EAST ZONE

TRAI AUDIT WIRELESS REPORT-ASSAM CIRCLE - OND QUARTER, 2014

Prepared By -

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Prepared For-

TRAI

Telecom Regulatory Authority of India

(IS/ISO 9001-2008 Certified Organisation)

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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 October 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

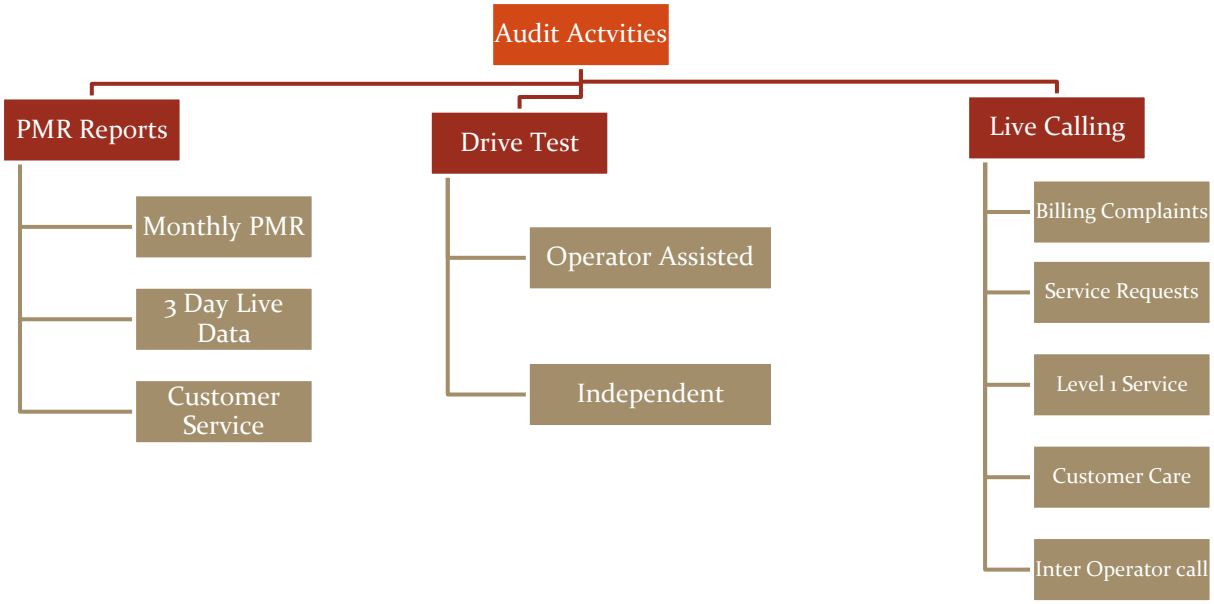
- Audit and Assess the Quality of Services being rendered by Basic (Wireline), Cellular Mobile (Wireless), and Broadband service against the parameters notified by TRAI. (The parameters of Quality of Services (QoS) have been specified by in the respective regulations published by TRAI).
- This report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

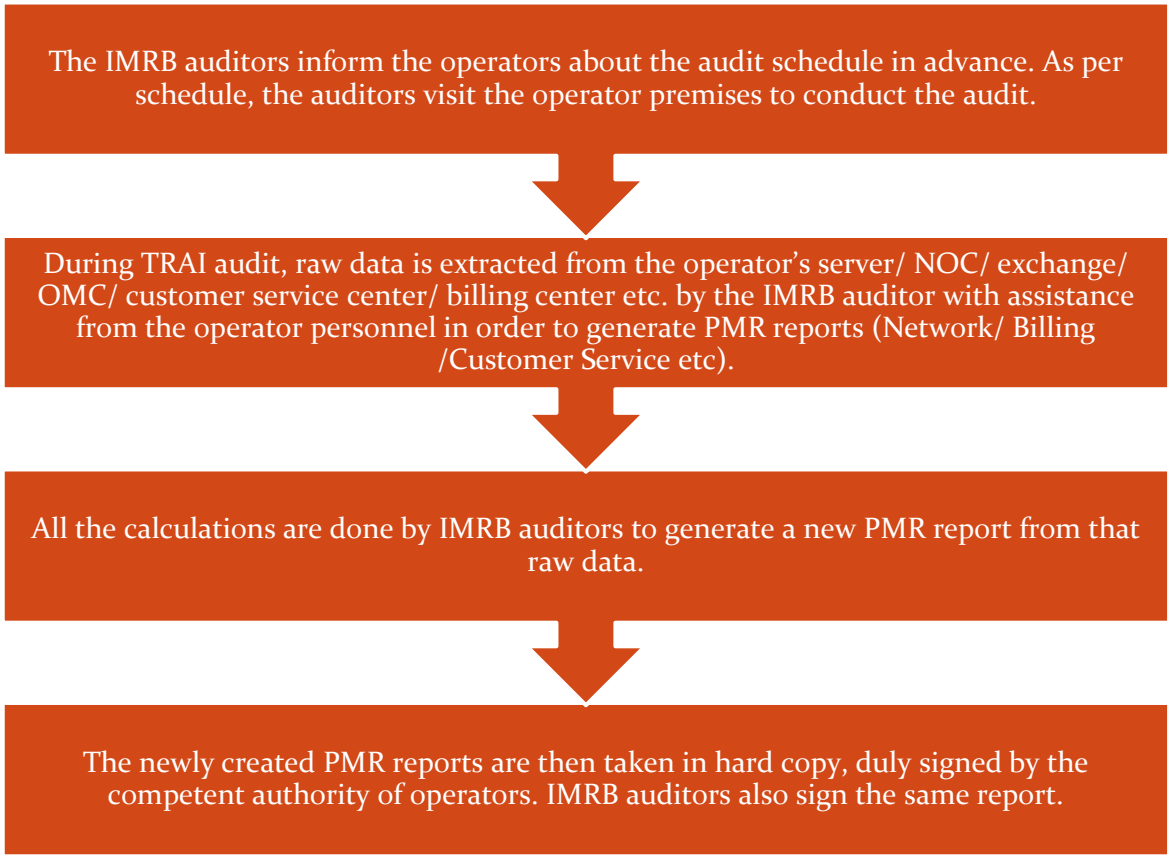


Let's discuss each of the activity in detail and the methodology adopted for each of the module.

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, November 2014 audit data was collected in the month of December 2014.

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 December 2014 (OND'14) was collected in the month of Jan 2014.

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 2014. 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 4 of the report. The benchmark values for each parameter have been given in the table below.

2.4.1.3 AUDIT PARAMETERS - NETWORK

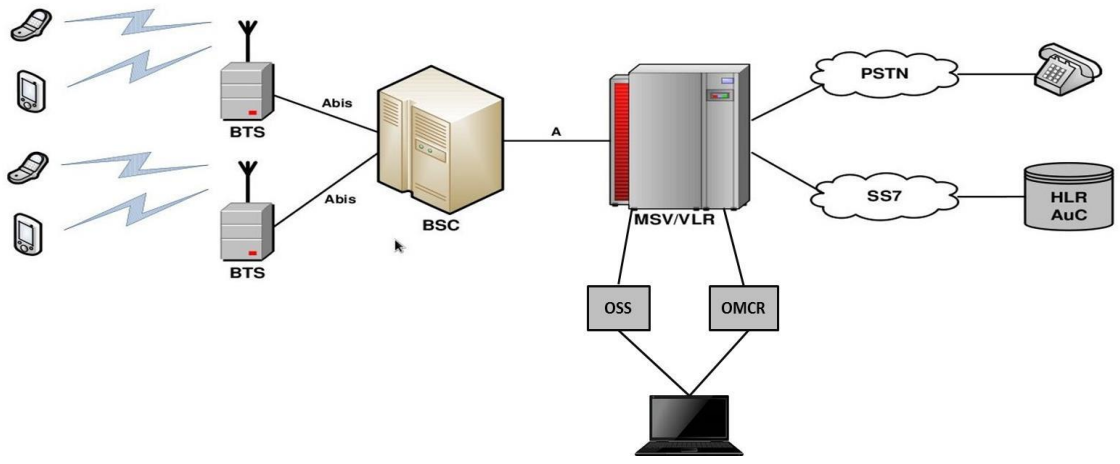
Let us now look at the various parameters involved in the audit reports.

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%

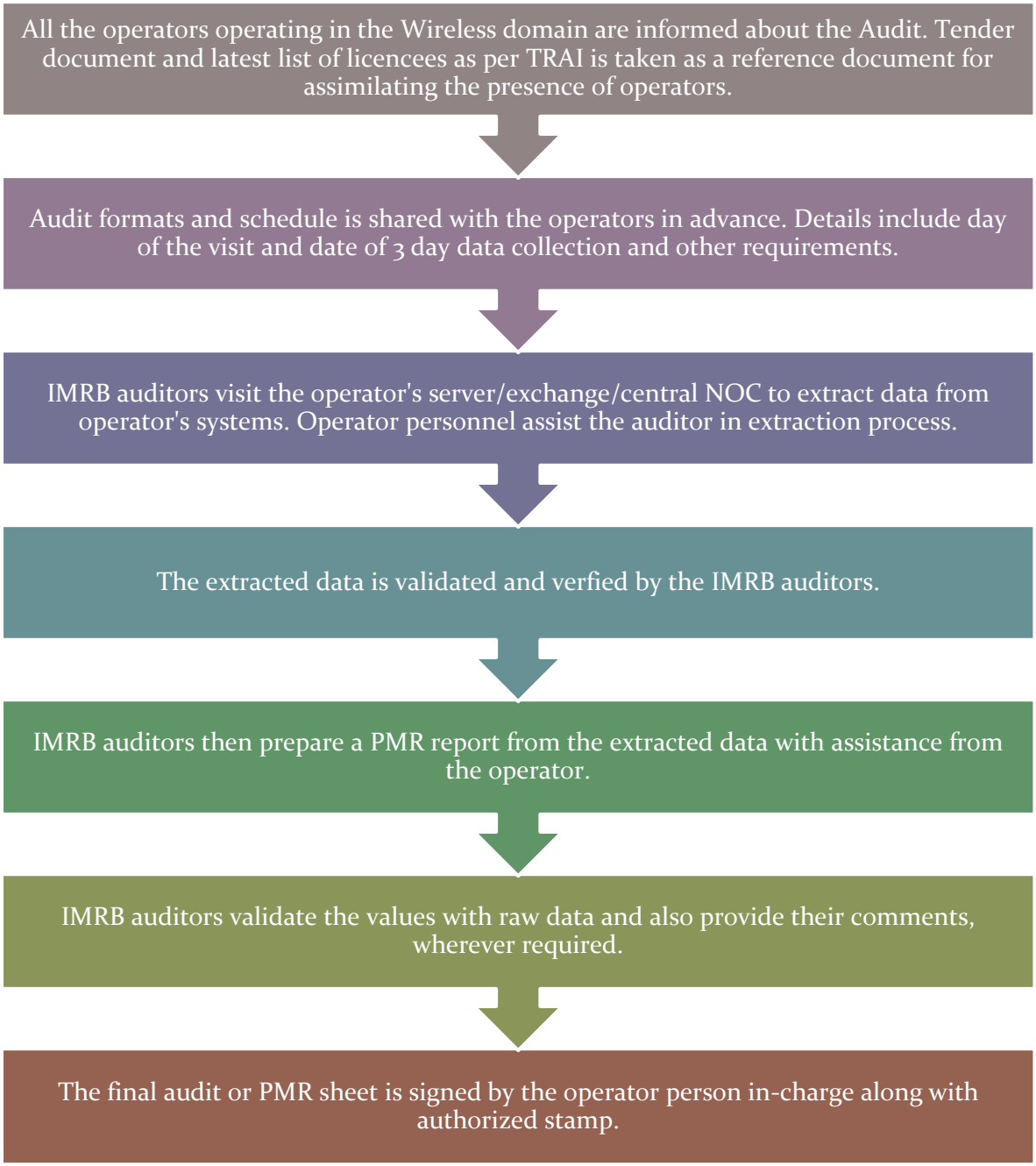
2.4.1.4 POINT OF DATA EXTRACTION

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.



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.

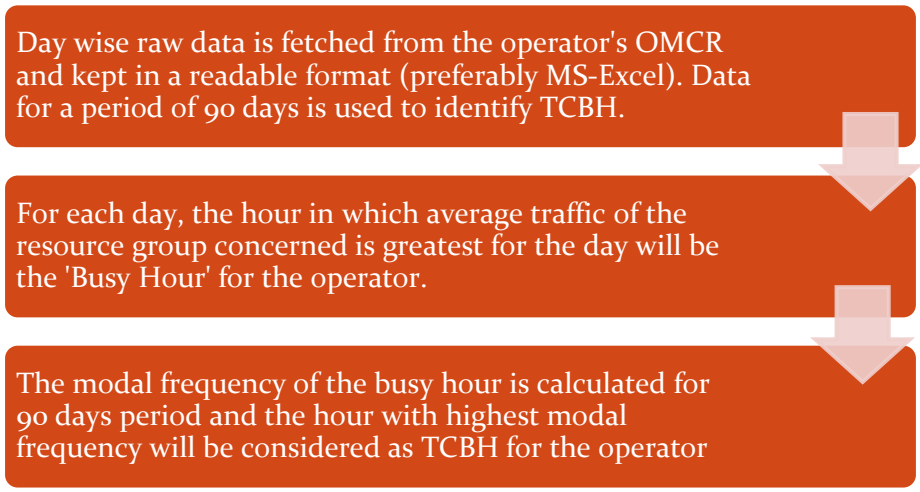
The 3 day live data provides a sample of 9 days in a quarter (3 days each month of a quarter) with hourly performance, which enables the auditor to identify and validate intraday issues for an operator on the QoS network parameters. For example, network congestion being faced by an operator during busy/peak 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 OND'14 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	18:00 - 19:00	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:

- Day wise raw data is fetched from the operator's OMCR and kept in a readable format (preferably MS-Excel). Data for a period of 90 days is used to identify CBBH.
- For each day, the hour in which a cell in cellular mobile telephone network experiences maximum traffic for the day will be the 'Busy Hour' for the operator.
- The modal frequency of the busy hour is calculated for 90 days period and the hour with highest modal frequency will be considered as CBBH for the operator

During audit, the auditors identified from the raw data that the CBBH for the operators in OND'14 was the time period as given below.

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

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 Dec 2014 (OND'14) was collected in the month of Jan 2014. 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 5 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 Dec 2014. 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 Nov 2014 was considered for live calling activity conducted in Dec 2014.

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 5.1.1.

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 OND'14, 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	State Heath Information Helpline
108	Emergency and Disaster Management Helpline
181	Chief Minister Helpline
1033	Road Accident Management Service
1056	Emergency Medical Service
1063	Public Grievance Cell of DOT
1064	Anti Corruption Helpline
1070	Relief Commissioner for Natural Calamities
1071	Air Accident Helpline
1072	Rail Accident Helpline
1073	Road Accident Information
1077	Control Room for District Collector
1091	Women Crisis Response Center
1098	Child Helpline
1099	Central Accident & Trauma Helpline
1909	National Do Not Call Registry
1916	Drinking Water Supply
1947	Unique Identification Authority of India
1950	Election Commission of India
15100	Free Legal Service Helpline
155214	Labour Helpline
106X	State of Art Hospitals (The actual code has to be confirmed from the operator as per presence of hospitals in the circle. We have to check for all hospitals as per avaialbility of list with operator, For example 1066 is for Apollo)

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 within 60 seconds 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 1000 HRS to 1300 HRS and 50 calls between 1500 HRS to 1700 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)	3496562
Airtel	4577463
BSNL CDMA	65278
BSNL GSM	1022944
Idea	678351
Reliance GSM	1962863
Vodafone	2900614

Dec'14 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)	4.22%	21.87%	95.15%	0.98%	2.88%	1.87%	17.09%	89.54%
Airtel	0.16%	0.82%	97.83%	0.33%	0.89%	1.27%	1.21%	98.35%
BSNL CDMA	14.95%	27.27%	98.30%	NA	No Data	1.80%	10.24%	83.57%
BSNL GSM	2.49%	5.05%	95.62%	0.87%	0.94%	2.12%	4.66%	92.21%
Idea	0.47%	0.51%	98.13%	0.21%	1.45%	1.47%	1.65%	95.57%
Reliance GSM	0.30%	1.79%	98.56%	0.05%	0.08%	0.69%	0.12%	98.40%
Vodafone	0.55%	1.59%	99.46%	0.14%	0.54%	0.60%	2.69%	97.72%

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

Note: Data for TCH congestion was not available at the OMC of 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 0.16%.

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 Idea at 0.51%.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. During the audits, the maximum CSSR was observed for Vodafone with 99.46%.
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 while Aircel failed to meet the benchmark on 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 0.60%.

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 0.12%.

Voice Quality

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

Aircel, BSNL CDMA and BSNL GSM failed to meet the benchmark. Best performance was recorded for Reliance GSM at 98.40%.

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)	3.37%	3.85%	97.83%	0.10%	0.69%	1.49%	16.89%	91.56%
Airtel	0.14%	0.00%	97.81%	0.39%	0.88%	1.24%	1.18%	98.38%
BSNL CDMA	14.78%	2.89%	98.28%	NA	No Data	7.66%	7.04%	83.57%
BSNL GSM	2.43%	1.77%	94.53%	0.54%	1.81%	2.57%	6.95%	92.43%
Idea	0.42%	0.38%	99.22%	0.17%	0.48%	1.07%	1.50%	96.23%
Reliance GSM	1.31%	1.79%	98.69%	0.02%	0.07%	0.65%	0.12%	98.29%
Vodafone	0.52%	0.16%	99.71%	0.09%	0.29%	0.55%	2.62%	98.20%

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

Note: Data for TCH congestion was not available at the OMC of BSNL CDMA.

BTSs Accumulated Downtime:

Aircel, BSNL CDMA and BSNL GSM failed to meet the TRAI specified benchmark. Minimum BTS Accumulated downtime was recorded for Airtel at 0.14%.

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 on this parameter. During the audits the maximum CSSR was observed for Vodafone with 99.71% of their calls getting completed.

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 TRAI specified benchmarks on the congestion parameters. Reliance GSM was the best performer on 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 & BSNL CDMA failed to meet the TRAI specified benchmark for Call Drop Rate. Vodafone had the best performance for the parameter with a call drop rate of 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 0.12%.

Voice Quality

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

Aircel, BSNL CDMA and BSNL GSM failed to meet the benchmark. Best performance was recorded for Airtel at 98.38%.

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	Call answered in 60 seconds	Accessibility of call centre/ customer care	Percentage of calls answered by the operators (voice to voice) within 90 seconds
Benchmark	≥ 98%	≥ 100%		≥ 95%	≥ 95%	≥ 95%
Aircel(DWL)	69.00%	89.00%	82.00%	88.67%	100.00%	100.00%
Airtel	76.00%	93.00%	73.00%	94.00%	90.00%	96.00%
BSNL CDMA	Data Not Available	Data Not Available	Data Not Available	90.67%	100.00%	100.00%
BSNL GSM	54.00%	67.00%	79.00%	88.00%	99.00%	70.00%
Idea	61.00%	80.00%	67.00%	86.00%	98.00%	98.00%
Reliance GSM	64.00%	80.00%	49.00%	74.67%	100.00%	95.00%
Vodafone	64.00%	86.00%	74.00%	90.67%	100.00%	100.00%

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.

Complaint/Request Attended to Satisfaction

All operators performed satisfactorily in terms of satisfaction of the customers for service requests. Aircel recorded the best performance at 82%.

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.

Level 1 Service

As per the live calling results, none of the operators met the TRAI benchmark for level 1 service with calls being answered within 60 seconds. 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, Airtel failed to meet the TRAI benchmark of 95%. Aircel, BSNL CDMA, Reliance GSM and Vodafone performed the best with 100% calls being answered by IVR within 60 seconds.

Customer Care / Helpline Assessment

BSNL GSM failed to meet the TRAI benchmark of 95% of calls answered by the call centre (voice to voice) within 90 seconds. Aircel, BSNL CDMA and Vodafone performed the best with 100% calls being answered by operator within 90 seconds.

3.4 BILLING AND CUSTOMER CARE - CONSOLIDATED

Name of Service Provider	Billing Disputes		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 within 60 seconds	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)	0.02%	0.19%	100.00%	100.00%	100.00%	88.77%	90.86%
Airtel	0.05%	0.01%	100.00%	100.00%	100.00%	100.00%	98.01%
BSNL CDMA	0.03%	0.03%	100.00%	100.00%	100.00%	100.00%	87.25%
BSNL GSM	0.00%	0.01%	98.02%	100.00%	100.00%	97.82%	93.11%
Idea	0.04%	0.36%	100.00%	100.00%	100.00%	99.03%	99.45%
Reliance GSM	0.07%	0.04%	100.00%	100.00%	100.00%	98.25%	66.17%
Vodafone	0.75%	0.20%	100.00%	100.00%	100.00%	99.96%	100.00%

Metering and Billing Credibility – Postpaid Subscribers

For the billing disputes of postpaid subscribers, it was observed that Vodafone failed to meet the benchmark of 0.75%. BSNL GSM had the best performance with 0.00%.

Metering and Billing Credibility – Prepaid Subscribers

For the prepaid customers, Aircel, Idea and Vodafone failed to meet the benchmark of billing disputes. Aircel 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.

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 within 60 seconds

Aircel did not meet the benchmark of 95% of its IVR call being attended within 60 seconds. Airtel and 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, BSNL CDMA, BSNL GSM 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	Reliance GSM	Vodafone
Aircel(DWL)	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Airtel	90.00%	NA	100.00%	91.00%	100.00%	100.00%	100.00%
BSNL CDMA	100.00%	97.00%	NA	99.00%	95.00%	98.00%	97.00%
BSNL GSM	99.00%	100.00%	100.00%	NA	98.00%	100.00%	100.00%
Idea	98.00%	100.00%	100.00%	100.00%	NA	99.00%	100.00%
Reliance GSM	100.00%	100.00%	100.00%	100.00%	100.00%	NA	91.00%
Vodafone	100.00%	100.00%	92.00%	100.00%	100.00%	100.00%	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. However, while connecting from Aircel to Airtel, the auditors identified that 90% of the calls were getting connected.

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

4.1 BTS ACCUMULATED DOWNTIME

4.1.1 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

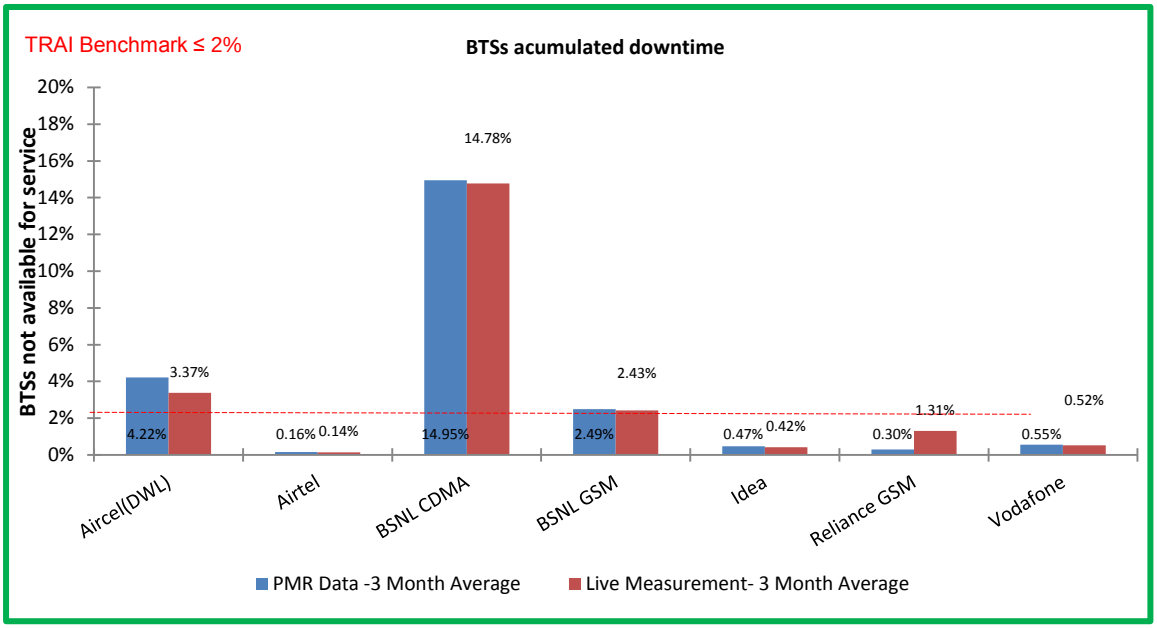
3. **TRAI Benchmark –**

    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.

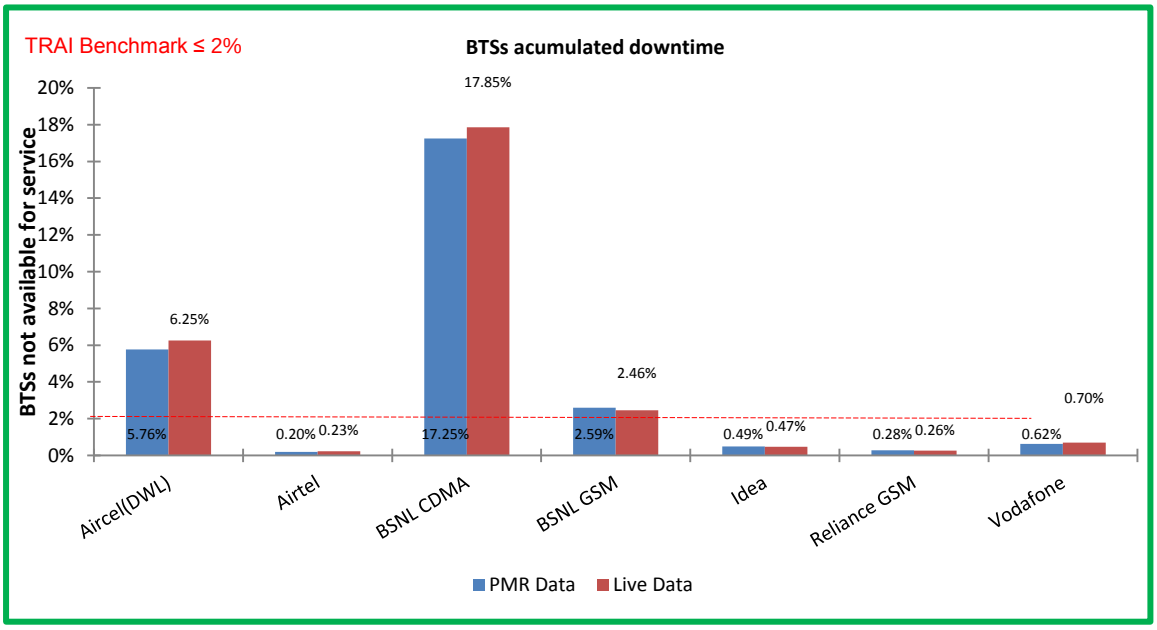
4.1.2 KEY FINDINGS - CONSOLIDATED



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

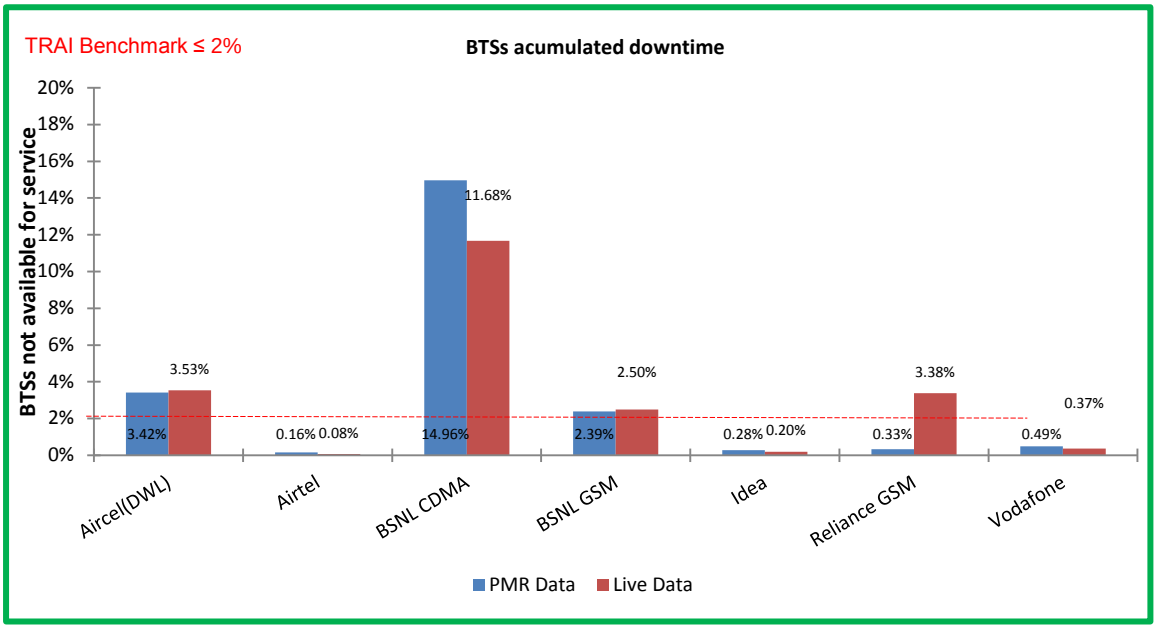
Aircel, BSNL CDMA and BSNL GSM did not meet the benchmark on aspect of BTS accumulated downtime as per audit/PMR data.

4.1.2.1 KEY FINDINGS – MONTH 1



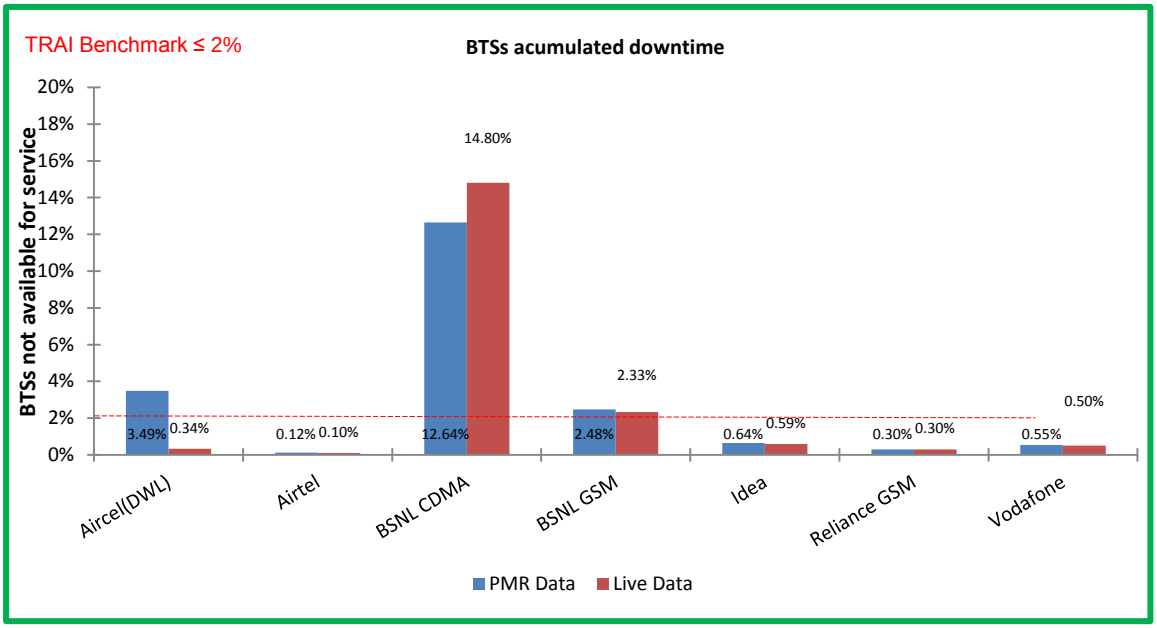
Data Source: Operations and Maintenance Center (OMC) of the operators

4.1.2.2 KEY FINDINGS – MONTH 2



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

4.1.2.3 KEY FINDINGS – MONTH 3



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

4.2 WORST AFFECTED BTS DUE TO DOWNTIME

4.2.1 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.

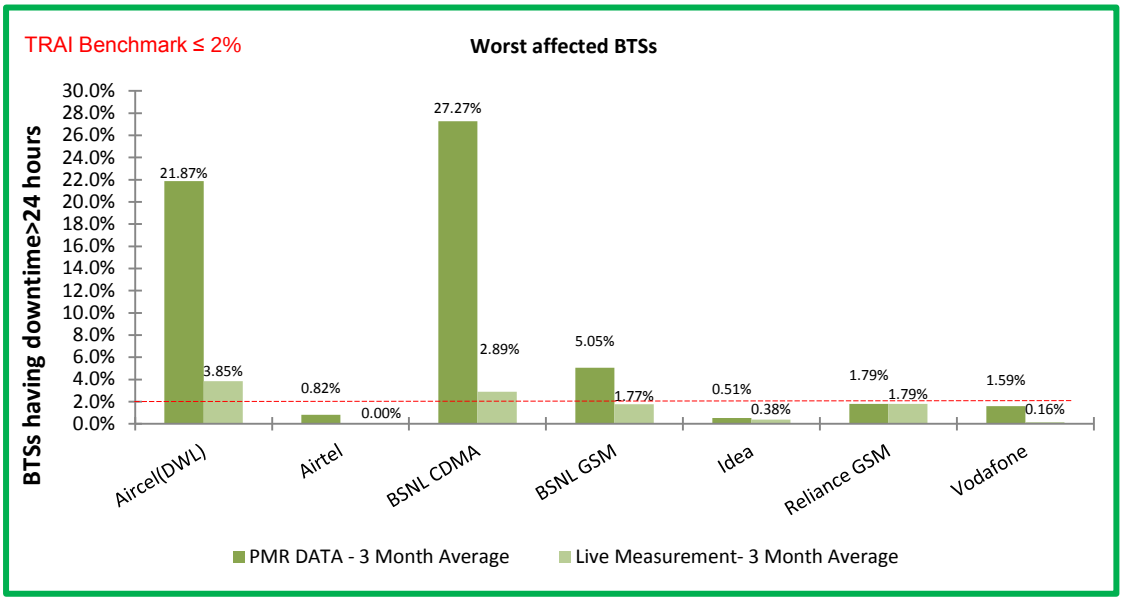
   iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

   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.

4.2.2 KEY FINDINGS - CONSOLIDATED

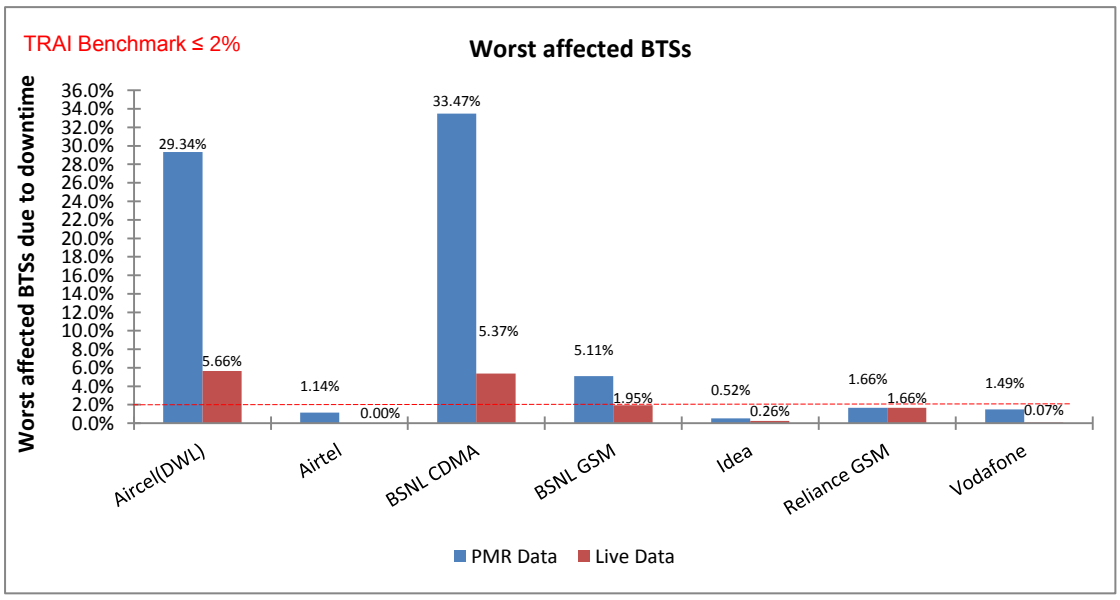


Data Source: Operations and Maintenance Center (OMC) of the operators

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

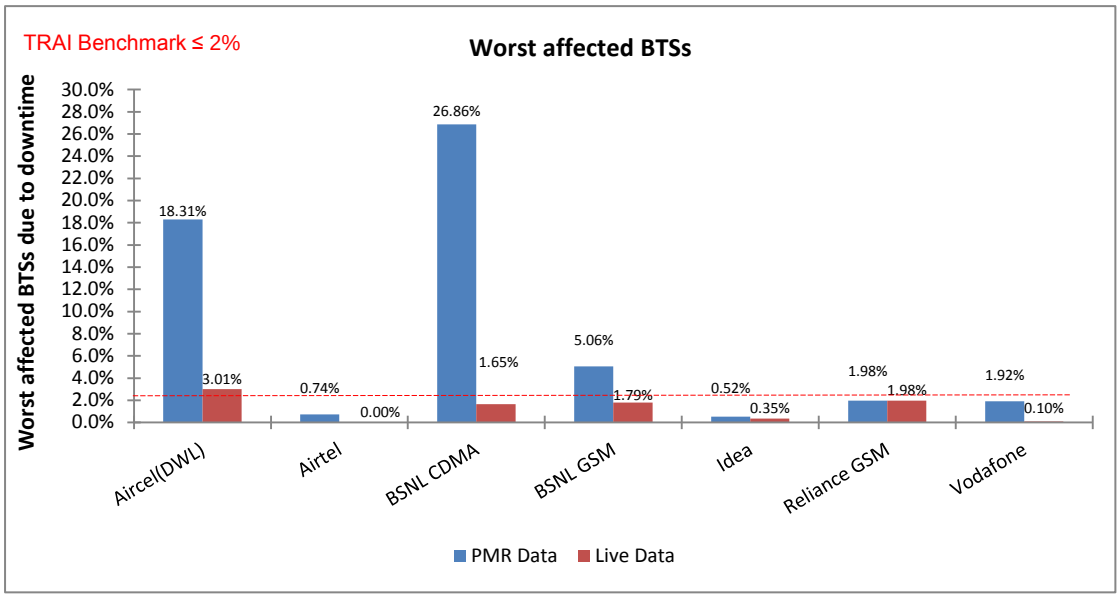
Significant difference was observed between PMR & live measurement data for Aircel, BSNL CDMA and BSNL GSM. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

4.2.2.1 KEY FINDINGS – MONTH 1



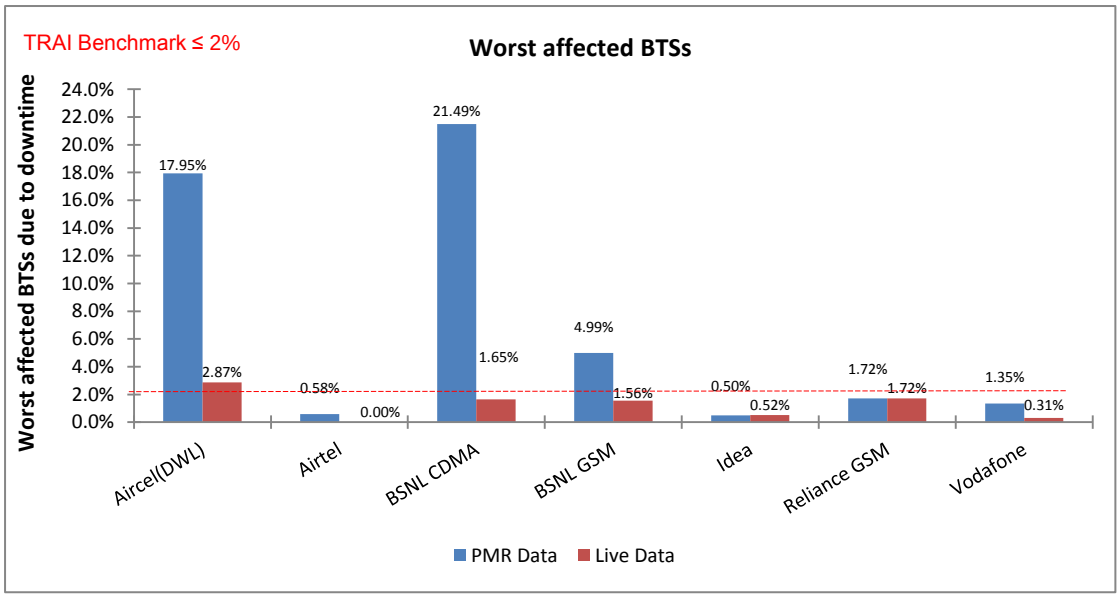
Data Source: Operations and Maintenance Center (OMC) of the operators

4.2.2.2 KEY FINDINGS – MONTH 2



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

4.2.2.3 KEY FINDINGS – MONTH 3



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

4.3 CALL SET UP SUCCESS RATE

4.3.1 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

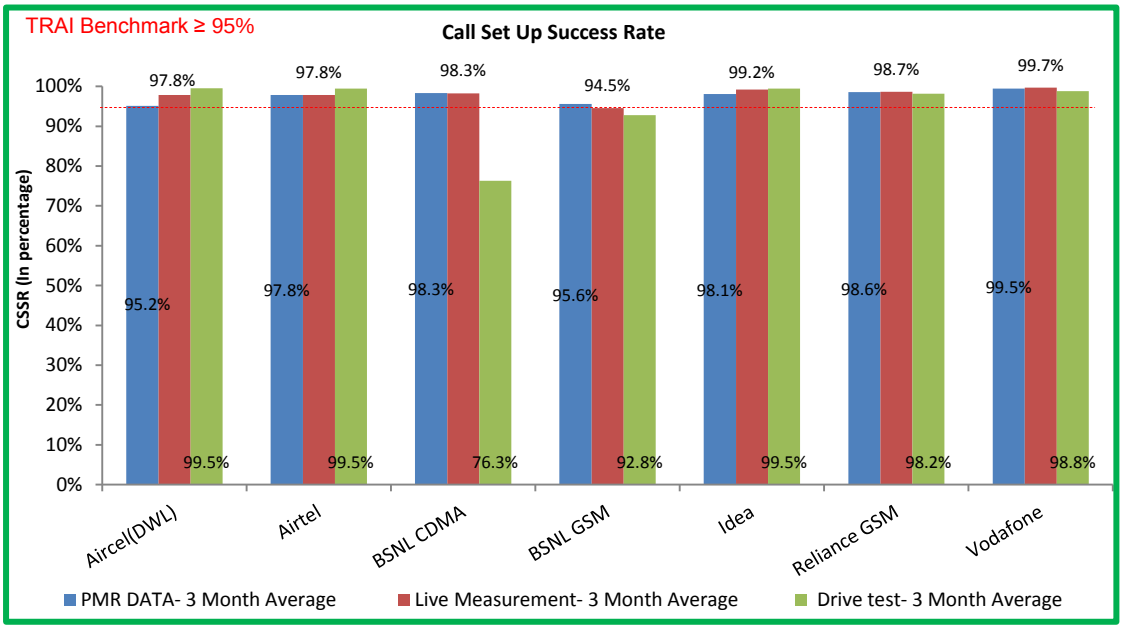
   Call Established means the following events have happened in call setup:-

   - 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.

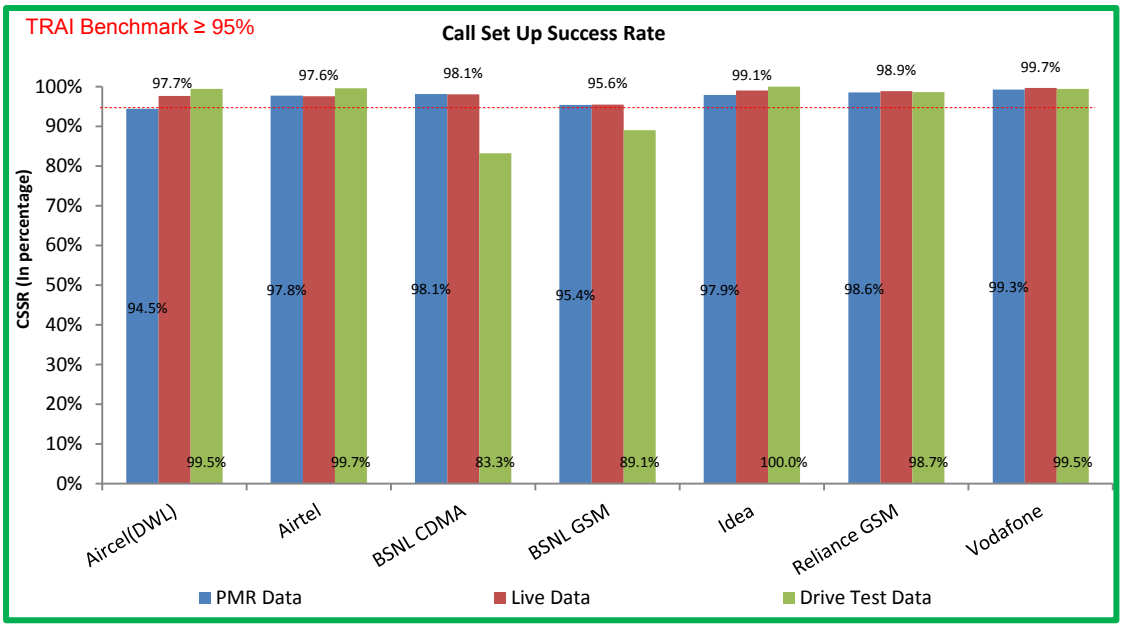
4.3.2 KEY FINDINGS - CONSOLIDATED



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

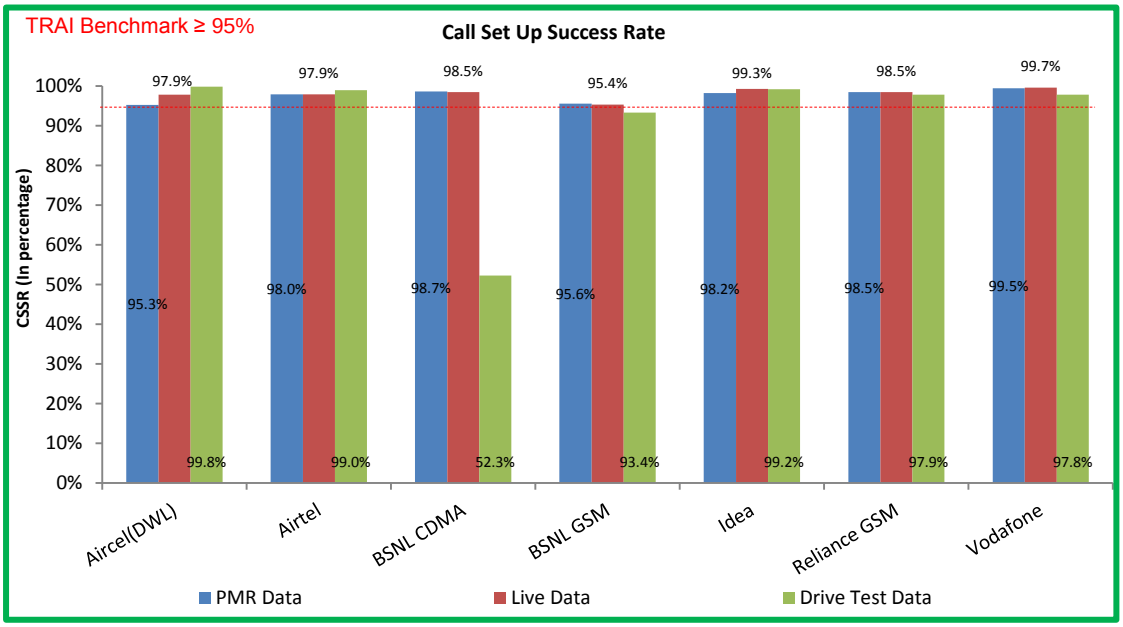
All operators met the TRAI benchmark as per audit/PMR data.

4.3.2.1 KEY FINDINGS – MONTH 1



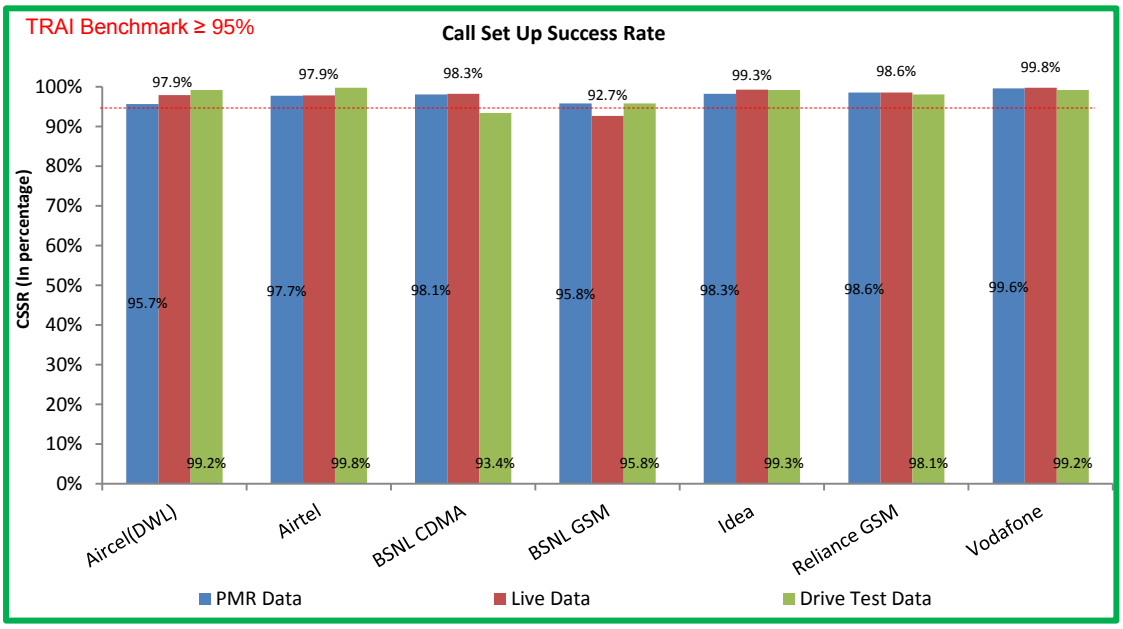
Data Source: Network Operations Center (NOC) of the operators

4.3.2.2 KEY FINDINGS – MONTH 2



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

4.3.2.3 KEY FINDINGS – MONTH 3



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

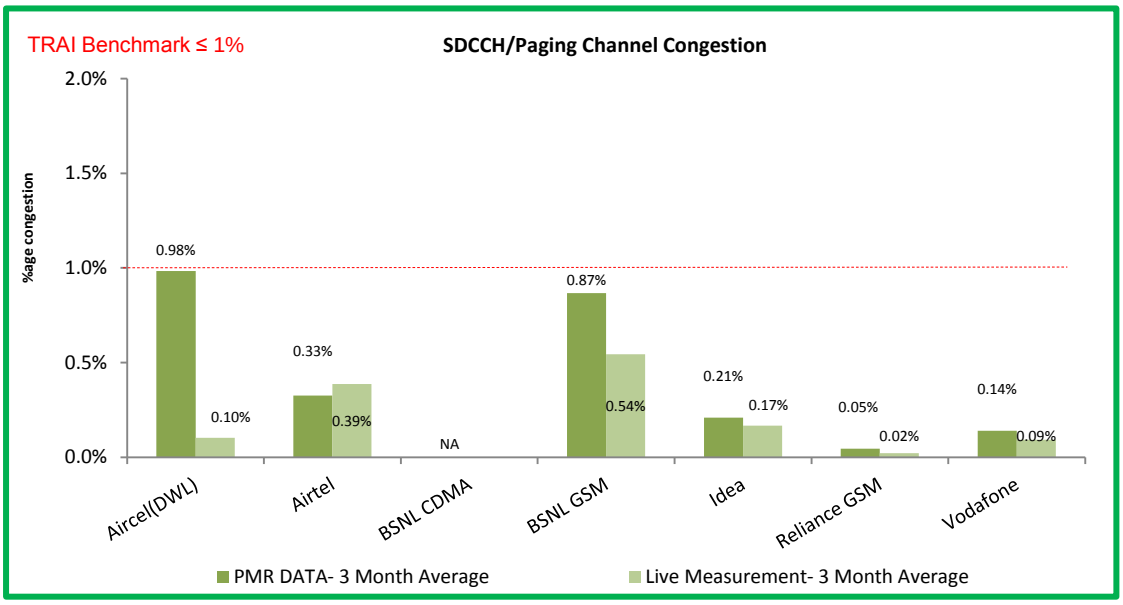
4.4 NETWORK CHANNEL CONGESTION- PAGING CHANNEL /TCH CONGESTION/POI

4.4.1 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

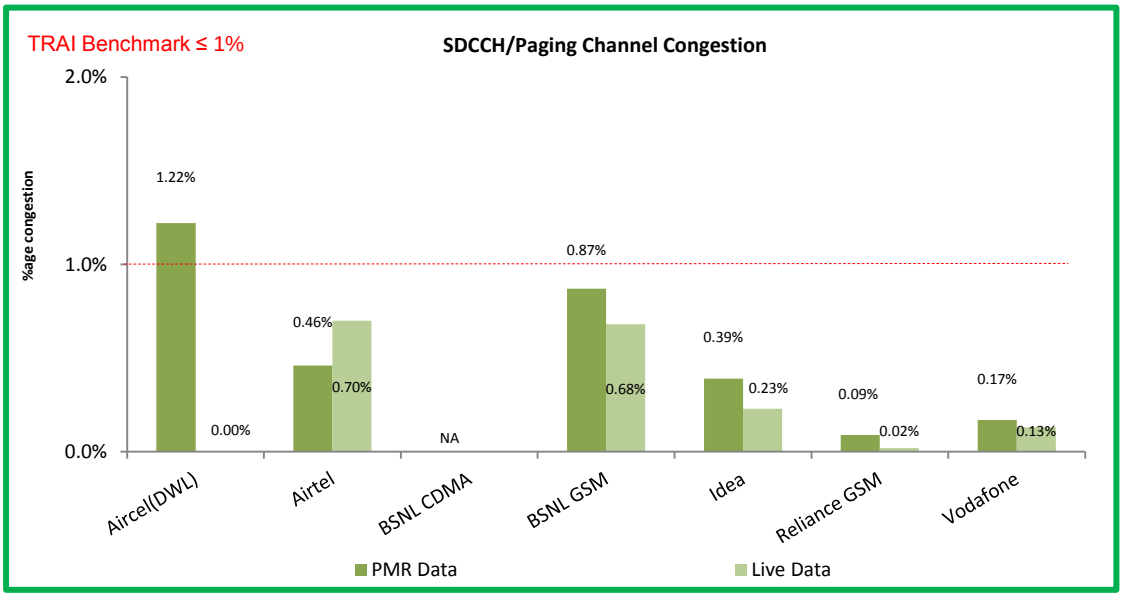
4.4.2 KEY FINDINGS - SDCCH/PAGING CHANNEL CONGESTION (CONSOLIDATED)



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

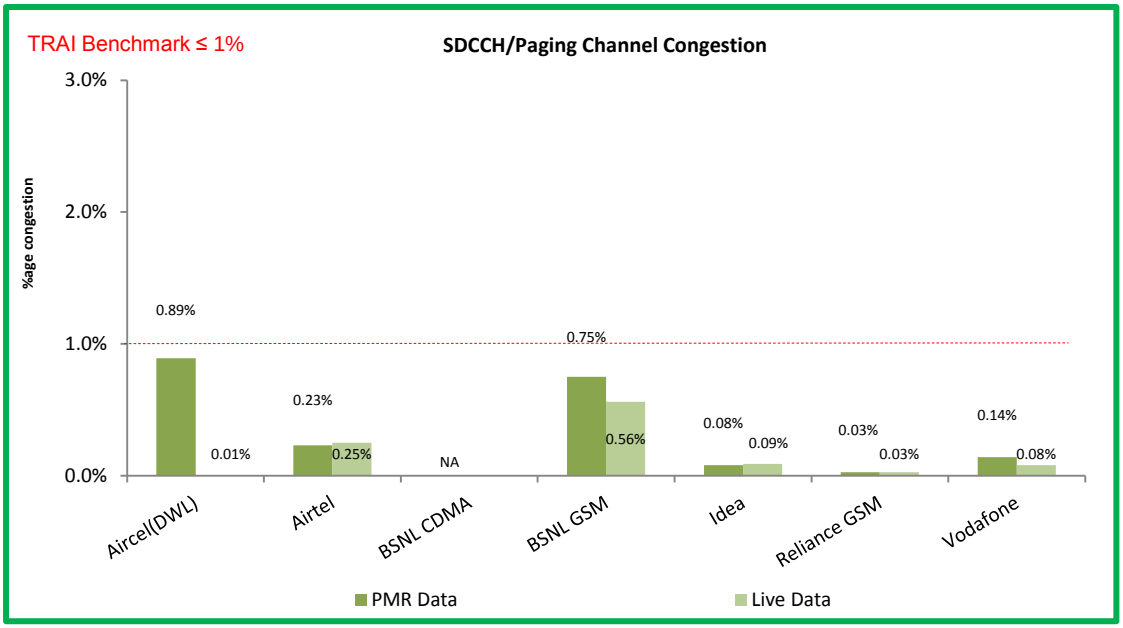
All operators met the benchmark as per PMR/audit Data.
Significant difference was observed between PMR & live measurement data for Aircel and BSNL GSM. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

4.4.2.1 KEY FINDINGS – MONTH 1



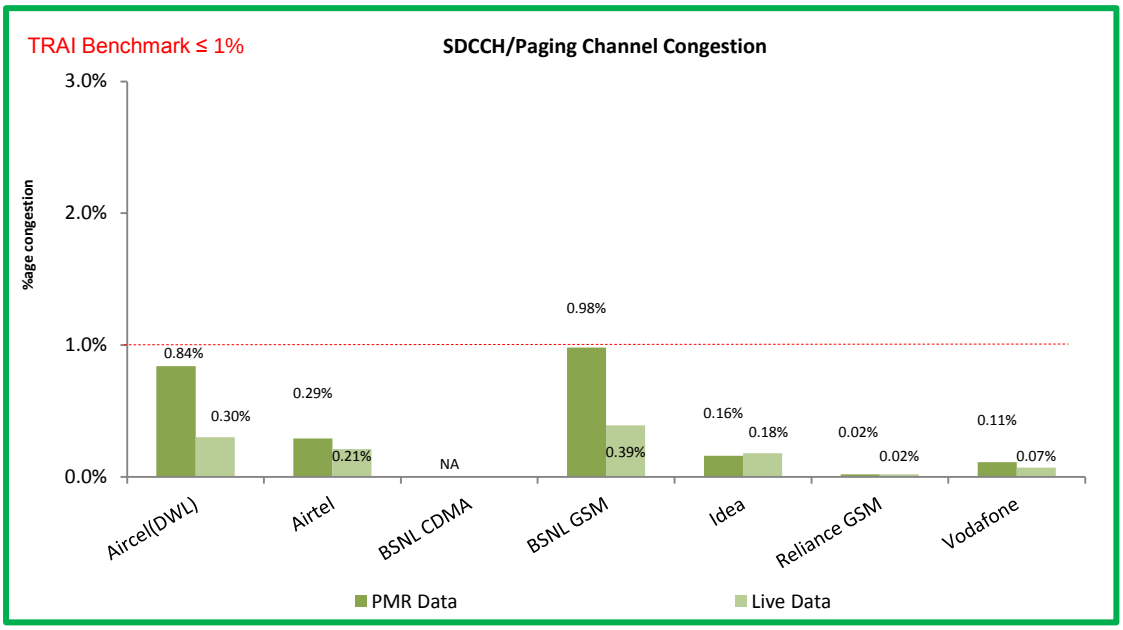
Data Source: Network Operations Center (NOC) of the operators

4.4.2.2 KEY FINDINGS – MONTH 2



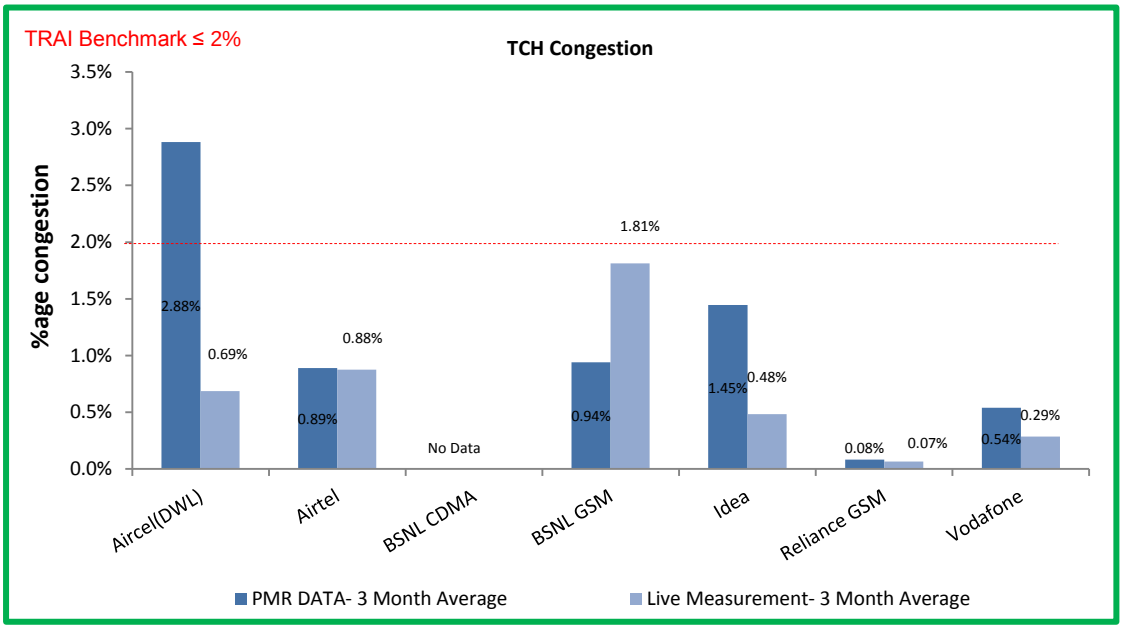
Data Source: Network Operations Center (NOC) of the operators

4.4.2.3 KEY FINDINGS – MONTH 3



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

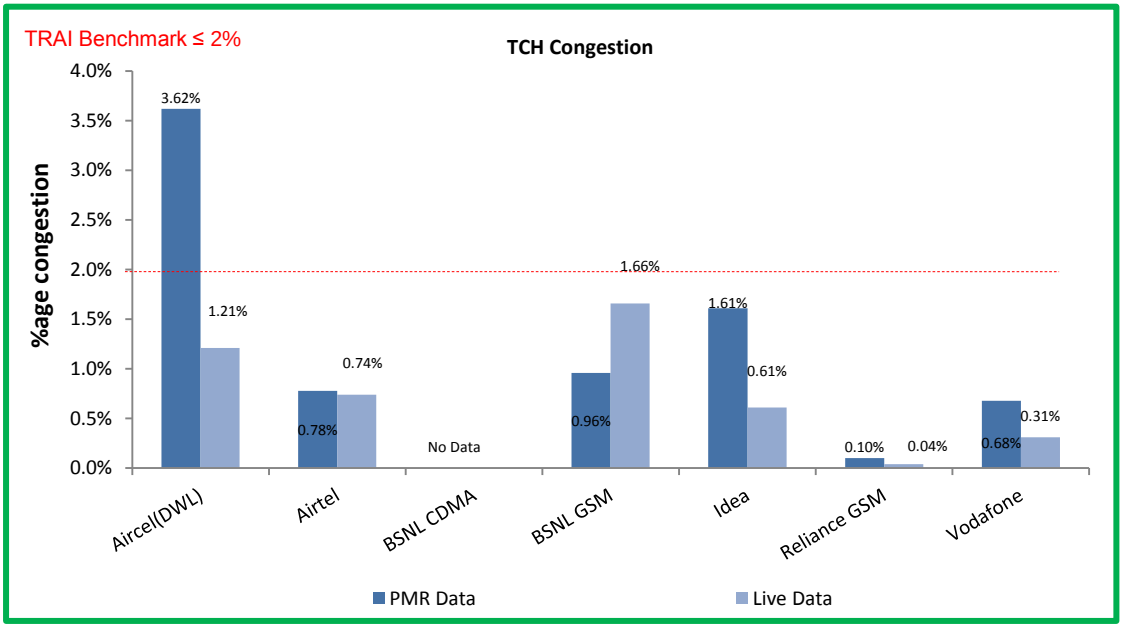
4.4.3 KEY FINDINGS – TCH CONGESTION (CONSOLIDATED)



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

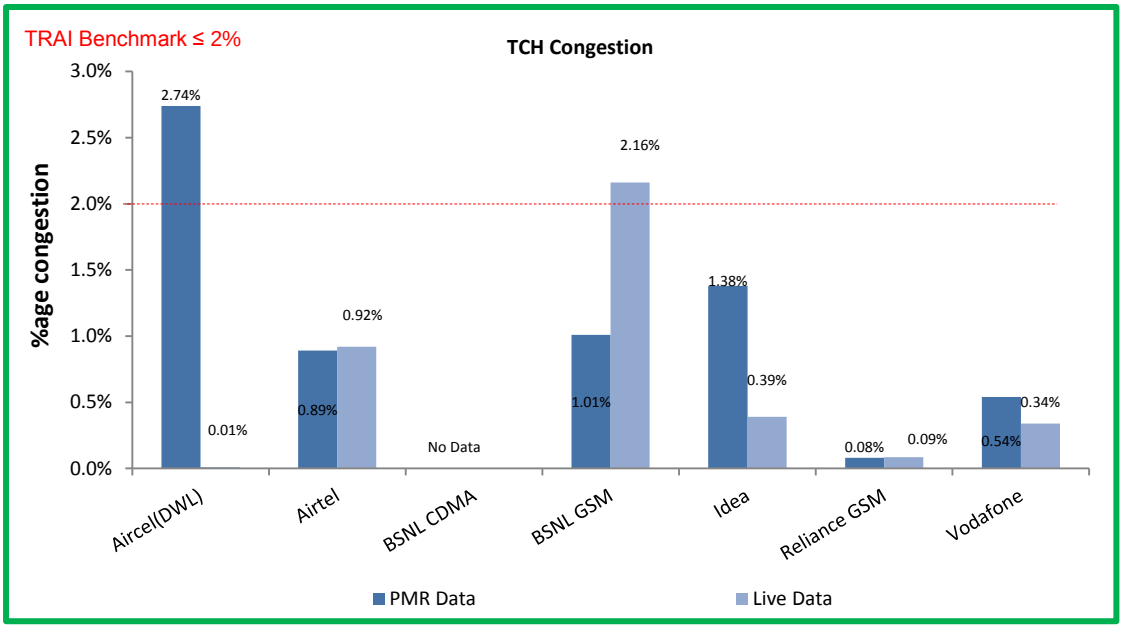
Aircel failed to meet the benchmark as per audit/PMR report.
Significant difference was observed between PMR & live measurement data for Aircel, BSNL GSM and Idea. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.
Note: Data for TCH congestion was not available at the OMC of BSNL CDMA.

4.4.3.1 KEY FINDINGS – MONTH 1



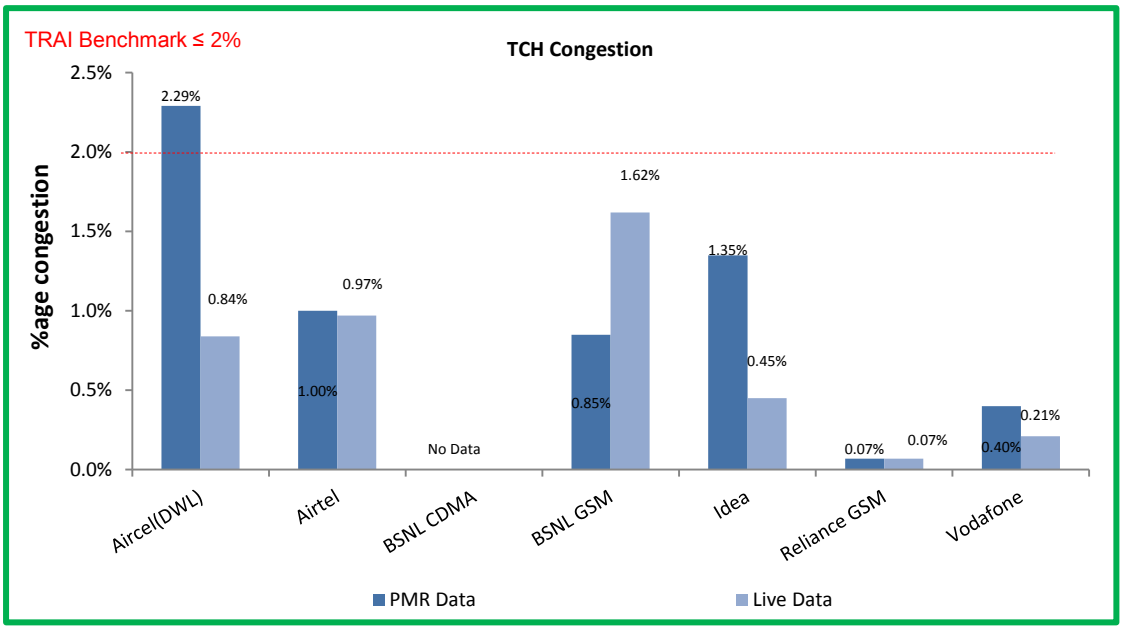
Data Source: Network Operations Center (NOC) of the operators

4.4.3.2 KEY FINDINGS – MONTH 2



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

4.4.3.3 KEY FINDINGS – MONTH 3



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

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

Audit Results for POI Congestion-Consolidated								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Average number of working POIs		51	15	0	19	29	23	28
Average No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Average Capacity of all POIs (A) - in erlangs		85416	86483	0	19644	21304	32495	60789900
Average Traffic served for all POIs (B)- in erlangs		55096	32502	0	19353	13360	19121	15411255
Average POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion-Consolidated								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Average number of working POIs		51	15	0	19	29	23	28
Average No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Average Capacity of all POIs (A) - in erlangs		85339	86426	0	19644	21289	32539	5974963
Average Traffic served for all POIs (B)- in erlangs		91393	33008	0	17348	14011	19523	1523957
Average 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.

4.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		51	15	0	19	29	23	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		85386	86228	0	19644	20387	33951	61010101
Traffic served for all POIs (B)- in erlangs		53422	32106	0	18799	11172	19164	15485026
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								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		51	15	0	19	29	23	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		85155	86051	0	19644	20341	34084	5955779
Traffic served for all POIs (B)- in erlangs		54444	32982	0	16966	12996	20370	1523858
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

4.4.4.2 KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		50	15	0	19	29	23	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		85457	86613	0	19644	21746	31757	59611887
Traffic served for all POIs (B)- in erlangs		56849	32728	0	19586	13983	19282	15055265
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								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		51	15	0	19	29	23	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		85457	86609	0	19644	21746	31757	5977954
Traffic served for all POIs (B)- in erlangs		55263	33235	0	17747	14508	19282	1521369
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

4.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data								
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		85404	86608	0	19643	21780	31776	61747713
Traffic served for all POIs (B)- in erlangs		55016	32672	0	19674	14924	18916	15693473
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								
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		85404	86617	0	19643	21780	31776	5991156
Traffic served for all POIs (B)- in erlangs		164473	32806	0	17331	14529	18916	1526644
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

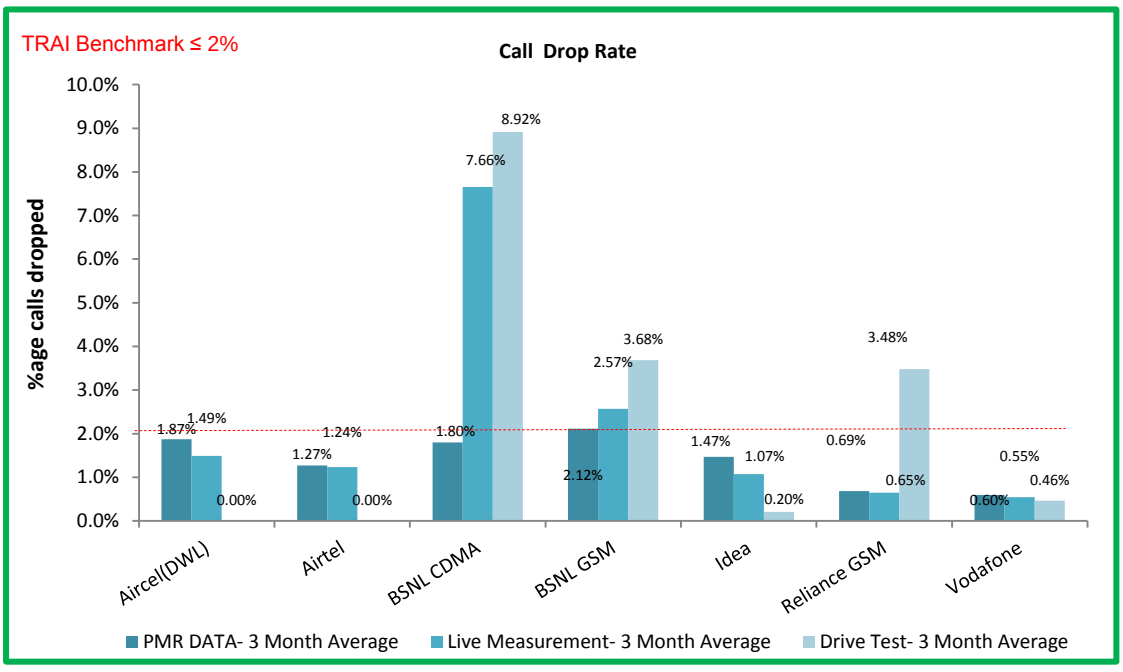
Data Source: Network Operations Center (NOC) of the operators

4.5 CALL DROP RATE

4.5.1 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.

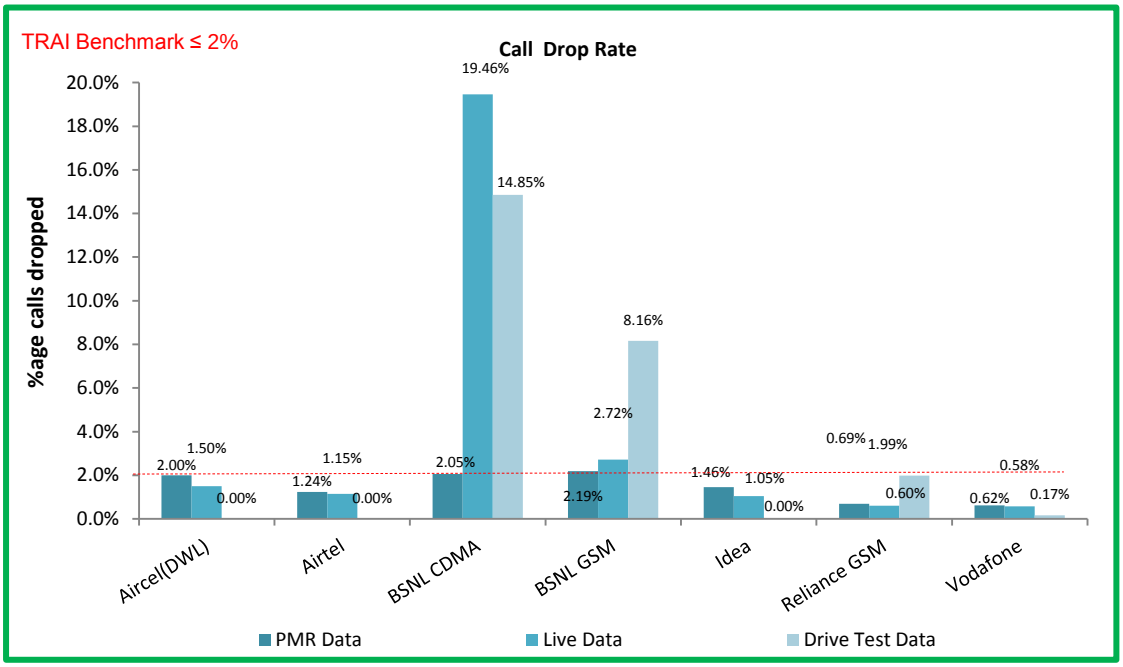
4.5.2 KEY FINDINGS - CONSOLIDATED



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

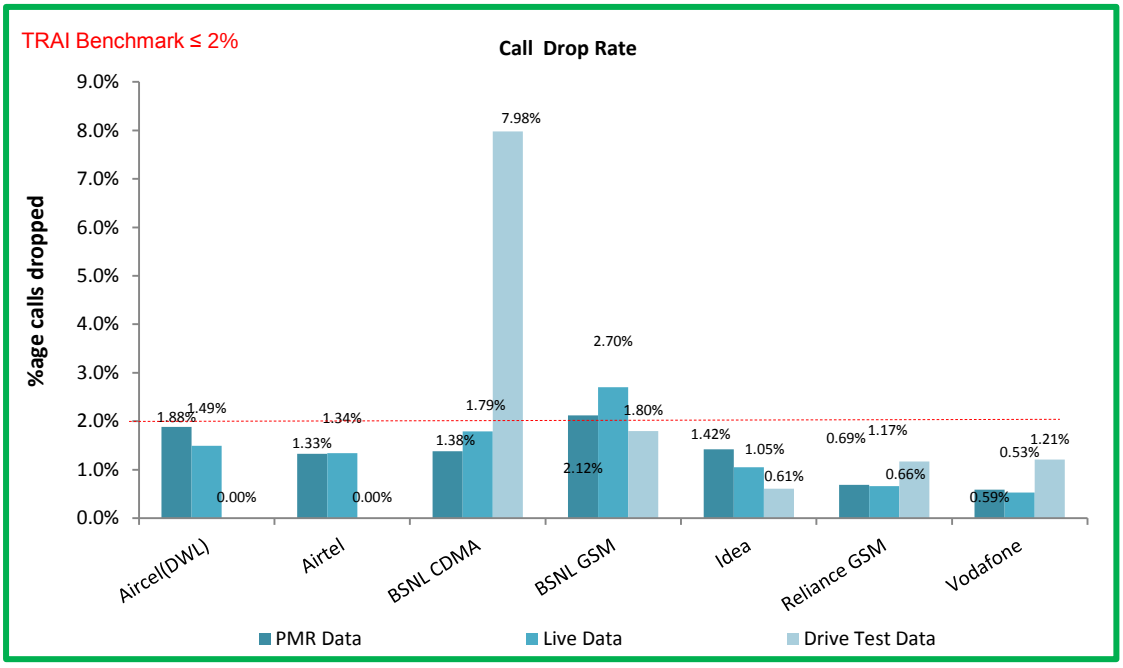
BSNL GSM failed to meet the benchmark for call drop rate during audit. The call drop rate during drive test and live measurement was observed to be higher than audit for BSNL CDMA.

4.5.2.1 KEY FINDINGS – MONTH 1



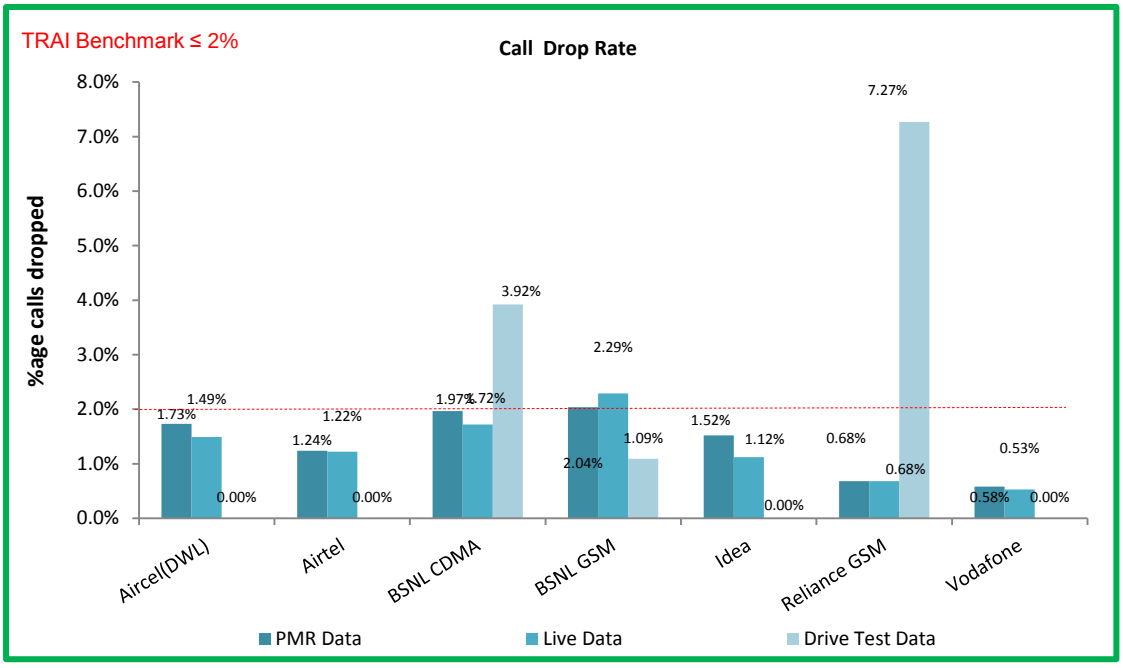
Data Source: Network Operations Center (NOC) of the operators

4.5.2.2 KEY FINDINGS – MONTH 2



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

4.5.2.3 KEY FINDINGS – MONTH 3



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

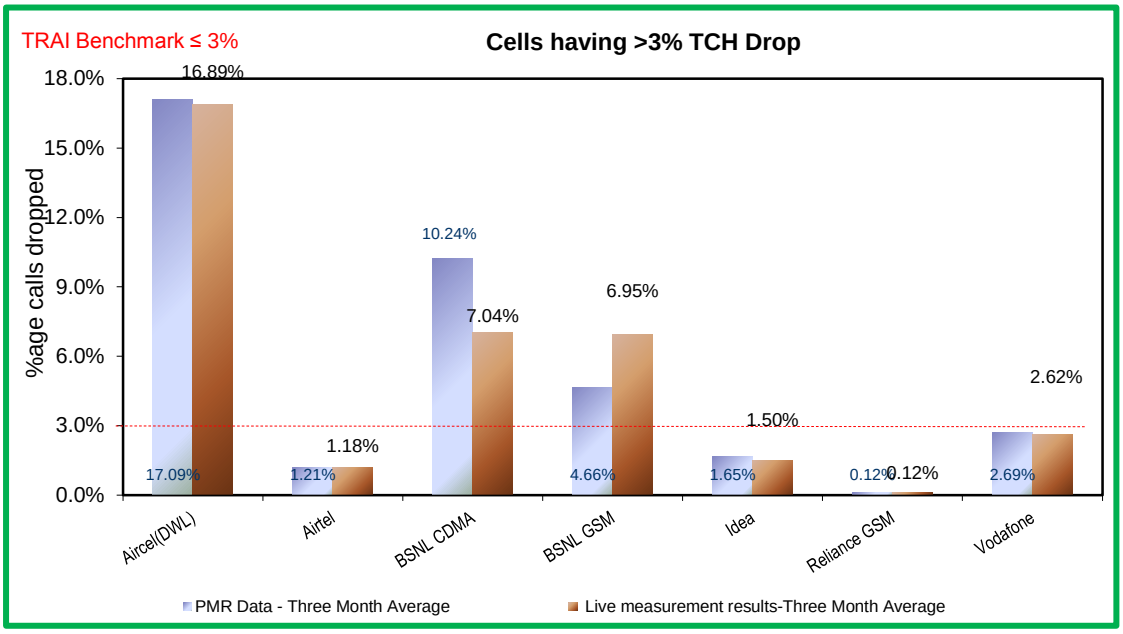
4.6 CELLS HAVING GREATER THAN 3% TCH DROP

4.6.1 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.

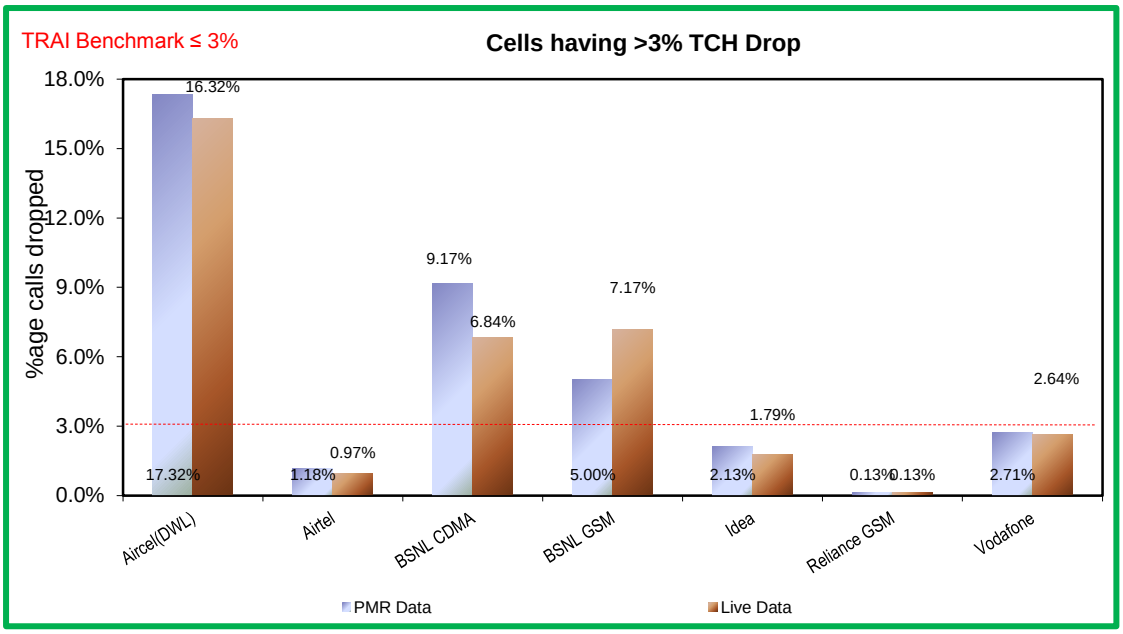
4.6.2 KEY FINDINGS - CONSOLIDATED



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

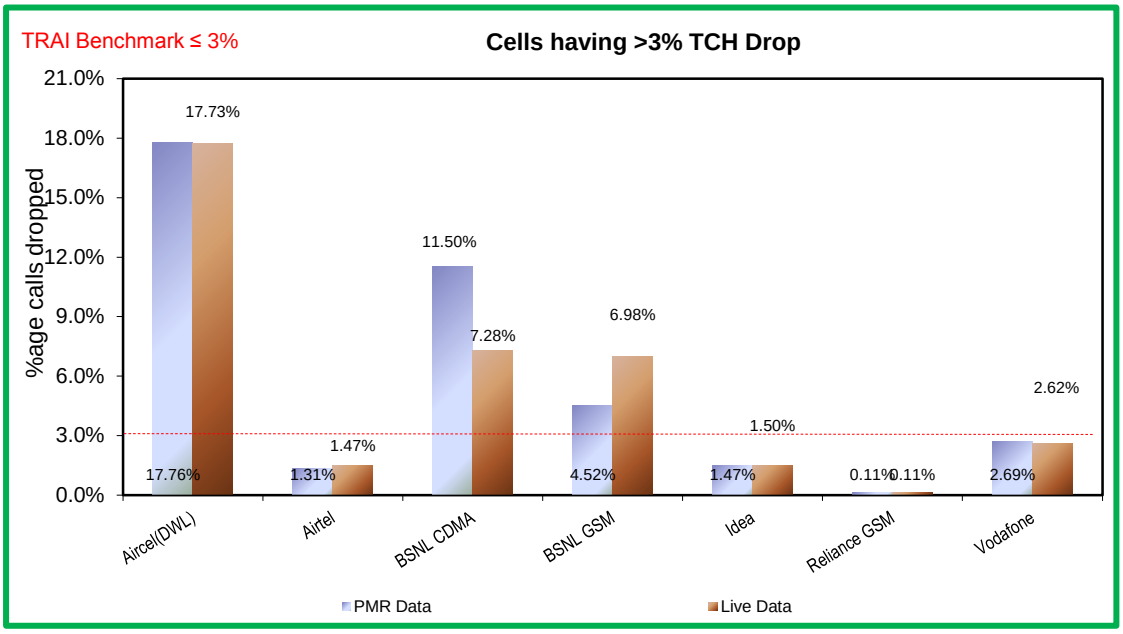
Aircel, BSNL CDMA and BSNL GSM did not meet the benchmark during audit.

4.6.2.1 KEY FINDINGS – MONTH 1



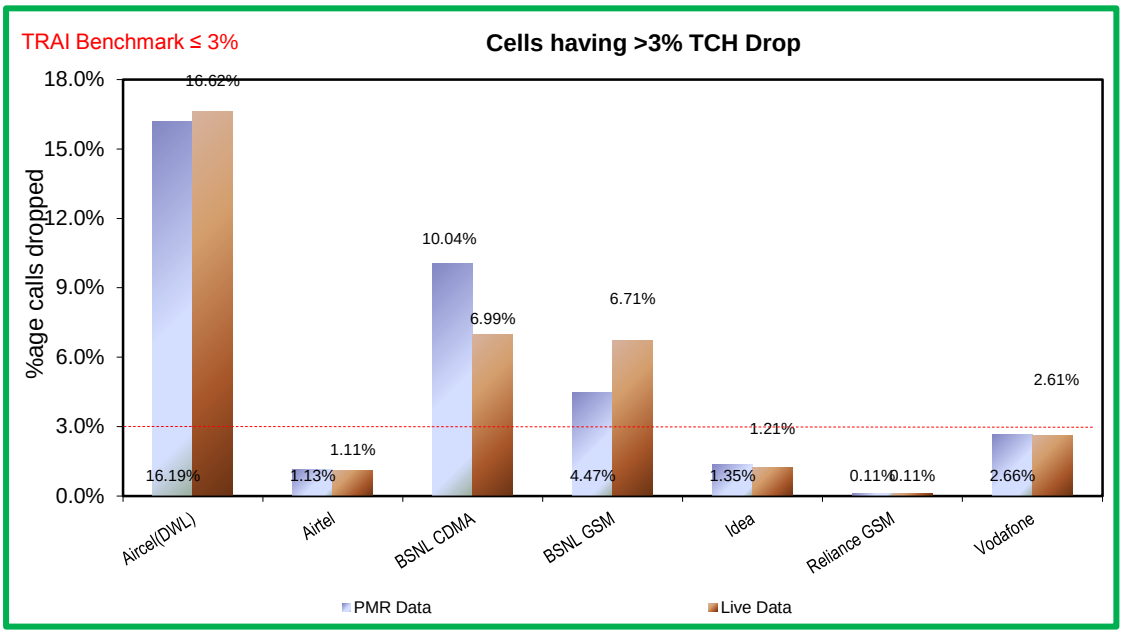
Data Source: Network Operations Center (NOC) of the operators

4.6.2.2 KEY FINDINGS – MONTH 2



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

4.6.2.3 KEY FINDINGS – MONTH 3



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

4.7 VOICE QUALITY

4.7.1 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**

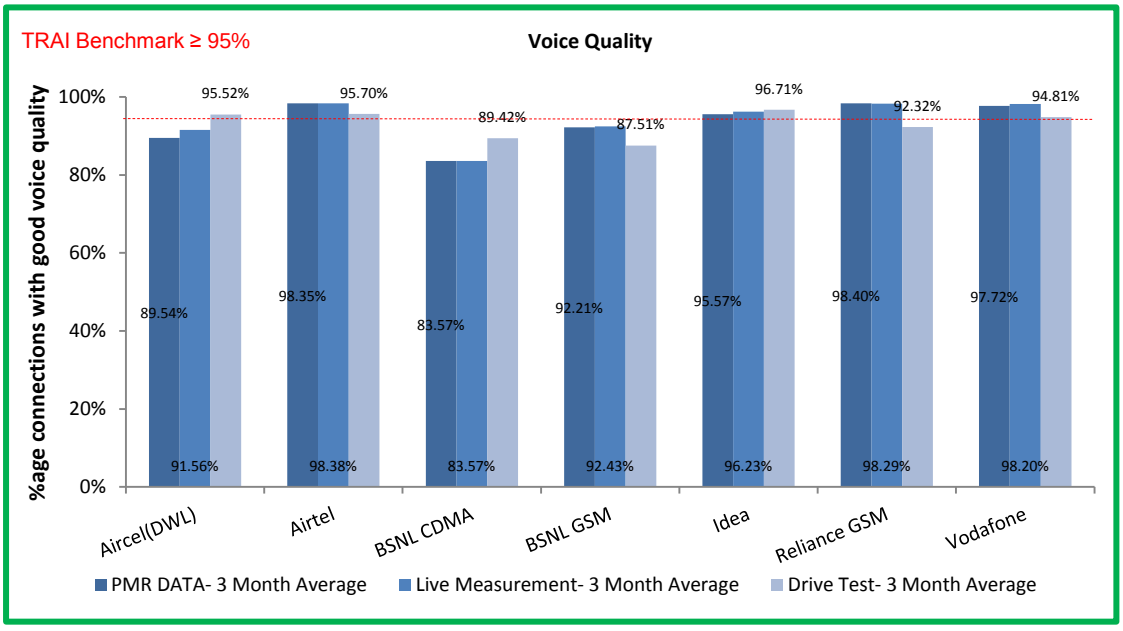
3. **TRAI Benchmark:** ≥ 95%

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.

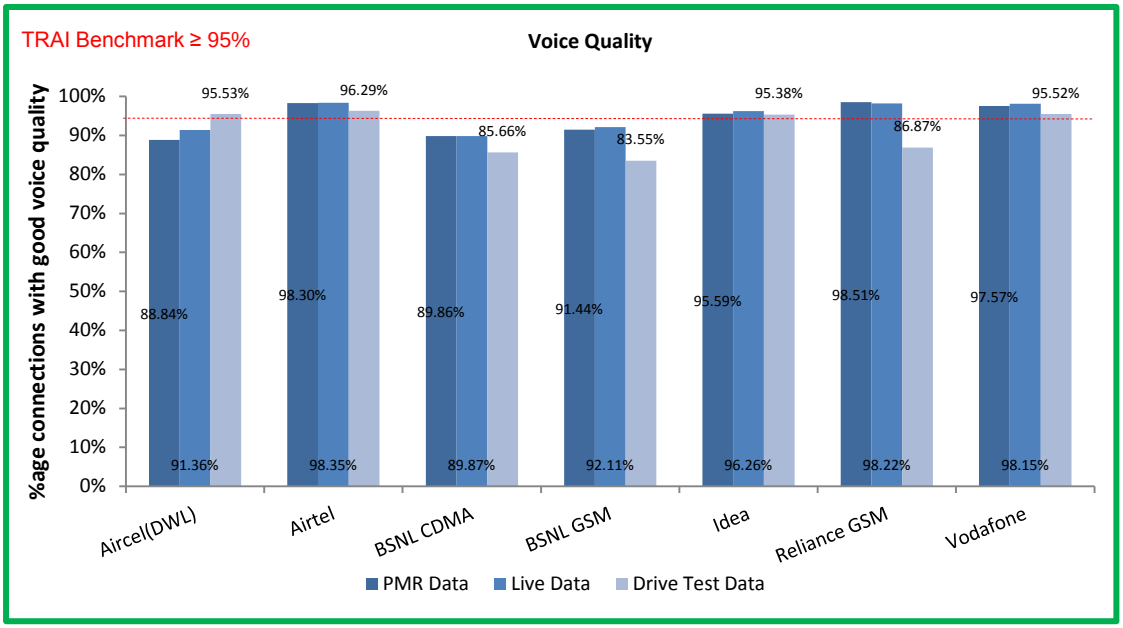
4.7.2 KEY FINDINGS



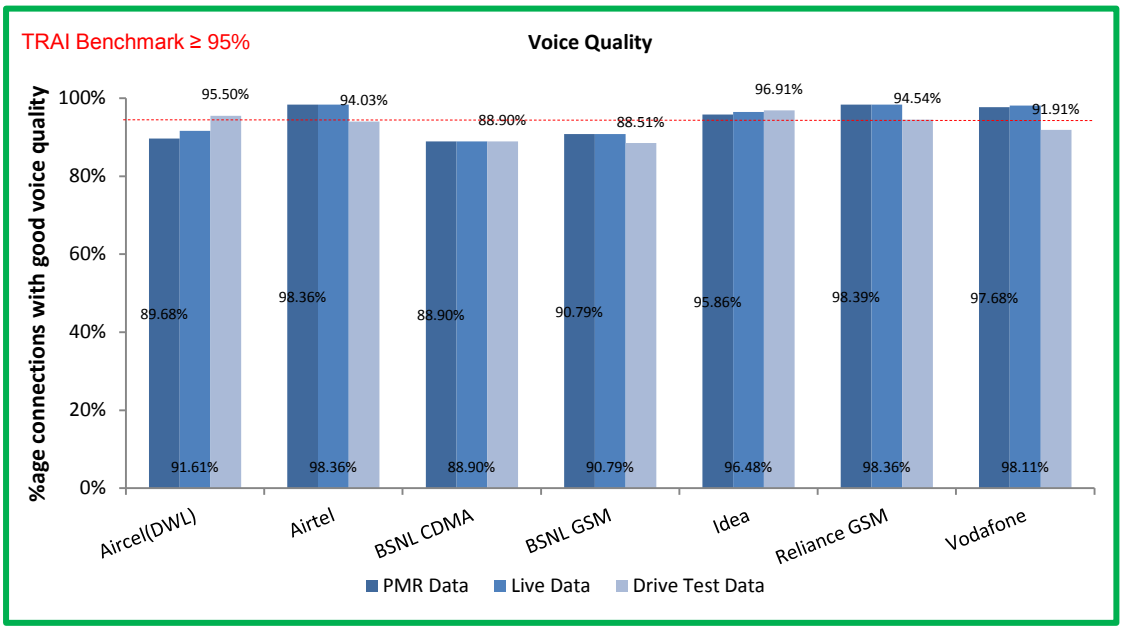
Data Source: Network Operations Center (NOC) of the operators

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

4.7.2.1 KEY FINDINGS – MONTH 1

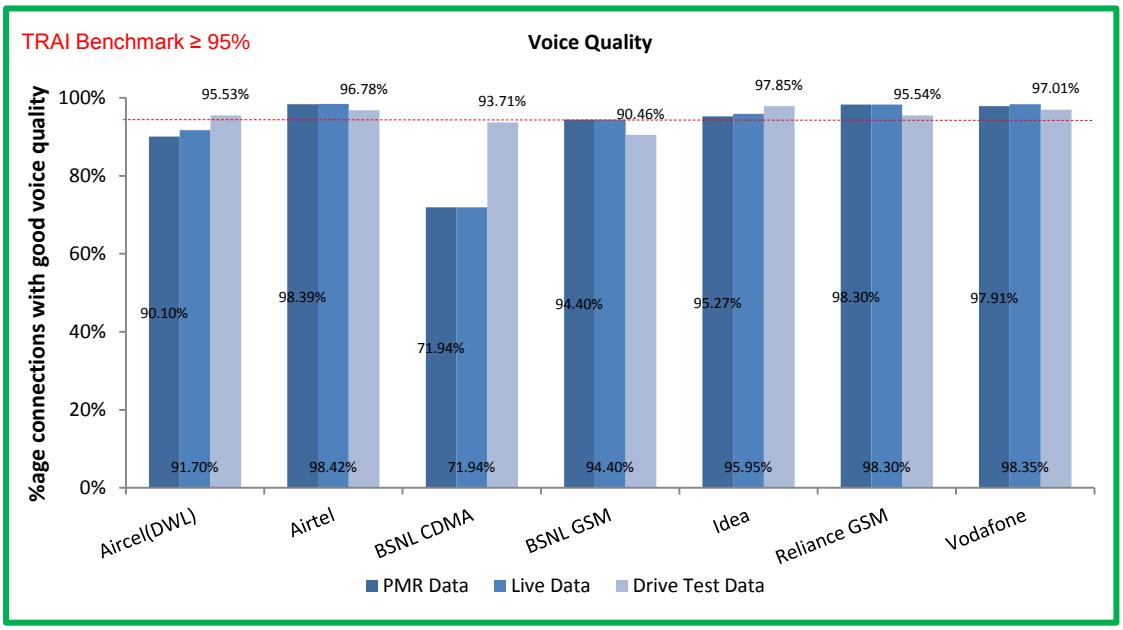


4.7.2.2 KEY FINDINGS – MONTH 2



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

4.7.2.3 KEY FINDINGS – MONTH 3



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

5 PARAMETER DESCRIPTION AND DETAILED FINDINGS – NON-NETWORK PARAMETERS

5.1 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.

5.1.1 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%

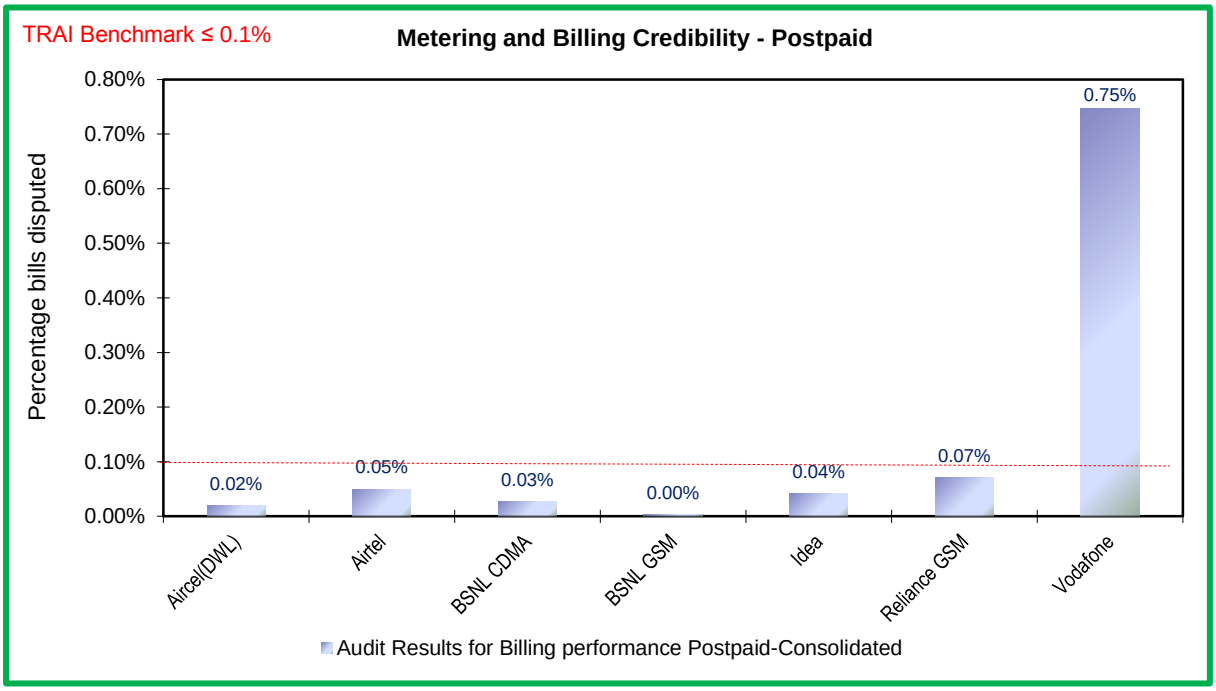
- Audit Procedure:

  - 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

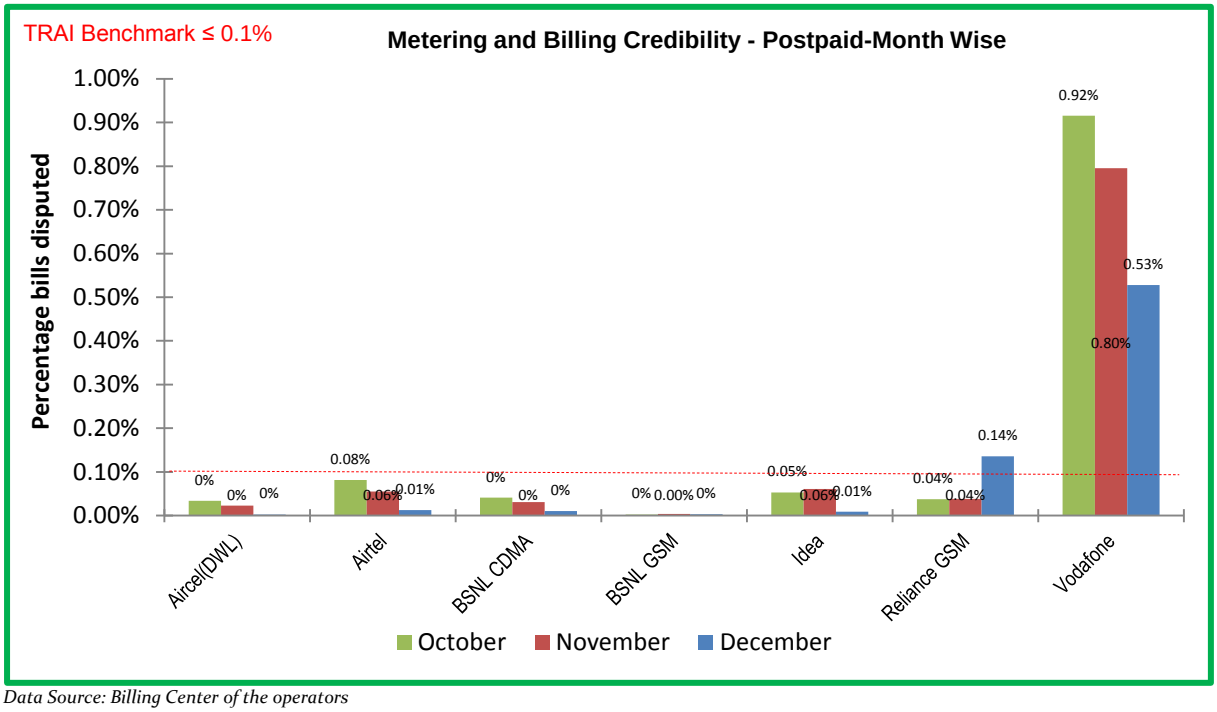
    - For Prepaid, the data of total charging complaints in a quarter would be taken for the purpose of audit

5.1.2 KEY FINDINGS – METERING AND BILLING CREDIBILITY (POSTPAID)



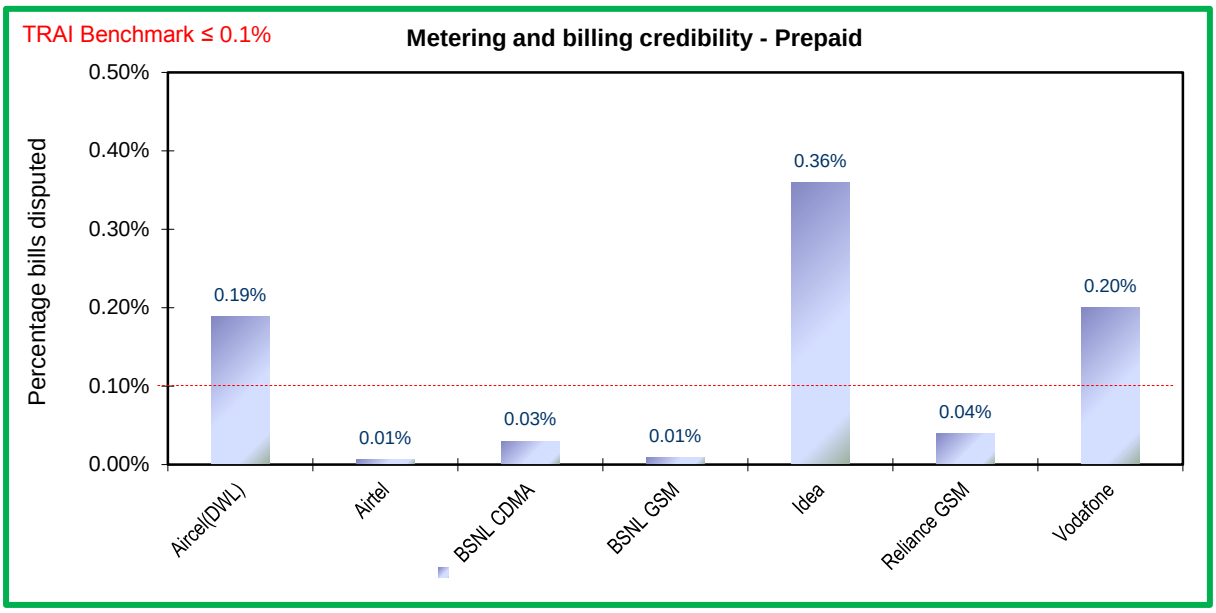
Data Source: Billing Center of the operators

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



Data Source: Billing Center of the operators

5.1.3 KEY FINDINGS - METERING AND BILLING CREDIBILITY (PREPAID)



Data Source: Billing Center of the operators

Aircel, Idea and Reliance GSM failed to meet the benchmark of metering and billing credibility for prepaid.

5.2 RESOLUTION OF BILLING/ CHARGING COMPLAINTS

5.2.1 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 =

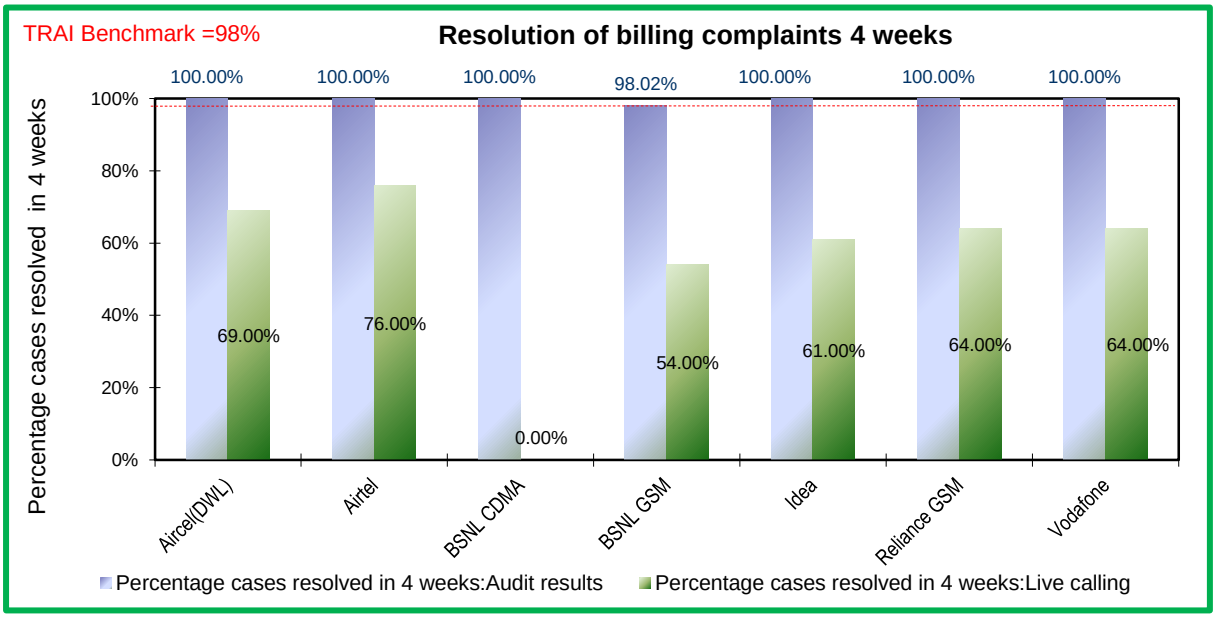
$$\frac{\text{number of billing complaints for post-paid customers/charging, credit/ validity complaints for pre-paid customers resolved within 6 weeks during the quarter}}{\text{number of billing/charging, credit / validity complaints received during the quarter}} \times 100$$

- **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.

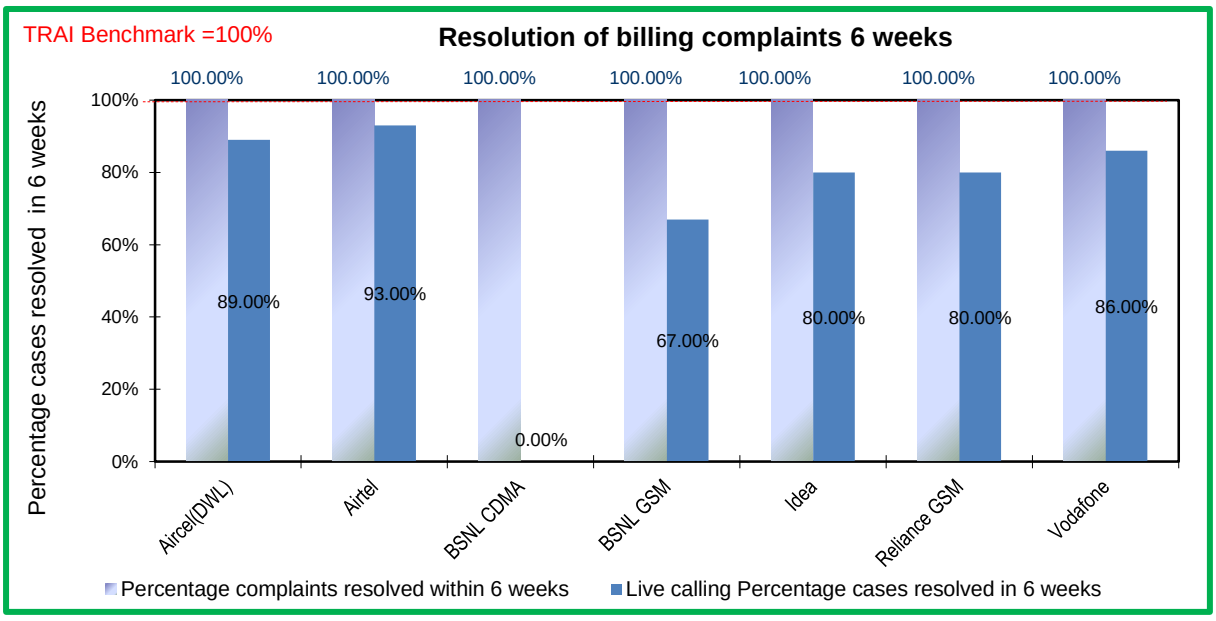
5.2.2 KEY FINDINGS - WITHIN 4 WEEKS



Data Source: Billing Center of the operators

All operators met the benchmark as per PMR data. However, as per live calling done to customers, the performance of all operators was observed to be far inferior to the PMR data.

5.2.3 KEY FINDINGS WITHIN 6 WEEKS



Data Source: Billing Center of the operators

All operators met the benchmark as per PMR data. However, as per live calling done to customers, the performance of all operators was observed to be far inferior to the PMR data.

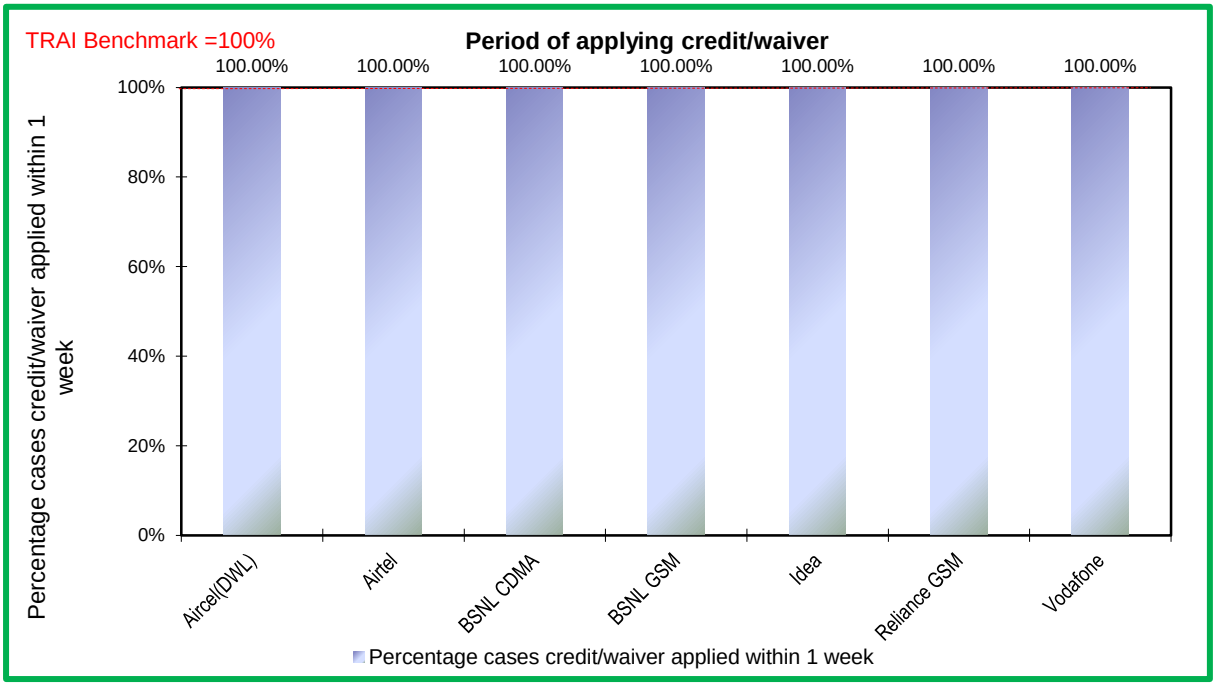
Note: Auditors did not receive the raw data for live calling from the central billing center of BSNL CDMA as the operator was unable to provide the same.

5.3 PERIOD OF APPLYING CREDIT/WAVIER

5.3.1 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

5.3.2 KEY FINDINGS



Data Source: Billing Center of the operators

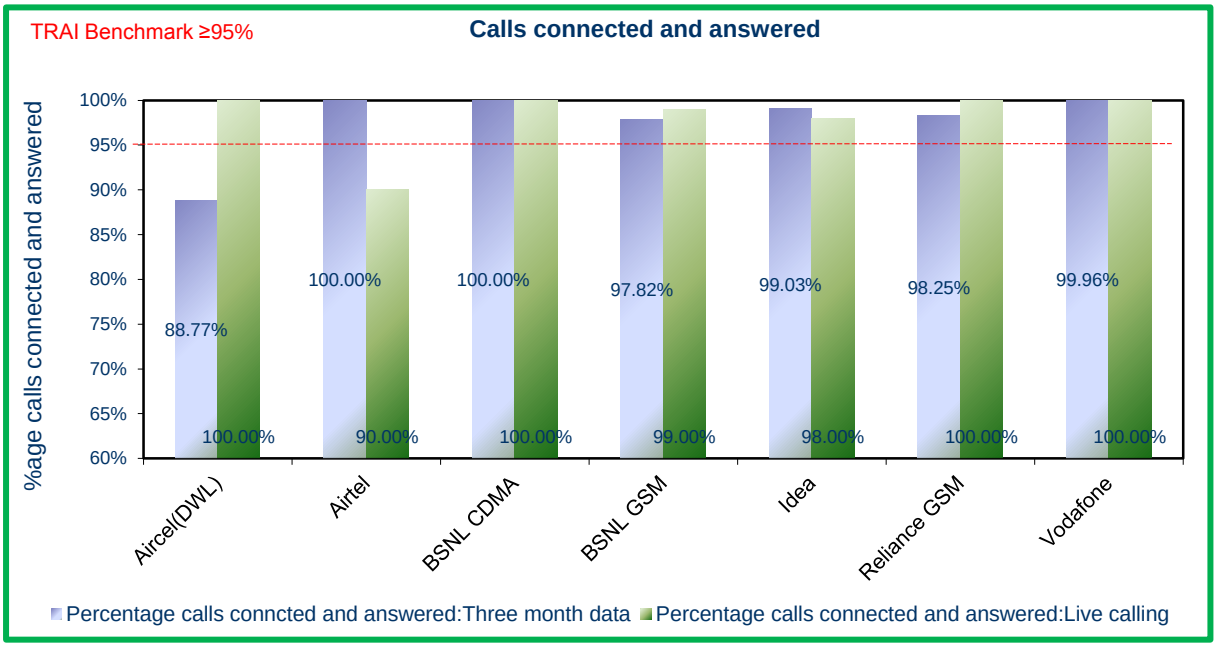
All operators met the benchmark for this parameter.

5.4 CALL CENTRE PERFORMANCE-IVR

5.4.1 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

5.4.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

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

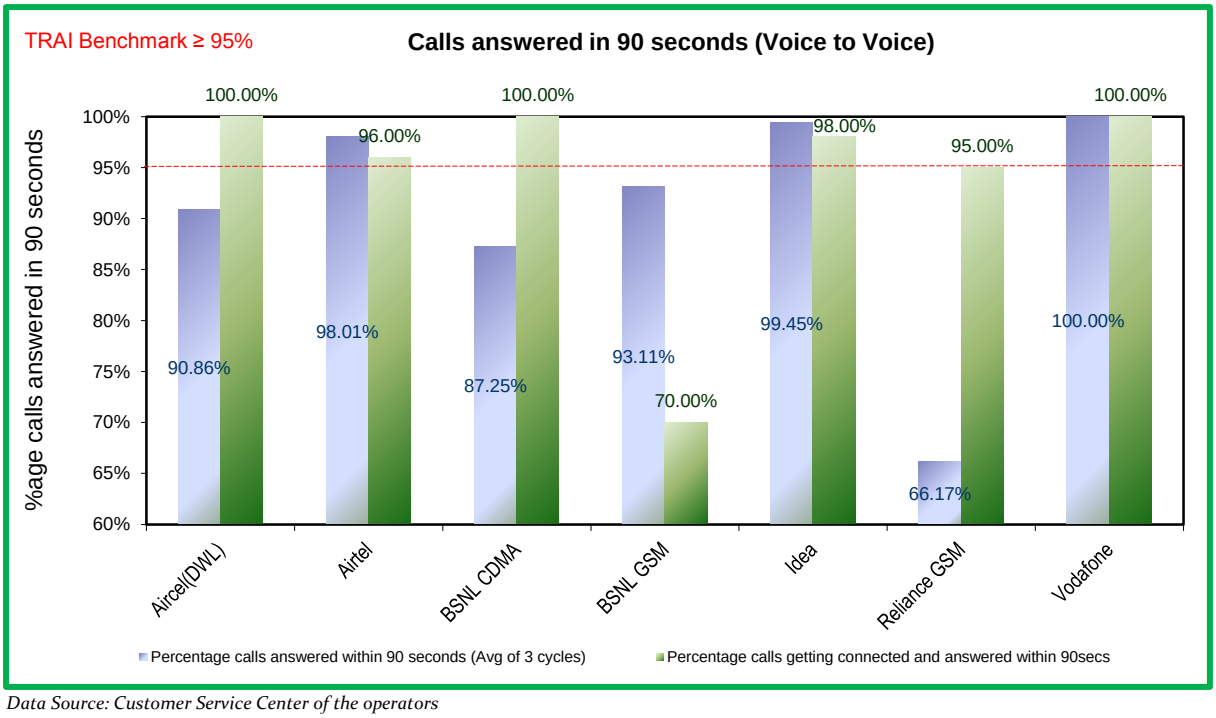
5.5 CALL CENTRE PERFORMANCE-VOICE TO VOICE

5.5.1 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

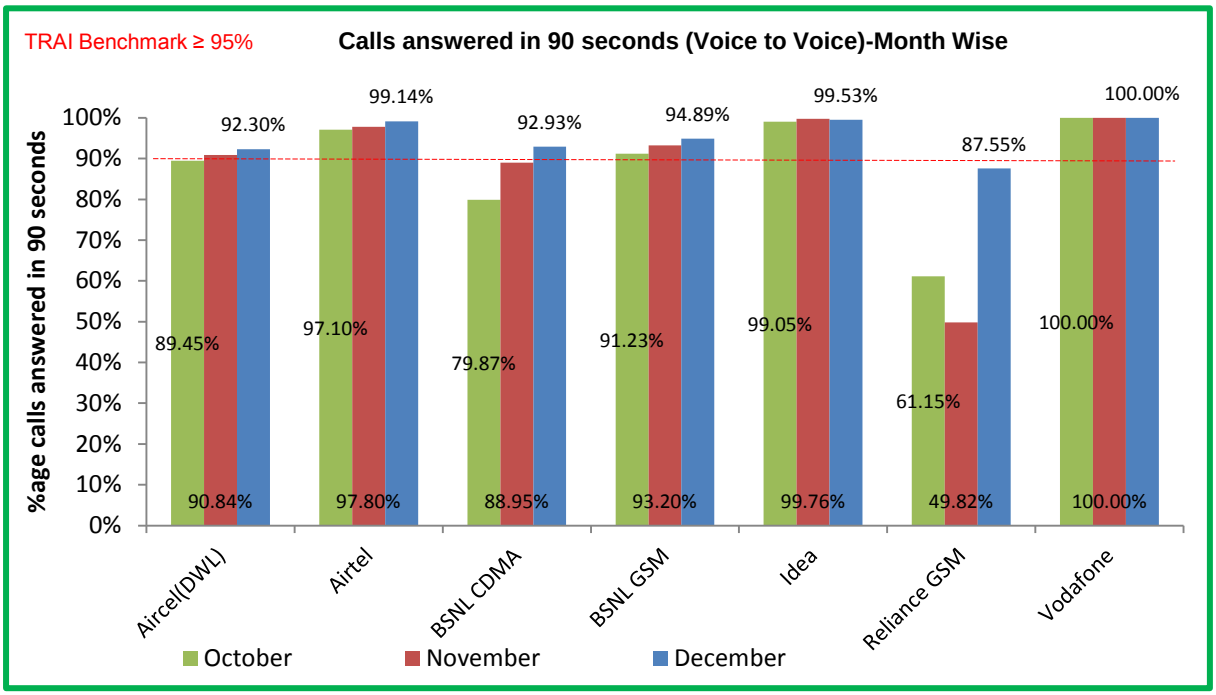
Benchmark: 95% calls to be answered within 90 seconds

5.5.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

Aircel BSNL CDMA, BSNL GSM 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 GSM was far inferior to the PMR data.



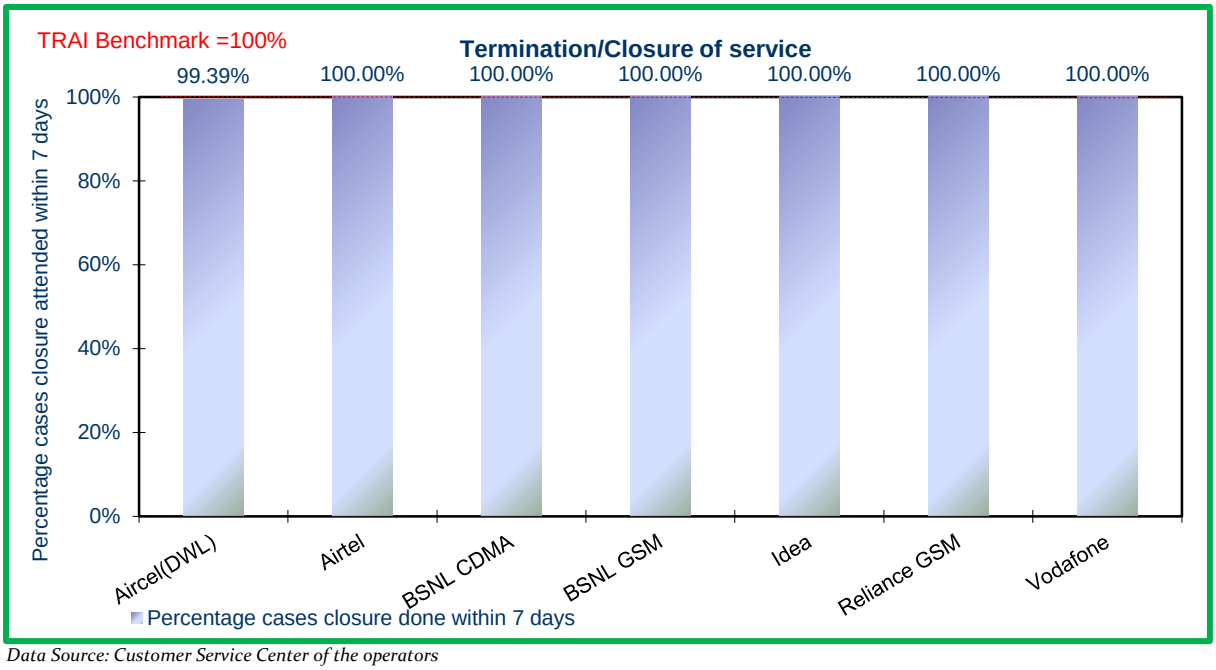
Data Source: Customer Service Center of the operators

5.6 TERMINATION/CLOSURE OF SERVICE

5.6.1 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

5.6.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

All operators met the TRAI benchmark for the parameter.

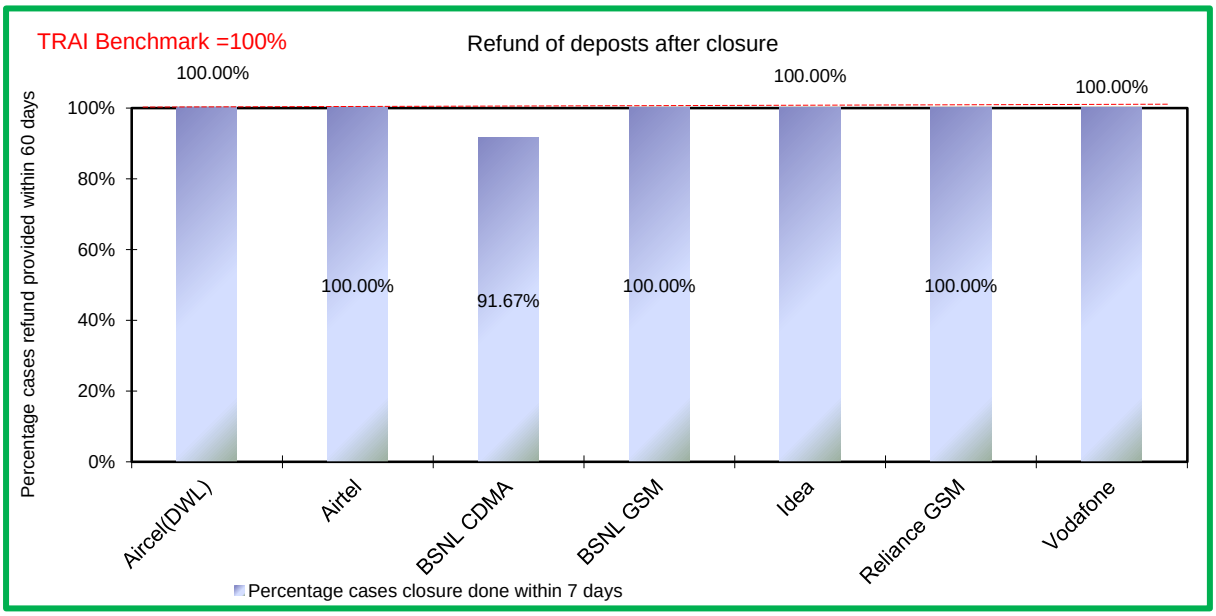
5.7 REFUND OF DEPOSITS AFTER CLOSURE

5.7.1 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

5.7.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

All operators met the TRAI benchmark for the parameter.

6 DETAILED FINDINGS - DRIVE TEST DATA

6.1 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 October, November and December 2014 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.

Month	Name of SSA Covered	Date of Drive Test
October	Nagaon	20th to 22nd October 2014
November	Tezpur	17th to 19th Nov'2014
December	Jorhat	22nd to 24th December 2014

	Name of Operator
Operator 1	Aircel(DWL)
Operator 2	Airtel
Operator 3	BSNL CDMA
Operator 4	BSNL GSM
Operator 5	Idea
Operator 8	Reliance GSM
Operator 10	Vodafone

6.1.1 OCTOBER - NAGAON SSA

Month	Name of SSA Covered	Date of Drive Test
October	Nagaon	20th to 22nd October 2014

6.1.1.1 ROUTE DETAILS - NAGAON SSA

Category	Type of location	Assam-October		
		Nagaon		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	JagiroadtoDhing and Dhing to Nagaon.(69 KM + 35 KM= 104 KM) and Nagaon Town Drive	Nagaon to Lumding via Lanka.(98 KM) and Lumding Town Drive	Lankato Morigaon via Donkamukam.(123 KM) and Morigaon Town Drive
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

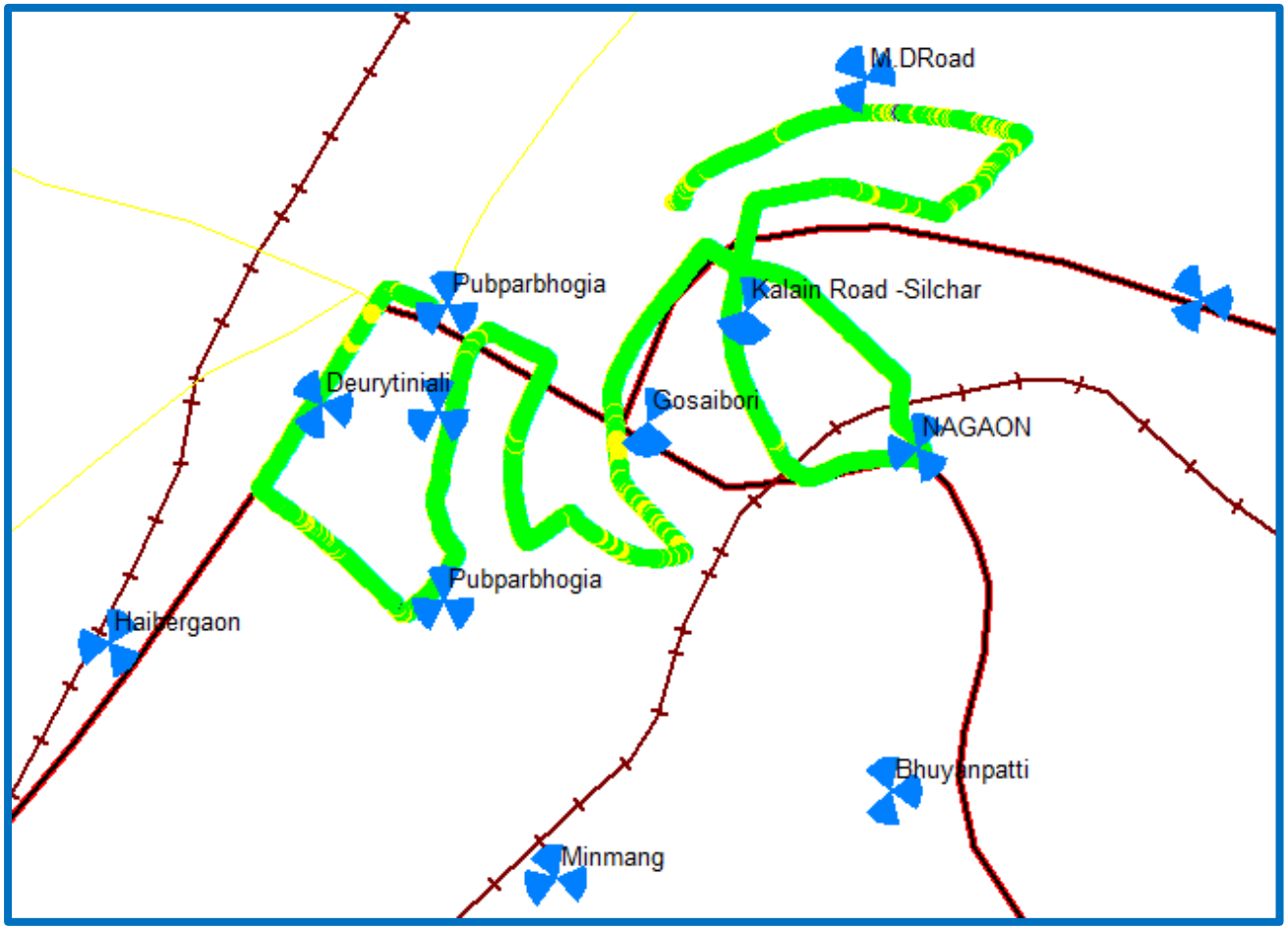
The route maps given in the report are provided for the purpose of identifying the routes traversed during the drive tests. We may observe three different colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to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

6.1.1.2 KILOMETERS TRAVELLED- NAGAON SSA

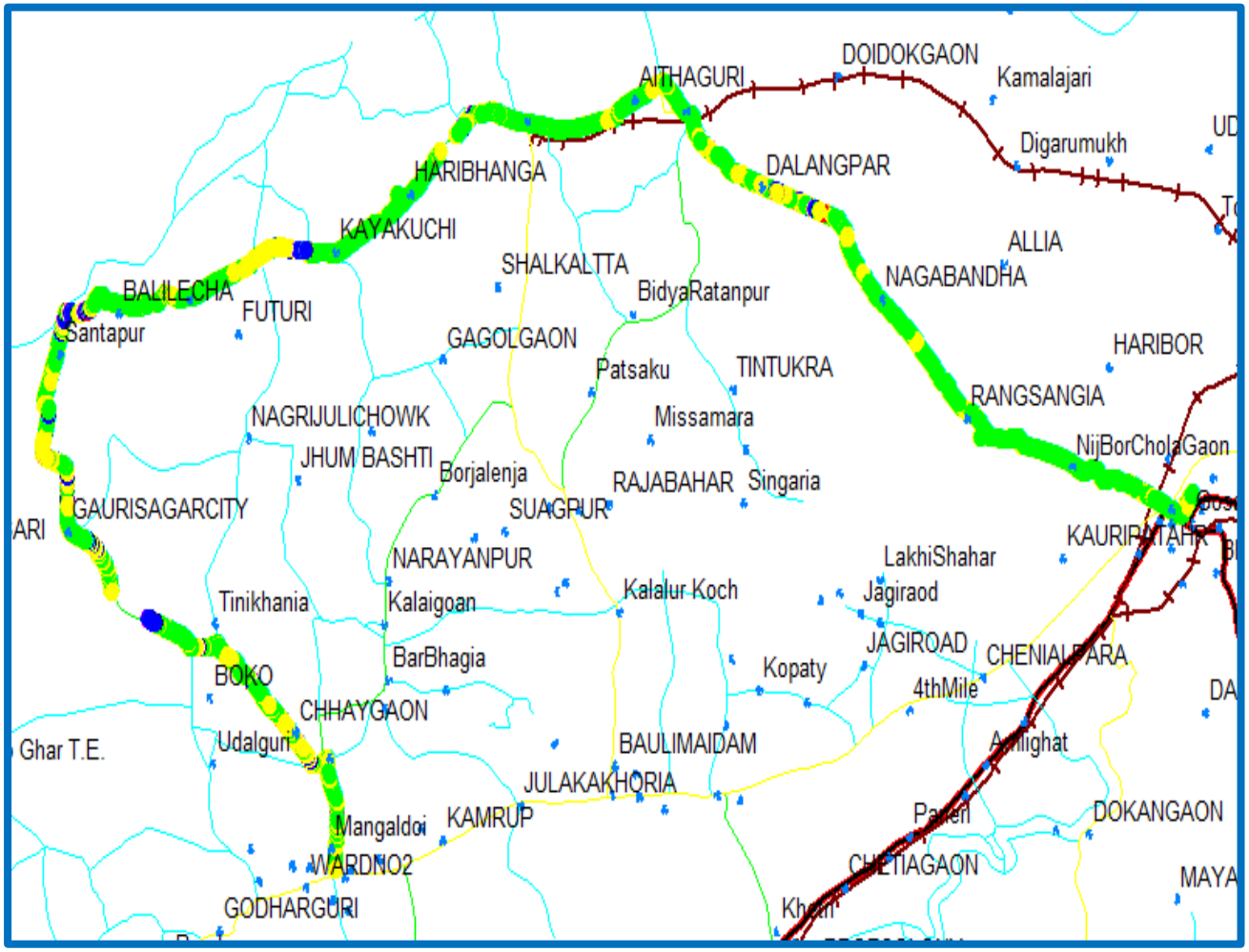
Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
Nagaon	104	98	123	325

6.1.1.3 ROUTE MAP - NAGAON DAY 1

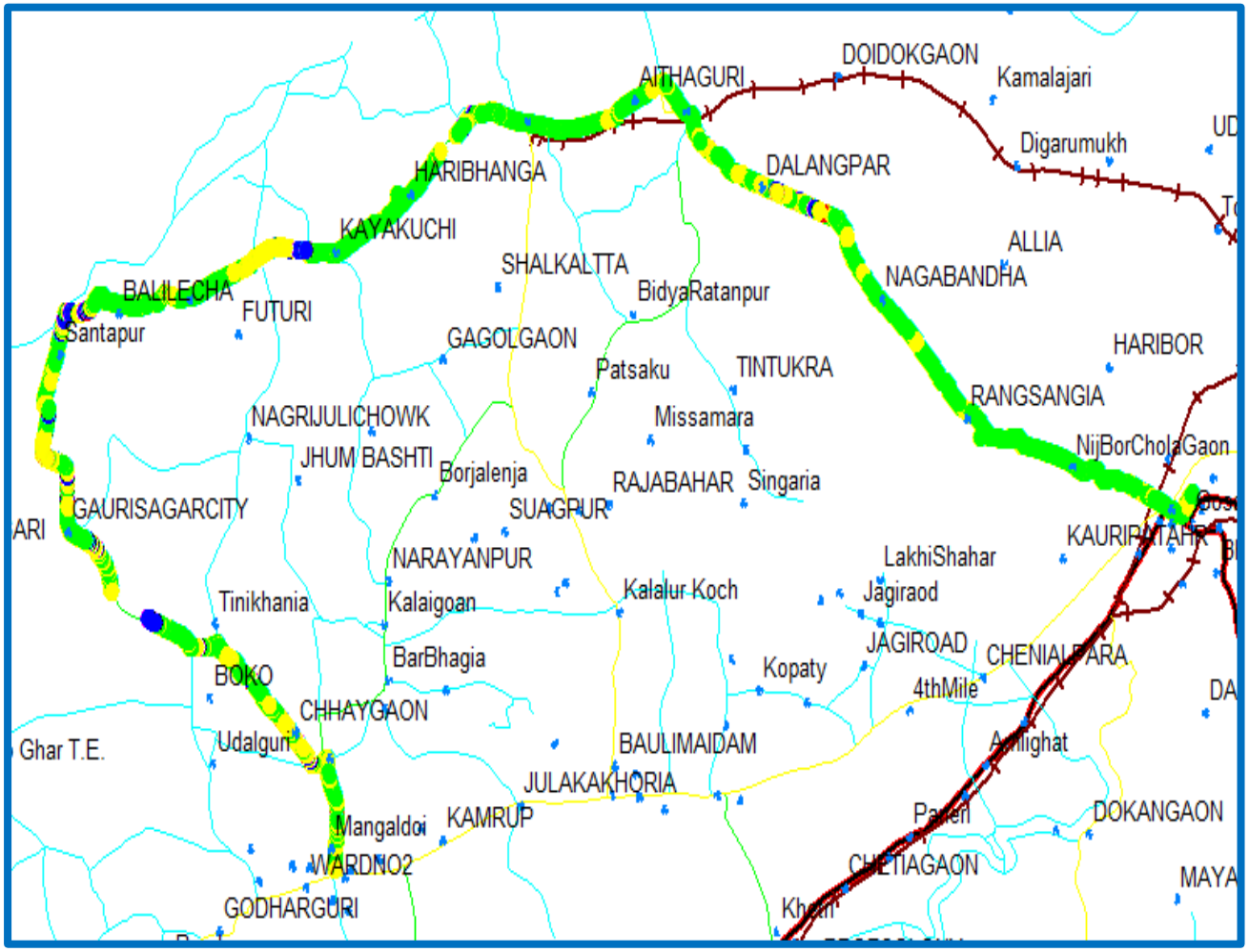
Day 1 – Within City



Day 1 – Major Roads

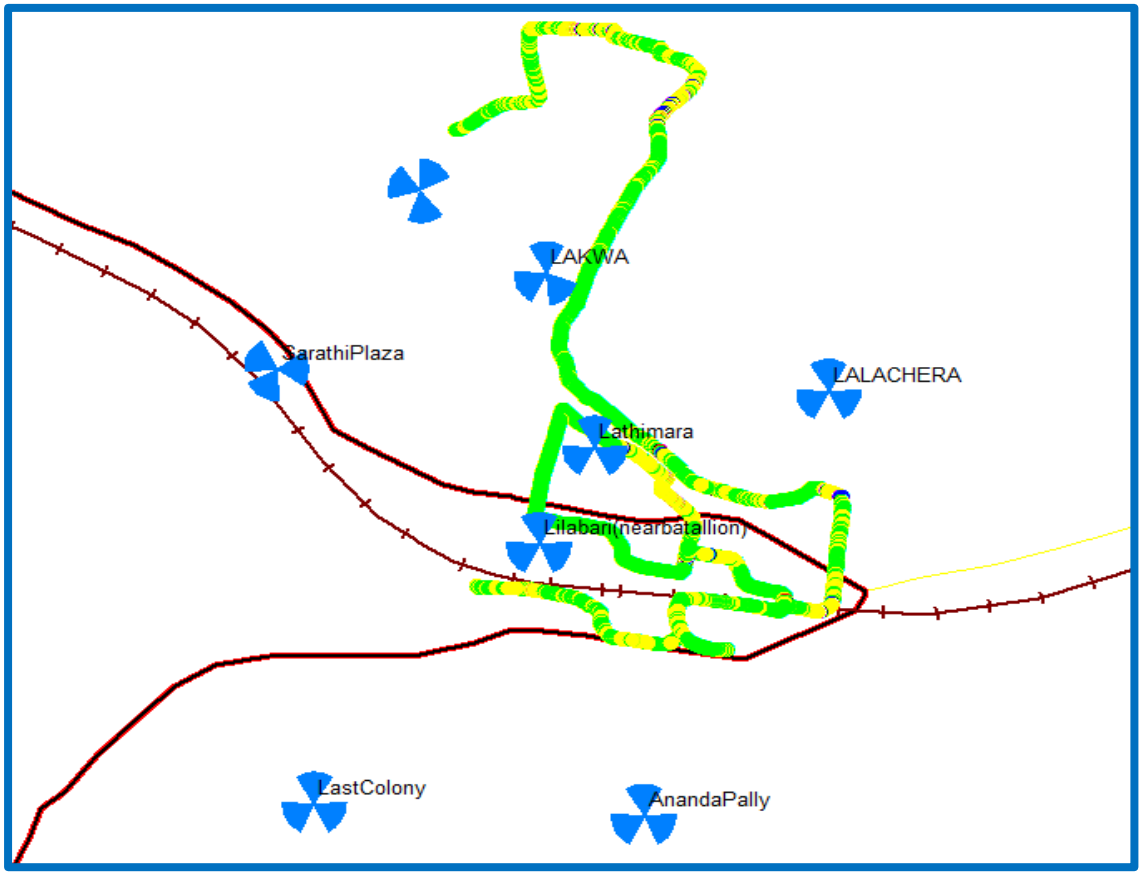


Day 1 – Highways

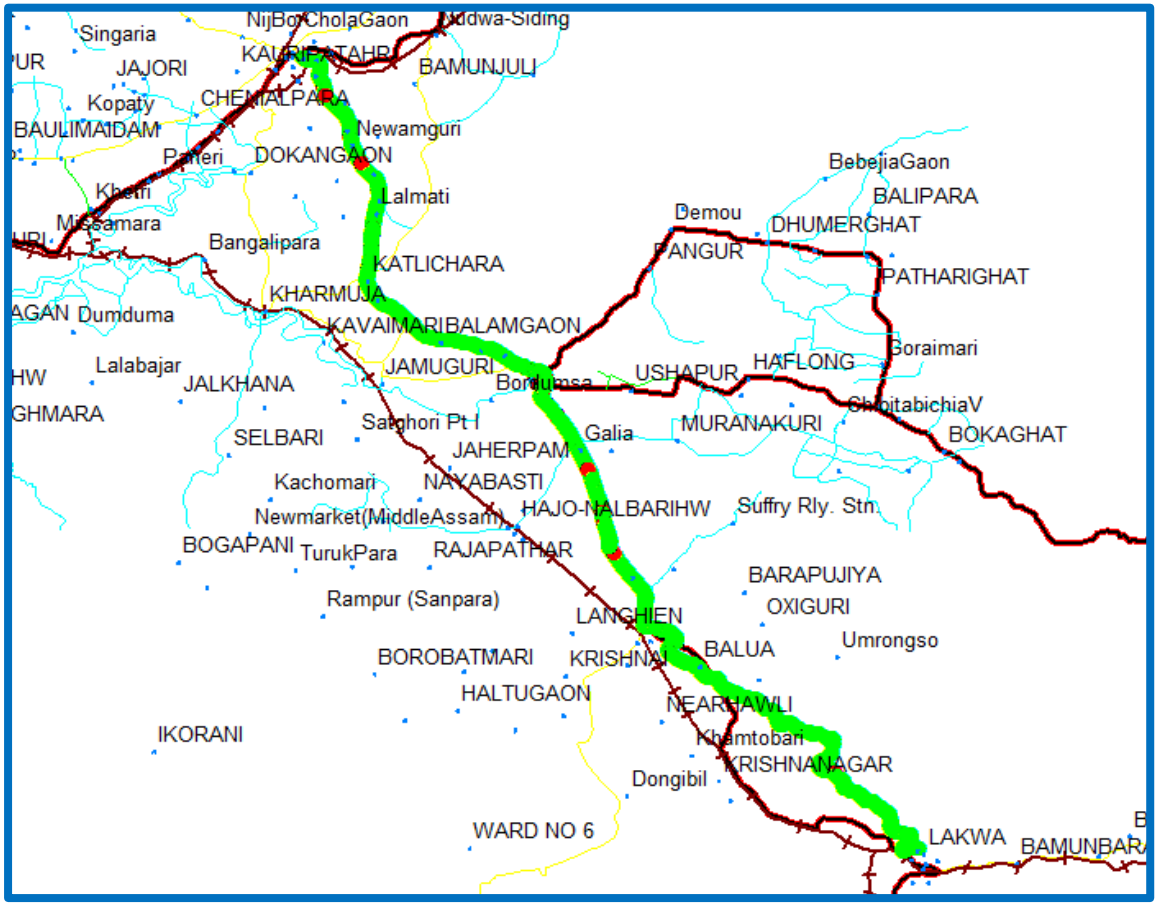


6.1.1.4 ROUTE MAP - NAGAON DAY 2

Day 2 – Within City

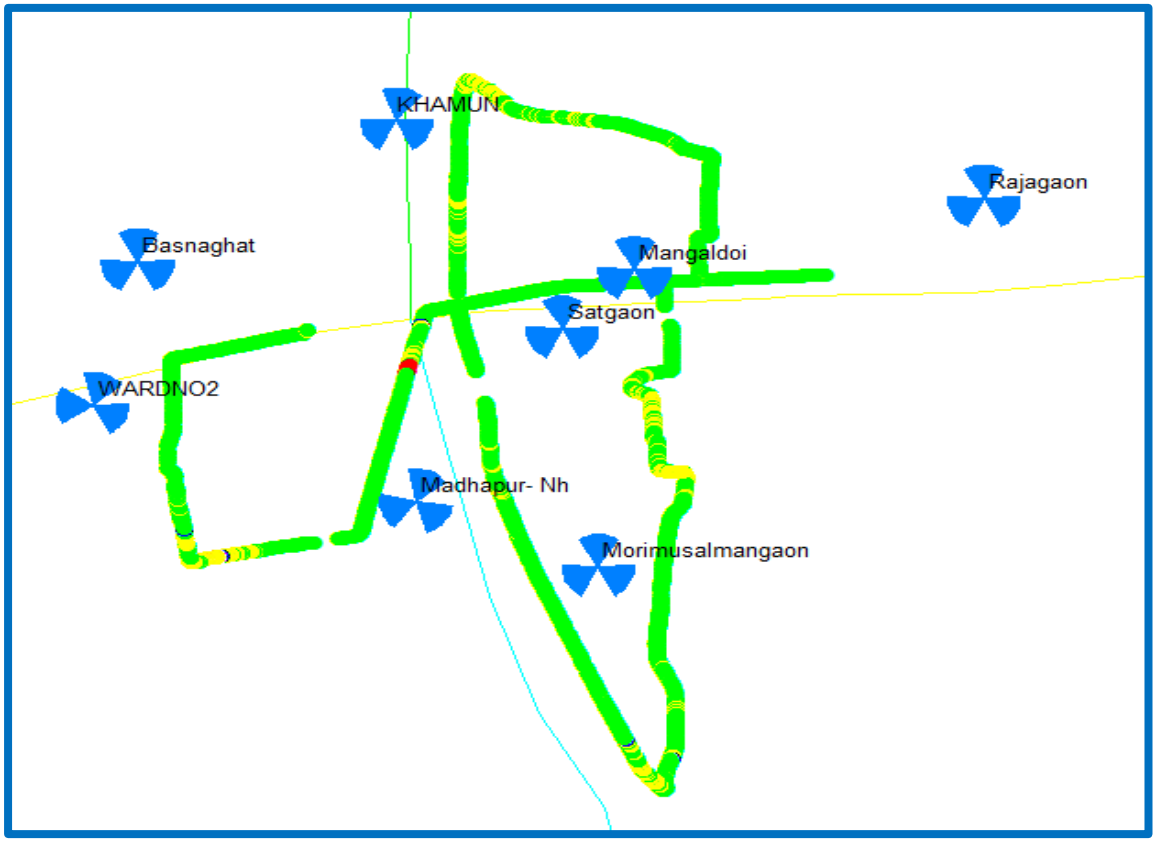


Day 2 – Highways

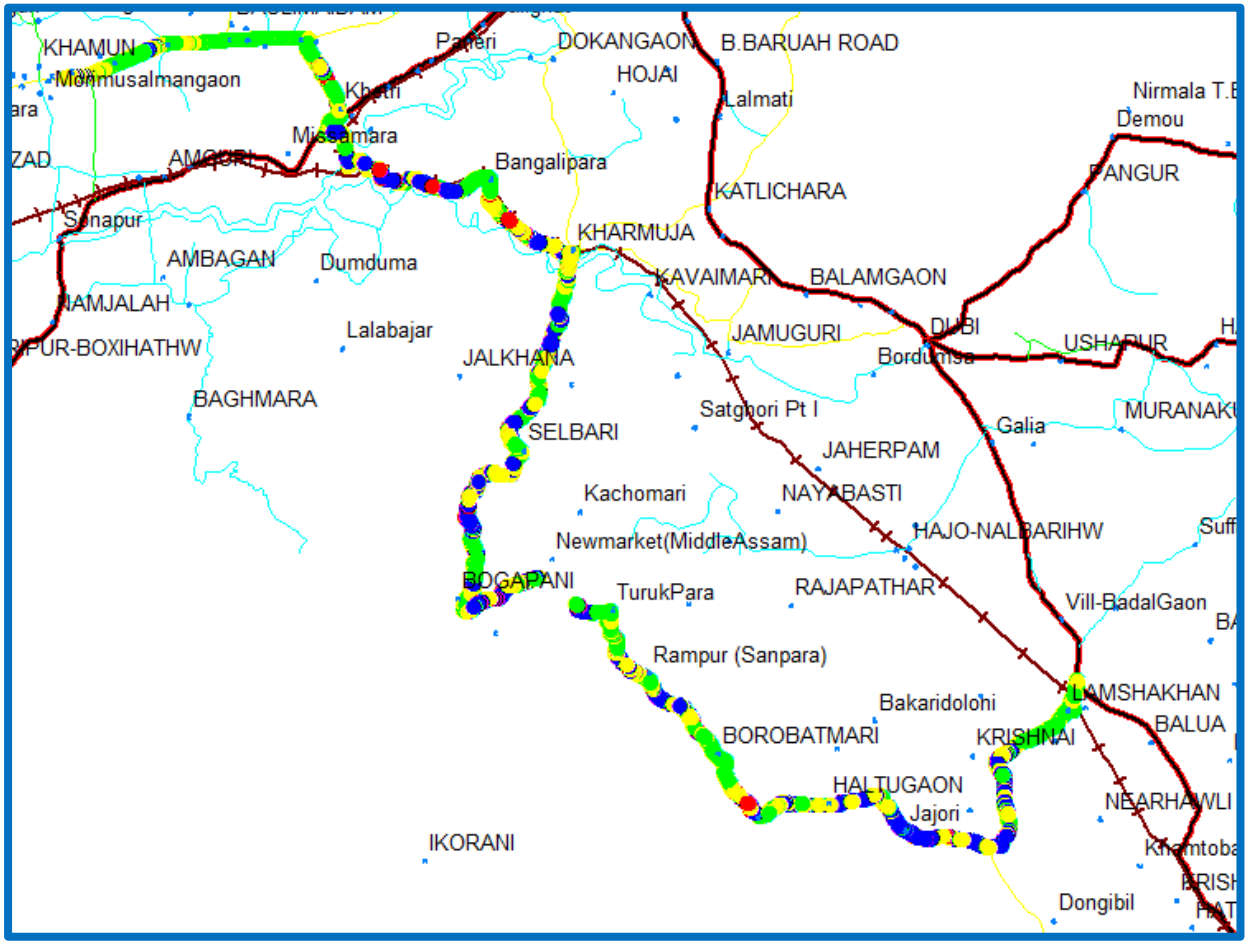


6.1.1.5 ROUTE MAP - NAGAON DAY 3

Day 3 – Within City



Day 3 – Highways



6.1.1.6 DRIVE TEST RESULTS - NAGAON SSA

	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		72.99%	68.62%	89.28%	57.62%	33.93%	20.63%	64.67%	22.89%	98.00%	61.00%	57.73%	37.16%	55.43%	38.44%
0 to -85 dBm		99.50%	92.71%	99.72%	86.99%	92.68%	44.38%	95.73%	58.44%	100.00%	87.71%	98.20%	71.70%	99.32%	77.18%
0 to -95 dBm		100.00%	99.12%	100.00%	100.00%	100.00%	72.71%	100.00%	87.84%	100.00%	98.71%	99.99%	90.76%	100.00%	94.76%
Voice quality	≥ 95%	98.16%	95.09%	98.91%	96.11%	99.84%	87.88%	90.86%	85.71%	99.16%	95.45%	96.68%	91.51%	96.93%	94.98%
CSSR	≥ 95%	100.00%	99.59%	100.00%	99.76%	94.17%	90.60%	88.84%	90.94%	100.00%	100.00%	100.00%	98.69%	100.00%	99.60%
%age Blocked calls		0.00%	0.41%	0.00%	0.16%	5.83%	9.40%	11.16%	9.06%	0.00%	0.00%	0.00%	1.31%	0.00%	0.49%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	10.10%	9.04%	11.44%	6.54%	0.00%	0.00%	0.00%	1.73%	0.00%	0.19%
Hands off success rate		100.00%	98.78%	100.00%	99.62%	100.00%	99.63%	99.51%	95.05%	100.00%	99.59%	100.00%	98.15%	100.00%	99.63%

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, Reliance GSM and Vodafone did not meet the benchmark in outdoor locations.

Call Set Success Rate (CSSR)

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

Call Drop Rate

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

6.1.2 NOVEMBER – TEZPUR SSA

Month	Name of SSA Covered	Date of Drive Test
November	Tezpur	17th to 19th Nov'2014

6.1.2.1 ROUTE DETAILS – TEZPUR SSA

Category	Type of location	Assam-November		
		Tezpur		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Sipajhar to Paneri and Paneri to Tezpur Road Drive ₹.(55 km + 94 km = 139 km) and MANGALDOI Town Drive	Tezpur to Narayanpur Road Drive ₹.(159 km) and TEZPUR Town Drive	Narayanpur to Dhemaji Road Drive ₹.(152 km) and DHEMAJI Town Drive
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

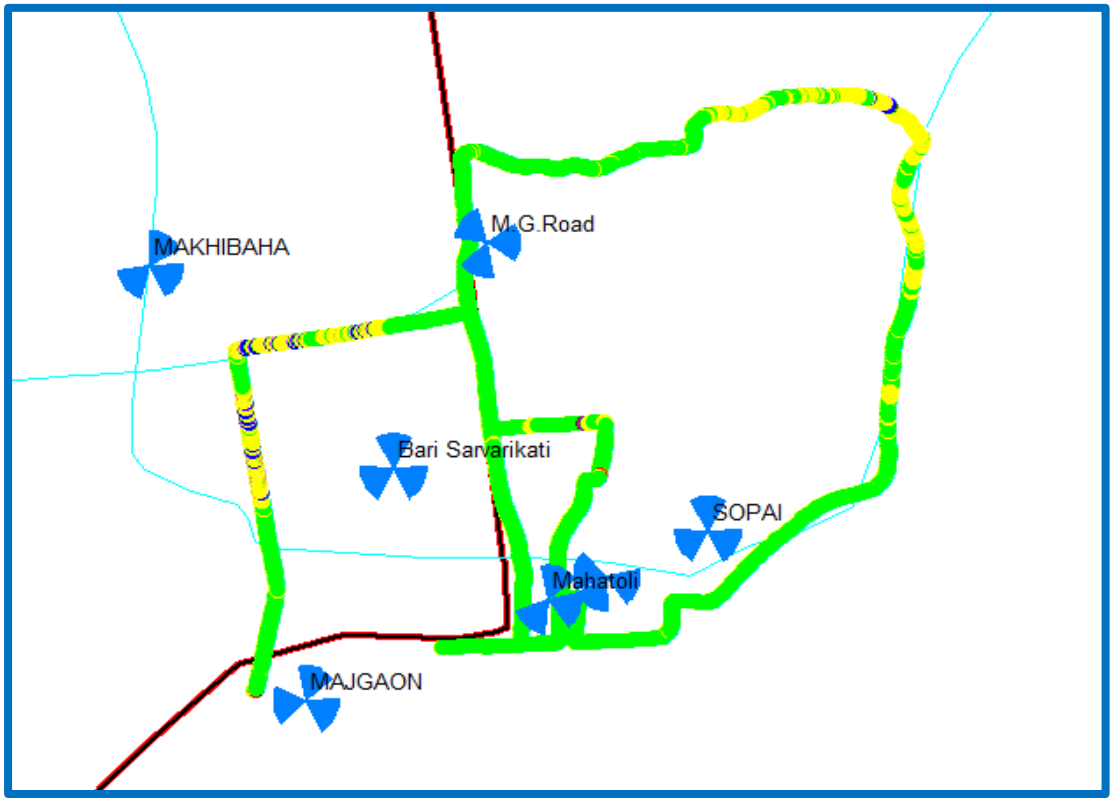
The route maps given in the report are provided for the purpose of identifying the routes traversed during the drive tests. We may observe three different colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to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

6.1.2.2 KILOMETERS TRAVELLED– TEZPUR SSA

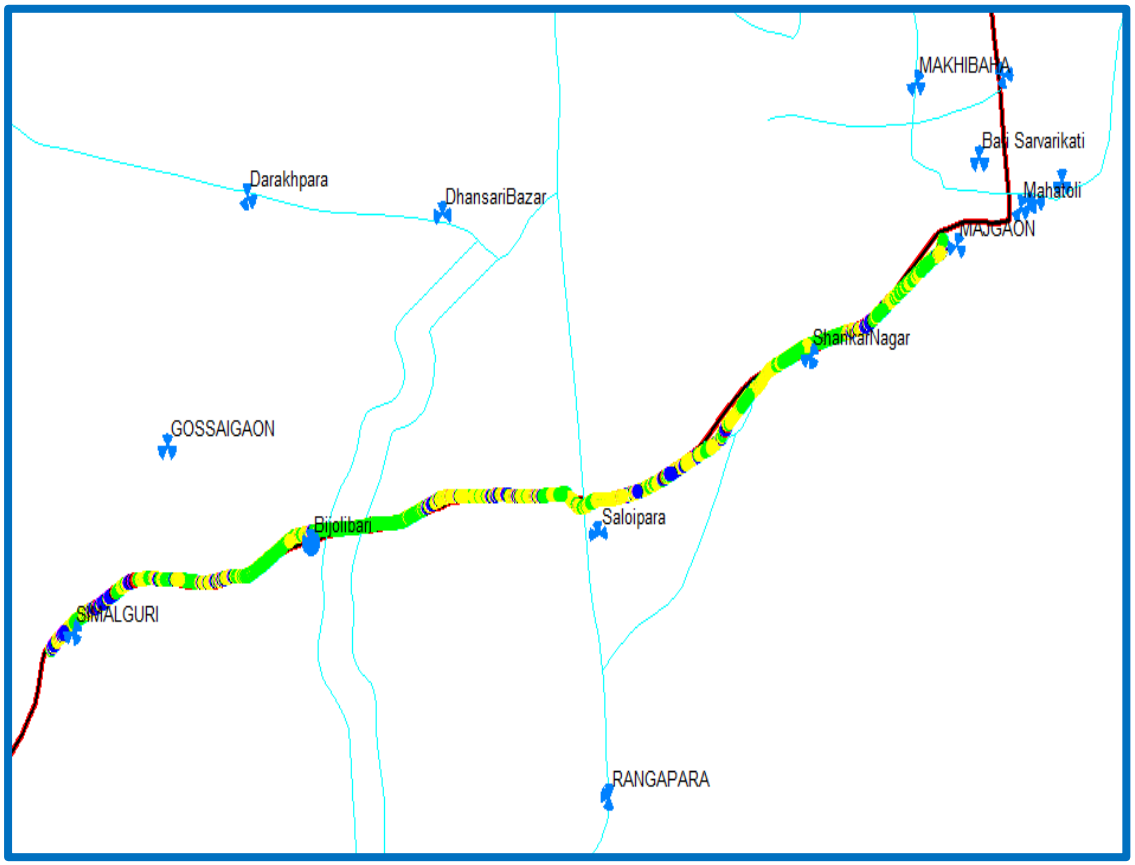
Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
Tezpur	139	159	152	450

6.1.2.3 ROUTE MAP TEZPUR DAY 1

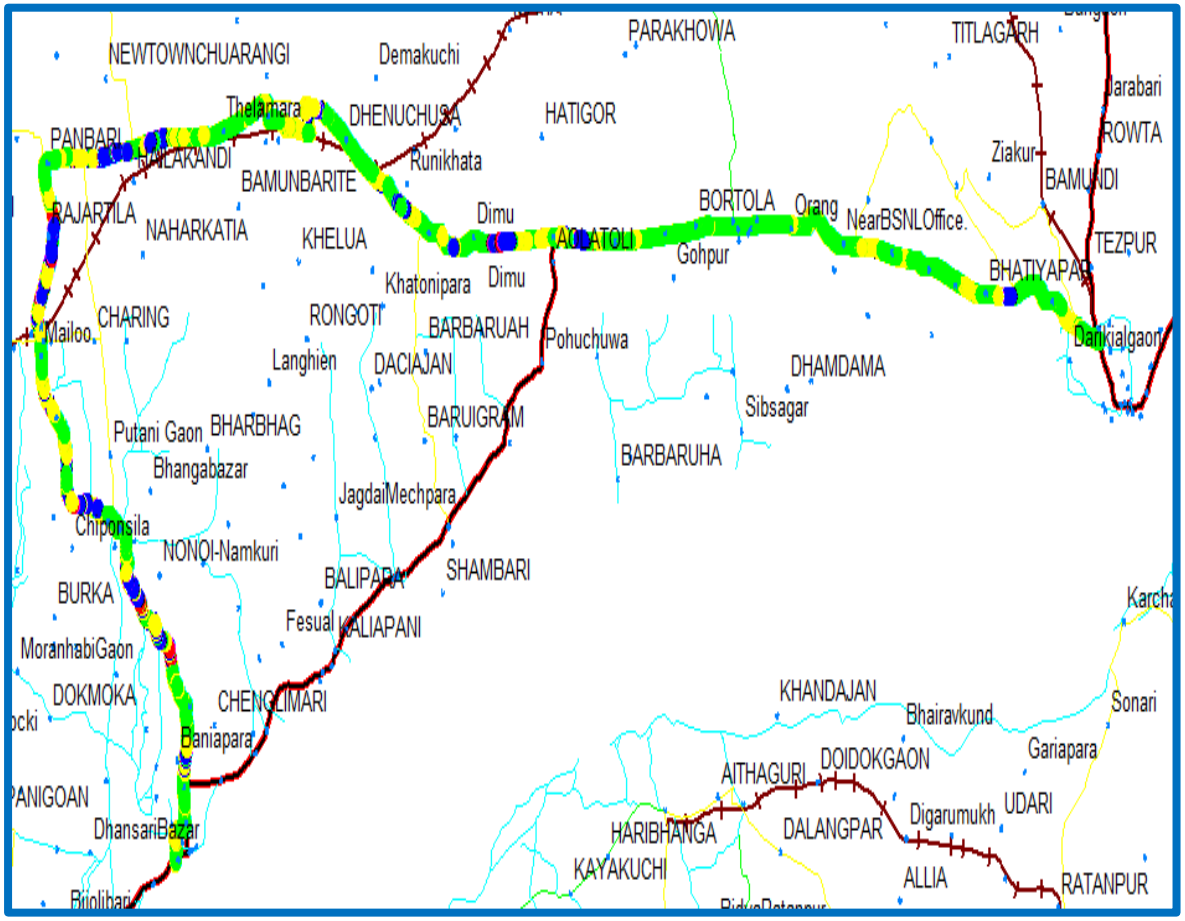
Day 1 – Within City



Day 1 – Highways

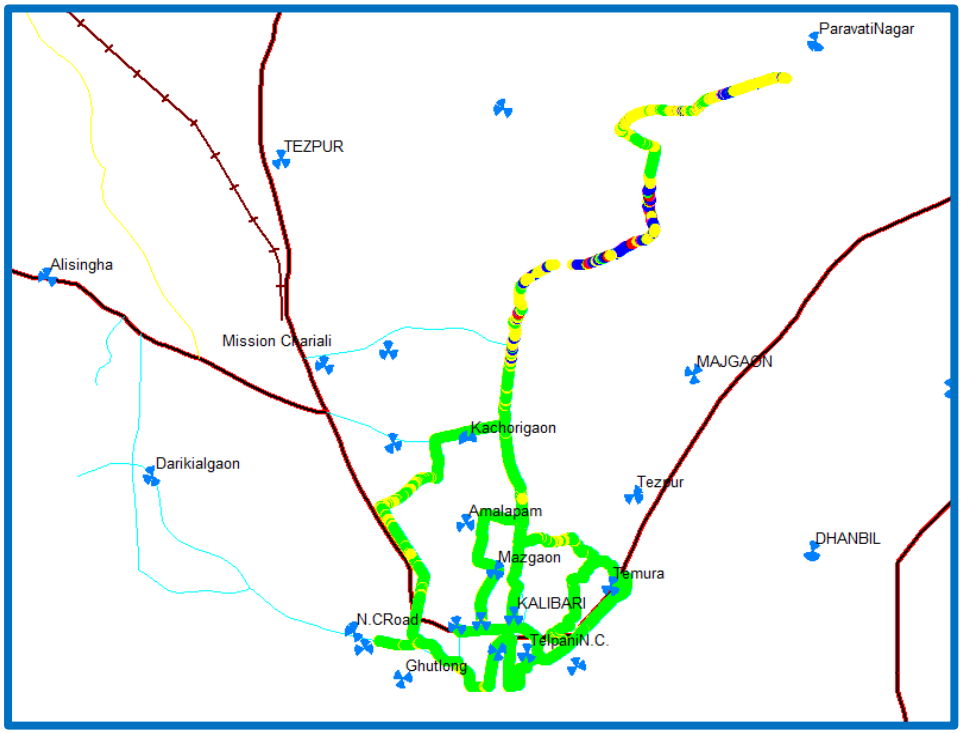


Day 1 – Major Roads

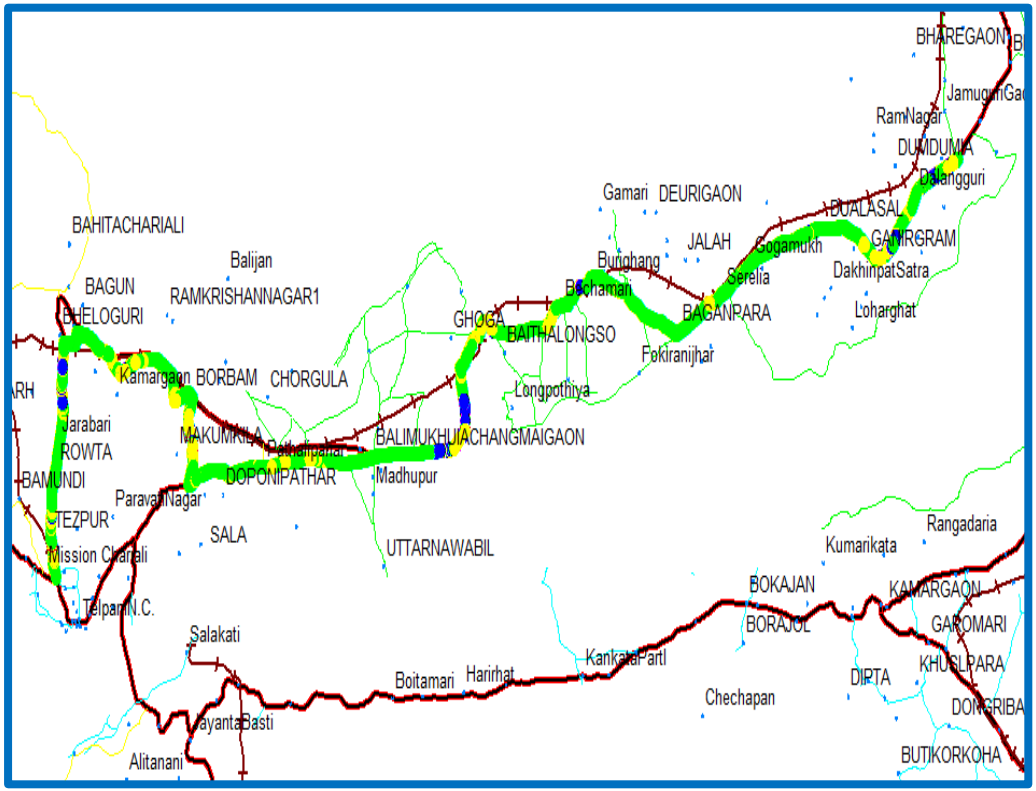


6.1.2.4 ROUTE MAP TEZPUR DAY 2

Day 2 – Within City



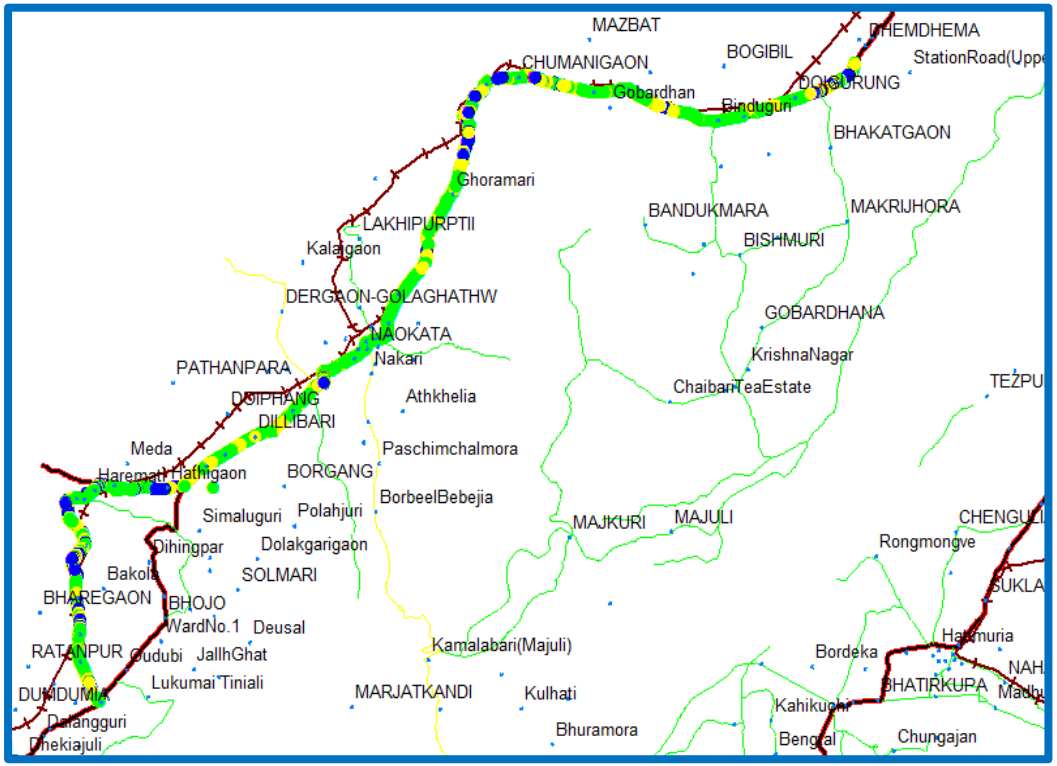
Day 2 – Highways



6.1.2.5 ROUTE MAP TEZPUR DAY 3

Day 3 – Within City

Day 3 – Highways



6.1.2.6 DRIVE TEST RESULTS – TEZPUR SSA

	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		68.90%	67.64%	97.44%	45.01%	30.33%	14.24%	89.33%	34.34%	62.00%	45.71%	97.90%	52.63%	51.13%	39.22%
0 to -85 dBm		94.54%	91.53%	99.96%	81.14%	63.67%	26.85%	98.67%	58.74%	83.00%	75.00%	99.99%	85.17%	95.00%	78.57%
0 to -95 dBm		99.81%	99.25%	99.99%	97.93%	64.00%	50.71%	99.67%	82.97%	100.00%	94.14%	100.00%	98.09%	100.00%	94.86%
Voice quality	≥ 95%	98.28%	95.15%	98.80%	94.02%	99.64%	85.89%	96.71%	86.20%	99.39%	97.07%	98.85%	94.45%	98.20%	91.08%
CSSR	≥ 95%	100.00%	99.88%	100.00%	98.73%	94.44%	63.56%	98.68%	91.26%	99.02%	99.32%	100.00%	97.74%	100.00%	96.94%
%age Blocked calls		0.00%	0.12%	0.00%	0.81%	5.56%	36.44%	1.32%	8.74%	0.98%	14.96%	0.00%	2.37%	0.00%	3.36%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	8.64%	1.80%	1.19%	0.00%	0.47%	0.00%	1.12%	0.00%	1.69%
Hands off success rate		100.00%	98.46%	100.00%	97.64%	100.00%	100.00%	100.00%	98.94%	100.00%	99.66%	100.00%	98.65%	100.00%	99.86%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

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 failed to meet the benchmark in outdoor as well as indoor locations. BSNL GSM failed to meet the benchmark in outdoor areas.

Call Drop Rate

BSNL CDMA failed to meet the benchmark of 2% in outdoor areas.

6.1.3 DECEMBER – JORHAT SSA

Month	Name of SSA Covered	Date of Drive Test
December	Jorhat	22nd to 24th December 2014

6.1.3.1 ROUTE DETAILS – JORHAT SSA

Category	Type of location	Assam-December		
		Jorhat		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Furkating to Sonari Via Titabor, Nazira Road Drive(High Way).(132 km) and NAZIRA Town Drive	Sonari to Moranhat (Major road) via BHOJO and Moranhat to Teok via SIBSAGAR Road Drive (High Way) .(29KM +77KM=106 km) and SIBSAGAR Town Drive	Teok to Golaghat via JORHAT, NUMALIGARH Road Drive (High Way) .(112km) and JORHAT and GOLAGHAT Town Drive
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

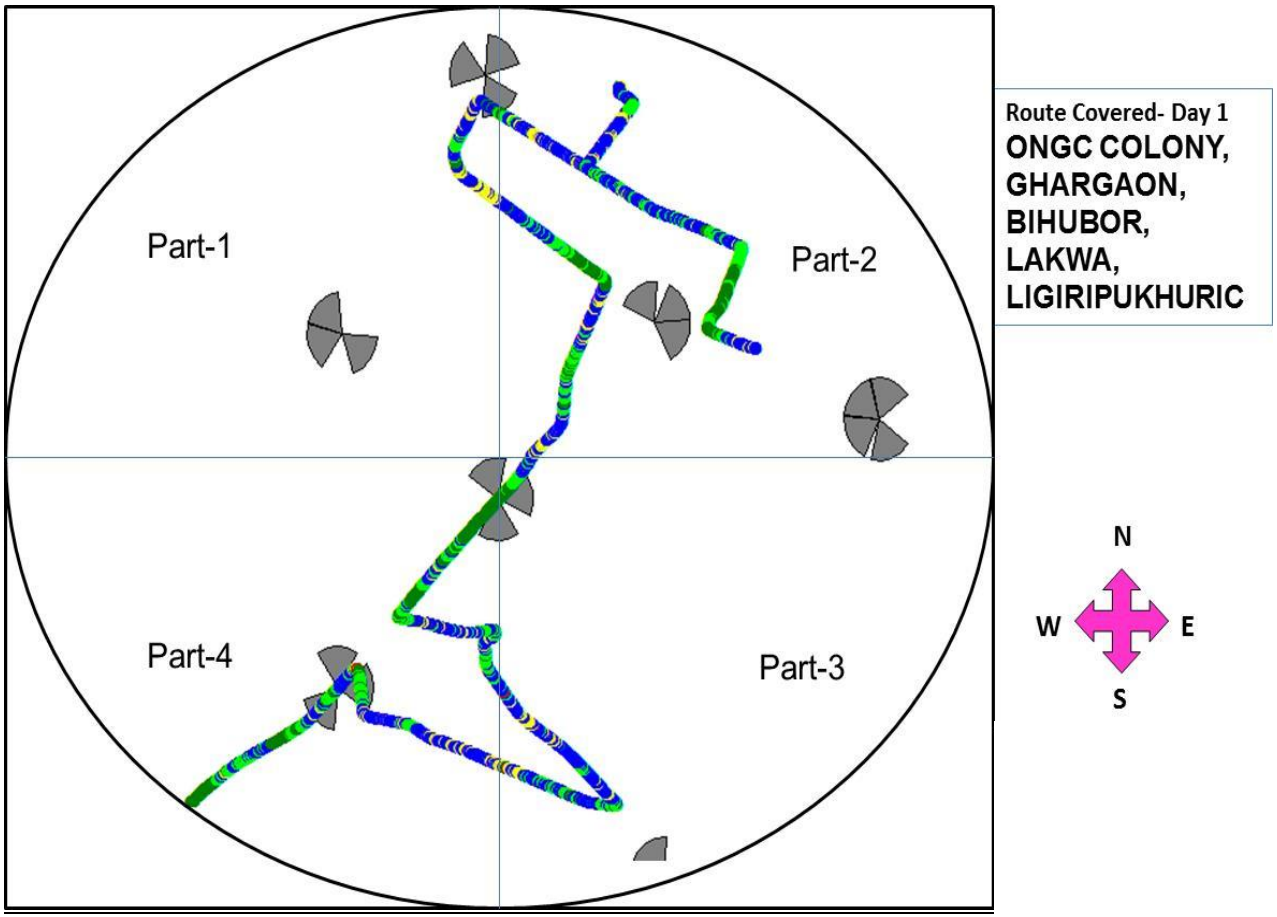
The route maps given in the report are provided for the purpose of identifying the routes traversed during the drive tests. We may observe three different colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to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

6.1.3.2 KILOMETERS TRAVELLED – JORHAT SSA

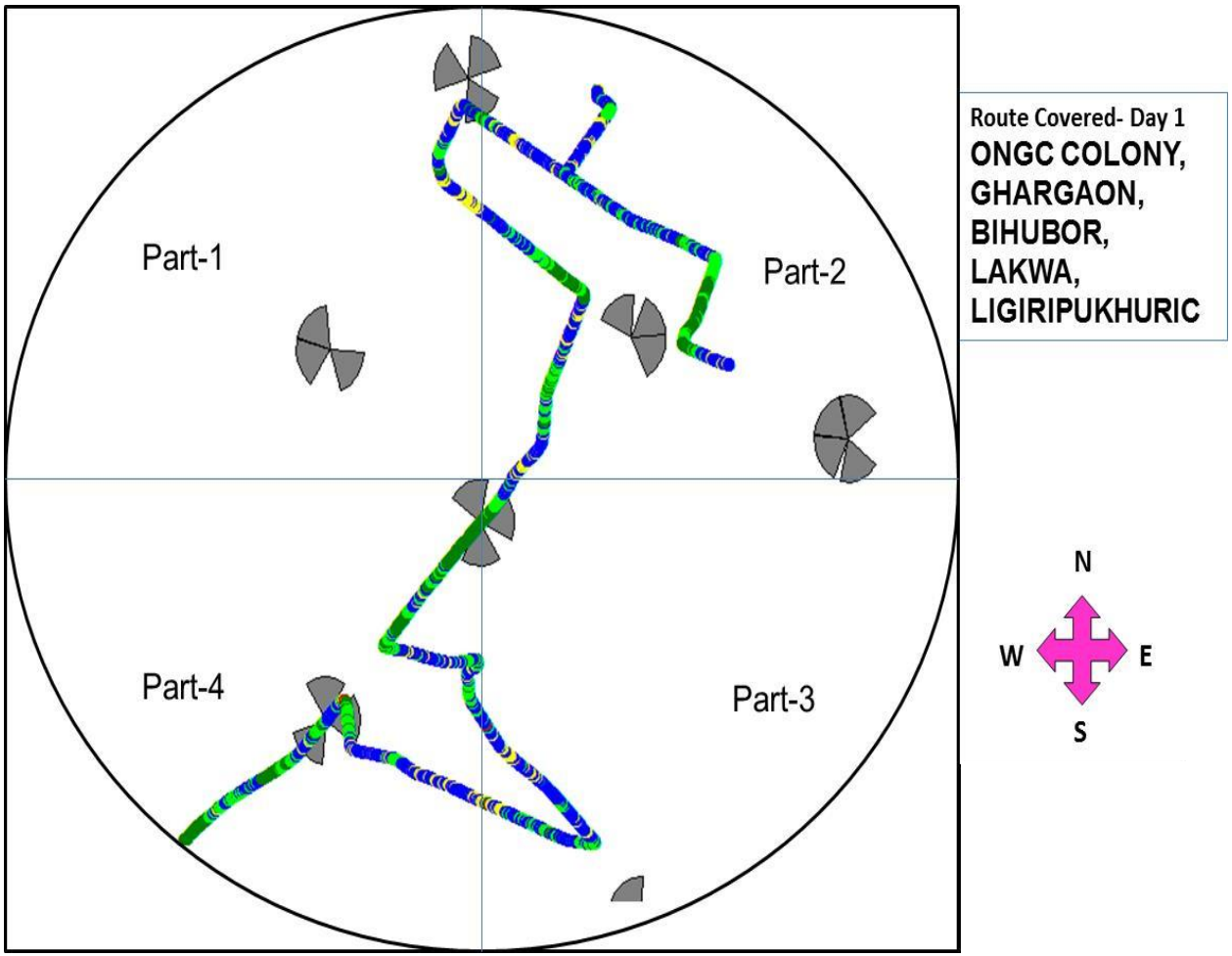
Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
Jorhat	132	106	77	315

6.1.3.3 ROUTE MAP JORHAT DAY 1

Day 1 – Within City

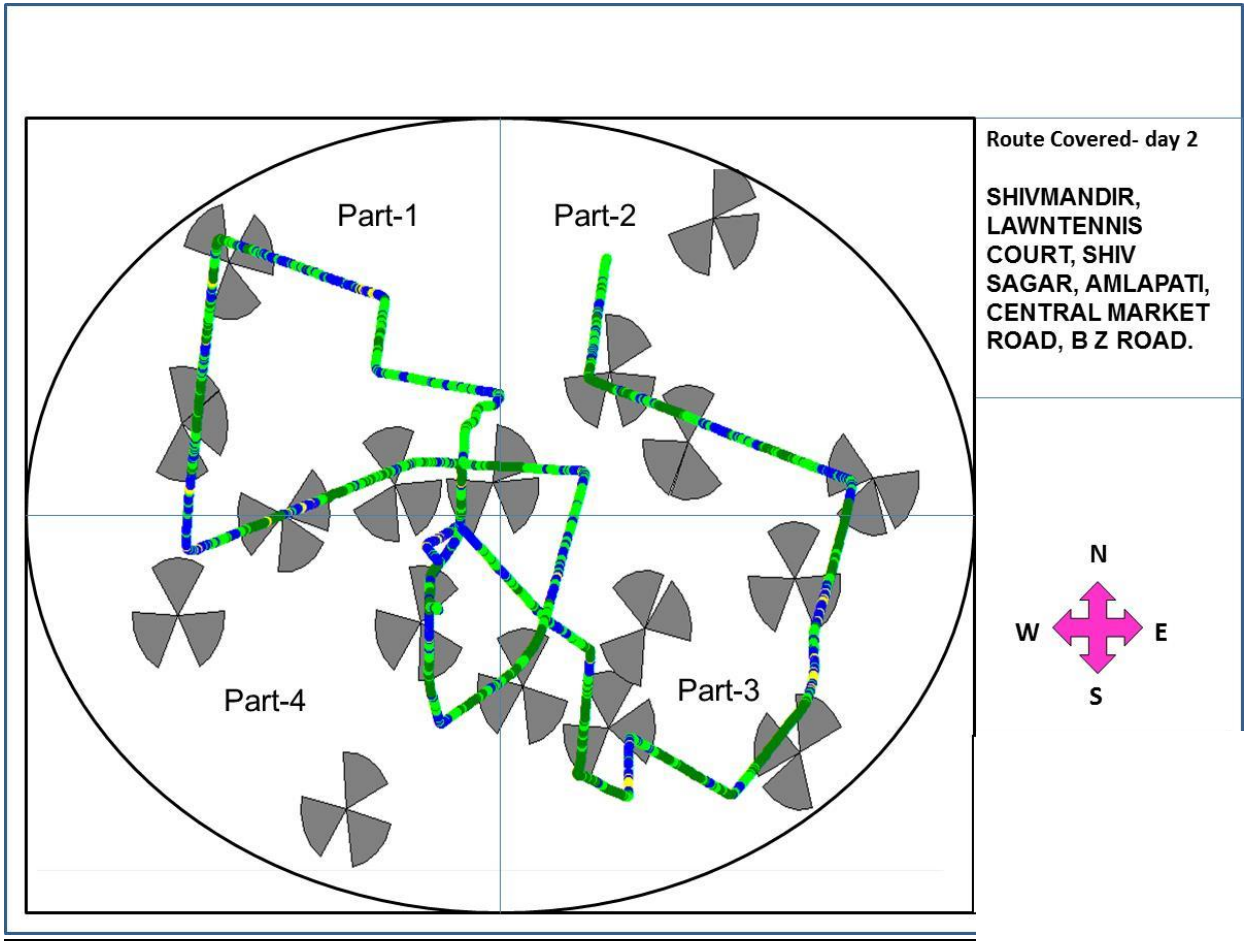


Day 1 – Highways

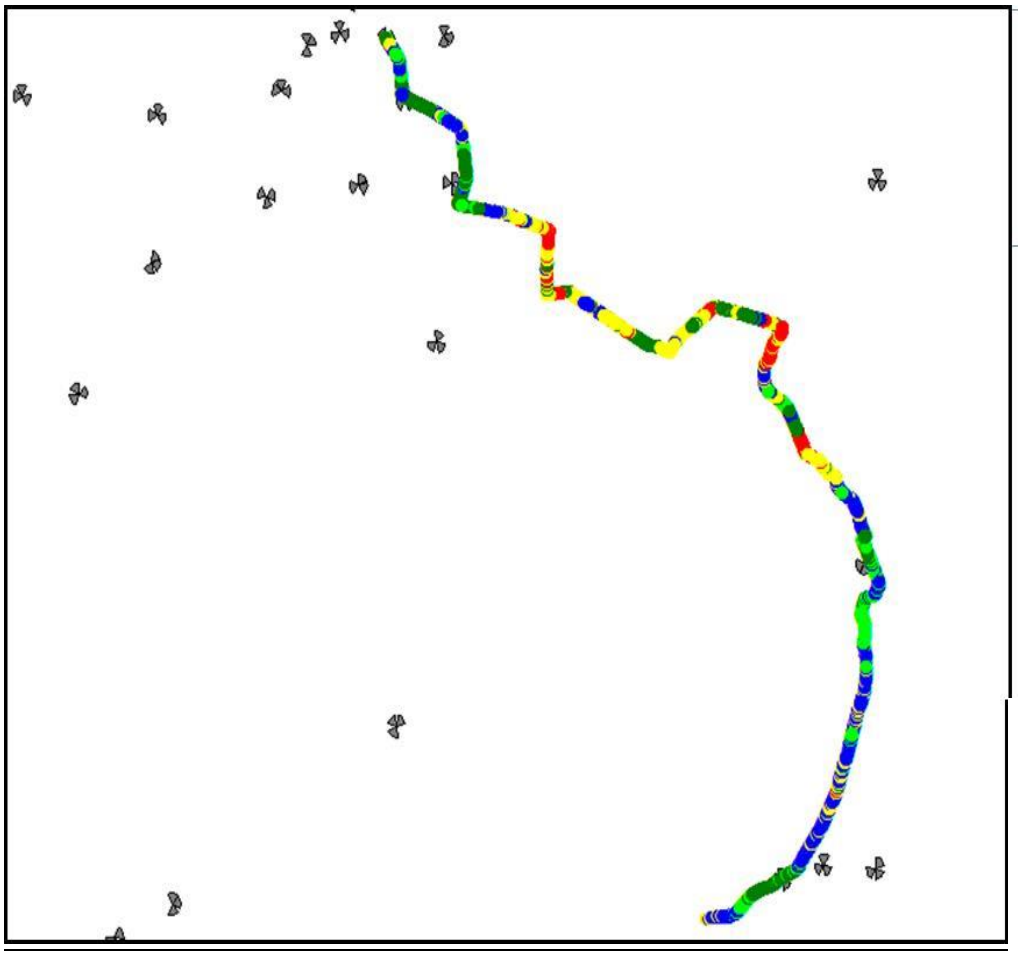


6.1.3.4 ROUTE MAP JORHAT DAY 2

Day 2 – Within City

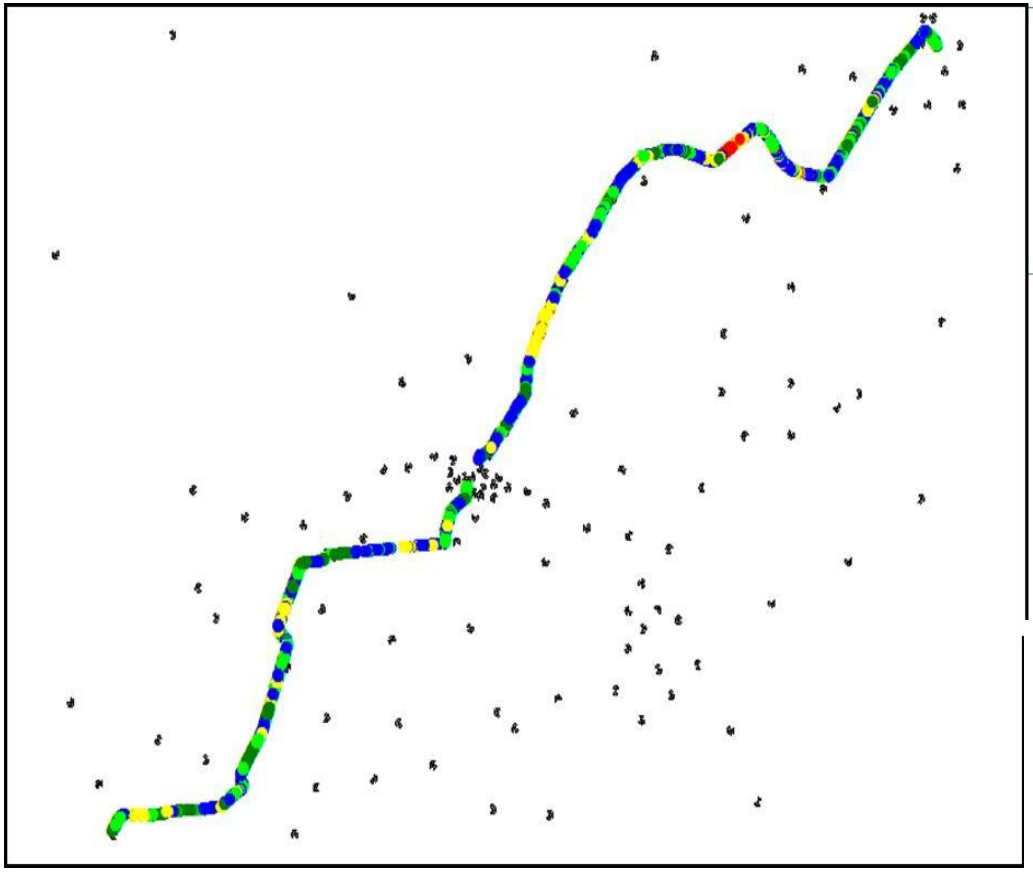


Day 2 – Major Roads



Route Covered- Day 2
Sonari
Bhojo
Moranhat

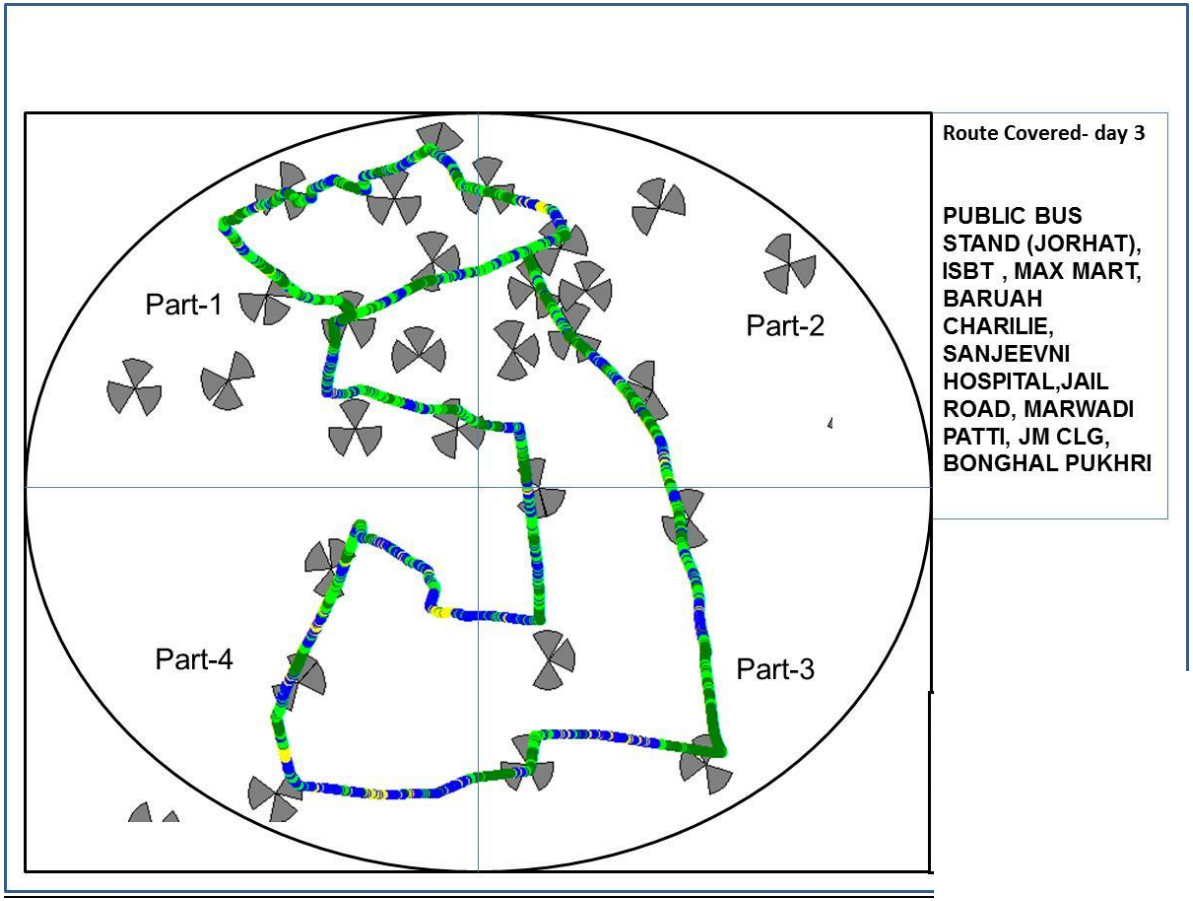
Day 2 – Highways



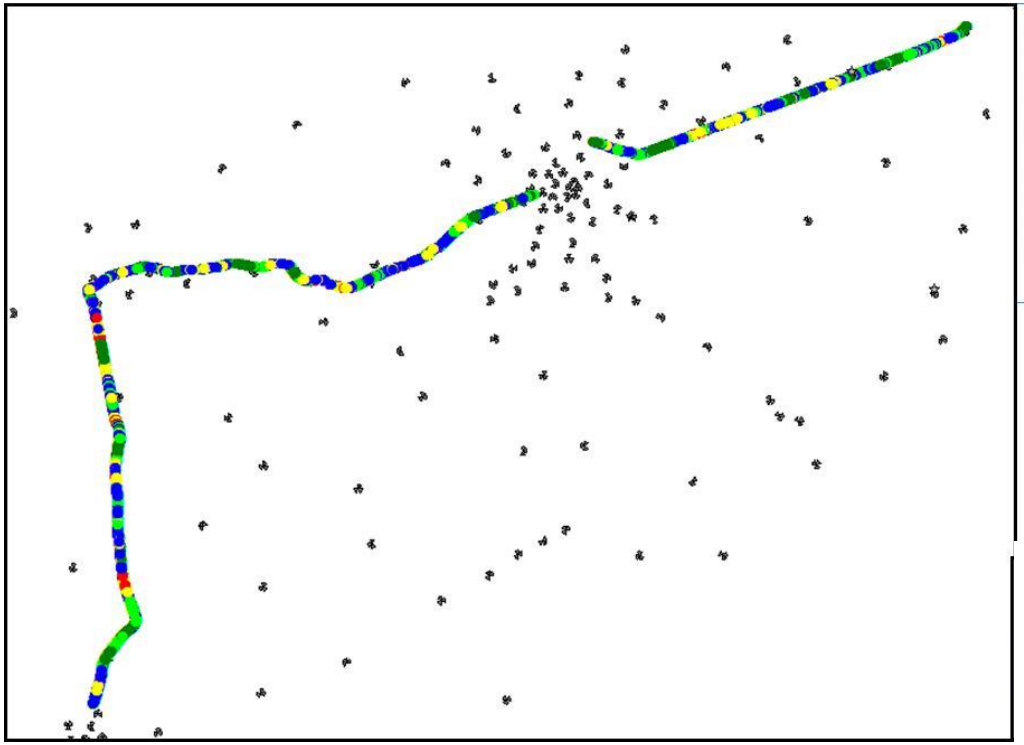
Route Covered- day 2
Moranhat,
Demo,
Shivsagar
Gaurisagar,
Jogdhar, Teok

6.1.3.5 ROUTE MAP JORHAT DAY 3

Day 3 – Within City



Day 3 – Highways



Route Covered- Day 3
Teok
Kokajan,
Jorhat,
Telikiam Bezgaon,
Dergaon, Golaghat,
Furkating Railway Station

6.1.3.6 DRIVE TEST RESULTS – JORHAT SSA

	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		36.50%	53.40%	69.22%	37.49%	100.00%	59.29%	65.84%	22.23%	97.26%	38.18%	59.19%	61.48%	83.70%	48.90%
0 to -85 dBm		88.05%	84.64%	95.14%	69.14%	100.00%	83.71%	88.23%	53.12%	99.92%	68.79%	97.19%	86.43%	99.13%	84.99%
0 to -95 dBm		99.80%	98.19%	99.69%	92.79%	100.00%	100.00%	98.77%	83.66%	100.00%	91.85%	99.99%	97.41%	100.00%	97.28%
Voice quality	≥ 95%	98.84%	94.87%	97.69%	96.70%	100.00%	93.05%	94.93%	89.49%	98.97%	97.65%	98.14%	96.02%	98.55%	96.52%
CSSR	≥ 95%	100.00%	99.57%	100.00%	99.88%	100.00%	93.83%	96.52%	96.06%	100.00%	99.34%	100.00%	98.29%	100.00%	99.16%
%age Blocked calls		0.00%	0.43%	0.00%	0.12%	0.00%	2.25%	3.48%	3.94%	0.00%	0.47%	0.00%	1.72%	0.00%	0.10%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	3.91%	1.08%	1.68%	0.00%	0.00%	1.11%	5.58%	0.00%	0.00%
Hands off success rate		100.00%	98.00%	100.00%	100.00%	100.00%	99.91%	100.00%	100.00%	100.00%	100.00%	100.00%	96.08%	100.00%	100.00%

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

Call Set Success Rate (CSSR)

BSNL CDMA failed to meet the benchmark in outdoor locations.

Call Drop Rate

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

7 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, Idea and Vodafone failed to meet the benchmark of metering and billing credibility for prepaid.

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.

8 ANNEXURE - CONSOLIDATED

8.1 NETWORK AVAILABILITY

Audit Results for Network Availability-Consolidated

	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		7556	9756	726	4019	3524	4707	8555
Sum of downtime of BTSs in a month (in hours)		237015	11460	80752	74269	12410	10613	35253
BTSs accumulated downtime (not available for service)	≤ 2%	4.22%	0.16%	14.95%	2.49%	0.47%	0.30%	0.55%
Number of BTSs having accumulated downtime >24 hours		1650	80	198	203	18	84	136
Worst affected BTSs due to downtime	≤ 2%	21.87%	0.82%	27.27%	5.05%	0.51%	1.79%	1.59%

Live Measurement- BTSs accumulated downtime-Consolidated

	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		7531	9728	726	4019	3468	4707	8555
Sum of downtime of BTSs in a month (in hours)		23925	961	7723	7035	1049	7589	3196
(not available for service)	≤ 2%	3.37%	0.14%	14.78%	2.43%	0.42%	1.31%	0.52%
Number of BTSs having accumulated downtime >24 hours		289	0	21	71	13	84	14
Live Mesurement - Worst affected BTSs due to downtime	≤ 2%	3.85%	0.00%	2.89%	1.77%	0.38%	1.79%	0.16%

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

8.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, SDCCH and TCH congestion-Consolidated								
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	95.15%	97.83%	98.30%	95.62%	98.13%	98.56%	99.46%
SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.98%	0.33%	NA	0.87%	0.21%	0.05%	0.14%
TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	2.88%	0.89%	NA	0.94%	1.45%	0.08%	0.54%

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

Live measurement results for CSSR, SDCCH and TCH congestion-Consolidated								
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	97.83%	97.81%	98.28%	94.53%	99.22%	98.69%	99.71%
SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.10%	0.39%	NA	0.54%	0.17%	0.02%	0.09%
TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	0.69%	0.88%	NA	1.81%	0.48%	0.07%	0.29%

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

Drive test results for CSSR (Average of three drive tests) and blocked calls-Consolidated								
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		1723	1684	2555	2127	1410	1739	1596
Total number of successful calls established		1715	1675	1900	1973	1403	1708	1578
CSSR	≥ 95%	99.51%	99.49%	76.32%	92.76%	99.48%	98.21%	98.84%
Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
%age blocked calls		0.49%	0.51%	23.68%	7.24%	0.52%	1.79%	1.16%

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-Consolidated								
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		495190468	492351150	1764253	1313746698	64700344	238005027	11918206
Total number of calls dropped		9232427	6239522	31026	431743127	950388	1633800	71384
Call drop rate	≤ 2%	1.87%	1.27%	1.80%	2.12%	1.47%	0.69%	0.60%
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		22315	29346	2061	11879	10575	14121	25803
Total number of cells having more than 3% TCH		3813	354	211	554	174	16	693
Worst affected cells having more than 3% TCH	≤ 3%	17.09%	1.21%	10.24%	4.66%	1.65%	0.12%	2.69%

Live measurement results for Call drop rate and for number of cells having more than 3% TCH-Consolidated								
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		549222382	48050597	174710	145904520	79258500	160499681	6000227
Total number of calls dropped		8202390	593730	13156	45261220	850801	1028744	32930
Call drop rate	≤ 2%	1.49%	1.24%	7.66%	2.57%	1.07%	0.65%	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		22224	29225	2061	11879	10407	14121	25803
Total number of cells having more than 3% TCH		3754	346	145	826	156	16	677
Worst affected cells having more than 3% TCH	≤ 3%	16.89%	1.18%	7.04%	6.95%	1.50%	0.12%	2.62%

Drive test results for Call drop rate (Average of three drive tests)-Consolidated								
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		1715	1675	1900	1973	1403	1711	1582
Total number of calls dropped		0	0	178	65	3	56	7
Call drop rate	≤ 2%	0.00%	0.00%	8.92%	3.68%	0.20%	3.48%	0.46%

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-Consolidated								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		52222460915	59211715155	134750	141960	8682690661	33735241829	2004694497
Total number of calls with good voice quality		46768744618	58236536906	115094	130961	8299029407	33195914528	1959062042
%age calls with good voice quality	≥ 95%	89.54%	98.35%	83.57%	92.21%	95.57%	98.40%	97.72%

Live measurement results for Voice quality-Consolidated								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		54564419795	5867717932	134740	164735	9002154755	23738113718	1015380304
Total number of calls with good voice quality		49961195483	5772432851	115094	152330	8662630759	23326008244	997123679
%age calls with good voice quality	≥ 95%	91.56%	98.38%	83.57%	92.43%	96.23%	98.29%	98.20%

Drive test results for Voice quality (Average of three drive tests)-Consolidated								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		2675040	2530325	189767	2188431	2247491	1430549	2576304
Total number of calls with good voice quality		2555220	2419018	171340	1907464	2172207	1330694	2446470
%age calls with good voice quality	≥ 95%	95.52%	95.70%	89.42%	87.51%	96.71%	92.32%	94.81%

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-Consolidated								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Average number of working POIs		51	15	0	19	29	23	28
Average No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Average Capacity of all POIs (A) - in erlangs		85416	86483	0	19644	21304	32495	60789900
Average Traffic served for all POIs (B)- in erlangs		55096	32502	0	19353	13360	19121	15411255
Average POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion-Consolidated								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Average number of working POIs		51	15	0	19	29	23	28
Average No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Average Capacity of all POIs (A) - in erlangs		85339	86426	0	19644	21289	32539	5974963
Average Traffic served for all POIs (B)- in erlangs		91393	33008	0	17348	14011	19523	1523957
Average 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

October							
Voice quality	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls	977065	919087	56905	866262	777973	305741	876958
November							
Voice quality	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls	941833	919928	39608	632581	829300	954637	779041
December							
Voice quality	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls	756142	691310	93254	689588	640218	170171	920305

Data Source: Drive test reports submitted by operators to auditors

8.7 METERING AND BILLING CREDIBILITY

Audit Results for Billing performance Postpaid-Consolidated								
Billing Performance	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Metering and billing credibility - Postpaid-(Avg of 3 billing cycles)								
Total bills generated during the period		212130	216701	28908	656979	34172	326809	216441
Total number of bills disputed		42	108	8	22	14	231	1611
Percentage bills disputed (Avg of 3 billing cycles)	≤ 0.1%	0.02%	0.05%	0.03%	0.00%	0.04%	0.07%	0.75%
October								
Total bills generated during the first billing cycle		70218	72327	9702	220190	11298	108592	71442
Total number of bills disputed in first billing cycle		24	59	4	6	6	41	654
Percentage bills disputed (first billing cycle)	≤ 0.1%	0.03%	0.08%	0.04%	0.00%	0.05%	0.04%	0.92%
November								
Total bills generated during the second billing cycle		70530	72128	9657	218748	11403	109383	71529
Total number of bills disputed in second billing cycle		16	40	3	9	7	42	569
Percentage bills disputed (second billing cycle)	≤ 0.1%	0.02%	0.06%	0.03%	0.00%	0.06%	0.04%	0.80%

Data Source: Billing Center of the operators

Billing Performance	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
December								
Total bills generated during the third billing cycle		71382	72246	9549	218041	11471	108834	73470
Total number of bills disputed in third billing cycle		2	9	1	7	1	148	388
Percentage bills disputed (third billing cycle)	≤ 0.1%	0.00%	0.01%	0.01%	0.00%	0.01%	0.14%	0.53%

Metering and billing credibility - Prepaid

Performance prepaid	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of charging complaints		7658	306	16	86	2467	798	5922
Total no of customers served		4067643	4750484	54003	943116	685990	2051910	2959008
Percentage of charging complaints disputed	≤ 0.1%	0.19%	0.01%	0.03%	0.01%	0.36%	0.04%	0.20%

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	Reliance GSM	Vodafone
Total number of billing/charging complaints		7676	341	24	102	2472	896	7370
Total number of complaints resolved in favour of customer		10	134	24	101	1472	802	4739
Total complaints considered invalid		7666	207	0	1	1000	94	2631
Number of complaints resolved in 4 weeks		10	134	24	99	1472	802	4739
Percentage complaints resolved within 4 weeks	98.00%	100.00%	100.00%	100.00%	98.02%	100.00%	100.00%	100.00%
Number of complaints resolved in 6 weeks		10	134	24	101	1472	802	4739
Percentage complaints resolved within 6 weeks	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		3	134	0	98	1472	7083	0
Percentage cases in which credit/waiver was received within 1 week	100.00%	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	Reliance GSM	Vodafone
Total Number of calls made		100	100	Data Not Available	100	100	100	100
Number of cases resolved in 4 weeks		69	76	Data Not Available	54	61	64	64
Percentage cases resolved in four weeks	98.00%	69.00%	76.00%	Data Not Available	54.00%	61.00%	64.00%	64.00%
Number of cases resolved in 6 weeks		89	93	Data Not Available	67	80	80	86
Live calling Percentage cases resolved in 6 weeks	100.00%	89.00%	93.00%	Data Not Available	67.00%	80.00%	80.00%	86.00%

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

8.8 CUSTOMER CARE

Audit results for customer care (IVR) -Consolidated								
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts to customer care for assistance		17849976	NA	8088	1146786	3088180	13165245	9498853
Number of calls getting connected and answered (electronically)		15845670	NA	8088	1121741	3058315	12934518	9494830
Percentage calls getting connected and answered	≥ 95%	88.77%	100.00%	100.00%	97.82%	99.03%	98.25%	99.96%
Total number of call attempts to callecenter during TCBH		1898951	2055140	521	98901	232451	13165245	358941
No. of calls connected and answered successfully during TCBH		1634303	2055138	521	98901	230595	12934518	325109

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	Reliance GSM	Vodafone
Total Number of calls received (3 cycles)		2849880	2655046	2162	490506	807427	2158395	3087646
Total Number of calls answered within 90 seconds (3 cycles)		2588041	2600102	1913	454476	802880	1424950	3087646
Percentage calls answered within 90 seconds (Avg of 3 cycles)	≥ 95%	90.86%	98.01%	87.25%	93.11%	99.45%	66.17%	100.00%

Data Source: Customer Service Center of the operators

October								
Total calls received (Month 1)		1020351	989044	477	218710	277420	614440	1044107
Total calls answered within 90 seconds (Month 1)		912674	960405	381	199529	274785	375736	1044107
% calls answered within 90 seconds (Month 1)	≥ 95%	89.45%	97.10%	79.87%	91.23%	99.05%	61.15%	100.00%
November								
Total calls received (Month 2)		910825	890883	851	175078	257207	801787	1009782
Total calls answered within 90 seconds (Month 2)		827387	871253	757	163172	256587	399412	1009782
% calls answered within 90 seconds (Month 2)	≥ 95%	90.84%	97.80%	88.95%	93.20%	99.76%	49.82%	100.00%
December								
Total calls received (Month 3)		918704	775119	834	96718	272800	742168	1033757
Total calls answered within 90 seconds (Month 3)		847980	768444	775	91775	271508	649802	1033757
% calls answered within 90 seconds (Month 3)	≥ 95%	92.30%	99.14%	92.93%	94.89%	99.53%	87.55%	100.00%

Data Source: Customer Service Center of the operators

Live calling results for customer care (IVR)								
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	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	90	100	99	98	100	100
Percentage calls getting connected and answered	≥ 95%	100.00%	90.00%	100.00%	99.00%	98.00%	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	Reliance GSM	Vodafone
Total Number of calls received		100	100	100	100	100	100	100
Total Number of calls getting connected and answered		100	96	100	70	98	95	100
Percentage calls getting connected and answered within 90secs	≥ 95%	100.00%	96.00%	100.00%	70.00%	98.00%	95.00%	100.00%

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

8.9 TERMINATION / CLOSURE OF SERVICE

Audit results for termination / closure of service-Consolidated								
Termination	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of closure request		818	1283	65	1069	435	443	1226
Number of requests attended within 7 days		813	1283	65	1069	435	443	1226
Percentage cases in which termination done within 7 days	100.00%	99.39%	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	Reliance GSM	Vodafone
Total number of cases requiring refund of deposits		316	127	48	265	66	525	548
Total number of cases where refund was made within 60 days		316	127	44	265	66	525	548
Percentage cases in which refund was receive within 60 days	100.00%	100.00%	100.00%	91.67%	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	Reliance GSM	Vodafone
Eqipped capacity of the network	188983	139681	33750	108000	31021	132000	114605
Total taffic handled in erlang during TCBH	115560	135089	294	19674	18451	56004	96140
Total no. of customers served (as per VLR)	3496562	4577463	65278	1022944	678351	1962863	2900614

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	Reliance GSM	Vodafone
Total Number of calls made	100	100	Data Not Available	100	100	100	100
Number of cases resolved to satisfaction	82	73	Data Not Available	79	67	49	74
Percentage cases resolved in four weeks	82.00%	73.00%	Data Not Available	79.00%	67.00%	49.00%	74.00%

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.

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	Reliance GSM	Vodafone
Total no. of calls made		150	150	150	150	150	150	150
Calls answered in 60 sec		133	141	136	132	129	112	136
% of calls connected in 60 seconds	≥ 95%	88.67%	94.00%	90.67%	88.00%	86.00%	74.67%	90.67%

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.

Level 1 Service No	Category	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
100	I	✔	✔	✔	✔	✔	✔	✔
101	I	✔	✔	✔	✔	✔	✔	✔
102	I	✔	✔		✔	✔	✔	✔
104	I	✔	✔		✔	✔	✔	✔
108	I	✔	✔	✔	✔	✔	✔	✔
181	I							
1033	I							
1056	I							
1063	I		✔					✔
1064	I		✔					
1066	I	✔	✔	✔	✔	✔	✔	✔
1068	I	✔	✔	✔	✔	✔	✔	✔
1070	I	✔	✔	✔	✔	✔	✔	✔
1071	I	✔	✔	✔	✔	✔	✔	✔
1072	I							✔
1073	I							
1077	I				✔	✔		✔
1091	I							
1099	I							
1909	I		✔				✔	✔
1916	I				✔		✔	
1947	I	✔	✔			✔	✔	✔
1950	I	✔		✔		✔		
15100	I				✔		✔	✔
155214	I							

Live calls were made to the active numbers to test the calls answered within 60 seconds. The details of the same have been given below for each operator.

Aircel			
Level 1 service No	Total calls made	Able to connect	Not able to connect
100	15	15	0
101	15	15	0
102	15	15	0
104	15	15	0
1070	15	15	0
1071	15	5	10
1947	15	15	0
108	15	15	0
1098	15	8	7
1950	15	15	0

Airtel			
Level 1 service No	Total calls made	Able to connect	Not able to connect
100	13	13	0
101	13	13	0
102	13	13	0
104	13	13	0
1064	13	13	0
1070	13	13	0
1071	12	7	5
1909	12	12	0
1947	12	12	0
108	12	12	0
1063	12	8	4
1098	12	12	0

BSNL CDMA			
Level 1 service No	Total calls made	Able to connect	Not able to connect
100	22	22	0
101	21	21	0
1070	21	21	0
1071	22	12	10
108	21	21	0
1098	22	18	4
1950	21	21	0

BSNL GSM			
Level 1 service No	Total calls made	Able to connect	Not able to connect
100	13	13	0
101	13	13	0
102	13	9	4
1070	13	13	0
1071	13	9	4
1916	12	8	4
104	12	12	0
108	12	12	0
1077	12	12	0
1098	12	8	4
15100	12	10	2
106X	13	13	0

Idea			
Level 1 service No	Total calls made	Able to connect	Not able to connect
100	14	14	0
101	14	14	0
102	14	14	0
104	13	7	6
1070	14	14	0
1071	12	9	3
1947	13	7	6
108	14	14	0
1077	14	14	0
1098	14	8	6
1950	14	14	0

Reliance GSM			
Level 1 service No	Total calls made	Able to connect	Not able to connect
100	13	13	0
101	13	13	0
102	13	8	5
1070	13	13	0
1071	12	8	4
1909	12	10	2
1916	13	7	6
104	13	13	0
108	12	12	0
1098	12	7	5
1947	12	2	10
15100	12	6	6

Vodafone			
Level 1 service No	Total calls made	Able to connect	Not able to connect
100	11	11	0
101	11	11	0
102	11	11	0
104	11	11	0
1070	11	11	0
1071	10	4	6
1909	10	10	0
1947	12	9	3
108	11	11	0
1063	11	11	0
1072	11	11	0
1077	11	11	0
1098	9	4	5
15100	10	10	0

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 (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
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 – OCTOBER

1. Network Availability

Audit Results for Network Availability- PMR data-October

	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2498	3240	242	1331	1156	1569	2815
Sum of downtime of BTSs in a month (in hours)		106992	4814	31054	25617	4232	3317	13055
BTSs accumulated downtime (not available for service)	≤ 2%	5.76%	0.20%	17.25%	2.59%	0.49%	0.28%	0.62%
Number of BTSs having accumulated downtime >24 hours		733	37	81	68	6	26	42
Worst affected BTSs due to downtime	≤ 2%	29.34%	1.14%	33.47%	5.11%	0.52%	1.66%	1.49%

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

	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2493	3234	242	1331	1156	1569	2815
Sum of downtime of BTSs in a month (in hours)		11223	544	3110	2355	388	293	1411
BTSs accumulated downtime (not available for service)	≤ 2%	6.25%	0.23%	17.85%	2.46%	0.47%	0.26%	0.70%
Number of BTSs having accumulated downtime >24 hours		141	0	13	26	3	26	2
Worst affected BTSs due to downtime	≤ 2%	5.66%	0.00%	5.37%	1.95%	0.26%	1.66%	0.07%

2. Connection Establishment (Accessibility)

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	94.50%	97.79%	98.14%	95.44%	97.90%	98.56%	99.32%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	1.22%	0.46%	NA	0.87%	0.39%	0.09%	0.17%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	3.62%	0.78%	NA	0.96%	1.61%	0.10%	0.68%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	97.71%	97.63%	98.06%	95.55%	99.06%	98.92%	99.69%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.00%	0.70%	NA	0.68%	0.23%	0.02%	0.13%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	1.21%	0.74%	NA	1.66%	0.61%	0.04%	0.31%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		590	599	914	578	510	610	584
Total number of successful calls established		587	597	761	515	510	602	581
CSSR	≥ 95%	99.49%	99.67%	83.26%	89.10%	100.00%	98.69%	99.49%

Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
%age blocked calls		0.51%	0.33%	16.74%	10.90%	0.00%	1.31%	0.51%

3. Connection Maintenance (Retainability)

Audit Results for Call drop rate and for number of cells having more than 3% TCH-October-PMR data								
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		159201044	170447588	554672	487902723	22547810	83660270	4065383
Total number of calls dropped		3177109	2108772	11349	10685069	329351	577344	25401
Call drop rate	≤ 2%	2.00%	1.24%	2.05%	2.19%	1.46%	0.69%	0.62%

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		7390	9745	687	3917	3469	4707	8496
Total number of cells having more than 3% TCH		1280	115	63	196	74	6	230
Worst affected cells having more than 3% TCH	≤ 3%	17.32%	1.18%	9.17%	5.00%	2.13%	0.13%	2.71%

Live measurement results for Call drop rate and for number of cells having more than 3% TCH-October- 3 Day data								
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		178320479	16654134	56991	51415356	26444954	76670189	2037683
Total number of calls dropped		2670195	190875	11091	1398498	278930	458453	11899
Call drop rate	≤ 2%	1.50%	1.15%	19.46%	2.72%	1.05%	0.60%	0.58%

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		7310	9728	687	3917	3469	4707	8496
Total number of cells having more than 3% TCH		1193	94	47	281	62	6	224
Worst affected cells having more than 3% TCH	≤ 3%	16.32%	0.97%	6.84%	7.17%	1.79%	0.13%	2.64%

Drive test results for Call drop rate (Average of three drive tests)-October - Drive Test Data								
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		587	597	761	515	510	602	581
Total number of calls dropped		0	0	113	42	0	12	1
Call drop rate	≤ 2%	0.00%	0.00%	14.85%	8.16%	0.00%	1.99%	0.17%

4. Voice quality

Audit Results for Voice quality -PMR Data-October								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		16685351648	19178726775	63836	58691	2705733735	11456577632	650236972
Total number of calls with good voice quality		14822691432	18853074254	57363	53666	2586533677	11286180526	634461559
%age calls with good voice quality	≥ 95%	88.84%	98.30%	89.86%	91.44%	95.59%	98.51%	97.57%

Live measurement results for Voice quality-3 Day data-October								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		17523881043	1906499693	63826	81466	2878723012	11420745234	336478151
Total number of calls with good voice quality		16010493487	1874967268	57363	75035	2771056591	11217282465	330249031
%age calls with good voice quality	≥ 95%	91.36%	98.35%	89.87%	92.11%	96.26%	98.22%	98.15%

Drive test results for Voice quality (Average of three drive tests) - DT data-October								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		977065	919087	56905	866262	777973	305741	876958
Total number of calls with good voice quality		933410	884968	48744	723750	742041	265601	837685
%age calls with good voice quality	≥ 95%	95.53%	96.29%	85.66%	83.55%	95.38%	86.87%	95.52%

5. POI Congestion

Audit Results for POI Congestion- PMR data-October								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		51	15	0	19	29	23	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		85386	86228	0	19644	20387	33951	61010101
Traffic served for all POIs (B)- in erlangs		53422	32106	0	18799	11172	19164	15485026
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-October								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		51	15	0	19	29	23	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		85155	86051	0	19644	20341	34084	5955779
Traffic served for all POIs (B)- in erlangs		54444	32982	0	16966	12996	20370	1523858
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

10 ANNEXURE – NOVEMBER

1. Network Availability

Audit Results for Network Availability- PMR data-November

	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2512	3257	242	1344	1156	1569	2858
Sum of downtime of BTSs in a month (in hours)		63894	3826	26937	23896	2417	3819	10437
BTSs accumulated downtime (not available for service)	≤ 2%	3.42%	0.16%	14.96%	2.39%	0.28%	0.33%	0.49%
Number of BTSs having accumulated downtime >24 hours		460	24	65	68	6	31	55
Worst affected BTSs due to downtime	≤ 2%	18.31%	0.74%	26.86%	5.06%	0.52%	1.98%	1.92%

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

	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2492	3238	242	1344	1156	1569	2858
Sum of downtime of BTSs in a month (in hours)		6327	188	2035	2423	166	3819	757
BTSs accumulated downtime (not available for service)	≤ 2%	3.53%	0.08%	11.68%	2.50%	0.20%	3.38%	0.37%
Number of BTSs having accumulated downtime >24 hours		75	0	4	24	4	31	3
Worst affected BTSs due to downtime	≤ 2%	3.01%	0.00%	1.65%	1.79%	0.35%	1.98%	0.10%

2. Connection Establishment (Accessibility)

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	95.26%	97.96%	98.65%	95.61%	98.23%	98.52%	99.46%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.89%	0.23%	NA	0.75%	0.08%	0.03%	0.14%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	2.74%	0.89%	NA	1.01%	1.38%	0.08%	0.54%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	97.86%	97.92%	98.51%	95.38%	99.33%	98.54%	99.66%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.01%	0.25%	NA	0.56%	0.09%	0.03%	0.08%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	0.01%	0.92%	NA	2.16%	0.39%	0.09%	0.34%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		637	609	958	1072	498	613	508
Total number of successful calls established		636	603	501	1001	494	600	497
CSSR	≥ 95%	99.84%	99.01%	52.30%	93.38%	99.20%	97.88%	97.83%

Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
%age blocked calls		0.16%	0.99%	47.70%	6.62%	0.80%	2.12%	2.17%

3. Connection Maintenance (Retainability)

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		166878750	158071572	705298	404777440	21155464	78768350	4051837
Total number of calls dropped		3131514	2094996	9750	8581281	300978	540565	23784
Call drop rate	≤ 2%	1.88%	1.33%	1.38%	2.12%	1.42%	0.69%	0.59%

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		7414	9796	687	3981	3469	4707	8626
Total number of cells having more than 3% TCH		1317	128	79	180	51	5	232
Worst affected cells having more than 3% TCH	≤ 3%	17.76%	1.31%	11.50%	4.52%	1.47%	0.11%	2.69%

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		182552307	15993463	62976	51007937	26221570	8253085	1989968
Total number of calls dropped		2727977	214903	1126	1377215	274218	54400	10579
Call drop rate	≤ 2%	1.49%	1.34%	1.79%	2.70%	1.05%	0.66%	0.53%

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		7401	9705	687	3981	3469	4707	8626
Total number of cells having more than 3% TCH		1312	143	50	278	52	5	226

Worst affected cells having more than 3% TCH	≤ 3%	17.73%	1.47%	7.28%	6.98%	1.50%	0.11%	2.62%

Drive test results for Call drop rate (Average of three drive tests)-November - Drive Test Data								
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		636	603	501	1001	494	600	497
Total number of calls dropped		0	0	40	18	3	7	6
Call drop rate	≤ 2%	0.00%	0.00%	7.98%	1.80%	0.61%	1.17%	1.21%

4. Voice quality

Audit Results for Voice quality -PMR Data-November								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		17635423078	19536422040	39608	36329	3075294098	11117555187	674268372
Total number of calls with good voice quality		15815817954	19216390462	35211	32984	2948120397	10938332511	658655486
%age calls with good voice quality	≥ 95%	89.68%	98.36%	88.90%	90.79%	95.86%	98.39%	97.68%

Live measurement results for Voice quality-3 Day data-November								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		18434602228	1996541701	39608	36329	3020023188	1156259474	342079923
Total number of calls with good voice quality		16888216435	1963797766	35211	32984	2913794603	1137324288	335608816
%age calls with good voice quality	≥ 95%	91.61%	98.36%	88.90%	90.79%	96.48%	98.36%	98.11%

Drive test results for Voice quality (Average of three drive tests) - DT data-November								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		941833	919928	39608	632581	829300	954637	779041
Total number of calls with good voice quality		899450	865018	35211	559896	803710	902513	716032
%age calls with good voice quality	≥ 95%	95.50%	94.03%	88.90%	88.51%	96.91%	94.54%	91.91%

5. POI Congestion

Audit Results for POI Congestion- PMR data-November								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		50	15	0	19	29	23	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		85457	86613	0	19644	21746	31757	59611887
Traffic served for all POIs (B)- in erlangs		56849	32728	0	19586	13983	19282	15055265
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-November								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		51	15	0	19	29	23	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		85457	86609	0	19644	21746	31757	5977954
Traffic served for all POIs (B)- in erlangs		55263	33235	0	17747	14508	19282	1521369
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

11 ANNEXURE – DECEMBER

1. Network Availability

Audit Results for Network Availability- PMR data-December

	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2546	3259	242	1344	1212	1569	2882
Sum of downtime of BTSs in a month (in hours)		66129	2820	22761	24756	5761	3477	11761
BTSs accumulated downtime (not available for service)	≤ 2%	3.49%	0.12%	12.64%	2.48%	0.64%	0.30%	0.55%
Number of BTSs having accumulated downtime >24 hours		457	19	52	67	6	27	39
Worst affected BTSs due to downtime	≤ 2%	17.95%	0.58%	21.49%	4.99%	0.50%	1.72%	1.35%

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

	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2546	3256	242	1344	1156	1569	2882
Sum of downtime of BTSs in a month (in hours)		6375	229	2578	2257	495	3477	1028
BTSs accumulated downtime (not available for service)	≤ 2%	0.34%	0.10%	14.80%	2.33%	0.59%	0.30%	0.50%
Number of BTSs having accumulated downtime >24 hours		73	0	4	21	6	27	9
Worst affected BTSs due to downtime	≤ 2%	2.87%	0.00%	1.65%	1.56%	0.52%	1.72%	0.31%

2. Connection Establishment (Accessibility)

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-December								
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	95.69%	97.74%	98.12%	95.82%	98.25%	98.60%	99.60%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.84%	0.29%	NA	0.98%	0.16%	0.02%	0.11%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	2.29%	1.00%	NA	0.85%	1.35%	0.07%	0.40%

Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-December								
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	97.92%	97.88%	98.27%	92.66%	99.27%	98.60%	99.79%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.30%	0.21%	NA	0.39%	0.18%	0.02%	0.07%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	0.84%	0.97%	NA	1.62%	0.45%	0.07%	0.21%

Drive test results for CSSR (Average of three drive tests) and blocked calls-December- Drive Test Data								
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		496	476	683	477	402	516	504
Total number of successful calls established		492	475	638	457	399	506	500
CSSR	≥ 95%	99.19%	99.79%	93.41%	95.81%	99.25%	98.06%	99.21%

Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
%age blocked calls		0.81%	0.21%	6.59%	4.19%	0.75%	1.94%	0.79%

3. Connection Maintenance (Retainability)

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		169110674	163831990	504283	421066535	20997070	75576407	3800986
Total number of calls dropped		2923804	2035754	9927	412476777	320059	515891	22199
Call drop rate	≤ 2%	1.73%	1.24%	1.97%	2.04%	1.52%	0.68%	0.58%

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		7511	9805	687	3981	3637	4707	8681
Total number of cells having more than 3% TCH		1216	111	69	178	49	5	231
Worst affected cells having more than 3% TCH	≤ 3%	16.19%	1.13%	10.04%	4.47%	1.35%	0.11%	2.66%

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		188349596	15403000	54743	43481227	26591976	75576407	1972576
Total number of calls dropped		2804218	187952	939	42485507	297653	515891	10452
Call drop rate	≤ 2%	1.49%	1.22%	1.72%	2.29%	1.12%	0.68%	0.53%

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		7513	9792	687	3981	3469	4707	8681
Total number of cells having more than 3% TCH		1249	109	48	267	42	5	227

Worst affected cells having more than 3% TCH	≤ 3%	16.62%	1.11%	6.99%	6.71%	1.21%	0.11%	2.61%

Drive test results for Call drop rate (Average of three drive tests)-December - Drive Test Data

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		492	475	638	457	399	509	504
Total number of calls dropped		0	0	25	5	0	37	0
Call drop rate	≤ 2%	0.00%	0.00%	3.92%	1.09%	0.00%	7.27%	0.00%

4. Voice quality

Audit Results for Voice quality -PMR Data-December

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		17901686189	20496566340	31306	46940	2901662828	11161109010	680189153
Total number of calls with good voice quality		16130235232	20167072190	22520	44311	2764375333	10971401491	665944997
%age calls with good voice quality	≥ 95%	90.10%	98.39%	71.94%	94.40%	95.27%	98.30%	97.91%

Live measurement results for Voice quality-3 Day data-December

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		18605936524	1964676538	31306	46940	3103408555	11161109010	336822230
Total number of calls with good voice quality		17062485561	1933667817	22520	44311	2977779565	10971401491	331265832
%age calls with good voice quality	≥ 95%	91.70%	98.42%	71.94%	94.40%	95.95%	98.30%	98.35%

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

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		756142	691310	93254	689588	640218	170171	920305
Total number of calls with good voice quality		722360	669032	87385	623818	626456	162580	892753
%age calls with good voice quality	≥ 95%	95.53%	96.78%	93.71%	90.46%	97.85%	95.54%	97.01%

5. POI Congestion

Audit Results for POI Congestion- PMR data-December								
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		85404	86608	0	19643	21780	31776	61747713
Traffic served for all POIs (B)- in erlangs		55016	32672	0	19674	14924	18916	15693473
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-December								
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		85404	86617	0	19643	21780	31776	5991156
Traffic served for all POIs (B)- in erlangs		164473	32806	0	17331	14529	18916	1526644
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. OND'14 – Refers to the quarter of October, November and December 2014
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

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