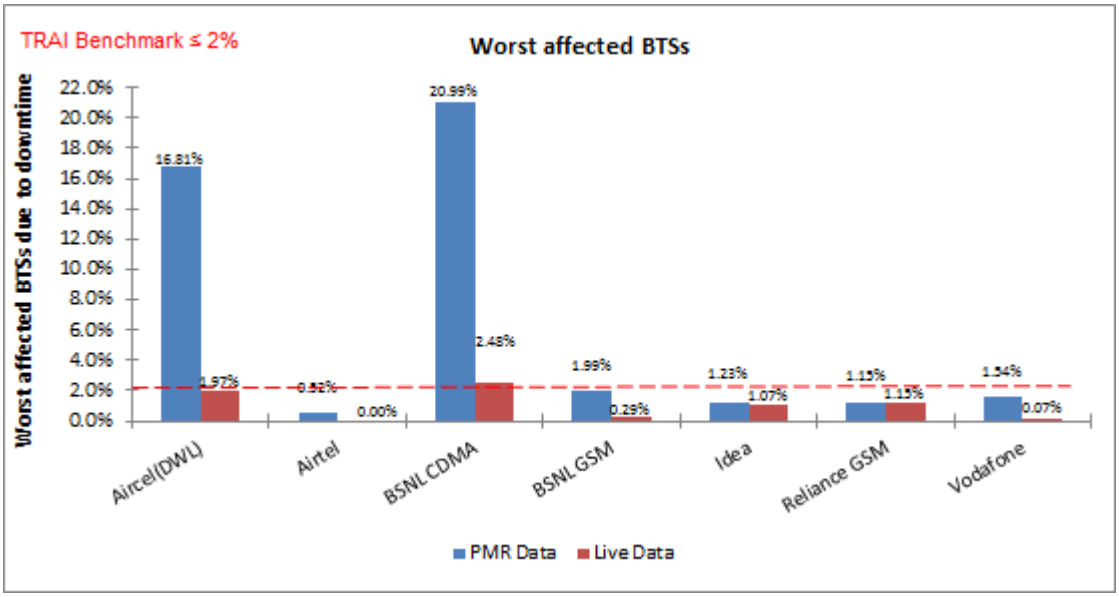
Significant difference was observed between PMR & live measurement data for Aircel, BSNL CDMA and BSNL GSM. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

5.2.2.1 KEY FINDINGS – MONTH 1



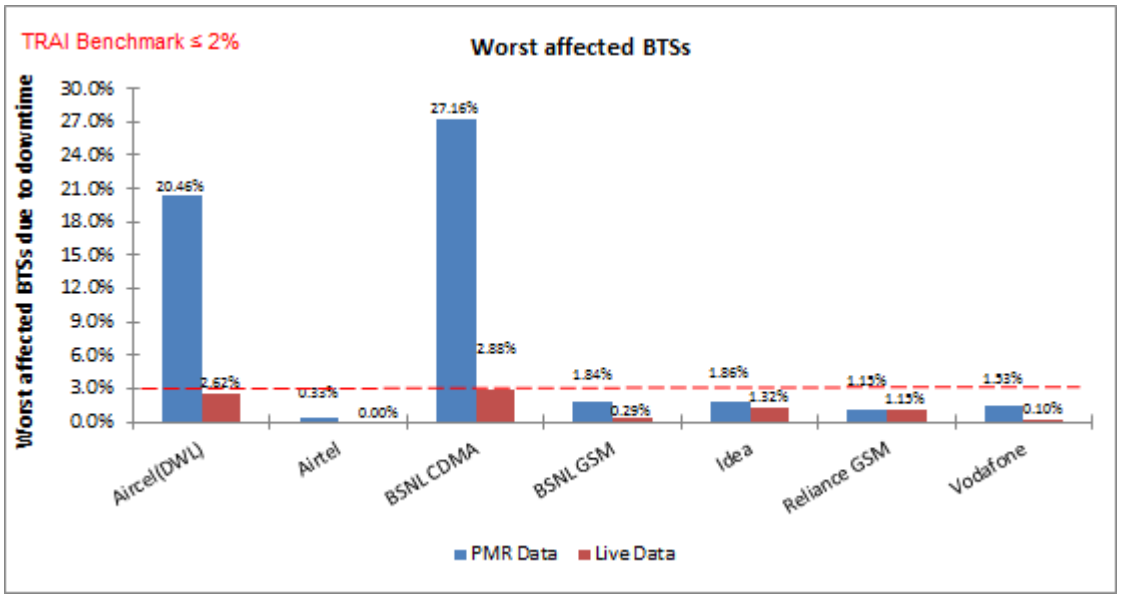
Data Source: Operations and Maintenance Center (OMC) of the operators

5.2.2.2 KEY FINDINGS – MONTH 2



Data Source: Operations and Maintenance Center (OMC) of the operators

5.2.2.3 KEY FINDINGS – MONTH 3



Data Source: Operations and Maintenance Center (OMC) of the operators

5.3 CALL SET UP SUCCESS RATE

5.3.1 PARAMETER DESCRIPTION

1. **Definition:** The ratio of successful calls established to total calls is known as Call Set-Up Success Rate (CSSR).
2. **Computation Methodology-**

   (Calls Established / Total Call Attempts) * 100

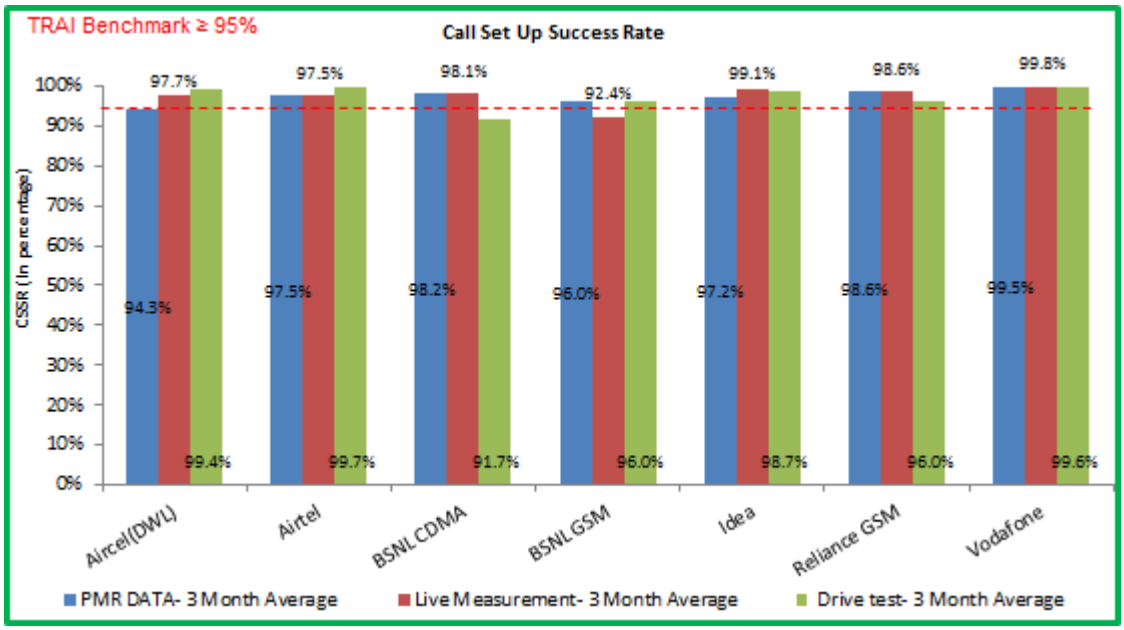
   Call Established means the following events have happened in call setup:-

   - call attempt is made
   - the TCH is allocated
   - the call is routed to the outward path of the concerned MSC

3. **TRAI Benchmark ≥** 95%
4. **Audit Procedure –**

   - The cell-wise data generated through counters/ MMC available in the switch for traffic measurements
   - CSSR calculation should be measured using OMC generated data only
   - Measurement should be only in Time Consistent Busy Hour (CBBH) period for all days of the week
   - Counter data is extracted from the NOC of the operators.
   - Total calls established include all calls established excluding Signaling blocking, TCH Drop and TCH blocking.
   - The numerator and denominator values are derived from adding the counter values from the MSC.

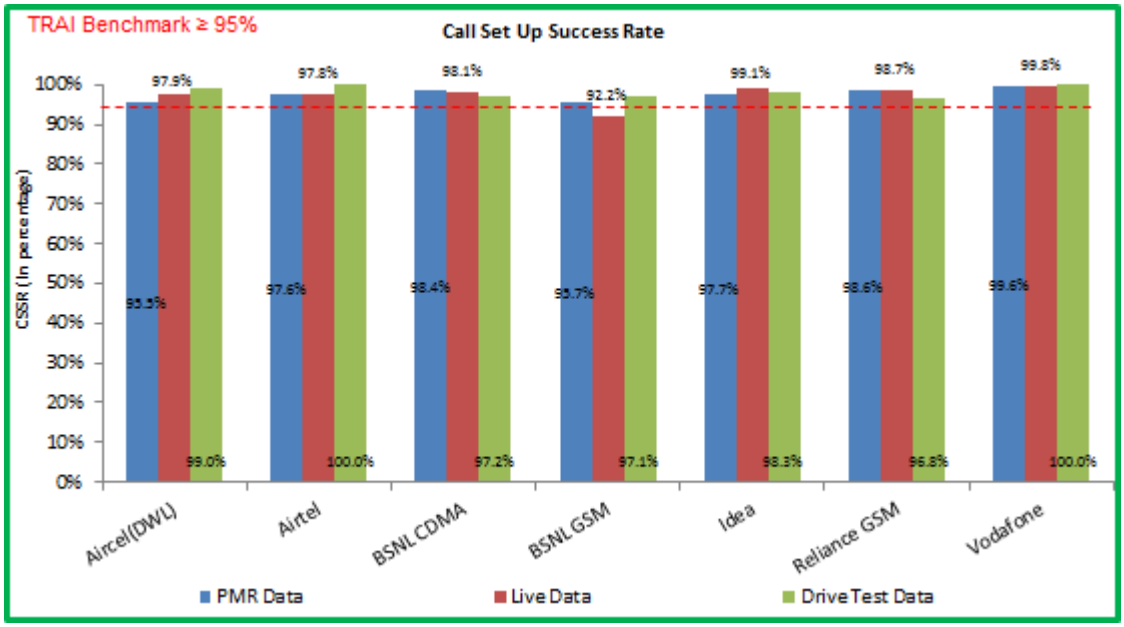
5.3.2 KEY FINDINGS - CONSOLIDATED



Data Source: Network Operations Center (NOC) of the operators

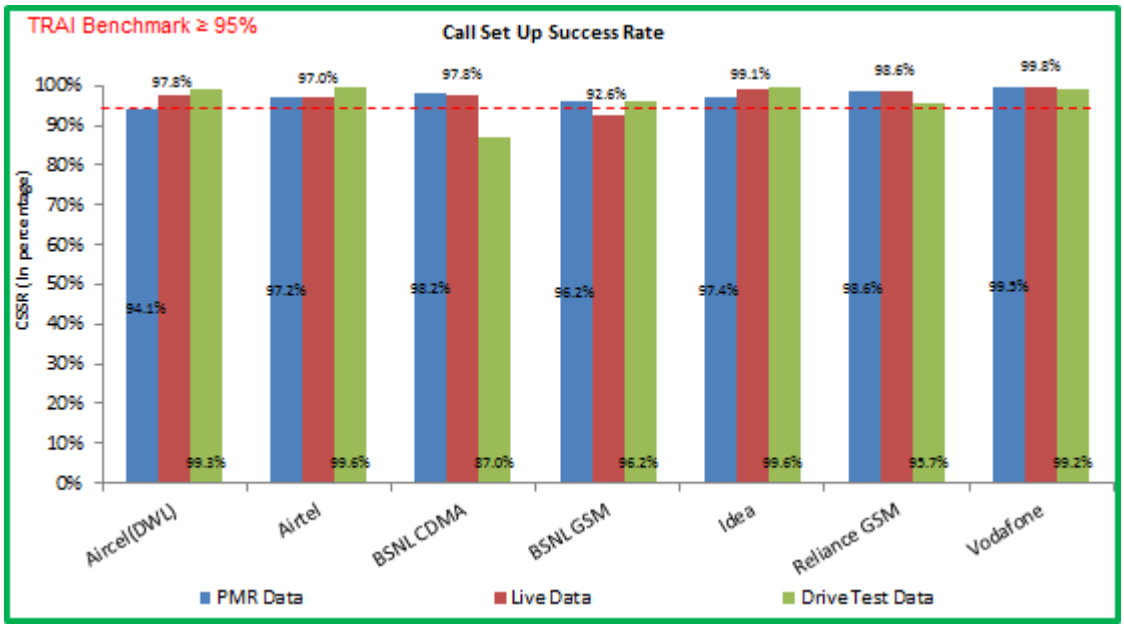
Aircel failed to meet the TRAI benchmark as per audit/PMR data.

5.3.2.1 KEY FINDINGS – MONTH 1



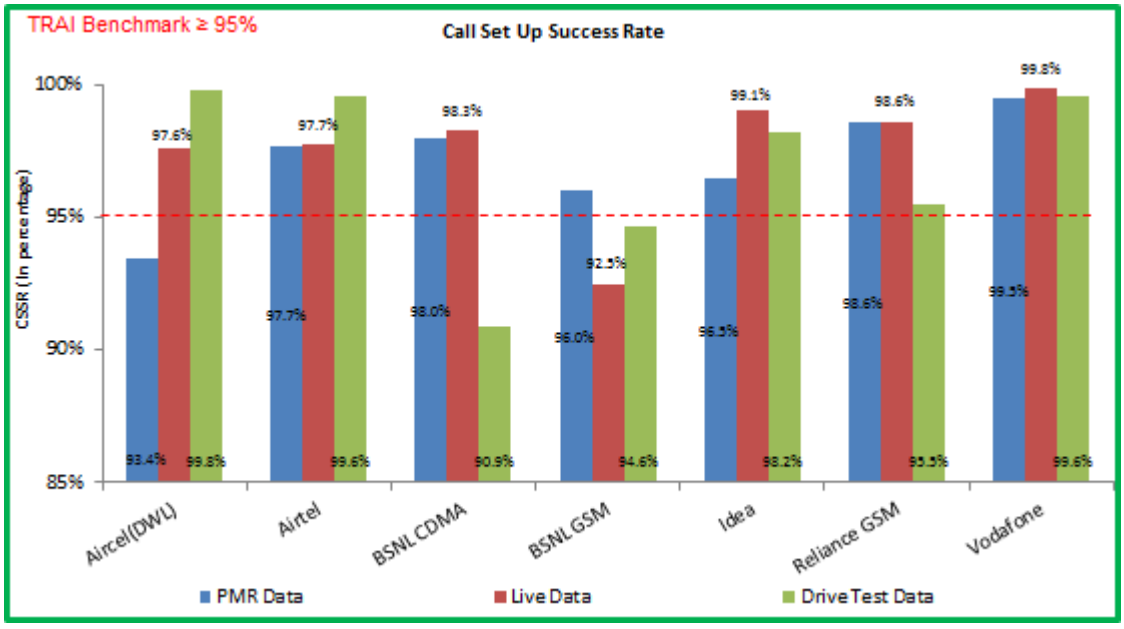
Data Source: Network Operations Center (NOC) of the operators

5.3.2.2 KEY FINDINGS – MONTH 2



Data Source: Network Operations Center (NOC) of the operators

5.3.2.3 KEY FINDINGS – MONTH 3



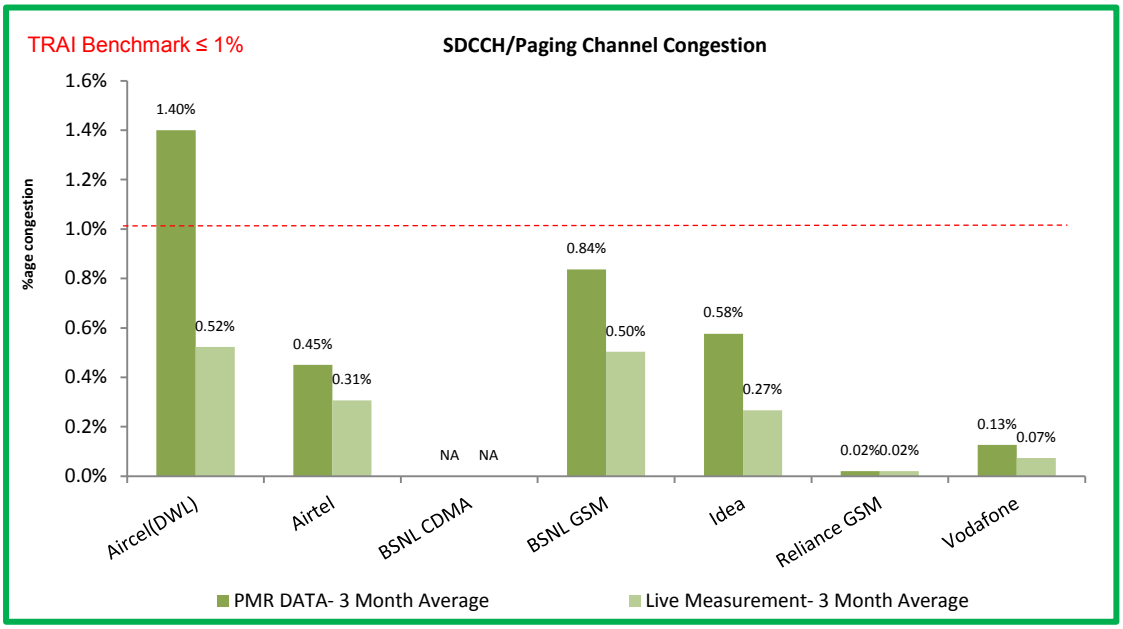
Data Source: Network Operations Center (NOC) of the operators

5.4 NETWORK CHANNEL CONGESTION- PAGING CHANNEL /TCH CONGESTION/POI

5.4.1 PARAMETER DESCRIPTION

1. **Definition:** It means a call is not connected because there is no free channel to serve the call attempt. This parameter represents congestion in the network. It happens at three levels:
   - SDCCH Level: Stand-alone dedicated control channel
   - TCH Level: Traffic Channel
   - POI Level: Point of Interconnect
2. **Computational Methodology:**
   - **SDCCH / TCH Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An)**
     - Where:-A1 = Number of attempts to establish SDCCH / TCH made on day 1
     - C1 = Average SDCCH / TCH Congestion % on day 1
     - A2 = Number of attempts to establish SDCCH / TCH made on day 2
     - C2 = Average SDCCH / TCH Congestion % on day 2
     - An = Number of attempts to establish SDCCH / TCH made on day n
     - Cn = Average SDCCH / TCH Congestion % on day n
   - **POI Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An)**
     - Where:-A1 = POI traffic offered on all POIs (no. of calls) on day 1
     - C1 = Average POI Congestion % on day 1
     - A2 = POI traffic offered on all POIs (no. of calls) on day 2
     - C2 = Average POI Congestion % on day 2
     - An = POI traffic offered on all POIs (no. of calls) on day n
     - Cn = Average POI Congestion % on day n
3. **Benchmark:**
   - SDCCH Congestion: ≤ 1%, TCH Congestion: ≤ 2%, POI Congestion: ≤ 0.5%
4. **Audit Procedure –**
   - Audit of the details of SDCCH and TCH congestion percentages computed by the operator (using OMC–Switch data only) would be conducted
   - The operator should be measuring this parameter during Time consistent busy hour (TCBH) only SDCCH

5.4.2 KEY FINDINGS - SDCCH/PAGING CHANNEL CONGESTION (CONSOLIDATED)



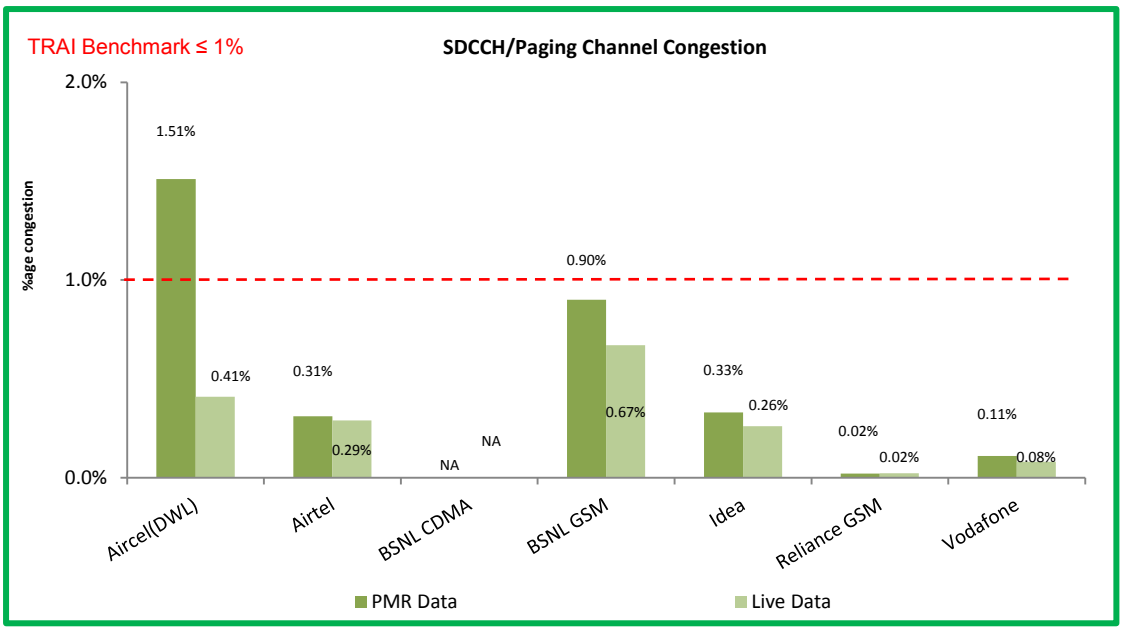
Data Source: Network Operations Center (NOC) of the operators

All operators met the benchmark as per PMR/audit Data.

Significant difference was observed between PMR & live measurement data for Aircel and BSNL GSM. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for 3 days.

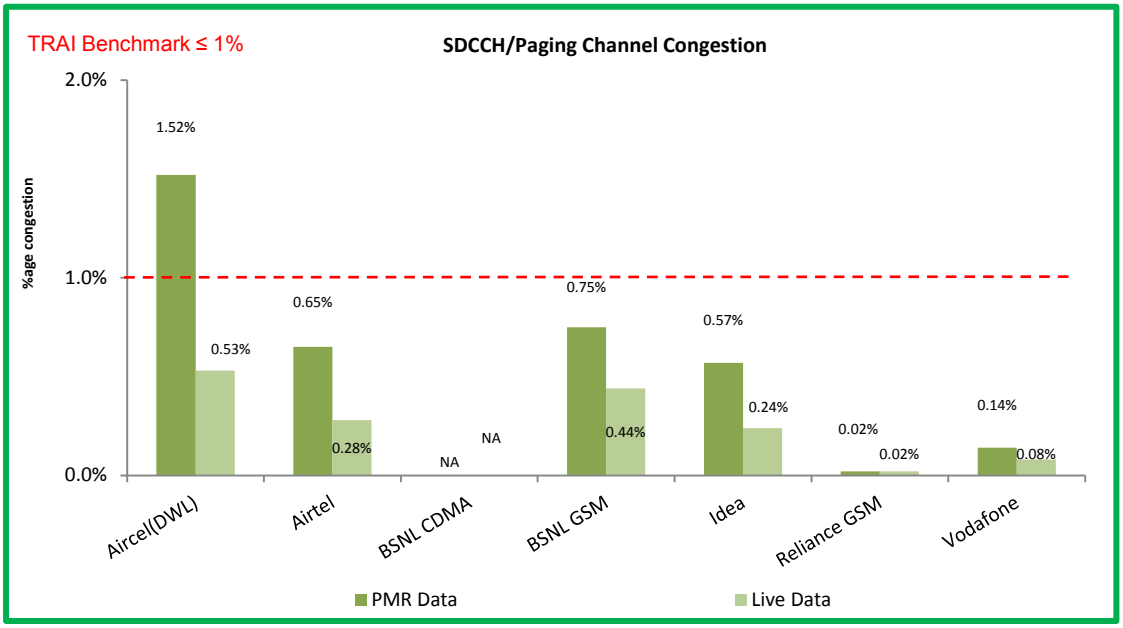
NA: SDCCH/ Paging channel congestion not applicable for CDMA operators. Hence, it has been reported as NA for BSNL CDMA.

5.4.2.1 KEY FINDINGS – MONTH 1



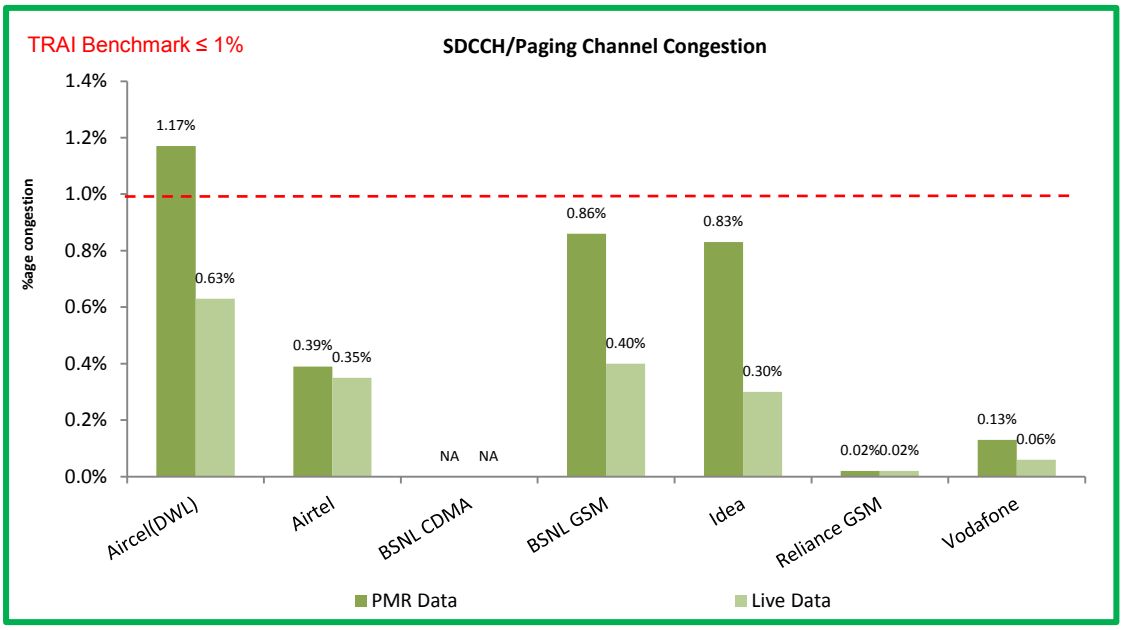
Data Source: Network Operations Center (NOC) of the operators

5.4.2.2 KEY FINDINGS – MONTH 2



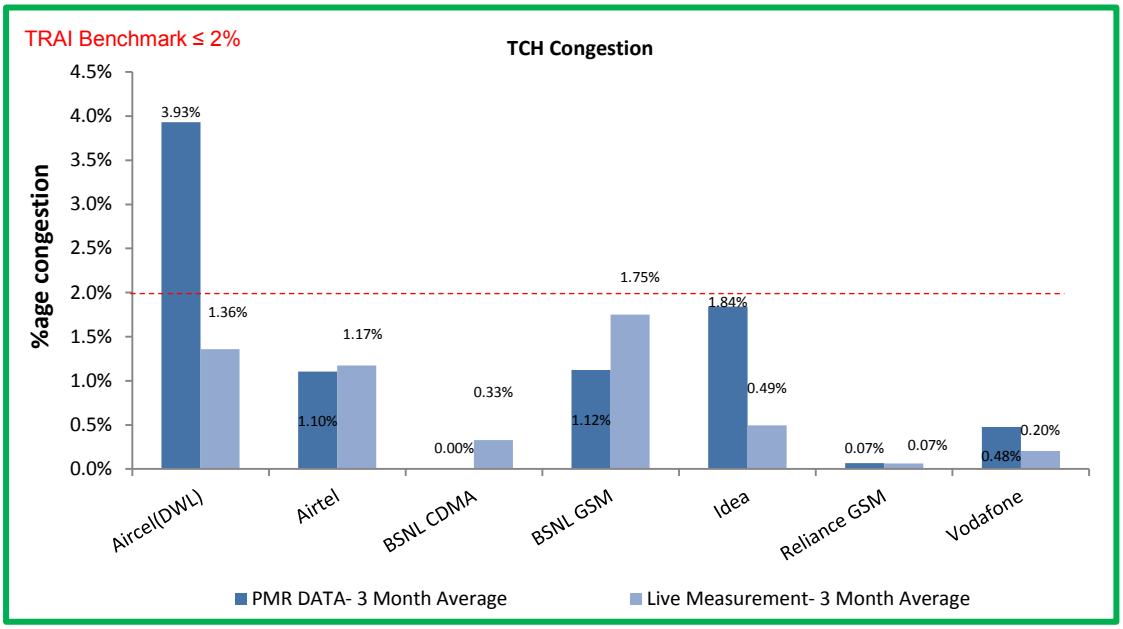
Data Source: Network Operations Center (NOC) of the operators

5.4.2.3 KEY FINDINGS – MONTH 3



Data Source: Network Operations Center (NOC) of the operators

5.4.3 KEY FINDINGS – TCH CONGESTION (CONSOLIDATED)

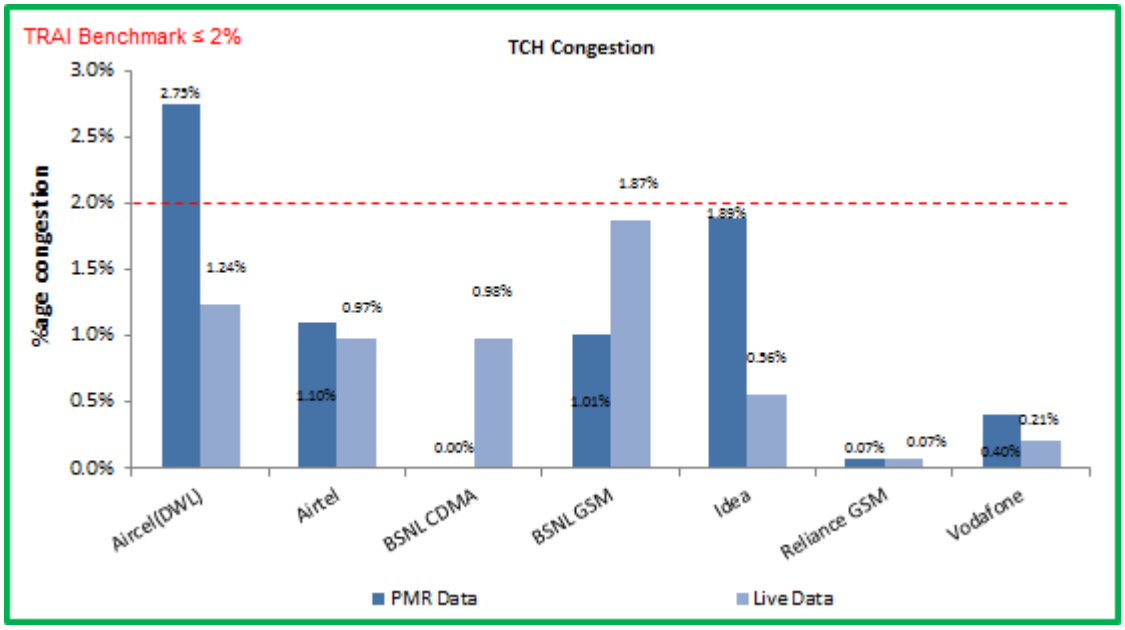


Data Source: Network Operations Center (NOC) of the operators

Aircel failed to meet the benchmark as per audit/PMR report.

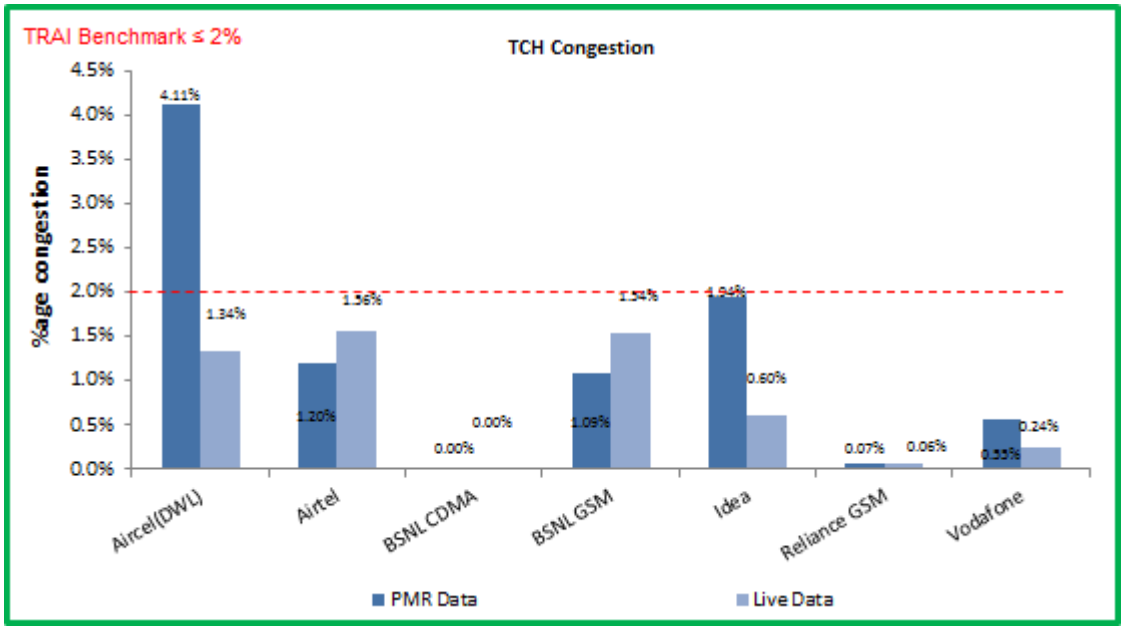
Significant difference was observed between PMR & live measurement data for Aircel, BSNL GSM and Idea. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

5.4.3.1 KEY FINDINGS – MONTH 1



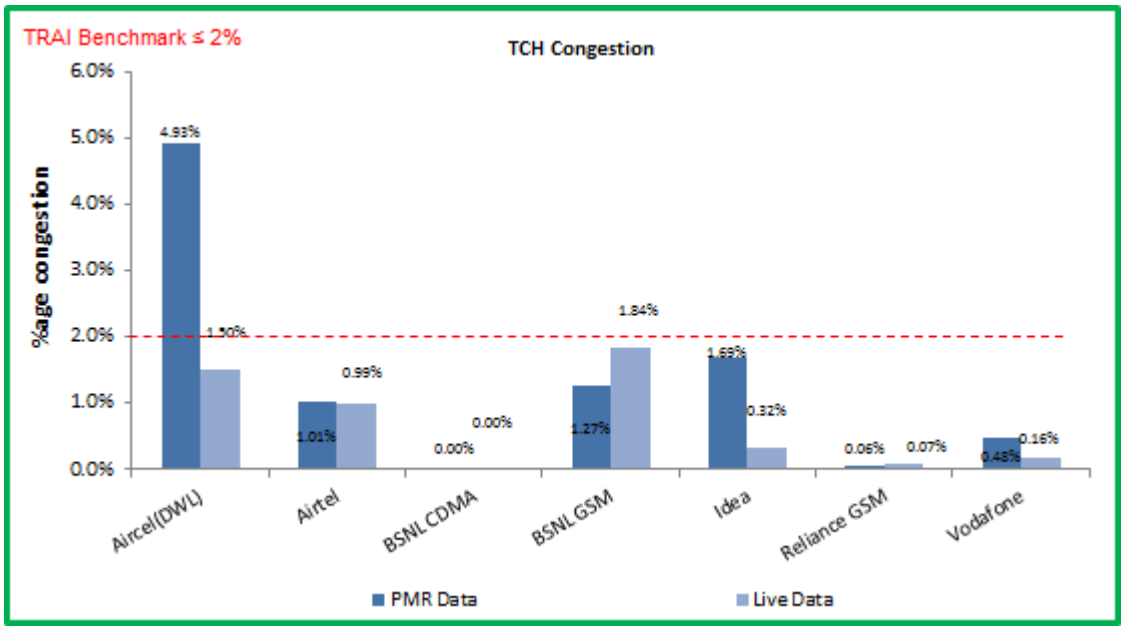
Data Source: Network Operations Center (NOC) of the operators

5.4.3.2 KEY FINDINGS – MONTH 2



Data Source: Network Operations Center (NOC) of the operators

5.4.3.3 KEY FINDINGS – MONTH 3



Data Source: Network Operations Center (NOC) of the operators

IMRB International | eTech
TRAI
Telecom Regulatory Authority of India
(IS/ISO 9001-2008 Certified Organisation)

5.4.4 KEY FINDINGS – POI CONGESTION (CONSOLIDATED) – AVERAGE OF 3 MONTHS

Audit Results for POI Congestion								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		51	15	0	19	30	23	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		87101	104370	0	19643	25470	31305	59400144
Traffic served for all POIs (B)- in erlangs		60105	36433	0	20223	17586	20479	15873803
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.03%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		51	16	0	19	30	23	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		86781	104810	0	19643	24326	31289	5991770
Traffic served for all POIs (B)- in erlangs		59435	36024	0	18057	16845	20712	1609175
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center (NOC) of the operators

All operators met the benchmark of POI Congestion as per PMR/audit Data.

Note: Auditors were not able to get the POI data from BSNL CDMA as operator uses the POI of BSNL GSM for its connectivity to other operators.

5.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data-January								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		51	15	0	19	30	23	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		86669	103472	0	19643	21836	30624	59993259
Traffic served for all POIs (B)- in erlangs		57141	35502	0	19305	17147	19794	15701337
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data-January								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		51	15	0	19	30	23	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		86669	103453	0	19643	21861	30624	6008811
Traffic served for all POIs (B)- in erlangs		58158	34030	0	17331	16117	19794	1586768
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center (NOC) of the operators

5.4.4.2 KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data-February								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		51	15	0	19	30	23	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		86729	105233	0	19643	24228	31701	56074902
Traffic served for all POIs (B)- in erlangs		60426	36253	0	20056	17790	20531	15071445
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data-February								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		51	16	0	19	30	23	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		86729	105440	0	19643	22172	31701	6008811
Traffic served for all POIs (B)- in erlangs		60563	36597	0	18212	17064	20531	1617287
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center (NOC) of the operators

5.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-March								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		51	15	0	19	30	23	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		87905	104406	0	19643	30347	31590	62132270
Traffic served for all POIs (B)- in erlangs		62748	37543	0	21306	17822	21112	16848628
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.08%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data-March								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		51	16	0	19	30	23	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		86944	105536	0	19643	28946	31542	5957687
Traffic served for all POIs (B)- in erlangs		59584	37445	0	18628	17353	21811	1623470
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

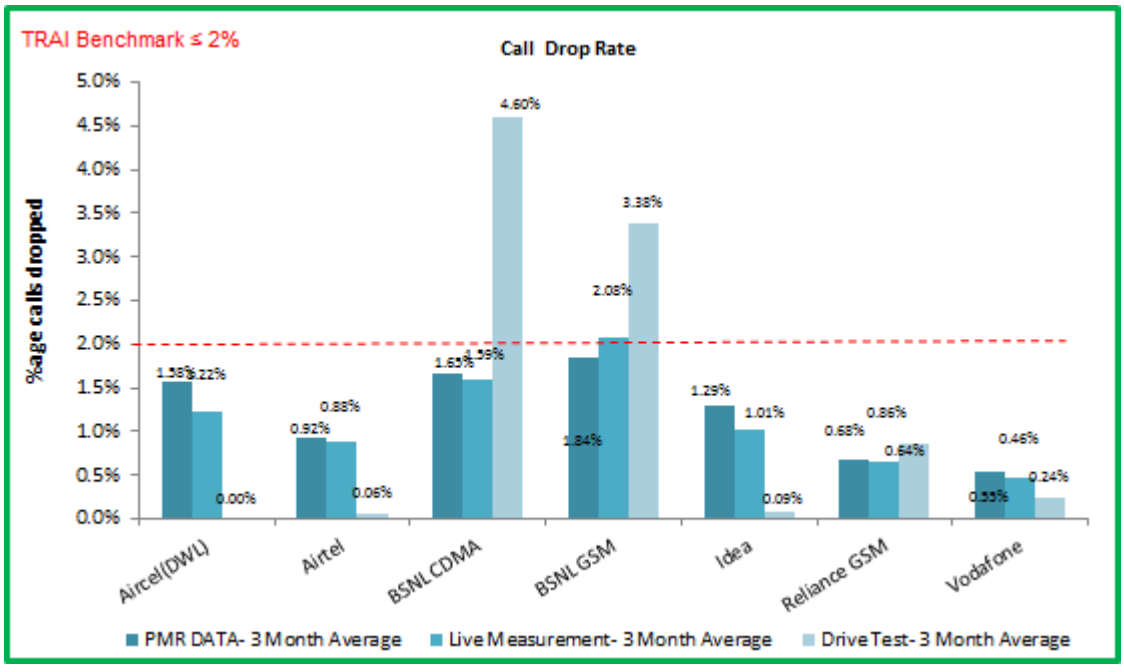
Data Source: Network Operations Center (NOC) of the operators

5.5 CALL DROP RATE

5.5.1 PARAMETER DESCRIPTION

1. **Definition** - The dropped call rate is the ratio of successfully originated calls that were found to drop to the total number of successfully originated calls that were correctly released.
   - **Total calls dropped** = All calls ceasing unnaturally i.e. due to handover or due to radio loss
   - **Total calls established** = All calls that have TCH allocation during busy hour
2. **Computational Methodology:** (**Total Calls Dropped** / **Total Calls Established) x 100**
3. **TRAI Benchmark** –
   - Call drop rate ≤ 2%
4. **Audit Procedure** –
   - Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR was used
   - The operator should only be considering those calls which are dropped during Time consistent busy hour (TCBH) for all days of the relevant quarter.

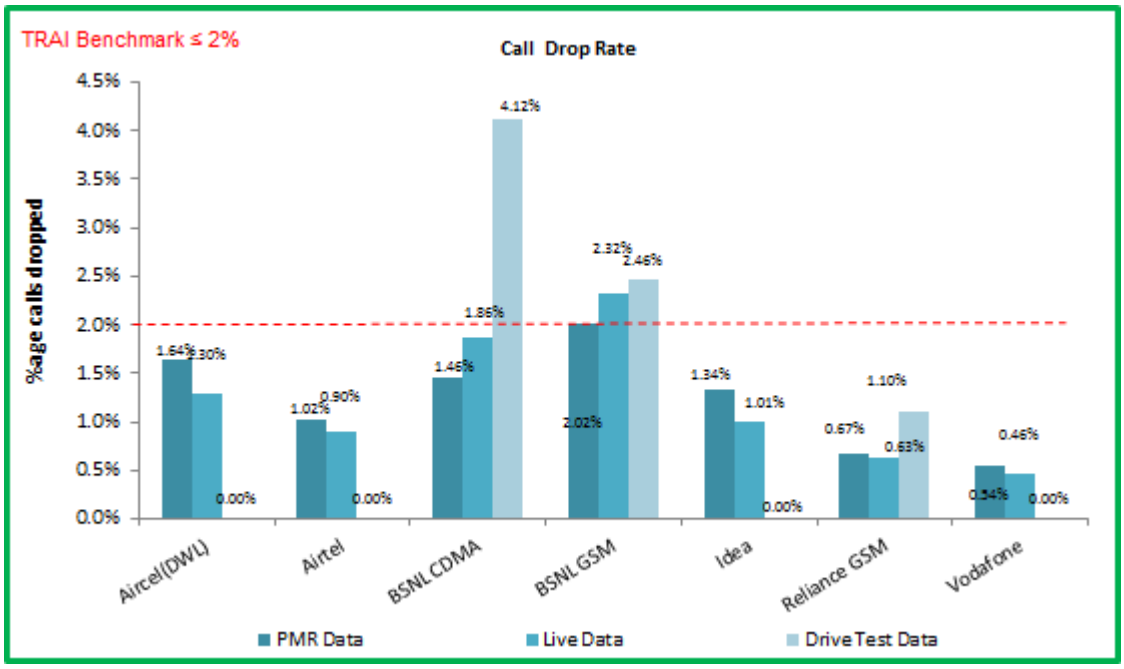
5.5.2 KEY FINDINGS - CONSOLIDATED



Data Source: Network Operations Center (NOC) of the operators

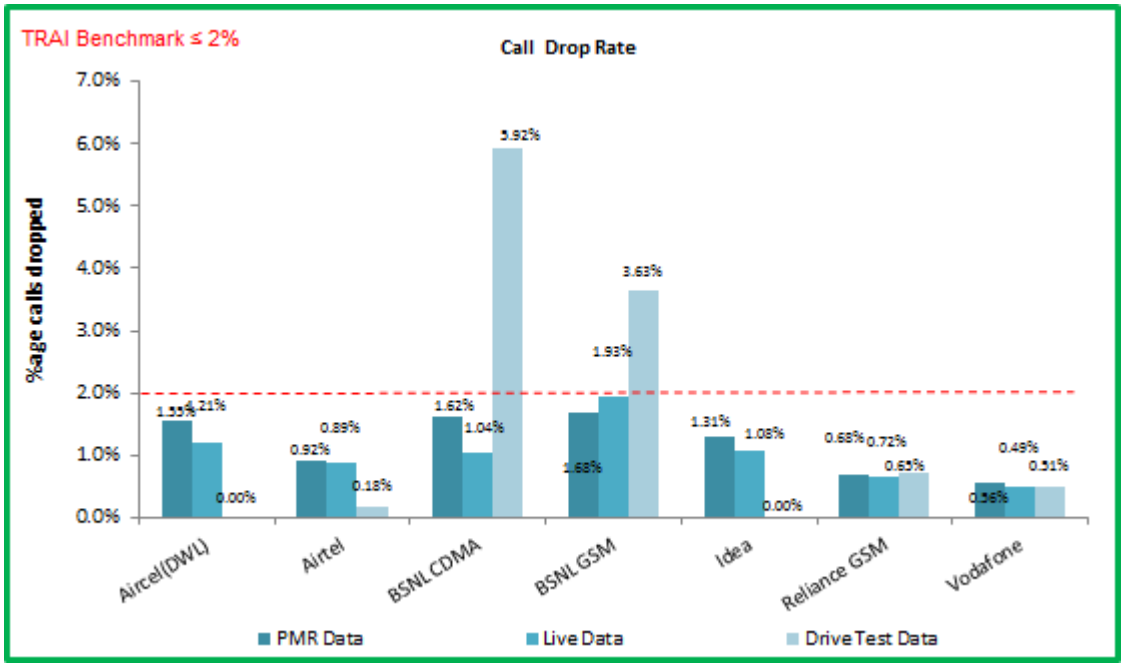
All operators met the benchmark for call drop rate during audit. The call drop rate during drive test and live measurement was observed to be higher than audit for BSNL CDMA and BSNL GSM.

5.5.2.1 KEY FINDINGS – MONTH 1



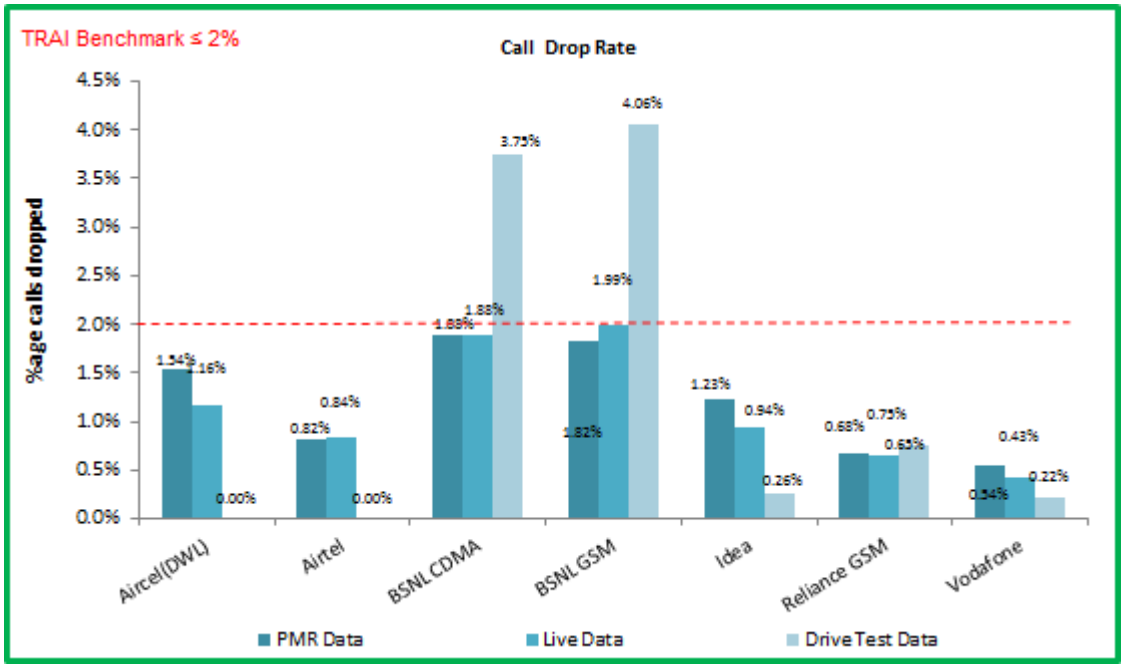
Data Source: Network Operations Center (NOC) of the operators

5.5.2.2 KEY FINDINGS – MONTH 2



Data Source: Network Operations Center (NOC) of the operators

5.5.2.3 KEY FINDINGS – MONTH 3



Data Source: Network Operations Center (NOC) of the operators

5.6 CELLS HAVING GREATER THAN 3% TCH DROP

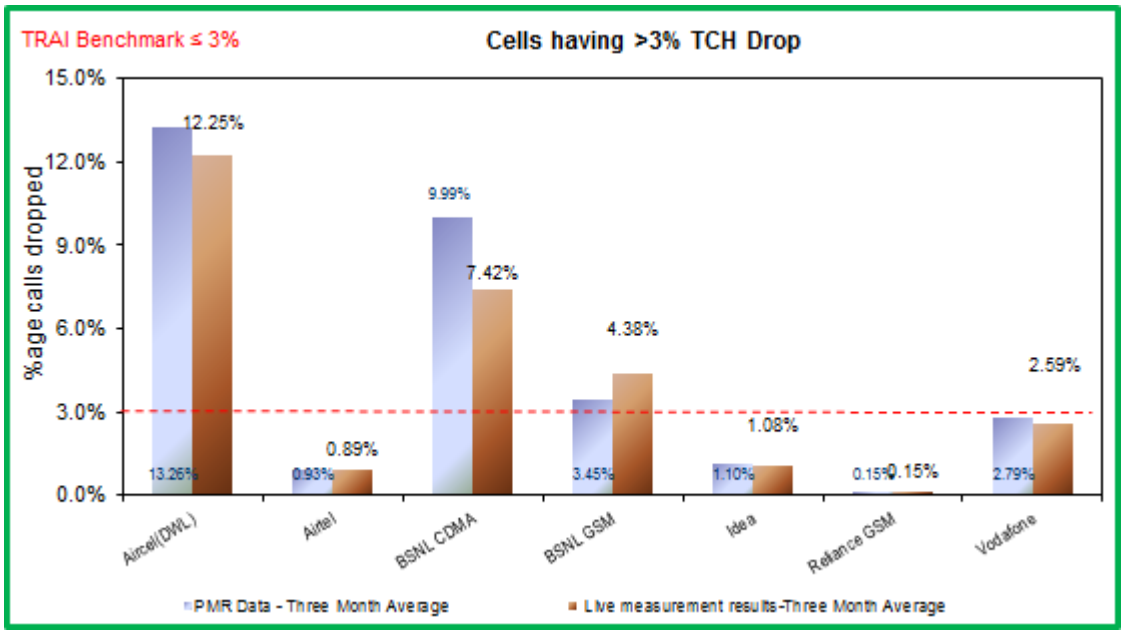
5.6.1 PARAMETER DESCRIPTION

1. **Definition- Worst Affected Cells having more than 3% TCH drop** shall measure the ratio of total number of cells in the network to the ratio of cells having more than 3% TCH drop.
2. **Computational Methodology: (Total number of cells having more than 3% TCH drop during CBBH/ Total number of cells in the network) x 100**
3. **TRAI Benchmark –**
   - Worst affected cells having more than 3% TCH drop rate ≤ 3%
4. **Audit Procedure –**
   - Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR would be conducted.

The operator should only be considering those calls which are dropped during Cell Bouncing Busy hour (CBBH) for all days of the relevant quarter.

IMRB International | eTech
TRAI
Telecom Regulatory Authority of India
(IS/ISO 9001-2008 Certified Organisation)

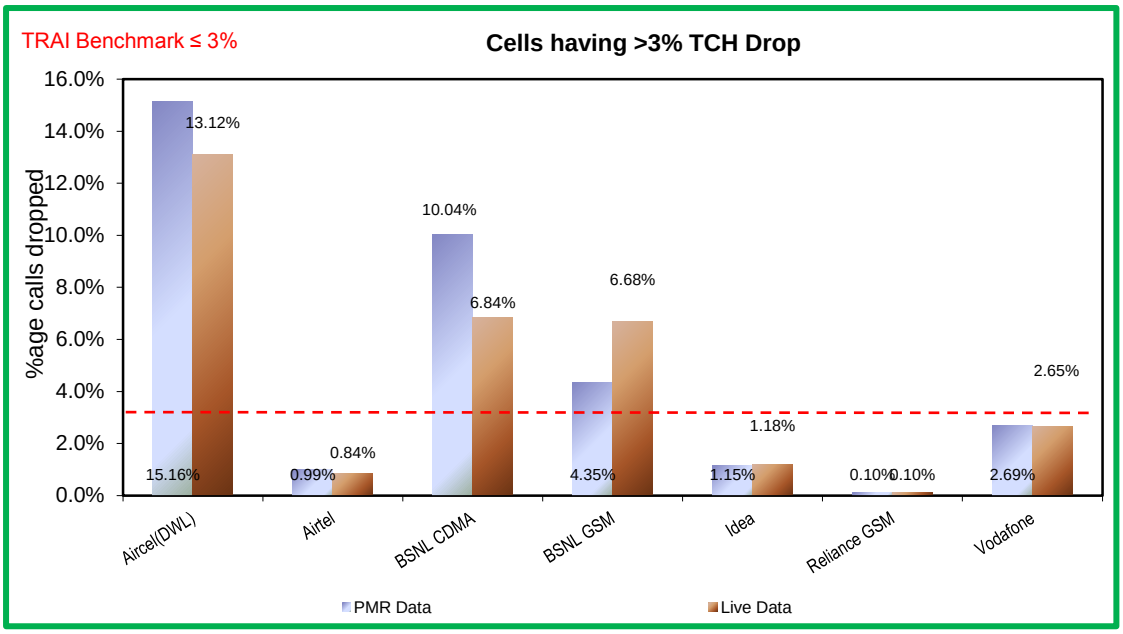
5.6.2 KEY FINDINGS - CONSOLIDATED



Data Source: Network Operations Center (NOC) of the operators

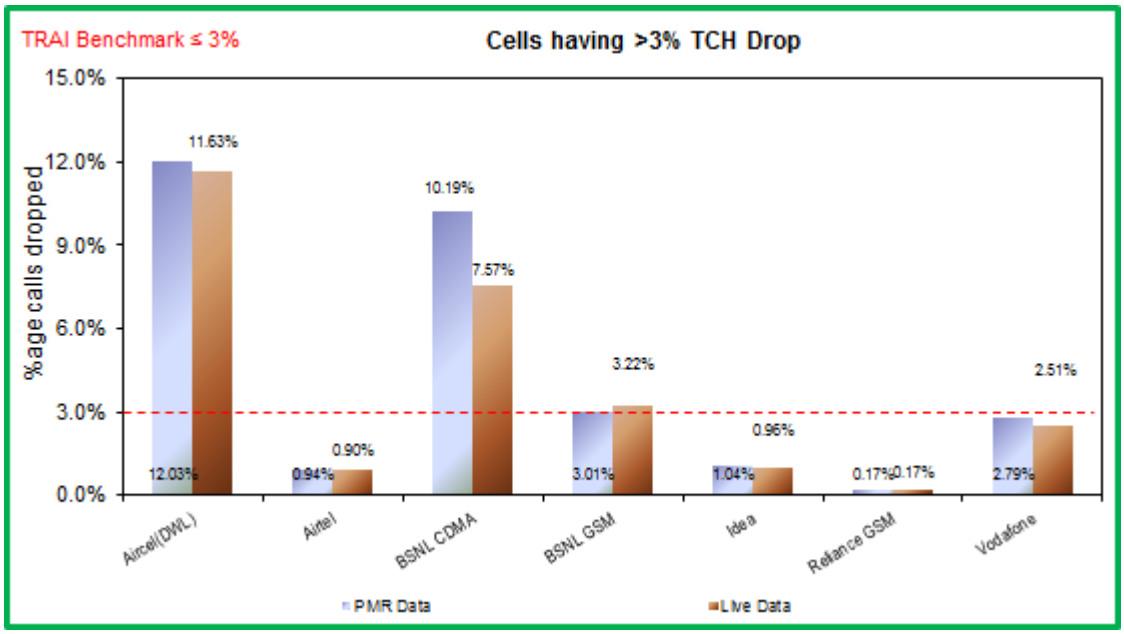
Aircel, BSNL CDMA and BSNL GSM did not meet the benchmark during audit.

5.6.2.1 KEY FINDINGS – MONTH 1



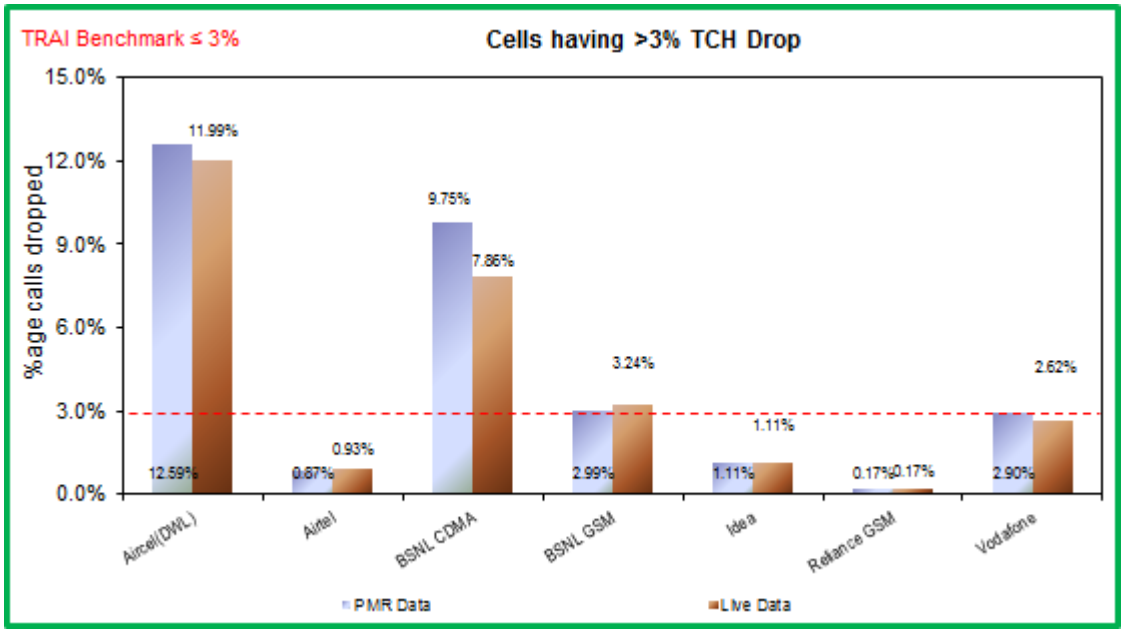
Data Source: Network Operations Center (NOC) of the operators

5.6.2.2 KEY FINDINGS – MONTH 2



Data Source: Network Operations Center (NOC) of the operators

5.6.2.3 KEY FINDINGS – MONTH 3



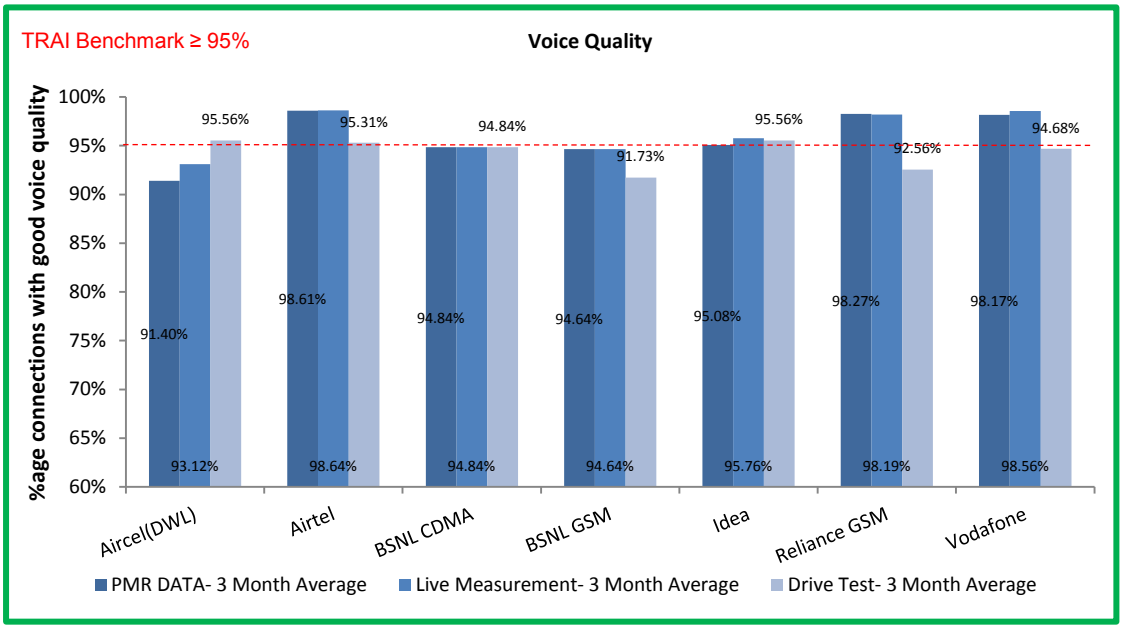
Data Source: Network Operations Center (NOC) of the operators

5.7 VOICE QUALITY

5.7.1 PARAMETER DESCRIPTION

1. **Definition:**
   - for GSM service providers the calls having a value of 0 –5 are considered to be of good quality (on a seven point scale)
   - For CDMA the measure of voice quality is Frame Error Rate (FER). FER is the probability that a transmitted frame will be received incorrectly. Good voice quality of a call is considered when it FER value lies between 0 – 4 %
2. **Computational Methodology:**
   - **% Connections with good voice quality = (No. of voice samples with good voice quality / Total number of samples) x 100**
3. **TRAI Benchmark:** ≥ 95%
4. **Audit Procedure –**
   a. A sample of calls would be taken randomly from the total calls established.
   b. The operator should only be considering those calls which are meeting the desired benchmark of good voice quality.

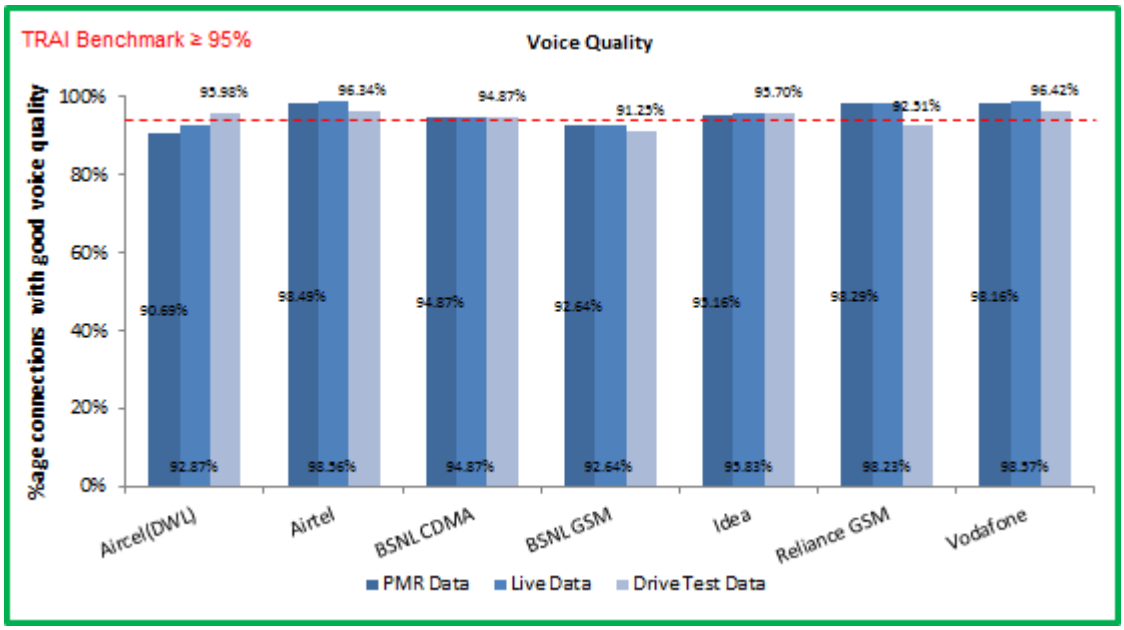
5.7.2 KEY FINDINGS



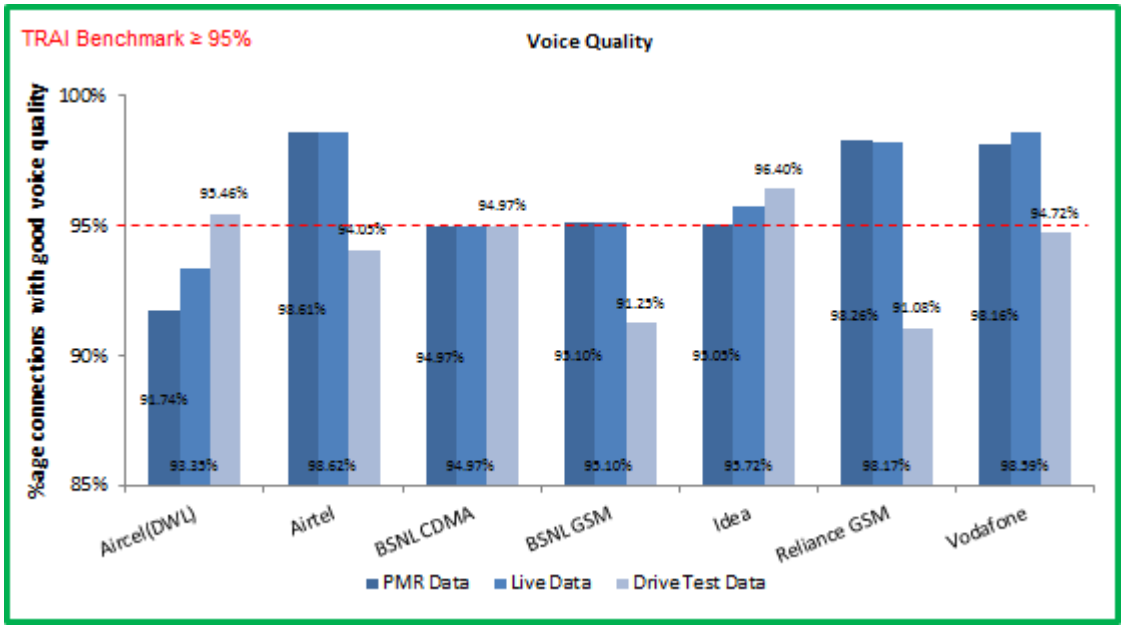
Data Source: Network Operations Center (NOC) of the operators

Aircel, BSNL CDMA and BSNL GSM were not able to meet the benchmark for Voice quality as per PMR data.

5.7.2.1 KEY FINDINGS – MONTH 1

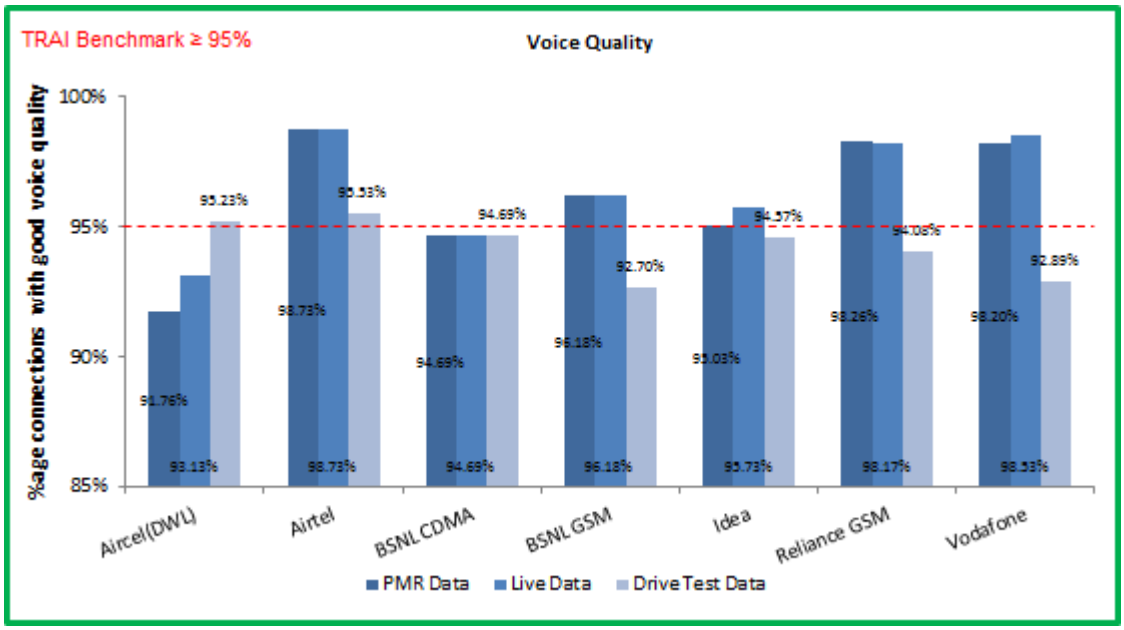


5.7.2.2 KEY FINDINGS – MONTH 2



Data Source: Network Operations Center (NOC) of the operators

5.7.2.3 KEY FINDINGS – MONTH 3



Data Source: Network Operations Center (NOC) of the operators

6 PARAMETER DESCRIPTION AND DETAILED FINDINGS – NON-NETWORK PARAMETERS

6.1 METERING AND BILLING CREDIBILITY

The billing complaints for postpaid are calculated by averaging over one billing cycle in a quarter. For example, there are three billing cycles in a quarter, the data for each billing cycle is calculated separately and then averaged over.

The charging complaints for prepaid are calculated by taking all complaints in a quarter.

6.1.1 PARAMETER DESCRIPTION

All the complaints related to billing/ charging as per clause 3.7.2 of QoS regulation of 20th March, 2009 were covered. The types of billing complaints covered are listed below.

- Payments made and not credited to the subscriber account
- Payment made on time but late payment charge levied wrongly
- Wrong roaming charges
- Double charges
- Charging for toll free services
- Local calls charged/billed as STD/ISD or vice versa
- Calls or messages made disputed
- Validity related complaints
- Credit agreed to be given in resolution of complaint, but not accounted in the bill
- Charging for services provided without consent
- Charging not as per tariff plans or top up vouchers/ special packs etc.
- Overcharging or undercharging

In addition to the above, any billing complaint which leads to billing error, waiver, refund, credit, or any adjustment is also considered as valid billing complaint for calculating the number of disputed bills.

- Computational Methodology:
  - **Billing complaints per 100 bills issued (Postpaid)** = (Total billing complaints** received during the relevant billing cycle / Total bills generated* during the relevant billing cycle)*100
  - *Operator to include all types of bills generated for customers. This would include printed bills, online bills and any other forms of bills generated

- **Billing complaints here shall include only dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end). It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.

- **Charging complaints per 100 subscribers (Prepaid)** = (Total charging complaints received during the quarter/ Total number of subscribers reported by the operator at the end of the quarter) * 100

- TRAI Benchmark: <= 0.1%

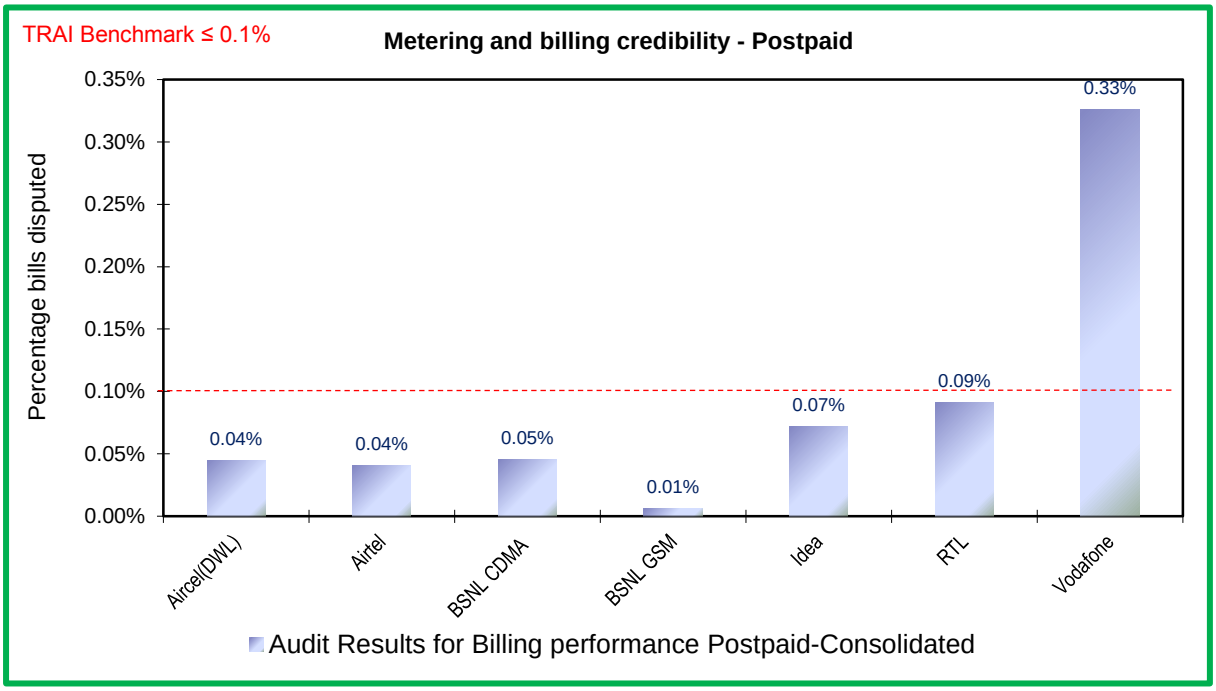
- Audit Procedure:

  - Audit of billing complaint details for the complaints received during the quarter and used for arriving at the benchmark reported to TRAI would be conducted

    - For Postpaid, the total billing complaints would be audited by averaging over billing cycles in a quarter

    - For Prepaid, the data of total charging complaints in a quarter would be taken for the purpose of audit

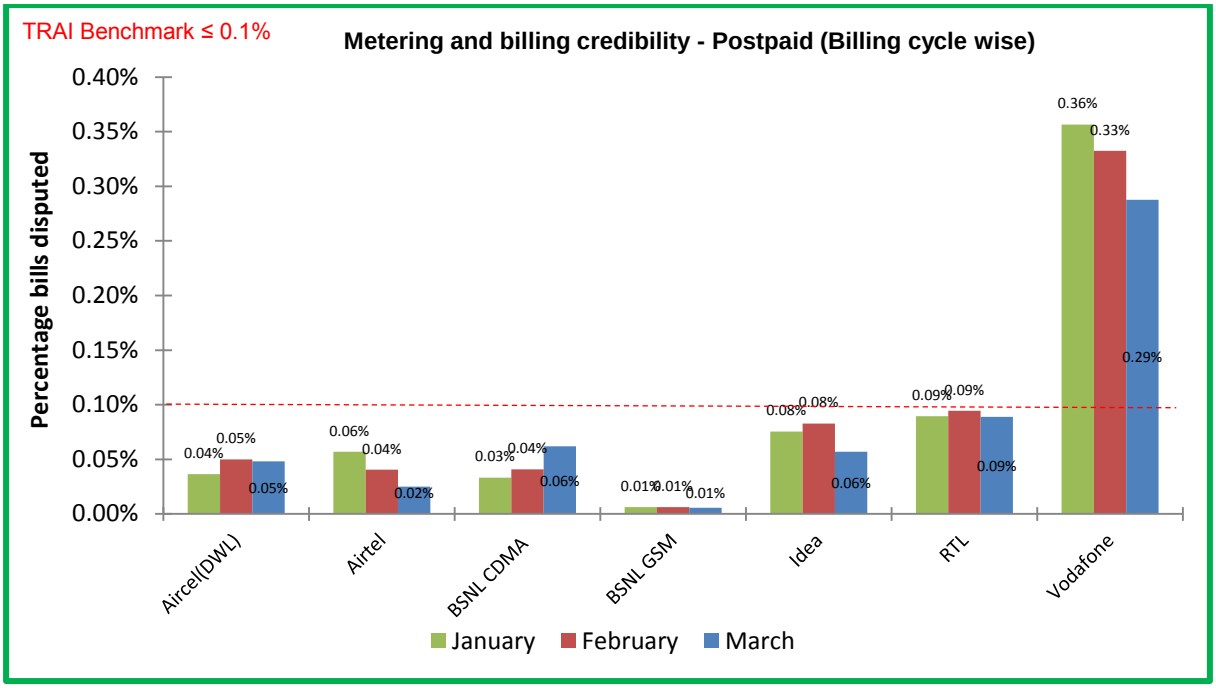
6.1.2 KEY FINDINGS – METERING AND BILLING CREDIBILITY (POSTPAID)



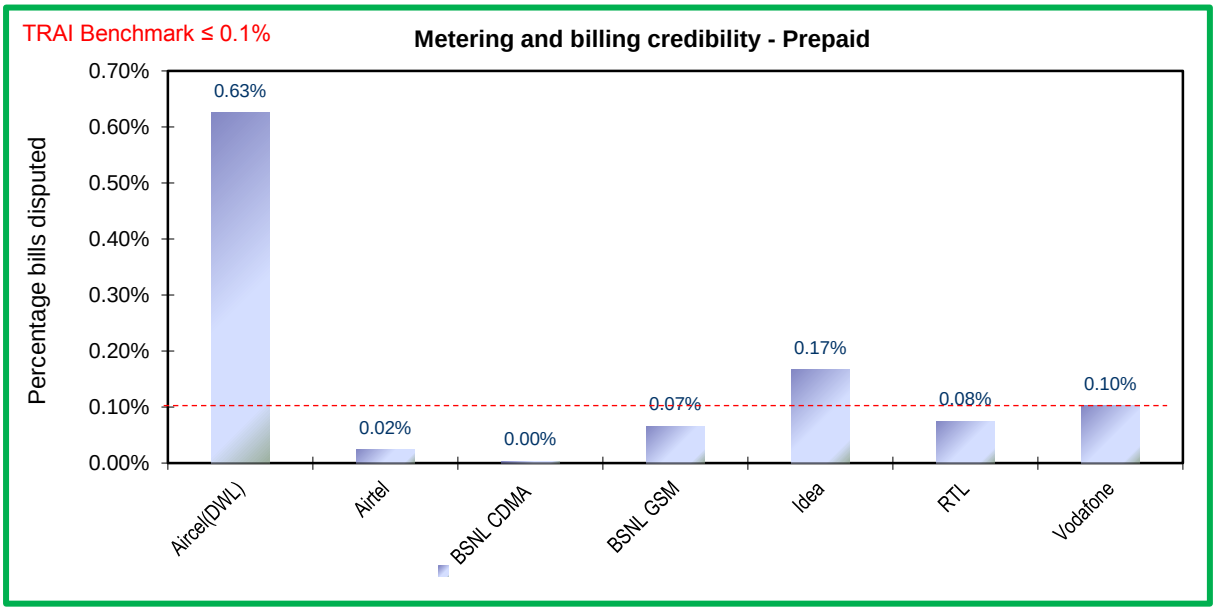
Data Source: Billing Center of the operators

Vodafone failed to meet the benchmark of 0.1% postpaid metering and billing credibility.

Data Source: Billing Center of the operators



6.1.3 KEY FINDINGS - METERING AND BILLING CREDIBILITY (PREPAID)



Data Source: Billing Center of the operators

Aircel and Idea failed to meet the benchmark for metering and billing credibility of prepaid subscribers.

6.2 RESOLUTION OF BILLING/ CHARGING COMPLAINTS

6.2.1 PARAMETER DESCRIPTION

Calculation of Percentage resolution of billing complaints

The calculation methodology (given below) as per QoS regulations 2009 (7 of 2009) was followed to - calculate resolution of billing complaints.

Resolution of billing complaints within 4 weeks:

%age of billing complaints (for post-paid customers)/ charging, credit & validity (for pre-paid customers) resolved within 4 weeks =

$$\frac{\text{number of billing complaints for post-paid customers/charging, credit/ validity complaints for pre-paid customers resolved within 4 weeks during the quarter}}{\text{number of billing/charging, credit / validity complaints received during the quarter}} \times 100$$

Resolution of billing complaints within 6 weeks:

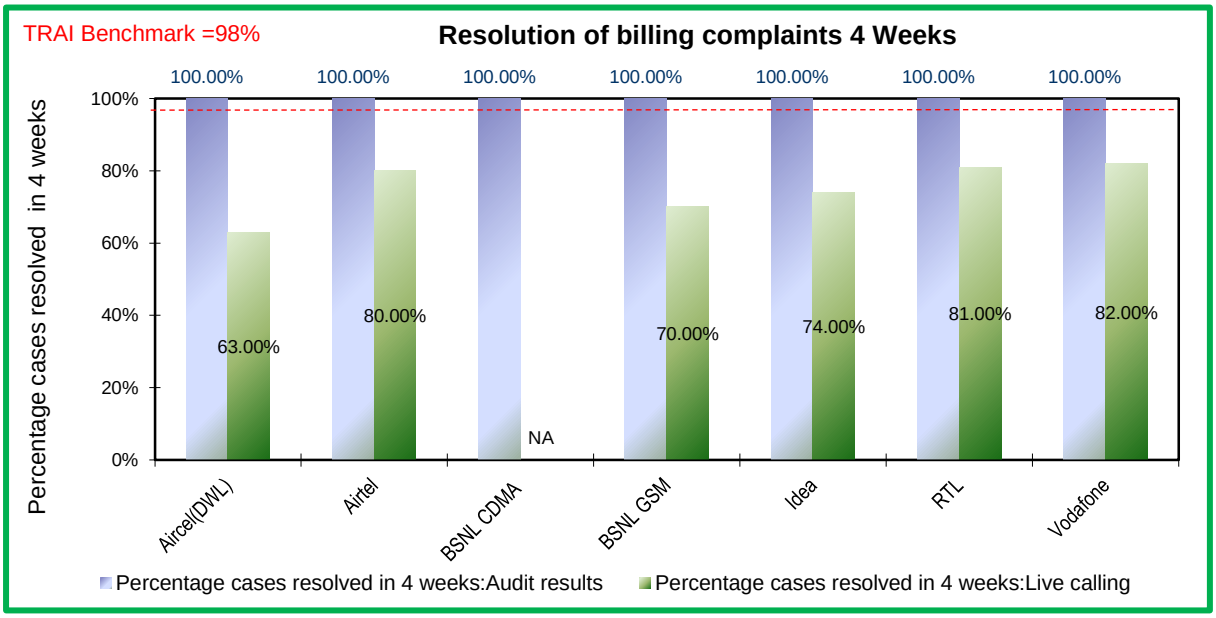
%age of billing complaints (for post-paid customers)/ charging, credit & validity (for pre-paid customers) resolved within 6 weeks =

$$\frac{\text{number of billing complaints for post-paid customers/charging, credit/ validity complaints for pre-paid customers resolved within 6 weeks during the quarter}}{\text{number of billing/charging, credit / validity complaints received during the quarter}} \times 100$$

- **Billing complaints here shall include only dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end). It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally. Complaints raised by the consumers to operator are only considered as part of the calculation.
- *** Date of resolution in this case would refer to the date when a communication has taken place from the operator's end to inform the complainant about the final resolution of the issue / dispute.

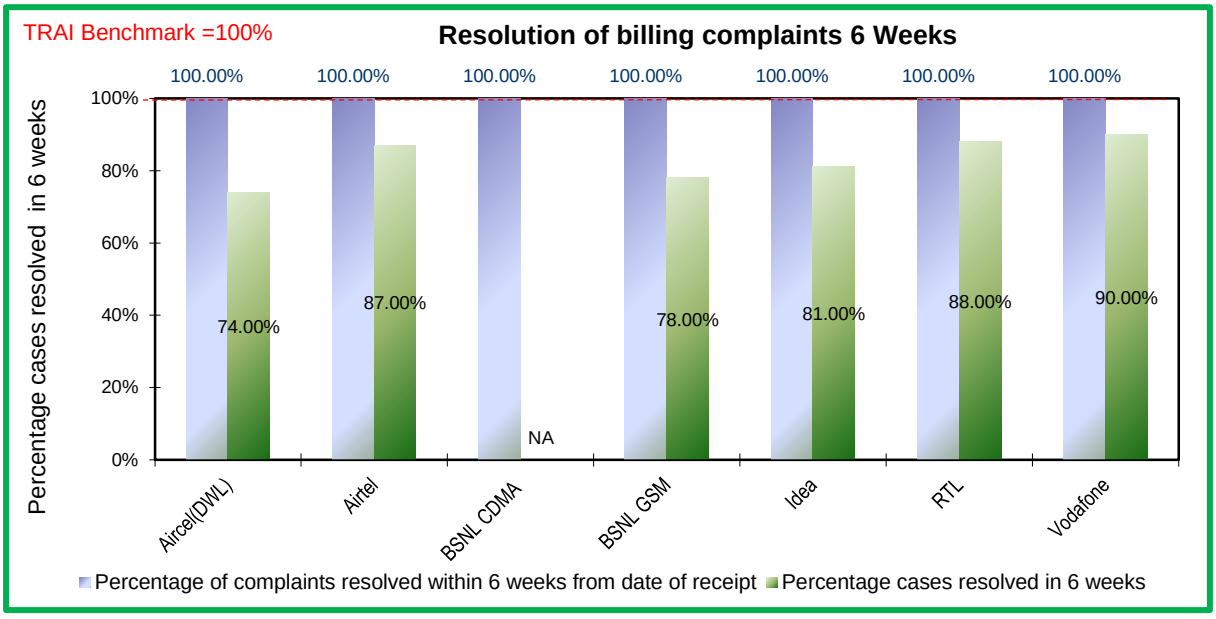
Benchmark: 98% complaints resolved within 4 weeks, 100% within 6 weeks.

6.2.2 KEY FINDINGS - WITHIN 4 WEEKS



Data Source: Billing Center of the operators

6.2.3 KEY FINDINGS WITHIN 6 WEEKS



Data Source: Billing Center of the operators

All operators met the TRAI benchmark of resolution of billing complaints within 4 weeks as well as 6 weeks. However, as per live calling done to customers, the performance of all operators was observed to be far inferior to the PMR data.

It is to be noted that Aircel, Airtel, Idea and Vodafone have reported high ratio of invalid complaints. Auditors recommend further investigation of the issue independently by TRAI. For details, kindly refer to the annexure (section 8.7).

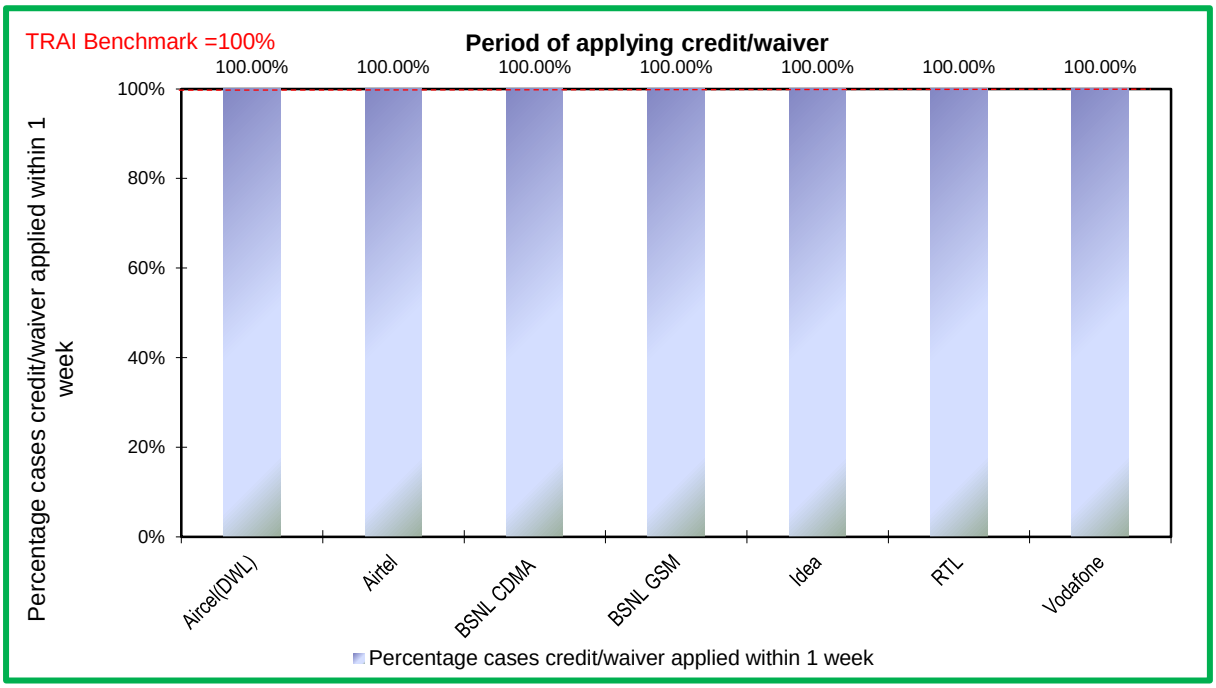
Note: Auditors did not receive the raw data for live calling from the central billing center of BSNL CDMA as the operator was unable to provide the same due to low base of complaints.

6.3 PERIOD OF APPLYING CREDIT/WAVIER

6.3.1 PARAMETER DESCRIPTION

- Computational Methodology:
  - **Period of applying credit waiver = (number of cases where credit waiver is applied within 7 days/ total number of cases eligible for credit waiver) * 100**
- TRAI Benchmark:
  - Period of applying credit waiver within 7 days: 100%
- Audit Procedure:
  - Operator to provide details of:-
    - List of all eligible cases along with
      - Date of applying credit waiver to all the eligible cases.
      - Date of resolution of complaint for all eligible cases

6.3.2 KEY FINDINGS



Data Source: Billing Center of the operators

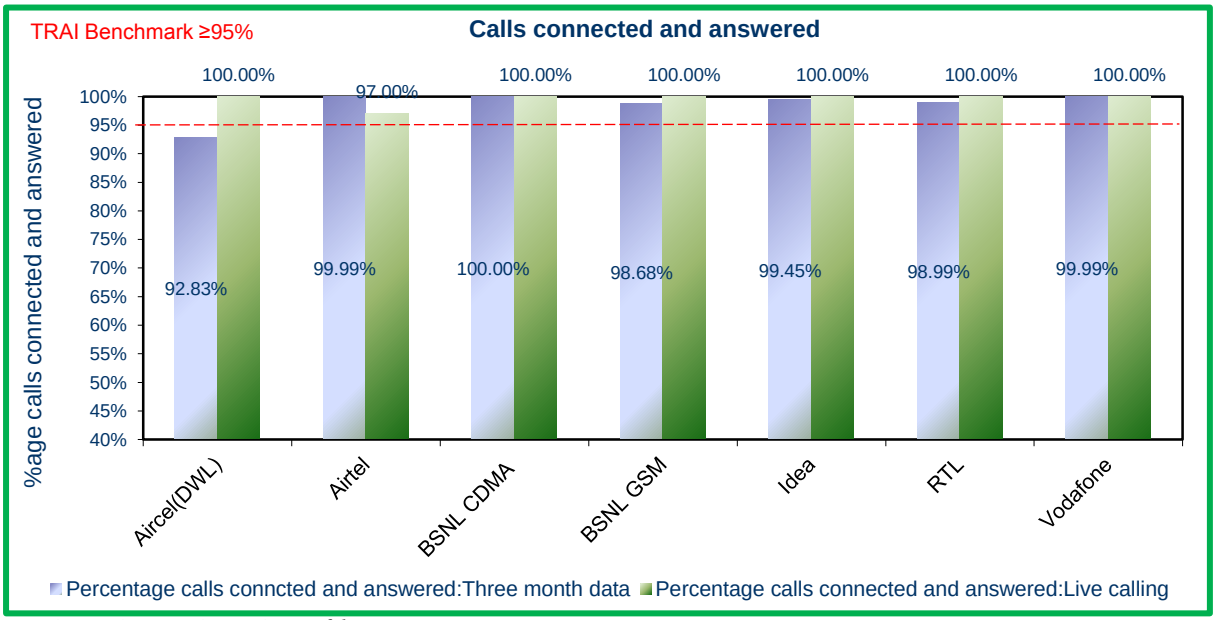
All operators met the benchmark for this parameter.

6.4 CALL CENTRE PERFORMANCE-IVR

6.4.1 PARAMETER DESCRIPTION

- Computational Methodology:
  - **Call centre performance IVR = (Number of calls connected and answered by IVR/ All calls attempted to IVR) * 100**
- TRAI Benchmark: >= 95%
- Audit Procedure:
  - Operators provide details of the following from their central call centre/ customer service database:
    - Total calls connected and answered by IVR
    - Total calls attempted to IVR
  - Also live calling is done to test the calls connected and answered by IVR

6.4.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

As per PMR data, Aircel was not able to meet the benchmark.

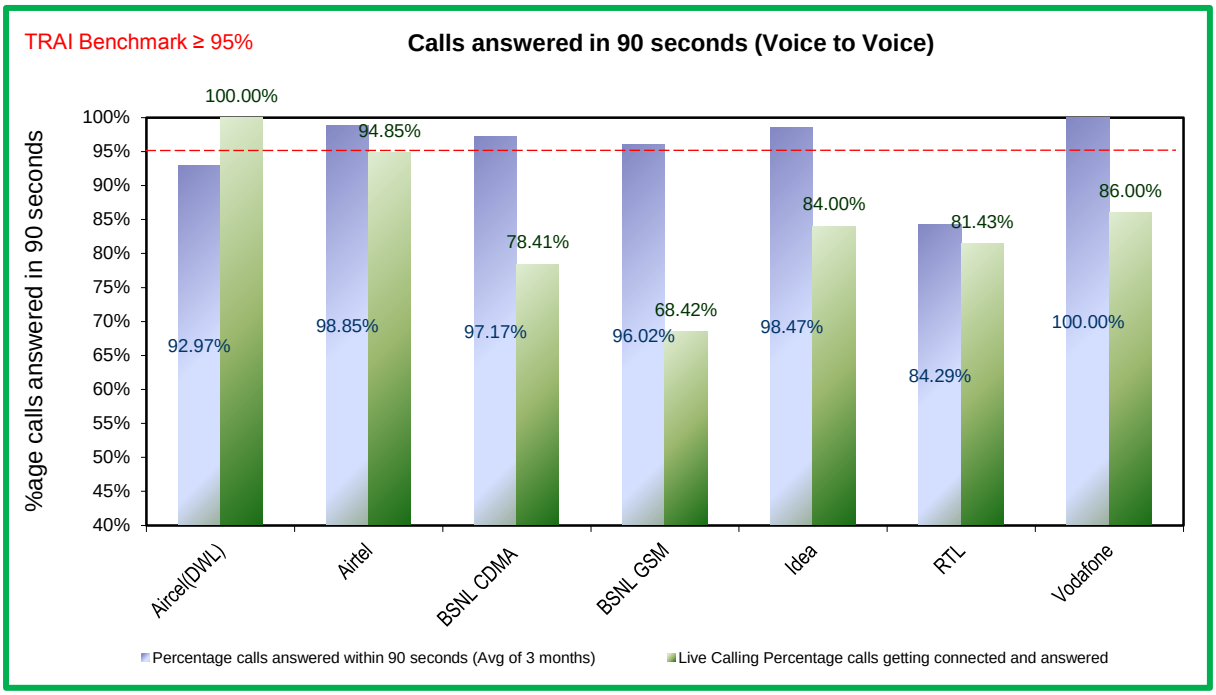
6.5 CALL CENTRE PERFORMANCE-VOICE TO VOICE

6.5.1 PARAMETER DESCRIPTION

- Computational Methodology:
  - Call centre performance Voice to Voice = (Number of calls answered by operator within 90 seconds/ All calls attempted to connect to the operator) * 100
- Audit Procedure:
  - Operators provide details of the following from their central call centre/ customer service database:
    - Total calls connected and answered by operator within 90 seconds
    - Total calls attempted to connect to the operator
  - Also live calling was done to test the calls answered within 90 seconds by the operator

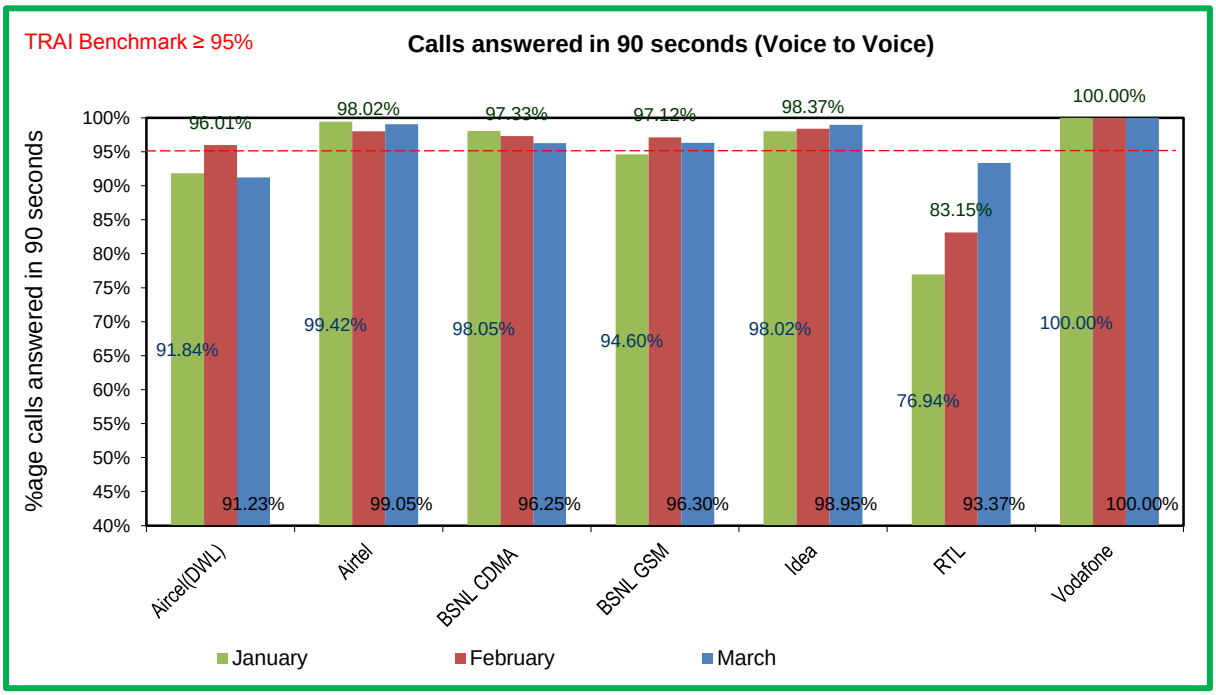
Benchmark: 95% calls to be answered within 90 seconds

6.5.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

Aircel and Reliance GSM were not able to meet the benchmark as per audit. However, as per live calling done to customers, the performance of BSNL CDMA, BSNL GSM, Idea and Vodafone was far inferior to the PMR data.



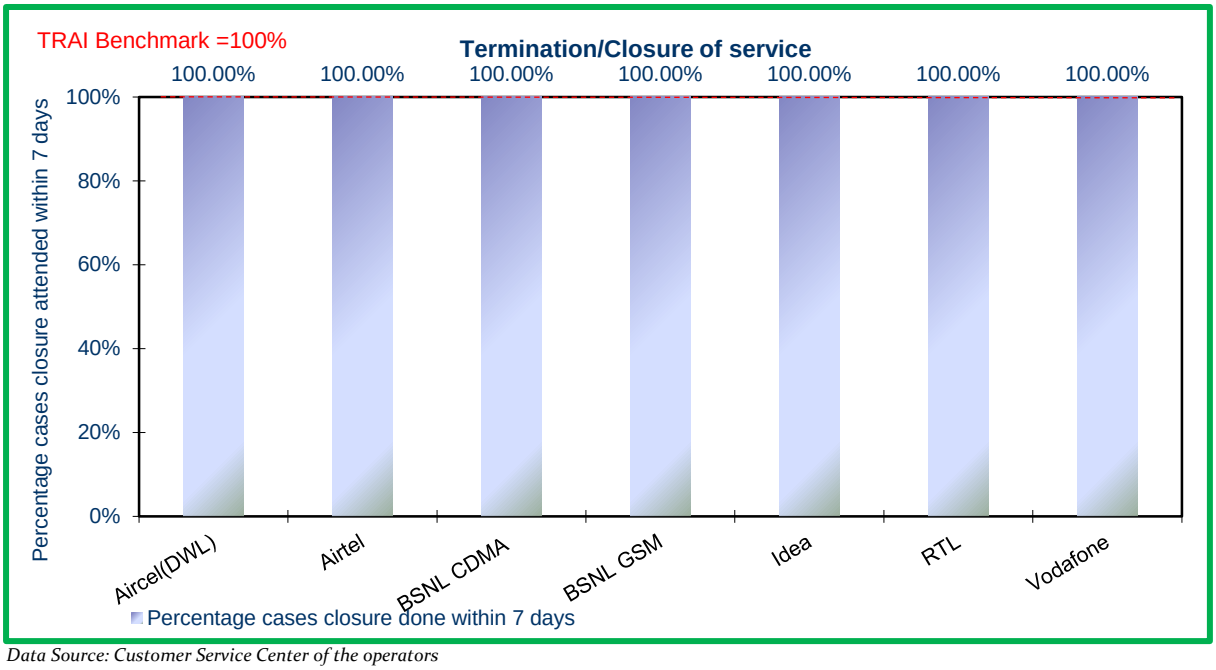
Data Source: Customer Service Center of the operators

6.6 TERMINATION/CLOSURE OF SERVICE

6.6.1 PARAMETER DESCRIPTION

- Computational Methodology:
  - **Time taken for closure of service = (number of closures done within 7 days/ total number of closure requests) * 100**
- TRAI Benchmark:
  - Termination/Closure of Service: <=7 days
- Audit Procedure:
  - Operator provide details of the following from their central billing/CS database:
    - Date of lodging the closure request (all requests in given period)
    - Date of closure of service

6.6.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

All operators met the TRAI benchmark for the parameter.

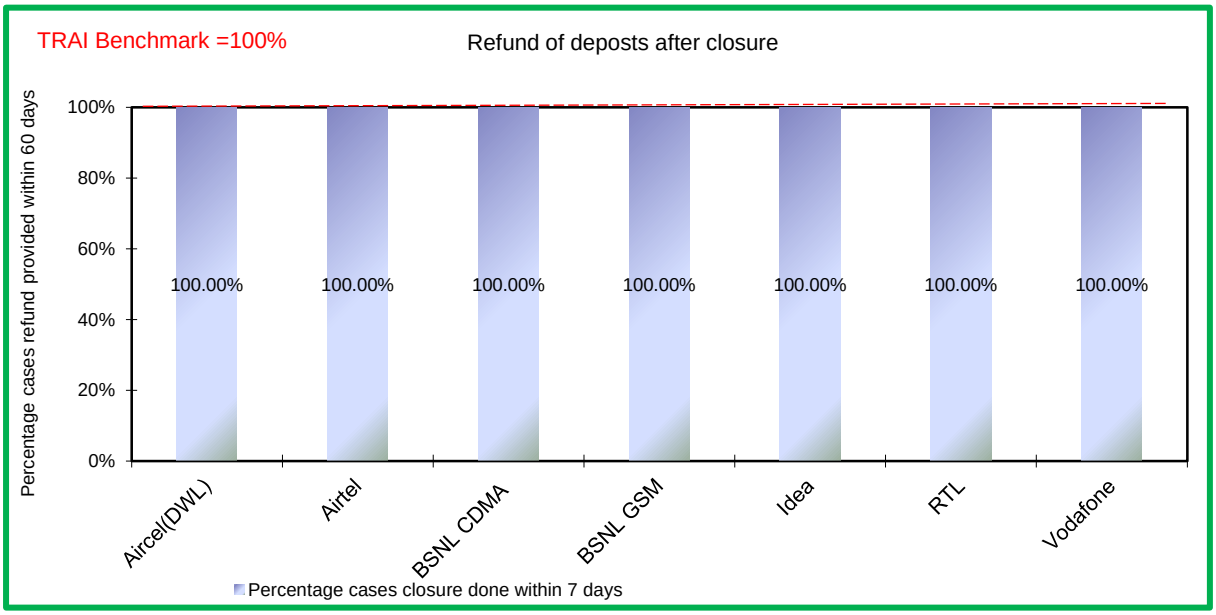
6.7 REFUND OF DEPOSITS AFTER CLOSURE

6.7.1 PARAMETER DESCRIPTION

- Computational Methodology:
  - **Time taken for refund for deposit after closures = (number of cases of refund after closure done within 60 days/ total number of cases of refund after closure) * 100**
  - Any case where the operators need to return the amount back to consumers post closure of service in form of cheque/cash is considered to be refund.
- TRAI Benchmark:
  - Time taken for refund for deposit after closures: 100% within 60 days
- Audit Procedure:
  - Operator provide details of the following from their central billing/refund database:
    - Dates of completion of all 'closure requests' resulting in requirement of a refund by the operator.

- Dates of refund pertaining to all closure request received during the relevant quarter

6.7.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

All operators met the TRAI benchmark for the parameter.

7 DETAILED FINDINGS - DRIVE TEST DATA

7.1 OPERATOR ASSISTED DRIVE TEST

The drive test was conducted simultaneously for all the operators present in the Assam circle. As per the new directive given by TRAI headquarters, drive test for the month of January, February and March 2015 were conducted at a SSA level. Drive test was conducted for three days in each SSA and the selection of routes ensured that the maximum towns, villages, highways are covered as part of drive test. The routes were selected post discussion with TRAI advisors. IMRB auditors were present in vehicles of every operator. The holding period for all test calls was 120 seconds and gap between calls was 10 seconds.

For measuring voice quality RxQual samples for GSM operators and Frame Error Rate (FERs) for CDMA service providers were measured. RxQual greater than 5 meant that the sample was not of appropriate voice quality and for CDMA operators FERs of more than 4 were considered bad. Call drops were measured by the number of calls that were dropped to the total number of calls established during the drive test. Similarly CSSR was measured as the ratio of total calls established to the total call attempts made. Signal strength was measured in Dbm with strength > -75 dbm for indoor, -85 dbm for in-vehicle and > -95 dbm outdoor routes.

The schedule and operators involved in the operator assisted drive test for Assam circle are given below.

Name of Operator
Aircel(DWL)
Airtel
BSNL CDMA
BSNL GSM
Idea
RTL
Vodafone

7.1.1 JANUARY - DIBRUGARH SSA

Month	Name of SSA Covered	Date of Drive Test
January	DIBRUGARH	28th , 29th & 30th Jan'15

7.1.1.1 ROUTE DETAILS - DIBRUGARH SSA

Category	Type of location	Assam		
		DIBRUGARH		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	1. Dibrugarh to Naharkatia – Via Moran NH Way (100 KM) 2. Dibrugarh- City Drive (within the city and office Complex).	1. Naharkatia to Soikhoa – Via Digboi NH Way Drive(90 KM) 2. Digboi - City Drive(within the city and office Complex).	1. Doomdooma to Dibrugarh - via Tinsukia, Duliajan NH Way Drive(95 KM) 2. Tinsukia - City Drive(within the city and office Complex).
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

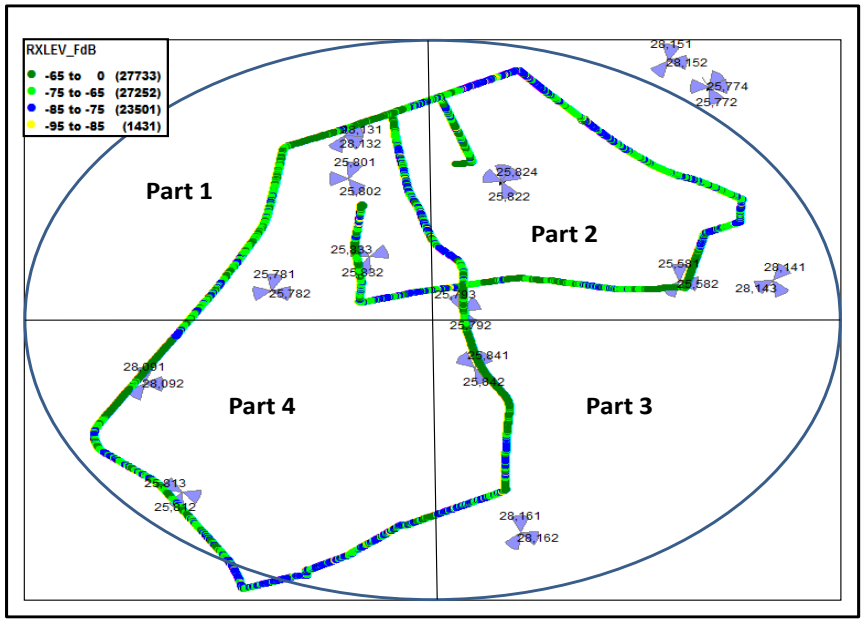
The route maps given in the report are provided for the purpose of identifying the routes traversed during the drive tests. We may observe three different colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to any findings in this report. IMRB submits detailed operator wise Drive Test reports separately.

7.1.1.2 KILOMETERS TRAVELLED- DIBRUGARH SSA

7.1.1.3 ROUTE MAP - DIBRUGARH DAY 1

Day 1 – Within City

Rx Level Plot- Day 1
Date of Drive Test- 28/01/2015
Name of SDCAs Covered- Dibrugarh



Route Covered- Day 1

1- PHOOL BAGAAN, CHAUNKIDINGNI, MILAN NAGAR, POLICE CHOWK, AMOLAPATTY, MEDICAL COLLEGE

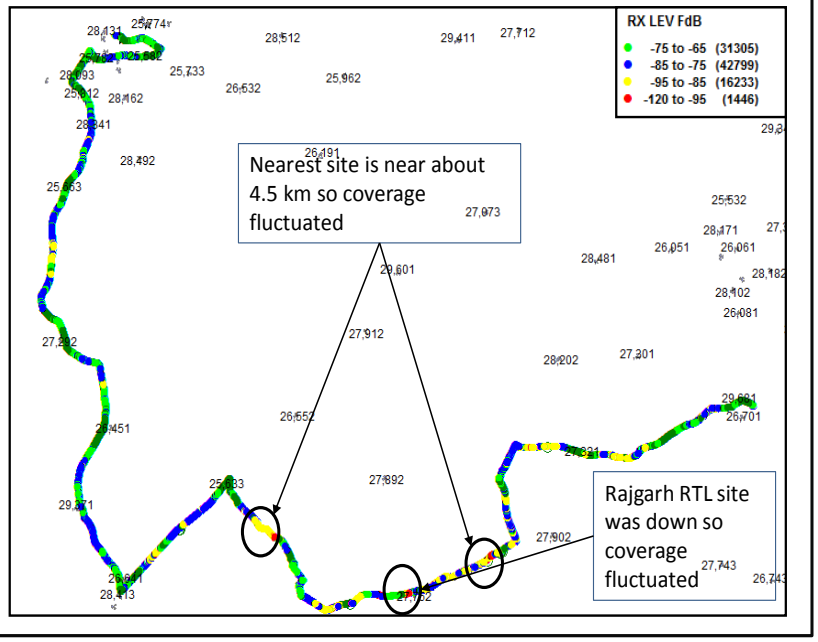
2- PALTAN BAZAAR,

3- MALWADIPATTY

IMRB International | eTech
TRAI Telecom Regulatory Authority of India (IS/ISO 9001-2008 Certified Organisation)

Day 1 – Highways

Rx Level Plot- Day 1
Date of Drive Test-28/01/2015
Name of SDCAs Covered- Dibrugarh(Highway Drive)



Route Covered- Day 1

1- DIBRUGARH ,MORANHAT, BARBORA

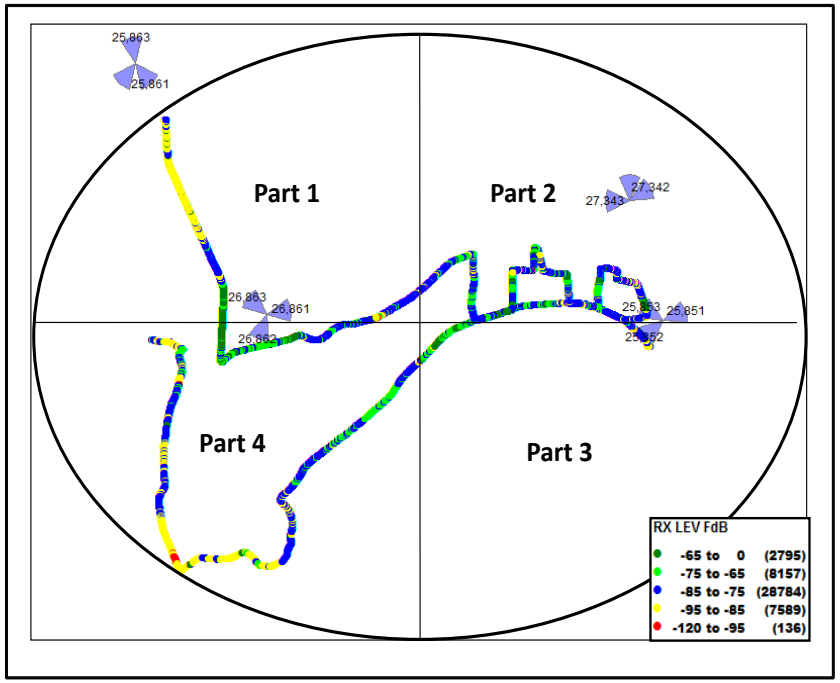
2- RAJGARH

3- NAHARKATIYA

7.1.1.4 ROUTE MAP - DIBRUGARH DAY 2

Day 2 – Within City

Rx Level Plot- Day 2
Date of Drive Test- 29/1/2015
Name of SDCAs Covered- Digboi



Route Covered-Day 2

1- DIGBOI MARKET

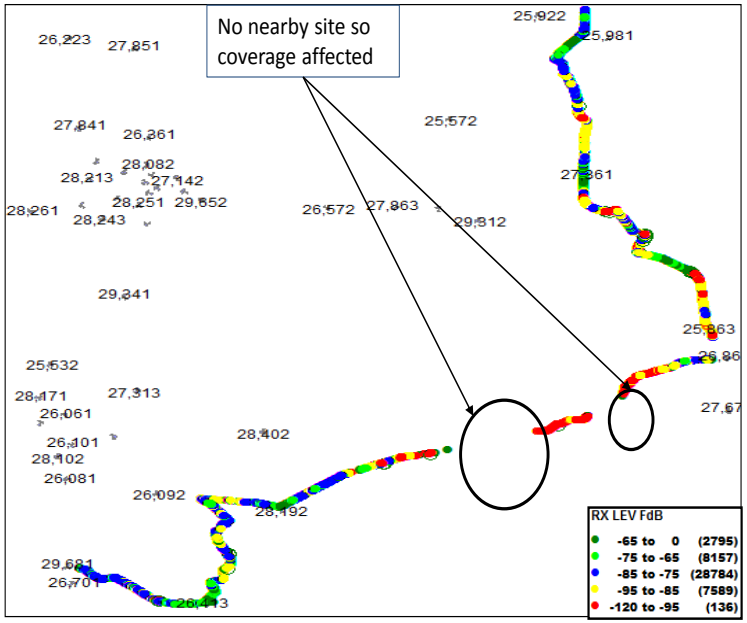
2- DURGABADI

3- OIL INDIA SUPER MARKET

4-OIL INDIA CIVIL HOSPITAL
OIL INDIA OFFICE

Day 2 – Highways

Rx Level Plot- Day 2
Date of Drive Test- 29/01/2015
Name of SDCAs Covered- Digboi (Highway Drive)



Route Covered- Day 2

1- NAHARKATIYA, JONAC

2- DIGBOI

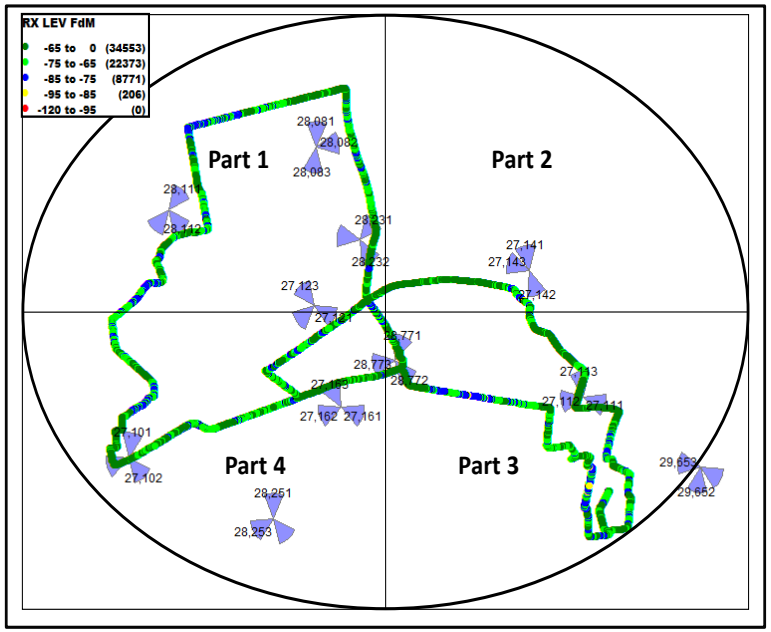
3- TIKOM, DUMDOMA

IMRB International | eTech
TRAI Telecom Regulatory Authority of India (IS/ISO 9001-2008 Certified Organisation)

7.1.1.5 ROUTE MAP - DIBRUGARH DAY 3

Day 3 – Within City

Rx Level Plot- Day 3
Date of Drive Test- 30/01/2015
Name of SDCAs Covered- Tinsukia



Route Covered- Day 3

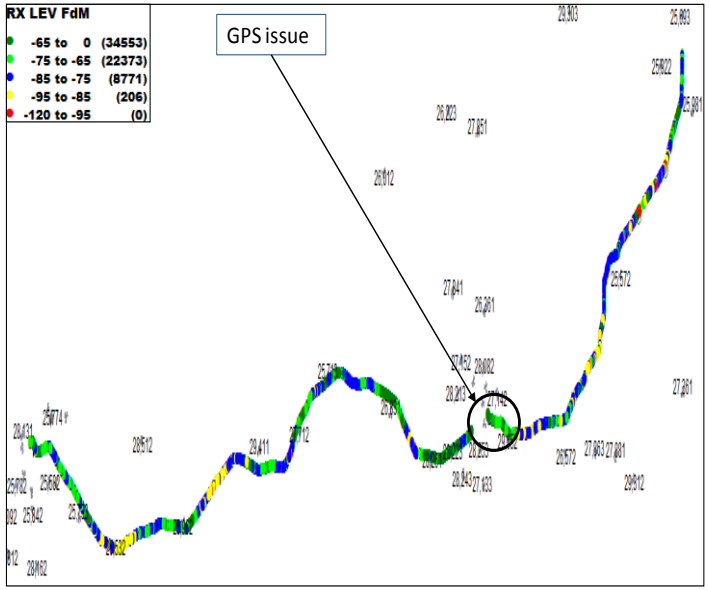
1- TINSUKIYA, MALL ROAD, MARUTI HOTEL

2- POLICE CHOWK

3- CENTRAL MARKET
, RAILWAY STATION

Day 3 – Highways

Rx Level Plot- Day 3
Date of Drive Test- 30/01/2015
Name of SDCAs Covered- Tinsukia Highway Drive



Route Covered- Day 3

1- DUMDONA, MAKOM

2- PANITOLA, CHUBAYA

3- DIKOM, DIBRUGARH

7.1.1.6 DRIVE TEST RESULTS - DIBRUGARH SSA

Executive Summary															
	B'mark	Aircel(DWL)		Airtel		BSNL CDMA		BSNL GSM		Idea		Reliance GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		73.02%	62.69%	61.17%	40.64%	62.42%	45.04%	41.75%	20.41%	89.75%	59.95%	87.95%	51.82%	59.47%	48.52%
0 to -85 dBm		98.61%	88.76%	95.78%	76.31%	90.57%	76.32%	92.36%	51.50%	96.53%	80.04%	99.25%	87.00%	98.64%	85.35%
0 to -95 dBm		99.92%	98.93%	99.93%	94.49%	90.57%	90.44%	99.99%	80.90%	99.68%	93.79%	100.00%	98.14%	99.99%	96.49%
Voice quality	≥ 95%	98.72%	95.32%	97.60%	96.07%	99.98%	92.33%	93.00%	90.21%	98.31%	95.51%	98.02%	91.92%	98.29%	95.92%
CSSR	≥ 95%	100.00%	99.05%	100.00%	100.00%	100.00%	97.08%	97.78%	97.04%	98.92%	98.40%	100.00%	95.14%	100.00%	100.00%
%age Blocked calls		0.00%	0.95%	0.00%	0.00%	0.00%	0.00%	2.22%	2.96%	0.00%	0.93%	0.00%	4.86%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	5.19%	0.00%	4.09%	0.00%	0.00%	0.00%	1.90%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	98.94%	99.65%	100.00%	100.00%	100.00%	83.09%	100.00%	99.17%	100.00%	83.15%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

BSNL GSM failed to meet the benchmark in outdoor as well as indoor locations. BSNL CDMA and Reliance GSM did not meet the benchmark in outdoor locations.

Call Set Success Rate (CSSR)

All operators met the benchmark for CSSR in outdoor as well as indoor locations.

Call Drop Rate

BSNL CDMA and BSNL GSM failed to meet the benchmark in outdoor locations.

7.1.2 FEBRUARY – KAMRUP SSA

Month	Name of SSA Covered	Date of Drive Test
February	KAMRUP	18th , 19th & 20th Feb'15

7.1.2.1 ROUTE DETAILS – KAMRUP SSA

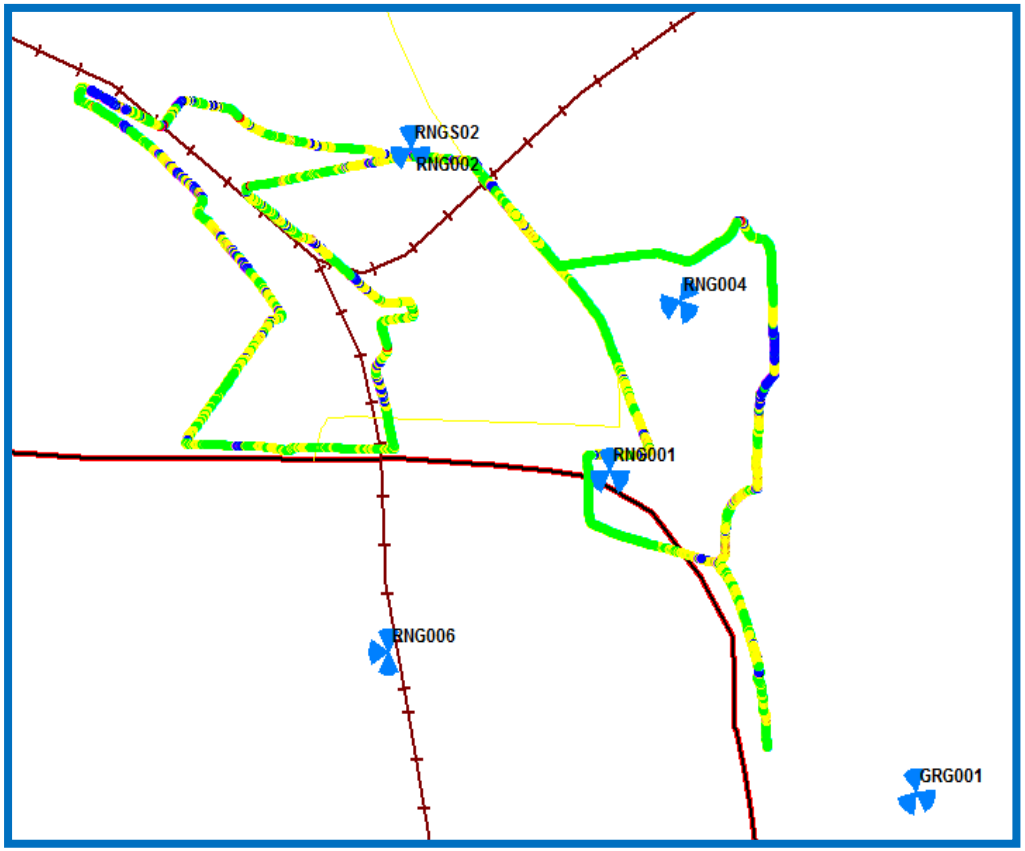
Category	Type of location	Assam		
		KAMRUP		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	1. Baihata Chariali to Dumunichowki – NH Way Drive(10 KM) Dumunichowki to Kurua– via bezera, Mandakata, Suktaguri No 2 Major Rd Drive (25 KM)	2. Guwahati (Part -1) - City Drive(within the city and office Complex).	1. Jalukbari to Khetri - via Khanapara NH Way Drive(50 KM) Hatibagara to Khanapara - via Narengi State High Way Drive(29 KM) Total- (50 + 29) = 79 KM 2. Guwahati (Part -2) - City Drive(within the city and office Complex).
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

The route maps given in the report are provided for the purpose of identifying the routes traversed during the drive tests. We may observe three different colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to any findings in this report. IMRB submits detailed operator wise Drive Test reports separately.

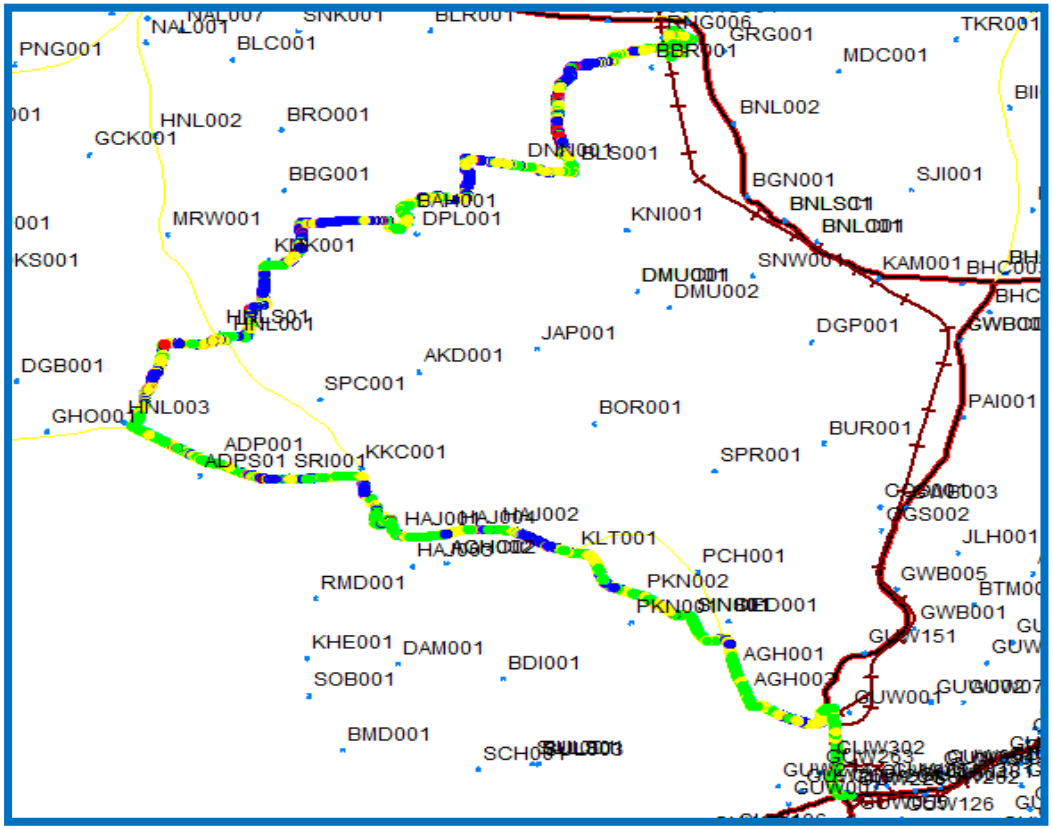
7.1.2.2 KILOMETERS TRAVELLED– KAMRUP SSA

7.1.2.3 ROUTE MAP KAMRUP DAY 1

Day 1 – Within City

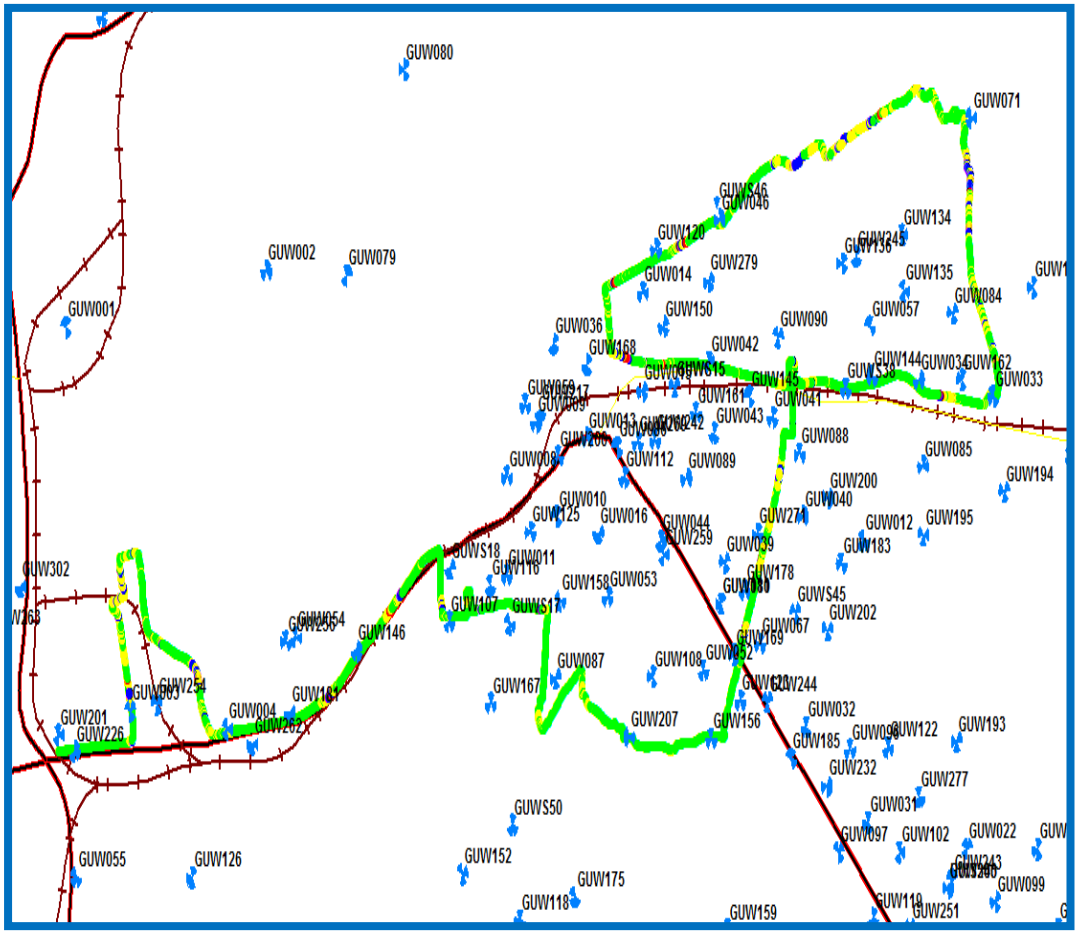


Day 1 – Major Roads

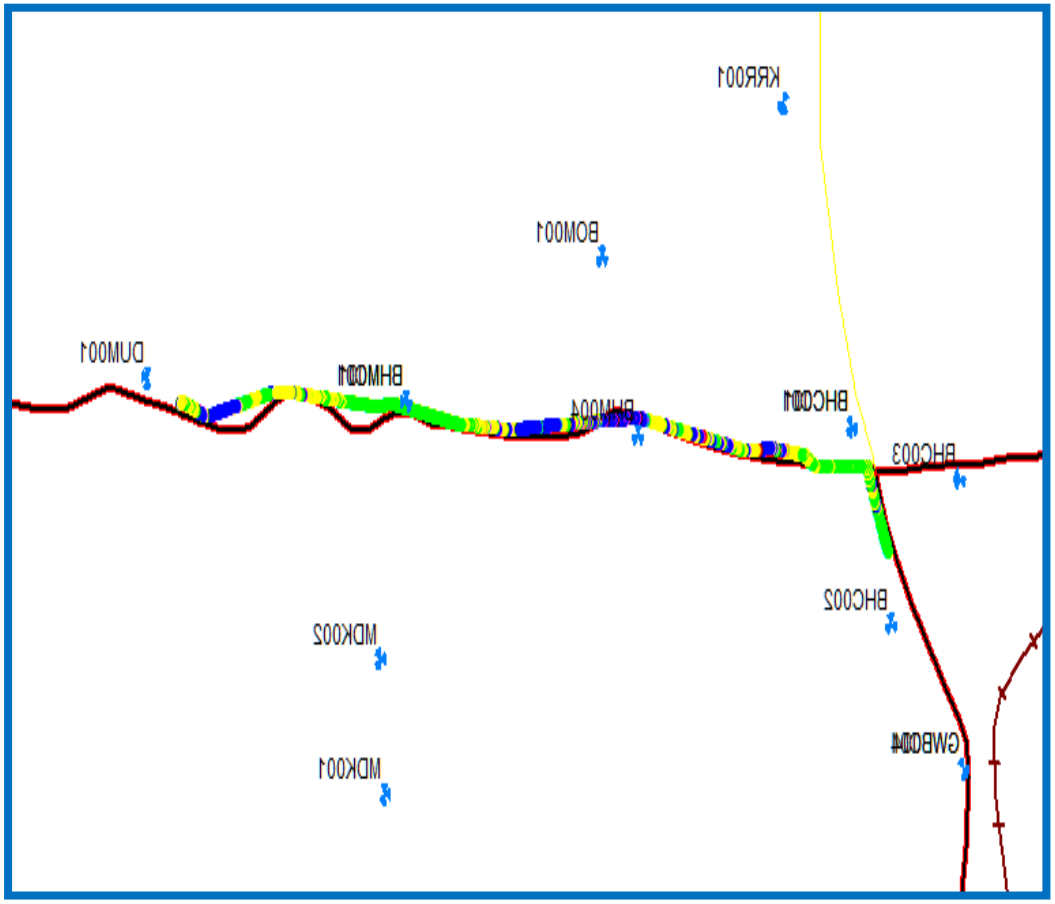


7.1.2.4 ROUTE MAP KAMRUP DAY 2

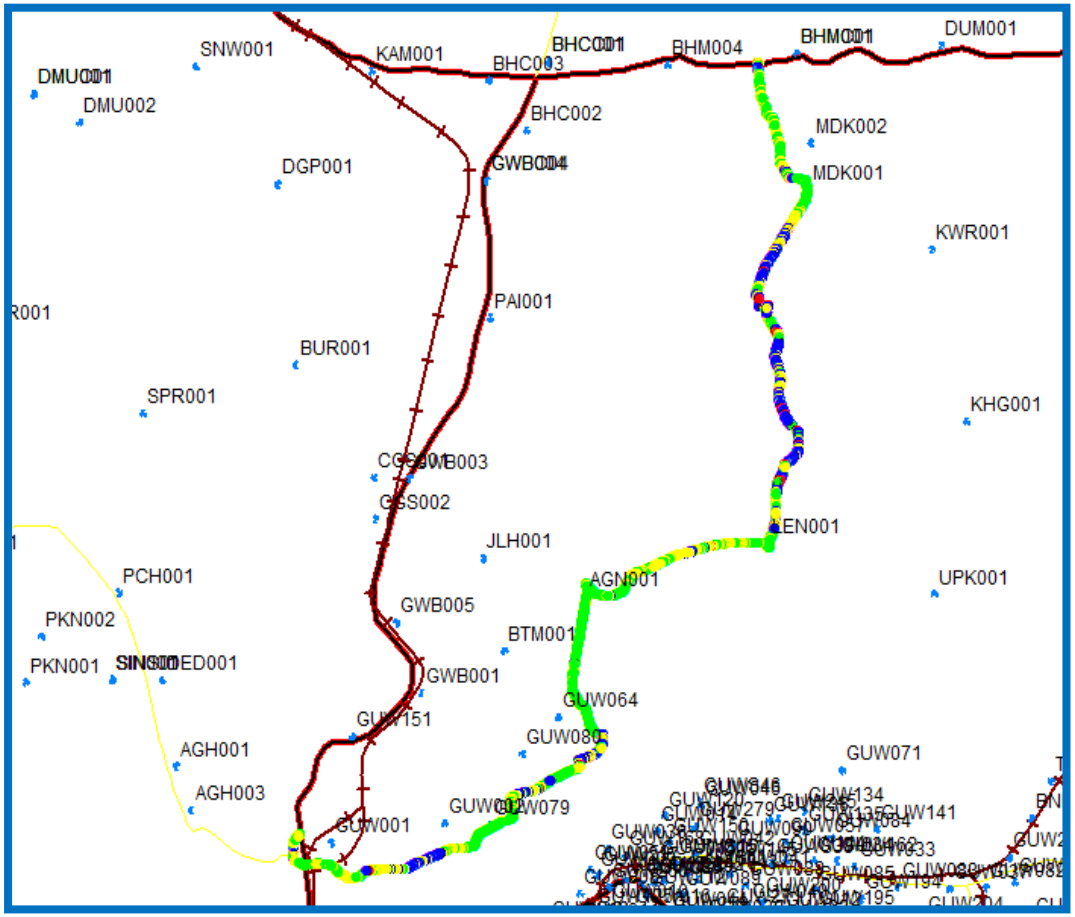
Day 2 – Within City



Day 2 – Highways

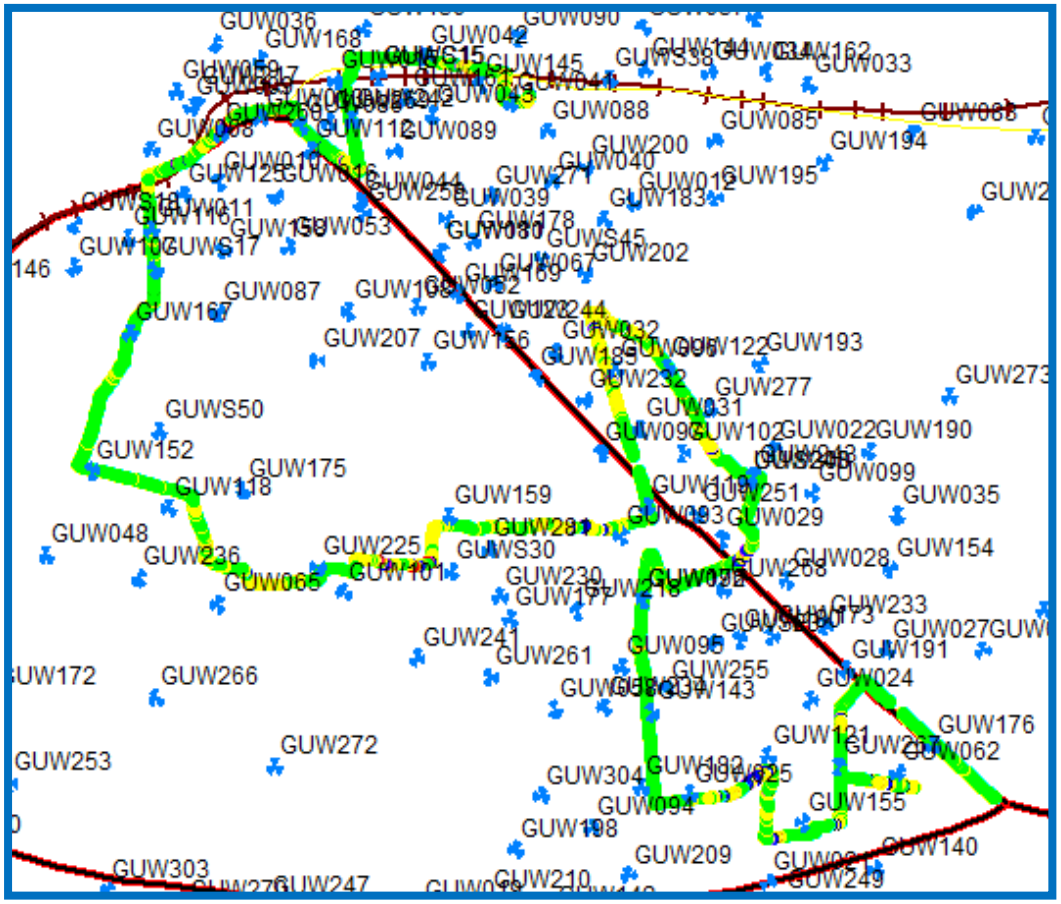


Day 2 – Major Roads

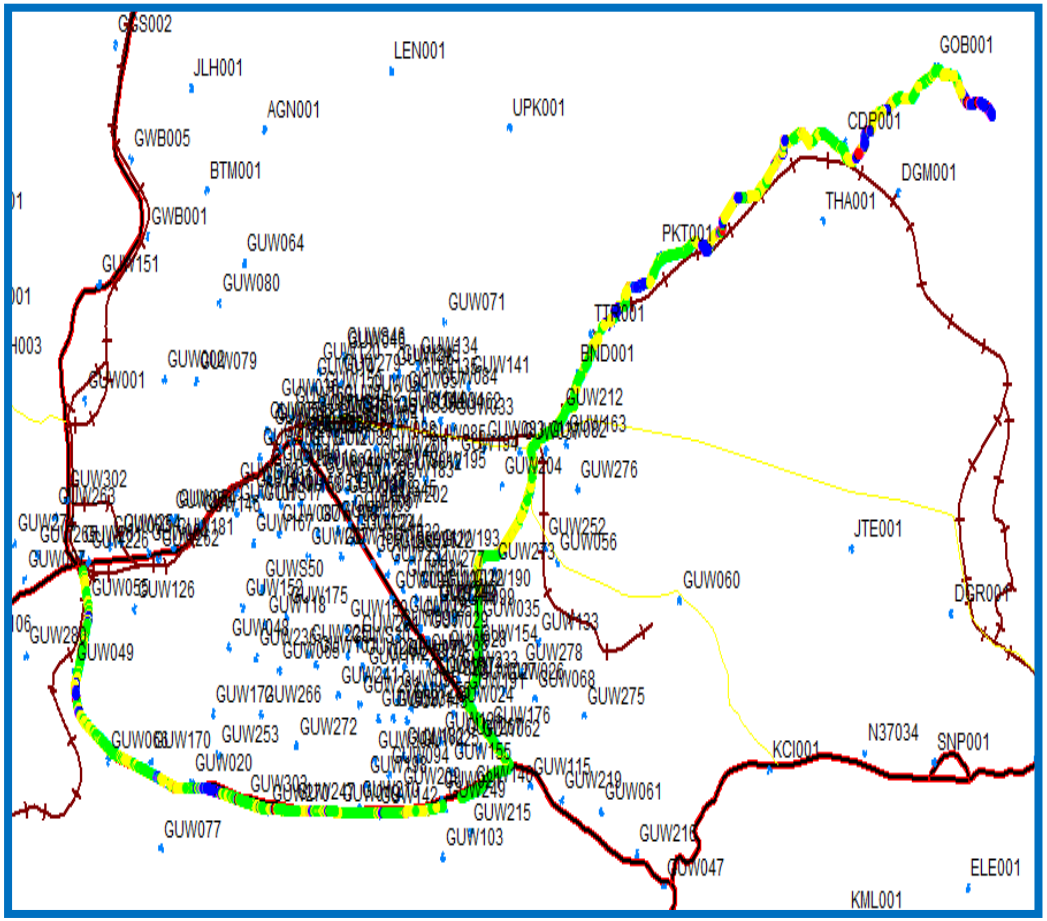


7.1.2.5 ROUTE MAP KAMRUP DAY 3

Day 3 – Within City



Day 3 – Highways



IMRB International | eTech

TRAI
Telecom Regulatory Authority of India
(IS/ISO 9001-2008 Certified Organisation)

7.1.2.6 DRIVE TEST RESULTS – KAMRUP SSA

Executive Summary															
	B'mark	Aircel(DWL)		Airtel		BSNL CDMA		BSNL GSM		Idea		Reliance GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		57.49%	60.25%	78.75%	41.38%	33.33%	28.45%	58.89%	43.32%	66.90%	44.79%	76.16%	71.41%	48.33%	50.63%
0 to -85 dBm		97.09%	88.56%	95.60%	74.24%	100.00%	52.90%	93.73%	73.23%	69.98%	75.82%	98.45%	92.26%	98.97%	85.40%
0 to -95 dBm		99.92%	98.90%	99.88%	92.97%	100.00%	80.59%	99.78%	90.98%	96.05%	94.69%	100.00%	98.81%	99.97%	96.71%
Voice quality	≥ 95%	98.56%	94.97%	95.20%	94.15%	99.86%	93.46%	96.46%	89.88%	97.85%	96.18%	97.49%	90.14%	97.89%	94.35%
CSSR	≥ 95%	100.00%	98.98%	100.00%	99.64%	99.59%	87.40%	100.00%	95.12%	100.00%	99.65%	100.00%	94.82%	100.00%	98.79%
%age Blocked calls		0.00%	1.02%	0.00%	0.21%	0.41%	12.56%	0.00%	4.88%	0.00%	0.35%	0.00%	5.18%	0.00%	1.21%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.21%	0.65%	7.49%	1.11%	4.26%	0.00%	0.00%	0.00%	0.75%	0.00%	0.66%
Hands off success rate		100.00%	99.26%	100.00%	99.72%	99.32%	97.71%	66.67%	90.73%	100.00%	100.00%	100.00%	100.00%	100.00%	98.79%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

Aircel, Airtel, BSNL CDMA, BSNL GSM, Reliance GSM and Vodafone did not meet the benchmark of 95% in outdoor areas.

Call Set Success Rate (CSSR)

BSNL CDMA and Reliance GSM failed to meet the benchmark in outdoor locations.

Call Drop Rate

BSNL CDMA and BSNL GSM failed to meet the benchmark in outdoor areas.

7.1.3 MARCH – SILCHAR SSA

Month	Name of SSA Covered	Date of Drive Test
March	Silchar	18/03/15 to 20/03/15

7.1.3.1 ROUTE DETAILS – SILCHAR SSA

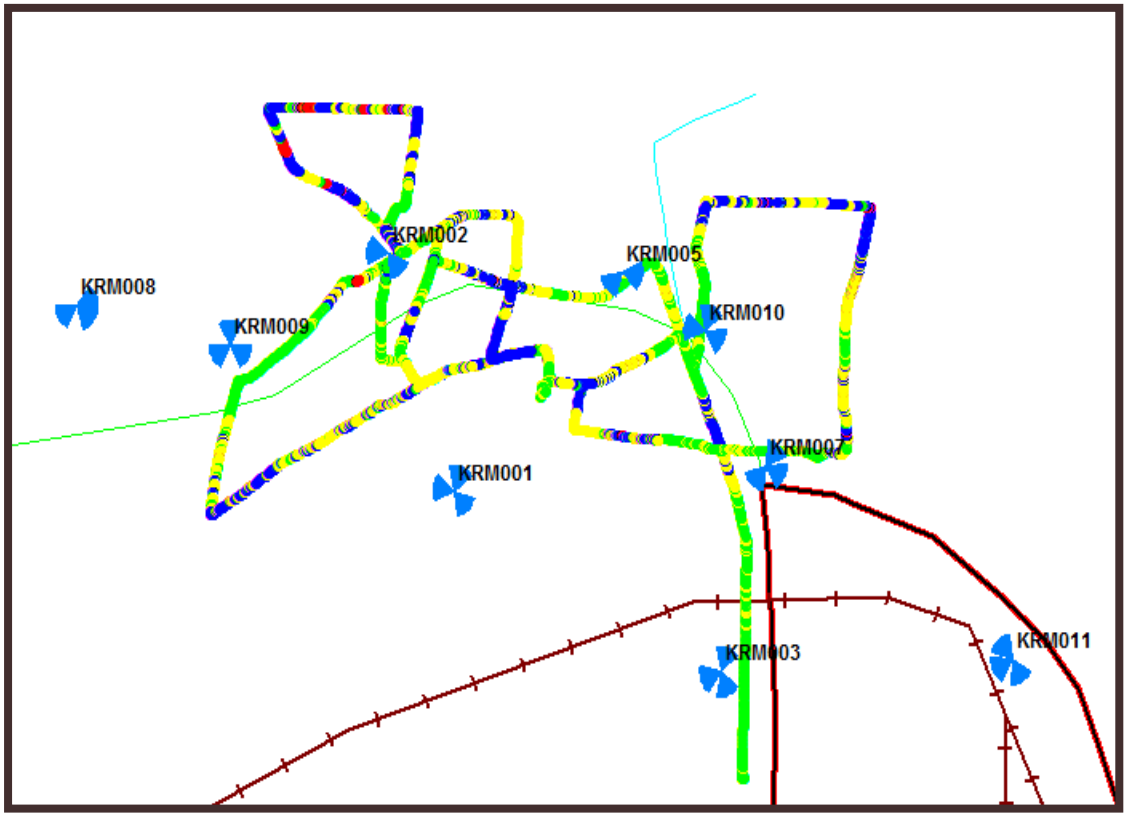
Category	Type of location	Assam		
		Silchar		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	1. Silchar to Bazarghat F.V– NH Way Drive (108 KM) 2. Karimganj - City Drive(within the city and office Complex).	1. Panchgram to Sultanicherra T E– NH Way Drive via Algapur Pt IV, Choto Jalenga Pt II, hailakandi, Lalapur (102 KM) 2. Hailakandi - City Drive(within the city and office Complex).	1. Kalain to Jirighat- NH Way Drive via Saidpur, binnakandi Grant, Lakhipur (81 KM) 2. Silchar - City Drive(within the city and office Complex).
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

The route maps given in the report are provided for the purpose of identifying the routes traversed during the drive tests. We may observe three different colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to any findings in this report. IMRB submits detailed operator wise Drive Test reports separately.

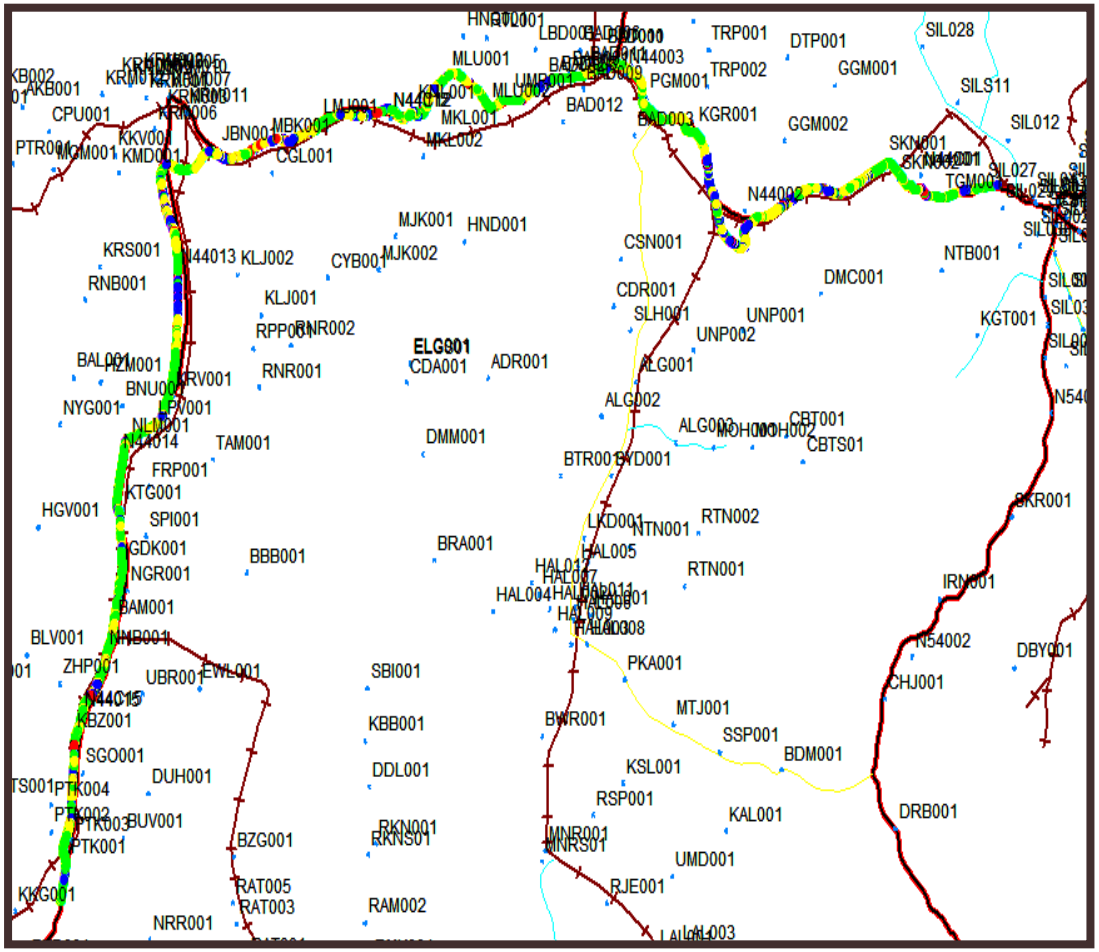
7.1.3.2 KILOMETERS TRAVELLED – SILCHAR SSA

7.1.3.3 ROUTE MAP SILCHAR DAY 1

Day 1 – Within City

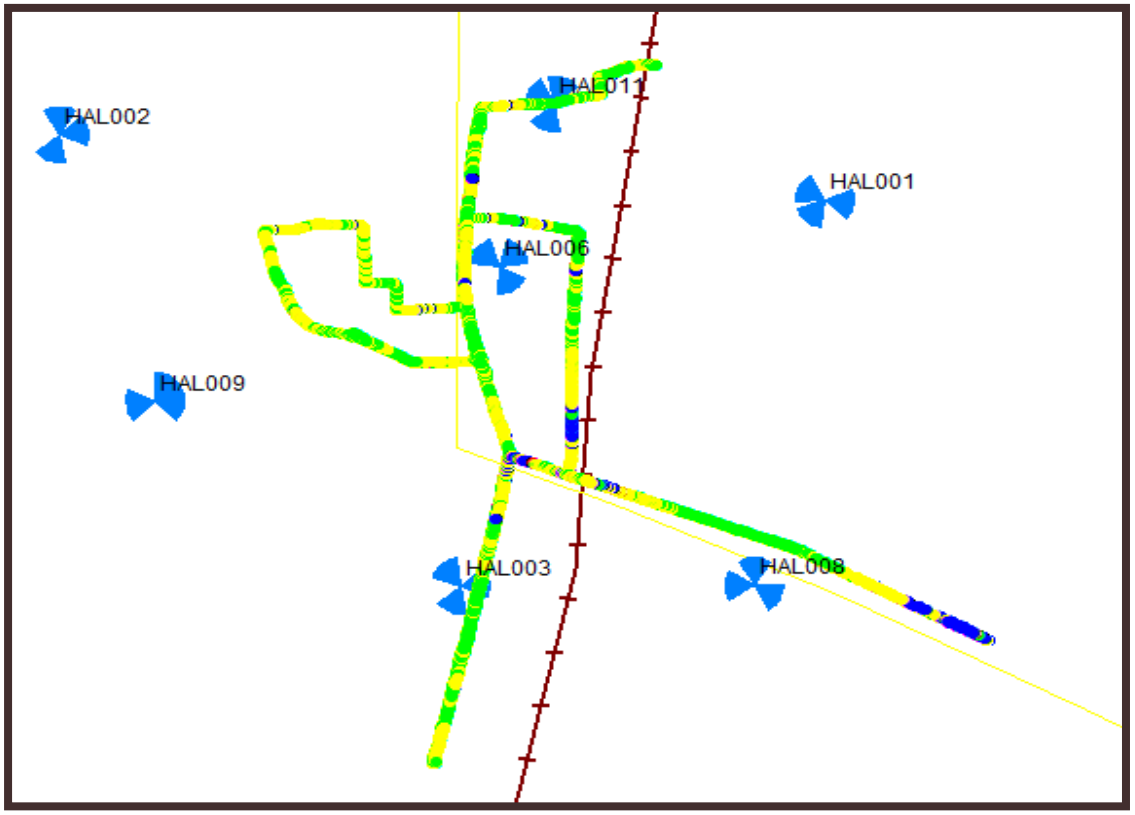


Day 1 – Highways

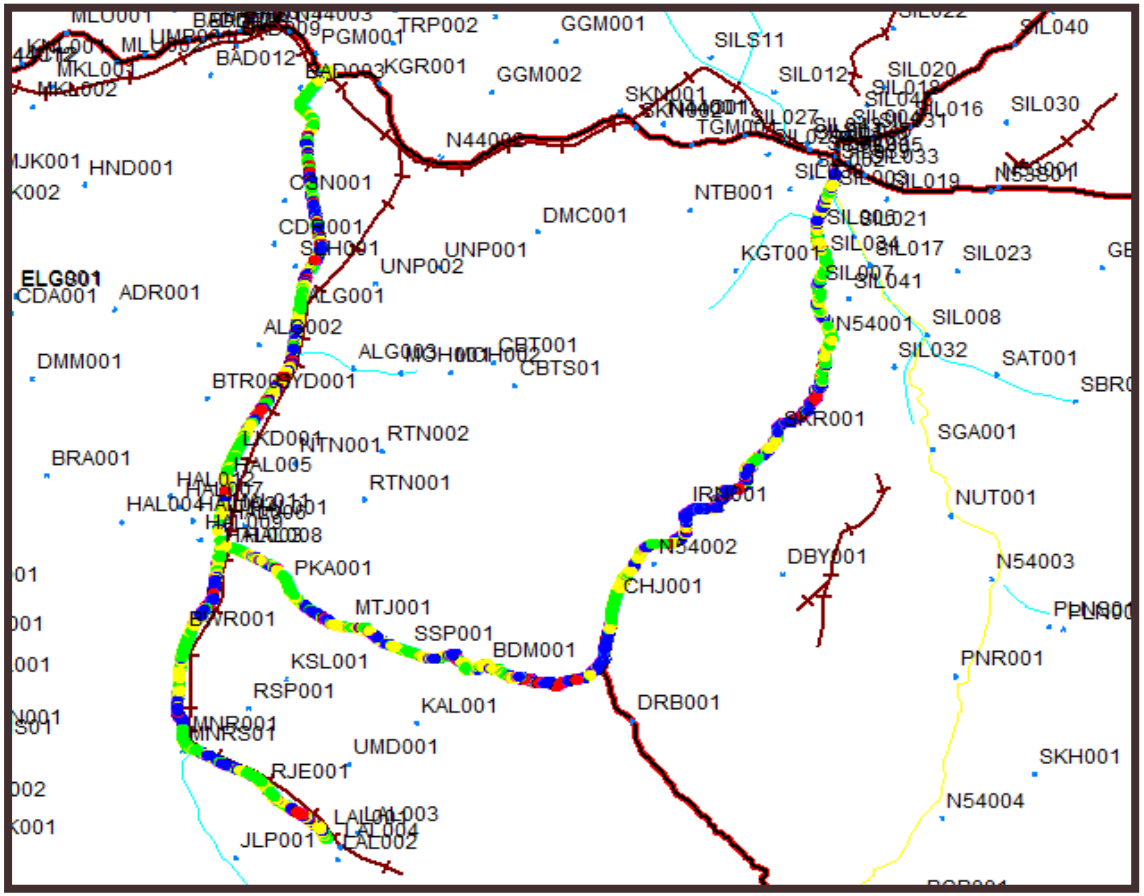


7.1.3.4 ROUTE MAP SILCHAR DAY 2

Day 2 – Within City

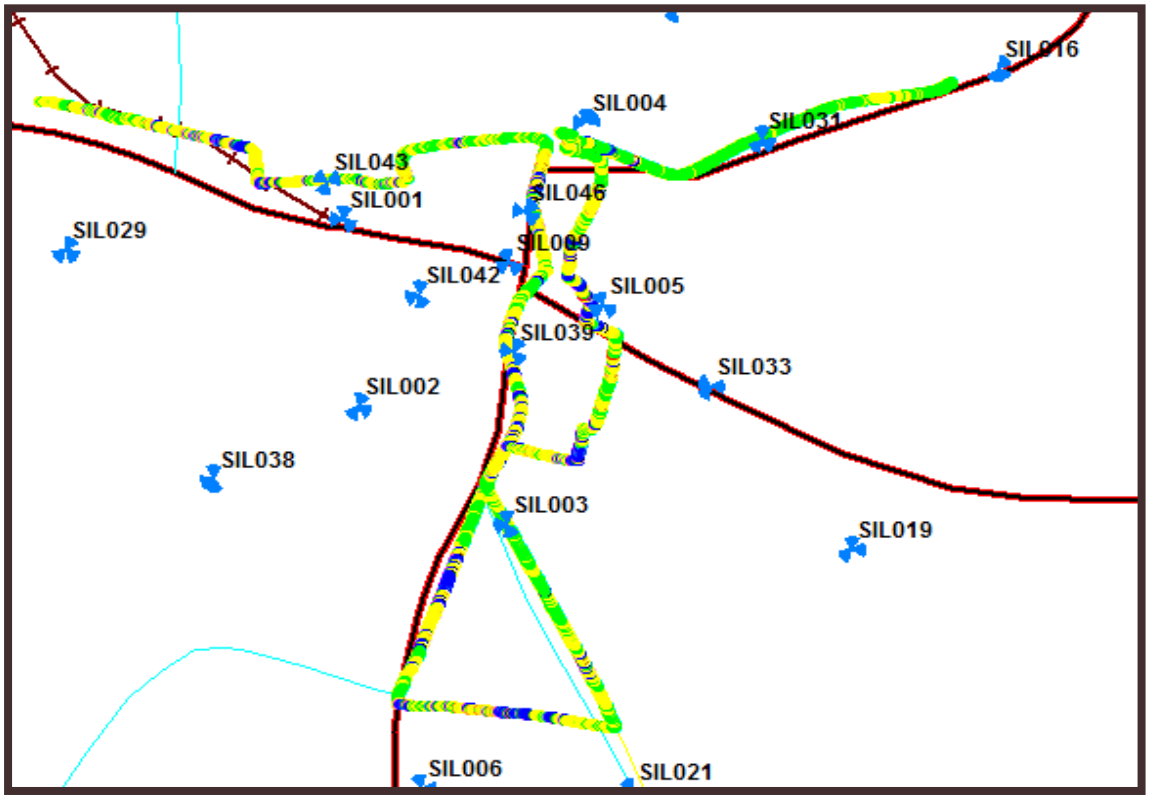


Day 2 – Highways

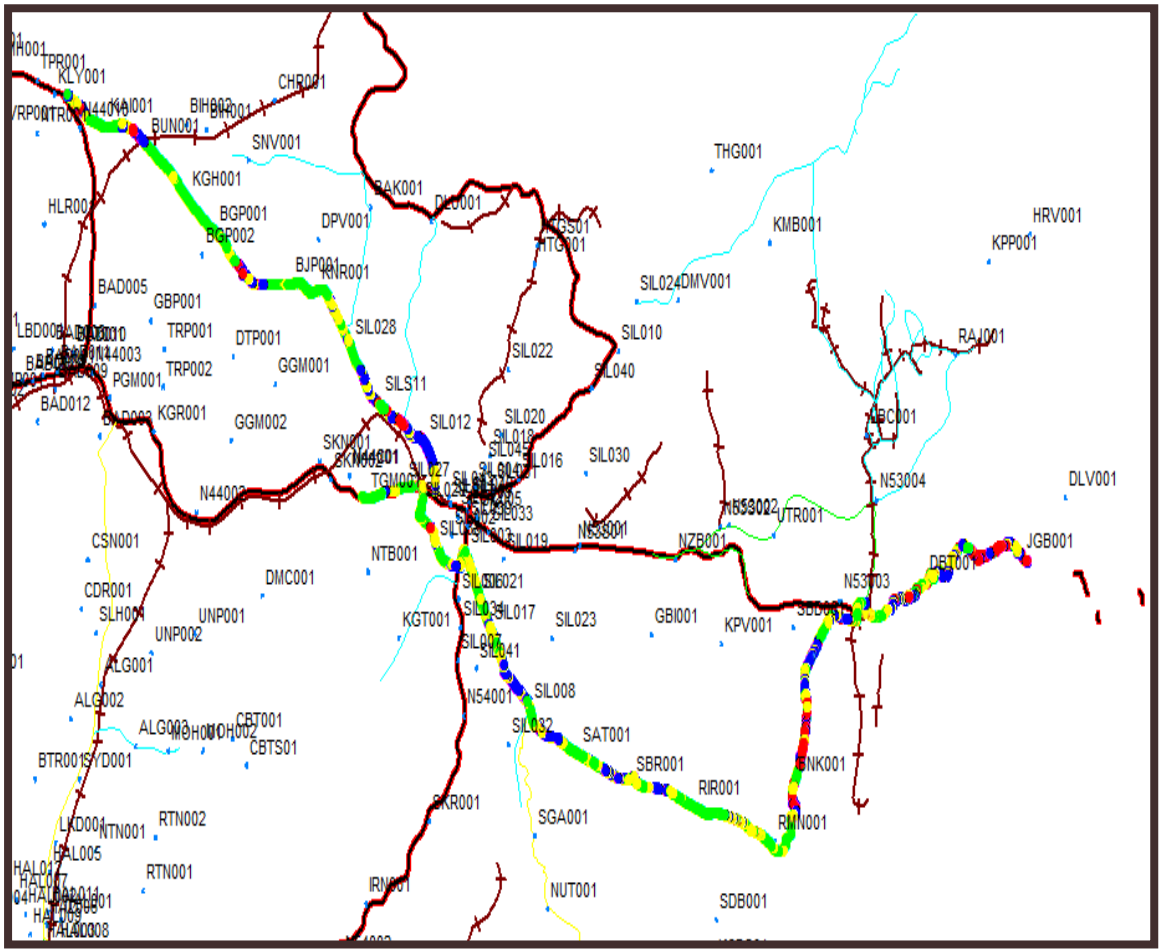


7.1.3.5 ROUTE MAP SILCHAR DAY 3

Day 3 – Within City



Day 3 – Highways



7.1.3.6 DRIVE TEST RESULTS – SILCHAR SSA

Executive Summary															
	B'mark	Aircel(DWL)		Airtel		BSNL CDMA		BSNL GSM		Idea		Reliance GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		57.49%	65.70%	95.88%	64.59%	98.97%	40.60%	84.67%	31.21%	78.42%	65.88%	78.60%	55.95%	28.11%	35.30%
0 to -85 dBm		97.09%	92.70%	99.93%	90.93%	100.00%	64.23%	98.67%	62.17%	97.40%	89.41%	97.85%	86.48%	96.05%	68.75%
0 to -95 dBm		99.92%	99.30%	100.00%	99.23%	100.00%	90.63%	100.00%	89.68%	99.66%	97.22%	100.00%	98.55%	99.89%	91.57%
Voice quality	≥ 95%	97.05%	95.06%	99.17%	95.50%	99.98%	94.71%	99.17%	91.91%	96.23%	94.13%	99.09%	93.55%	98.46%	91.93%
CSSR	≥ 95%	100.00%	99.83%	100.00%	99.64%	97.85%	92.38%	100.00%	93.21%	100.00%	98.41%	100.00%	95.01%	100.00%	99.60%
%age Blocked calls		0.00%	0.17%	0.00%	0.36%	2.15%	7.62%	0.00%	4.60%	0.00%	1.59%	0.00%	4.64%	0.00%	0.40%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	4.14%	0.00%	4.33%	0.00%	0.23%	0.00%	0.61%	0.00%	0.19%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	99.69%	99.41%	100.00%	97.90%	100.00%	97.14%	100.00%	83.79%	100.00%	99.57%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

BSNL CDMA, BSNL GSM, Idea, Reliance GSM and Vodafone failed to meet the benchmark in outdoor areas.

Call Set Success Rate (CSSR)

BSNL CDMA and BSNL GSM failed to meet the benchmark in outdoor locations.

Call Drop Rate

BSNL CDMA and BSNL GSM failed to meet the benchmark in outdoor locations.

8 ANNEXURE - CONSOLIDATED

8.1 NETWORK AVAILABILITY

Audit Results for Network Availability								
	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		7904	9855	728	4062	3718	4703	9051
Sum of downtime of BTSs in a month (in hours)		189695	9472	72328	62026	18462	10656	31923
BTSs accumulated downtime (not available for service)	≤ 2%	3.32%	0.13%	13.80%	2.12%	0.69%	0.31%	0.49%
Number of BTSs having accumulated downtime >24 hours		1438	53	175	145	47	63	143
Worst affected BTSs due to downtime	≤ 2%	18.18%	0.54%	24.04%	3.58%	1.25%	1.34%	1.58%

Live Measurement- BTSs accumulated downtime								
	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		7891	9829	727	4062	3713	4703	9051
Sum of downtime of BTSs in a month (in hours)		17830	757	7020	6298	1865	7257	2478
(not available for service)	≤ 2%	3.14%	0.11%	13.41%	2.15%	0.70%	2.14%	0.38%
Number of BTSs having accumulated downtime >24 hours		183	0	25	27	35	63	8
Live Mesurement - Worst affected BTSs due to downtime	≤ 2%	2.32%	0.00%	3.44%	0.66%	0.93%	1.34%	0.09%

Data Source: Operations and Maintenance Center (OMC) of the operators

8.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, SDCCH and TCH congestion								
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	94.34%	97.48%	98.18%	95.96%	97.19%	98.61%	99.52%
SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	1.40%	0.45%	2.47%	0.84%	0.58%	0.02%	0.13%
TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	3.93%	1.10%	0.00%	1.12%	1.84%	0.07%	0.48%

Data Source: Network Operations Center (NOC) of the operators

Live measurement results for CSSR, SDCCH and TCH congestion								
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	97.75%	97.51%	98.08%	92.40%	99.08%	98.62%	99.80%
SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.52%	0.31%	2.92%	0.50%	0.27%	0.02%	0.07%
TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	1.36%	1.17%	0.33%	1.75%	0.49%	0.07%	0.20%

Data Source: Network Operations Center (NOC) of the operators

Drive test results for CSSR (Average of three drive tests) and blocked calls								
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		1460	1402	1802	1500	1313	1279	1466
Total number of successful calls established		1451	1398	1632	1438	1297	1226	1459
CSSR	≥ 95%	99.38%	99.73%	91.68%	95.96%	98.70%	95.99%	99.58%
Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
%age blocked calls		0.62%	0.27%	8.32%	4.04%	1.30%	4.01%	0.42%

Data Source: Drive test reports submitted by operators to auditors

8.3 CONNECTION MAINTENANCE (RETAINABILITY)

Audit Results for Call drop rate and for number of cells having more than 3% TCH								
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		527208718	567572813	1735838	1317888036	85427592	191401949	12099161
Total number of calls dropped		8304964	5226131	28460	24297762	1100103	1302616	66242
Call drop rate	≤ 2%	1.58%	0.92%	1.65%	1.84%	1.29%	0.68%	0.55%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		23376	29543	2061	11943	11156	14394	27292
Total number of cells having more than 3% TCH		3096	276	206	412	123	21	763
Worst affected cells having more than 3% TCH	≤ 3%	13.26%	0.93%	9.99%	3.45%	1.10%	0.15%	2.79%

Data Source: Network Operations Center (NOC) of the operators and Drive test reports submitted by operators to auditors

Live measurement results for Call drop rate and for number of cells having more than 3% TCH								
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		606231975	58265673	149721	133681078	97292960	20449312	6357861
Total number of calls dropped		7411567	511346	2473	2782854	978958	131488	29092
Call drop rate	≤ 2%	1.22%	0.88%	1.59%	2.08%	1.01%	0.64%	0.46%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		23319	29572	2061	11943	11141	14394	27292
Total number of cells having more than 3% TCH		2854	264	153	523	121	21	708
Worst affected cells having more than 3% TCH	≤ 3%	12.25%	0.89%	7.42%	4.38%	1.08%	0.15%	2.59%

Drive test results for Call drop rate (Average of three drive tests)								
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		1451	1398	1748	1438	1297	1226	1461
Total number of calls dropped		0	1	85	50	1	10	4
Call drop rate	≤ 2%	0.00%	0.06%	4.60%	3.38%	0.09%	0.86%	0.24%

Data Source: Network Operations Center (NOC) of the operators and Drive test reports submitted by operators to auditors

8.4 VOICE QUALITY

Audit Results for Voice quality								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		58151000949	57267678297	185285	208028	10807013887	29075135210	2182477412
Total number of calls with good voice quality		53158298568	56472213394	175752	197382	10275130705	28572239520	2142640624
%age calls with good voice quality	≥ 95%	91.40%	98.61%	94.84%	94.64%	95.08%	98.27%	98.17%

Live measurement results for Voice quality								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		60502352043	5878635176	185285	208028	11091335541	3248118658	1074413198
Total number of calls with good voice quality		56338879564	5798443100	175752	197382	10620875005	3189377044	1058972299
%age calls with good voice quality	≥ 95%	93.12%	98.64%	94.84%	94.64%	95.76%	98.19%	98.56%

Drive test results for Voice quality (Average of three drive tests)								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		2159937	2103642	185285	2122798	2149387	2142947	2326245
Total number of calls with good voice quality		2063452	2002342	175752	1947311	2054683	1979626	2202142
%age calls with good voice quality	≥ 95%	95.56%	95.31%	94.84%	91.73%	95.56%	92.56%	94.68%

Data Source: Network Operations Center (NOC) of the operators and Drive test reports submitted by operators to auditors

8.5 POI CONGESTION

Audit Results for POI Congestion								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		51	15	0	19	30	23	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		87101	104370	0	19643	25470	31305	59400144
Traffic served for all POIs (B)- in erlangs		60105	36433	0	20223	17586	20479	15873803
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.03%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		51	16	0	19	30	23	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		86781	104810	0	19643	24326	31289	5991770
Traffic served for all POIs (B)- in erlangs		59435	36024	0	18057	16845	20712	1609175
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center (NOC) of the operators

Note: Auditors were not able to get the POI data from BSNL CDMA as the operator has been using the POI of BSNL GSM.

8.6 TOTAL CALL MADE DURING THE DRIVE TEST-VOICE QUALITY

January							
Voice quality	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls	613404	627832	78816	548126	653686	564319	691613
February							
Voice quality	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls	840717	836839	59085	865289	796679	919227	926034
March							
Voice quality	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls	705816	638971	47384	709383	699022	659401	708598

Data Source: Drive test reports submitted by operators to auditos

8.7 METERING AND BILLING CREDIBILITY

Audit Results for Billing performance Postpaid-Consolidated								
Billing Performance	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	RTL	Vodafone
Metering and billing credibility - Postpaid (Avg of 3 billing cycles)								
Metering and billing credibility - Postpaid								
Total bills generated during the period		215931	216024	44229	632490	40572	331203	231109
Total number of bills disputed		97	88	20	38	29	301	751
Total number of valid billing complaints		3	13	20	38	3	246	629
Total complaints considered invalid		94	75	0	0	26	55	122
Percentage bills disputed (Avg of 3 billing cycles)	≤ 0.1%	0.04%	0.04%	0.05%	0.01%	0.07%	0.09%	0.33%
January								
Total no. of bills issued during the Period 1st billing cycle		71430	71994	15019	212098	13256	109560	75191
Total no. of valid billing complaints during the Period 1st billing cycle		1	4	5	13	1	83	217
Total no. of complaints considered invalid during the Period 1st billing cycle		25	37	0	0	9	15	51
No. of complaints from customers / bills disputed during the Period 1st billing cycle		26	41	5	13	10	98	268
Percentage of Billing complaints per 100 bills issued during the Period 1st billing cycle	≤ 0.1%	0.04%	0.06%	0.03%	0.01%	0.08%	0.09%	0.36%

Data Source: Billing Center of the operators

February								
Total no. of bills issued during the Period 2nd billing cycle		72052	71749	14648	210867	13295	110123	77013
Total no. of valid billing complaints during the Period 2nd billing cycle		0	6	6	13	2	72	228
Total no. of complaints considered invalid during the Period 2nd billing cycle		36	23	0	0	9	32	28
No. of complaints from customers / bills disputed during the Period 2nd billing cycle		36	29	6	13	11	104	256
Percentage of Billing complaints per 100 bills issued during the Period 2nd billing cycle	≤ 0.1%	0.05%	0.04%	0.04%	0.01%	0.08%	0.09%	0.33%
March								
Total no. of bills issued during the Period 3rd billing cycle		72449	72281	14562	209525	14021	111520	78905
Total no. of valid billing complaints during the Period 3rd billing cycle		2	3	9	12	0	91	184
Total no. of complaints considered invalid during the Period 3rd billing cycle		33	15	0	0	8	8	43
No. of complaints from customers / bills disputed during the Period 3rd billing cycle		35	18	9	12	8	99	227
Percentage of Billing complaints per 100 bills issued during the Period 3rd billing cycle	≤ 0.1%	0.05%	0.02%	0.06%	0.01%	0.06%	0.09%	0.29%

Data Source: Billing Center of the operators

Metering and billing credibility - Prepaid								
Performance prepaid	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	RTL	Vodafone
Total no. of prepaid customers during the Period		4255717	4870443	54384	923823	794963	2174279	3351562
Total no. of valid billing complaints during the Period		26	118	2	610	672	1398	1889
Total no. of complaints considered invalid during the Period		26598	1079	0	17	656	236	1548
Total no. of complaints related to charging, credit & validity during the Period		26624	1197	2	610	1328	1634	3437
Percentage of complaints per 100 customers during the Period	≤ 0.1%	0.63%	0.02%	0.00%	0.07%	0.17%	0.08%	0.10%

Data Source: Billing Center of the operators

Resolution of billing complaints (Postpaid+Prepaid)-Consolidated								
Billing Performance	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	RTL	Vodafone
Total no. of billing/charging resolved complaints during the Period		29	131	22	648	675	1644	2518
Total no. of complaints considered invalid during the Period		26692	1154	0	17	682	291	1670
Total no. of billing complaints received during the Period		26721	1285	22	665	1357	1935	4188
Total no. of complaints resolved within 4 weeks from date of receipt for complaints listed		29	131	22	648	675	1644	2518
Percentage of complaints resolved within 4 weeks from date of receipt	≥ 98%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Total no. of complaints resolved within 6 weeks from date of receipt for complaints listed		29	131	22	648	675	1644	2518
Percentage of complaints resolved within 6 weeks from date of receipt	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Period of applying credit / waiver								
Total number of complaints where credit/waiver is required		29	131	0	670	684	1644	747
Percentage cases in which credit/waiver was received within 1 week	100%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Billing Center of the operators

Live calling results for resolution of billing complaints								
Resolution of billing complaints	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	RTL	Vodafone
Total Number of calls made		100	100	NA	100	100	100	100
Number of cases resolved in 4 weeks		63	80	NA	70	74	81	82
Percentage cases resolved in 4 weeks	≥ 98%	63.00%	80.00%	NA	70.00%	74.00%	81.00%	82.00%
Number of cases resolved in 6 weeks		74	87	NA	78	81	88	90
Percentage cases resolved in 6 weeks	100.00%	74.00%	87.00%	NA	78.00%	81.00%	88.00%	90.00%

Data Source: Billing Center of the operators

8.8 CUSTOMER CARE

Audit results for customer care (IVR and voice-to-Voice) -Consolidated								
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	RTL	Vodafone
Total number of call attempts to customer care for assistance		16563804	2152444	9368	1022328	3541284	10385131	12003666
Number of calls getting connected and answered (electronically)		0	2152242	9368	1008803	3521665	10280018	12001930
Percentage calls getting connected and answered	≥ 95%	0.00%	99.99%	100.00%	98.68%	99.45%	98.99%	99.99%

Data Source: Customer Service Center of the operators

Audit results for customer care (voice-to-Voice)- (Avg of 3 months)-Consolidated								
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	RTL	Vodafone
Total Number of calls received (3 months)		2697063	2164469	5009	658450	880162	2096383	3013622
Total Number of calls answered within 90 seconds (3 months)		2507446	2139529	4867	632248	866726	1767051	3013622
Percentage calls answered within 90 seconds (Avg of 3 months)	≥ 95%	92.97%	98.85%	97.17%	96.02%	98.47%	84.29%	100.00%

Data Source: Customer Service Center of the operators

January								
Total calls received (Month 1)		883755	770157	1693	201140	279758	711876	1025407
Total calls answered within 90 seconds (Month 1)		811613	765656	1660	190278	274226	547744	1025407
% calls answered within 90 seconds (Month 1)	≥ 95%	91.84%	99.42%	98.05%	94.60%	98.02%	76.94%	100.00%
February								
Total calls received (Month 2)		869883	695422	1422	192825	274486	718264	928279
Total calls answered within 90 seconds (Month 2)		835142	681648	1384	187271	270013	597236	928279
% calls answered within 90 seconds (Month 2)	≥ 95%	96.01%	98.02%	97.33%	97.12%	98.37%	83.15%	100.00%
March								
Total calls received (Month 3)		943425	698890	1894	264485	325918	666243	1059936
Total calls answered within 90 seconds (Month 3)		860691	692225	1823	254699	322487	622071	1059936
% calls answered within 90 seconds (Month 3)	≥ 95%	91.23%	99.05%	96.25%	96.30%	98.95%	93.37%	100.00%

Data Source: Live calls made by auditors from operator's network

Live calling results for customer care (IVR)								
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	RTL	Vodafone
Total number of call attempts to customer care for assistance		100	100	100	100	100	100	100
Number of calls getting connected and answered (electronically)		100	97	100	100	100	100	100
Percentage calls getting connected and answered	≥ 95%	100.00%	97.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Live calling results for customer care (Voice to Voice)								
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	RTL	Vodafone
Total Number of calls received		80	97	88	38	100	70	100
Total Number of calls getting connected and answered		80	92	69	26	84	57	86
Live Calling Percentage calls getting connected and answered	≥ 95%	100.00%	94.85%	78.41%	68.42%	84.00%	81.43%	86.00%

8.9 TERMINATION / CLOSURE OF SERVICE

Audit results for termination / closure of service-Consolidated								
Termination	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	RTL	Vodafone
Total number of closure request		918	1173	761	864	499	820	879
Number of requests attended within 7 days		918	1173	761	864	499	820	879
Percentage cases in which termination done within 7 days	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Customer Service Center of the operators

8.10 TIME TAKEN FOR REFUND OF DEPOSITS AFTER CLOSURE

Audit results for refund of deposits-Consolidated								
Refund	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	RTL	Vodafone
Total number of cases requiring refund of deposits		802	238	196	806	283	1744	1270
Total number of cases where refund was made within 60 days		802	238	196	806	283	1744	1270
Percentage cases in which refund was receive within 60 days	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Billing Center of the operators

8.11 ADDITIONAL NETWORK RELATED PARAMETERS

Audit Results for Total Traffic Handled in Erlang							
Traffic in Erlang	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	RTL	Vodafone
Eqipped capacity of the network	191567	143925	33750	108000	29547	132000	117851
Total taffic handled in erlang during TCBH	208198	139951	252	20223	22406	55202	107158
Total no. of customers served (as per VLR)	3596924	4767186	10278	1041537	756780	1934716	3006828

Data Source: Network Operations Center (NOC) of the operators

8.12 LIVE CALLING RESULTS FOR RESOLUTION OF SERVICE REQUESTS

Live calling results for resolution of service requests							
Resolution of service requests	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	RTL	Vodafone
Total Number of calls made	100	100	NA	100	100	100	100
Number of cases resolved to satisfaction	83	78	NA	73	84	52	88
Percentage cases resolved in four weeks	83.00%	78.00%	NA	73.00%	84.00%	52.00%	88.00%

Data Source: Live calls made by auditors from operator's network

Note: Auditors were not able to get the raw data for live calling from the central customer service center of BSNL CDMA as the operator was unable to provide the same due to low base of service complaints.

8.13 LIVE CALLING RESULTS FOR LEVEL 1 SERVICES

Live calling for level 1 services								
Level 1 services		Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	RTL	Vodafone
Total no. of calls made		150	150	150	150	150	150	150
Calls answered		145	150	150	150	150	150	150
% of calls connected	≥ 95%	96.67%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Live calls made by auditors from operator's network

8.14 LEVEL 1 SERVICE CALLS MADE

All the numbers given in mandatory list in Section 2.4.2.4.1 were tested. The following table provides the numbers that are activated for each operator. A tick (✔) for an operator signifies that the number was active for the operator.

Live calls were made to the active numbers to test the calls answered. The details of the same have been given below for each operator.

Aircel					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		15	14
101	Fire		×		
102	Ambulance	✓		14	13
104	Health Information Helpline				
108	Emergency and Disaster Management Helpline	✓		15	14
138	All India Helpine for Passangers	✓		14	13
149	Public Road Transport Utility Service		×		
181	Chief Minister Helpline		×		
182	Indian Railway Security Helpline	✓		14	13
1033	Road Accident Management Service		×		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		×		
1056	Emergency Medical Services		×		
106X	State of the Art Hospitals		×		
1063	Public Grievance Cell DoT Hq	✓		12	12
1064	Anti Corruption Helpline		×		
1070	Relief Commission for Natural Calamities		×		
1071	Air Accident Helpline		×		
1072	Rail Accident Helpline		×		
1073	Road Accident Helpline		×		
1077	Control Room for District Collector	✓		12	12
1090	Call Alart (Crime Branch)		×		
1091	Women Helpline		×		
1097	National AIDS Helpline to NACO	✓		13	13
1099	Central Accident and Trauma Services (CATS)		×		
10580	Educationa & Vocational Guidance and Counselling		×		
10589	Mother and Child Tracking (MCTH)		×		
10740	Central Pollution Control Board		×		
10741	Pollution Control Board		×		
1511	Police Related Service for all Metro Railway Project		×		
1512	Prevention of Crime in Railway		×		
1514	National Career Service(NCS)		×		
15100	Free Legal Service Helpline		×		
155304	Municipal Corporations		×		
155214	Labour Helpline		×		
1903	Sashastra Seema Bal (SSB)	✓		14	14
1909	National Do Not Call Registry	✓		14	14
1912	Complaint of Electricity	✓		13	13
1916	Drinking Water Supply		×		

1950	Election Commission of India		×		
Airtel					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		14	14
101	Fire		×		
102	Ambulance	✓		13	13
104	Health Information Helpline	✓		14	14
108	Emergency and Disaster Management Helpline	✓		14	14
138	All India Helpine for Passangers	✓		15	15
149	Public Road Transport Utility Service		×		
181	Chief Minister Helpline		×		
182	Indian Railway Security Helpline		×		
1033	Road Accident Management Service		×		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		×		
1056	Emergency Medical Services		×		
106X	State of the Art Hospitals				
1063	Public Grievance Cell DoT Hq	✓		13	13
1064	Anti Corruption Helpline		×		
1070	Relief Commission for Natural Calamities	✓		13	13
1071	Air Accident Helpline		×		
1072	Rail Accident Helpline	✓		14	14
1073	Road Accident Helpline		×		
1077	Control Room for District Collector		×		
1090	Call Alart (Crime Branch)		×		
1091	Women Helpline		×		
1097	National AIDS Helpline to NACO	✓		13	13
1099	Central Accident and Trauma Services (CATS)		×		
10580	Educationa & Vocational Guidance and Counselling		×		
10589	Mother and Child Tracking (MCTH)		×		
10740	Central Pollution Control Board		×		
10741	Pollution Control Board		×		
1511	Police Related Service for all Metro Railway Project		×		
1512	Prevention of Crime in Railway	✓		14	14
1514	National Career Service(NCS)		×		
15100	Free Legal Service Helpline		×		
155304	Municipal Corporations		×		
155214	Labour Helpline		×		
1903	Sashastra Seema Bal (SSB)		×		
1909	National Do Not Call Registry	✓		13	13
1912	Complaint of Electricity		×		
1916	Drinking Water Supply		×		
1950	Election Commission of India		×		
BSNL CDMA					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		18	18
101	Fire		×		
102	Ambulance		×		
104	Health Information Helpline	✓		16	16

108	Emergency and Disaster Management Helpline	✓		17	17
138	All India Helpine for Passangers		×		
149	Public Road Transport Utility Service		×		
181	Chief Minister Helpline		×		
182	Indian Railway Security Helpline	✓		16	16
1033	Road Accident Management Service		×		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		×		
1056	Emergency Medical Services		×		
106X	State of the Art Hospitals		×		
1063	Public Grievance Cell DoT Hq		×		
1064	Anti Corruption Helpline		×		
1070	Relief Commission for Natural Calamities	✓		17	17
1071	Air Accident Helpline		×		
1072	Rail Accident Helpline		×		
1073	Road Accident Helpline		×		
1077	Control Room for District Collector	✓		17	17
1090	Call Alart (Crime Branch)		×		
1091	Women Helpline		×		
1097	National AIDS Helpline to NACO	✓		18	18
1099	Central Accident and Trauma Services (CATS)		×		
10580	Educationa & Vocational Guidance and Counselling		×		
10589	Mother and Child Tracking (MCTH)		×		
10740	Central Pollution Control Board		×		
10741	Pollution Control Board		×		
1511	Police Related Service for all Metro Railway Project		×		
1512	Prevention of Crime in Railway		×		
1514	National Career Service(NCS)		×		
15100	Free Legal Service Helpline		×		
155304	Municipal Corporations		×		
155214	Labour Helpline		×		
1903	Sashastra Seema Bal (SSB)	✓		17	17
1909	National Do Not Call Registry	✓		14	14
1912	Complaint of Electricity		×		
1916	Drinking Water Supply		×		
1950	Election Commission of India		×		

BSNL GSM

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		10	10
101	Fire	✓		10	10
102	Ambulance	✓		10	10
104	Health Information Helpline	✓		10	10
108	Emergency and Disaster Management Helpline	✓		10	10
138	All India Helpine for Passangers	✓		10	10
149	Public Road Transport Utility Service		×		
181	Chief Minister Helpline		×		
182	Indian Railway Security Helpline	✓		10	10
1033	Road Accident Management Service		×		
1037	Public Grievance Cell DoT Hq as 'Telecom		×		

	Consumer Grievance Redressal Helpline'				
1056	Emergency Medical Services		×		
106X	State of the Art Hospitals				
1063	Public Grievance Cell DoT Hq		×		
1064	Anti Corruption Helpline		×		
1070	Relief Commission for Natural Calamities	✓		10	10
1071	Air Accident Helpline		×		
1072	Rail Accident Helpline		×		
1073	Road Accident Helpline		×		
1077	Control Room for District Collector	✓		10	10
1090	Call Alart (Crime Branch)	✓		10	10
1091	Women Helpline		×		
1097	National AIDS Helpline to NACO	✓		10	10
1099	Central Accident and Trauma Services (CATS)		×		
10580	Educationa & Vocational Guidance and Counselling		×		
10589	Mother and Child Tracking (MCTH)		×		
10740	Central Pollution Control Board		×		
10741	Pollution Control Board		×		
1511	Police Related Service for all Metro Railway Project		×		
1512	Prevention of Crime in Railway		×		
1514	National Career Service(NCS)		×		
15100	Free Legal Service Helpline	✓		10	10
155304	Municipal Corporations		×		
155214	Labour Helpline		×		
1903	Sashastra Seema Bal (SSB)	✓		10	10
1909	National Do Not Call Registry	✓		10	10
1912	Complaint of Electricity	✓		10	10
1916	Drinking Water Supply		×		
1950	Election Commission of India		×		
Idea					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		15	15
101	Fire	✓		15	15
102	Ambulance		×		
104	Health Information Helpline		×		
108	Emergency and Disaster Management Helpline	✓		15	15
138	All India Helpline for Passangers		×		
149	Public Road Transport Utility Service		×		
181	Chief Minister Helpline		×		
182	Indian Railway Security Helpline	✓		15	15
1033	Road Accident Management Service		×		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		×		
1056	Emergency Medical Services		×		
106X	State of the Art Hospitals		×		
1063	Public Grievance Cell DoT Hq		×		
1064	Anti Corruption Helpline		×		
1070	Relief Commission for Natural Calamities		×		
1071	Air Accident Helpline		×		
1072	Rail Accident Helpline		×		

1073	Road Accident Helpline		×		
1077	Control Room for District Collector	✓		15	15
1090	Call Alart (Crime Branch)		×		
1091	Women Helpline		×		
1097	National AIDS Helpline to NACO	✓		15	15
1099	Central Accident and Trauma Services (CATS)		×		
10580	Educationa & Vocational Guidance and Counselling		×		
10589	Mother and Child Tracking (MCTH)		×		
10740	Central Pollution Control Board		×		
10741	Pollution Control Board		×		
1511	Police Related Service for all Metro Railway Project		×		
1512	Prevention of Crime in Railway		×		
1514	National Career Service(NCS)		×		
15100	Free Legal Service Helpline	✓		15	15
155304	Municipal Corporations		×		
155214	Labour Helpline		×		
1903	Sashastra Seema Bal (SSB)	✓		15	15
1909	National Do Not Call Registry	✓		15	15
1912	Complaint of Electricity	✓		15	15
1916	Drinking Water Supply		×		
1950	Election Commission of India		×		

Reliance

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		10	10
101	Fire		×		
102	Ambulance	✓		10	10
104	Health Information Helpline	✓		10	10
108	Emergency and Disaster Management Helpline	✓		10	10
138	All India Helpine for Passangers	✓		10	10
149	Public Road Transport Utility Service		×		
181	Chief Minister Helpline		×		
182	Indian Railway Security Helpline	✓		10	10
1033	Road Accident Management Service		×		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		×		
1056	Emergency Medical Services		×		
106X	State of the Art Hospitals		×		
1063	Public Grievance Cell DoT Hq		×		
1064	Anti Corruption Helpline		×		
1070	Relief Commission for Natural Calamities	✓		10	10
1071	Air Accident Helpline		×		
1072	Rail Accident Helpline		×		
1073	Road Accident Helpline		×		
1077	Control Room for District Collector	✓		10	10
1090	Call Alart (Crime Branch)		×		
1091	Women Helpline		×		
1097	National AIDS Helpline to NACO	✓		10	10
1099	Central Accident and Trauma Services (CATS)		×		
10580	Educationa & Vocational Guidance and Counselling		×		

10589	Mother and Child Tracking (MCTH)		×		
10740	Central Pollution Control Board		×		
10741	Pollution Control Board		×		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	✓		10	10
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	✓		10	10
155304	Municipal Corporations		×		
155214	Labour Helpline		×		
1903	Sashastra Seema Bal (SSB)	✓		10	10
1909	National Do Not Call Registry	✓		10	10
1912	Complaint of Electricity	✓		10	10
1916	Drinking Water Supply	✓		10	10
1950	Election Commission of India		×		

Vodafone

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		11	11
101	Fire		×		
102	Ambulance	✓		11	11
104	Health Information Helpline	✓		11	11
108	Emergency and Disaster Management Helpline	✓		11	11
138	All India Helpine for Passangers	✓		10	10
149	Public Road Transport Utility Service		×		
181	Chief Minister Helpline		×		
182	Indian Railway Security Helpline	✓		10	10
1033	Road Accident Management Service		×		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		×		
1056	EmergenMedical Services		×		
106X	State of the Art Hospitals		×		
1063	Public Grievance Cell DoT Hq	✓		11	11
1064	Anti Corruption Helpline		×		
1070	Relief Commission for Natural Calamities	✓		11	11
1071	Air Accident Helpline		×		
1072	Rail Accident Helpline		×		
1073	Road Accident Helpline		×		
1077	Control Room for District Collector	✓		10	10
1090	Call Alart (Crime Branch)		×		
1091	Women Helpline		×		
1097	National AIDS Helpline to NACO	✓		10	10
1099	Central Accident and Trauma Services (CATS)		×		
10580	Educationa & Vocational Guidance and Counselling		×		
10589	Mother and Child Tracking (MCTH)		×		
10740	Central Pollution Control Board		×		
10741	Pollution Control Board		×		
1511	Police Related Service for all Metro Railway Project		×		
1512	Prevention of Crime in Railway	✓		11	11
1514	National Career Service(NCS)		×		
15100	Free Legal Service Helpline		×		

155304	Municipal Corporations		×		
155214	Labour Helpline		×		
1903	Sashastra Seema Bal (SSB)	✓		11	11
1909	National Do Not Call Registry	✓		11	11
1912	Complaint of Electricity	✓		11	11
1916	Drinking Water Supply		×		
1950	Election Commission of India		×		

Data Source: Live calls made by auditors from operator's network

8.15 COUNTER DETAILS

Sl No.	KPI	Formula with Counter Description
1	CSSR= (No of established Calls / No of Attempted Calls)%	***No of established Calls =*** ([Assignment Requests]-([Failed Assignments (Signaling Channel)]+[Failed Assignments during MOC on the A Interface (Including Directed Retry)]+[Failed Assignments during MTC on the A Interface (Including Directed Retry)]+[Failed Assignments during Emergency Call on the A Interface (Including Directed Retry)] +[Failed Assignments during Call Re-establishment on the A Interface (Including Directed Retry)]+[Failed Mode Modify Attempts (MOC) (TCHF)]+[Failed Mode Modify Attempts (MTC) (TCHF)]+[Failed Mode Modify Attempts (Emergency Call) (TCHF)]+[Failed Mode Modify Attempts (Call Re-establishment) (TCHF)]+[Failed Mode Modify Attempts (MOC) (TCHH)]+[Failed Mode Modify Attempts (MTC) (TCHH)]+[Failed Mode Modify Attempts (Call Re-establishment) (TCHH)]))/***No of Attempted Calls =*** ([Assignment Requests (Signaling Channel) (TCH)] + [Assignment Requests (Signaling Channel) (SDCCH)] + [Assignment Requests (TCHF Only)] + [Assignment Requests (TCHH Only)] + [Assignment Requests (TCHF Preferred, Channel Type Unchangeable)] + [Assignment Requests (TCHH Preferred, Channel Type Unchangeable)] + [Assignment Requests (TCHF or TCHH, Channel Type Unchangeable)] + [Assignment Requests (TCHF Preferred, Channel Type Changeable)] + [Assignment Requests (TCHH Preferred, Channel Type Changeable)] + [Assignment Requests (TCHF or TCHH, Channel Type Changeable)])
2	SDCCH congestion= (SDCCH Failure/SDCCH attempts)%	***SDCCH Failure=*** ([Channel Assignment Failures (All Channels Busy or Channels Unconfigured) in Immediate Assignment Procedure (SDCCH)] + [Failed Internal Intra-Cell Handovers (No Channel Available) (SDCCH)] + [Number of Unsuccessful Incoming Internal Inter-Cell Handovers (No Channel Available) (SDCCH)] + [Failed Incoming External Inter-Cell Handovers (No Channel Available) (SDCCH)])/***SDCCH attempts =*** ([Channel Assignment Requests in Immediate Assignment Procedure (SDCCH)] + [Internal Intra-Cell Handover Requests (SDCCH)] + [Number of Incoming Internal Inter-Cell Handover Requests (SDCCH) (900/850/810-900/850/810)] + [Number of Incoming Internal Inter-Cell Handover Requests (SDCCH) (1800/1900-1800/1900)] + [Number of Incoming Internal Inter-Cell Handover Requests (SDCCH) (900/850/810-1800/1900)] + [Number of Incoming Internal Inter-Cell Handover Requests (SDCCH) (1800/1900-900/850/810)] + [Incoming External Inter-Cell Handover Requests (SDCCH) (900/850/810-900/850/810)] + [Incoming External Inter-Cell Handover Requests (SDCCH) (1800/1900-1800/1900)] + [Incoming External Inter-Cell Handover Requests (SDCCH) (900/850/810-1800/1900)] + [Incoming External Inter-Cell Handover Requests (SDCCH) (1800/1900-900/850/810)])
3	TCH congestion= (TCH Failures /TCH Attempts)%	***TCH Failures=*** ((Failed TCH Seizures due to Busy TCH (Signaling Channel)+([Failed Assignments (First Assignment, No Channel Available in Assignment Procedure)]+[Failed Assignments (First Assignment, No Channel Available in Directed Retry Procedure)]+[Failed Assignments (Reconnection to Old Channels, No Channel Available in Assignment)]+[Failed Assignments (Reconnection to Old Channels, No Channel Available in Directed Retry)])/***TCH Attempts =*** ([Assignment Requests (Signaling Channel) (TCH)] + [Assignment Requests (Signaling Channel) (SDCCH)] + [Assignment Requests (TCHF Only)] + [Assignment Requests (TCHH Only)] + [Assignment Requests (TCHF Preferred, Channel Type Unchangeable)] + [Assignment Requests (TCHH Preferred, Channel Type Unchangeable)] + [Assignment Requests (TCHF or TCHH, Channel Type Unchangeable)] + [Assignment Requests (TCHF Preferred, Channel Type Changeable)] + [Assignment Requests (TCHH Preferred, Channel Type Changeable)] + [Assignment Requests (TCHF or TCHH, Channel Type

		Changeable)])
4	Call Drop Rate= (The total no of dropped calls*100)/Total no of calls successfully established (where traffic channel is allotted)	***The total no of dropped calls=*** ([Call Drops on Radio Interface in Stable State (Traffic Channel)] + [Call Drops on Radio Interface in Handover State (Traffic Channel)] + [Call Drops Due to No MR from MS for a Long Time (Traffic Channel)] + [Call Drops due to Abis Terrestrial Link Failure (Traffic Channel)] + [Call Drops due to Equipment Failure (Traffic Channel)] + [Call Drops due to Forced Handover (Traffic Channel)] + [Call Drops due to local switching Start Failure] + [Call Drops due to Failures to Return to Normal Call from local switching])/***Total no of calls successfully established (where traffic channel is allotted) =*** ([Assignment Requests]-([Failed Assignments (Signaling Channel)]+[Failed Assignments during MOC on the A Interface (Including Directed Retry)]+[Failed Assignments during MTC on the A Interface (Including Directed Retry)]+[Failed Assignments during Emergency Call on the A Interface (Including Directed Retry)] +[Failed Assignments during Call Re-establishment on the A Interface (Including Directed Retry)]+[Failed Mode Modify Attempts (MOC) (TCHF)]+[Failed Mode Modify Attempts (MTC) (TCHF)]+[Failed Mode Modify Attempts (Emergency Call) (TCHF)]+[Failed Mode Modify Attempts (Call Re-establishment) (TCHF)]+[Failed Mode Modify Attempts (MOC) (TCHH)]+[Failed Mode Modify Attempts (MTC) (TCHH)]+[Failed Mode Modify Attempts (Call Re-establishment) (TCHH)])
5	Call Drop Rate= (No of cells having call drop rate >3% during CBBH in a month*100)/Total no of cells in the licensed service area	Above formula with counters being used in CBBH.
6	Connection with good quality voice= (Connection with good quality voice/Total voice samples)%	***Connection with good quality voice =*** ((Number of MRs on Downlink TCHF (Receive Quality Rank 0)+Number of MRs on Downlink TCHF (Receive Quality Rank 1)+Number of MRs on Downlink TCHF (Receive Quality Rank 2)+Number of MRs on Downlink TCHF (Receive Quality Rank 3)+Number of MRs on Downlink TCHF (Receive Quality Rank 4)+Number of MRs on Downlink TCHF (Receive Quality Rank 5)+Number of MRs on Downlink TCHH (Receive Quality Rank 0)+Number of MRs on Downlink TCHH (Receive Quality Rank 1)+Number of MRs on Downlink TCHH (Receive Quality Rank 2)+Number of MRs on Downlink TCHH (Receive Quality Rank 3)+Number of MRs on Downlink TCHH (Receive Quality Rank 4)+Number of MRs on Downlink TCHH (Receive Quality Rank 5)) /***Total voice samples=*** ((Number of MRs on Downlink TCHF (Receive Quality Rank 0)+Number of MRs on Downlink TCHF (Receive Quality Rank 1)+Number of MRs on Downlink TCHF (Receive Quality Rank 2)+Number of MRs on Downlink TCHF (Receive Quality Rank 3)+Number of MRs on Downlink TCHF (Receive Quality Rank 4)+Number of MRs on Downlink TCHF (Receive Quality Rank 5)+Number of MRs on Downlink TCHF (Receive Quality Rank 6)+Number of MRs on Downlink TCHF (Receive Quality Rank 7)+Number of MRs on Downlink TCHH (Receive Quality Rank 0)+:Number of MRs on Downlink TCHH (Receive Quality Rank 1)+Number of MRs on Downlink TCHH (Receive Quality Rank 2)+Number of MRs on Downlink TCHH (Receive Quality Rank 3)+Number of MRs on Downlink TCHH (Receive Quality Rank 4)+Number of MRs on Downlink TCHH

IMRB International | eTech
TRAI Telecom Regulatory Authority of India (IS/ISO 9001-2008 Certified Organisation)

		(Receive Quality Rank 5)+Number of MRs on Downlink TCHH (Receive Quality Rank 6)+Number of MRs on Downlink TCHH (Receive Quality Rank 7))

8.15.1 ERICSSON

Ericsson provides network support to Vodafone, Aircel, Idea and Reliance GSM in the circle.

Sl No.	KPI	Ericsson
1	**CSSR= (No of established Calls / No of Attempted Calls)%**	CSSR (No of established Calls / No of Attempted Calls)=(TCASSALL/TASSALL)*100
2	**SDCCH congestion= (SDCCH Failure/SDCCH attempts)%**	SDCCH congestion (SDCCH Failure/SDCCH attempts)% = (CCONGS/CCALLS)*100
3	**TCH congestion= (TCH Failures /TCH Attempts)%**	TCH congestion (TCH Failures /TCH Attempts)%= (CNRELCONG+TNRELCONG)/TASSALL)*100
4	**Call Drop Rate= (The total no of dropped calls*100)/Total no of calls successfully established (where traffic channel is allotted)**	Call Drop Rate (Total no dropped calls/No of established calls)%= (TNDROP)/TCASSALL*100

IMRB International | eTech
TRAI Telecom Regulatory Authority of India (IS/ISO 9001-2008 Certified Organisation)

5	**Call Drop Rate= (No of cells having call drop rate >3% during CBBH in a month*100)/Total no of cells in the licensed service area**	Above formula with counters being used in CBBH.
6	**Connection with good quality voice= (Connection with good quality voice/Total voice samples)%**	Connection with good quality voice (Connection with good quality voice samples 0-5 /Total voice samples)= 100 * (QUAL50DL + QUAL40DL + QUAL30DL + QUAL20DL + QUAL10DL + QUAL00DL) / (QUAL70DL + QUAL60DL + QUAL50DL + QUAL40DL + QUAL30DL + QUAL20DL + QUAL10DL + QUAL00DL)

Ericsson Counters

Counter	Counter Description
TCASSALL	Number of assignment complete messages on TCH for all MS classes
TASSALL	Number of first assignment attempts on TCH for all MS classes.
CNRELCONG	Number of released connections on SDCCH due to TCH or Transcoder (TRA) congestion.
TNRELCONG	Number of released TCH signalling connections due to transcoder resource congestion during immediate assignment on TCH
CCONGS	Congestion counter for SDCCH. Stepped per congested allocation attempt.
CCALLS	Channel allocation attempt counter on SDCCH.
TNDROP	The total number of dropped TCH Connections.
QUAL00DL	Number of quality 0 reported on downlink.
QUAL10DL	Number of quality 1 reported on downlink.
QUAL20DL	Number of quality 2 reported on downlink.
QUAL30DL	Number of quality 3 reported on downlink.
QUAL40DL	Number of quality 4 reported on downlink.
QUAL50DL	Number of quality 5 reported on downlink.
QUAL60DL	Number of quality 6 reported on downlink.
QUAL70DL	Number of quality 7 reported on downlink.

8.15.2 NSN (NOKIA SIEMENS NETWORKS)

NSN provides network support to Airtel in the circle.

Sl No.	KPI	NSN
1	CSSR= (No of established Calls / No of Attempted Calls)%	CSSR= 100-100*((SDCCH_BUSY_ATT)-(TCH_SEIZ_DUE_SDCCH_CON) + (SDCCH_RADIO_FAIL)+(SDCCH_RF_OLD_HO)+(SDCCH_USER_ACT)+(SDCCH_BCSU_RESET)+(SDCCH_NETW_ACT)+(SDCCH_BTS_FAIL)+(SDCCH_LAPD_FAIL)+ (BLCK_8I_NOM)/ {(CH_REQ_MSG_REC)+(PACKET_CH_REQ)}-{(GHOST_CCCH_RES)-(REJ_SEIZ_ATT_DUE_DIST)}
2	SDCCH congestion= (SDCCH Failure/SDCCH attempts)%	SDCCH congestion = (sdcch_busy_att - .tch_seiz_due_sdcch_con)/{(CH_REQ_MSG_REC)+(PACKET_CH_REQ)}-{(GHOST_CCCH_RES)-(REJ_SEIZ_ATT_DUE_DIST)}
3	TCH congestion= (TCH Failures /TCH Attempts)%	TCH congestion = BLCK_8I_NOM / {(TCH_NORM_SEIZ)+(MSC_I_SDCCH_TCH_AT)+(BSC_I_SDCCH_TCH_AT)}
4	Call Drop Rate= (The total no of dropped calls*100)/Total no of calls successfully established (where traffic channel is allotted)	TCH Drop = (drop_after_tch_assign)-(tch_re_est_release) / {(TCH_NORM_SEIZ)+(MSC_I_SDCCH_TCH_AT)+(BSC_I_SDCCH_TCH_AT)}
5	Call Drop Rate= (No of cells having call drop rate >3% during CBBH in a month*100)/Total no of cells in the licensed service area	Above formula with counters being used in CBBH.
6	Connection with good quality voice= (Connection with good quality voice/Total voice samples)%	Connection with good quality voice= (FREQ_DL_QUAL0+FREQ_DL_QUAL1+FREQ_DL_QUAL2+FREQ_DL_QUAL3+FREQ_DL_QUAL4+FREQ_DL_QUAL5) / (FREQ_DL_QUAL0+FREQ_DL_QUAL1+FREQ_DL_QUAL2+FREQ_DL_QUAL3+FREQ_DL_QUAL4+FREQ_DL_QUAL5+FREQ_DL_QUAL6+FREQ_DL_QUAL7)

9 ANNEXURE – JANUARY

PERFORMANCE REPORTS - PARAMETER WISE

1. Network Availability

Audit Results for Network Availability- PMR data-January

	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2601	3274	242	1344	1212	1569	2941
Sum of downtime of BTSs in a month (in hours)		63523	3939	24102	25632	3233	3786	12456
BTSs accumulated downtime (not available for service)	≤ 2%	3.28%	0.16%	13.39%	2.56%	0.36%	0.32%	0.57%
Number of BTSs having accumulated downtime >24 hours		449	25	58	93	8	27	49
Worst affected BTSs due to downtime	≤ 2%	17.26%	0.76%	23.97%	6.92%	0.66%	1.72%	1.67%

Live Measurement Results for Network Availability- 3 Day live data-January

	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2588	3274	242	1344	1212	1569	2941
Sum of downtime of BTSs in a month (in hours)		5846	353	2308	2286	343	387	899
BTSs accumulated downtime (not available for service)	≤ 2%	3.14%	0.15%	13.25%	2.36%	0.39%	0.34%	0.42%
Number of BTSs having accumulated		61	0	12	19	5	27	3

downtime >24 hours								
Worst affected BTSs due to downtime	≤ 2%	2.36%	0.00%	4.96%	1.41%	0.41%	1.72%	0.10%

2. Connection Establishment (Accessibility)

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-January								
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	95.47%	97.61%	98.38%	95.68%	97.70%	98.64%	99.60%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	1.51%	0.31%	NA	0.90%	0.33%	0.02%	0.11%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	2.75%	1.10%	0.00%	1.01%	1.89%	0.07%	0.40%

Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-January								
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	97.86%	97.84%	98.14%	92.20%	99.13%	98.68%	99.79%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.41%	0.29%	NA	0.67%	0.26%	0.02%	0.08%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	1.24%	0.97%	0.98%	1.87%	0.56%	0.07%	0.21%

Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-January								
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone

Total number of call attempts		413	398	425	377	405	281	405
Total number of successful calls established		409	398	413	366	398	272	405
CSSR	≥ 95%	99.03%	100.00%	97.18%	97.08%	98.27%	96.80%	100.00%

Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
%age blocked calls		0.97%	0.00%	2.82%	2.92%	1.73%	3.20%	0.00%

3. Connection Maintenance (Retainability)

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-January

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		179402673	190040204	679075	450979447	25955791	60742151	3929499
Total number of calls dropped		2933755	1939478	9942	9109785	348427	408968	21369
Call drop rate	≤ 2%	1.64%	1.02%	1.46%	2.02%	1.34%	0.67%	0.54%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		7651	9806	687	3981	3637	4798	8858
Total number of cells having more than 3% TCH		1160	97	69	173	42	5	238
Worst affected cells having more than 3% TCH	≤ 3%	15.16%	0.99%	10.04%	4.35%	1.15%	0.10%	2.69%

Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-January

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		205736853	19072871	59838	45429678	30637701	7932272	2081940
Total number of calls dropped		2670789	172602	1111	1053968	308457	50148	9539
Call drop rate	≤ 2%	1.30%	0.90%	1.86%	2.32%	1.01%	0.63%	0.46%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		7677	9849	687	3981	3637	4798	8858
Total number of cells having more than 3% TCH		1007	83	47	266	43	5	235
Worst affected cells having more than 3% TCH	≤ 3%	13.12%	0.84%	6.84%	6.68%	1.18%	0.10%	2.65%

Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-January								
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		409	398	413	366	398	272	405
Total number of calls dropped		0	0	17	9	0	3	0
Call drop rate	≤ 2%	0.00%	0.00%	4.12%	2.46%	0.00%	1.10%	0.00%

4. Voice quality

Audit Results for Voice quality -PMR Data-January								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		18479052580	19970868124	78816	61117	3428976017	8942055918	692503935
Total number of calls with good voice quality		16758833966	19669227114	74769	56616	3263110311	8788974682	679771648
%age calls with good voice quality	≥ 95%	90.69%	98.49%	94.87%	92.64%	95.16%	98.29%	98.16%

Live measurement results for Voice quality-3 Day data-January								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		19714907414	2003046689	78816	61117	3540443449	1099385384	350564087
Total number of calls with good voice quality		18310106075	1974253400	74769	56616	3392879672	1079979554	345561045

%age calls with good voice quality	≥ 95%	92.87%	98.56%	94.87%	92.64%	95.83%	98.23%	98.57%

Drive test results for Voice quality (Average of three drive tests) - DT data-January								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		613404	627832	78816	548126	653686	564319	691613
Total number of calls with good voice quality		588720	604883	74769	500157	625584	522033	666825
%age calls with good voice quality	≥ 95%	95.98%	96.34%	94.87%	91.25%	95.70%	92.51%	96.42%

5. POI Congestion

Audit Results for POI Congestion- PMR data-January								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		51	15	0	19	30	23	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		86669	103472	0	19643	21836	30624	59993259
Traffic served for all POIs (B)- in erlangs		57141	35502	0	19305	17147	19794	15701337
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data-January								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		51	15	0	19	30	23	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		86669	103453	0	19643	21861	30624	6008811
Traffic served for all POIs (B)- in erlangs		58158	34030	0	17331	16117	19794	1586768
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

10 ANNEXURE – FEBRUARY

PERFORMANCE REPORTS - PARAMETER WISE

1. Network Availability

Audit Results for Network Availability- PMR data-February

	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2635	3284	243	1359	1218	1567	2982
Sum of downtime of BTSs in a month (in hours)		55469	2627	22503	18297	7023	3435	9172
BTSs accumulated downtime (not available for service)	≤ 2%	3.13%	0.12%	13.78%	2.00%	0.86%	0.33%	0.46%
Number of BTSs having accumulated downtime >24 hours		443	17	51	27	15	18	46
Worst affected BTSs due to downtime	≤ 2%	16.81%	0.52%	20.99%	1.99%	1.23%	1.15%	1.54%

Live Measurement Results for Network Availability- 3 Day live data-February

	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2635	3274	242	1359	1213	1567	2982
Sum of downtime of BTSs in a month (in hours)		5200	222	2190	2009	877	3435	849
BTSs accumulated downtime (not available for service)	≤ 2%	2.74%	0.09%	12.57%	2.05%	1.00%	3.04%	0.40%
Number of BTSs having accumulated		52	0	6	4	13	18	2

downtime >24 hours								
Worst affected BTSs due to downtime	≤ 2%	1.97%	0.00%	2.48%	0.29%	1.07%	1.15%	0.07%

2. Connection Establishment (Accessibility)

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-February

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	94.12%	97.15%	98.16%	96.17%	97.36%	98.57%	99.45%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	1.52%	0.65%	NA	0.75%	0.57%	0.02%	0.14%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	4.11%	1.20%	0.00%	1.09%	1.94%	0.07%	0.55%

Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-February

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	97.79%	96.98%	97.84%	92.56%	99.07%	98.62%	99.76%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.53%	0.28%	NA	0.44%	0.24%	0.02%	0.08%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	1.34%	1.56%	0.00%	1.54%	0.60%	0.06%	0.24%

Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-February

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone

Total number of call attempts		602	549	828	602	513	577	596
Total number of successful calls established		598	547	720	579	511	552	591
CSSR	≥ 95%	99.34%	99.64%	86.96%	96.18%	99.61%	95.67%	99.16%

Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
%age blocked calls		0.66%	0.36%	13.04%	3.82%	0.39%	4.33%	0.84%

3. Connection Maintenance (Retainability)

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-February								
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		160787808	178150354	531839	421256204	27149503	65329899	4115771
Total number of calls dropped		2494652	1641923	8641	7077104	355374	446824	22930
Call drop rate	≤ 2%	1.55%	0.92%	1.62%	1.68%	1.31%	0.68%	0.56%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		7804	9854	687	3981	3655	4798	8998
Total number of cells having more than 3% TCH		939	93	70	120	38	8	251
Worst affected cells having more than 3% TCH	≤ 3%	12.03%	0.94%	10.19%	3.01%	1.04%	0.17%	2.79%

Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-February								
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		195982600	19447414	39265	45529173	32355629	6258520	2104608
Total number of calls dropped		2370389	172362	410	878713	348956	40670	10218
Call drop rate	≤ 2%	1.21%	0.89%	1.04%	1.93%	1.08%	0.65%	0.49%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		7759	9850	687	3981	3640	4798	8998
Total number of cells having more than 3% TCH		902	89	52	128	35	8	226
Worst affected cells having more than 3% TCH	≤ 3%	11.63%	0.90%	7.57%	3.22%	0.96%	0.17%	2.51%

Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-February								
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		598	547	828	579	511	552	591
Total number of calls dropped		0	1	49	21	0	4	3
Call drop rate	≤ 2%	0.00%	0.18%	5.92%	3.63%	0.00%	0.72%	0.51%

4. Voice quality

Audit Results for Voice quality -PMR Data-February								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		18322850680	18064747285	59085	49377	3399572238	10066539646	729393100
Total number of calls with good voice quality		16808949493	17814497349	56115	46959	3231390108	9891632419	715998111
%age calls with good voice quality	≥ 95%	91.74%	98.61%	94.97%	95.10%	95.05%	98.26%	98.16%

Live measurement results for Voice quality-3 Day data-February								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		19988627533	1985289892	59085	49377	3694727635	1074366637	356923801
Total number of calls with good voice quality		18659277681	1957959555	56115	46959	3536638525	1054698745	351888130

%age calls with good voice quality	≥ 95%	93.35%	98.62%	94.97%	95.10%	95.72%	98.17%	98.59%

Drive test results for Voice quality (Average of three drive tests) - DT data-February

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		840717	836839	59085	865289	796679	919227	926034
Total number of calls with good voice quality		802572	787037	56115	789546	768020	837217	877122
%age calls with good voice quality	≥ 95%	95.46%	94.05%	94.97%	91.25%	96.40%	91.08%	94.72%

5. POI Congestion

Audit Results for POI Congestion- PMR data-February

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		51	15	0	19	30	23	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		86729	105233	0	19643	24228	31701	56074902
Traffic served for all POIs (B)- in erlangs		60426	36253	0	20056	17790	20531	15071445
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data-February

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		51	16	0	19	30	23	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		86729	105440	0	19643	22172	31701	6008811
Traffic served for all POIs (B)- in erlangs		60563	36597	0	18212	17064	20531	1617287
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

11 ANNEXURE – MARCH

PERFORMANCE REPORTS - PARAMETER WISE

1. Network Availability

Audit Results for Network Availability- PMR data-March

	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2668	3297	243	1359	1288	1567	3128
Sum of downtime of BTSs in a month (in hours)		70703	2906	25723	18098	8206	3435	10295
BTSs accumulated downtime (not available for service)	≤ 2%	3.56%	0.12%	14.23%	1.79%	0.86%	0.29%	0.44%
Number of BTSs having accumulated downtime >24 hours		546	11	66	25	24	18	48
Worst affected BTSs due to downtime	≤ 2%	20.46%	0.33%	27.16%	1.84%	1.86%	1.15%	1.53%

Live Measurement Results for Network Availability- 3 Day live data-March

	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2668	3281	243	1359	1288	1567	3128
Sum of downtime of BTSs in a month (in hours)		6785	182	2522	2003	645	3435	730
BTSs accumulated downtime (not available for service)	≤ 2%	3.53%	0.08%	14.41%	2.05%	0.70%	3.04%	0.32%
Number of BTSs having accumulated		70	0	7	4	17	18	3

downtime >24 hours								
Worst affected BTSs due to downtime	≤ 2%	2.62%	0.00%	2.88%	0.29%	1.32%	1.15%	0.10%

2. Connection Establishment (Accessibility)

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-March								
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	93.42%	97.69%	98.00%	96.03%	96.50%	98.62%	99.52%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	1.17%	0.39%	NA	0.86%	0.83%	0.02%	0.13%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	4.93%	1.01%	0.00%	1.27%	1.69%	0.06%	0.48%

Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-March								
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	97.59%	97.72%	98.26%	92.45%	99.05%	98.57%	99.84%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.63%	0.35%	NA	0.40%	0.30%	0.02%	0.06%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	1.50%	0.99%	0.00%	1.84%	0.32%	0.07%	0.16%

Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-March								
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone

Total number of call attempts		445	455	549	521	395	421	465
Total number of successful calls established		444	453	499	493	388	402	463
CSSR	≥ 95%	99.78%	99.56%	90.89%	94.63%	98.23%	95.49%	99.57%

Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
%age blocked calls		0.22%	0.44%	9.11%	5.37%	1.77%	4.51%	0.43%

3. Connection Maintenance (Retainability)

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-March								
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		187018237	199382255	524924	445652385	32322298	65329899	4053891
Total number of calls dropped		2876557	1644730	9877	8110873	396302	446824	21943
Call drop rate	≤ 2%	1.54%	0.82%	1.88%	1.82%	1.23%	0.68%	0.54%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		7921	9883	687	3981	3864	4798	9436
Total number of cells having more than 3% TCH		997	86	67	119	43	8	274
Worst affected cells having more than 3% TCH	≤ 3%	12.59%	0.87%	9.75%	2.99%	1.11%	0.17%	2.90%

Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-March								
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		204512522	19745388	50618	42722227	34299630	6258520	2171313
Total number of calls dropped		2370389	166382	952	850173	321545	40670	9335
Call drop rate	≤ 2%	1.16%	0.84%	1.88%	1.99%	0.94%	0.65%	0.43%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		7883	9873	687	3981	3864	4798	9436
Total number of cells having more than 3% TCH		945	92	54	129	43	8	247
Worst affected cells having more than 3% TCH	≤ 3%	11.99%	0.93%	7.86%	3.24%	1.11%	0.17%	2.62%

Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-March								
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		444	453	507	493	388	402	465
Total number of calls dropped		0	0	19	20	1	3	1
Call drop rate	≤ 2%	0.00%	0.00%	3.75%	4.06%	0.26%	0.75%	0.22%

4. Voice quality

Audit Results for Voice quality -PMR Data-March								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		21349097689	19232062888	47384	97534	3978465632	10066539646	760580377
Total number of calls with good voice quality		19590515109	18988488931	44868	93807	3780630286	9891632419	746870865
%age calls with good voice quality	≥ 95%	91.76%	98.73%	94.69%	96.18%	95.03%	98.26%	98.20%

Live measurement results for Voice quality-3 Day data-March								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		20798817096	1890298595	47384	97534	3856164457	1074366637	366925310
Total number of calls with good voice quality		19369495808	1866230145	44868	93807	3691356808	1054698745	361523124

%age calls with good voice quality	≥ 95%	93.13%	98.73%	94.69%	96.18%	95.73%	98.17%	98.53%

Drive test results for Voice quality (Average of three drive tests) - DT data-March								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		705816	638971	47384	709383	699022	659401	708598
Total number of calls with good voice quality		672160	610422	44868	657608	661079	620376	658195
%age calls with good voice quality	≥ 95%	95.23%	95.53%	94.69%	92.70%	94.57%	94.08%	92.89%

5. POI Congestion

Audit Results for POI Congestion- PMR data-March								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		51	15	0	19	30	23	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		87905	104406	0	19643	30347	31590	62132270
Traffic served for all POIs (B)- in erlangs		62748	37543	0	21306	17822	21112	16848628
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.08%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data-March								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		51	16	0	19	30	23	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		86944	105536	0	19643	28946	31542	5957687
Traffic served for all POIs (B)- in erlangs		59584	37445	0	18628	17353	21811	1623470
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

12 ABBREVIATIONS

Following terms/abbreviations have been used in this report. This section provides meaning of the abbreviations used in the report.

1. TRAI – Telecom Regulatory Authority of India
2. QoS – Quality of Service
3. JFM'15 – Refers to the quarter of January, February and March 2015
4. IMRB – Refers to IMRB International, the audit agency for this report
5. SSA – Secondary Switching Area
6. NOC – Network Operation Center
7. OMC – Operations and Maintenance Center
8. MSC – Mobile Switching Center
9. PMR – Performance Monitoring Reports
10. TCBH – Time Consistent Busy Hour
11. CBBH - Cell Bouncing Busy Hour
12. BTS – Base Transceiver Station
13. CSSR – Call Setup Success Rate
14. TCH – Traffic Channel
15. SDCCH – Standalone Dedicated Control Channel
16. CDR – Call Drop Rate
17. FER – Frame Error Rate
18. SIM – Subscriber Identity Module
19. GSM – Global System for Mobile
20. CDMA – Code Division Multiple Access
21. NA – Not Applicable
22. NC – Non Compliance
23. POI – Point of Interconnection
24. IVR – Interactive Voice Response
25. STD – Standard Trunk Dialing
26. ISD – International Subscriber Dialing

SCO 47, 5th Floor, Old Judicial Complex, Sector 15
Part 1, Gurgaon, Haryana – 122001

✆+91 (124) 4217300

www.imrbint.com